Project Manual

October 8, 2026

Delaware Technical Community College
George Campus
Main Entrance Renovations
DTCC-C9004040007

TEVEBAUGH ARCHITECTURE

Two Mill Road, Suite 210 Wilmington, DE 19805

EDiS Company
110 South Poplar Street, Suite 400
Wilmington, DE 19801

SECTION 000107 – SEALS PAGE

DESIGN PROFESSIONALS OF RECORD

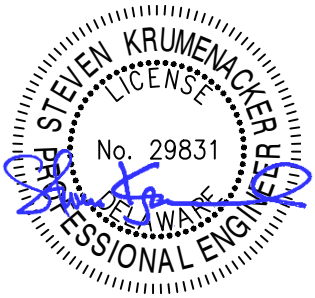
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DE License No.: 13559



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SUBMISSIONS:
1. For Bid 10.08.2026

PROJECT TEAM

Initials	Name	Role
DTCC	Del Tech Community College	Owner
TA	Tevebaugh Architecture	Architect
VER	Verdantas	Civil Engineer
DCI	DCI Engineers	Structural Engineer
DEDC	DEDC, LLC	MEP Engineer
EDiS	EDiS Company	Construction Manager

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All drawings for the George Campus Main Entrance Renovations as listed on drawing CS001 of the George Campus Main Entrance Renovations drawing set are hereby made a part of this Contract.

SHEET NO.	SHEET NAME
GENERAL	
CS001	COVER SHEET
CIVIL	
C-001	INDEX SHEET
C-101	EXISITNG CONDITIONS PLAN / DEMOLITION PLAN
C-201	SITE PLAN
C-301	LINES & GRADES PLAN
C-501	EROSION & SEDIMENT CONTROL PLAN
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A203 BUILDING ELEVATIONS – ALTERNATE
A301 BUILDING SECTIONS

A302 BUILDING SECTIONS
A310 WALL SECTIONS & DETAILS
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M600 MECHANICAL – SCHEDULES

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ELECTRICAL

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E001 ELECTRICAL SYMBOLS AND ABBREVIATIONS
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E801 ELECTRCIAL SCHEDULES

END OF SECTION

SECTION 001116 - INVITATION TO BID

RECEIPT OF BIDS:

Public notice is hereby given that sealed bids for the following prime contracts will be received for the construction of DTCC C9004040007 George Campus Main Entrance Renovations located in Wilmington, Delaware. Bids will be received at the **Delaware Tech, George Campus entrance, 300 North Orange Street, Wilmington DE 19801** until 2:00pm local time on January 7th, 2027, at which time they will be publicly opened and read aloud. ***Bidders bear the risk of late delivery. Any bids received after the stated time will be returned unopened.*** The time and location of the bid opening may be extended with a minimum of two calendar day notice to the Bidders.

A-01	Sitework
A-02	Selective Demolition
A-03	Concrete
A-04	Masonry
A-05	Structural Steel & Miscellaneous Metals
A-06	Carpentry & General Works
A-07	Roofing
A-08	Metal Panels
A-09	Cold Form Metal Framing & Drywall
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A-15	Casework & Millwork
A-16	Fire Protection Systems
A-17	HVAC & Plumbing
A-18	Electrical & Special Systems
A-19	Building ATC Systems
A-20	Testing, Adjusting & Balancing

BIDDING DOCUMENTS:

1. It is the responsibility of each bidder to review and coordinate all Project Documents. This includes plans, specifications, and addendums.
2. Bid documents will be available on the EDiS FTP site. To obtain access to the FTP site, please submit your request via email to Jessica dePolo, jdepolo@ediscompany.com. Your request should include the following information: your company name, contact name, contracts you are bidding, email address, and phone number. Upon receipt of this information, instructions detailing how to access the bid documents on the FTP site will be emailed to you.

ADDENDA:

Addenda for the project will be issued from the Construction Manger's office to those Subcontractors who have received bidding documents. Addenda may be examined at the same locations that the bidding documents may be examined.

PRE-BID MEETING:

A pre-bid meeting will be held at the Delaware Tech, George Campus entrance, 300 North Orange Street, Wilmington DE 19801 on December 2nd, 2026, at 2:00pm local time. A site visit will be conducted immediately following the pre-bid meeting. A second site visit will be conducted on December 9th, 2026 at 2:00pm.These site visits will be the only opportunities for the bidders to visit the existing building and review existing conditions affecting the work. Attendance is **mandatory**.

QUESTIONS:

Questions regarding the project should be directed to the attention of EDiS Company, Roger Tighe at rtighe@ediscompany.com ***281-967-1386*** with questions.

Conformance to the Delaware Architectural Accessibility Act and the standards of the Architectural Accessibility Board is required on the Project.

Prevailing Wage Rates
Prevailing Wage Rates, as directed by Delaware Law, must be adhered to where applicable.

Pursuant to the Office of Management and Budget (OMB) "4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects" required that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds implement a Mandatory Drug Testing Program. The latest regulation can be downloaded from the following website:

http://regulations.delaware.gov/AdminCode/title19/4000/4100/4104.pdf

Drug Testing Requirements

Pursuant to the Office of Management and Budget (OMB) "4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects" required that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds implement a Mandatory Drug Testing Program. The latest regulation can be downloaded from the following website: http://regulations.delaware.gov/AdminCode/title19/4000/4100/4104.pdf

Craft Training for Public Works Procurement

In accordance with Delaware Code, Title 29, Chapter 69, Section 6962A, requires: A public works contract must include a requirement that the contractor provide craft training for journeyman and apprentice levels if all of the following apply:

A. The project requires prevailing wages and,
B. The contractor or subcontractor employs 10 or more people and,
C. It is not a federal highway project, except for the Route 301 project.

The craft training may be provided by any of the following:

A. The contractor, or
B. The subcontractor, or
C. A program registered pursuant under Section 1101-4.0 of Title 19 of the Delaware Administrative Code.

Subsection 6902 defines "Craft Training" as "an apprenticeship program approved by and registered with any state apprenticeship agency or the United States Department of Labor. The Secretary of the Department of Labor shall maintain a list of crafts for which there are approved and registered training programs."

DELAWARE'S CONTRACTOR REGISTRATION ACT IS EFFECTIVE JULY 1, 2021
https://labor.delaware.gov/divisions/industrial-affairs/labor-law/contractor-registration-act/

END OF SECTION

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INSTRUCTIONS TO BIDDERS

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8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE 1: GENERAL

1.1 DEFINITIONS

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

1.2 STATE: The State of Delaware.

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

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

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

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

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

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

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

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

1.11 BIDDER OR VENDOR: A person or entity who formally submits a Bid for the material or Work contemplated, acting directly or through a duly authorized representative who meets the requirements set forth in the Bidding Documents.

1.12 SUB-BIDDER: A person or entity who submits a Bid to a Bidder for materials or labor, or both for a portion of the Work.

1.13 BID: A complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

1.14 BASE BID: The sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).

1.15 ALTERNATE BID (or ALTERNATE): An amount stated in the Bid, where applicable, to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents is accepted.

1.16 UNIT PRICE: An amount stated in the Bid, where applicable, as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

1.17 SURETY: The corporate body which is bound with and for the Contract, or which is liable, and which engages to be responsible for the Contractor's payments of all debts pertaining to and for his acceptable performance of the Work for which he has contracted.

1.18 BIDDER'S DEPOSIT: The security designated in the Bid to be furnished by the Bidder as a guaranty of good faith to enter into a contract with the Agency if the Work to be performed or the material or equipment to be furnished is awarded to him.

1.19 CONTRACT: The written agreement covering the furnishing and delivery of material or work to be performed.

1.20 CONTRACTOR: Any individual, firm or corporation with whom a contract is made by the Agency.

1.21 SUBCONTRACTOR: An individual, partnership or corporation which has a direct contract with a contractor to furnish labor and materials at the job site, or to perform construction labor and furnish material in connection with such labor at the job site.

1.22 CONTRACT BOND: The approved form of security furnished by the contractor and his surety as a guaranty of good faith on the part of the contractor to execute the work in accordance with the terms of the contract.

1.23 CUSTOM FABRICATION: As defined in 29 Del. C. § 6902, the term “custom fabrication” means the offsite fabrication, assembly, or other production of non-standard goods or materials, including components, fixtures or parts thereof, specifically for a public works project. Such goods and materials shall include those used in the following trades or systems: (1) Plumbing or pipe fitting systems, including heating, ventilating, air-conditioning, refrigeration systems, sheet metal or other duct systems; (2) Electrical systems; (3) Mechanical insulation work; (4) Ornamental iron work; and (5) Commercial signage that does not attempt or appear to direct the movement of traffic on highways or roadways or interfere with, imitate, or resemble any official traffic sign, signal or device.

ARTICLE 2: BIDDER'S REPRESENTATION

2.1 PRE-BID MEETING

2.1.1 A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is a pre-requisite for submitting a Bid, unless this requirement is specifically waived elsewhere in the Bid Documents.

2.2 By submitting a Bid, the Bidder represents that:

2.2.1 The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.

2.2.2 The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

2.2.3 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception.

2.2.4 Bidder has accounted for the possibility of price increases due to the direct and indirect effect of tariffs, other international events, inflation, and supply chain interruptions. Change Orders will be denied if they are based upon any of these events. Bidder is expected to account for these possibilities and include them in the bid.

2.3 JOINT VENTURE REQUIREMENTS

2.3.1 For Public Works Contracts, each Joint Venturer shall be qualified and capable to complete the Work with their own forces.

2.3.2 Included with the Bid submission, and as a requirement to bid, a copy of the executed Joint Venture Agreement shall be submitted and signed by all Joint Venturers involved.

2.3.3 All required Bid Bonds, Performance Bonds, Material and Labor Payment Bonds must be executed by both Joint Venturers and be placed in both of their names.

2.3.4 All required insurance certificates shall name both Joint Venturers.

2.3.5 Both Joint Venturers shall sign the Bid Form.

2.3.6 Both Joint Venturers shall include their Federal E.I. Number with the Bid.

2.3.7 In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.

2.3.8 Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.

2.4 ASSIGNMENT OF ANTITRUST CLAIMS

2.4.1 As consideration for the award and execution by the Owner of this contract, the Contractor hereby grants, conveys, sells, assigns and transfers to the State of Delaware all of its right, title and interests in and to all known or unknown causes of action it presently has or may now or hereafter acquire under the antitrust laws of the United States and the State of Delaware, relating to the particular goods or services purchased or acquired by the Owner pursuant to this contract.

ARTICLE 3: BIDDING DOCUMENTS

3.1 COPIES OF BID DOCUMENTS

3.1.1 Bidders may obtain complete sets of the Bidding Documents from the Architectural/Engineering firm designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein.

3.1.2 Bidders shall use complete sets of Bidding Documents for preparation of Bids. The issuing Agency nor the Architect assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.1.3 Any errors, inconsistencies or omissions discovered shall be reported to the Architect immediately.

3.1.4 The Agency and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.

3.2.2 Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to the date for receipt of Bids. Interpretations, corrections and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.

3.2.3 The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.

3.2.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

3.2.5 The Owner will bear the costs for all impact and user fees associated with the project.

3.3 SUBSTITUTIONS

3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will be considered, providing that the Vendor certifies that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the proposed substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.

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

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

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

3.4 ADDENDA

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

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

3.4.3 No Addenda will be issued later than 2 calendar days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which extends the time or changes the location for the opening of bids.

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

ARTICLE 4: BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

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

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

4.1.3 Execute all blanks on the Bid Form.

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

4.1.5 BID ALL REQUESTED ALTERNATES AND UNIT PRICES, IF ANY. If there is no change in the Base Bid for an Alternate, enter “No Change”. The Contractor is responsible for verifying that they have received all addenda issued during the bidding period. Work required by Addenda shall automatically become part of the Contract.

4.1.6 Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.

4.1.7 Each copy of the Bid shall include the legal name of the Bidder and a statement whether the Bidder is a sole proprietor, a partnership, a corporation, or any legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached, certifying agent's authority to bind the Bidder.

4.1.8 Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.

4.1.9 In the construction of all Public Works projects for the State of Delaware or any agency thereof, preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State.

4.1.10 Each bidder shall include a signed Affidavit for the Bidder certifying compliance with OMB Regulation 4104 - "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects." "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

4.2 BID SECURITY

4.2.1 All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the bidder assigned to the agency, for a sum equal to at least 10% of the bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10% of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the standard OMB form (attached). The bid bond may be an electronic bond and need not be transmitted as a paper document.

4.2.2 The Agency has the right to retain the bid security of Bidders to whom an award is being considered until either a formal contract has been executed and bonds have been furnished or the specified time has elapsed so the Bids may be withdrawn or all Bids have been rejected.

4.2.3 In the event of any successful Bidder refusing or neglecting to execute a formal contract and bond within 20 days of the awarding of the contract, the bid bond or security deposited by the successful bidder shall be forfeited.

4.3 SUBCONTRACTOR LIST

4.3.1 In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, each Bidder shall submit with their Bid a completed List of Sub-Contractors included with the Bid Form. NAME ONLY ONE SUBCONTRACTOR FOR EACH TRADE. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the Bidder will be using to perform the work and provide material for that subcontractor category. Should the Bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the Bidder shall list that third-tier contractor's full name and address (City & State). **If the Bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the Bidder intends to perform the work themselves, the Bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

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

4.4 AFFIDAVIT OF CONTRACTOR QUALIFICATIONS

4.4.1 In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, each Bidder shall submit with their Bid the Affidavit of Contractor Qualifications certifying that the Bidder will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term. After a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

4.5 AFFIDAVIT OF CRAFT TRAINING COMPLIANCE

4.5.1 In accordance with Title 29, Chapter 69, Section 6962(c)(13) of the Delaware Code, contractors and subcontractors must provide craft training for journeyman and apprentice levels if **all** of the following apply:

A. A project meets the prevailing wage requirement under Title 29, Chapter 69, Section 6960 of the Delaware Code.
B. The contractor employs 10 or more total employees.
C. The project is not a federal highway project

Failure to provide required craft training on the project may subject the successful contractor and/or subcontractor(s) to penalties as outlined in Title 29, Chapter 69, Section 6962(c)(13) of the Delaware Code.

Bidders shall submit the Affidavit of Craft Training Compliance prior to contract execution.

4.6 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

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

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

B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

4.7 PREVAILING WAGE REQUIREMENT

4.7.1 Wage Provisions: For renovation and new construction projects whose costs exceed the thresholds contained in Delaware Code, Title 29, Section 6960, the minimum wage rates for various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware.

4.7.2 The employer shall pay all mechanics and labors employed directly upon the site of work, or engaged in custom fabrication work, as that term is defined in Article 1.23 herein and as also as defined in 29 Del. C § 6902 and described in 29 Del. C. § 6960(b), regardless of where the work is performed, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics.

4.7.3 As per 29 Del. C. § 6960(b), the scale of the wages to be paid must be posted by the employer in a prominent and easily accessible place at the site of the work. There may be withheld from the employer so much of accrued payments as may be considered necessary by the Department of Labor to pay laborers and mechanics employed by the employer the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and rates of wages received by such laborers and mechanics to be remitted to the Department of Labor for distribution upon resolution of any claims.

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

4.8 SUBMISSION OF BIDS

4.8.1 Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid.

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

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

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

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

4.8.6 Compliance with Federal Bureau of Investigation rules mandates training for Contractors, Subcontractors, their employees, and custodial workers with access to locations that have access to Criminal Justice Information Services (CJIS). The contract awardee must have fingerprinting and background checks done for all Subcontractors and employees.

4.9 MODIFICATION OR WITHDRAW OF BIDS

4.9.1 Prior to the closing date for receipt of Bids, a Bidder may withdraw a Bid by personal request and by showing proper identification to the Architect. A request for withdraw by letter or fax, if the Architect is notified in writing prior to receipt of fax, is acceptable. A fax directing a

modification in the bid price will render the Bid informal, causing it to be ineligible for consideration of award. Telephone directives for modification of the bid price shall not be permitted and will have no bearing on the submitted proposal in any manner.

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

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

ARTICLE 5: CONSIDERATION OF BIDS

5.1 OPENING/REJECTION OF BIDS

5.1.1 Unless otherwise stated, Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids will be made available to Bidders.

5.1.2 The Agency shall have the right to reject any and all Bids. A Bid not accompanied by a required Bid Security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

5.1.3 If the Bids are rejected, it will be done within thirty (30) calendar days of the Bid opening.

5.2 COMPARISON OF BIDS

5.2.1 After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.

5.2.2 The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.

5.2.3 An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.

5.2.4 The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.

5.2.5 No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).

5.2.6 Bidder must account for the possibility of price increases due to the direct and indirect effect of tariffs or other international events, inflation, and supply chain interruptions. Change Orders will be denied if they are based upon any of these events. Bidder is expected to account for these possibilities and include them in the bid.

5.3 DISQUALIFICATION OF BIDDERS

5.3.1 An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:

A. The Bidder's financial, physical, personnel or other resources including Subcontracts;

B. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;

C. The Bidder's written safety plan;

D. Whether the Bidder is qualified legally to contract with the State;

E. Whether the Bidder supplied all necessary information concerning its responsibility; and,

F. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.

G. Any Bidder who is debarred in another State and/or by the United States Government is also debarred in Delaware.

5.3.2 If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.

5.3.3 In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.

5.3.3.1 More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.

5.3.3.2 Evidence of collusion among Bidders.

5.3.3.3 Unsatisfactory performance record as evidenced by past experience.

5.3.3.4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.

5.3.3.5 If there are any unauthorized additions, interlineation, conditional or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning.

5.3.3.6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.

5.3.3.7 If any exceptions or qualifications of the Bid are noted on the Bid Form.

5.4 ACCEPTANCE OF BID AND AWARD OF CONTRACT

5.4.1 A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.

5.4.2 Per Section 6962(d)(13)a., Title 29, Delaware Code, "The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid. Any public school district and its board shall award public works contracts in accordance with this section's requirements except it shall award the contract within 60 days of the bid opening."

5.4.3 Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.

5.4.4 The Agency shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid, plus accepted Alternates.

5.4.5 The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. The successful Bidder shall provide, at least two business days prior to contract execution, copies of the Employee Drug Testing Program for the Bidder and all listed Subcontractors. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in affect for period of two (2) years after the date of the Certificate of Final Payment.

5.4.6 If the successful Bidder fails to execute the required Contract, Bond and all required information, as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.

5.4.7 Each bidder shall supply with its bid its taxpayer identification number (i.e., federal employer identification number or social security number) and should the vendor be awarded a contract, such vendor shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

5.4.8 The Bid Security shall be returned to the successful Bidder upon the execution of the formal contract. The Bid Securities of unsuccessful bidders shall be returned within thirty (30) calendar days after the opening of the Bids.

ARTICLE 6: POST-BID INFORMATION

6.1 CONTRACTOR'S QUALIFICATION STATEMENT

6.1.1 Bidders to whom an award of a Contract is under consideration shall, if requested by the Agency, submit a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a statement has been previously required and submitted.

6.2 Bidders to whom an award of a Contract has been made must produce their Delaware Business License before the Contract can be executed.

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

7.1.1 The cost of furnishing the required Bonds, that are stipulated in the Bidding Documents, shall be included in the Bid.

7.1.2 If the Bidder is required by the Agency to secure a bond from other than the Bidder's usual sources, changes in cost will be adjusted as provide in the Contract Documents.

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

7.2 TIME OF DELIVERY AND FORM OF BONDS

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

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

7.2.3 The Performance Bond and/or the Payment Bond may be electronic bonds and need not be transmitted as paper documents.

ARTICLE 8: FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

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

END OF SECTION

SECTION 00 21 14 – ADDITIONAL INSTRUCTION TO BIDDERS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. The provisions of Division 00 herein shall govern any conflict between Division 00 and other provisions of this Project Manual.

1.02 QUALIFICATION OF BIDDERS

A. All Contractors shall be a Contractor who holds a license in Wilmington, Delaware and the State of Delaware at the time that bids are taken for this project.

B. All Contractors shall list all their tier subcontracts.

1.03 DEFINITIONS

A. OWNER as defined herein is the Delaware Technical and Community College.

B. TENANT as defined herein is Delaware Technical and Community College.

C. ARCHITECT/ENGINEER as defined wherever in Project Manual is Tevebaugh Architecture, Two Mill Road, Suite 210, Wilmington, DE 19805. Telephone: 302-984-1400 or email jraftery@tevebaugh.com.

D. The Construction Manager (CM) as defined wherever in Project Manual will be EDiS Company 110 South Poplar Street, Wilmington, DE 19801.

1.04 BID FORM

A. All names must be typed or printed below the signature.

B. The Bid shall contain an acknowledgment of receipt of all Addenda by number and date.

1.05 CONTRACT TIME

A. The timing of work to be performed under this contract is critical and set forth in detail in the Contract Documents.

1.06 REPRESENTATION OF BIDDERS

A. Before submitting their Bid, each Bidder shall thoroughly review Contract Documents prior to visiting site, take Contract Documents to site during scheduled building tour, and

thoroughly explore, to any extent necessary, existing conditions as relating to fulfilling the requirements of this Contract.

B. Bidders requiring access to the facility must make prior arrangements and be prepared to identify themselves satisfactorily (picture ID) before obtaining access.

C. If discrepancies are noted between requirements of Contract Documents and existing conditions or ambiguity, inconsistency or error are determined in Contract Documents, Bidder shall so indicate to Architect/Engineer prior to seven (7) days before Bid Date and clarification will be issued in the form of Addenda.

D. The submission of a bid will constitute an incontrovertible representation by the Bidder that they have complied with every requirement of Representation of Bidders Article and that their bid is based upon the contents of the Contract Documents without exception.

1.07 INTERPRETATIONS

A. All questions about the meaning or intent of the Contract Documents or requests for substitutions shall be submitted to the Architect/ Engineer in writing and shall be in Architect/ Engineer's office seven (7) days before Bid Date.

B. Replies will be in the form of numbered and dated Addenda mailed or delivered to all parties recorded by Architect/ Engineer as having received the Contract Documents.

C. Only the contents of formal written Addenda will be binding. Oral or other interpretations or clarifications will be without legal validity.

D. Prior to submitting their bid, each Bidder shall ascertain that they have received all Addenda issued and shall acknowledge receipt in their bid.

1.08 SUBSTITUTIONS

A. Bids shall be submitted only on the basis of materials, products or equipment specified in the specifications, on the drawings, or as named by Addendum issued prior to bid date and pursuant to requests for approval.

B. Materials, products or equipment specified in these specifications or on the drawings, are specified for the purpose of establishing a standard of quality, cost, design and function. It is not the intent to limit the acceptance of materials, products or equipment specified but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or approved substitute" or "or equivalent equal", they shall be subject to equals only as approved by the Architect/ Engineer prior to the date for receipt of bids.

C. No substitutions shall be considered unless written requests are submitted to the Architect / Engineer for approval ten (10) days prior to the date for receipt of bids. Such requests shall be from a Prime Contractor and shall include a complete description of the proposed substitute, documentary proof of equal or superior quality, drawings or catalog cuts clearly marking the models or lines, sample of materials, performance and test data, jobs completed locally within the past five years and any other data or information necessary for a complete evaluation.

D. Approved substitutions will be set forth by Addenda to alert all bidders.

E. The contract documents have been prepared to provide for the incorporation of at least one of the specified items or assemblies of every category of materials, products or pieces of equipment. In the event that incorporation of a substituted item or assembly into the work will require revisions or additions to the contractual requirements of the Prime Contractor or any of their Sub-Contractors, the Prime Contractor or Sub-Contractor electing to use such item or assembly shall bear the cost of such revisions or additions to the work of all trades at no change in the contract sum.

F. If no prospective bidder has elected to obtain approval by the means described above, the Owner has no obligation, after award of contract, to consider any brand other than those named in the contract documents.

G. A substitution submitted by a Contractor or Sub-Contractor after the award of contract, for reason that a product is not available will not be permitted unless proof is submitted that a firm order was placed within 30 days after Notice of Award to the Prime Contractor. If an order was placed as stated, and the product is not available, the Contractor shall have the substitute product approved by the Owner and Architect/Engineer.

1.09 WAGE RATES

A. The schedule of prevailing wage rates is included in the Contract Documents under Section 00 73 43.

1.10 START OF WORK

A. The time of completion of this Contract has been established on the basis that the Contractor shall start work within ten (10) days following receipt of an official State of Delaware Purchase Order and it is agreed that work shall accordingly be commenced on that day.

1.11 TABLES OF CONTENTS

A. TABLE OF CONTENTS are included with this Project Manual for reference only and are not part thereof.

B. The Architect/ Engineer does not guarantee the accuracy of the Table of Contents or the inclusion or exclusion of any category of the work.

C. In case of discrepancy between Table of Contents and the documents bound herein, the bound documents will govern.

1.12 COST OF CONTRACT DOCUMENTS

A. Refer to ADVERTISEMENT FOR BIDS herein.

END OF
SECTION

SECTION 003132 – GEOTECHNICAL DATA

1. GENERAL

A. Owner's Disclaimer

1. Site Information: Data on subsurface conditions are made available in the Bidding Documents as a convenience to Bidders and the Contractor. They are not intended as representations or warrants of continuity of such conditions between soil borings. It shall be expressly understood that the Owner will not be responsible for interpretations or conclusions drawn there from by the Contractor. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner, provided such operations are acceptable to the Architect and Construction Manager.

B. UTILITY LOCATION DATA - TBD

END OF SECTION

Contract No. A-01: Sitework

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES: ***FINAL LIST TO BE DETERMINED***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for rock excavation as specified in excavation section.	_____	_____	_____	_____
2.	Price per cubic yard for earth excavation as specified in excavation section.	_____	_____	_____	_____
3.	Price per cubic yard for earth excavation by hand.	_____	_____	_____	_____
4.	Price per cubic yard for earth fill required to replace rock excavation.	_____	_____	_____	_____
5.	Additional mass concrete in footings.	_____	_____	_____	_____
6.	Price per cubic yard for concrete in foundation walls (including forms and reinforcement).	_____	_____	_____	_____
7.	Price per cubic yard for reinforced concrete on grade	_____	_____	_____	_____
8.	Price per cubic yard for reinforced concrete (including forms) for structural slabs above grade.	_____	_____	_____	_____
9.	Unit price for resilient tile.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of A-01 Sitework have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-02 Selective Demolition

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

ALTERNATES ***TO BE DETERMINED***

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERMINED***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for rock excavation as specified in excavation section.	_____	_____	_____	_____
2.	Price per cubic yard for earth excavation as specified in excavation section.	_____	_____	_____	_____
3.	Price per cubic yard for earth excavation by hand.	_____	_____	_____	_____
4.	Price per cubic yard for earth fill required to replace rock excavation.	_____	_____	_____	_____
5.	Additional mass concrete in footings.	_____	_____	_____	_____
6.	Price per cubic yard for concrete in foundation walls (including forms and reinforcement).	_____	_____	_____	_____
7.	Price per cubic yard for reinforced concrete on grade	_____	_____	_____	_____
8.	Price per cubic yard for reinforced concrete (including forms) for structural slabs above grade.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of A-02 Selective Demo have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract A-03 Concrete

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

ALTERNATES ***- TO BE DETERMINED***

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERMINED***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for rock excavation as specified in excavation section.	_____	_____	_____	_____
2.	Price per cubic yard for earth excavation as specified in excavation section.	_____	_____	_____	_____
3.	Price per cubic yard for earth excavation by hand.	_____	_____	_____	_____
4.	Price per cubic yard for earth fill required to replace rock excavation.	_____	_____	_____	_____
5.	Additional mass concrete in footings.	_____	_____	_____	_____
6.	Price per cubic yard for concrete in foundation walls (including forms and reinforcement).	_____	_____	_____	_____
7.	Price per cubic yard for reinforced concrete on grade	_____	_____	_____	_____
8.	Price per cubic yard for reinforced concrete (including forms) for structural slabs above grade.	_____	_____	_____	_____
9.	Unit price for concrete.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-03 Concrete*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-04 Masonry

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

ALTERNATES ***- TO BE DETERMINED***

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERMINED***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for grouting.	_____	_____	_____	_____
2.	Unit price for Masonry.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-04 Masonry*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____ _____
Title

_____
Name of Surety

Witness_____ _____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. 5 Structural Steel & Miscellaneous Metals

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERIMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		Add	Deduct	Add	Deduct
1.	Header plates .	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-05 STRUCTURAL STEEL & MISC. METALS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-06 Carpentry & General Works

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERMINED - SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

				BULK	
		Add	Deduct	Add	Deduct
1.	BACKING AND BLOCKING.	_____	_____	_____	_____
2.	CAPRENTRY LABOR PER HOUR.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-06 CARPENTRY AND GENERAL WORKS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-07 Roofing

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***FINAL LIST TO BE DETERMINED - SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

				BULK	
		Add	Deduct	Add	Deduct
1.	ROOFING INSTALL.	_____	_____	_____	_____
2.	UNIT PRICING FOR BLOCKING.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-07 ROOFING*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-08 Metal Panels

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

				BULK	
		Add	Deduct	Add	Deduct
1.	Price per sf of metal paneling.	_____	_____	_____	_____

2.

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-08 METAL PANELS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-09 Cold Form Metal Framing & Drywall

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

				BULK	
		Add	Deduct	Add	Deduct
1.	Price per square for rock drywall.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-09 COLD FORM METAL FRAMING & DRYWALL*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-10 Glass & Glazing

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(**A copy of Bidder's Delaware Business License must be attached to this form.**)

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

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

$_____ ($_
)

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

Alternate No. 1: Description

Add/Deduct _____($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK			
	Add	Deduct	Add	Deduct	
1. Price per SF glazing.	_____	_____	_____	_____	

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

By _____ Trading as _____

(Individual's / General Partner's / Corporate Name)

_____
(State of Corporation)

Business Address:_____

_____

_____

_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

- Sub-Contractor List
- Non-Collusion Statement
- Bid Bond
- Consent of Surety
- Affidavit of Employee Drug Testing Program
- Affidavit of Contractor Qualifications
- Affidavit of Craft Training Compliance
- Bid Security
- Delaware Business License
- City of Wilmington Contractor's License
- (Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date (***Insert Appropriate Name***)

All the terms and conditions of ***A-10 GLASS & GLAZING*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

_____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-11 Flooring

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

				BULK	
		Add	Deduct	Add	Deduct
1.	Price per SF carpet flooring.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-11 FLOORING*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-12 Terrazzo

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		PATCH	
		Add	Deduct	Add	Deduct
1.	Price per sf for Terrazzo.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-12 TERRAZZO*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-13 Acoustical Ceilings & Wall Panels

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per SF for ceiling tile.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-13 ACCOUSTICAL CEILINGS & WALL PANELS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-14 Painting & Wall Coverings

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		PATCH	
		Add	Deduct	Add	Deduct
1.	Price per square foot painting.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-14 PAINTING & WALL COVERINGS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-15 Casework & Millwork

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETEMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		PATCH	
		Add	Deduct	Add	Deduct
1.	Price per LF for decorative trim.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).
I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____

(Authorized Signature)

(SEAL)

_____

(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-15 CASEWORK & MILLWORK*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-16 Fire Protection Systems

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per linear foot branch line replacement.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).
I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-16 FIRE PROTECTION SYSTEMS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-17 HVAC & Plumbing

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for rock excavation as specified in excavation section.	_____	_____	_____	_____
2.	Price per cubic yard for earth excavation as specified in excavation section.	_____	_____	_____	_____
3.	Price per cubic yard for earth excavation by hand.	_____	_____	_____	_____
4.	Price per cubic yard for earth fill required to replace rock excavation.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address: _____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-17 HVAC & PLUMBING*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-18 Electrical & Special Systems

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per cubic yard for rock excavation as specified in excavation section.	_____	_____	_____	_____
2.	Price per cubic yard for earth excavation as specified in excavation section.	_____	_____	_____	_____
3.	Price per cubic yard for earth excavation by hand.	_____	_____	_____	_____
4.	Price per cubic yard for earth fill required to replace rock excavation.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

By _____ Trading as _____

(Individual's / General Partner's / Corporate Name)

(State of Corporation)

Business Address: _____

_____

_____

_____

Witness: _____ By: _____

(Authorized Signature)

(SEAL)

_____

(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-18 ELECTRICAL & SPECIAL SYSTEMS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-19 Building ATC Systems

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per control point. _____	_____	_____	_____	

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-19 BUILDING ATC SYSTEMS*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

Contract No. A-20 Testing, Adjusting & Balancing

BID FORM

For Bids Due: _____ To: DTCC George Campus
300 North Orange Street
Wilmington, DE 19801

Name of Bidder: _____

Bidder Address: _____

_____

Contact Name: _____ E-Mail Address: _____

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

(Other License Nos.): _____
(A copy of Bidder's Delaware Business License must be attached to this form.)

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

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

$_____ ($_____)

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

Alternate No. 1: Description

Add/Deduct _____ ($_____)

UNIT PRICES ***TO BE DETERMINED. SAMPLE UNIT PRICES ARE SHOWN BELOW.***

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

		BULK		TRENCH	
		Add	Deduct	Add	Deduct
1.	Price per unit for adjustment.	_____	_____	_____	_____

NOTE: The difference in price between Add and Deduct in the above Unit Prices should not exceed fifteen percent (15%).

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

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

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

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

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

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

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

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

_____
(State of Corporation)

Business Address:_____
_____
_____

Witness: _____ By: _____
(Authorized Signature)

(SEAL)

_____
(Title)

Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Bid Bond
Consent of Surety
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Affidavit of Craft Training Compliance
Bid Security
Delaware Business License
City of Wilmington Contractor's License
(Others as Required by Project Manuals)

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	**Subcontractor**	**Address (City & State)**	**Subcontractors tax-payer ID # or Delaware Business license #**
1.				
2.				
3.				
4.				
5.				

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date ***(Insert Appropriate Name)***

All the terms and conditions of ***A-20 TESTING, ADJUSTING & BALANCING*** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE (TYPED): _____

AUTHORIZED REPRESENTATIVE (SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

_____

_____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

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

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

Sealed with _____seal and dated this____day of _____in the year of our Lord two thousand and _____(20__).

SEALED, AND DELIVERED IN THE PRESENCE OF

_____
Name of Bidder (Organization)

Corporate Seal

By:_____
Authorized Signature

Attest _____

_____
Title

_____
Name of Surety

Witness_____

_____

_____
Title

CONSENT OF SURETY

DATE_____

To: *DELAWARE TECHNICAL COMMUNITY COLLEGE*
100 CAMPUS DRIVE
DOVER, DE 19904

Gentlemen:

We, the _____

_____
(Surety Company's Address)

_____

a Surety Company authorized to do business in the State of Delaware hereby agrees that if

_____
(Contractor)

_____
(Address)

_____

is awarded the Contract No. _____

We will write the required Performance and/or Labor and Material Bond required by Paragraph 9 of the Instructions to Bidders.

_____
(Surety Company)

By _____
(Attorney-in-Fact)

AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

Sworn to and Subscribed before me this _____day of_____ 20_____.

My Commission expires _____. NOTARY PUBLIC _____.

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

AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

_____

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

END OF SECTION

SECTION 005200 - AGREEMENT

1. SUMMARY

A. The Agreement Form for this Project is the American Institute of Architects Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, AIA Document A132 – 2019

B. A copy of AIA Document A132 - 2019 Edition is bound into this Project Manual following this page.

1. Under Article 5.1.4.5 add the following:

"Upon completion of the work under the Contract, the Owner may release 60% of the amount then retained. The balance of the amount retained will be held until:

a. All reports required of the Contract are received;
b. All Subcontractors in trades listed on the Bid Form are paid by the Contractor, unless the amount owed to the Subcontractor is disputed, in which case the Owner may withhold 150% of the amount withheld by the Contractor in its dispute with the Subcontractor; and
c. Final payment is authorized by the Owner."

END OF SECTION

DRAFT

AIA® Document A132™ – 2019

Standard Form of Agreement Between Owner and Contractor,
Construction Manager as Adviser Edition

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

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

« »« »
« »
« »
« »

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

« »« »
« »
« »
« »

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

«Blank AIAs»
« »
« »

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

« »« »
« »
« »
« »

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

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

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

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

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™–2019 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.

AIA Document A132™ – 2019. Copyright © 1975, 1980, 1992, 2009, and 2019 by The American Institute of Architects. All rights reserved. The "American Institute of Architects," "AIA," the AIA Logo, and "AIA Contract Documents" are registered trademarks and may not be used without permission. This draft was produced by AIA software at 10:17:50 ET on 12/06/2021 under Order No.3552269513 which expires on 01/17/2022, is not for resale, is licensed for one-time use only, and may only be used in accordance with the AIA Contract Documents® Terms of Service. To report copyright violations, e-mail copyright@aia.org.
User Notes: (861488725)

TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS
EXHIBIT B DETERMINATION OF THE COST OF THE WORK

ARTICLE 1 THE CONTRACT DOCUMENTS

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

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:
(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

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« »

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

Portion of Work	Substantial Completion Date

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:
(Check one of the following boxes and complete the necessary information.)

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

[« »] By the following date: « »

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, 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 one of the following:
(Check the appropriate box.)

[« »] Stipulated Sum, in accordance with Section 4.2 below

[« »] Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below

[« »] Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

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

Item	Price

§ 4.2.2.2 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.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

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Item	Price	Conditions for Acceptance

§ 4.2.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price

§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.3.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

« »

§ 4.3.3 The method of adjustment of the Contractor's Fee for changes in the Work:

« »

§ 4.3.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

« »

§ 4.3.5 Rental rates for Contractor-owned equipment shall not exceed « » percent (« » %) of the standard rental rate paid at the place of the Project.

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.3.7 The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price

§ 4.4.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

« »

§ 4.4.3 The method of adjustment of the Contractor's Fee for changes in the Work:

« »

§ 4.4.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

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« »

§ 4.4.5 Rental rates for Contractor-owned equipment shall not exceed « » percent (« » %) of the standard rental rate paid at the place of the Project.

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.4.7 Guaranteed Maximum Price

§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed « » ($ « »), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

§ 4.4.7.2 Alternates

§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:

Item	Price

§ 4.4.7.2.2 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.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price:
(Identify each allowance.)

Item	Price

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based:
(Identify each assumption.)

« »

§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

« »

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§ 4.6 Other:
(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

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

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 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.

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 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.

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

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

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§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a Guaranteed Maximum Price

§ 5.1.5.1 With each Application for Payment, the Contractor shall submit the cost control information required in Exhibit B, Determination of the Cost of the Work, along with payrolls, petty cash accounts, receipted invoices, or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor, plus payrolls for the period covered by the present Application for Payment, less that portion of the payments attributable to the Contractor's Fee.

§ 5.1.5.2 Applications for Payment shall show the Cost of the Work actually incurred by the Contractor through the end of the period covered by the Application for Payment and for which the Contractor has made or intends to make actual payment prior to the next Application for Payment.

§ 5.1.5.3 In accordance with AIA Document A232-2019 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

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

.1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;

.2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and

.3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work included in Section 5.1.5.3.1.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

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

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;

.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.5.5 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor, and such action shall not be deemed to be a representation that (1) the Construction Manager and Architect have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Article 5 or other supporting data; (2) that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.5.6 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.

§ 5.1.5.7 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

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§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a Guaranteed Maximum Price

§ 5.1.6.1 With each Application for Payment, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 5.1.6.2 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

§ 5.1.6.2.1 The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.6.2.2 The allocation of the Guaranteed Maximum Price under this Section 5.1.6.2 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

§ 5.1.6.2.3 When the Contractor allocates costs from a contingency to another line item in the schedule of values, the Contractor shall submit supporting documentation to the Architect and Construction Manager.

§ 5.1.6.3 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. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed; or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Contractor on account of that portion of the Work and for which the Contractor has made payment or intends to make payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

§ 5.1.6.4 In accordance with AIA Document A232-2019, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

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

.1 That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;

.2 That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and

.4 The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

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

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

.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;

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.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;

.5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and

.6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.6.5 The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.6.6 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.6.7 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.

§ 5.1.6.8 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, 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.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:
(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)

« »

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§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

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

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

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

« »

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

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

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

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

« »

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Article 15 of AIA Document A232–2019.

[« »] Litigation in a court of competent jurisdiction.

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[« »] Other: *(Specify)*

« »

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

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

.1 Take the Cost of the Work incurred by the Contractor to the date of termination;

.2 Add the Contractor's Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232-2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

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§ 7.2.1.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term "profit" shall be understood to mean the Contractor's Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 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)

« »
« »
« »
« »
« »
« »

§ 8.3 The Contractor's representative:

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

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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

« »

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§ 8.7 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

§ 8.8 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

.2 AIA Document A132™–2019, Exhibit A, Insurance and Bonds Exhibit

.3 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document A132™–2019, Exhibit B, Determination of the Cost of the Work

[« »] AIA Document E235™–2019, Sustainable Projects Exhibit, Construction Manager as Adviser Edition, dated as indicated below:
(Insert the date of the E235-2019 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

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Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232–2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DRAFT

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SECTION 00 54 13

SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR A132-2019

The following supplements modify the "Standard Form of Agreement Between Owner and Contractor, Construction Manager as Advisor Edition" AIA Document A132-2019. Where a portion of the Standard Form of Agreement is modified or deleted by the following, the unaltered portions of the Standard Form of Agreement shall remain in effect.

ARTICLE 3: DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

3.1 Delete paragraph 3.1 in its entirety and replace with the following:

"The date of Commencement of the Work shall be a date set forth in a notice to proceed issued by the Owner."

3.3.1 In the space provided, insert "As defined in Article 9.8 of AIA Document A232-2019 and amended by the Owner's 'Supplementary General Conditions A232-2019'"

ARTICLE 4: CONTRACT SUM

4.1 Delete paragraph 4.1 in its entirety and replace with the following:

"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 a Stipulated Sum, in accordance with Section 4.2 below.

4.3 Delete paragraph 4.3 in its entirety.

4.4 Delete paragraph 4.4 in its entirety.

ARTICLE 5: PAYMENTS

5.1 PROGRESS PAYMENTS

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

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

5.1.5 Delete paragraph 5.1.5 in its entirety.

5.1.6 Delete paragraph 5.1.6 in its entirety.

5.2.2 Delete paragraph 5.2.2 in its entirety.

5.3 Insert the interest rate of "1% per month not to exceed 12% per annum."

ARTICLE 6: DISPUTE RESOLUTION

6.2 BINDING DISPUTE RESOLUTION

Check the box “Other” – and add the following sentence:

"Any remedies available in law or in equity."

ARTICLE 7: TERMINATION or SUSPENSION

7.1.1.1 Delete paragraph 7.1.1.1 in its entirety.

7.2 Delete paragraph 7.2 in its entirety.

ARTICLE 8: MISCELLANEOUS PROVISIONS

8.4 Delete paragraph 8.4 in its entirety and replace with the following:

“The Contractor’s representative shall not be changed without ten days written notice to the Owner.”

8.7 Delete paragraph 8.7 in its entirety.

ARTICLE 9: ENUMERATION OF CONTRACT DOCUMENTS

9.1.9 Insert “Supplement to Agreement Between Owner and Contractor A132-2019”

9.1.9 Insert “Supplementary General Conditions A232-2019”

END OF SECTION

SECTION 00 54 14

SUPPLEMENT TO A132-2019 – EXHIBIT A - INSURANCE AND BONDS

The following supplements modify the "Standard Form of Agreement Between Owner and Contractor, *Construction Manager as Adviser Edition*" AIA Document A132-2019 Exhibit A Insurance and Bonds. Where a portion of the Standard Form of Agreement, Exhibit A is modified or deleted by the following, the unaltered portions of the Standard Form of Agreement, Exhibit A shall remain in effect.

ARTICLE A.2 OWNER'S INSURANCE

A.2.1 General

Delete paragraph A.2.1 in its entirety.

A.2.2 Liability Insurance

Delete paragraph A.2.2 in its entirety, except in the case of school projects this paragraph shall remain.

A.2.3 Required Property Insurance

Delete paragraph A.2.3 in its entirety.

A.2.4 Optional Extended Property Insurance

Delete paragraph A.2.4 in its entirety.

A.2.5 Other Optional Insurance

Delete paragraph A.2.5 in its entirety.

ARTICLE A.3 CONTRACTORS INSURANCE AND BONDS

A.3.1.1 Strike the last sentence of the paragraph.

A.3.1.3 Additional Insured Obligations

In the first sentence after "coverage to include (1)" delete "(1) the Owner,".

Strike the remainder of the first sentence beginning at the semicolon "; and (2) the Owner" through the end of the sentence.

Delete the second sentence in its entirety.

A.3.2.2.1 Insert "$1,000,000.00" in the blank for each occurrence.
Insert "$3,000,000.00" in the blank for general aggregate.
Insert "$3,000,000.00" in the blank for aggregate for products-completed operations hazard.

A.3.2.3 Insert "$1,000,000.00" in the blank for per accident.

A.3.2.6 Insert “$500,000.00” in the blank for each accident.
Insert “$500,000.00” in the blank for each employee.
Insert “$500,000.00” in the blank for policy limit.

A.3.2.8 Insert “$1,000,000.00” in the blank for per claim.
Insert “$3,000,000.00” in the blank for in the aggregate.

A.3.2.9 Insert “$1,000,000.00” in the blank for per claim.
Insert “$3,000,000.00” in the blank for in the aggregate.

A.3.2.10 Insert “$2,000,000.00” in the blank for per claim.
Insert “$4,000,000.00” in the blank for in the aggregate.

A.3.2.11 Strike in its entirety.

A.3.2.12 Strike in its entirety.

A.3.3.2.1 Delete paragraph 3.3.2.1 in its entirety

A.3.3.2.2 Strike in its entirety.

A.3.3.2.3 Insert “$1,000,000.00” in the blanks for per claim.
Insert “$3,000,000.00” in the blanks for in the aggregate.

A.3.4 Insert the actual contract price in both the Payment Bond and the Performance Bond Penal Sum blanks. It must be 100% of the contract price.

Strike the last sentence in this section and replace with “Payment and Performance Bonds shall be in the standard form issued by the Delaware Office of Management and Budget.”

END OF SECTION

DRAFT AIA® Document A132® – 2019 Exhibit A

Insurance and Bonds

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

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

Colonial School District
William Penn High School
713 E Basin Road
New Castle DE 19720

THE OWNER:
(Name, legal status, and address)

Colonial School District
318 Basin Rd
New Castle, DE 19720

THE CONTRACTOR:
(Name, legal status, and address)

« »« »
« »

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A232™–2019, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

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.

This document is intended to be used in conjunction with AIA Document A232™–2019, General Conditions of the Contract for Construction. Article 11 of A232™–2019 contains additional insurance provisions

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§ A.2.2 Liability Insurance

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

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to false work and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's, Construction Manager's, and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

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§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[X] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

« »

[X] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

« »

[X] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

« »

[X] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

« »

[X] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

« »

[X] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

« »

[X] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

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[X] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(Indicate applicable limits of coverage or other conditions in the fill point below.)

« »

[X] **§ A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self- insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, and the Construction Manager and the Construction Manager's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Millions Dollars ($ 1,000,000) each occurrence, Three Million Dollars ($ 3,000,000) general aggregate, and Three Million Dollars ($ 3,000,000) aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal injury and advertising injury;

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.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; and

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

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

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

.3 Claims for bodily injury other than to employees of the insured.

.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

.8 Claims related to roofing, if the Work involves roofing.

.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

.10 Claims related to earth subsidence or movement, where the Work involves such hazards.

.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

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

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

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than Five Hundred Thousand Dollars ($ 500,000) each accident, Five Hundred Thousand Dollars ($ 500,000) each employee, and Five Hundred Thousand Dollars ($ 500,000) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than One Million Dollars ($ 1,000,000) per claim and Three Million Dollars ($ 3,000,000) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than One Million Dollars ($ 1,000,000) per claim and Three Million Dollars ($ 3,000,000) in the aggregate.

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§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

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

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.
(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[« »] **§ A.3.3.2.1** If there is only one Contractor performing the Work on the Project, property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« »

[« »] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for Work within fifty (50) feet of railroad property.

[« »] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than « » ($ « ») per claim and « » ($ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[« »] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

[« »] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

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[« »] **§ A.3.3.2.6 Other Insurance**

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

Coverage	Limits

§ A.3.4 Performance Bond and Payment Bond

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

Type	Penal Sum ($0.00)
Payment Bond	« »
Performance Bond	

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« »

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STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

PERFORMANCE BOND

Bond Number: _____

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

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

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

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

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

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

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

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

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

_____ By: _____(SEAL)
Name: Name:
Title:

(Corporate Seal)

SURETY

Name: _____

Witness or Attest: Address: _____

_____ By: _____ (SEAL)
Name: Name:
Title:

(Corporate Seal)

STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

PAYMENT BOND

Bond Number: _____

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

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

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

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

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

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

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

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

_____ By: _____(SEAL)
Name: Name:
Title:

(Corporate Seal)

SURETY

Name: _____

Witness or Attest: Address: _____

_____ By: _____(SEAL)
Name: Name:
Title:

(Corporate Seal)

SECTION 006216 – CERTIFICATE OF INSURANCE

In conjunction with Insurance Requirements AIA General Conditions, Article 11, the Contractor shall be bound by the following limits of liability insurance (for Contracts under this Bid Pac). The Contractor shall use the standard "ACCORD" for titled "Certificate of Insurance" in submitting his liability insurance limits. The required limits to be inserted in accordance with the sample "ACCORD" form in this section:

GENERAL NOTES

1. Other Insurance

    A. Contractor shall carry any necessary insurance required to cover Owned and Rental equipment that may be necessary for them to use in the performance of the Work.

2. Contractor shall have the following additional items added to his required "ACCORD" form Certificate of Insurance:

    A. Name and Address of Insured (Contractor).

    B. Description of Operations/Locations

3. Added Insured – ***Delaware Technical Community College and EDiS Company***

4. Certificate Holder – ***Delaware Technical Community College***

Contractors shall note that although not a part of AIA Document A232 - 2019 Edition, these additional articles apply as noted to this Project.

A sample certificate is bound into the Project Manual immediately following this Document.

END OF SECTION

ACORD — CERTIFICATE OF LIABILITY INSURANCE

Date (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
SAMPLE CERTIFICATE	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID #:	

INSURED	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

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

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
X	**GENERAL LIABILITY**	X	X	XXXXXXX	XX/XX/XXXX	XX/XX/XXXX	EACH OCCURENCE	$1,000,000
	X COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea. occurrence)	$100,000
	[ ] CLAIMS-MADE [X] OCCUR						MED EXP (Any one person)	$10,000
	_____						PERSONAL & ADV INJURY	$1,000,000
	_____						GENERAL AGGREGATE	$2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS – COMP/OP AGG	$2,000,000
	[ ] POLICY [X] PROJECT [ ] LOC							
X	**AUTOMOBILE LIABILITY**	X	X	XXXXXXX	XX/XX/XXXX	XX/XX/XXXX	COMBINED SINGLE LIMIT (Ea. accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	
	ALL OWNED AUTOS						BODILY INJURY (Per accident)	
	SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident)	
	X HIRED AUTOS							
	X NON-OWNED AUTOS							
X	X **UMBRELLA LIAB** [X] OCCUR	X	X	XXXXXXXX	XX/XX/XXXX	XX/XX/XXXX	EACH OCCURRENCE	$5,000,000
	EXCESS LIAB [ ] CLAIMS-MADE						AGGREGATE	$5,000,000
	DEDUCTIBLE						EACH OCCURRENCE	
	RETENTION $						AGGREGATE	
X	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N		X	XXXXXXXX	XX/XX/XXXX	XX/XX/XXXX	X WC STATUTORY LIMITS [ ] OTH-ER	
	ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER / MEMBER EXCLUDED?						E.L. EACH ACCIDENT	$500,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EACH EMPLOYEE	$500,000
							E.L. DISEASE - POLICY LIMIT	$500,000
X	**POLLUTION LIABILITY (For Hazardous material, site excavation/utility, and building envelope subcontractors)**	X	X	XXXXXXXX	XX/XX/XXXX	XX/XX/XXXX	EACH CLAIM	$2,000,000
	X CLAIMS MADE FORM						POLICY AGGREGATE	$2,000,000
X	**PROFESSIONAL LIABILITY (for all Design and Professional Service subcontractors)**			XXXXXXXX	XX/XX/XXXX	XX/XX/XXXX	EACH CLAIM	$2,000,000
	X CLAIMS MADE FORM						POLICY AGGREGATE	$2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project: DTCC George Campus Main Entrance Improvements

Added Insured: Delaware Technical and Community College; EDiS Company, as well as any other party as required by contract are listed as additional insureds under all policies (except Workers Compensation and Professional Liability) for all work performed by the named insured. The General Liability and Umbrella/Excess Liability aggregate shall apply on a per-project basis, and all policies shall be primary and non-contributing with respect to any insurance maintained by the additional insureds. Umbrella policy follows form as respects to Additional Insured status on the CGL, Employers Liability and Automobile Liability policies. A waiver of subrogation applies in favor of the additional insureds under all policies.

➡ ***In addition to the above language, please provide the General Liability, On-going and Completed Operations Additional Insured endorsements with all required additional insureds listed in the Schedule box (if not a blanket policy), the Primary and Non-Contributory Endorsements, and the Waiver of Subrogation endorsements for all policies with all required additional insured entities listed (if not a blanket policy). Provide evidence of no EIFS exclusions, if within scope of work.]*** ⬅

CERTIFICATE HOLDER

Delaware Technical and Community College
300 North Orange Street
Wilmington, DE 19801

CANCELLATION

SHOULD ANY OF THE ABOVE-DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

SAMPLE

Professional Liability and Pollution Insurance Requirements

Contract Number	Contract Name	Professional Liability Insurance	Pollution Insurance
A-01	Sitework	N	Y
A-02	Selective Demolition	N	Y
A-03	Concrete	N	Y
A-04	Masonry	N	Y
A-05	Structural Steel & Miscellaneous Metals	Y	Y
A-06	Carpentry & General Works	Y	Y
A-07	Roofing	Y	Y
A-08	Metal Panels	Y	Y
A-09	Cold Form Metal Framing & Drywall	N	Y
A-10	Glass & Glazing	Y	N
A-11	Flooring	N	N
A-12	Terrazzo	N	Y
A-13	Acoustical Ceilings & Wall Panels	Y	N
A-14	Painting & Wall Coverings	N	Y
A-15	Casework & Millwork	N	Y
A-16	Fire Protection Systems	Y	Y
A-17	HVAC & Plumbing	Y	Y
A-18	Electrical & Special Systems	Y	Y
A-19	Building ATC Systems	Y	N
A-20	Testing, Adjusting & Balancing	N	N

SECTION 007200 – GENERAL CONDITIONS

1. SUMMARY

   A. The General Conditions for this Project are the American Institute of Architects General Conditions of the Contract for Construction, Construction Manager as Advisor Edition, AIA Document A232 - 2019 Edition.

   B. A copy of AIA Document A232 - 2019 Edition is bound into this Project Manual following this page

END OF SECTION

DRAFT

AIA® Document A232™ – 2019

General Conditions of the Contract for Construction,
Construction Manager as Adviser Edition

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

«Blank AIAs»
« »

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

« »« »
« »

THE OWNER:
(Name, legal status, and address)

« »« »
« »

THE ARCHITECT:
(Name, legal status, and address)

« »« »
« »

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.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

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

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

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

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 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.

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

§ 1.1.9 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.

§ 1.1.10 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.

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§ 1.2 Correlation and Intent of the Contract Documents

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

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and 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.

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building

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Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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 Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

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assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 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 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

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

§ 2.3.6 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.

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

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect, and the Construction Manager or 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 Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

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

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where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the 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. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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§ 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 the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

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

§ 3.4.2 Except in the case of minor changes in the Work 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, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

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

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

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or

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(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, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents:

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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§ 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, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 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 Construction Manager's and Architect's approval. The Architect and Construction Manager'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 Construction Manager and 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 participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 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 Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate 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 and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are 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 Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract

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Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, 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 reviewed and 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 Construction Manager and 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 Construction Manager and 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, the Architect, and the Construction Manager 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. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 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 Construction Manager and Architect at the time and in the form specified by the Architect.

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§ 3.13 Use of Site

§ 3.13.1 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.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

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

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, 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, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, 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, Architect, or Construction Manager. 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 through the Construction Manager.

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

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

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and 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, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager 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 other Contractors shall be

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through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 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. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect 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 Construction Manager and 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 Construction Manager and 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.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 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's own forces, Separate Contractors, Construction Manager and other 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's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and 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 or other Contractors' 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 Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces, Separate Contractors, or other Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors 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, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager 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.

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§ 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

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

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

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager 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 Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Construction Manager and Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

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

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager 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.

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

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

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The 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 Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

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

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

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section

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15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all

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Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager 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 Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager 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 Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager'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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation 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, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 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 Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality

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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 Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or 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 or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the 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 or other Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project 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 Construction Manager and Architect.

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

§ 9.6.3 The Construction Manager 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 Owner, Construction Manager and Architect 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

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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, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, 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 list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction

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

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly 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 after consultation with the Construction Manager.

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their 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 Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data

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establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and 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 through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

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

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

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

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. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 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;
- **.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; and
- **.4** construction or operations by the Owner, Separate Contractors, or other Contractors.

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

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

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§ 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, 10.2.1.3 and 10.2.1.4 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, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any 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, Construction Manager 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.

§ 10.3 Hazardous Materials

§ 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, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If 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, the 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.

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

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tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within 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 directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 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.

§ 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

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Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and 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 directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to

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requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or 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 Construction Manager or 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 Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

§ 13.3.2 No action or failure to act by the Owner, 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 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 Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become

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requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and 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 Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and 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's and Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Construction Manager has not certified or 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, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

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

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

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§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons 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, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

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.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

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 the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

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

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

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

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

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

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

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

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

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation

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within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

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

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

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

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

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

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

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

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§ 15.4.4 Consolidation or Joinder

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

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

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

DRAFT

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SECTION 00 73 13

SUPPLEMENTARY GENERAL CONDITIONS A232-2019

The following supplements modify the "General Conditions of the Contract for Construction, Construction Manager as Advisor Edition." AIA Document A232-2019. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ARCHITECT AND CONSTRUCTION MANAGER
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

ARTICLE 1: GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

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

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

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following Paragraphs:

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

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

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

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

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

"All pre-design studies, drawings, specifications and other documents, including those in electronic form, prepared by the Architect under this Agreement are, and shall remain, the property of the Owner whether the Project for which they are made is executed or not. As for the Project for which the Architect is hired, the Architect still remain liable for any claim relating to the design that arises from the Project.

However, such documents may be used by the Owner to construct one or more like projects without the approval of, or additional compensation to, the Architect. The Contractor, Subcontractors, Sub-subcontractors and Material or Equipment Suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or Material and Equipment Supplier on other Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and Architect's consultants.

The Architect shall not be liable for injury or damage resulting from the re-use of drawings and specifications if the Architect is not involved in the re-use Project."

1.6 NOTICE

1.6.1 Insert the following sentence at the end of the paragraph:

"Electronic mail, also known as email, is an acceptable form of electronic transmission of notices under this Agreement."

ARTICLE 2: OWNER

2.1 General

2.1.2 Delete Paragraph 2.1.2 in its entirety.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 Delete the second sentence in this paragraph and replace with the following: "The Contractor shall have no obligation to commence the Work until the Owner issues a Purchase Order for the Project."

2.2.2 Delete the last three sentences in this paragraph.

ARTICLE 3: CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.4 Delete the third sentence in Paragraph 3.2.4.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following Paragraphs:

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

3.3.4 The Contractor must provide suitable storage facilities at the Site, or an alternative site as approved by the Owner, for the proper protection and safe storage of their materials. Consult the Owner and the Architect before storing any materials.

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

3.4 LABOR AND MATERIALS

3.4.1.1 Add a new section 3.4.1.1:

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

Add the Following Paragraphs:

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

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

3.5 WARRANTY

Add the following Paragraphs:

3.5.3 The Contractor will warrant all materials and workmanship against original defects, except injury from proper and usual wear when used for the purpose intended, for two years after Substantial Completion of the project in accordance with Section 9.8.4 of this Agreement, and will maintain all items in condition that conforms with the Contract Documents during the period of warranty.

3.5.4 Non-conforming work during the period of warranty will be corrected by the Contractor at its expense upon demand of the Owner, it being required that the Work conforms to the Contract Documents at the expiration of the warranty period.

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

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

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following Paragraphs:

3.11.1 During the course of the Work, the Contractor shall maintain a record set of drawings on which the Contractor shall mark the actual physical location of all piping, valves, equipment, conduit, outlets, access panels, controls, actuators, including all appurtenances that will be concealed once construction is complete, etc., including all invert elevations.

3.11.2 At the completion of the project, the Contractor shall obtain a set of reproducible drawings from the Architect, and neatly transfer all information outlined in 3.11.1 to provide a complete record of the as-built conditions.

3.11.3 The Contractor shall provide two (2) prints of the as-built conditions, along with the reproducible drawings themselves, to the Owner and one (1) set to the Architect. In addition, attach one complete set to each of the Operating and Maintenance Instructions/Manuals.

3.15 CLEANING UP

3.15.2 Strike sentence in its entirety and replace with the following:

"If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall withhold the amount that reflects the cost of the cleanup from any moneys owed the Contractor. If the cost of cleanup exceeds the moneys owed to the Contractor, the Owner shall be entitled to reimbursement from the Contractor for the amount exceeding what is withheld.

3.17 In the second sentence of 3.17, insert "indemnify and" between "shall" and "hold".

ARTICLE 4: ARCHITECT AND CONSTRUCTION MANAGER

4.2 Administration of the Contract

Delete the first sentence of Paragraph 4.2.11 and replace with the following:

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

Delete the second sentence of Paragraph 4.2.11 and replace with the following:

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

Add the following to Paragraph 4.2.17:

There will be no full-time Project representative provided by the Owner or Architect on site for this Project.

Add to Paragraph 4.2.20 "and in compliance with all applicable codes, regulations and ordinances." to the end of the sentence.

ARTICLE 5: SUBCONTRACTORS

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

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

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

ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

6.1.1 Delete "and waiver of subrogation" from the last sentence.

6.1.3 Delete Paragraph 6.1.3 in its entirety and replace with the following:

"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 Constructor who executes each separate Owner-Contractor Agreement."

6.2 MUTUAL RESPONSIBILITY

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

ARTICLE 7: CHANGES IN THE WORK

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

ARTICLE 8: TIME

8.2 PROGRESS AND COMPLETION

Add the following Paragraphs:

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

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

8.3 DELAYS AND EXTENSION OF TIME

8.3.1 Strike "binding dispute resolution" and insert "remedies at law or in equity".

Add the following Paragraph:

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

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

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

Add the following Paragraph:

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

8.3.5 The parties agree that Paragraph 8.3.3 of the Supplementary General Conditions does not apply to the Construction Manager in the event of a delay caused by a party other than the Construction Manager.

ARTICLE 9: PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.2 Strike Section 9.1.2 in its entirety.

9.2 SCHEDULE OF VALUES

Add the following Paragraphs:

9.2.1 The Schedule of Values shall be submitted using AIA Document G732, Continuation Sheet to G703.

9.3 APPLICATIONS FOR PAYMENT

Add the following Paragraph:

9.3.1.3 Application for Payment shall be submitted on AIA Document G732 "Application and Certificate for Payment", supported by AIA Document G703 "Continuation Sheet". Said Applications shall be fully executed and notarized.

Add the following Paragraphs:

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

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

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following to 9.5.1:

.8 failure to provide a current Progress Schedule;
.9 a lien or attachment is filed;
.10 failure to comply with mandatory requirements for maintaining Record Documents.

9.6 PROGRESS PAYMENTS

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

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

9.6.8 Strike "Provided the Owner has fulfilled its payment obligations under the Contract Documents, the" and replace with "The".

9.7 FAILURE OF PAYMENT

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

9.8 SUBSTANTIAL COMPLETION

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

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following Paragraphs:

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

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

10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Paragraph:

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

situations. Material Safety Data Sheets shall be provided directly to the Owner or its designee, along with the shipping slips that include those products.

10.3 HAZARDOUS MATERIALS

Delete Paragraph 10.3.3 in its entirety.

Delete Paragraphs 10.3.6 in its entirety.

ARTICLE 11: INSURANCE AND BONDS

11.1 CONTRACTOR'S INSURANCE AND BONDS

11.1.1 Strike "Owner," at the beginning of the third sentence.

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

11.2 OWNER'S INSURANCE

Delete Paragraph 11.2 in its entirety and replace with the following:

11.2 The Owner will not provide Builder's All Risk Insurance for the Project. The Construction Manager will provide Builder's All Risk Insurance for the Project. The Contractor and all Subcontractors shall provide coverage for materials, fixtures and/or equipment being used in the construction or renovation of a building or structure should those items sustain physical loss or damage from a covered cause.

11.3 WAIVERS OF SUBROGATION

Delete Paragraph 11.3 and its subparagraphs in their entirety. Substitute the following:
The Construction Manager and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, consultants and employees, each of the other; (2) the Architect and Architect's consultants; (3) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (4) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Article shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property. For clarity, the Owner does not waive any of its subrogation rights.

11.4 LOSS OF USE, BUSINESS INTERRUPTION, AND DELAY IN COMPLETION INSURANCE

Delete Paragraph 11.4 in its entirety.

11.5 ADJUSTMENT AND SETTLEMENT OF INSURED LOSS
Delete Paragraph 11.5 in its entirety. Substitute the following:
A loss insured under the property insurance required by the Agreement shall be adjusted by the Construction Manager and made payable to the Construction Manager. The

Construction Manager shall pay the Architect and Contractor their just shares of insurance proceeds received by the Construction Manager, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner. Prior to settlement of an insured loss, the Construction Manager shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Construction Manager shall settle the loss and the Contractor shall be bound by the settlement and allocation. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Construction Manager may proceed to settle the insured loss, and any dispute between the Construction Manager and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant remedies at law and in equity. For clarity, the Owner shall be listed as an Additional Insured to protect the Owner's property interest on the Project under the Builder's Risk Insurance.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

12.2.2.1 In the first sentence, strike "within one year after the date of Substantial Completion of the Work or designated portion thereof" and replace with "within two years after the date of Substantial Completion of the Project in accordance with Section 9.8.4 of this Agreement or designated portion thereof".

12.2.2.1 In the third sentence of the paragraph, strike "one year period" and replace it with "two year period".

Add the following Paragraph:

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

12.2.2.2 Strike "one" and insert "two".

12.2.2.3 Strike "one" and insert "two".

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

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

13.1 Strike the second sentence in its entirety.

13.5 INTEREST

13.5 Strike 13.5 in its entirety and replace with the following:
"Payments are due 30 days after receipt of a valid Application for Payment. After that 30 day period, interest may be charged at the rate of 1% per month not to exceed 12% per annum."

Add the following Paragraph:

13.6 CONFLICTS WITH FEDERAL STATUTES OR REGULATIONS

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

ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

ARTICLE 15: CLAIMS AND DISPUTES

15.1.2 TIME LIMITS ON CLAIMS.

15.1.2 Strike "in accordance with the requirements of the binding dispute resolution method selected in the Agreement and" from the first sentence.
Strike the second sentence in its entirety.

15.1.4 CONTINUING CONTRACT PERFORMANCE

15.1.4.2 Strike in its entirety.

15.1.7 CLAIMS FOR CONSEQUENTIAL DAMAGES

Delete Paragraph 15.1.7 and its subparagraphs in their entirety.

15.2 INITIAL DECISION

15.2.1 Delete "and binding dispute resolution"

15.2.5 Delete in its entirety and replace with the following:

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

Delete Paragraph 15.2.6 and its subparagraphs in their entirety.

15.3 MEDIATION

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

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

15.3.3 Strike in its entirety.

15.4 ARBITRATION

Delete Paragraph 15.4 and its subparagraphs in their entirety.

END OF SECTION

SECTION 007343 – WAGE RATE REQUIREMENTS

1. SUMMARY

A. In accordance with Delaware Code, Title 29, Subchapter IV, Section 6960, all laborers and mechanics of the Contractor and all subcontractors employed to perform work directly upon the site of the work shall be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account the full amounts accrued at the time of payment computed at wage rates not less than those determined by the Division of Industrial Affairs, Department of Labor, State of Delaware, as the prevailing rates in this area.

B. This approved scale of wages must be posted by the Contractor in a prominent and easily accessible place at the site of the work.

C. It is further stipulated that there may be withheld from the Contractor such accrued payment as may be considered necessary by the contracting officer to pay laborers and mechanics employed by the Contractor or any subcontractors on the work the difference between the rates of wages required and the rate of wages received by such laborers and mechanics and not refunded to the Contractor, subcontractor or their agents.

D. Where wage rates are published in this Manual they are issued by the State Department of Labor on the date indicated and are included for the convenience of Bidders. The Owner, the Architect, and the Construction Manager, accept no responsibility for the accuracy or applicability of any rates included herein. The actual wage rate determinations which will apply to the work will be those in effect on the first day of public advertisement for bids as determined by the State Department of Labor. It will be the responsibility of each bidder to contact the State Department of Labor and to incorporate these rates in his bid.

E. In accordance with Delaware Code, Title 29, Subchapter IV, Section 6960, as amended January 11, 2024, contractors shall furnish sworn payroll information to the Department of Labor on a weekly basis for each contract which exceeds $45,000 for renovation work and/or $500,000 for new construction. The construction contract amount is based on a cumulative total of all contracts bid for a specific project. Payroll forms for submission may be obtained from the Department of Labor.

1. A Payroll Report, available from the Department of Labor is to be used to provide this information.

F. A copy of the Prevailing Wages for the project is attached hereto.

END OF SECTION

STATE OF DELAWARE
DEPARTMENT OF LABOR
OFFICE OF CONSTRUCTION INDUSTRY ENFORCEMENT
252 CHAPMAN ROAD, STE 210
NEWARK, DELAWARE 19702

Via Electronic and Regular Mail

October 5, 2026

Mr. John Raftery
Tevebaugh Architecture
2 Mill Road
Suite 210
Wilmington, DE 19806

Re: DTCC21344 ARCENGO George Campus Main Entrance Renovation, New Castle County, DE

Dear Mr. Raftery,

I am responding to your request for a category determination for the DTCC21344 ARCENGO George Campus Main Entrance Renovation, which is a state funded construction project located in New Castle County, DE. The work consists of demolition of existing vestibule structure and steps. Build new vestibule, steps, and planters. Replace existing storefront windows and metal panels. New lobby finishes, new ceilings, new lighting, and new HVAC systems. You estimate the total cost of construction for this project to be $4,688,000.00.

Based upon the information you provided the Department of Labor has determined that this project is a Building Construction project.

Delaware's Prevailing Wage Regulations provide that the rates applicable to a project are the rates in effect on the date of publication of the specifications for that project. I have enclosed a certified copy of the March 13, 2026, prevailing wage rates for Building Construction to be included in your bid specification. However, please be advised that, in the event that a contract for a project is not executed within one hundred and twenty (120) days from the earliest date the specifications were published, the rates in effect at the time of the execution of the contract shall be the applicable rates for the project.

This determination is directed solely to the parties identified herein. It is based on the unique facts relevant to this matter. It does not constitute precedent and should not be cited as such by future parties.

Pursuant to 19 Del. Chapter 36, all contractors must obtain their Contractor Registration Certificate prior to performing construction services or maintenance work throughout Delaware. Contractors can submit an application by visiting the Delaware One Stop https://onestop.delaware.gov/Operate_Contractors.

Additionally, effective January 1, 2025, SSI for SB307 amends Delaware's Prevailing Law 29 Del.C.6960(b) now requires these applicable prevailing wage rates to be paid to all workers who perform custom fabrication work regardless of where the work is performed. For further information regarding custom fabrication see 29 Del.C.6902(8).

Lastly, please see the enclosed debarment list. Entities/individuals listed shall not be permitted to bid on, be awarded or work on Delaware State funded construction projects, in the timeframe specified, as provided for under 29 Del.C.6960 or other applicable State statutes.

If you have any questions or I can provide any additional assistance, please do not hesitate to contact me at (302) 451-3411.

Sincerely,

Ellen Romero

Labor Law Enforcement Officer

ellen.romero@delaware.gov

Enclosures

STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
OFFICE OF LABOR LAW ENFORCEMENT
PHONE: (302) 318-2769

Mailing Address:
252 Chapman Road
Suite 210
Newark, DE 19702

Located at:
252 Chapman Road
Suite 210
Newark, DE 19702

PREVAILING WAGES FOR BUILDING CONSTRUCTION EFFECTIVE MARCH 13, 2026

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
ASBESTOS WORKERS	30.70	37.78	55.01
BOILERMAKERS	91.87	46.61	68.52
BRICKLAYERS	68.29	68.29	68.29
CARPENTERS	64.06	64.06	52.30
CEMENT FINISHERS	96.91	68.92	53.44
ELECTRICAL LINE WORKERS	61.02	52.34	39.90
ELECTRICIANS	86.87	86.87	86.87
ELEVATOR CONSTRUCTORS	121.73	86.57	109.37
GLAZIERS	88.42	88.42	76.04
INSULATORS	71.54	71.54	71.54
IRON WORKERS	79.33	79.33	79.33
LABORERS	59.65	59.65	59.65
MILLWRIGHTS	91.00	91.00	73.10
PAINTERS	61.53	61.53	61.53
PILEDRIVERS	93.37	52.83	42.72
PLASTERERS	40.06	40.06	29.69
PLUMBERS/PIPEFITTERS/STEAMFITTERS	82.05	85.29	78.26
POWER EQUIPMENT OPERATORS	85.29	85.29	85.29
ROOFERS-COMPOSITION	36.41	31.28	33.64
ROOFERS-SHINGLE/SLATE/TILE	24.68	29.36	23.08
SHEET METAL WORKERS	87.84	87.84	87.84
SOFT FLOOR LAYERS	63.69	63.69	50.43
SPRINKLER FITTERS	77.63	77.63	77.63
TERRAZZO/MARBLE/TILE FNRS	73.75	73.75	84.10
TERRAZZO/MARBLE/TILE STRS	81.93	81.93	93.27
TRUCK DRIVERS	58.41	36.83	28.66

CERTIFIED: 10/5/2026 BY: Sabrina Cheeseboro
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

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

CLASSIFICATIONS OF WORKERS ARE DETERMINED BY THE DEPARTMENT OF LABOR. FOR ASSISTANCE IN CLASSIFYING WORKERS, OR FOR A COPY OF THE REGULATIONS OR CLASSIFICATIONS, PHONE (302) 318-2769.

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

PROJECT: DTCC21344 ARCENGO George Campus Main Entrance Renovation, New Castle County

PREVAILING WAGE DEBARMENT LIST

The following contractors have been debarred for violations of the prevailing wage law 29Del.C. §6960 or other applicable State statutes.

Therefore, no public construction contract in this State shall be bid on, awarded to, or received by contractors and individuals on this list for a period of (3) three years from the date of the judgment or as deemed by a court of competent jurisdiction.

Contractor	Address	Date of Debarment
Mullen Brothers, Inc. and Daniel Mullen, individually	3375 Garnett Road, Boothwyn, PA 19060	Indefinite/ Civil Contempt
State Contractors Corporation, and Jose Oscar Rivera, individually	13004 Hathaway Drive Silver Spring, MD 20906	Indefinite/ 19 Del.C. 2374(f)
Green Granite and Jason Green, individually	604 Heatherbrooke Court Avondale, PA 19311	Indefinite/ Civil Contempt
Pro Image Landscaping, Inc. and Owner(s) individually	23 Commerce Street Wilmington, DE 19801 and/or 2 Cameo Road Claymont, DE 19703	Indefinite/19 Del.C. §108 & 10 Del.C. 542(c)
Liberty Mechanical, LLC and Owner(s), individually	2032 Duncan Road Wilmington, DE 19801	Indefinite/ 19 Del.C. 2374(f)
Integrated Mechanical and Fire Systems Inc. and Allison Sheldon, individually	4601 Governor Printz Boulevard Wilmington, DE 19809	Indefinite/19 Del.C. §108 & 10 Del.C. 542(c)
ACH 1, INC.	873 Salem Church Road Newark, DE 19702	Indefinite/19 Del.C.6960

Updated: July 6, 2022

SECTION 00 81 13

GENERAL REQUIREMENTS

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1. GENERAL
2. OWNER
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8. TIME
9. PAYMENTS AND COMPLETION
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12. UNCOVERING AND CORRECTION OF WORK
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ARTICLE 1: GENERAL

1.1 CONTRACT DOCUMENTS

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

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

1.2 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

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

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

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

ARTICLE 2: OWNER

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SUPPLEMENTARY GENERAL CONDITIONS)

ARTICLE 3: CONTRACTOR

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

3.2 Subcontracts: Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all material, their own and those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.

3.3 Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.

3.4 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.

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

3.6 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.

3.7 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.

3.8 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.

3.9 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.

3.10 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.

3.11 STATE LICENSE AND TAX REQUIREMENTS

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

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

3.13 During the contract Work, the Contractor and each Subcontractor, shall implement an Employee Drug Testing Program in accordance with OMB Regulation 4104 - "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working

on “Large Public Works Projects”. “Large Public Works” is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.1 CONTRACT SURETY

4.1.1 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

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

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

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

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

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

4.2 FAILURE TO COMPLY WITH CONTRACT

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

4.3 CONTRACT INSURANCE AND CONTRACT LIABILITY

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

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

4.4 RIGHT TO AUDIT RECORDS

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

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

ARTICLE 5: SUBCONTRACTORS

5.1 SUBCONTRACTING REQUIREMENTS

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

1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only – street number and P.O. Box addresses not required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.

2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:

   A. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;

   B. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and

C. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.

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

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

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

A. Is unqualified to perform the work required;

B. Has failed to execute a timely reasonable Subcontract;

C. Has defaulted in the performance on the portion of the work covered by the Subcontract; or

D. Is no longer engaged in such business.

5.1.5 Should a Bidder be awarded a contract, such successful Bidder shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

5.1.6 The Contractor may employ additional Subcontractors on the jobsite only after submitting a copy of the Subcontractor's Employee Drug Testing Program to the Owner for approval. A Contractor or Subcontractor shall not commence work until the Owner has concluded its review and determined that the submitted Employee Drug Testing Program complies with OMB Regulation 4104.

5.2 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS

5.2.1 Should the Contractor fail to utilize any or all of the Subcontractors in the Contractor's Bid statement in the performance of the Work on the public bidding, the Contractor shall be penalized in the amount of (project specific amount*). The Agency may determine to deduct payments of the penalty from the Contractor or have the amount paid directly to the Agency. Any penalty amount assessed against the Contractor may be remitted or refunded, in whole or in part, by the Agency awarding the Contract, only if it is established to the satisfaction of the Agency that the Subcontractor in question has defaulted or is no longer engaged in such business. No claim for the remission or refund of any penalty shall be granted unless an application is filed within one year after the liability of the successful Bidder accrues. All

penalty amounts assessed and not refunded or remitted to the contractor shall be reverted to the State.

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

5.3 ASBESTOS ABATEMENT

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

5.4 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE PHYSICALLY HANDICAPPED

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

5.5 CONTRACT PERFORMANCE

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

ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

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

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

ARTICLE 7: CHANGES IN THE WORK

7.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.

7.2 The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.

7.3 The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the ‘DPE’ wages required and the “invoice price” of the materials/equipment needed.

7.3.1 “DPE” shall be defined to mean “direct personnel expense”. Direct payroll expense includes prevailing wage rates plus a maximum multiplier of 1.35 times DPE. For example, if the prevailing wage rate is $50/hour, the DPE would be $67.50/hour (50 x 1.35).

7.3.2 "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity. Rates for equipment that is leased and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.

7.3.3 In addition to the above:

7.3.3.1 The General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces.

7.3.3.2 For additional subcontractor work, the Subcontractor is allowed a fifteen (15) percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding seven- and one-half percent (7.5%) on the subcontractor's work.

7.3.3.3 Where the Third Tier Contractor is going to be completing the additional work, the Third-Tier contractor will be allowed a markup of fifteen percent (15%) overhead and profit on changes order work above and beyond the direct costs stated previously. To this amount, the Subcontractor will be allowed a markup not to exceed seven and one-half percent (7.5%) on the Third-Tier Contractor's work and the General Contractor will be allowed a markup not to exceed seven and one-half percent (7.5%) of the amount of the Subcontractor's markup.

7.3.3.4 No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

7.3.3.5 These markups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc.

ARTICLE 8: TIME

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

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

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

8.4 SUSPENSION AND DEBARMENT

8.4.1 Per Section 6962(d)(14), Title 29, Delaware Code, "Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule

established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the Project."

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

8.5 RETAINAGE

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

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

ARTICLE 9: PAYMENTS AND COMPLETION

9.1 APPLICATION FOR PAYMENT

9.1.1 Applications for payment shall be made upon AIA Document G702. There will be a five percent (5%) retainage on all Contractor's monthly invoices until completion of the project. This retainage may become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.

9.1.2 A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor's itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.

9.1.3 Section 6516, Title 29 of the Delaware Code annualized interest is not to exceed 12% per annum beginning thirty (30) days after the "presentment" (as opposed to the date) of the invoice.

9.2 PARTIAL PAYMENTS

9.2.1 Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.

9.2.2 When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.

9.2.2.1 Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.

9.2.3 If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

9.3 SUBSTANTIAL COMPLETION

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

9.3.2 If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.

9.3.3 On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.

9.4 FINAL PAYMENT

9.4.1 Final payment, including the five percent (5%) retainage if determined appropriate, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):

9.4.1.1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,

9.4.1.2 An acceptable RELEASE OF LIENS,

9.4.1.3 Copies of all applicable warranties,

9.4.1.4 As-built drawings,

9.4.1.5 Operations and Maintenance Manuals,

9.4.1.6 Instruction Manuals,

9.4.1.7 Consent of Surety to final payment.

9.4.1.8 The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

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

10.2 The Contractor shall notify the Owner in the event any previously unknown hazardous material such as PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval to the closeout documents to be submitted at the end of the project.

10.2.1 Any activities with the potential to disturb lead-based materials should be performed by the Contractor in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.

10.2.1.1 The Contractor shall notify the Owner in the event they encounter previously unknown material that they suspect may contain “lead”. The Owner will arrange with a qualified specialist for identification and testing and advise the Contractor of the results. In the case that testing identifies potential lead based materials, the contractor shall continue performance of the work that has the potential to disturb associated in accordance with OSHA regulations pertaining to Lead in Construction, 29 CFR 1926.62, Lead.

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

10.4 The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

ARTICLE 11: INSURANCE AND BONDS

11.1 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.

11.2 Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.

11.3 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.

11.4 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.

11.5 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, may be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and their Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.

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

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

11.7.1 Contractor's Contractual Liability Insurance

Minimum coverage to be:

Bodily Injury		
	$1,000,000	for each occurrence
	$3,000,000	aggregate
Property Damage	$1,000,000	for each occurrence
	$3,000,000	aggregate

11.7.2 Contractor's Protective Liability Insurance

Minimum coverage to be:

Bodily Injury		
	$1,000,000	for each occurrence

	$3,000,000	aggregate
Property Damage	$1,000,000	for each occurrence
	$3,000,000	aggregate

11.7.3 Automobile Liability Insurance

Minimum coverage to be:

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

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

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

11.7.5.1 Minimum Limit on employer's liability to be as required by law.

11.7.5.2 Minimum Limit for all employees working at one site.

11.7.6 Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.

11.7.7 Social Security Liability

11.7.7.1 With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor’s business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.

11.7.7.2 Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.

11.7.7.3 If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.1 The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.

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

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 CUTTING AND PATCHING

13.1.1 The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.

13.2 DIMENSIONS

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

13.3 LABORATORY TESTS

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

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

13.4 ARCHAEOLOGICAL EVIDENCE

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

13.5 GLASS REPLACEMENT AND CLEANING

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

13.6 WARRANTY

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

remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.

14.2 “If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement.”

END OF SECTION

SECTION 008114 – DRUG TESTING PROGRAM AND FORMS

1. SUMMARY

A. Pursuant to 4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds submit with their bid an Affidavit of Employee Drug Testing Program. A copy of the current Regulation is attached hereto.

B. Each Contractor shall provide two (2) business days prior to contract execution, copies of the Employee Drug Testing Program for the Contractor and all Subcontractors.

C. Initial Drug Testing - Employees commencing work on a Jobsite must be tested within the past 180 days from the date of commencing work, with the exception that an Employee who has passed a random or scheduled drug test within that time frame, or an Employee who passed a pre-employment drug test administered pursuant to a Contractor's or Subcontractor's Program and is subject to testing as part of a Contractor's or Subcontractor's ongoing Program or as part of a Consortium shall be permitted to work at the Jobsite without further testing; however, the Employee is still subject to random testing.

D. A Contractor or Subcontractor's Program shall provide that no less than 5% of a Contractor’s or Subcontractor’s employees shall be randomly selected each month for drug testing and no less than 2.5% of a Contractor or Subcontractor's employees be randomly selected for alcohol testing. Test results must be kept by a Contractor or Subcontractor for a minimum of 1 year subsequent to the date of close out of the Public Works project. See the form attached hereto.

E. The Contractor will notify the Owner in writing of any positive results of random drug testing. See the form attached hereto. The results must be reported to the Owner within 24 hours of receipt of the test results.

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF FACILITIES MANAGEMENT
4000 Office of Management and Budget
4100 Division of Facilities Management

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects

1.0 Purpose

The Office of Management and Budget ("Office"), has developed these regulations that require contractors and subcontractors to implement a program of mandatory drug testing for employees who work on large public works contracts funded all or in part with public funds pursuant to 29 **Del.C.** §6908(a)(6). The regulations establish the mechanism, standards and requirements of a Mandatory Drug Testing Program that will be incorporated by reference into all large public works contracts awarded pursuant to 29 **Del.C.** §6962.

2.0 Definitions

"**Consortium"/"third party administrator**" or "**(C/TPA)**" means a service agent that provides or coordinates the provision of a variety of drug and alcohol testing services to employers. C/TPAs typically perform administrative tasks concerning the operation of the employers' drug and alcohol testing programs. This term includes, but is not limited to, groups of employers who join together to administer, as a single entity, the drug and alcohol testing programs of its members.

"**Contractor**" means an entity such as, but not limited to, an individual, firm, partnership or corporation that has a contractual obligation to perform work for contracts awarded pursuant to 29 **Del.C.** §6962.

"**Division of Facilities Management**" and "**DFM**" means the Division of Facilities Management within the Office of Management and Budget.

"**Drug testing firm**" is an entity engaged in the business of providing drug testing services for businesses, individuals, governments or any entity that requires drug testing of employees, applicants, licensees, etc., in compliance with these requirements.

"**Employee**" means an individual employed by a contractor or subcontractor who works on the jobsite of a large public works contract but does not fulfill a clerical or administrative function. For the purpose of this definition, clerical or administrative functions shall refer to job responsibilities that do not generally require an employee to work outside of the contractor's jobsite office, home office or other employer-provided office. For the purposes of this regulation, the term "employee" shall also include supervisors and foremen working on the jobsite. The term "employee" shall also include employees of a contractor or subcontractor working on or delivering materials and equipment to and from a jobsite.

"**Impairment**" or "**impaired**" means symptoms that an employee while working may be under the influence of drugs or alcohol that may decrease or lessen the employee's performance of the duties or tasks of the employee's job position, including symptoms of the employee's speech, walking, standing, physical dexterity, agility, coordination, actions, movement, demeanor, appearance, clothing, odor, irrational or unusual behavior, negligence or carelessness in operating equipment, machinery or production or manufacturing processes, disregard for the safety of the employee or others, or other symptoms causing a reasonable suspicion of the use of drugs or alcohol.

"Jobsite" means the site or area directly or indirectly owned, operated or controlled by the owner in which the contractor or subcontractor performs work or delivers services to the owner. For the purpose of this definition, "jobsite" does not mean a remote work site not under the direct or indirect control of the owner in which work is performed to fulfill the contractor's or subcontractor's obligations.

"Large public works contract" means a contract for a public works construction awarded pursuant to 29 **Del.C.** §6962.

"Mandatory drug testing program" and "**program**" means a defined set of basic procedures, requirements and rules that must be used by a contractor or subcontractor to test employees for drugs in compliance with these requirements.

"Owner" is the state agency, school district or entity that awards a large public works contract to a contractor pursuant to 29 **Del.C.** §6962.

"Positive test result" and "**fail a drug test**" means the result reported by a Health and Human Services certified laboratory when a specimen contains a drug or drug metabolite equal to or greater than the cutoff concentration. For purposes of these regulations, an employee shall not be considered to have a positive test result nor shall an employee be considered to "fail a drug test", unless the employee was impaired by marijuana at the jobsite if:

- The employee is a registered qualifying patient and;
- The drug detected was marijuana, a component of marijuana, or marijuana metabolites.

"Random drug testing" means that an employee is chosen at random for testing without advance notice, from a pool of employees or as a member of a consortium. Specific requirements for random drug testing conducted under these regulations are described in Section 5.0.

"Registered qualifying patient" means a person (1) validly issued and in possession of an unexpired registry identification card as defined by 16 **Del.C.** §4902A (14), and (2) subject to confirmation through a "verification system" as set forth at 16 **Del.C.** §4902A(17).

"Subcontractor" means an entity such as, but not limited to, an individual, firm, partnership or corporation that has a contractual obligation to perform work for, or supply services to a contractor as defined in Section 2.0.

21 DE Reg. 503 (12/01/17)

3.0 Employee Drug Testing Documentation Requirements

3.1 The following documentation requirements apply:

3.1.1 At bid submission. A solicitation for a large public works contract must require each contractor that submits a bid for the work to submit with the bid a signed affadavit certifying that the contractor and subcontractor(s) has in place or will implement during the entire term of the contract a mandatory drug testing program that complies with this regulation.

3.1.2 At least 2 business days prior to contract execution. The awarded contractor shall provide to the owner copies of the employee drug testing program for the contractor and for all listed subcontractors.

3.1.3 During contract execution. Contractors that employ additional subcontractors on the jobsite may do so only after submitting a copy of the subcontractor's employee drug testing program. A contractor or subcontractor shall not commence work until the owner has concluded the employee drug testing program complies with this regulation as per subsection 3.2.

3.1.4 In the event of an emergency a contractor may employ additional subcontractors on the jobsite prior to submitting the subcontractor's employee drug testing program provided that said program is submitted to the owner as soon as practicable.

3.2 A contractor or subcontractor shall be treated as having a mandatory drug testing program that complies with this regulation if the program includes the following:

3.2.1 The program meets the minimum standards in Section 4.0 of this regulation.

3.2.2 The program provides for the frequency of testing of employees as per Section 5.0 of this regulation:

3.2.3 The program imposes disciplinary measures on an employee who fails a drug test as per Section 6.0 of this regulation.

3.3 Prequalified contractors and subcontractors. A contractor or subcontractor may meet the provisions of subsection 3.1 if they are prequalified through the DFM prequalification and if the DFM prequalification includes provisions requiring an employee mandatory drug testing program that meet the requirements of Sections 4.0, 5.0 and 6.0 of this regulation

3.4 The State shall not be obligated to pay, and the contractor or subcontractor shall expressly agree that, any portion of work performed by a contractor or subcontractor commenced before that contractor or subcontractor has complied with subsections 3.1 and 3.2, provided however that emergency work as referenced in subsection 3.1.4 may not be subject to this provision.

21 DE Reg. 503 (12/01/17)

4.0 Minimum Standards for a Mandatory Drug Testing Program

4.1 Testing for the presence of drugs in an employee's system and the handling of test specimens shall be conducted in accordance with guidelines for the collection, chain-of-custody procedures, laboratory testing, and Medical Officer Review procedures contained within the Mandatory Guidelines for Federal Workplace

Drug Testing Programs published by the Substance Abuse and Mental Health Services Administration (SAMHSA). (49 CFR Part 40).

All tests must be processed by a federal Health and Human Services certified laboratory. Contractors must provide documentation detailing the procedures used in the collection, testing and reporting of drug tests sufficient to show conformance with SAMHSA guidelines.

4.2 Contractors and subcontractors subject to these regulations may procure the services of an appropriate drug testing firm to administer their program. A contractor or subcontractor may also participate in a consortium. A contractor or subcontractor may also implement a mandatory drug testing program using in-house personnel and resources.

4.3 Employees subject to drug testing shall be tested using at a minimum a seven-panel protocol testing plus alcohol screening for the following:

Initial test analyte	**Initial test cutoff concentration**	**Confirmatory test analyte**	**Confirmatory test cutoff concentration**
Marijuana metabolites	50 ng/mL	THCA	15 ng/mL.
Cocaine metabolites	150 ng/mL	Benzoylecgonine	100 ng/mL.
Opiate metabolites			
Codeine/Morphine	2000 ng/mL	Codeine	2000 ng/mL.
		Morphine	2000 ng/mL.
6-Acetylmorphine	10 ng/mL	6-Acetylmorphine	10 ng/mL.
Phencyclidine	25 ng/mL	Phencyclidine	25 ng/mL.
Amphetamines			
AMP/MAMP	500 ng/mL	Amphetamine	250 ng/mL.
		Methamphetamine	250 ng/mL.
MDMA	500 ng/mL	MDMA	250 ng/mL.
		MDA	250 ng/mL.
		MDEA	250 ng/mL.
Alcohol	0.04%		

4.4 The frequency of random drug testing and the methodology for selecting employees to be screened are defined in Section 5.0 and shall be incorporated into contractor and subcontractor mandatory testing procedures. A contractor or subcontractor may incorporate rules or requirements that exceed the requirements defined herein.

21 DE Reg. 503 (12/01/17)

5.0 Drug Testing Requirements – Frequency for the Testing of Employees

5.1 Initial drug testing. Employees commencing work on a jobsite must be tested with the exception that an employee who has passed a random or scheduled drug test within the past 180 days from the date of commencing work or an employee who passed a pre-employment drug test administered pursuant to an contractor's or subcontractor's program, or who possesses a certification no more than 6 months old under the then current New Castle County ordinance 2.05.305 - Alcohol and Drug Testing of Employees of Contractors Working on Public Works Projects and Jobsites, and is subject to testing as part of a contractor's or subcontractor's ongoing program or as part of a consortium shall be permitted to work at the jobsite without further testing; however, the employee is still subject to random testing.

5.2 Random drug testing. During the course of a project, each contractor and subcontractor with employees on the jobsite shall maintain a program that meets or exceeds the following requirements.

5.2.1 All employees will be subject to random, unannounced testing.

5.2.2 The selection of employees shall be made by a scientifically valid method of randomly generating an employee identifier from a contractor or subcontractor’s entire pool of employees, through those employees working on a public works jobsite or through the contractor or subcontractor's participation in a consortium.

5.2.3 A contractor or subcontractor's program shall provide that no less than 5% of a contractor’s or subcontractor’s employees shall be randomly selected each month for drug testing and no less than 2.5% of a contractor or subcontractor's employees be randomly selected for alcohol testing. Contractors or

subcontractors may participate in a consortium provided that no less than 5% of the consortium's pool shall be subject to drug testing each month and no less than 2.5% of the consortium's pool shall be subject to alcohol testing each month. Contractors or subcontractors with less than 10 employees that do not participate in a consortium shall test at least 1 of their employees, selected randomly per month. Each employee shall have an equal chance of selection each time the selection is made. Because the selection process is random, some employees may not be tested within a year, while others may be tested more than once. Nothing in this regulation shall require an employee of a contractor or subcontractor not working or assigned to a public works jobsite to be subject to random alcohol testing.

5.2.4 Employees notified that they have been selected must report within 4 hours for testing to a site specified. Employees so notified must have been given such notification at least 4 hours before the scheduled closing time of the testing facility. Any failure to report for random testing, or to cooperate with the testing procedure shall be considered a positive result.

5.2.5 Purposely impeding or delaying an employee's fulfillment of the testing requirements herein by a contractor or subcontractor may subject the contractor or subcontractor to sanctions listed in Section 8.0.

5.3 Reasonable suspicion testing. An employee will be required to take a drug and/or alcohol test at any time his or her employing contractor, subcontractor or the owner reasonably believes that he or she has an impairment caused by drugs and/or alcohol. Further, an employee may be required to take a drug and/or alcohol test at any time his or her employing contractor, subcontractor or the owner finds drug paraphernalia and/or open alcohol containers on the jobsite.

5.4 Return to duty testing. As required in Section 6.0.

5.5 Accident triggered testing. An employee will be required to take a drug test and may be subject to an alcohol breathalyzer test at any time there is a jobsite accident involving loss or significant property damage, injury or death to an employee of the contractor, subcontractor, or owner or member of the public.

5.5.1 As soon as practicable following an accident, the contractor will notify the employee(s) whose performance could have contributed to the accident of the need for the test.

5.5.2 The appropriate contractor shall ensure that an employee, required to be tested under this section, report to a testing center as soon as practicable, but no longer than 4 hours after the accident. Employees so notified must have been given such notification at least 4 hours before the scheduled closing time of the testing facility. If the drug test is not conducted within 4 hours, attempts to conduct the test must cease and the reasons for the failure to test documented.

5.5.3 An employee who is subject to post-accident testing who fails to remain readily available for such testing, including notifying a supervisor of his or her location if he or she leaves the scene of the accident prior to submission to such test, may be deemed to have refused to submit to testing.

5.5.4 If an employee fails or refuses to be tested, he/she must be removed from the jobsite and shall be subject to consequences in Section 6.0.

5.5.5 Nothing in this section shall be construed to require the delay of necessary medical attention for the injured following an accident, or to prohibit an employee from leaving the scene of an accident for the period necessary to obtain assistance in responding to the accident, or to obtain necessary emergency medical care.

5.6 All testing required by this section shall be administered according to the standards outlined in Section 4.0.

21 DE Reg. 503 (12/01/17)

28 DE Reg. 228 (09/01/24)

6.0 Consequences of a Positive Test Result

6.1 The disciplinary measures contained within a contractor's or subcontractor's program for an employee who tests positive to a mandatory drug test must include at a minimum, all of the following:

6.1.1 The employee is subject to an immediate suspension from any public works jobsite.

6.1.2 The employee is not eligible for reinstatement by the contractor or subcontractor to any public works jobsite until 30 days after the employee tests negative on a seven drug panel plus alcohol test certified by a medical review officer.

6.1.3 The employee is subject to unscheduled monthly random testing as per subsection 5.2.

6.1.4 An employee who has tested positive for more than 1 drug test within a 3-year period shall be permanently banned from working at public works jobsites.

6.1.5 An employee who has tested positive for marijuana, a component of marijuana, or marijuana metabolites and is a registered qualifying patient shall be exempted from the disciplinary actions contained in this section unless:

6.1.5.1 The employee was impaired by marijuana at the jobsite.

6.1.5.2 Employment of the registered qualifying patient would cause the owner to lose monetary or licensing-related benefits under Federal law.

6.2 A contractor or subcontractor shall report the positive test result to the employee's professional licensing board, if applicable.

21 DE Reg. 503 (12/01/17)

7.0 Contractor and Subcontractor Certification of Compliance with Regulations

7.1 During the term of the contract:

7.1.1 During the term of the contract, contractors and subcontractors on the jobsite for more than 30 days shall maintain testing data that includes but is not limited to the data elements contained in subsection 7.1.2:

7.1.1.1 A contractor or subcontractor that is employed on the jobsite for less than 30 days shall not be subject to the reporting requirements contained in subsection 7.1.2 of this regulation, unless the owner specifies that such reporting is required in the invitation to bid or specifications relating to the work to be performed.

7.1.2 The data shall at a minimum contain the following elements:

7.1.2.1 The number of employees who worked on the jobsite during the previous month or quarter.

7.1.2.2 The number of employees subjected to random testing during the previous month or quarter.

7.1.2.3 The number of negative results and the number of positive results.

7.1.2.4 Action taken by the contractor or subcontractor on an employee who failed or tested positive to a random test.

7.1.3 Test results must be kept by a contractor or subcontractor for a minimum of 1 year subsequent to the date of close out of the public works project.

7.1.4 Any positive test result of an employee working on a public works jobsite including the employee name and action taken in response by a contractor or subcontractor must be reported by the contractor or subcontractor to the owner in writing within 24 hours of the contractor or subcontractor receiving the test results.

7.1.5 The owner shall have the right to periodically audit all contractor and subcontractor test results at the contractor or subcontractor's offices or by other means to make the data available for inspection by the owner.

7.1.6 The failure to comply with these reporting requirements may be considered a material breach of any agreement relating to the performance of work by the contractor or subcontractor.

21 DE Reg. 503 (12/01/17)

8.0 Penalties

8.1 A contractor or subcontractor on a large public works contract that fails to implement a mandatory drug testing program in accordance with this regulation or falsifies testing results shall be subject to the following sanctions:

8.1.1 Written warning (1st offense).

8.1.2 Prohibition from bidding on new public works jobs for a period not to exceed 3 months (2nd offense) and 1 year (3rd offense).

8.1.3 For subsequent offenses, debarment or bond revocation.

8.2 Notwithstanding any other provision of this regulation, if any failure to comply with the requirements of this regulation are particularly flagrant or egregious, the owner may seek a termination for cause, a temporary suspension, a determination that the contractor or subcontractor is not responsible, debarment or bond revocation, and any other statutory, common law, or equitable remedy.

19 DE Reg. 207 (09/01/15)

21 DE Reg. 503 (12/01/17)

21 DE Reg. 645 (02/01/18)

28 DE Reg. 228 (09/01/24)
28 DE Reg. 326 (10/01/24)

EMPLOYEE DRUG TESTING REPORT FORM
Period Ending:_____

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds maintain testing data that includes but is not limited to the data elements below.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Number of employees who worked on the jobsite during the report period: _____

Number of employees subject to random testing during the report period: _____

Number of Negative Results _____ Number of Positive Results _____

Action taken on employee(s) in response to a failed or positive random test:

_____

_____

_____

Authorized Representative of Contractor/Subcontractor: _____
(typed or printed)

Authorized Representative of Contractor/Subcontractor: _____
(signature)

Date: _____

This form is not required to be submitted to the Owner. Included as a reference to show information required to be maintained by the Contractor. The Owner shall have the right to periodically audit all Contractor and Subcontractor test results at the Contractor's or Subcontractor's offices (or by other means to make the data available for inspection by the Owner).

EMPLOYEE DRUG TESTING
REPORT OF POSITIVE RESULTS

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds to notify the Owner in writing of a positive random drug test.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

_____

_____

Name of employee with positive test result: _____

Last 4 digits of employee SSN: _____

Date test results received: _____

Action taken on employee in response to a positive test result:

_____

_____

_____

Authorized Representative of Contractor/Subcontractor: _____
(typed or printed)

Authorized Representative of Contractor/Subcontractor: _____
(signature)

Date: _____

This form shall be sent by mail to the Owner within 24 hours of receipt of test results.

Enclose this test results form in a sealed envelope with the notation "Drug Testing Form – DO NOT OPEN" on the face thereof and place in a separate mailing envelope.

END OF SECTION

INSERT YOUR LETTERHEAD

INSERT DATE

INSERT PROJECT MANAGER'S NAME
Project Manager
EDiS Company
110 S. Poplar Street
Wilmington, DE 19801

RE: *INSERT PROJECT NAME* – Initial Drug Testing

Dear *INSERT PROJECT MANAGER'S NAME:*

This letter is to certify that the following employees have passed their initial drug testing in accordance with Section 5.1 of 4104 Regulations for the Drug Testing. These employees are scheduled to commence work on the project within 60 days of the date of the test.

Name	Last 4 SSN	Date Tested	Results
John Doe	1234	06/01/16	Negative
Jane Smith	5678	06/01/16	Negative
Peter Pan	9012	06/01/16	Negative

During the course of the project, all employees will be subject to random, unannounced drug testing. No less than 10% of these employees will be tested on a monthly basis. The results of this random testing will be submitted on the form from the project manual and submitted with the monthly payment application.

Sincerely,

YOUR COMPANY'S NAME HERE

NAME & SIGNATURE OF AN OFFICER OF THE COMPANY

EMPLOYEE DRUG TESTING REPORT FORM
Period Ending:_____

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds maintain testing data that includes but is not limited to the data elements below.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____
_____
_____

Number of employees who worked on the jobsite during the report period:_____

Number of employees subject to random testing during the report period:_____

Number of Negative Results _____ Number of Positive Results _____

Action taken on employee(s) in response to a failed or positive random test:
_____
_____
_____

Date: _____

This form is not required to be submitted to the Owner. Included as a reference to show information required to be maintained by the Contractor. The Owner shall have the right to periodically audit all Contractor and Subcontractor test results at the Contractor's or Subcontractor's offices (or by other means to make the data available for inspection by the Owner).

EMPLOYEE DRUG TESTING
REPORT OF POSITIVE RESULTS

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds to notify the Owner in writing of a positive random drug test.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____
_____
_____

Name of employee with positive test result: _____

Last 4 digits of employee SSN: _____

Date test results received: _____

Action taken on employee in response to a positive test result:
_____
_____
_____

Authorized Representative of Contractor/Subcontractor: _____
(typed or printed)

Authorized Representative of Contractor/Subcontractor: _____
(signature)

Date: _____

This form shall be sent by mail to the Owner within 24 hours of receipt of test results.

Enclose this test results form in a sealed envelope with the notation "Drug Testing Form – DO NOT OPEN" on the face thereof and place in a separate mailing envelope.

SECTION 008115 – AFFIDAVIT OF CRAFT TRAINING

1. AFFIDAVIT OF CRAFT TRAINING

1.1 Form Affidavit of Craft Training (008115 attached).

DTCC George Campus Main Entrance Renovations
300 N Orange Street Wilmington DE 19801

AFFIDAVIT OF CRAFT TRAINING COMPLIANCE

We, the contractor, hereby certify that we and all applicable subcontractors will abide by the contractor and subcontractor craft training requirements outlined below for the duration of the contract. Craft training must be provided by a contractor and/or subcontractor for each craft on a project for which there are Delaware Department of Labor approved and registered training programs or, if the contractor and/or subcontractor meets the requirements under Title 29, Chapter 69, Section 6960A.(b)(1)c.1.-3., payment may be made in accordance with Title 29, Chapter 69, Section 6960A.(b)(1)d. A list of crafts for which there are approved and registered training programs is maintained by the Delaware Department of Labor and can be found at: https://laborfiles.delaware.gov/main/det/apprenticeship/DE%20Craft%20Training%20Occupation%20List%20Effective%20March%201%202022.pdf. If you have questions regarding craft training programs, please submit all questions in writing to the Delaware Department of Labor at: apprenticeship@delaware.gov. ***This Affidavit of Craft Training Compliance must be submitted prior to contract execution***.

In accordance with Title 29, Chapter 69, Section 6960A.(a)(1), a contract relating to a public works project under § 6962 of Title 29 must include a craft training program for each craft in the project if at the time the contractor executes a public works contract, all of the following apply:

a. A project meets the prevailing wage requirement under Section 6960 of Title 29.
b. The contractor employs 10 or more total employees.
c. The project is not a federal highway project, except for the project under Section 6962(c)(11) of Title 29.
d. There is an apprenticeship program for a craft in the project on the list of crafts under Section 204(b)(2) of Title 19.

Pursuant to Title 29, Chapter 69, Section 6960A.(a)(2), ***a contractor must commit that all subcontractors provide craft training*** if paragraph (a)(1) of this section applies to the subcontractor. Failure to provide required craft training or payment on the project may subject the successful contractor and/or subcontractor(s) to penalties as outlined in Title 29, Chapter 69, Section 6960A.(d)(1)-(3).

Craft(s): _____

Contractor Name: _____

Contractor Address: _____

_____

_____

Contractor Program Registration Number(s) _____
On this line also indicate whether DE, Other State (identify) or US Registration Number

Or

☐ **A payment has been made in the amount established under Section 204(b)(2)b.2. of Title 19, for the craft into the Delaware Department of Labor's Apprenticeship and Training Fund.**

Or

☐ **Craft Training requirements are not applicable because:**

_____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

State of Delaware)
) ss:
County of _____)

Before me, a notary public, in and for said county and state, personally appeared, _____, who acknowledged to me that she/he did execute the foregoing instrument on behalf of _____.

IN TESTIMONY WHEREOF, I have subscribed my name and affixed my official seal this ____ day of _____ 20___.

_____
Notary Public
Commission Expires _____

THIS PAGE MUST BE SIGNED AND NOTARIZED TO BE CONSIDERED.

SECTION 011100 - SUMMARY OF WORK

1. RELATED DOCUMENTS

   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Sections, apply to work of this Section.

2. CONTRACTS

   A. The work will be performed under separate prime contracts managed by the Construction Manager.

3. ALTERATIONS & COORDINATION

   A. Contractor shall be responsible to coordinate their work with the work of others, including, but not limited to, the preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from the beginning of activity, through project close-out and warranty periods.

4. KNOWLEDGE OF CONTRACT REQUIREMENTS

   A. The Contractor and his Subcontractors, Sub-subcontractors and material men shall consult in detail the Contract Documents for instructions and requirements pertaining to the Work, and at his and their cost, shall provide all labor, materials, equipment and services necessary to furnish, install and complete the work in strict conformance with all provisions thereof.

   B. The Contractor will be held to have examined the site of the Work prior to submitting his proposal and informed himself, his Subcontractors, Sub-subcontractors and material men of all existing conditions affecting the execution of the Work.

   C. The Contractor will be held to have examined the Contract Documents and modifications thereto, as they may affect subdivisions of the Work and informed himself, his Subcontractors, Sub-subcontractors and material men of all conditions thereof affecting the execution of the Work.

   D. The Scope of Work for the Contract is not necessarily limited to the description of each section of the Specifications and the illustrations shown on the Drawings. Include all minor items not expressly indicated in the Contract Documents, or as might be found necessary as a result of field conditions, in order to complete the Work as it is intended, without any gaps between the various subdivisions of work.

   E. The Contractor will be held to be thoroughly familiar with all conditions affecting labor in the area of the Project including, but not limited to, Unions, incentive pay, procurements, living, parking and commuting conditions and to have informed his Subcontractors and Sub-subcontractors thereof.

5. CONTRACT DOCUMENTS INFORMATION

A. The Contract Documents are prepared in accordance with available information as to existing conditions and locations. If, during construction, conditions are revealed at variance with the Contract Documents, notify the Construction Manager immediately, but no more than three (3) days from the day the variance is first known. Failure to give timely notice shall operate to waive any claim Contractor might otherwise have for an adjustment to Contract Time or Sum as a consequence of such variance.

B. The Specifications determine the kinds and methods of installation of the various materials, the Drawings establish the quantities, dimensions and details of materials, the schedules on the Drawings give the location, type and extent of the materials.

C. Dimensions given on the Drawings govern scale measurements and large scale drawings govern small scale drawings, except as to anything omitted unless such omission is expressly noted on the large scale drawings.

D. The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “open generic/descriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The methods used for specifying one unit of work has no bearing on requirements for another unit of work.

E. Whenever a material, article or piece of equipment is referred to in the singular number in the Contract Documents, it shall be the same as referring to it in the plural. As many such materials, articles or pieces of equipment shall be provided as are required to complete the Work.

F. Whenever a material, article or piece of equipment is specified by reference to a governmental, trade association of similar standard, it shall comply with the requirements of the latest publication thereof and amendments thereto in effect on the bid date.

G. In addition to the requirements of the Contract Documents, Contractor’s work shall also comply with applicable standards of the construction industry and those industry standards are made a part of Contract Documents by reference, as if copied directly into Contract Documents, or as if published copies were bound herein.

H. Where compliance with two (2) or more industry standards, contract requirements, or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, then the most stringent requirements, which are generally recognized to be also the most costly, is intended and will be enforced, unless specifically detailed language written into the Contract Documents clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent, to Architect for decision before proceeding.

I. Reference standards referenced directly in Contract Documents or by governing regulations have precedence over non-reference standards which are recognized in industry for applicability of work.

J. Contractor's bid is based on the complete set of Contract Documents including documents not specifically issued as part of the bid pack but referenced in same.

6. SCOPE OF WORK/GENERAL INFORMATION

A. A Scope of Work for each contract to be awarded on the project follows in this section. When a Contract has been awarded to a Contractor, the successful Contractor will be listed after the title of the Contract. When no Contract has yet been awarded, no Contractor's name will be listed. Previous Scopes of Work include addendum changes.

B. Contractor is responsible for performing the work listed in the Summary of Work for his contract. Contractor is also responsible for knowing the work that has been assigned to preceding contracts. No additional compensation or extension of time will be allowed a Contractor due to his ignorance of the work assigned to his Contract or to other contracts which may affect his work. The Contractor is responsible, however, for all items which are covered in the Specifications and Drawings relating to their Contract if not specifically mentioned in the Summary of Work.

C. The Construction Manager will provide on-site a source for temporary electric, temporary water and portable sanitation facilities only. It is each Contractor's responsibility to make the necessary connections, including all material for temporary electric and water. Please note that utility charges for office trailers will be the responsibility of the individual Contractors.

D. A dumpster will be provided on site for free use by Contractors to dispose of non-hazardous, common, work-related refuse. Clean-up is the responsibility of each Contractor. Clean up shall be performed on a daily basis. Contractors not complying will be advised in writing and back charged for all costs associated with the cleanup of their work.

E. Contractors are reminded that there are limited storage areas available on site. Off-site storage will be the responsibility of each individual Contractor.

F. Office trailer permits off site will be the responsibility of each individual Contractor. On site Contractor's field offices, one (1) per Contractor, if required, will be located as directed by the Construction Manager.

G. Contractor will be prepared to discuss and submit a detailed project schedule seven (7) days after receipt of Notice to Proceed and to begin its submittal process. The Project Schedule is an integral part of this contract. Certain construction sequences and priorities must take place in order to meet the target dates. Concentrated work periods will occur and each Contractor is responsible to staff the project as required by the current Construction Schedule or as directed by the Construction Manager. Contractor will cooperate with the Construction Manager in planning and meeting the required sequences of work and Project Schedule as periodically updated by the Construction Manager.

H. All bids must include insurance limits in accordance with Article 11 of the Section 007300 SUPPLEMENTARY CONDITIONS.

I. Hoisting, scaffolding and material handling is the responsibility of each Contractor, unless otherwise noted.

J. Contractor will be responsible for layout of its own work. The Construction Manager will provide benchmark and layout of the building line.

K. Contractor will be responsible to keep clean public roadways soiled by construction traffic on a daily basis. If cleaning is not done, the Construction Manager may perform the cleaning on an overtime basis and backcharge the Contractor responsible.

L. Contractor Scopes of Work and Schedule are interrelated. Familiarity with each is required.

M. The Construction Manager will provide testing services for soil, concrete and steel. Other testing as required by the Contract Documents will be in accordance with the technical specifications and/or the individual scope of work. Refer to Specification Section 004500 - QUALITY CONTROL.

N. Safety is the responsibility of each individual Contractor. The project will be governed under the guidelines of OSHA.

O. Inter-Contractor shop drawing distribution will be performed by the Construction Manager. Contractor is individually responsible for either coordinating his work with these distributed drawings or notifying the Construction Manager, in writing, of any discrepancies.

P. Coordination with other trades will be required. The Contractor will be required to attend periodic coordination meetings with other trades where requirements, conflicts and coordination issues will be discussed and resolved. Attendance when requested will be mandatory. If inter-Contractor coordination is not satisfactorily performed, the conflicting Contractors shall mutually share the cost to relocate and/or reinstall their work.

Q. Contractor shall submit a schedule of values to the Construction Manager prior to the submission of their first invoice for approval

R. Contractor is expected to review and coordinate its Work with the complete set of Contract Documents, including all items noted as by his trade whether or not shown on that particular set of drawings. Documents are available at the site for review.

S. Contractor is responsible for obtaining all necessary permits required for his work, including street permits. Unless otherwise noted, building permit shall be secured by the Construction Manager. Any subcontractor who will be restricting access to street, right of way or adjacent property must notify the Construction Manager 48 hours in advance.

T. Contractor's License: Submit a copy of all business licenses required by local and state agencies.

U. Contractor shall absorb, without additional compensation, any and all costs of working beyond normal hours to maintain job progress in accordance with the current construction schedule.

V. No asbestos or PCB's in or on any material or equipment will be accepted or allowed on this project. All hazardous materials will be treated in accordance with all State and Federal regulations.

W. Daily cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Contractor will be individually back charged by the Construction Manager for clean up not satisfactorily performed by the Contractor.

X. In the event asbestos is uncovered, the Contractor shall notify the Construction Manager of the areas requiring removal of asbestos. The Construction Manager shall then coordinate the removal with the Owner.

Y. This project is to be constructed adjacent to and in existing buildings. Contractor shall exercise all due precautions to minimize noise, air pollution and any other construction hazards which in any way would cause discomfort or danger to the occupants of the existing building in the area.

Z. Existing mechanical, electrical, plumbing, sprinkler, medical gas, fire alarm, etc. systems will be shut off and locked out by the Owner as required by the Work. Tie-in's and modifications to those systems will be performed by the specific Contractor associated with the work as indicated in the Contract Documents. Re-energizing and re-startup of all systems should be performed by the Owner.

AA. The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Field Manager. It shall be the responsibility of each and every Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each and every Contractor shall be responsible to re-install the Safety Cable System immediately after work is completed. Each and every Contractor shall be responsible to re-install the Safety Cable System in accordance to OSHA standards.

AB. Normal work hours for this project are from 7:00 a.m. to 3:30 p.m. Any work to be performed outside of these hours must receive prior approval from the Construction Manager. Requests to work beyond normal work hours shall be submitted at least 48 hours prior.

AC. Contractor is responsible for having a competent project superintendent/foreman on-site during all work performed under its contract.

AD. In the event the Contractor has non-English speaking employees or subcontractors on the project, they shall have a superintendent or foreman on site, at all times, who speaks English and can communicate with Contractor's employees. Should the Contractor fail to meet this requirement, at any time, Construction Manager may direct all Work to stop until the proper supervision is on site. The Contractor will be responsible for maintaining the project work schedule and make up at its own expense, any delay to the Schedule resulting from the work stoppage.

AE. Punch List Procedures: Contractor shall be given a copy of the punch list with his appropriate

work identified. Contractor shall have nine (9) calendar work days to complete its punch list work. On the 10th day or as determined by the Construction Manager, the Construction Manager shall employ other contractors, as required, to complete any incomplete punch list work and retain from the appropriate Contractors retainage all costs incurred.

AF. Contractor shall provide the necessary safety barricades and railings required to complete their work and comply with all OSHA, local code and contract specifications.

AG. **Liquidated Damages:** N/A

AH. **Prohibition of Using Photographs on EDiS Projects**: The Contractor and all associated subcontractors agrees to not issue any news release or advertising pertaining to the Work or the Project, including references to the Project on the Contractor's/subcontractor website or other social media outlets, without obtaining EDiS' prior written approval, in each instance. The Contractor, for itself, its employees, vendors and subcontractors, agrees to not use the name of the Owner, the Project, EDiS or any photographs, videos, or other images of the Project in connection with any of Contractor's business promotion activities, advertising, website, social media outlets, or operations, without EDiS' prior written approval in each instance.

CONTRACT NO. A-01 SITEWORK

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Division 22	Plumbing
Division 23	HVAC
Division 26	Electrical
Section 033000	Concrete
Section 311000	Site Clearing
Section 312000	Earth Moving
Section 312316.13	Trenching
Section 312319	*Dewatering*
Section 321216	Asphalt Paving
Section 321313	Concrete Paving
Section 311623	Sidewalks
Section 321814	Subgrade and Stone Aggregate Drainage Layer
Section 329300	Plants
Section 331000	Storm Utility Drainage Piping
Section 334200	Stormwater Conveyence
Section 334600	Subdrainage

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide sitework, storm sewer, sanitary sewer, water utilities, fire hydrants, paving, curbs, sidewalks and topsoil/seeding.

2. This Contractor shall visit the site of the proposed work, fully acquaint and familiarize themselves with the conditions as they exist and the character of the operations to be carried out under the proposed Contract, and make such investigation as he may see fit so that he shall fully understand the facilities, physical conditions and restrictions affecting the work under the Contract. Claims for additional compensation and/or extensions of time because of Contractor's failure to familiarize himself with all conditions which might affect the work shall not be allowed.

3. Provide layout of this contract work from a licensed surveyor.

4. Before ANY excavation work is to commence, the Contractor/Excavator shall contact the utility companies or utility owners and advise them of the proposed work and ask them to mark the location of the underground utility installations. This notification shall be done within established or customary local response times. If the work is on private property and the utility company will not mark out the utilities, the Contractor/Excavator will hire a private locating

service to mark the utilities. Once the utilities are located and marked, the Contractor/Excavator will excavate by hand or use a vacuum truck to expose the utilities and record the exact location and elevation of the utilities. The Contractor/Excavator must submit the Excavation Permit to EDiS Company verifying their assurance of communication with the utility companies or utility owners. The Contractor/Excavator must follow State, Local, and Federal Guidelines prior to proceeding with excavations. The Contractor/Excavator will have these marks restored as long as there is work to perform. Once the Contractor has installed new utilities, they will provide to EDiS Company an as-built drawing, within 7 days, showing the exact location and elevation of the utilities. The installing Contractor will be responsible for locating and marking these utilities for other contractors that may have work in the same area.

5. Furnish, install, maintain and remove sediment control system including sediment control plan. Maintain sediment control until substantial completion established by DNREC.

6. Provide a certified construction reviewer (CCR) to perform inspections and provide written reports; signed and sealed by a professional engineer.

7. Provide, maintain, and remove at the end of the project the stabilized site entrances as required by DNREC.

8. Provide, maintain, and remove at the end of the project the concrete washout station(s) as required by DNREC. The washout station(s) will be used by all contractors on the project.

9. Protect all existing trees to remain within the limits of construction.

10. Provide potable water for sitework and dust control from a mobile source. The use of the school owner's fire hydrants for construction water is not authorized.

11. Temporary water will be the responsibility of the individual Contractors. The Construction Manager will not provide this service.

12. The Contractor will carefully analyze and make themselves familiar with the Geotechnical Report, specifically; borings, test pits, and engineer's recommendations.

13. Clearing, grubbing and removal of trees, roots and stumps.

14. Saw cutting and removal of sidewalks, curbs, etc. in the performance of work is this Contractor's responsibility.

15. Remove/relocate utilities including, but not limited to the removal of light standards.

16. Topsoil stripping and stockpiling on site. Topsoil will be spread after the sidewalks and roadways are complete. This contractor will furnish and install any additional topsoil required to meet final grades.

17. Rock excavation and backfilling for structures and trenches is defined as work consisting of "bedrock and ledge rock removal for structures and trenches that cannot be accomplished

without either blasting or using rippers. This work also consists of the use or disposal of such excavated material and backfilling the excavation with suitable material" per DelDOT Standard Specifications dated August 2016. Rock excavation (if applicable) will be paid for on a unit price basis.

18. Rough grading for area defined on site drawings for building, lawn areas, bituminous roads, parking and walkways. Preparation of subgrade for building slabs, walks and pavements.

19. The Sitework Contractor will be performing the foundation excavation for the Concrete Contractor. The Concrete Contractor will be responsible for laying out all concrete work as shown on the structural and architectural drawings. This work is to be closely coordinated between the Sitework Contractor and the Concrete Contractor. It will be the responsibility of the Sitework Contractor to maintain all open excavations and dewater as specified until the excavation work is turned over to the Concrete Contractor. Once the Concrete Contractor has accepted this work it will be the responsibility of the Concrete Contractor to maintain and dewater all excavations until the concrete work is complete at which time dewatering will be the responsibility of the Sitework Contractor until final acceptance. The Concrete Contractor and the Sitework Contractor are to coordinate this procedure so that there are no additional costs to the Owner for additional excavation or concrete.

20. Furnish, install and maintain select fill under slab. The Sitework Contractor will bring the area beneath the building to an elevation that is 8-inches below finished concrete elevation. The area will then be turned over to the Concrete Contractor who will be excavating and installing the foundations. It will be the responsibility of the Sitework Contractor to maintain all open excavations and dewater as specified until the excavation work is turned over to the Concrete Contractor. Once the Concrete Contractor has accepted this work it will be the responsibility of the Concrete Contractor to maintain and dewater all excavations until the concrete work is complete. The Concrete Contractor and the Sitework Contractor are to coordinate this procedure so that there are no additional costs to the Owner for additional excavation or concrete. Backfilling around the foundation walls, inside and outside, will be the responsibility of the Concrete Contractor.

21. Proof rolling of limit of excavation prior to the start of fill operations.

22. Underpinning construction will be performed by others. This Contractor, however, shall include in their bid the necessary excavation and backfill for the underpinning.

23. Filling and backfilling as detailed below is the responsibility of this Contractor. Soil types shall be in accordance with project documents.

OPTION 1: It is the intent to use on site material, as much as possible, and imported fill. The use of this onsite material shall conform with the compaction requirements as specified on Civil drawings and in Specification Section 312000. If the onsite material does not meet those requirements or if there is insufficient on site material available, this contractor shall import at no additional expense to the project, enough material to complete the work. Any excess

material shall be removed from the site and disposed of properly at no additional expense to the project.

OPTION 2: It is the intent to use on site material and not imported fill. The use of this on site material shall conform with the compaction requirements as specified on Civil drawings and in Specification Section 312000. If it is determined by the testing agency that the onsite material is unsatisfactory material, then the material shall be removed and replaced at a unit price for select fill.

OPTION 3: It is the intent to use imported fill within the foot print of the building, plus a 10 foot zone around the entire perimeter of the building. It is the intent to use on site material and not imported fill as much as practicable. The use of this onsite material shall conform with the compaction requirements as specified on the drawings and in the specifications. There is not enough fill material on the site. Therefore, importing of material is required, and shall be included in the cost of the work. If it is determined by the testing agency that the onsite material is unsatisfactory material, then the material shall be removed and replaced at a unit price for select fill.

24. Provide water meter pit, and water meter.

25. Provide pipe and backfill for foundation drainage.

26. All new utilities shall be brought to within +/- 5 feet of the building line by this Contractor. The connection and all utilities from +/- 5 feet and into the building shall be by others.

27. Third party testing for on-site quality control (soil compaction, concrete, asphalt, etc.) will be provided by the Owner.

28. Provide all DelDOT permits related to work for this project.

29. This Contractor will provide all pavements markings, fire lane signs, and traffic signs.

30. Provide pre-cast concrete parking bumpers.

31. Provide caulk and joint sealants for work under this contract.

32. This Contractor shall include in the base bid the cost of remobilization, cleaning and tack coating the asphalt base course in order to install the asphalt top coat.

33. Include all costs for traffic maintenance, temporary signage, temporary barricades, arrows, pedestrian protection, flagmen, etc. required to complete the work.

34. Provide access for the Elevator Contractor to the cylinder hole and dispose of spoils from the cylinder excavation.

35. Provide perimeter protection of all excavated areas until suitably backfilled.

36. Base bid shall include all standard dewatering measures; utilizing trenches, crocks, stone and portable pumping measures. This contractor to provide these measures as required to perform their work. Well pointing if necessary, will be handled as a negotiated cost by the Owner.

37. Provide dewatering for perimeter water proofer.

38. Provide street cleaning of mud, etc. on a daily basis for ALL Contractors throughout the entire construction period.

39. Provide site utilities to playing fields and courtyards, including irrigation lines.

40. Provide playing field construction including grading, preparation of subbase, planting mix, seeding and line striping.

41. Provide complete pricing for "synthetic fields" as provided in alternate sections.

42. ASPHALT CEMENT COST ADJUSTMENT
    a. Payments to the Contractor shall be adjusted to reflect increase or decreases in the Delaware Posted Asphalt Cement Price when compared to the Project Asphalt Cement Base Price, as defined in these Special Provisions.
    b. The Delaware Posted Asphalt Cement Price will be issued monthly by the Department and will be the industry price for Asphalt Cement, F.O.B. Philadelphia, Pennsylvania.
    c. All deviations of the Delaware Posted Asphalt Cement Price from the Project Asphalt Cement Base Price are eligible for cost adjustment. No minimum increases or decreases or corresponding percentages are required to qualify for cost adjustment.
    d. Actual quantity of asphalt cement qualifying for any Asphalt Cement Cost Adjustment will be computed based on weight tickets and asphalt percentage from the approved job mix formula.
    e. For Recycled Hot-Mix the asphalt percentage eligible for cost adjustment shall be only the new asphalt cement added to the mix.
    f. The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price for the project will be based on the *MONTH* / *YEAR* price posted on DelDOT's website.
    g. If the Contractor exceeds the authorized allotted completion time, the price of asphalt cement on the last authorized allotted work day, shall be the prices used for cost adjustment. However, if the industry posted price for asphalt cement goes down, the asphalt cement cost shall be adjusted downward accordingly.

43. Provide an allowance to furnish and install 5,000 square feet of 6 inch thick stone base and filter fabric for access around the construction site as directed by the Construction Manager. This Contractor will remove and dispose of this material prior to final grading and spreading of topsoil.

44. Provide in the base bid $150,000 allowance for work as directed by the Construction Manager.

45. Furnish, install and remove temporary orange construction fencing as directed by the Construction Manager (including 5,000 linear feet in base bid).

46. This Contractor shall provide and maintain all temporary access roads as detailed in Contract Documents, until completion of project.

47. Furnish, install, maintain and remove temporary chain link site fencing, temporary walks as shown on the site plan. Maintain this work until Substantial Completion.

48. This Contractor shall provide and maintain all temporary access roads as detailed in Contract Documents, until completion of project. Provide and maintain temporary stone dust paths from the emergency doors of the existing high school. The paths shall be 6' wide and 6" deep.

49. Provide and maintain a temporary access road between the existing west parking lot and the existing roller skating rink. The road is to be constructed of stabilized stone material, crushed concrete or asphalt millings. Road will be 24' wide and 12" thick. Maintain paths and access road during the duration of construction. Remove the temporary access road at the end of the project and restore the area to pre-construction conditions. See sketches TEMP-001, TEMP-002, & TEMP-003 ***(Project Manager's Note: Edit this paragraph if your project requires temporary access roads or paths.)***

DEMOLITION

50. Provide all labor, material, trucking, equipment, disposal, hoisting, scaffolding, power, temporary facilities, supervision, layout, clean up, etc. for the complete performance of all demolition work. This contractor is responsible for all the demolition notes detailed on drawings XXX & XXX. The utility relocations discussed in notes XXX, XXX, XXX and XXX will be performed by the utility companies and is not the responsibility of the Sitework Contractor. The Sitework Contractor will coordinate and cooperate with the utility companies while the work is being performed.

51. Any existing piping, subsoil drainage systems, conduit, manholes, tanks, catch basins, etc. which are abandoned shall be plugged with concrete and, to the extent within or beneath the limits of excavation, removed. All others are to be maintained and repaired or otherwise restored to proper operating condition.

52. Remove from site all combustible material including, but not limited to wood, steel, iron, structural steel, and dispose of in a legal manner. No on site burning of material will be allowed at any time.

53. Remove from site concrete slabs on grade, hot mix paving, retaining walls (concrete and masonry) in a legal manner.

54. Items of demolition shall include, but not necessarily be limited to, complete structures, wall framing, masonry walls, structural steel, interior partitions, roofing, mechanical and electrical equipment and fixtures, and related equipment.

55. This Contractor shall notify the Construction Manager immediately if hazardous materials (i.e. asbestos, lead, PCB's, etc.) are uncovered. At that time, all work in the affected area will be stopped until proper removal can be completed by others (i.e. hazardous material abatement

contractor).

56. Temporary maintenance standby labor such as for temporary water, temporary power, temporary light and the like where required due to this Contractor's work is to be included within the Contract Price.

57. This Project is to be constructed adjacent to existing buildings, this Contractor shall exercise all due precautions to minimize noise, air pollution and any other construction hazards which in any way would cause discomfort or danger to the occupants of the existing buildings in the area.

58. All light, power, water and any other utilities, including special provisions for hookups to same for this Contractor's operations will be provided by this Contractor within the Contract Price and unit prices.

59. This Contractor shall comply with all Federal, State and local laws requiring noise control and hours which work is to be conducted. Mufflers, "whisperized" compressors, etc., shall be used as required for compliance with laws and ordinances throughout the course of the Work.

60. It is understood that all Work under this Contract shall be in strict accordance with the Building Code with the County, State and any other agency having jurisdiction. In the event of any conflict in any provisions of any regulatory agency and Contract Documents, the more stringent requirements shall apply.

61. This Contractor is aware of the structural capacities of various portions of the structure. Cranes, materials, deliveries and material storage, shall not exceed rated capacities without this Contractor taking appropriate steps to compensate for the imposition of loads which may exceed the design criteria, and which are imposed solely by this Contractor's operations.

62. This Contractor shall provide any and all "fire watch" personnel required due to the Contractor's cutting, burning, welding or other open flame activity.

63. This Contractor shall submit proposed methods and operations of building demolition to the Owner, his representative or agents for review prior to the start of work, including a schedule of coordinating the shut off, capping and/or continuation of utility services as required.

64. This Contractor, in the performance of the Work under his subcontractor, shall maintain all required means of egress from the existing buildings and alter such stairs, platforms and fire escapes as required to satisfy all agencies having jurisdiction.

65. Before demolition work is started, existing sewer, water, gas and other service lines to the existing buildings shall be shut off, disconnected and capped or plugged in accordance with the requirements of the utility companies or other authorities having jurisdiction. This Contractor shall notify all such authorities in advance and obtain their approval and cooperation in shutting off utilities. All costs in connection with disconnecting utilities shall be borne by this Contractor.

66. This Contractor shall take special precautions to shore, brace, and support or relocate any utility lines as may be required to satisfy all agencies having jurisdiction.

67. This Contractor shall, in cooperation with utility companies, remove or cause to be removed all light and power poles if required to be removed, at such time as the services utilizing said poles are no longer required.

68. If required, this Contractor shall relocate power or light poles, fire hydrants, traffic signs or signals and similar utility and public service items in use and shall cooperate with all governmental agencies having jurisdiction over such items so as not to interfere with the services of such governmental agencies.

69. Street openings made for the shutting off or tapping of utility lines or for any other purpose shall be backfilled, tamped and the surfaces restored in accordance with the requirement of applicable local codes or to match existing; whichever is greater.

70. Existing services to remain will be defined by the Owner prior to or immediately after the start of demolition work.

71. Utility equipment belonging to the utility companies, if to be retained by these companies, will be removed from the site by the company owning the equipment upon notification by this Contractor.

72. This Contractor shall make a careful examination of the structures to be demolished and the adjoining property and utilities which are to remain; take whatever precautions are necessary and carry on operations to prevent personal injury and any settlement, collapse, damage from falling debris or other causes to adjacent building.

73. Any damage to public property, private property, or to utilities due to demolition operations, or the Contractor's neglect, shall be corrected by this Contractor, in a manner approved by the Owner and the parties whose property has been damaged, all at no additional cost to the Owner.

74. Miscellaneous equipment and furnishings belonging to the Owner, if to be retained by the Owner, will be removed before the commencement of the demolition work. All other equipment or furnishings attached, remaining, in the building at the start of the demolition work shall become the property of this Contractor and shall be removed and disposed of by this Contractor.

75. All equipment, materials and debris shall be regularly removed by this Contractor from the Site as work progresses in such manner as not to create a nuisance and shall be disposed of by this Contractor at his own expense, at locations to be determined by this Contractor. Permits required in connection with the disposal of the materials shall be obtained by this Contractor. Disposal shall be in accordance with all Federal, State and local laws, rules, codes, orders and regulations.

76. Materials and equipment to be salvaged or which have been sold to others by this Contractor must be promptly removed by this Contractor and shall not be stored at the site. The offering, advertising, display or sale of materials and equipment will not be permitted.

77. Contractor shall remove debris promptly and will not burn anything on the site. Contractor shall keep required fire extinguishing equipment in serviceable condition, properly distributed so that

it will be available for immediate use, particularly during any acetylene cutting operations. This Contractor shall afford adequate facilities for inspection by, and carry out the recommendations of, the local Fire Department. This Contractor shall maintain one fire riser during demolition.

78. This Contractor shall, prior to the start of Work, provide the name and location of proposed dump site to receive the demolition debris. Dump site must be licensed and acceptable to all local government agencies having jurisdiction.

79. This Contractor shall provide signed and stamped dump site debris tickets identifying the location, date, time and quantity of debris deposited at the dump site.

CONTRACT NO. A-02 - SELECTIVE DEMOLITION

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 024119	Selective Demolition

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide all labor, material, dumpsters, trucking, disposal, equipment, hoisting, scaffolding, power, temporary facilities, permit fees, supervision, layout, clean up, etc. for the complete performance of all selective demolition work.

2. This Contractor shall visit the site of the proposed work, fully acquaint and familiarize himself with the conditions as they exist and the character of the operations to be carried out under the proposed Contract, and make such investigation as he may see fit so that he shall fully understand the facilities, physical conditions and restrictions affecting the work under the Contract. Claims for additional compensation and/or extensions of time because of Contractor's failure to familiarize himself with all conditions which might affect the work shall not be allowed

3. This contractor owns selective demolition of existing concrete slabs, curbs, interior partitions, exterior walls, doors, frames and hardware, vestibules, interior and exterior windows, storefront, wall systems, flooring, ceilings, casework, masonry, toilet partitions, metal partitions, hose and fire extinguisher cabinets, mechanical equipment, plumbing fixtures and equipment, electrical equipment, fire shutters, signage, fencing and gates as indicated on the drawings. Additional items include standpipe, automatic sprinkler connections, existing drains, roof vents, emergency lighting, public announcement system horn, security cameras, exterior can lighting and any electrical conduit as indicated on the drawings.

4. Salvage and store on-site all materials listed on the demolition sheet notes. Materials can be removed from site for cleaning and returned to site at the contractor's expense. All salvaged materials are to be properly palletized and protected prior to being stored at the location directed by the construction manager.

5. The Fire Protection Contractor will be responsible for disconnecting, draining and safing off the existing fire sprinkler systems prior to the Selective Demolition Contractor's work. Any fire sprinkler piping shown to be demolished will be disconnected and placed on the floor. The Selective Demolition Contractor will be responsible for removal and disposal.

6. The HVAC & Plumbing Contractor will be responsible for disconnecting, draining and safing off the existing HVAC ductwork and piping, and existing plumbing systems prior to the Selective Demolition Contractor's work. Once the HVAC ductwork, HVAC piping, and plumbing systems

are disconnected the Selective Demolition Contractor will be responsible for removal and disposal.

7. The Electrical Contractor will be responsible for disconnecting and safing off the existing electrical systems, lighting, and equipment prior to the Selective Demolition Contractor's work. Once the electrical systems, lighting, and equipment are disconnected the Selective Demolition Contractor will be responsible for removal and disposal.

8. The existing freight elevator may be used to remove demolished materials that are properly contained in carts or barrels, from the building to the load dock area. The existing passenger elevators WILL NOT be used by any contractors. The loading dock area will be the location used for dumpsters. The Selective Demolition Contractor shall provide minimum ½" thick plywood protection for walls and floor inside the freight elevator.

9. Not included in this scope is the disconnection of the mechanical, plumbing, electrical or fire sprinkler lines or equipment.

10. Not included in this scope is the demolition of the existing roof. This work is assigned to Contract BPA-04 Roofing.

11. Not included in this scope is the demolition of the existing exterior louvers. This work is assigned to Contract BPA-03 Glass & Glazing.

12. Demolish all structures and buildings and their appertains construction to new subgrade grade level. Fill in all depressions to new subgrade grade level including vaults and areaways beyond the face of the building. Fill shall consist of clean non-combustible material such as brick and other masonry debris in compliance with the City building code. Excess material to be removed from site in a legal manner. Fill must be clean common compactable fill or select material.

13. Remove from site all combustible material including, but not limited to wood, steel, iron, structural steel, and dispose of in a legal manner. No on site burning of material will be allowed at any time.

14. Remove from site concrete slabs on grade, hot mix paving, retaining walls (concrete and masonry) in a legal manner.

15. All foundation walls, areaway walls, vault walls, shop walls, yard walls shall be demolished to 1'0" below existing grade and filled of depression to subgrade with non-combustible fill material.

16. Items of demolition shall include, but not necessarily be limited to, complete structures, wall framing, masonry walls, structural steel, interior partitions, roofing, mechanical and electrical equipment and fixtures, and related equipment.

17. Remove all oil and fuel storage tanks that are located within the structure in accordance will all City, State and Federal regulations.

18. Remove all concrete (including hot mix, brick, and stone) curbs and sidewalks on as shown. Maintain all utilities.

19. This Contractor shall notify the Construction Manager immediately if hazardous materials (i.e. asbestos, lead, PCB's, etc.) are uncovered. At that time, all work in the affected area will be stopped until proper removal can be completed by others (i.e. hazardous material abatement contractor).

20. Temporary maintenance standby labor such as for temporary water, temporary power, temporary light and the like where required due to this Contractor's work is to be included within the Contract Price.

21. If this Project is to be constructed adjacent to existing buildings, this Contractor shall exercise all due precautions to minimize noise, air pollution and any other construction hazards which in any way would cause discomfort or danger to the occupants of the existing buildings in the area.
22. This Contractor shall clean public streets and sidewalks daily. This Contractor shall collect and remove from the site daily all rubbish, scrap and other debris resulting from its operations.

23. This Contractor shall include in the Contract Price and unit prices, the cost of all police traffic details required for the execution of the Work.

24. All light, power, water, and any other utilities, including special provisions for hookups to same for this Contractor's operations will be provided by this Contractor within the Contract Price and unit prices.

25. This Contractor shall comply with all Federal, State, and local laws requiring noise control and hours which work is to be conducted. Mufflers, "whisperized" compressors, etc., shall be used as required for compliance with laws and ordinances throughout the course of the Work.

26. It is understood that all Work under this Contract shall be in strict accordance with the Building Code with the City, State and any other agency having jurisdiction. In the event of any conflict in any provisions of any regulatory agency and Contract Documents, the more stringent requirements shall apply.

27. This Contractor is aware of the structural capacities of various portions of the structure. Cranes, materials, deliveries, and material storage, shall not exceed rated capacities without this Contractor taking appropriate steps to compensate for the imposition of loads which may exceed the design criteria, and which are imposed solely by this Contractor's operations.

28. This Contractor shall provide any and all "fire watch" personnel required due to the Contractor's cutting, burning, welding or other open flame activity.

29. This Contractor shall submit proposed methods and operations of building demolition to the Owner, his representative, or agents for review prior to the start of work, including a schedule of coordinating the shut off, capping and/or continuation of utility services as required.

30. Before proceeding with the demolition work, this Contractor shall obtain a permit from the City, protect all public sidewalks, streets or thoroughfares and all property adjacent to the site as required by such codes, ordinances, rules, and regulations, including, but not limited to, scaffolding, sidewalk bridges, fences, barricades, aprons, warning signs and lights.

31. This Contractor, before commencement of any part of the Work, shall give any notices, required to be given to an adjoining landowner and other parties.

32. This Contractor, in the performance of the Work under his subcontractor, shall maintain all required means of egress from the existing buildings and alter such stairs, platforms and fire escapes as required to satisfy all agencies having jurisdiction.

33. Before demolition work is started, existing sewer, water, gas, and other service lines to the existing buildings shall be shut off, disconnected, and capped or plugged-in accordance with the requirements of the utility companies or other authorities having jurisdiction. This Contractor shall notify all such authorities in advance and obtain their approval and cooperation in shutting off utilities. All costs in connection with disconnecting utilities shall be borne by this Contractor.

34. This Contractor shall take special precautions to shore, brace, support or relocate any utility lines as may be required to satisfy all agencies having jurisdiction.

35. Any existing piping, subsoil drainage systems, conduit, manholes, tanks, catch basins, etc., which are abandoned shall be plugged with concrete and to the extent within or beneath the limits of excavation, removed. All others are to be maintained and repaired or otherwise restored to proper operating condition.

36. This Contractor shall, in cooperation with utility companies, remove or cause to be removed all light and power poles if required to be removed, at such time as the services utilizing said poles are no longer required.

37. If required, this Contractor shall relocate power or light poles, fire hydrants, traffic signs or signals and similar utility and public service items in use and shall cooperate with all governmental agencies having jurisdiction over such items so as not to interfere with the services of such governmental agencies.

38. Street openings made for the shutting off or tapping of utility lines or for any other purpose shall be backfilled, tamped and the surfaces restored in accordance with the requirement of applicable local codes or to match existing; whichever is greater.

39. Existing services to remain will be defined by the Owner prior to or immediately after the start of demolition work.

40. Utility equipment belonging to the utility companies, if to be retained by these companies, will be removed from the site by the company owning the equipment upon notification by this Contractor.

41. This Contractor shall make a careful examination of the structures to be demolished and the adjoining property and utilities which are to remain; take whatever precautions are necessary and carry-on operations so as to prevent personal injury and any settlement, collapse, damage from falling debris or other causes to adjacent building.

42. Any damage to public property, private property, or to utilities due to demolition operations, or the Contractor's neglect, shall be corrected by this Contractor, in a manner approved by the Owner

and the parties whose property has been damaged, all at no additional cost to the Owner.

43. Miscellaneous equipment and furnishings belonging to the Owner, if to be retained by the Owner, will be removed before the commencement of the demolition work. All other equipment or furnishings attached, remaining, in the building at the start of the demolition work shall become the property of this Contractor and shall be removed and disposed of by this Contractor.

44. All equipment, materials and debris shall be regularly removed by this Contractor from the Site as work progresses in such manner as not to create a nuisance and shall be disposed of by this Contractor at his own expense, at locations to be determined by this Contractor. Permits required in connection with the disposal of the materials shall be obtained by this Contractor. Disposal shall be in accordance with all Federal, State, and local laws, rules, codes, orders, and regulations.

45. Materials and equipment to be salvaged or which have been sold to others by this Contractor must be promptly removed by this Contractor and shall not be stored at the site. The offering, advertising, display or sale of materials and equipment will not be permitted.

46. Contractor shall remove debris promptly and will not burn anything on the site. Contractor shall keep required fire extinguishing equipment in serviceable condition, properly distributed so that it will be available for immediate use, particularly during any acetylene cutting operations. This Contractor shall afford adequate facilities for inspection by, and carry out the recommendations of, the local Fire Department. This Contractor shall maintain one fire riser during demolition.

47. This Contractor shall, prior to the start of Work, provide the name and location of proposed dump site to receive the demolition debris. Dump site must be licensed and acceptable to all local government agencies having jurisdiction.

48. This Contractor shall provide signed and stamped dump site debris tickets identifying the location, date, time, and quantity of debris deposited at the dump site.

49. This contractor shall provide parking and/or transportation to and from the site. Parking will not be allowed on site at any time.

50. This Contractor shall include a $25,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-03 CONCRETE

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification Sections:

Division 0	Bidding	and	Contract	Requirements

Division 1	General Requirements
Section 02200	Earthwork
Section 03310	*Concrete*
Section 05500	*Metal Fabrications*
Section 07200	*Insulation*

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide concrete foundations, slabs on grade, slabs on deck and all reinforcing steel.

2. This Contractor will be responsible for laying out all concrete work as shown on the structural and architectural drawings.

3. This Contractor to furnish and install reinforcing steel, admixtures, curing compound, sealers as required in the Contract Documents.

4. Perimeter insulation at foundation walls.

5. Underslab vapor barrier, insulation, reglets, waterstops, control and construction joints (including required caulking at control and construction joints).

6. Placement of related items furnished under other Specification Sections.

7. Anchor bolts and leveling plates to be installed by this Contractor and furnished by the Structural Steel contractor. Installation within required tolerances. Anchor bolt assemblies to be placed with templates only. Contractor shall supply as-built drawings to steel erector for coordination prior to steel placement.

8. All blockouts and embedments required by plans and specifications.

9. This Contractor to furnish and install all sleeves for incoming utilities at the perimeter walls.

10. This Contractor is responsible for grouting all structural steel base or leveling plates and elevator sill angles.

11. Include all weather, frost protection, and water pumping as required. This Contractor is also responsible for the premiums required for hot water, heated aggregate and admixtures for cold

weather concrete.

12. Coordinate the "Notch" in the concrete slabs to allow for a future Contractor to easily install expansion joint details.

13. Provide concrete fill at steel pan stair treads, landings and associated items.

14. Provide dewatering after acceptance from Sitework Contractor until re-acceptance by the Sitework Contractor.

15. This Contractor will be responsible for laying out all concrete work as shown on the structural and architectural drawings. This work is to be coordinated with the Sitework Contractor who will be performing the excavation for this Contractor. It will be the responsibility of the Sitework Contractor to maintain all open excavations and dewater as specified until the excavation work is turned over to this Contractor. Once this Contractor has accepted this work it will be the responsibility of this Contractor to maintain and dewater all excavations until the concrete work is complete at which time dewatering will be the responsibility of the Sitework Contractor until final acceptance. This Contractor and the Sitework Contractor are to coordinate this procedure so that there are no additional costs to the Owner for additional excavation or concrete.

16. Provide and maintain perimeter fall protection at excavated area per OSHA standards.

17. Provide certified anchor bolt verification drawings to the Construction Manager for review prior to steel erection.

18. Equipment bases and foundations shall be the responsibility of the Contractor providing the equipment.

19. Asphalt concrete paving and portland cement concrete paving, sidewalks and curbs shall be provided by others.

20. All concrete testing will be completed by the Construction Manager, however, it will be the responsibility of this Contractor to furnish all samples.

21. Provide off site disposal of all unsuitable excavated materials.

22. CM Note: Construction Manager to ensure that FF/FL compliance is verified b an independent testing agency within 48 hours of completion of pour, per ACI (Section 8.15.4). Also, a report must be provided to the concrete contractor within 72 hours of pour per ACI.

23. Provide specified sloping for floor drains/trenches in kitchen, showers, as detailed (Drains to be furnished by Mechanical Contractor.)

24. This Contractor shall include the finishing of concrete slabs around a minimum of (fill in) floor penetrations throughout the first and second floor slab areas. These penetrations will consist of electrical boxes, stubbed conduits, mechanical piping and electrical and technology conduit

stubs, etc.

25. This Contractor shall also include all work included in finishing the concrete floors to a minimum of 30 floor drains and or trench drains. Include all sloping and beveling to create a positive flow to the drains.

26. This Contractor shall provide written documentation that all concrete slabs are within the tolerance required by the contract documents. Testing and analysis to be paid for by this Contractor.

27. This Contractor shall include a minimum of two additional out of sequence remobilizations for concrete slab installation.

CONTRACT NO. A-04 MASONRY

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification Sections:

Division 0	Bidding and Contract Requirements
Division 1	General Requirements
Section 03310	Concrete
Section 040511	Masonry Moraring and Grouting
Section 042000	Unit Masonry
Section 07200	Insulation
Section 07900	Joint Sealants

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide masonry units, reinforcing, accessories and related work.
2. Caulking of masonry to masonry and to dissimilar materials.
3. Masonry Caulking
4. Integral masonry flashings, expansion joints, insulation and other related items as required.
5. Mock up as required.
6. Grouting of door frames at masonry openings.
7. Weather protection and temporary heat as required to perform the work and maintain the project schedule.
8. Scaffolding as required to complete the work.
9. Dewatering of work areas.
10. Layout of the work including responsibility for all elevations and dimensions as they affect other Contractor's work.
11. Lintels either required by this Contract or install loose lintels furnished by others.
12. Fill at hollow concrete masonry units.
13. Setting of reinforcing steel in block walls.

14. Cementitious parging.

15. Silicone waterproofing.

16. Cast stone/limestone work.

17. Temporary protection for final wash down/cleaning of masonry.

18. Flashing Summary: (

19. Thru wall and cavity flashing below the roof line shall be by the Masonry Contractor.
20. Thru wall and cavity flashing above the roof line shall be by the Roofing Contractor.

21. Cutting, fitting and building into masonry work, embedments provided by others.

22. Provide all firesafing and fire caulking as required. Work related to masonry work.

23. Furnish masonry veneer anchors to Exterior Structural Stud Contractor for installation.

24. Bond beams including reinforcing and fill.

25. Furnish and install all masonry veneer anchors where required

CONTRACT NO. A-05 STRUCTURAL STEEL & MISCELLANEOUS METALS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 054000	Cold-Formed Metal Framing
Section 055000	Metal Fabrications
Section 057300	Decorative Metal Railings
Section 055100	Metal Stairs
Section 055213	Pipe and Tube Railings
Section 089119	Fixed Louvers

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide structural steel, joists, joist reinforcement, beam reinforcement, metal floor and roof decking.

2. Provide stairs, loose lintels, floor opening frames, handrails, railings, steel ladders and accessories.

3. Provide steel dunnage platforms to support the AHU's on the roof above the 3rd floor. Include metal grating, removable handrails, and ladders at the platforms. Openings for the steel dunnage post-ups in the existing roofing materials shall be cut and patched by the Roofing Contractor. The Structural Steel & Miscellaneous Metals Contractor will be responsible for layout, cutting metal deck, and installation of post-ups.

4. Provide Sturdistruct (or approved equal) rooftop framing system, roof mounted base supports, and louvered equipment screens around the AHUs on the 2nd Floor roof level.

5. The existing roof parapet height is not adequate to meet the OSHA standards for fall protection. This contractor is responsible to provide a fall protection plan and systems that meet OSHA's requirements.

6. Provide roof stairs and ladders.

7. Provide patching of existing roof deck where equipment shown to be demolished, removed, and no new equipment is being installed in its place.

8. Provide operable partition supplementary steel.

9. Provide supplementary steel at skyboom fixtures and anesthesia column ceiling plates.

10. Provide toilet partition and sink supports.

11. Remove, refurbish, and reinstall existing roof ladders as shown on AD-120.

12. Miscellaneous rough hardware, iron shapes, framing and support angles.

13. Framing out for openings (roof drains, mechanical openings, access hatches, stairs, etc.). Assume opening frames will be field installed.

14. Prime paint systems, galvanizing, and related finishing of steel items, including touch up.

15. All steel testing will be the responsibility of the Construction Manager; however, this Contractor will cooperate with the testing agency in the inspection at the fabrication shop and in the field.

16. Provide data and submittal information related to the Scope of this Contract signed and sealed by a Professional Engineer as required by the Contract Documents.

17. The location for a crane to load and unload materials from the roofs is along North Orange Street, between 2nd Street and 3rd Street. This will require a street closure permit through the City of Wilmington that must be included in the crane lift plan. Any activities associated with the work on the roof must be accomplished off-hours or on weekends.

18. This Contractor shall include all necessary staging, rigging, matting and remobilizations to accommodate the sequence of construction.

19. Galvanizing, as required.

20. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.

21. Field touch-up paint.

22. No electrical power for welders will be provided.

23. Verify field dimensions.

24. This Contractor shall include a $10,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-06 - CARPENTRY & GENERAL WORK

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 061053	Miscellaneous Rough Carpentry
Section 064000	Architectural Woodwork
Section 079200	Joint Sealants
Section 081113	Hollow Metal Doors and Frames
Section 081416	Flush Wood Doors
Section 087100	Door Hardware
Section 101101	Visual Display Units
Section 102113	Toilet Compartments
Section 102123	Cubicle Curtains and Tracks
Section 102600	Wall and Door Protection
Section 102800	Toilet, Bath, and Laundry Accessories
Section 104400	Fire Protection Specialties
Section 122413	Roller Window Shades

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide labor and materials to perform the work related to all carpentry and general work.

2. All rough carpentry related to work associated with replacing the roof, installing new mechanical work, and roof screens on the roof. This contract to also provide all wood blocking integral to the roof and wall assemblies (including but not limited to roof parapet blocking, roof blocking, and blocking at curbs). This contractor to coordinate with roof design and provide sufficient wood blocking to meet designed thickness of roof and insulation based upon required slopes. No additional funds will be provided for additional blocking based upon roof thickness.

3. The existing roof parapet height is not adequate to meet the OSHA standards for fall protection. This contractor is responsible to provide a fall protection plan and systems that meet OSHA's requirements.

4. All rough carpentry related to the interior of the building including blocking, wood nailers, etc. for the installation of fire extinguishers, doors, windows, toilet accessories, cabinets, toilet partitions, casework, millwork, markerboards, tackboards, etc. including fire treating, as required.

5. The location for a crane to load and unload materials from the roofs is along North Orange

Street, between 2nd Street and 3rd Street. This will require a street closure permit through the City of Wilmington that must be included in the crane lift plan. Any activities associated with the work on the roof must be accomplished off-hours or on weekends.

6. Provide hollow metal door, wood doors, and frames.

7. Provide finish hardware related to all hollow metal and wood doors. All material to be stored by this Contractor until delivery is requested. Material to be delivered to the site and off loaded by this Contractor. Contract BPA-03 Glass & Glazing is responsible to furnish and install door hardware associated with all aluminum doors.

8. Coordinate card reader requirements with electrical hardware.

9. Keying coordination for all lock sets (Hollow Metal, Wood Doors, Overhead Doors & Grilles, Aluminum Entrances). Contract BPA-06 Carpentry & General Work will be responsible to provide permanent Best cores for all locksets, including work by Contract BPA-03 Glass and Glazing. Replace all construction cores with permanent cores. Install key control cabinet and organize keys according to this key control system.

10. All field trimming required to adjust to existing conditions.

11. Provide visual display boards, white boards, marker boards, tack boards, flag holders, and tack strips. Include any blocking/shims required on the face of the wall to maintain a level mounting surface with the tile wainscot.

12. Provide toilet partitions. Coordinate any structural requirements with Contract BPA-02 Structural Steel & Miscellaneous Metals. Include any blocking required on the face of the wall to maintain a level mounting surface with the tile wainscot.

13. Provide fire extinguishers, cabinets, and accessories.

14. Provide toilet and bath accessories.

15. Provide hand dryers, including stainless steel panels beneath each hand dryer. Coordinate with electrical drawing for power requirements.

16. Provide defibrillators and cabinets.

17. Provide cubicle curtains and tracks

18. Provide roller window shades.

19. Provide mirrors (both framed and frameless). Include any blocking required on the face of the wall to maintain a level mounting surface with the tile wainscot.

20. Provide wall and door protection.

21. Anchoring devices, fasteners, inserts and other related items associated with the installation of the above items.

22. Provide temporary wood safety barricades including toe-boards at all new floor openings for mechanical shafts.

23. Provide temporary walls and barricades at all floors as shown on Life Safety Plans A-002 and A-003. The temporary walls shall be constructed with doors, closers, and panic devices. The side of the temporary walls facing the occupied areas shall receive 5/8" fire rated plywood painted to match adjacent finishes. Doors shall be configured to ensure the door swing follows egress requirements. Temporary walls shall be constructed to the underside of the existing structure and shall not be mechanically fastened to the floor. Temporary barricades will be required at the existing elevators. They are to discourage persons on the elevator from entering the Construction Areas. However, the barricades must allow for persons to exit the elevators and use the egress stairs in case of emergency. Any fastening methods shall be repaired to match the existing finishes. This contractor will also modify the partitions during each phase to allow for the installation of the new ceilings while maintaining separation between the construction area and the occupied areas. When directed by the Construction Manager this contractor shall remove and dispose of the temporary walls and barricades.

24. Provide temporary plywood boxes to protect the existing science casework in rooms SE205, SE211, SE305, and SE309, that will remain during construction. The boxes will be constructed from ½" plywood and 2x framing and shall be freestanding and not attached to the casework. This Contractor will install the temporary plywood boxes prior to the start of selective demolition. This Contractor will remove and dispose of the boxes after all overhead work is complete and when directed to by the Construction Manager.

25. This Contractor shall at a minimum provide and maintain for the length of the project, one temporary fire extinguisher for each 3,000 sq. ft of the protected building area. Fire extinguishers shall be 10lb, Multi-Purpose (ABC) dry chemical, UL labeled, with a rating of 3a:40bc.

26. This Contractor shall include a $25,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-07 - ROOFING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

  Division 0 Procurement and Contract Requirements
  Division 1 General Requirements
  Section 070150.19 Preparation for Re-Roofing
  Section 071113 Bituminous Damp proofing
  Section 071416 Cold Fluid Applied Water Proofing.
  Section 072119 Foamed In-Place Insulation
  Section 075000 Membrane Roofing
  Section 076200 Sheet Metal Flashing & Trim
  Section 077100 Roof Specialties
  Section 079200 Joint Sealants

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Perform demolition of existing roofing system, roof curbs, roof flashings, parapet coping, etc, as shown on the Roof Demolition Plans. The Roofing Contractor will be responsible for removing and disposing off all demolition materials. The selective demolition of any existing mechanical or electrical equipment will be performed by Contract BPA-01 Selective Demolition.

2. Provide single ply flexible roofing system, including rigid and tapered insulation and all related accessories. The Roofing Contractor shall coordinate the demolition and installation of new roofing to ensure that the areas being worked are watertight at the end of any shift.

3. The location for a crane to load and unload materials from the roofs is along North Orange Street, between 2nd Street and 3rd Street. This will require a street closure permit through the City of Wilmington that must be included in the crane lift plan. Any activities associated with the work on the roof must be accomplished off-hours or on weekends.

4. This contractor shall carefully review the edge of roof details to determine if the roof can be placed before the exterior wall assembly is complete. This contractor shall include all costs associated with returning to the jobsite to complete the roof perimeter after wall assembly is complete.

5. The existing roof parapet height is not adequate to meet the OSHA standards for fall protection. This contractor is responsible to provide a fall protection plan and systems that meet OSHA's requirements.

6. Provide sealants and caulking related to roofing, flashing and roof accessories.

7. Roof drains and associated plumbing, and ductwork penetrations and curbs, shall be provided by the HVAC & Plumbing Contractor. Flashing of the roof drains, curbs, and other penetrations shall

be by the Roofing Contractor. Openings in the existing roofing materials shall be cut and patched by the Roofing Contractor. Openings in the metal deck shall be cut by the HVAC & Plumbing Contractor. This work will be performed prior to the installation of the new roofing system.

8. Openings for the steel dunnage post-ups in the existing roofing materials shall be cut and patched by the Roofing Contractor. The Structural Steel & Miscellaneous Metals Contractor will be responsible for layout, cutting metal deck, and installation of post-ups. This work will be performed prior to the installation of the new roofing system.

9. Provide metal parapet coping.

10. Provide walk pads.

11. Provide metal drip edges.

12. Provide expansion joints that are integral to the roof.

13. Provide permanent patching of existing roofing systems at areas of demolition. Demolition of roof drains, mechanical and electrical equipment shall be performed by others. All patching shall conform to original warranty requirements and documents.

14. Provide gutters, downspouts, and splash pans.

15. Provide metal scuppers and related work.

16. Provide a safety rail system and roof edge protection (i.e. Garlok) at the existing roof hatches. These systems shall be installed prior to the start of construction and turned over to the owner at the end of the project.

17. Provide waterproof seals around lightning protection system as required by roof manufacturer requirements. If locations of lightning protection conduits are not clearly shown on the roof plan, include an allowance to seal one penetration for every 500 sf of roof area.

18. Wood blocking shall be provided by others.

19. Provide flashing and sheet metal trim as needed to provide a complete roofing system with no leaks.

20. This Contractor shall include a $25,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-08 - EXTERIOR METAL PANELS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification Sections:

Division 0	Bidding and Contract Requirements
Division 1	General Requirements
Section 07410	Preformed Metal Siding
Section 07460	Preformed Metal Siding
Section 07620	Flashing and Sheet Metal
Section 07900	Joint Sealants

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide panels at perimeter walls and penthouse and all necessary anchoring devices.
2. Flashing of panels integral with the panel system.
3. Caulking of panels.
4. Miscellaneous metal items necessary to support panels other than required structural steel.
5. Furnish anchorage items for embedding into other construction for support of panels.
6. Touch up of all welding.
7. Galvanized, epoxy or stainless steel, etc. anchors as specified.
8. Metal fascias and copings related to the panel system.
9. This Contractor shall coordinate his shop drawings with the Window Contractor's shop drawings.
10. Verification of field dimensions is the responsibility of this Contractor.

CONTRACT NO. A-09 COLD-FORMED METAL FRAMING & DRYWALL

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

  Division 0 Procurement and Contract Requirements
  Division 1 General Requirements
  Section 054000 Cold-Formed Metal Framing
  Section 078100 Applied Fireproofing
  Section 078400 Firestopping
  Section 079200 Joint Sealants
  Section 081113 Hollow Metal Doors and Frames
  Section 081416 Flush Wood Doors
  Section 083100 Access Doors and Panels
  Section 092116 Gypsum Board Assemblies
  Section 134900 Radiation Protection

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide metal studs, insulation, gypsum wallboard, taping, and spackling.

2. Provide batt insulation, both thermal and acoustical and related work.

3. Provide radiation protection in the walls at the Radiology Laboratory on the Lower Level.

4. Provide acoustical sealant of penetrations in insulated drywall partitions.

5. Provide sealants at the top and bottom track of metal stud partitions as shown on the partition schedule.

6. Provide sprayed-on fireproofing of beams, columns and decking as required by the contract documents.

7. Removal of spray fireproofing to expose points of attachment to structural steel is to be performed in a workmanlike manner. Removal of spray fireproofing in excess of 3" greater than the attached item will require repatching which will be backcharged to this Contractor.

8. Provide metal stud infill and drywall patching where existing ductwork, piping, electrical conduits, etc. are removed and new services are not being installed in the same locations. Reference the demolition drawings and new work drawings to determine locations.

9. Installation of access panels furnished by other trades (i.e., HVAC, Plumbing, Electrical, etc.)

10. Include filling of all interior hollow metal door frames in drywall where required.

11. Include fire taping and sealing at perimeter edge and as shown on the Drawings.

12. Scaffolding and lifts for this work.

13. Comebacks and out-of-sequence work may be required and as such should be included.

14. Include all necessary field measurements.

15. Include two (2) passes per floor to "touch-up" mechanical penetrations to ensure ratings required. The first pass will be required prior to ceiling grid installation and the second pass will be required prior to final inspection for Certificate of Occupancy.

16. Bidders are advised to pay particular attention to top of wall conditions, fire and smoke safing of slabs and acoustical sealants.

17. Provide all metal framing as indicated for back up of other materials.

18. Provide metal furring.

19. This Contractor shall include a $25,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-10 – GLASS & GLAZING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

  Division 0 Procurement and Contract Requirements
  Division 1 General Requirements
  Section 079200 Joint Sealants
  Section 084113 Aluminum-Framed Entrances and Storefronts
  Section 084228.23 Sliding Automatic Entrances
  Section 087100 Door Hardware
  Section 088000 Glazing

  This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

  1. Provide aluminum-framed entrances, storefronts, glass, and glazing systems.

  2. Provide finish hardware for all aluminum doors and systems provided under this contract.

  3. Perform demolition of existing louvers shown on the architectural elevations. Provide new aluminum storefront and spandrel glass at these locations.

  4. Provide all glass and glazing at interior and exterior of building.

  5. Provide caulking and sealants related to storefront doors and systems.

  6. Provide custom break metal trim and infill.

  7. Mock-ups as required by the Drawings and Specifications.

  8. Hoisting/scaffolding related to the work of this Contract.

  9. Provide caulk between the materials supplied under this contract and the adjacent surfaces.

  10. Do not provide interior hollow metal or hardware. These items will be provided by others.

  11. Coordinate glass types with partition and door fire ratings. Contact Construction Manager with any discrepancies.

  12. This Contractor shall include a $5,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-11 - FLOORING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 090561	Common Work Results for Flooring Preparation
Section 096813	Tile Carpeting

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide flooring in accordance with the finish schedule and specifications.

2. Prepare subfloor for finished flooring including surface preparation, flash patching, and leveling. Include in the base bid, leveling and patching as per the manufacturer's recommendations for the LVT, RVT, and resinous flooring. Only flash patching is required under tile carpet floors; leveling is not required under tile carpeting.

3. Provide resilient flooring.

4. Provide tile carpeting.

5. Provide resinous flooring.

6. Provide resilient base, this includes the toe kicks at casework.

7. Provide resilient transition and reducer strips at edges of resilient flooring and at edges of carpeting.

8. Provide cleaning, waxing, and protection. Protection will be with reinforced kraft paper, cardboard, or Masonite. Protection shall be maintained until directed to be removed by the Construction Manager.

9. Provide attic stock.

10. Provide cutting and fitting around work of others.

11. This Contractor shall include a $20,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-12 – TERRAZZO

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials and equipment for:

- Technical Specification sections:

Division 0	Bidding and Contract Requirements
Division 1	General Requirements
Section 096613	Thin Set Epoxy Terrazzo

This contract also includes, but is not necessarily limited to, all labor, materials and equipment for the following:

1. Provide terrazzo flooring in accordance with the finish schedule and specification.

2. Provide floor preparation in accordance with manufacturer's written instructions.

3. Barricades, protection, and touch-up as required.

4. Prior to concrete grinding, this Contractor shall set up floor to ceiling poly in work area to contain dust.

5. Provide mock-ups as required by plans and specifications.

6. Provide vapor retarding sealer prior to terrazzo application, as required by specifications or manufacturer's installation instructions.

7. Provide shop drawings and control joint drawings.

8. Fitting around work installed by others.

9. Provide cleaning, sealing, and protection. Protection to be ram-board. Provide protection of finished products until acceptance by Construction Manager. Protection shall be applied over entirety of terrazzo areas. Contractor shall include material and labor for two (2) additional trips to replace flooring protection.

10. Provide expansion joints and sealants as required per manufacturer's installation instructions.

11. Provide crack suppression membrane for this terrazzo installation as required by the project documents.

12. Provide metal strips installed as part of the terrazzo installation. This includes all transitions between terrazzo and Other flooring types.

13. Attic stock.

14. Contractor must provide crews as needed to maintain the project schedule.

15. Provide daily fine cleanup of the work is the responsibility of each individual Contractor which includes broom cleaning of their debris as required. Daily Fine clean up, on a daily basis, shall be defined as those means/methods utilized to perform the daily cleaning tasks without producing dust, noise and stacking of stored materials. Furnish fine clean up on a daily basis. All debris must be removed from the work area at the end of each workday to the appropriate dumpster.

16. Provide at least a 48 hour notice prior to any delivery. All deliveries are to be between 7:00 AM and 3:30 PM.

17. This is not a secure site. All contractors are responsible for concealing, locking and/or removing any materials on a daily basis. EDiS will not be responsible for any lost tools, materials or equipment.

18. This project must adhere to HUD Section 3 requirements. It is expected that all Contractors assist in meeting these requirements. Contractors will be expected to submit HUD form 4737A with each payment application.

19. Incorporation of DBE prime contractors/subcontractors/suppliers shall be a part of the evaluation process for bids. All Contractors all encouraged to participate. Contractors shall include with bids all DBE participation including the name of the company and the value of that portion of the overall contract.

20. Include a $10,000 allocation to be used at direction of Construction Manager.

CONTRACT NO. A-13 - ACOUSTICAL CEILINGS & WALL PANELS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 079200	Joint Sealants
Section 095113	Acoustical Panel Ceilings
Section 095423	Linear Metal Ceilings
Section 098413	Fixed Sound-Absorptive Panels
Section 099300	Staining and Transparent Finishing.

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide acoustical panel ceilings, suspension system and hangers.

2. Provide acoustical lay in insulation blankets above ceiling where required by Specifications or Drawings.

3. Provide fixed sound absorptive panels.

4. Provide supplemental suspension hangers at large ducts above ceilings and at openings for lighting fixtures.

5. Furnish and install hold down clips where required by governing regulations for fire resistant ratings.

6. Provide expansion joints in acoustical ceilings, where required.

7. Provide reflected ceiling layout to be reviewed and approved by the architect prior to the start of work.

8. This Contractor shall cut openings in ceilings for sprinkler heads, lights, mechanical diffusers, and grilles, etc.

9. Attic stock.

10. This Contractor shall include a $10,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-14 – PAINTING & WALL PANELS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 079200	Joint Sealants
Section 097200	Wall Coverings
Section 099000	Painting and Coating
Section 099300	Staining and Transparent Finishing

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide all painting and vinyl or fabric wall covering (all walls and ceilings indicated on the finish schedule).

2. Provide sealants at all interior joints between dissimilar materials that require sealants.

3. Paint all exposed block work and concrete work as shown on the room finish schedule.

4. Prime, stain or seal all wood trim and doors.

5. Paint exposed piping and ductwork (sprinkler, plumbing, electrical) in accordance with the Drawings and Specifications.

6. Provide supplementary ventilation as required in enclosed spaces.

7. Paint and caulk all hollow metal frames and doors as shown on the door schedule.

8. Prefinished items will not be painted by this Contractor.

9. Galvanized items will not be painted by this Contractor.

10. Paint all semi-exposed wood blocking as indicated on the drawing.

11. Provide labeling of fire rated walls as required by IBC as stated below:
    a. Where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with stenciling in the concealed space. Such identification shall:
        i. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
        ii. Include lettering not less than 3 inches (76 mm) in height with a minimum 3/8-inch

(9.5 mm) stroke in a contrasting color incorporating the suggested wording, "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS".

12. Protection of adjacent surfaces.

13. Minor patching prior to application of finishes.

14. Clean up.

15. Attic stock.

16. Final coat of paint is to be installed after ceilings are installed, if directed by Construction Manager.

17. This Contractor shall include a $20,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-15 - CASEWORK & MILLWORK

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 064000	Architectural Woodwork
Section 079200	Joint Sealants
Section 123600	Countertops

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide labor and materials to perform the work related to all casework and millwork. Provide molded rubber base at perimeter of casework where specified.

2. Provide lockers, locker bases, and locker room benches.

3. Provide countertops and backsplashes.

4. Provide grommets for cable pass throughs.

5. Provide all field trimming required to adjust to existing conditions.

6. Coordinate power and data requirements and locations with the electrical contractor for locations and sizes of holes needed.

7. Coordinate cutting holes in casework with other trades.

8. Coordinate blocking requirements with Contract BPA-06: Carpentry & General Work.

9. Provide joint sealants integral to casework/millwork and to dissimilar materials.

10. This Contractor shall include a $5,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-16 - FIRE PROTECTION SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 024119	Selective Demolition
Section 078400	Fire Stopping
Section 079200	Joint Sealants
Section 083113	Access Doors and Panels
Division 21	Fire Suppression
Division 22	Plumbing
Division 23	Heating, Ventilating and Air Conditioning
Division 26	Electrical
Division 28	Electronic Safety and Security

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide piping, fittings, couplings, valves, and sprinkler heads.

2. Provide firestopping and joint sealants.

3. This Contractor will be responsible for safing-off existing fire sprinkler systems prior to the demolition contractor performing their work.

4. Provide design.

5. Provide as-built drawings.

6. Testing and inspections.

7. Cutting and patching.

8. Flow and tamper switches to be supplied by this Contractor and wired by the Electrical Contractor. It is this Contractors responsibility to provide flow and tamper switches to meet applicable state and local codes.

9. This Contractor to coordinate the need for and compatibility of his system to the emergency generator, supplied by others.

10. Pipe identification.

11. Provide the necessary coordination with trade to avoid interferences with other work and make

corrections at no extra charge.

12. The Fire Protections Contractor will be responsible for disconnecting, draining and safing off the existing fire sprinkler systems prior to the Selective Demolition Contractor's work. Any fire sprinkler piping shown to be demolished will be disconnected and placed on the floor. The Selective Demolition Contractor will be responsible for removal and disposal.

13. Relocate the existing fire sprinkler heads to provide adequate coverage in the temporary access corridor created when the temporary wall is installed on the first floor. See drawing A-002 for the location of the temporary wall.

14. This Contractor shall include a $10,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-17 - HVAC & PLUMBING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 024119	Selective Demolition
Section 078400	Fire Stopping
Section 079200	Joint Sealants
Section 083113	Access Doors and Panels
Division 21	Fire Suppression
Division 22	Plumbing
Division 23	Heating, Ventilating and Air Conditioning
Division 26	Electrical
Division 28	Electronic Safety and Security

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide a complete mechanical, plumbing and piping system as indicated on the Drawings and in the Specifications.

2. The HVAC & Plumbing Contractor will be responsible for disconnecting, draining and safing off the existing HVAC ductwork and piping, and existing plumbing systems prior to the Selective Demolition Contractor's work. Once the HVAC ductwork, HVAC piping, and plumbing systems are disconnected the Selective Demolition Contractor will be responsible for removal and disposal.

3. Division 26 of the specifications should be reviewed as it relates to the power wiring and other requirements for HVAC equipment including the coordination of furnishing and installing motor starters as provided in the specifications.

4. This Contractor shall be responsible to designate an individual within his organization, intimately familiar with this project and assigned on site, to act as the System Start-up Coordinator. This individual must be pre-approved by the Construction Manager. This individual's responsibilities shall include, but not be limited to, coordinating the start-up of all mechanical equipment, including the coordination between the Electrical Contractor, the Controls Contractor, and all testing, adjusting and balancing work. This individual shall report on a weekly basis, in written form, to the Construction Manager. These reports shall include a summary of current conditions including manufacturers' start-ups, systems' deficiencies noted to date and the remediation of same, coordination issues between trades, system interfacing and forecasting, as necessary to project the completion of each individual system within the building.

5. Provide equipment bases and housekeeping pads.

6. Provide permits/meters.

7. Provide pipe and duct insulation.

8. Penetrations through wall, floors, etc. including cutting, patching, sealants, and fire safing.

9. Clean up.

10. All guarantees and warranties to begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion.

11. Hoisting, rigging, and scaffolding.

12. The existing roof parapet height is not adequate to meet the OSHA standards for fall protection. This contractor is responsible to provide a fall protection plan and systems that meet OSHA's requirements.

13. The location for a crane to load and unload materials from the roofs is along North Orange Street, between 2nd Street and 3rd Street. This will require a street closure permit through the City of Wilmington that must be included in the crane lift plan. Any activities associated with the work on the roof must be accomplished off-hours or on weekends.

14. Provide ductwork, flex duct, grilles, registers, and diffusers.

15. Provide roof drains.

16. Provide louvers and vents related to HVAC operations.

17. Roof curbs, pipe, hoods, and vent equipment & supports are to be supplied by contractor in which the units, piping, etc. are being supplied. The openings for the curbs in the roofing materials shall be cut by Contract BPA-04 Roofing. Openings in the metal deck shall be cut by the contractor in which the units are being provided. The roofing contractor shall provide all flashing and sealing of the curbs. Any wood blocking required will be provided by Contract BPA-06 Carpentry & General Work.

18. Provide all caulking and sealants for proper installation of HVAC and plumbing equipment.

19. Provide firestopping.

20. Coordinate damper size, location, and type of damper with architectural drawings.

21. Temporary heat and ventilation installation, maintenance, and removal. Refer to Division 1, Specification Section 015123 - TEMPORARY HEAT AND VENTILATION, for specific scope.

22. Provide gas piping, meter, and pressure regulator valve.

23. Provide roof curbs.

24. Provide a Cold Storage Unit to replace the existing Cold Storage Unit on the 3rd floor. This work is part of Alternate No. 4.

25. Install Owner pre-purchased equipment, if applicable.

26. Furnish Access panels where required to access HVAC and plumbing equipment. Installation of access panels to be provided by Contract A-05 Cold Formed Metal Framing & Drywall Contractor.

27. Provide as-built drawings.

28. This Contractor shall include a $50,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-18 – ELECTRICAL & SPECIAL SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 024119	Selective Demolition
Section 078400	Fire Stopping
Section 079200	Joint Sealants
Section 083113	Access Doors and Panels
Division 21	Fire Suppression
Division 22	Plumbing
Division 23	Heating, Ventilating and Air Conditioning
Division 26	Electrical
Division 28	Electronic Safety and Security

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide a complete electrical power and lighting systems as indicated on the drawings, schedules and in the specifications.

2. The Electrical Contractor will be responsible for disconnecting and safing off the existing electrical systems, lighting, and equipment prior to the Selective Demolition Contractor's work. Once the electrical systems, lighting, and equipment are disconnected the Selective Demolition Contractor will be responsible for removal and disposal.

3. Division 23 of the specifications should be reviewed as it relates to the power wiring and other requirements for HVAC equipment including the coordination of furnishing and installing motor starters and controllers as detailed in the Specifications and on the Drawings.

4. Temporary electric installation, maintenance, and removal. Refer to Division 1, Specification Section 015113 - TEMPORARY ELECTRIC, for specific scope.

5. Rough in and final connection and related work for equipment provided under other contracts (i.e. HVAC, sprinkler, motorized doors, etc.)

6. Provide permits and inspections.

7. Penetrations through walls, floors, etc. including cutting, patching, sealants, and fire safing.

8. Testing.

9. Clean up.

10. Provide all caulking and sealants for proper installation of HVAC and plumbing equipment.

11. Provide firestopping.

12. Roof curbs, pipe, hoods, and vent equipment & supports are to be supplied by contractor in which the units, piping, etc. are being supplied. The openings for the curbs in the roofing materials shall be cut by Contract BPA-04 Roofing. Openings in the metal deck shall be cut by the contractor in which the units are being provided. The roofing contractor shall provide all flashing and sealing of the curbs. Any wood blocking required will be provided by Contract BPA-06 Carpentry & General Work.

13. The existing roof parapet height is not adequate to meet the OSHA standards for fall protection. This contractor is responsible to provide a fall protection plan and systems that meet OSHA's requirements.

14. All guarantees and warranties to begin at the substantial completion of the entire project. Maintain equipment prior to substantial completion.

15. Hoisting, rigging, and scaffolding.

16. Furnish Access panels where required to access electrical equipment. Installation of access panels to be provided by Contract A-05 Cold Formed Metal Framing & Drywall Contractor.

17. Provide heat tracing.

18. Special systems (CCTV, sound, security, time clock, sound masking).

19. Grounding of building columns and interior spaces as required.

20. Pull strings and boxes for voice/data boxes.

21. Provide as-built drawings.

22. Provide rough-in and final connection and related work for equipment provided under other contracts (i.e. HVAC, sprinkler, motorized doors, audio-visual, etc.).

23. Provide complete audio and audiovisual systems.

24. This Contractor shall include a $25,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-19 – BUILDING ATC SYSTEMS

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification Sections:

Division 0	Procurement and Contract Requirements
Division 1	General Requirements
Section 078400	Fire Stopping
Section 079200	Joint Sealants
Section 083113	Access Doors and Panels
Division 21	Fire Suppression
Division 22	Plumbing
Division 23	Heating, Ventilating and Air Conditioning
Division 26	Electrical
Division 28	Electronic Safety and Security

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide automatic temperature controls for equipment whose main purpose include all items in the automatic temperature control scope. Provided, however, that the controls do not directly switch the power lines to the equipment; the wiring of such controls to remain the responsibility under Contract Scope 16000.

2. Provide environmental controls.

3. Provide ventilation controls.

4. Provide cooling controls.

5. Provide humidification and dehumidification controls.

6. Provide refrigeration controls.

7. Provide motorized dampers when not specified as part of the factory packaged equipment supplied to job site for distribution and installation by others.

8. Building centralization controls including centralized temperature, humidity, pressure and flow indication and recorders, centralization of air conditioning, heating, ventilation, humidification, and refrigeration equipment operation.

9. Building life safety control and equipment safety control including operators and controls for motorized smoke dampers, operators, and controls for motorized fire dampers, firestats, freeze protection thermostats, shut down safety devices forming part of automatic temperature control.

10. Permits as required for work under this contract scope.

11. Inspections as required under this contract scope.

12. Provide electrical thermostats intended for automatic temperature controls complete with subbases or adapter plates to mount on standard electrical box.

13. Provide remote reading gauges, transmitters, and recorders for automatic temperature control.

14. Furnish Access panels where required to access ATC equipment. Installation of access panels to be provided by Contract A-05 Cold Formed Metal Framing & Drywall Contractor.

15. Control wiring and/or air piping required for all automatic temperature controls supplied under this contract scope.

16. Wiring for remote thermostats and remote prewired auxiliary control panels for packaged equipment.

17. Boiler feed water control wiring.

18. The magnetic starter coil and relay coils supplied under Contract BPA-17 Electrical and intended for automatic temperature controls, including interlocking between starters and/or relays when controlled automatically.

19. Exclude direct reading temperature and pressure gauges connected directly to non-potable water systems.

20. Exclude motorized dampers when specified as integral part of packaged equipment.

21. Exclude automatic temperature controls when specified as integral part of packaged equipment.

22. Exclude flow measuring and control devices.

23. Exclude direct reading temperature and pressure gauges connected directly to refrigeration systems.

24. Exclude filter gauges directly connected to duct systems.

25. Exclude fire alarm, fan shut-down, relays and wiring Section 16720.
26. This Contractor shall include a $10,000 allowance in their base bid for work to be directed by the Construction Manager. All remaining allowance shall be returned to the Owner at completion.

CONTRACT NO. A-20 – TESTING, ADJUSTING & BALANCING

A. Work included in this contract consists of, but is not necessarily limited to, all labor, materials, and equipment for:

- Technical Specification sections:

Division 0	Bidding and Contract Requirements
Division 1	General Requirements
Section 230593	Testing, Adjusting, and Balancing for HVAC
Section 230800	Commissioning of HVAC
Division 22	Plumbing
Division 23	Heating, Ventilating and Air Conditioning
Division 26	Electrical

This contract also includes, but is not necessarily limited to, all labor, materials, and equipment for the following:

1. Provide water and air testing and balancing.

2. Contractor shall prepare, at a minimum, a preliminary balance report for the City of Wilmington Final Inspection.

3. Submissions will be reviewed once, and any resubmittals will be reviewed once. Any other submittals will be billed to the contractor at the Engineers standard rates. Please thoroughly review all submissions prior to forwarding to avoid these costs.

4. Provide complete signed and sealed testing report prior to substantial completion and final inspection as required by City of Wilmington.

5. This contractor has been allotted 30 days to complete all work and provide final, sealed balancing report by the Construction Manager. This contractor will need to work closely with the Construction Manager and all MEP trades to sequence work so that the completion of the balancing is completed in a manner that does not delay acceptance from the City of Wilmington.

6. Provide confirmation of duct testing completed by Contract BPA-15 HVAC & Plumbing.

7. This contractor must provide all lifts or scaffold means to access all elements.

8. Provide circulating water system test.

END OF SECTION

SECTION 012100 - ALLOWANCES

1. RELATED DOCUMENTS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

   C. Refer to Scope Information Sheets for all contracts bound in the Project Manual under Section 011100 - SUMMARY OF WORK. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.

   D. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

   E. Include in the Contract Sum all lump sum and unit cost allowances stated in the Contract Documents.

   F. Designate in the construction progress schedule the delivery dates for products specified under each allowance.

   G. Designate in the Schedule of Values the quantities of materials required under each unit cost allowance.

2. ALLOWANCES FOR PRODUCTS

   A. The amount of each allowance includes:

      1. The cost of the product or labor to the Contractor or Subcontractor, less any applicable trade discounts.

      2. Delivery to the site.

      3. Labor required under the allowance, only when labor in specified to be included in the allowance. If labor is not specified to be included in the allowance, it shall be included in the Contractor's bid and in the resulting Contract Sum.

      4. Applicable taxes.

      5. Profit and overhead.

   B. In addition to the amount of each allowance, include in the Contract Sum the Contractor's costs for:

1. Handling at the site; including unloading, uncrating and storage.

2. Protection from the elements and from damage.

3. Labor for installation and finishing, except where labor is specified to be a part of the allowance.

4. Other expenses required to complete the installation.

5. Contractor's and Subcontractor's overhead and profit.

C. Refer to Scope Information Sheets under Section 011100 - SUMMARY OF WORK for the amount of each lump sum allowance and for work specified in the specification sections listed below.

3. ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.

1. For products and labor specified under a unit cost allowance, the unit cost shall apply to the quantities actually used with a nominal allowance for waste, as determined by receipted invoices, or by field measurement.

B. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

END OF SECTION

ALLOWANCE AUTHORIZATION

Project:

Architect: **Project No.**

Contractor:

AAA No.: **Initiation Date:**

The Allowance is allocated as follows:

Total original Contract Allowance was:	$
Amount of Contract Allowance Access previously authorized:	$
Adjusted Contract Allowance prior to this authorization is:	$
The amount of available Allowance will Decrease by this Access Authorization:	$
The remaining Contract Allowance, after this Access Authorization will be:	$

Recommended by:
Architect

By (Signature): _____
Date: _____

Accepted by:
Contractor

By (Signature): _____
Date: _____

Approved by:
Owner

By (Signature): _____
Date: _____

SECTION -12300 - ALTERNATES

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 – 2019 Edition, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

   C. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

2. BASE BID

   A. The Base Bid shall consist of all Work shown or specified in the Contract Documents, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).

   B. The Base Bid shall include all work in any Subtractive Alternates specified herein.

3. ALTERNATES

   A. State in the Bid Form, where applicable, the amount to be added to or deducted from the amount of the Base Bid for each Alternate specified.

   B. See Section 002113 - INSTRUCTIONS TO BIDDERS for related information.

   C. The description of Alternates contained herein is in summary form. Detailed requirements for materials and execution shall be as specified in other sections and as shown on drawings.

      Alternate No. 1: Storefront Replacement 1
      1. Base Bid: No work required.
      2. Alternate: Remove and replace existing storefront in Vestibule SE201A with new storefront. Provide new solid surface sills & base.

      Alternate No. 2: Door & Storefront Replacement
      1. Base Bid: No work required.
      2. Alternate: Remove and replace existing aluminum and glass doors and storefront system adjacent to South Corridor 103.

      Alternate No. 3: Storefront Replacement 2
      1. Base Bid: No work required.

2. Alternate: Remove and replace existing storefront in Southeast Building Lobby with new storefront. Maintain existing solid surface sills and base.

Alternate No. 4: Additional Metal Panels
1. Base Bid: No work required.
2. Alternate: Install metal panels over existing brick above new vestibule addition, see A203.

Alternate No. 5: Roof Mounted Equipment Screen
1. Base Bid: No work required.
2. Alternate: Provide metal panel equipment screen as shown on C1/A201. Include galvanized steel supports and associated roofing modifications.

Alternate No. 6: Concrete Planter Wall
1. Base Bid: Construct planter walls with face brick and CMU, refer to Civil drawings.
2. Alternate: Construct planter walls with face brick and poured in place concrete, refer to Civil drawings.

Alternate No. 7: Stairwell Heat
1. Base Bid: No work required.
2. Alternate: Install new stairwell heat in the (2) two stair towers in the Southeast Building, see M103.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Identify product, fabrication, and installation method to be replaced. Include affected Specification Section number and title and Drawing numbers and titles. Indicate specific Drawing detail, where applicable.

1. Submit PDF electronic files of each request for consideration. No pre-bid substitution requests will be permitted.
2. Substitution Request Form: Use CSI Form 13.1A.
3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product, fabrication, and installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements

indicated. Indicate deviations, if any, from the Work specified. Indicate modifications to Work in place required to accommodate substitution.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with specified requirements.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES or other organizations acceptable to authority having jurisdiction.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
n. Draft Change Order documenting substitution acceptance prepared on form specified in Section 012600 "Contract Modification Procedures."

4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
   c. Architect will consider only one request for substitution for each product. If substitution request is not accepted, provide specified product.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions for Consideration: Architect will consider Contractor's request for substitution when the following conditions are satisfied. When any condition for consideration is not satisfied, Architect will return request without action, except to record noncompliance with these requirements:

1. Requested substitution is consistent with the Contract Documents and will produce indicated results.
2. Requested substitution provides sustainable design characteristics that specified product provided.
3. Substitution request is fully documented and properly submitted.
4. Requested substitution will not adversely affect Contractor's construction schedule.
5. Requested substitution has received necessary approvals of authorities having jurisdiction.
6. Requested substitution is compatible with other portions of the Work.
7. Requested substitution has been coordinated with other portions of the Work.
8. Requested substitution provides specified warranty.
9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions will not be considered:

1. When indicated or implied on Shop Drawing or Product Data submittals, without separate written request.
2. When acceptance will require Contract Documents revision.
3. When request is not from Contractor.

C. Substitutions for Cause: Submit requests for substitution required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

1. Submit requests immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
2. Additional Conditions for Consideration:

a. Specified product, through no fault of Contractor, is not available or cannot be delivered in time to meet Project schedule. Failure of Contractor to

order specified product in time to meet schedule is not a condition necessitating substitution.

b. Specified product, through no fault of Contractor, cannot comply with changed Project conditions.

D. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CHANGE ORDER PROCEDURES

1. GENERAL

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

C. The Construction Manager is responsible for processing all change orders. Each request will be assigned a change order request (COR) number. The Change Order Request & Execution Form will be initiated via the web-based project management system (Building Blok) used by the CM.

D. It is to be clearly understood that no extra work shall commence without an approved written and executed change order from the Owner.

2. INITIATING A CHANGE ORDER

A. Specific changes initiated by the Owner, Architect, Construction Manager (CM) or Contractor will be processed as follows:

1. The Owner will authorize the Architect to prepare sufficient documents to establish an accurate price. These documents to be forwarded to the Construction Manager and Owner "for pricing only, not authorized for construction." The Construction Manager will develop the estimate (within 2 weeks) showing a breakdown by trades with all trade contractor quotes. The Owner will approve or reject the change request within two (2) weeks. If the Owner elects to proceed with the change, the Construction Manager will prepare formal change orders to the various trade contractors involved in the change and reference in all formal change orders the original change order request number.

2. Field Change: Contractor shall immediately notify the Construction Manager of a change due to field conditions or site conditions. If documents cannot be prepared for pricing due to schedule constraints, the Construction Manager will make every effort in estimating the field change. If the Owner and Construction Manager agree that certain field changes should be handled on a time and material basis, the Construction Manager will closely monitor the Contractor's labor and material affecting this change. At the completion of the work a formal change order will be issued.

3. Contractor Change: If a Contractor initiates a change order for work not included in the Contract, the Construction Manager and Architect will research the validity of the request, verify quantities and pricing and submit to the Owner for approval on a change order request.

B. The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor, Construction Manager and the Architect.

3. PROCESSING A CHANGE ORDER

A. The Contractor will fill in the Change Order Request & Execution Form (COREF) with a brief description of the change, any time extension, and cost changes.

B. The Contractor will attach to the COREF copies of the written quotations from the trade contractors, Contractors, and suppliers. The Labor Detail Sheet and the Change Order Detail forms must be added as an attachment to the COREF. The Contractor and each sub-tier contractor (as applicable) must fill out the Labor Detail Sheet and Change Order Detail Sheet. Samples of these forms are attached.

C. In all cases, this cost or credit shall be based on the "DPE" wages required and the "invoice price" of the materials/equipment needed.

D. "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes direct salary plus customary fringe benefits (prevailing wage rates) and documented statutory costs such as workman's compensation insurance, FICA, and unemployment insurance.

1. "Fringe Benefit" is any medical, life or disability insurance, paid time off, etc.

2. "Worker's Compensation" is the insurance required for injuries including medical leave, etc.

3. "FICA" is the costs association with Social Security and Medicare insurance.

4. "Unemployment insurance" is the cost associated with the governmental assessment for employee's unemployment benefits.

E. "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor (or Subcontractor) to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity.

F. In addition to the above, the Contractor is allowed markup for overhead and profit on additional work performed as outlined in Specification Section 012613, Contractor Compensation.

G. Building Blok Procedures: The Contractor will submit all change order requests and supporting documentation via the Building Blok web-based project management system. Each Contractor will be issued a unique login and password. Each contractor must submit the information as follows:

1. Create a new change order, from your "To-Do List" by clicking on the "Create Issue" tab in the upper right corner and select "Change Order Request".

2. The Contractor will enter a brief description of the change in the "Summary" block. A detailed description of the change will be entered in the "Description of Change" block, to include any changes to documents or time extension. The cost of the change will be entered in the "Total Cost Change" block.

3. The Labor Detail Sheet and the Change Order Detail forms must be added as an attachment to the request. The Contractor and each sub-tier contractor (as applicable) must fill out the Labor Detail Sheet and Change Order Detail Sheet. Samples of these forms are included behind this section. In addition to these forms, the Contractor also must attach any material and equipment rental quotations. All of these documents should be scanned and saved as a PDF file. Click on the "Browse" box to upload the file. Be sure to wait until Building Blok tells you the file was "Uploaded Successfully".

4. Once the information is entered on the form and the proper attachments are uploaded, the contractor will click "Save". The Contractor will be prompted to enter their password to approve an electronic signature. Once you save the request you will have an opportunity to check it before submitting it to the CM. After you verify the COREF is correct click "Recommend Approval" to submit the change request to the CM. The Contractor will then be prompted to re-enter the password to approve an electronic signature and complete the submission request. Click on "Home" in the upper left corner to make sure the change order does not appear on your To-Do List.

5. The Change Order Request will then be reviewed by the CM Project Manager and Recommended for Approval, Rejected, or returned to the Contractor for additional information. Once the Construction Manager, Owner, and Architect have approved the request all parties will receive an email from Building Blok notifying them that a fully executed Change Order and Contract Recalculation Form can be downloaded from Building Blok. Hard copies of the executed change order and recalculation form will not be provided by the CM.

It is to be clearly stated that no extra work shall commence without an approval from the Owner or Construction Manager or Owner's representative.

END OF SECTION

CHANGE ORDER DETAIL FORM

(Provided by contractor, subcontractor or sub tier contractor)

DATE SUBMITTED:

CONTRACT:

CONTRACTOR:

PROJECT NAME:

CHANGE ORDER REQUEST #:

LABOR SECTION

TRADESMAN(s):	LABOR HOURS	RATE (per schedule)	SUBTOTAL
Subtotal			

MATERIAL SECTION

MATERIAL:	QUANTITY	UNIT COST	SUBTOTAL
Subtotal			

EQUIPMENT SECTION

EQUIPMENT:	QUANTITY	UNIT COST	SUBTOTAL
Subtotal			

SUBTOTAL	
SUBCONTRACTOR/ SUB TIER*	
OH & PROFIT (7.5% on sub/sub tier only))	
BOND COST	
OH & PROFIT (15% on own work)	
GRAND TOTAL	

LABOR DETAIL FORM

(Provided by contractor, subcontractor, or sub-tier contractor)

DATE:

CONTRACT:

CONTRACTOR:

PROJECT NAME:

CHANGE ORDER REQUEST #:

CLASSIFICATION:			
Base Wage Rate:			
Health Insurance			
Holidays			
Sick Days			
Life Insurance			
Disability Insurance			
Dental Insurance			
Company Vehicle			
401K			
Education			
Other (*specify below*)			
Subtotal			
Posted Prevailing Rate			
FICA (Social Security & Medicare)			
SUTA (State Unemployment)			
FUTA (Federal Unemployment)			
General Liability Insurance			
Worker's Compensation			
Total Wage Rate			

SECTION 012613 - CONTRACTOR COMPENSATION

1. GENERAL

A. The Contractor agrees to perform any additional Work, for the net cost of materials and labor (including wages paid, payroll taxes, and all insurance) plus the following percentage for all of his overhead and profit, which includes Field Supervision:

The percentages to be added or allowed for any Work change involving both added Work and omitted Work shall be applied only to the net difference in cost.

1. 15% mark-up (10% overhead and 5% profit) by the Contractor on Work performed by his own forces.

2. For work done by a Subcontractor, 10% for subcontractor overhead and 5% for subcontractor profit to which the Contractor may add 7.5% for his overhead and profit combined.

3. Contractor mark-up shall include supervision, home and field overhead, all self-owned small tools and equipment.

B. When the Contractor is directed to perform overtime work at the CM (Owner) expense to accelerate contractual work, the cost for same shall only be the actual premium costs incurred by the Contractor.

END OF SECTION

SECTION 012900 - PAYMENT PROCEDURES

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 - 2019 Edition, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, CONSTRUCTION MANAGER AS ADVISOR EDITION, for requirements in addition to those specified in Division 1.

   C. For work being constructed under separate prime contracts, provisions of this Section apply to each contract being bid.

2. REQUIREMENTS INCLUDED

   A. Submit Applications for Payment to Construction Manager in accordance with the schedule and procedures established in the Contract Documents.

3. RELATED REQUIREMENTS

   A. Owner-Contractor Agreement.

   B. Conditions of the Contract: Article 9 PAYMENTS AND COMPLETION.

   C. Section 01 31 13: Project Coordination Meetings

   D. Section 01 33 00: Submittal Procedures

   E. Section 01 77 00: Closeout Procedures

4. FORMAT AND DATA REQUIRED

   A. Submit itemized applications typed on AIA Document G702/CMa, Application and Certificate for Payment, and Continuation Sheet G703, examples of which will be furnished to the Contractor at the Pre-Construction meeting.

   B. Provide itemized data on Continuation Sheet

      1. Format, schedules, line items and values: Duplicates of those of the schedule of values previously accepted by the Construction Manager.

5. PREPARATION OF APPLICATIONS FOR PROGRESS PAYMENTS

   A. Form: AIA Document G702/CMa

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on Continuation Sheets.

B. Continuation Sheets

1. Line items of components of Work will be subject to Owner's review and approval under the Provisions of Section 013300 - SUBMITTALS, and the General Conditions. Continuation Sheets shall follow Schedule of Values submitted at the start of the job.

2. Fill in total list of all scheduled components of Work, with item number and scheduled dollar value for each item. Fill in values of work completed in the period.

3. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored; round off values to nearest dollar.

4. List each Change Order executed prior to date of submission, at the end of the Continuation Sheets; list by Change Order Number, and description, as for an original component item of work.

5. Contractor is to include a line item for "Closeout Documents" equaling 3.5% of their contract value.

6. PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified in progress payments.

7. SUBMITTAL PROCEDURES

A. Complete Invoice:

1. Submit completed Application to the Construction Manager by the date stipulated in the Project Manual.

B. Number: Submit 3 copies of each invoice.

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes.
   1. Project coordination.
   2. Coordination and Project Conditions.
   3. Preconstruction meeting.
   4. Site mobilization meeting.
   5. Progress meetings.
   6. Preinstallation meetings.
   7. Requests for Interpretation or Information (RFIs).
   8. Project web site.

1.2 INFORMATIONAL SUBMITTALS

A. Coordination documents.
   1. Initial completed documents.
   2. Revisions, when completed.

1.3 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
   1. Include provisions to accommodate items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

C. Coordinate space requirements, supports, and installation of fire protection, plumbing, mechanical, and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
   1. Coordinate completion of portions of Work designated for Owner partial occupancy.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work to minimize disruption of Owner's activities.

1.4 COORDINATION DOCUMENTS

A. Prepare coordination drawings to organize installation of mechanical, plumbing, fire protection, electrical, laboratory, and medical equipment and systems for using space efficiently, sequencing installation, and identifying potential conflicts and interferences.

B. Show systems for each area on one drawing. Indicate systems showing actual sizes, locations, and elevations.

C. Show clearances between systems and where systems cross structural framing.

D. Identify electrical power characteristics and control wiring required for equipment.

E. Revise drawings to eliminate conflicts preventing completion of Work.

F. Require each installer with work shown on coordination drawings to sign drawings indicating acceptance of coordinated work locations.

G. Maintain documents for the duration of the Work. Record changes during progress of Work.

H. Reproduce and distribute coordination documents to affected parties.

1.5 PRECONSTRUCTION MEETING

A. Construction Manager will schedule meeting.

B. Required Attendees: Construction Manager, Owner, Architect, and Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing parties in Contract, Architect, and consultants.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal requests, requests for information, Change Orders, and Contract closeout procedures.
   7. Scheduling.
   8. Scheduling activities of code required special inspections.

D. Record minutes and upload to project website within two days after meeting.

1.6 SITE MOBILIZATION MEETING

A. Construction Manager will schedule meeting at Project site before Contractor occupancy.

B. Required Attendees: Construction Manager, Owner, Architect, consultants, Contractor, Contractor's superintendent, and major subcontractors.

C. Agenda:
1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and Project layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Testing procedures.
10. Record documents maintenance procedures.
11. Equipment start-up requirements.
12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and upload to project website within two days after meeting.

1.7 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at minimum two-week intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, and record minutes.

C. Required Attendees: Owner, Architect, Construction Manager, prime contractors, job superintendent, major subcontractors and suppliers, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Previous meeting minutes review.
2. Work progress review.
3. Field observations, problems, and decisions.
4. Problems impeding planned progress identification.
5. Submittal schedule and status review.
6. Off-site fabrication and delivery schedules review.
7. Progress schedule maintenance.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Projected progress coordination.
11. Quality and work standards maintenance.

12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

E. Record minutes and upload to project website within two days after meeting.

1.8 PREINSTALLATION MEETINGS

A. When required in individual Specification sections, convene preinstallation meetings before starting work of specific section.
   1. Meeting Location: Project site, as directed by Owner, or as specified in individual Specification sections.

B. Require attendance of parties directly affecting or affected by Work of the Specification section.

C. Notify Architect four business days in advance of meeting date.

D. Prepare agenda and preside at meeting.

E. Agenda Items:
   1. Delivery, storage, preparation, and installation procedures.
   2. Installation sequencing.
   3. Approved submittals review.
   4. Manufacturers' written recommendations and instructions review.
   5. Related work coordination.
   6. Compatibility of materials with previously installed work.
   7. Field samples or mockups requirements.
   8. Surrounding work protection.
   9. Installation tolerances and their impact on preceding and subsequent work.
   10. Testing and inspections.
   11. Protection after installation.
   12. Warranty requirements.
   13. Other items required in individual Specification sections.

F. Record minutes and upload to project website within two days after meeting.

1.9 REQUESTS FOR INTERPRETATION OR INFORMATION (RFI)

A. RFIs will be accepted and processed by Architect regarding Architect's Contract Documents, only.
   1. Make requests regarding preliminary drawings or specifications by normal correspondence, not by RFI. Architect’s responses to such requests do not constitute Contract requirements for Work.
   2. Architect will only respond to Contractor submitted RFIs.

B. Acceptable RFI Purposes:
   1. Errors, inconsistencies, or omissions are discovered in Contract Documents.
   2. Contract Documents or existing conditions do not comply with applicable codes or regulations.

3. Existing conditions are not as described in Contract Documents or other available project documents.
4. RFIs for other purposes are not permitted.

C. Owner Documents: Make requests for information or interpretation of Owner-prepared Contract Documents by normal correspondence, not by RFI. Owner is responsible for responding to such requests. Provide contemporaneous copies of such requests to Architect.

D. RFI submission constitutes representation that Contractor made good faith, careful study and comparison of Contract Documents, field conditions, other Project information, Contractor prepared coordination drawings, and prior project correspondence or documentation before submitting RFI.

E. Submit RFIs on project web site using AIA Document G716 or Architect accepted form.
1. Attach sketches, diagrams, product data sheets, and other supplementary information relevant to the RFI.

F. Architect Action: Allow five business days for response. RFIs received by Architect after 2:00 PM will be considered as received on following business day.
1. Architect may request additional information or clarification, in which case Architect's time for response will date from time of receipt of requested additional information or clarification from Contractor.

G. When Contractor believes Architect's response requires change in Contract Time or Contract Sum, or when Contractor disagrees with Architect's response, notify Architect in writing within five business days of receipt of response.

H. RFI Log: Maintain tabular log of RFIs and submit copies at Progress Meetings. Include:
1. Project name.
2. Contractor name.
3. RFI number.
4. RFI subject.
5. Submission date and time.
6. Response date.

1.10 PROJECT WEB SITE

A. Project Web Site: Use Construction Manager's project web site for project communication and documentation.
1. Types of Communication and Documentation on Project Web Site:
a. Submittals and submittal logs.
b. Schedules.
c. Meeting minutes.
d. RFI forms and logs.
e. Project correspondence.
f. Project directories.
g. Photographic documentation.
h. Payment applications.
i. Project closeout documents.

j. Contract modification forms and logs.

B. Construction Manager Furnished Project Web Site:
1. Coordinate Contractor personnel training with Construction Manager.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 013113 - PROJECT COORDINATION MEETING

1. PROJECT COORDINATION MEETING

   A. An on-site project coordination meeting will be held on a biweekly basis throughout the project construction period.

2. ATTENDANCE

   A. Attendance at the project coordination meeting is mandatory of each Contractor or major supplier on the project.

   B. The representative of the Contractor shall be the Project Manager and field superintendent unless a substitute representative has been approved by the Construction Manager.

   C. Contractor will begin attending the Project Coordination Meetings at least 4 weeks prior to mobilization on site and will continue until the Contractor has fulfilled the obligations of his Contract.

3. AGENDA

   A. The Construction Manager will set the agenda for the biweekly Project Coordination Meeting.

   B. At a minimum, the Contractor shall be prepared to discuss the following:

      1. Actual vs. as planned progress for the prior two-week period.

      2. Planned construction activities for the next four weeks.

      3. Contract document clarifications.

      4. Coordination items with other contractors.

      5. Quality Control.

      6. Recently issued change orders.

      7. Potential change orders.

      8. Submittals and shop drawings.

      9. Other items requiring Construction Manager's attention.

END OF SECTION

SECTION 013119 – PRE-INSTALLATION MEETINGS

1. PRE-INSTALLATION MEETINGS

   A. An on-site pre-installation meeting will be held at least two weeks prior to commencement of installation of work.

2. ATTENDANCE

   A. Attendance at the pre-installation meeting is mandatory of each Contractor and/or major supplier as required for each specific meeting listed below.

   B. The following individuals shall attend these meetings:
      - Contractors' Project Manager
      - Contractors' Field Superintendent
      - Contractors' Safety Representative (as needed)
      - Key Subcontractors, Suppliers, and Vendors
      - EDiS Project Manager
      - EDiS Field Manager
      - EDiS Safety Director (as needed)
      - EDiS MEP Specialist (as needed)
      - Owner's Representative (as needed)
      - Architect/Engineer (as needed)
      - Governmental Agency Representatives (as needed)
      - Testing/Inspection Agency Representatives (as needed)
      - Utility Company Representatives (as needed)

3. SUBMITTALS

   A. Each contractor is responsible to have all submittals and mock-ups, as related to the pre-installation meeting scope of work, submitted and approved prior to commencement of the pre-installation meeting.

4. LIST OF REQUIRED MEETINGS

   - Sitework – Erosion and Sediment Control
   - Sitework
     - Bulk Grading
     - Asphalt Paving
     - Concrete Curbs, Gutters, & Sidewalks
   - Landscaping
   - Site Utilities
   - Foundations & Concrete Slabs
   - Underslab Utilities
   - Structural Steel Erection & Miscellaneous Metals OSHA mandated Safety Meeting
   - Roofing OSHA mandated Safety Meeting

- Building Envelope
  - Exterior Structural Stud Assembly
  - Masonry & Stone
  - Curtain Wall/Glazing/Storefronts
- Doors/Frames/Hardware
- Interior Glass and Glazing
- Finish Carpentry & Millwork
- Acoustical Ceilings/Acoustical Wall Panels
- Paint and VWC
- Flooring (VCT, Carpet)
- Terrazzo Flooring
- Partition Walls
  - Metal Studs
  - Drywall
  - Insulation
  - Doors/Frames/Hardware
- Fire Protection
  - Fire Sprinkler Systems
  - Fire Alarm Systems
- MEP Coordination
  - Mechanical Piping Roughin
  - Plumbing Roughin
  - Insulation
  - Electrical Roughin
  - Electrical – Bonding, grounding, lightning protection
  - Automatic Temperature Controls
  - Commissioning
- Voice/Data Low Voltage Wiring
- Security System
- Audio-Visual Equipment
- Owner Furnished Equipment
- Final Cleaning

5. AGENDA

   A. At a minimum, the Contractor shall be prepared to discuss the items as listed on the agenda template shown on the following page:

PROJECT: _____

PRE-INSTALLATION MEETING: (Insert Phase of Work)

A. ATTENDEES:

NAME	COMPANY	WORK ITEM	CONTRACT

B. TESTING & INSPECTION REQUIREMENTS
(THESE REQUIREMENTS COME FROM THE PROJECT MANUAL)

C. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS

Drawing / Spec No.	Comments / Conflicts

D. REVIEW SCOPES OF WORK ***(SEE SECTION 011100 IN THE PROJECT MANUAL)***

E. REVIEW RELEVANT RFI'S

F. REVIEW SUBMITTALS *(SEE THE SUBMITTAL REGISTER)*

G. REVIEW MATERIALS AND DELIVERIES

H. REVIEW SCHEDULE AND SEQUENCE OF WORK

I. JOB SITE SAFETY *(SEE THE CONTRACTOR'S SAFETY PROGRAM OR OSHA)*

- Safety Plans must be submitted before the start of work
- Certificates of Insurance need to be submitted before the start of work
- Minimum PPE – Hardhats, steel toe boots, safety glasses
- Lock-out, Tag, Test and Try ALL utilities is critical before the start of demolition
- Signage & HAZCOM Requirements
- Potential Hazards
    - Excavations >4 ft
    - Slips/trips/falls
    - Existing utilities to remain and protected
    - Overhead debris
    - Power tools
    - Heavy equipment

J. COORDINATION WITH OTHER TRADES

K. ACTION ITEMS AND RESPONSIBILITY

END OF SECTION

SECTION 013125– WEB-BASED PROJECT MANAGEMENT SYSTEM

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. Refer to provisions in AIA Document A232 – 2019 EDITION, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, for requirements in addition to those specified in Division 1.

   C. Refer to Scope Information Sheets for all contracts bound in the Project Manual under Section 011100 - SUMMARY OF WORK. The Scope Information Sheets describe generally the work included in each contract, but the work is not necessarily limited to that described.

   D. All Contractors shall use Internet/Web-based project management software to transmit documents, track, and otherwise manage this project.

   E. Use of this project management software will not change any contractual responsibilities of the construction team members.

2. DEFINITIONS

   A. System: A real time web-based software that shares data, translates data, organizes data, facilitates communication, archives actions, and offers scheduling prompts to identified Users.

   B. Users: Authorized participants of this project furnished with a unique password and authorized to access the system to view/input/export data. Owner, Construction Manager, Architect, and the Contractors are all Users. Other Users may be added as necessary.

   C. Contacts: Entities identified to automatically receive specific transmissions or entities selected to receive specific information sent by the system through to an e-mail address.

   D. Signees: Those individuals identified, by the Contractors, authorized to sign change orders and payment applications via electronic signature. This electronic signature is as contractually binding as an original signature on paper.

3. USE OF SYSTEM

   A. The use of the system is mandatory for the documentation of the transmittal of all non-oral information, even if the actual transmission of the information is by another means.

   B. The use of the system will be mandatory by the Contractors to send, retrieve, and respond to data.

   C. In addition to this web-based project management system, the Contractors will be required to use

electronic mail (email) for day-to-day communication and correspondence. Email will be the primary means of transmitting written communication (i.e. meeting minutes, draft pay applications, etc.).

4. QUALITY ASSURANCE

A. A three-hour training session in the use of the software for this project will be offered by the Construction Manager at a location convenient to the project site. Attendance by one member of each Contractor's organization is mandatory. Additional attendees may enroll based on availability of training space. All attendees must have a working knowledge of computers. Training can not begin until three working days after the receipt of the submittals indicated below.

B. Technical assistance will be provided by on-line help, email, or telephone for all Users throughout the life of the project.

5. SUBMITTALS

A. Submit to the Construction Manager, within 5 days following the receipt of the letter of intent to award, in an electronic template, the following:

1. Electronic logo of organization (as needed)
2. Names, mailing address and electronic address of its Users and Contacts.
3. Designation the role/responsibility for each User

6. SOFTWARE AND HARDWARE REQUIREMENTS

A. Each User shall provide and maintain a computer with high-speed internet access and an email address. The computer shall have a high-speed internet browser (Internet Explorer 8.0 or higher, Firefox version 3.6.12 or higher, Google Chrome or Safari version 5.0 or higher) and a high speed cable Internet access, high speed DSL or T1 line.

B. License(s) to Use System - Each Contractor will be provided unlimited licenses to use the system for this project. Each license will allow secure unlimited usage from the notice to proceed until the original contract completion date.

7. SYSTEM DESCRIPTION

A. The web-based project management system is a "secure, real-time, interactive, centralized database" specifically established and maintained for the management of this construction project. The product is designed to facilitate communication and improve the time management of its users by facilitating the sharing of information. Information will be available 24/7, from any computer meeting the specifications listed above. The information is fully protected. The electronic platform allows information to be transmitted across the internet reducing printing and postage costs and the time associated with such activities.

B. The system contains a directory of the project participants.

C. The system includes templates, with the CM's letterhead, for each document created inside the system. The template allows the use of "pull down" menus to complete significant portions of each document.

D. The system allows the templates (and attached documents created outside the system) to be distributed to Users and Contacts.

E. The System contains "translation software" to permit the viewing (and marking) of documents created outside the system. The system can view documents created by different software programs and can deliver images of its translation to any computer meeting the criteria listed above.

F. The system can be personalized by the Construction Manager to automatically send e-mail notices upon issuance of certain documents if such a practice facilitates the User's business needs.

G. The system is the product of ***Building Blok, LLC*** (www.buildingblok.com) and will be continuously updated.

H. The Construction Manager will administer the Building Blok User accounts for this project.

8. DOCUMENTS CREATED INSIDE THE SYSTEM

A. The following documents shall be created on templates inside the system.

1. Transmittals for submittals processed in the system. The transmittals are automatically created by the system when the submittal is uploaded.
2. Submittal Register showing all of the submittals required of the contract, assigned to each Contractor.
3. Submittal Log: The CM will maintain submittal log after it is initialized.
4. RFI (Requests for Information)
5. Change Orders
6. RFP (Requests for Proposal)
7. ASI (Architect's Supplemental Instructions)
8. Tasks & Memos as determined by the CM
9. Payment Applications
10. Closeout Tracking Log

B. The following documents may, at each Users option, be created on the system.

1. Morning & Afternoon Activity Reports generated by the system
2. E-mails: Contacts that do not have access to the system may be sent information from the system, by the system.
3. Reports of information on the system
4. Project Notices: "Broadcast" messages can be sent to other Users system entry screen.

9. DOCUMENTS CREATED OUTSIDE THE SYSTEM AND DISTRIBUTED BY THE SYSTEM

   A. The following documents are expected to be created outside the system and distributed through the system. The actual documents may be scanned or electronically attached to the transmittal.

      1. Technical Submittals: Shop drawings, product data, testing reports, certifications, installation instructions, operation & maintenance manuals, will be submitted and distributed through the system. The Architect will return all submissions through the system electronically. The Construction Manager will distribute submittals (after Architect's action) electronically. Contractors may download and distribute submittals to their subcontractors and suppliers or elect to print paper copies for distribution, or both.
      2. Photographs: Digital photographs and scanned images can be loaded onto the system and shared.
      3. Schedule of Values/ Payment Applications: (The "pencil" review of these documents can occur inside the system).
      4. Change Orders: (The "pencil" review of these documents can occur inside the system.)
      5. Schedules: The schedule document(s) will be available for review on the system.
      6. Data created in other software may be uploaded to the system electronically.

10. DOCUMENTS CREATED OUTSIDE THE SYSTEM AND DISTRIBUTED OUTSIDE THE SYSTEM

   A. The following documents are expected to be created outside the system and distributed outside the system. The actual documents may be scanned or electronically attached to the transmittal.

      1. Schedules: The Construction Manager will develop the Master Schedule through Microsoft Project 2003. The schedule will be distributed either through hard copies at meetings or through email.
      2. Product samples, color samples, physical samples are still required to be provided per the technical specifications, however, the transmittal documenting the distribution shall be done inside the system and submitted electronically and printed to accompany the actual submission.
      3. Meeting minutes will be created using Microsoft Word 2003 and distributed through hard copies at meetings or through email.
      4. AIA closeout documents, which require an "original" signature, will created and distributed outside the system.

END OF SECTION

SECTION 013216 - CONSTRUCTION SCHEDULE

1. PRE-BID CONSTRUCTION SCHEDULE

A. Time is a critical element of this Project. By entering a bid, the Contractor agrees to adhere to the intermediate Milestone Dates and Dates of Substantial and Final Completion established herein. The Contractor also understands that all work must be performed in an orderly and closely coordinated sequence in order to achieve the specified Milestones and Completion Dates, and the Contractor hereby agrees to perform his work in conformance with the Pre-Bid Construction Schedule established herein, or with the then current and approved Project Construction Schedule as amended from time to time by the Construction Manager.

B. The Pre-Bid Construction Schedule is a milestone schedule with durations that identify portions of the project that must be completed. This schedule includes allowances for time lost due to adverse and abnormal weather conditions, other than floods, hurricanes, tornadoes, lightening and other like acts of God. The Contractor understands and agrees that it shall not be entitled to any extensions of the Contract Time or adjustment to the Contract Sum, except as allowed in the General Conditions of the Contract for Construction. The Contractor further acknowledges that the Work may be required to be performed during the winter season, that conditions during this season may be adverse and abnormal, but that such conditions will not be the basis for an extension of the Contract Time or adjustment to the Contract Sum. By submitting a bid, each Contractor is certifying that they can complete their work within the durations, or less time, outlined in the milestone schedule and its bid includes any and all costs associated with the schedule. This includes one Contractor completing their work in conjunction with another Contractor's work (i.e. electrical conduits installed in CMU walls). Each Contractor agrees to provide sufficient labor, crew size, equipment and/or work overtime, weekends, or shiftwork as necessary to meet the activity durations on this schedule and subsequently the latest coordinated Project Construction Schedule.

2. SCHEDULING OF THE WORK AFTER AWARD OF CONTRACT

A. After award of Contract, or issuance of a Notice to Proceed, the Contractor will meet with the Construction Manager to review the Pre-Bid Construction Schedule, and the overall project plan for construction. Following the above review, the Contractor will meet with each subcontractor and supplier to view the detailed plans for performing his Work. Following these meetings and within fourteen (14) days after award of the Contract or issuance of a Notice to Proceed, the Contractor shall prepare and submit for the Construction Manager's approval a Work Schedule providing for the expeditious, timely and practical execution of the Work. The Contractor's Work Schedule shall include activity descriptions and durations for shop drawings, fabrication, delivery, and installation. The Contractor's Work Schedule shall be organized by Area, Building, Phase, and/or Floor as required by the Construction Manager. If the Construction Manager so requests, the Contractor shall provide adequate explanation regarding crew sizes, production rates and similar data used to arrive at the durations and sequences. If the Contractor fails to provide a work schedule for their activities then they will be held to the Project Construction Schedule developed and updated by the Construction Manager.

B. The Construction Manager shall review the Contractor's Work Schedule, coordinate it with the separate work by other contractors, the Owner, and the Construction Manager, and after

coordination, shall incorporate it into the approved Project Construction Schedule.

C. After all Contractors submit their Work Schedules and the schedules have been incorporated into the overall Project Construction Schedule a Schedule Charrette will be held by the Construction Manager. Each Contractor is required to participate in the Schedule Charrette in order to produce a coordinated Project Construction Schedule. The Construction Manager will have the final authority concerning the sequence of work, priorities or work, and activity durations. The approved coordinated Project Construction Schedule shall be issued to the Contractors and each Contractor shall perform their Work in conformity therewith.

C. The Contractor shall submit proposed schedule revisions and obtain the written approval of the Construction Manager therefore before deviating from the Project Construction Schedule.

D. The Construction Manager will incorporate approved schedule revisions into the Project Construction Schedule and shall otherwise update and revise the Project Construction Schedule as the Construction Manager, at his sole discretion, deems necessary. Each Contractor acknowledges that Construction Manager may modify, change, or alter the sequence, duration, start dates, completion dates to maintain the progress of the work. Contractor agrees to perform the work in accordance with the revised schedules and that modification of the schedule or sequence of the work by the Construction Manager shall not be the basis of any claim by the Contractor for damages or costs.

E. Weather Delays: The project substantial completion date, shall only be adjusted due to extreme weather conditions that are above and beyond the following "Adverse Weather Days" already accounted for in the Pre-Bid Construction Schedule. These adverse weather days are based on a seven day week and come from the DelDOT Standards:

a. January (12), February (10), March (5), April (5), May (4), June (2), July (4), August (3), September (4), October (3), November (2), and December (6).
b. Time extension due to weather must be related to critical path activities.
c. Delays due to weather must be reported by the Contractor on the day they occur on the Contractor's daily report.
d. Any time lost during the work week must be made up the same week by overtime and/or working weekends. The Owner will not be responsible for additional costs for overtime.

3. ADHERENCE TO THE SCHEDULE

A. The Contractor shall start each part of its Work on the date designated for start in the approved Project Construction Schedule unless advised by the Construction Manager. The Contractor shall carry the Work forward expeditiously with adequate forces, equipment, and materials, and shall complete each part of his work on or before the date designated in the approved Project Construction Schedule.

B. If the Construction Manager determines that the Contractor is behind schedule, the Construction Manager shall have the right to require that the Contractor take steps, at the Contractor's expense, to accelerate its Work. Such steps shall include increases in manpower, equipment, and materials and/or overtime as the Construction Manager may deem necessary. If any work is not started or

completed within five (5) calendar days of the schedule date in the latest Project Construction Schedule, the Construction Manager shall have the right to direct the Contractor to expedite their work by whatever means the Construction Manager deems necessary to regain the schedule, without additional compensation to the Contractor. If any work falls behind schedule more than ten (10) days, the Construction Manager shall have the right to perform the work or have the work performed by whatever means the Construction Manager deems necessary. The costs incurred by the Construction Manager in order to "maintain the Project Construction Schedule" shall be reimbursed by the Contractor or Contractors causing the delay. If the Contractor fails to comply with the Construction Manager's instructions relating to improved rate of progress, the Contractor may be held in default under the appropriate provisions of the General Conditions of the Contract.

C. Each Contractor shall, if directed by the Construction Manager, provide the Construction Manager a two-week look ahead of anticipated manpower showing the number of men, classification, and anticipated work.

D. Each Contractor must schedule their manpower to work on all available work at a given time. Contractors must not assume that they have an entire work area available at one time or exclusive to their work. Working simultaneously in and around other trades is required. Therefore, if an area of the building is ready for the Contractor's work to begin or continue the Contractor must have manpower onsite working.

E. If a Contractor misses any portion of a workday due to weather, manpower, lack of materials, failure to plan, or scheduling conflicts, they must make-up this lost time on overtime or Saturday. If two or more days are lost in the same work week, the Contractor must work overtime, the immediate Saturday and the Saturdays following the week to make up the lost days. Failure to provide sufficient manpower during the normal week days may result in charges for supervision by EDiS Company, at the discretion of EDiS Company.

F. All punchlist work and project closeout documentation shall be completed within twenty-one (21) calendar days of the Substantial Completion date. Any open punchlist items after this date will be completed by EDiS Company and back charged to the responsible Contractor.

END OF SECTION

SECTION 013219 - SUBMITTAL REGISTER

1. SUBMITTALS/SUBMITTAL REGISTER

   A. The Contractor shall submit all items listed or specified within the sections of the Specifications included in its Work. Submittals shall include such items as: contractor's, manufacturer's or fabricator's drawings; descriptive literature including, but not limited to, catalog cuts, diagrams, operation charts or curves; test reports; samples, operations and maintenance manuals, including parts lists; certifications; warranties and other required submittals. Submittals pertinent to materials and equipment which are subject to advance approval shall be scheduled and made prior to the acquisition or the delivery thereof.

   B. The Contractor shall carefully control procurement operations to assure that each individual submittal is made on or before the dates required for timely performance of its Work.

   C. Within seven (7) days after award of Contract or issuance of Notice to Proceed, the Contractor shall execute and submit to the Construction Manager, seven (7) copies of the Submittal Register, on a form to be provided by the Construction Manager, on which shall be listed each item of equipment and material of each type for which fabricator's drawings and/or related descriptive data, test reports, samples, spare parts, operation and maintenance manuals, or other types of submittals required by the Specifications. The Submittal Register form shall be reproduced by the Contractor. The order of listing of items on the Register shall conform to the sequence of the items as they occur within the divisions. Drawings of component items forming a system or that are interrelated shall be scheduled to be correlated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time shall be allowed for review and approval and possible resubmittal of any item subject to approval, because no delay damages or time extensions will be allowed for time lost in late submittals or resubmittals. The Construction Manager and Architect/Engineer will review the Submittal Register for approval action. The approved Register will become a part of the Contract and Contractor will be subject to requirements thereof. The Contractor shall revise and/or update the Register monthly to take into account all changes in the Contract. Each such revised edition and/or revision to the Register shall be resubmitted to the Construction Manager. This Register shall be coordinated with related submittals of other Contractors.

2. SAMPLES

   A. Submit tagged or labeled samples in triplicate, unless another quantity is otherwise specified by the Construction Manager.

   B. Tags or labels shall be securely affixed and contain as a minimum the following information: Project Name, Contractor's Name, Contract Title and Number, Date, Transmittal Number, Product Manufacturer's or Fabricator's Name and Product Identifier.

END OF SECTION

SECTION 013226 - SUBCONTRACTOR DAILY REPORTS

1. SUBCONTRACTOR DAILY REPORTS

   A. The Subcontractor shall submit a Daily Report to the Construction Manager on the forms provided covering the following subjects:

      1. Work in Progress, including areas where work is being performed, nature of the operations in progress, and the manpower assigned.

      2. Extra Work (Time and Material) in progress.

      3. Materials Received.

      4. Trade labor breakdown including identification of all workers on site and the number of hours (or portions thereof) worked by each.

      5. Inspection Checklist (performed daily).

   B. The Subcontractor shall submit the Daily Report to the Construction Manager by 9:00 AM on the next workday following the workday covered in the Daily Report.

2. DAILY EXTRA WORK REPORT

   A. The Subcontractor shall submit on the form provided a Daily Extra Work Report on each day he performs authorized Extra Work on a time and material basis.

   B. A separate Daily Extra Work Report shall be submitted for each separate authorized Extra Work item done on a time and material basis.

   C. The Subcontractor shall submit his Daily Extra Work Report as an attachment to his Daily Report by 9:00 AM on the next workday following the workday covered in the Daily Extra Work Report.

3. SAMPLE DAILY REPORT

   A. A sample daily report follows this section for your reference.

END OF SECTION

SECTION 013300 – SUBMITTAL PROCEDURES

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

2. ITEMS TO BE SUBMITTED AT START OF WORK

   A. Performance/Labor and Material Payment Bond(s): One (1) copy of each bond simultaneously with the signed Agreement. See General Conditions Article 11.4 and Supplementary Conditions.

   B. Policies or Certificates of Insurance: Two (2) copies simultaneously with the signed Agreement. See General Conditions Article 11 and Supplementary Conditions.

   C. Contractor's License: Submit a copy of all business licenses required by local and state agencies.

   D. Contractor's Schedule of Values: Two (2) copies for approval within 21 days after the Agreement is signed. See General Conditions Article 9.2 and provisions in this Section.

   E. Contractor's Progress Schedule: Two (2) copies for review and reference within 21 days after the Agreement is signed. See General Conditions Article 3.10 and provisions in this Section.

   F. Submittal Schedule: Two (2) copies for review and reference within 21 days after the Agreement is signed. See provisions in this Section.

   G. Products List: Two (2) copies for approval within 30 days after the Agreement is signed. See provisions in Section 016200 - MATERIAL AND EQUIPMENT.

3. NON-RESIDENT CONTRACTOR & SUBCONTRACTORS BONDS

   A. Refer to requirements in Section 011100 - INSTRUCTIONS TO BIDDERS for filing of Surety Bonds with the Division of Revenue.

   B. If such bonds are required on this project, it will be the responsibility of the Contractor to produce evidence to the Construction Manager that they have been filed, or if not required, to supply a notarized statement that they are not required. This must be done within seven (7) days after award of Contract and in any event before construction starts.

4. RELATED REQUIREMENTS

   A. See Section 017700 - CONTRACT CLOSE OUT: for submittal requirements for Contract Close out.

5. SUBMITTALS

A. All submittals shall be directed to the Construction Manager in the manner directed by the Construction Manager, and paragraph 9 of this section. Contractor shall use the Contractor Submittal Form appended to this section.

B. Prepare a Submittal's Schedule for Shop Drawings, Product Data and Samples. Show:

1. The dates for Contractor's submittals.

2. The dates submittals will be required for Owner-furnished products.

3. The date approved submittals will be required from the Architect.

C. Should the Architect or Construction Manager elect to omit any items from the list of items to be reviewed, it shall not relieve the Contractor from compliance with the Contract Documents with regard to that item. In such instance, the Contractor may still elect to have submittals prepared for his own use without review by the Architect or Construction Manager.

6. SHOP DRAWINGS

A. Conform to provisions in General Conditions applying to Shop Drawings.

B. Present in a clear and thorough manner.

1. Identify details by reference to sheet and details, schedule or room numbers shown on Contract Drawings.

2. Maximum sheet size: 30" x 42".

7. PRODUCT DATA

A. Conform to provisions in General Conditions applying to Product Data.

B. Preparation:

1. Clearly mark each copy to specifically identify products or models pertinent to project.

2. Show performance characteristics and capacities.

3. Show dimensions and clearances required.

4. Show wiring or piping diagrams and controls.

C. Manufacturer's standard schematic drawings and diagrams:

1. Modify drawings and diagrams to delete information which is not applicable to the Work.

2. Supplement standard information to provide information specifically applicable to the Work.

8. SAMPLES

A. Conform to provisions in General Conditions applying to Samples.

B. Provide samples of sufficient size and quantity to clearly illustrate:

1 .Functional characteristics of the project, with integrally related parts and attachment devices.

2. Full range of color, texture and pattern.

C. Field samples and mock-ups; See requirements, if any, in other specification Sections.

9. SUBMITTAL REQUIREMENTS

A. Make submittals promptly through the Construction Manager in accordance with published schedule, and in such sequence as to cause no delay in the Work or in the Work of any other contractor.

B. Number of submittals required.

1. Shop drawings: Submit eight (8) copies for each submittal. Copies will be marked up with corrections and comments, stamped and returned. Any additional copies required by the Contractor shall be made by him.

2. Product Data: Submit eight (8) copies. Four (4) will be retained by the Architect, the Construction Manager and the Consultants. Four (4) will be reviewed, marked and stamped by the Architect and returned to the Contractor by the Construction Manager. Any additional copies required by the Contractor shall be made by him from the stamped copy.

3. Samples: Submit four (4) each. When approved it will be returned to the Construction Manager to be retained at the site for reference use.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contract identification.

4. The names of the Contractor, Supplier and Manufacturer.

5. Identification of the product, with the specification section number.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8 inch x 3 inch blank space for Contractor and Architect's stamps.

12. Contractor's stamp, initialed or signed, certifying review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents. Submittals which have not been stamped with this stamp or its approved equivalent will be returned without being reviewed.

D. Shop Drawing coordination and interface with work of other Contracts and adjacent work is the responsibility of each individual Contractor.

E. All submittals shall be accompanied by the contractor's submittal form, a copy of which is part of this section. The contractor's submittal form must be completed in its entirety by the contractor.

10. RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by the Architect and resubmit until approved.

B. Shop drawings and Product Data:

1. Revise initial drawings or data, and resubmit as specified for the initial submittal.

2. Indicate any changes which have been made other than those requested by the Architect.

C. Samples: Submit new samples as required for initial submittal.

11. FINAL DISTRIBUTION OF APPROVED SUBMITTALS

A. The Construction Manager will receive and log submittals and forward to Architect after processing.

B. The Construction Manager will distribute copies of Shop Drawings and Product Data which carry the Architect's stamp to:

1. Contractor that made submittal.

2. Jobsite File.

3. Record Document File.

4. Other Contractors, as required for coordination.

C. The Construction Manager will distribute samples as required.

D. The Contractor will distribute copies of Shop Drawings and Product Data which carry the Architect's stamp to:

1. Subcontractors.

2. Suppliers.

3. Fabricators.

12. SCHEDULE OF VALUES

A. Use AIA Document G703, Continuation Sheet to G702.

13. PROGRESS SCHEDULE

A. Prepare schedules in the form of a horizontal bar chart.

1. Provide separate horizontal bar chart for each trade or operation.

2. Horizontal time scale: Identify the first work day of each week.

3. Scale and spacing: To allow space for notations and future revisions.

4. Minimum sheet size 11 inches by 17 inches.

B. Format of listings: The chronological order of the start of each item of work.

C. Show the complete sequence of construction by activity.

D. Show the dates for the beginning, and completion of, each major element of construction such as:

1. Site clearing.

2. Site utilities.

3. Foundation work.

4. Structural framing.

5. Subcontractor work.

6. Equipment installation.

E. Show projected percentage of completion for each item as of the first day of each month.

F. Update Progress Schedule monthly and submit with Application for Payment and Schedule of values.

G. Indicate progress of each activity to date of submission.

H. Show changes occurring since previous submission of schedule:

1. Major changes in scope.

2. Activities modified since previous submission.

3. Revised projections of progress and completion.

4. Other identifiable changes.

I. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays and the impact of the schedule.

2. Corrective action recommended, and its effect.

3. The effect of changes on schedules of other prime contractors.

J. Submit one reproducible transparency.

K. After review, distribute copies of the schedule to:

1. Jobsite File.

2. Subcontractors.

3. Architect.

4. Owner.

L. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

END OF SECTION

DIGITAL FILE RELEASE AND CONSENT AGREEMENT

Client: Delaware Technical and Community College
Project: George Campus Main Entrance Renovations

Digital design files provided by Tevebaugh Architecture are provided for convenience only. Tevebaugh Architecture ("Tevebaugh") gives you permission to receive these files provided you comply with the following:

1.) This agreement is governed by the State of Delaware. This release is the entire understanding between the parties related to the subject matter referenced herein and supersedes all prior or contemporaneous understandings, whether written or oral. The receiving party ("Receiver") agrees to indemnify and hold harmless Tevebaugh, and its directors, officers, employees, agents, and representatives, from any claim, action, allegation, damages, or liability (including attorney's fees) arising or relating to your breach of, or negligent acts or omissions relating to, your obligations under this agreement. The foregoing indemnities shall survive expiration or termination of this agreement. You may not assign this agreement, in whole or in part, without written permission from Tevebaugh.
2.) The Receiver acknowledges the digital design files provided are Tevebaugh's instruments of service to the Client, for the Project. The file's contents remain the intellectual property of Tevebaugh, and may not be used by the Receiver, in whole or in part, for any purposes other than in their service to the Client, for the named Project. All legal rights and permissions to the digital design file's contents remain the sole property of Tevebaugh, and may not be reproduced, published, or distributed without an intellectual property release from Tevebaugh.
3.) Tevebaugh makes no warranties, expressed or implied, as to the accuracy of the data contained in the digital design files. Any digital design files provided by Tevebaugh are supplied as a matter of courtesy and are not contract documents. The data provided is done so "as is", without warranty as to the accuracy of the content. The use of, or reliance on, the data requires confirmation by the user as to the accuracy and completeness.

Receiver:

_____
Signature of Authorized Agent Date

_____
Title of Authorized Agent

_____
Company

SECTION 01 33 01 – CADD RELEASE

1. Digital File Release and Consent Agreement is attached.

SECTION 013523 - SAFETY PROGRAM

1. GENERAL

A. The Contractor shall be responsible for initiating, maintaining, and supervising all safety activities and programs in connection with their Work.

B. Contractor shall be responsible for the safety of their personnel as well as their subcontractors.

C. Hard hats and safety glasses must be worn by all personnel on the jobsite, except in contractor's administrative office/trailer. All equipment must comply with OSHA standards. All job site personnel shall wear long pants, shirts (no tank tops), high visibility garments worn on the outer layer of clothing, and work boots.

2. SAFETY PROGRAM

A. Prior to commencing the work, the Contractor shall submit to the Construction Manager (1) electronic copy and (1) bound copy of its safety program and one (1) copy of SDS information in a 2" ringed notebook. One paper copy of the safety program and SDS will be retained by the Construction Manager in the field office.

B. The safety program shall outline those hazards peculiar to the Contractor's Work, and the steps to be taken to eliminate or reduce the risk of injury or loss due to those hazards. The program shall be project and site specific. Every Contractor shall implement and enforce its safety program, in accordance with all OSHA, Federal, State, and local laws.

C. Crystalline Silica Exposure Control Plan - Affected Contractors must provide a Written Exposure Control Plan for Respirable Crystalline Silica, meeting Subpart Z of the OSHA Construction Industry Regulations, that ensures each employee covered by this section of the Regulations can demonstrate knowledge and understanding meeting the requirements of the regulation, identify the competent person designated by the employer in accordance with the section, and otherwise comply with the requirements of this section of the Regulations.

D. Every Contractor shall designate a qualified Safety Supervisor and Alternate to implement the safety program. If during the progress of the work the Safety Supervisor is not performing their duties in a manner satisfactory to the Construction Manager the Contractor will designate a new qualified Safety Supervisor.

E. Every Contractor shall furnish the names and qualifications of the Primary and Alternate competent persons and qualified persons who may be required for their scope of work by the Contractor's safety procedures, and by federal, state and/or local regulations. Examples include competent persons and/or qualified persons for steel erection, excavation, scaffold erection, confined space entry, crane and rigging operations, annual crane inspections, fall protection

including horizontal lifeline systems, etc.

F. The employer shall verify compliance by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall include the date the employer determined the prior training was adequate rather than the date of actual training.

G. Copies of any and all documents, including information stored electronically, such as safety and health program handbooks and training certification records shall be provided when necessary.

1. The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury. Please forward certification (document) of training for each employee on an EDiS project. The latest training certificate shall be maintained.

H. Contractor Daily Reports with Safety Inspection Checklist will be submitted daily to the Superintendent, verifying inspection of work area, machinery, equipment, and tools.

I. Prior to starting work on-site, the Contractor shall arrange with the on-site Superintendent to have their employees complete the EDiS Company Zero Accidents Safety Orientation program.

J. Every Contractor shall hold, at a minimum, weekly safety toolbox talks with all its employees every Monday at 12:30 PM. Every Contractor shall designate a responsible, qualified, and capable person to conduct these meetings. Contractor's safety supervisor or superintendent must submit to the Construction Manager weekly toolbox talks attendance sheets and the topics discussed.

3. SUBSTANCE ABUSE POLICY STATEMENT

A. The Construction Manager is committed to providing a safe work site environment for its employees and Contractors' employees. The Construction Manager does not condone or permit employees and Contractors' employees to use or be under the influence of drugs or alcohol while they are on any of the Construction Manager work sites. The Policy is as follows:

1. It is a violation of the Construction Manager's policy for employees and Contractors' employees to use, possess, sell, trade, or otherwise engage in the use of illegal drugs and alcohol.

2. It is a violation for employees and Contractors' employees to report to work while influenced by illegal drugs or alcohol.

3. It is a violation for employees and Contractors' employees to use prescription drugs illegally (i.e., to use prescription drugs that have not been legally obtained) and to use prescription drugs in a manner other than the prescribed intentions.

4. Employees and Contractors' employees who are taking medication, which is prescribed by their physician, are expected to discuss potential side effects with their prescribing physician, as it relates to the work requirements.

B. Violations of this policy will require disciplinary action. If any employees or Contractors' employees are observed or suspected of being influenced by drugs or alcohol, they will be instructed to stop work and may be required to leave the work site.

4. EXECUTION

A. Every Contractor shall comply with all applicable federal, state and local laws, regulations and orders relating to occupational safety and health, and related procedures, and shall, to the extent permitted by law, indemnify and hold Construction Manager, Owner and Architect, and their respective directors, officers, or agents and employees, harmless from any and all liability, public or private, penalties, contractual or otherwise, losses, damages, costs, attorney's fees, expenses, causes of action, claims or judgments resulting from a claim filed by anyone in connection with the aforementioned acts, or any rule, regulation or order promulgated thereunder, arising out of the Contractor's Work, this Agreement or any subcontract executed in prosecution of the Work. Every Contractor further agrees in the event of a claim of violation of any such laws, regulations, orders, or procedures arising out of or in any way connected with the performance of this agreement, Construction Manager may immediately take whatever action is deemed necessary by Owner and/or Construction Manager to remedy the claim or violation. Any and all costs or expenses paid or incurred by Owner and/or Construction Manager in taking such action shall be borne by the Contractor and may be deducted from any payments due Contractor.

B. The Contractor agrees to (1) take all necessary steps to promote safety and health on the job site; (2) cooperate with Owner and/or Construction Manager and other Contractors in preventing and eliminating safety and health hazards: (3) train, instruct and provide adequate supervision to ensure that its employees are aware of, and comply with, applicable Federal and State safety and health laws, standards, regulations and rules, safe healthful work practices and all applicable safety rules, regulations and work practices and procedures (4) not create any hazards or expose any of its employees, employees of the Owner and/or Construction Manager or employees of Contractors to any hazards; and (5) where the Contractor is aware of the existence of a hazard not within its control, notify the Construction Manager of the hazard as well as warn exposed persons to avoid the hazard.

C. The Contractor / Sub-contractor shall prepare a written Job Hazard Analysis (JHA) common to the construction industry for any work of a high risk nature. This JHA will be prepared and signed by each work crew each day prior to starting work on a specific area of work and any time

a crew is re-assigned to a new work task. The JHA form is generally in table form and simply describes tasks to be performed, potential hazards and mitigating measures. The form is used to identify, analyze, understand and mitigate potential hazards associated with repetitive or potentially hazardous work operations. Each employee associated with the work to be performed shall be instructed by their companies designated Competent Person of the safety measures listed on the form and shall sign the document prior to the commencement of work. (examples of "high risk": pre-cast concrete, scaffold activities, steel erection, work at heights, work at depths, road work, etc.) If the contractor prepares a similar assessment form it must be reviewed to meet the criteria of a Job Hazard Analysis (JHA) as described by the U.S. Department of Labor (OSHA 3071 2002 Revised).

D. The Contractor's Superintendent or Safety Supervisor shall immediately, verbally report, and promptly thereafter confirm in writing to the Construction Manager any unsafe conditions or practices that are observed, or violations of job safety which are not within the Contractor's control.

E. Contractors shall immediately, verbally report, and promptly thereafter confirm in writing, to the Construction Manager any unsafe practices or conditions that are observed which are not under the Contractor's control.

F. The Contractor's Superintendent or Safety Supervisor shall ensure that adequate first aid supplies are available, and that personnel are qualified to administer first aid/CPR, as required by State and/or Federal regulations.

G. Every Contractor shall promptly notify Construction Manager of any personal injury requiring medical treatment of any of the Contractor's employees at the Project site; or of significant damage to property arising in connection with Contractor's performance, as promptly as possible after the occurrence of such injury or damage. Within twenty-four hours of such occurrence, Contractor shall furnish to Construction Manager a complete written report of such injury or damage.

H. Contractor certifies that the forgoing terms shall be made applicable to all Contractors' subcontractors, suppliers, materialmen, or anyone furnishing labor and/or materials to the site.

I. Every Contractor shall continue to educate their job Safety Supervisor or Superintendent of their responsibilities, which shall include:

1. Instructing workers and subcontractors under its supervision in safe work practices and work methods at the time they are given work assignments.

2. Ensuring that its workers and subcontractors have and use the proper protective equipment and suitable tools for the job.

3. Continuously checking to see that no unsafe practices or conditions are allowed to exist on any part of his job.

4. Acquainting its workers and subcontractors with all applicable safety requirements and ensuring that they are enforced.

5. Setting a good example for their workers.

6. Making a complete investigation of incidents to determine facts necessary to take corrective action.

7. Promptly completing an "Incident Investigation Form" with his Supervisor's assistance and distributing as required.

8. Holding weekly "tool box" safety meetings with their employees to:

   a. Discuss observed unsafe work practices or conditions including a review of current foreman meeting and progress meeting reports.

   b. Review each incident with their employees and discuss correction of incident root causes.

   c. Encourage safety suggestions from his men.

9. Seeing that prompt medical treatment is administered to an injured employee.

10. Correcting or reporting immediately to project superintendent any observed unsafe conditions, practices or violations of job safety or security.

11. Making all reports required by these Contract Documents to the Construction Manager in a full and timely fashion.

5. SAFETY MEETINGS

A. The Contractor's Project Manager or Superintendent shall attend weekly or biweekly supervisory job meetings. The first topic of these meetings will be job site safety. The weekly safety reports will be reviewed, and violations must be corrected immediately. Contractors will be encouraged to participate in the on-going jobsite safety.

6. TOOL BOX SAFETY MEETINGS

A. The Contractor shall schedule weekly "tool box" safety sessions to be held by their project safety supervisor or competent person / superintendent for all their employees.

B. A member of the Contractor's management staff shall periodically attend "tool box" safety sessions to evaluate their effectiveness and offer any appropriate suggestions for improvement.

7. REPORTS

A. Contractors shall report all accidents or injuries on a timely basis in accordance with all applicable regulations.

B. Contractors shall promptly complete an incident investigation report of all incidents.

C. A record of all "tool box" safety sessions shall be made and submitted to the Construction Manager.

8. SAFETY REPRESENTATIVE

A. The Construction Manager (CM) may employ the services of a Safety Representative on the project.

B. The CM Safety Representative will visit the job site on a weekly basis, or as necessary, to determine if the work is being performed in a safe manner and in accordance with OSHA, State and Local safety regulations. The CM Safety Representative is not responsible for observing and documenting all possible safety violations. The Contractors' Safety Representatives, Safety Supervisors, or Superintendents shall attend job site safety inspections with the CM Safety Representative.

C. The CM Safety Representative will prepare a written report at the end of each inspection listing the safety violations observed during the inspection. This report will be distributed to all Contractors. Contractors will immediately correct all safety violations and provide written documentation to the CM verifying that all hazards have been corrected.

9. RIGHT TO STOP THE WORK DUE TO SAFETY VIOLATIONS

A. The Construction Manager, in its sole discretion, may order the Contractor to stop the work due to safety violations under the following circumstances:

1. If the Construction Manager observes the Contractor is violating safety regulations and the Contractor takes no immediate action to correct the violation.

2. If the Contractor has been notified by the Construction Manager in writing that he is in violation of safety regulations and fails to take action to correct the violation within 24 hours of the notice.

B. If the Construction Manager directs the Contractor to stop the work due to safety violation, it will be done in accordance with the General Conditions of the Contract. Contractor shall not be permitted an adjustment of the Contract Time or Sum for the days lost to any suspension of work.

C. If the Construction Manager or Safety Representative observes Contractor's employee violating this safety program or OSHA Standards in a habitual manner, or creating a serious life safety violation, the Construction Manager or Safety Representative may instruct the Contractor's superintendent or foreman to remove the violator from the work site for failure to comply with the safety program and the contract.

10. EMERGENCY PROCEDURES

A. The Construction Manager shall establish a central meeting location for the assembly of all Contractors' employees in the event of a job site emergency.

B. Contractors shall assemble all their personnel and account for all employees. Contractors must immediately report to the Project Superintendent with the status of their employees.

11. FALL PROTECTION PROCEDURES

A. Contractors are responsible, in accordance with federal, state, local laws and regulations including OSHA. to provide and enforce their own site specific fall protection program and equipment. The following fall protection procedures shall be enforced by all Contractors as a minimum standard.

1. All workers on walking/working surfaces with unprotected sides or edges six feet (6') or higher above the next lower level must be protected from falls by the use of guardrail systems, net systems, fall arrest systems or control access zone programs. It is intended that when fall protection is required, it is required 100% of the time. All contractors are reminded that relevant industry regulations require that contractors comply with the following standards.

a. Workers constructing or working near leading edges must be protected.

b. Workers on the face of formwork or reinforcing steel must be protected at a height of 6 feet (6') or greater.

c. Employees working from scaffolds shall be guarded / protected from falling 6 feet (6') above next lower level.

d. Brick layers performing overhand bricklaying and related work six feet (6') or higher above lower levels must be protected from falls.

e. Roofers must comply with OSHA regulations for roof work.

f. The Contractor's controlled access zone plan shall be included in their site-specific safety program and shall be submitted prior to the start of work. Contractors are responsible for assuring programs are OSHA compliant.

g. Guidelines for Residential Construction or any interpretations will not be accepted in lieu of 1926 Standards.

h. Contractors must provide certification per OSHA CFR29 § 1926.503(b) of employee training and retraining on fall protection upon request.

B. Contractor shall provide their own fall protection. Fall protection may be provided by guardrail systems, net systems, or personal fall arrest systems. All fall protection systems must comply with OSHA regulations.

C. Stepladders, exposed to shafts or edges of the building, greater than six feet (6') above the next lower level, must be tied off or otherwise secured. Employee must wear fall protection, i.e., harness/lanyard.

D. The Safety Cable System shall not be altered or removed without a written request submitted to the Project Manager with a copy to the Superintendent. It shall be the responsibility of each Contractor that is removing or altering the Safety Cable System to maintain the fall protection safety provided by the safety cable and not leave the area unprotected. Each Contractor shall be responsible to re-install the Safety Cable System immediately after work is completed. Each Contractor shall be responsible to re-install the Safety Cable System in accordance with OSHA regulations.

E. Fall protection will be enforced for Structural Steel Erectors.

1. Contractors engaged in structural steel erection are specifically advised that structural steel erectors shall comply with all protection requirements for all work at a height of six feet (6') or greater above the next lower level, 100 percent of the time, by any of the following means.

a. Standard guardrail system.

b. Personal Fall Arrest System (PFAS) – full body harness with shock absorbing lanyard. PFAS must meet the requirements of CFR 1926 subpart M.

c. Access to work area shall be provided by ladders or other safe methods. There shall be sufficient number of ladders, or other safe methods, available to reduce the amount of "beam walking." When it is absolutely necessary to traverse a beam, 100% fall protection must be utilized.

d. Steel erection Contractors must, at all times, be able to certify in writing that each of their employees have been properly trained in both OSHA fall protection standards and the Contractor's site specific project fall protection procedures.

e. Prior to the erection of the steel, the Contractor shall meet with the Project Manager and Safety Representatives to review and document site specific procedures.

12. AIRBORNE CONTAMINENTS PROCEDURES

A. Contractors must provide and use equipment furnished with Exhaust Purifiers / Scrubbers when any equipment produces airborne containments and will be used in an enclosed building.

B. The Contractor shall verify air quality by the use of air monitoring equipment and document such verified air quality on the daily report. The monitoring equipment shall, at a minimum, be designed with an auditory alarm and shall provide continuous monitoring of these four gases: Oxygen, Hydrogen Sulfide, Carbon Monoxide and Combustible gases.

C. The Contractor must provide administrative or engineering controls to protect its workers from exposure to occupational health, environmental or other hazards to be implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed by local, state, and federal regulations. Any equipment and technical measures used for this purpose must first be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1926.103.

13. CELL PHONE AND RADIO USE POLICY

A. Use of cell phones on EDiS Company projects should be limited to non-construction type activity areas and away from active construction areas (i.e., project office). This includes both cell phone use and the review of data, information, texts, and the internet. Except in an emergency circumstance, phones should only be used in the designated areas. Anyone observed using a cell phone outside of these designated areas without regard to maintaining a safe focus on their surroundings can be subject to discipline, up to and including removal from the project. Use of ear buds, ear phones, and portable radios are absolutely prohibited on EDiS Company project sites. Anyone using ear buds, ear phones, or any other device that would prevent the wearer from receiving auditory cues about the surrounding environment will be subject to discipline, up to and including removal from the project.

14. EXCAVATION PROCEDURES

A. Before ANY excavation work is to commence, the Contractor/Excavator shall contact the utility companies or utility owners and advise them of the proposed work and ask them to mark the location of the underground utility installations. This notification shall be done within established or customary local response times. If the work is on private property and the utility company will not mark out the utilities, the Contractor/Excavator will hire a private locating service to mark the utilities. Once the utilities are located and marked, the Contractor/Excavator will excavate by hand or use a vacuum truck to expose the utilities and record the exact location and elevation of the

utilities.

B. The Contractor/Excavator must submit the Excavation Permit to EDiS Company verifying their assurance of communication with the utility companies or utility owners. The Contractor/Excavator must follow State, Local, and Federal Guidelines prior to proceeding with excavations. The Contractor/Excavator will have these marks restored as long as there is work to perform.

C. Once the Contractor has installed new utilities, they will provide to EDiS Company an as-built drawing, within 7 days, showing the exact location and elevation of the utilities. The installing Contractor will be responsible for locating and marking these utilities for other contractors that may have work in the same area.

D. Definition: "Excavator" shall mean any person, including those acting either as an employer or employee, intending to perform or performing excavation or demolition work.

E. Definition: "Excavate" or "Excavation" shall mean any operation in which earth, rock or other material in the ground is moved, removed, or otherwise displaced or disturbed by means of any tools, equipment or explosives and includes, without limitation, grading, trenching, digging, dredging, ditching, drilling, auguring, tunneling, boring, backfilling, post pounding, driving objects into the ground, installation of form pins, hammering, scraping, cable or pipe plowing or driving.

15. TRAFFIC CONTROL PROCEDURES: Manual on Uniform Traffic Control Devices (MUTCD)

A. Traffic control plan(s) for the work may be required by the Authorities Having Jurisdiction (AHJ). Traffic control plans, if required, shall be prepared per AHJ standards, at the Contractor's expense, for review and approval by the AHJ. (Note: anything on a public right of way controlled by the state will require an engineer's stamp.) The implementation of the traffic control plan and any associated maintenance shall be performed at the Contractor's expense in accordance with the requirements of the AHJ. All warning signs and safety devices used by the Contractor to perform the work shall conform to the requirements contained in the State where the work is being performed, and the Department of Transportation's current edition of "Manual on Uniform Traffic Control Devices". The Contractor shall also be responsible for all traffic control required by the AHJ over the Project on the intersecting streets.

B. Contractors must submit a traffic control plan to the AHJ over the project for approval within fourteen (14) calendar days of Contract award. The approved traffic plan must be submitted prior to the commencement of work in a public street. The Contractor's representative on the site responsible for traffic control shall produce evidence that he/she has completed training acceptable to the Department of Transportation for safety through construction zones. All of the streets in which the work will occur shall remain open to traffic and one lane of traffic maintained at all times unless otherwise directed by the AHJ. Businesses and residences adjacent to the work

shall be notified forty- eight (48) hours in advance of closing of streets, roadways, driveways, etc. The Contractor shall make every effort to minimize the amount of public parking temporarily eliminated due to construction in areas fronting businesses. No stockpiles of pipe or other material will be allowed in traveled right-of- ways unless otherwise approved. These requirements shall not authorize any extension of time for performance of this Contract.

16. SCAFFOLDING PROCEDURES

A. A written project specific scaffold inspection checklist must be completed by the Contractor's competent person responsible for inspecting the scaffolding before each work shift, and after any occurrence which could affect a scaffold's structural integrity. A copy of the documented scaffold inspection checklist must be maintained by each company performing work on a scaffold and a second copy provided for record to the EDiS project office.

B. Contractors are required to ensure that all employees working on or around scaffolding are properly trained. Contractors shall provide documented verification of scaffold training upon request.

C. Scaffold erectors and dismantlers are required to wear fall protection during the erecting, modifying and dismantling scaffolds. In cases where fall protection is infeasible or creates a greater hazard, the competent person shall document their decision at each specific location of scaffold assembly. At minimum, the scaffold erectors and dismantlers shall wear a fall protection harness during the erection, modification and dismantling of scaffolds.

D. Contractors shall utilize a scaffold tag system. The scaffold tag system shall be color coded and visible. The competent person shall sign and date the scaffold tag.

1. Green tags are reserved for complete systems.
2. Red tags are reserved for erection/dismantling activities and for scaffolds with deficiencies in the system.

3. Yellow tags are reserved for systems that require the use of both PFAS and guardrail systems for incomplete scaffold systems or platforms.

END OF SECTION

SAFETY FORM:

Job Hazard Analysis

Job:	(Company name and address)
Department or location:	

Task or Step	Hazards	Controls	Personal Protective Equipment (PPE)

JHA by:	
Date:	

Instructions:

Use this basic form “as is” to identify hazards, controls, and PPE at the job task (or step) level. You can modify the form to meet any additional needs of your workplace. JHA hazard information can be used to develop separate safe work procedures for employee use.

Job: You need to first select a job (or main activity) to observe and analyze.

Tasks or Steps: List tasks or steps that are part of the job you selected in the “Task” column.

Example: “Operating a table saw” would be the job while “Installing a blade” and “Ripping” would be separate tasks.

Hazards: Note any condition in the workplace that can potentially cause occupational injury, death, or disease. Assume that no personal protective equipment is being worn- even if it is because hazards could persist if PPE isn’t used. You may choose to add detail about how injuries could occur due to the hazard.

Examples of hazards include: working at heights, slippery surfaces, exposed moving machinery parts, fire, explosion, noise, electricity, toxic emissions, corrosive chemicals, low oxygen, repetitive tasks, heavy lifting, infectious Bloodborne pathogens, assault, and homicide.

Examples of how injuries can occur: work at height can result in falls that can result in broken bones, paralysis, or death; noise exposure can cause permanent and severe ringing in the ears and hearing loss; exposure to corrosive chemicals can cause permanent skin damage and blindness; and working in low oxygen areas can lead to sudden suffocation, unconsciousness, and death.

Controls: Note how you will eliminate or minimize the hazard. This doesn’t include PPE.

Examples of controls include: Using a safer tool or equipment or chemical, adding safeguards to machinery, using safer work practices, using local exhaust ventilation for toxic emissions, and enclosing noisy equipment or moving workers away from such equipment to reduce exposure levels.

PPE (Personal Protective Equipment): Detail what type of PPE is needed for each hazard that can’t be eliminated or minimized using controls.

SAFETY FORM:

Job Hazard Analysis

Job:	(Company name and address)
Department or location:	

Task or Step	Hazards	Controls	Personal Protective Equipment (PPE)

JHA by:	
Date:	

Instrucciones:

El formato JHA debe completarse en inglés.

Utilice este formato básico “tal como está” para identificar riesgos, controles y EPP a nivel de tarea (o paso). Puede modificar el formato para adaptarlo a las necesidades de su lugar de trabajo. La información de riesgos del JHA puede usarse para desarrollar procedimientos de trabajo seguro para los trabajadores.

Trabajo: Primero seleccione un trabajo (o actividad principal) para observar y analizar.

Tareas o pasos: Liste las tareas o pasos del trabajo seleccionado en la columna “Tarea”.

Ejemplo: “Operar una sierra de mesa” es el trabajo, mientras que “Instalar la hoja” y “Corte longitudinal” son tareas separadas.

Riesgos:
Identifique cualquier condición en el lugar de trabajo que pueda causar lesiones, enfermedad o muerte. Asuma que no se está usando EPP, aunque sí se utilice, ya que el riesgo puede existir si no se usa correctamente. Puede agregar detalles sobre cómo podrían ocurrir las lesiones.

Ejemplos de riesgos: trabajo en altura, superficies resbalosas, partes móviles expuestas, incendio, explosión, ruido, electricidad, emisiones tóxicas, químicos corrosivos, bajo oxígeno, tareas repetitivas, levantamiento pesado, patógenos transmitidos por sangre, agresión y homicidio.

Ejemplos de cómo pueden ocurrir lesiones: El trabajo en altura puede provocar caídas con fracturas, parálisis o muerte; la exposición al ruido puede causar zumbido permanente y pérdida auditiva; los químicos corrosivos pueden causar daño permanente en la piel o ceguera; trabajar en áreas con poco oxígeno puede provocar asfixia, pérdida de conciencia o muerte.

Controles: Indique cómo eliminará o reducirá el riesgo. Esto no incluye EPP.

Ejemplos de controles: uso de herramientas, equipos o químicos más seguros; resguardos en maquinaria; prácticas de trabajo seguras; ventilación localizada para emisiones tóxicas; encerrar equipos ruidosos o alejar a los trabajadores para reducir la exposición.

EPP (Equipo de Protección Personal):
Indique el tipo de EPP necesario para cada riesgo que no pueda eliminarse o reducirse mediante controles.

SECTION 014000 – Quality Requirements

Part 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection 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 quality-control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Construction Manager**,** or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of (5) five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. 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, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.

1. Mockups are used for one or more of the following:

a. Verify selections made under Sample submittals.
b. Demonstrate aesthetic effects.
c. Demonstrate the qualities of products and workmanship.

d. Demonstrate successful installation of interfaces between components and systems.
e. Perform preconstruction testing to determine system performance.

2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. 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.

J. 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. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.

1.3 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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 rea-

sonable 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 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: 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. Permits, Licenses, and Certificates: For Owner's record, 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 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
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.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Statement that products at Project site comply with requirements.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Statement that equipment complies with requirements.
2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
3. Other required items indicated in individual Specification Sections.

1.6 QUALITY ASSURANCE

A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. 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.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, 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.

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 in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.

1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated,

as documented in accordance with ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Engage a qualified testing agency to perform quality-control services.

    a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspection will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations 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 duties of Contractor.

E. 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 Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspection equipment at Project site.

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

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

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner as indicated on the drawings and as follows:

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

1.9 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's**,** and Construction Manager's and authorities' having jurisdiction reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

1.10 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, 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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams

that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014500 - QUALITY CONTROL

1. DESCRIPTION

   A. Quality control services include inspections and tests performed by independent agencies and governing authorities, as well as by the Contractor. Inspection and testing services are intended to determine compliance of the work with requirements specified. Specific quality control requirements are specified in individual specification sections.

2. RESPONSIBILITIES

   A. Contractor Responsibilities: Except where indicated as being the Owner's responsibility, quality control services are the Contractor's responsibility, including those specified to be performed by an independent agency and not by the Contractor. The Contractor shall employ and pay an independent agency, testing laboratory or other qualified firm to perform quality control services specified.

      1. The Owner will engage and pay for services of an independent agency to perform the inspections and tests that are specified as Owner's responsibilities.

   B. Retest Responsibility: Where results of inspections or test do not indicate compliance with Contract Documents, retests are the Contractor's responsibility.

   C. Responsibility for Associated Services: The Contractor shall cooperate with independent agencies performing inspections or test. Provide auxiliary services as are reasonable. Auxiliary services include:

      1. Provide access to the Work.

      2. Assist taking samples.

      3. Deliver samples to test laboratory.

   D. Coordination: The Contractor and independent test agency shall coordinate the sequence of their activities and shall avoid removing and replacing work to accommodate inspections and test. The Contractor is responsible for scheduling time for inspections and tests.

   E. Qualifications for Service Agencies: Contractor shall engage only inspection and test service agencies which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories.

   F. Submittals: Contractor shall submit a certified written report of each test, Inspection or similar service, in duplicate to the Construction Manager. Contractor shall submit additional copies of each report to any governing authority, when the authority so directs.

   G. Report Data: Written inspection or test reports shall include:

1. Name of testing agency or test laboratory.

2. Dates and locations of samples, tests or inspections.

3. Names of individual present.

4. Complete inspection of test data.

5. Test results.

6. Interpretations.

7. Recommendations.

H. Repair and Protection: Upon completion of inspection or testing, Contractor shall repair damaged work and restore substrates and finishes. Contractor shall comply with requirements for "Cutting and Patching."

I. Special Instructions:

1. Structural tests and special inspections must be conducted by an approved agency (an agency or firm regularly engaged in conducting tests or furnishing inspection services, approved by the authority having jurisdiction.) This means that contractors will no longer be allowed to cast their own test cylinders for example.

2. Continuous special inspection (the full-time observation of work by an approved special inspector who is present until completion of the work) is required for any steel welds and connections. Critical elements may include: all slip critical bolted connections, complete and partial groove welds, multi-pass fillet welds and single pass fillet welds greater than 5/16".

3. Continuous special inspection is required during the placement of all concrete and shotcrete for the proper application techniques with a few exceptions.

4. Periodic special inspection (the part-time observation by an approved special inspector) is required for any steel welds and connections. Critical elements may include: all slip critical bolted connections, complete and partial groove welds, multi-pass fillet welds and single pass fillet welds greater than 5/16".

5. Spray applied fireproofing requires periodic special inspection for the structural member surface conditions, application, thickness, density and bond strength.

6. Based on the classification, occupancy, and design of the structure, the code requires periodic special inspection for placement of masonry units and reinforcing steel and continuous special inspection of grout placement.

END OF SECTION

SECTION 015113 - TEMPORARY ELECTRICITY

1. GENERAL

A. RELATED WORK SPECIFIED ELSEWHERE

1. Electrical Basic Materials and Methods, Division 16 or 26.

B. DESCRIPTION OF SYSTEM

1. Power Source

a. Suppliers: Existing Facility

b. The Construction Manager shall provide 277/480 volt, three phase, 60 cycle power service to the site.

c. The Construction Manager will make all arrangements for bringing the power supply to the site and for installation of appropriate temporary transformers to provide for the power supply in 1.B.1.b, above.

d. The source will be adequate to service temporary electrical needs of the proposed construction.

2. Electrical Service

a. Contractor will be responsible to pay for all costs associated with providing electrical service from the power source to their respective site office, temporary storage facilities or temporary construction buildings as appropriate.

b. Prior to issuance of the Notice to Proceed for the electrical contract, the Construction Manager will be responsible for providing temporary electrical service as provided in 1.B.2.c, below. After issuance of the Notice to Proceed for the electrical contract, the Electrical Contractor shall become responsible for maintaining all electrical power supply and service facilities installed by the Construction Manager. The Electrical Contractor shall also, from that date forward, be responsible for providing and maintaining temporary electrical service to the site as provided in 1.B.2.c, below.

c. The Construction Manager or Electrical Contractor, as provided in 1.B.2.b, above, shall install temporary electric service for items below, throughout the construction period, such that power can be secured at any desired point with no more than a 60 foot extension:

(1) Power Centers for miscellaneous tools and equipment used in the construction work shall be provided with a minimum of four 20-amp, 120 volt grounding type outlets. Each outlet shall be provided with ground fault detecting circuit breaker protection.

(2) Adequate lighting for safe working conditions shall be provided and maintained on a 24 hour per day basis throughout the building, tunnels, and stairways per OSHA requirements. Each lamp must be rated at least 100 watts. Voltage of each socket must be at least 110 volts.

(3) Power for testing and checking equipment must be supplied.

3. Capacity

a. All electrical power supply and service lines installed shall be of adequate capacity for construction use by all trades during the construction period at the locations necessary.

b. The Electrical Contractor shall notify the Power Company if unusually heavy loads, such as welding units, are anticipated.

4. Power Costs

a. The Construction Manager will pay all costs of temporary electrical power used during construction.

b. The Owner will pay all costs of power used in the permanent wiring.

C. REQUIREMENTS AND REGULATORY AGENCIES

1. The Electrical Contractor will obtain permits as required by local governmental authorities.

2. The temporary electrical service shall comply with National Electrical Code, 1990 Edition and applicable local codes and utility regulations.

D. USE OF PERMANENT SYSTEM

1. The Electrical Contractor shall regulate any part of the permanent electrical system which is used for construction purposes to prevent interference with safety and orderly progress of the Work.

2. Contractors shall leave permanent electrical services in a condition as good as new and clean.

2. PRODUCTS

A. MATERIALS

1. General

a. The materials may be new or used, but must be adequate in capacity for the purposes intended and must not create unsafe conditions or violate the requirements of applicable

codes.

2. Conductors

   a. Use wire, cable, or busses of appropriate type, sized in accordance with the National Electrical Code for the applied loads.

   b. Use only UL labeled wire and devices.

B. EQUIPMENT

1. Provide appropriate enclosure for the environment in which used in compliance with NEMA standards.

3. EXECUTION

A. GENERAL

1. Install all work with a neat and orderly appearance.

2. Make structurally sound throughout.

3. Maintain to give continuous service and to provide safe working conditions.

4. Modify temporary power and light installation as job progress requires.

B. INSTALLATION

1. Locate so that interference with storage areas, traffic areas and work under other Contracts is avoided.

C. REMOVAL

1. Remove all temporary equipment and materials completely upon completion of construction.

2. Repair all damage caused by the installation and restore to satisfactory condition.

END OF SECTION

SECTION 015123 - TEMPORARY HEATING, COOLING AND VENTILATING

1. GENERAL

A. RELATED REQUIREMENTS SPECIFIED ELSEWHERE

1. Temporary Electric: Section 015113

2. Temporary Facilities: Section 015200

3. Heating Requirements for Cold Weather Installation and Protection of Materials: Respective specification section for each item of work.

B. DEFINITIONS

1. Temporary Enclosures: Sufficient preliminary enclosures of an area of structure, or of an entire building, to prevent entrance or infiltration of rainwater, wind, or other elements and which will prevent undue heat loss from within enclosed area.

2. Permanent Enclosure: Stage of construction at which all moisture and weather protection elements of construction have been installed in accordance with Contract Documents, either for a portion of structure, or for an entire building.

C. DESCRIPTION OF SYSTEM

1. Prior to the building or portion of building being permanently enclosed, each Contractor shall provide temporary heat and ventilation and weather protection necessary for their work, as described below. After permanent enclosure the Mechanical Contractor provide and maintain temporary heat and ventilation in enclosed areas, coordinated by the Construction Manager required to:

a. Facilitate progress of Work.

b. Protect Work and products against dampness and cold.

c. Prevent moisture condensation on surfaces.

d. Provide suitable ambient temperatures and humidity levels for installation and curing of materials.
e. Provide adequate ventilation to meet health regulations for safe working environment.

2. Temperatures Required

a. Generally, 24 hours a day: Minimum of 40 degrees F.

b. 24 hours a day during placing, setting, and curing of cementitious materials: As required by specification section for each product.

c. 24 hours a day, seven days prior to, and during, placing of interior finishes: woodwork, resilient floors, painting and finishing: As required by specification section for each product.

d. 24 hours a day after application of finishes, and until Substantial Completion: Minimum of 50 degrees F.

3. Ventilation Required:

a. Contractors shall prevent hazardous accumulations of dusts, fumes, mists, vapors, or gases in areas occupied during construction. Reference OSHA regulations CFR 1926.55 (Gases, vapors, fumes, dusts, and mists). and CFR 1926.57 (Ventilation).

(1) Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.

(2) Dispose of exhaust materials in manner that will not result in harmful dispersal of hazardous substances into atmosphere of occupied areas.

(3) Continuously ventilate storage spaces containing hazardous or volatile materials.

(4) Contractor/subcontractor must provide and use equipment which is furnished with Exhaust Purifiers/Scrubbers or is electrically power driven when any such equipment produces airborne containments and will be used in an enclosed building.

(5) The Contractor/subcontractor shall verify air quality by the use of air monitoring equipment and document the verified air quality on the daily report. The monitoring equipment shall, at a minimum, be designed with an auditory alarm and shall provide continuous monitoring of those four gasses, Oxygen, Hydrogen Sulfide, Carbon Monoxide and Combustible gasses.

4. Contractors shall provide adequate ventilation for:

a. Curing installed materials.
b. Dispersal of humidity.

c. Temporary sanitary facilities.

5. Duration of Operations:

a. For Personnel:

(1) At all times personnel occupy an area subject to hazardous accumulations of harmful elements.

(2) Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful elements.

b. For curing installed materials: As required by specification section for respective materials.

c. For humidity dispersal: Continuously ventilate to provide suitable ambient conditions for work.

d. The Mechanical Contractor shall maintain supervision and operation of temporary heating and ventilating equipment in order to:

(1) Enforce conformance with applicable codes and standards.

(2) Enforce safe practices.

(3) Prevent abuse of services.

D. COSTS OF INSTALLATION AND OPERATION

1. The Contractor shall be responsible for all installation and operating costs for any heat and ventilation as required in this section until the permanent HVAC system is in operation.

2. After the permanent HVAC system is operational, the Owner will pay the costs of fuel for temporary heat and ventilation. The Contractor will pay the costs for maintaining the system until final acceptance by the Owner.

3. The Mechanical Contractor shall be responsible for all installation and operating costs for any heat required to supplement that which is to be supplied by the Construction Manager in paragraph 1.C.1, above.

E. REQUIREMENTS OF REGULATORY AGENCIES

1. The Construction Manager will obtain and pay for permits as required by governing authorities for those activities required by this Section.

2. Contractor shall comply with Federal, State, and local codes, and utility company regulations.

2. PRODUCTS

A. MATERIALS

1. General

    a. Materials may be new or used but must be adequate for purposes intended and must not create unsafe conditions nor violate requirements of applicable codes.

B. EQUIPMENT

1. Standard products, meeting code requirements.

2. Provide required facilities, including piping, wiring and controls.

3. Portable Heaters:

    a. Indirect hot air units, located outside with duct entering into the building. Provide a sufficient number of units to meet the temperature and ventilation requirements specified above.

    b. Provide Safety Controls against explosion, overheating, and carbon monoxide build up.

    c. Provide adequate combustion air.

    d. Provide Temperature Controls installed in the building at a location(s) designated by the Construction Manager.

    e. Provide temporary barricades around the equipment to protect against damage from other construction equipment.

    f. Provide supplementary fans / distribution equipment capable of distributing heated air evenly throughout the space(s).

4. Oil-Fired heaters will not be allowed.

3. EXECUTION

A. GENERAL

1. Comply with applicable sections of Division 26 - Mechanical.

2. Install work in neat and orderly manner.

3. Make structurally, mechanically, and electrically sound throughout.

4. Maintain to give safe, continuous service at required times and to provide safe working conditions.

5. Modify and extend system as work progress requires.

B. INSTALLATION

1. Locate units to provide equitable distribution of heat and air movements.

2. Locate to avoid interference with, or hazards to:

   a. Work or movement of personnel.

   b. Traffic areas.

   c. Materials handling.

   d. Storage areas.

   e. Work of other Contractors.

   f. Finishes.

C. OPERATION OF PERMANENT EQUIPMENT

1. The Mechanical Construction Manager will coordinate with Contractor.

2. The Contractor will place permanent HVAC system in operation only upon written authorization by the Construction Manager.

3. Before operating the permanent HVAC equipment, the Contractor shall confirm to the Construction Manager that:

   a. Inspection has been made by proper authorities.

   b. Systems, equipment piping, strainers, filters and associated operating items are sufficiently complete, cleaned, and ready for operation.

   c. Controls and safety devices are complete and tested, or adequate temporary controls are provided.

   d. Before operating the permanent HVAC equipment, the Contractor shall install temporary filters:

      (1) For air handling units.

      (2) For permanent ducts.

D. REMOVAL

1. The Contractor shall completely remove temporary materials and equipment when no longer required, or on completion of construction.

2. The Contractor shall clean and repair damage caused by temporary installation and restore equipment to specified or original condition.

3. The Mechanical Contractor shall remove temporary filters and install new filters, or clean permanent filters, in the permanent HVAC system prior to final acceptance by the Owner.

END OF SECTION

SECTION 015200 - CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

1. GENERAL

A. DESCRIPTION

1. Construction Manager and Contractors shall provide all temporary facilities throughout the construction period unless otherwise indicated in the Contract Documents.

2. Construction Manager and Contractors shall pay all costs for providing, maintaining and removing of all temporary facilities unless otherwise indicated in the Contract Documents.

B. RELATED WORK SPECIFIED ELSEWHERE

1. Temporary Electric: Section 015113.

2. FACILITIES

A. TEMPORARY SANITATION FACILITIES

1. Construction Manager will provide and maintain sanitary facilities for all personnel on the project.

2. The number of sanitary facilities required shall be based on the total number or workers employed on the site and shall be in accordance with the provisions of the applicable code.

3. Construction Manager will maintain sanitary facilities in a sanitary and clean condition at all times.

B. TEMPORARY WATER

1. Drinking Water: Contractor shall provide potable water for drinking purposes for all his personnel on the site. He shall furnish disposable drinking cups at water stations. Each water station shall be equipped with a suitable trash container for disposal of the drinking cups.

2. Construction Water: Construction Manager will provide and maintain tap locations for construction water of sufficiently pure and potable quality to avoid deleterious effect on any materials used. Location of construction water tap locations will be determined by the Construction Manager depending on the stage of construction of the incoming water service. Contractor shall provide and maintain all hoses, piping and valves as required for obtaining construction water from taps provided by the Construction Manager.

C. TEMPORARY TELEPHONES

1. Construction Manager will not provide any telephones or fax machines for Contractor's personnel. Each Contractor is responsible for its own phones and fax machines.

D. FIELD OFFICE

1. During the period of the Work and until final acceptance of the project, the Construction Manager will provide a weatherproof building for the Construction Manager's Field Project Manager(s) and Superintendent(s). Contractor shall make provisions for its own field office, subject to approval by the Construction Manager.

E. FIRE PROTECTION

1. The Carpentry and General Works Contractor will provide and maintain portable fire extinguishers on each floor level and building area. Number to conform to applicable codes.

2. Contractor shall provide additional fire extinguishers as required by OSHA regulations for its work.

3. Fire extinguishers shall be 10lb, Multi-Purpose (ABC) dry chemical, UL labeled, with a rating of 3a:40bc.

F. ACCESS ROADS AND PARKING AREAS

1. The Construction Manager will provide and maintain access roads on the site.

2. Neither the Construction Manager nor the Owner will provide parking for Contractor's personnel on or about the project site. All parking provisions required for Contractors will be solely the responsibility of the Contractors or their personnel.

G. STORAGE AREAS

1. The Construction Manager will assign storage areas on the site. Storage areas are extremely limited and will be assigned in a manner which will best facilitate the work.

2. Contractor shall provide all other storage space required for its work at off-site locations.

3. All combustible or flammable materials must be safely stored in a secured area in strict accordance with regulations, codes and laws enforced by local, State or Federal agencies, whichsoever is the most stringent.

H. FIRST AID STATION

1. The Contractor's Superintendent or Safety Supervisor shall insure that adequate first aid

supplies are available, and that personnel are qualified to administer first aid/CPR, as required by State and/or Federal regulations.

I. SECURITY

1. The Construction Manager will provide the following security measures at the site: security lighting will be provided.

2. All other safety and security measures shall be the responsibility of each Contractor. These measures shall include but are not limited to the provision of secured storage for tools, construction equipment, and materials and equipment scheduled for installation in the building.

J. BENCH MARKS AND BASELINE

1. The Construction Manager will lay out and establish and maintain bench marks and baselines.

2. The Contractor shall lay out his own work and shall be responsible for the accuracy of same.

3. Contractor shall check grades, lines, levels and dimensions as shown on the drawings and shall promptly report errors or inconsistencies in same to the Construction Manager before Work proceeds.

4. The Contractor is responsible for damaging or altering the bench marks and baselines established by the Construction Manager and shall bear the costs of replacing same.

K. FIELD OFFICE AND STORAGE TRAILERS

1. Contractor shall provide and maintain its own field office and storage trailers as required.

2. Contractor shall provide temporary heat and power for its field office and storage trailer.

3. Contractor’s field offices and storage trailers shall be located as directed by the Construction Manager.

L. PROJECT SIGN

1. The Construction Manager will provide a Project Sign naming the major participants, as determined by the Owner.

M. TRASH DISPOSAL

1. Each Contractor shall be responsible for daily clean up and depositing its common trash in the dumpsters provided by the Construction Manager.

2. The Construction Manager will not provide a trash chute.

3. The Construction Manager will provide dumpsters, and will arrange for disposal of common, non-hazardous, work-related trash deposited in these dumpsters.

N. HOISTING

1. Contractor shall provide its own materials hoists and cranes. No personnel hoist will be provided.

O. SCAFFOLDING AND WORKING PLATFORMS

1. No scaffolding shall be provided by the Construction Manager. Each Contractor shall provide all scaffolding required to perform its Work.

P. SAFETY BARRICADES AND RAILINGS

1. The Structural Contractor shall provide barricades **and protective barriers** around elevator, stair, shaft and cut openings in floors and roofs, and edges of floors and roofs. The methods and materials used in barricading shall be in accordance with OSHA and local code regulations. Barricades and protective barriers will be installed immediately after the installation of the floor slab on any level or part of a level on the Building. Until a level has been fully barricaded, the Structural Contractor will be responsible for maintenance of the barricades. When a warning barricade is used to prohibit employees from entering a restricted work area. The "warning barricade" shall meet the requirements of CFR 1926.502 (f)(2). The supported rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material and maintain between 34 and 39 inches above the walking/working surface; Warning signs and tags shall be used in accordance with Subpart G of CFR OSHA Construction Industry Regulations.

2. After the barricades and protective barriers are no longer needed, the Structural Contractor will remove the barricades from the site. The Construction Manager will determine the location and scheduling of barriers to be removed.

3. Contractor shall provide for its own barricades at all other trenches, excavations, and locations not specifically identified in Paragraph 1 above.

4. Contractors who remove barricades shall be responsible for replacing them. If, after proper notification, in writing, from the Construction Manager the responsible Contractor does not correct his deficiencies in safety barricade placement, the Construction Manager reserves the right to undertake this work and backcharge the responsible Contractor(s).

5. During the execution of his work, Contractor will provide daily maintenance of, and upon completion of same, restore all barricades in a manner acceptable to prevailing

safety standards enforced by local, State or Federal ordinance, whichsoever is most stringent. The intent is to leave no floor penetration or perimeter opening in an unsafe condition.

6. The Construction Manager shall arrange for temporary ladders required for access to each of the floor levels after the completion of floor slab work, and until the final stairs are ready for use.

Q. PUMPING AND DRAINAGE

1. Contractor shall provide its own pumping and drainage.

2. When an area is released by one Contractor to another, the Contractor releasing an area shall be responsible for leaving it in a drained condition. The incoming Contractor shall assume responsibility for drainage on the day that he is scheduled to start work in the area. If the incoming Contractor is late in starting work, he shall assume responsibility for pumping and drainage arising as a result.

R. TEMPORARY BUILDING ENCLOSURES

1. The Construction Manager will equip all temporary exterior doors of the building with self-closing hardware and padlocks.

2. All other temporary enclosures and protection shall be provided by the Contractor requiring the protection.

3. Temporary enclosures required due to late delivery of materials or untimely installation of work shall be the responsibility of the Contractor responsible for the delay.

S. TEMPORARY POWER AND LIGHTING

1. Contractor shall provide all extension cords and outlets as required for obtaining electric power from power centers provided by the Electrical Contractor. Refer to Section 015113 - TEMPORARY ELECTRIC.

2. Contractor shall provide its own additional temporary lighting of sufficient lighting levels to properly install his work.

T. TEMPORARY HEAT

1. Contractor shall provide temporary heat as required for its operations. Once a building has reached the “Permanent Enclosure” stage, temporary heat will be provided as specified in Section 015123 - TEMPORARY HEAT AND VENTILATION.

2. Equipment and methods of temporary heating shall be reported to the Construction Manager.

U. PROTECTION OF ADJACENT MATERIALS

1. Contractor shall protect adjacent materials and finishes from damage as a result of its work.

V. CLEAN UP

1. Contractor shall arrange for clean up and removal of debris resulting from its operations, and shall dispose of debris in accordance with the provisions of Paragraph 2.13 above. Clean up shall be on a continual basis to ensure that building, grounds and public properties are maintained free from accumulations of waste materials and trash.

2. The Contractor will limit use of and ensure that all materials, including waste, that are combustible or flammable will be removed from the building continually, as work progresses, **and at a minimum** at the end of each work day. All trash which is potentially edible or may attract rodents or insects will be disposed of in metal containers and removed by the end of the work day.

3. At completion of its Work, each Contractor shall remove waste materials, rubbish, tools, equipment, and clean up all exposed surfaces in preparation for final cleaning.

4. If, after notification in writing from the Construction Manager, the Contractor does not correct its deficiencies in housekeeping within twenty four (24) hours, the Construction Manager reserves the right to undertake the Work and to backcharge the Contractor.

5. Final clean up prior to Owner occupancy shall be arranged for by the Construction Manager.

W. DUST PROTECTION

1. Contractor shall erect and maintain dust proof protection whenever its operations will produce dust and dirt that might filter through the building into occupied or finished areas. Contractor shall be responsible for all cleaning required due to its failure to provide adequate dust protection.

X. PROTECTION OF EXISTING CONSTRUCTION

1. Contractor shall be responsible for all damage that it may cause to materials and equipment stored or installed by other Contractors.

Y. OTHER

1. Contractor shall provide any other Temporary Facilities and services that it requires and which are not specifically identified above.

3. PERMITS

3.1 The Construction Manager will obtain the Building Permit. All other permits are to be obtained and paid for by the Contractor requiring them.

4. EXECUTION

A. GENERAL

1. Contractor shall install all temporary facilities in accordance with applicable codes.

2. Contractor shall maintain temporary facilities for which it is responsible throughout the construction period.

3. Contractor shall remove all temporary facilities for which it is responsible when they are no longer required or when the Construction Manager directs the removal of same.

4. Contractor shall repair all damage to the Project Site caused by the installation of its temporary facilities.

END OF SECTION

SECTION 016200 - MATERIAL AND EQUIPMENT

1. GENERAL CONDITIONS

   A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate apply to the Work specified in this Section.

   B. Where work is to be executed under Separate Prime Contracts, the provisions of this Section apply to each Contract.

2. REQUIREMENTS INCLUDED

   A. All materials and equipment incorporated into the Work shall:

      1. be new;

      2. conform to applicable specifications and standards; and

      3 comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.

   B. Manufactured and Fabricated Products shall conform to the following requirements:

      1. Designed, fabricated and assembled in accord with the best engineering and shop practices.

      2 Manufactured like parts of duplicate units to standard sizes and gauges, to be interchangeable.

      3. Two or more items of the same kind shall be identical, by the same manufacturer.

      4 Products shall be suitable for service conditions.

      5. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

   C. Contractor shall not use materials or equipment for any purpose other than that for which it is designated or is specified.

   D. Materials removed from existing structures shall not be reused in the completed work unless specifically indicated or specified.

   E. For materials and equipment specifically indicated or specified to be reused in the Work:

      1. Contractor shall use special care on removal, handling storage and reinstallation, to assure proper function in the completed Work.

2. Arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation. Pay all costs for such work.

3. MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, Contractor shall obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Construction Manager.

1. Maintain one set of complete instructions at the job site during installation and until completion.

B. Contractor shall handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, Contractor shall consult with Construction Manager for further instructions.

2. Contractor shall perform work in accord with manufacturer's instructions. Contractor shall not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

4. TRANSPORTATION AND HANDLING

A. Contractor shall arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Contractor shall immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.

B. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

5. STORAGE AND PROTECTION

A. Contractor shall store Products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Contractor shall store Products subject to damage by the elements in weathertight enclosures.

2. Contractor shall maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior Storage

1. Contractor shall store fabricated Products above the ground, on blocking or skids, to prevent soiling or staining. Cover Products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

2. Contractor shall store loose granular materials in a well-drained area on soiled surfaces to prevent mixing with foreign matter.

C. Contractor shall arrange storage in a manner to provide easy access for inspection. Contractor shall make periodic inspections of stored Products to assure that Products are maintained under specified conditions, and free from damage or deterioration.

D. Contractor shall store flammable materials so as to prevent contact with flames and fire. Conform with manufacturer's recommendations and local laws. Pay particular attention to storage of:

1. Roof insulation.

2. Roofing materials, including solvents.

3. Paint materials.

4. Cleaning and other solvents.

5. Fuels.

E. Protection after Installation:

1. Contractor shall provide substantial coverings as necessary to protect installed Products from damage from traffic and subsequent construction operations. Remove when no longer needed.

6. SUBSTITUTIONS AND PRODUCT OPTIONS

A. Product List.

1. Within 30 days after Contract Date, Contractor shall submit to Construction Manager a complete list of major products proposed to be used, with the name of the manufacturer and the installing Contractor.

B. Contractor's Options.

1. For Products specified only by reference standard, Contractor shall select any Product meeting that standard.

2. For Products specified by naming several Products or manufacturers, Contractor shall select

any one of the Products or manufacturers named which complies with the specifications.

3. For Products specified by naming one or more Products or manufacturers and "or equal", Bidders must, during the bidding period, submit a request for substitutions for any Product or manufacturer not specifically named. See provisions in Paragraph 6.C, below.

4. For Products specified by naming only one Product and manufacturer, there is no option; and Contractor shall provide the precise Product specified.

C. Substitutions.

1. The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will be considered, providing that the Vendor certified that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the propose4d substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.

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

3. Until a date no later than seven (7) days before the date Bids are due, Architect will consider written requests from bidders for substitution of Products. **The contractor will submit any substitution requests to the Construction Manager for transmittal to the Architect. The** architect will review requests and will notify Bidders in an Addendum if the requested substitution is acceptable.

4. Should the Bidder desire a substitution, it shall submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:

   a. Comparison of the qualities of the proposed substitution with that specified.

   b. Changes required in other elements of the Work because of the substitution.

   c. Effect on the construction schedule.

   d. Cost data comparing the proposed substitution with the Product specified.

   e. Any required license fees or royalties.

f. Availability of maintenance service, and source of replacement materials.

5. Architect, in its sole discretion, shall be the judge of the acceptability of the proposed substitution.

6. A request for a substitution constitutes a representation that Bidder:

   a. has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified;

   b. will provide the same warranties or bonds for the substitution as for the Product specified;

   c. will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects; and

   d. waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

D. Architect will review requests for substitutions with reasonable promptness, and notify Bidders, in writing, through the Construction Manager, of the decision to accept or reject the requested substitution. Any decision to accept a substitution must be confirmed in an Addendum issued during the bidding period in order to be valid. Oral approvals will not be binding.

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

END OF SECTION

SECTION 017000 – Execution and Closeout Requirements

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final Completion procedures.
3. List of incomplete items.
4. Submittal of Project warranties.
5. Final cleaning.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services

and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.6 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect and Construction Manager
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. MS Excel Electronic File: Architect[**,** through Construction Manager**,** will return annotated file.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by uploading to web-based project software site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.

b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
d. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
e. Vacuum and mop concrete.
f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
h. Remove labels that are not permanent.
i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
j. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
k. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
l. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
m. Clean strainers.
n. Leave Project clean and ready for occupancy.

3.2 CORRECTION OF THE WORK

A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017000

SECTION 017123 - FIELD ENGINEERING

1. GENERAL PROVISIONS

   A. The general provisions of the Contract, including the Conditions of the Contract, (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

   B. The provisions of the section apply to all contracts.

2. SURVEY

   A. The Owner has had a site survey prepared by Tevenbaugh. This information has been included in this Bid Pac.

3. CONSTRUCTION MANAGER

   A. The Construction Manager will establish a bench mark and base line from which structures and grades shall be laid out by Contractors as designated in this section. The total extent of this layout is shown on the site drawings. One bench elevation shall be provided.

END OF SECTION

SECTION 017329 - CUTTING AND PATCHING

1. GENERAL

A. Definition: "Cutting and Patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

B. Refer to Other Sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

C. Structural Work: Do not cut and patch structural work in a manner resulting in a reduction of load carrying capacity or load deflection ratio. Submit proposal and request and obtain Architect's/Engineer's approval before proceeding with cut and patch of structural work.

D. Operational/Safety Limitations: Do not cut and patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance. Submit proposals and requests and obtain Architect's/Engineer's approval before proceeding with cut and patches of structural work.

E. Visual/Quality Limitations: Do not cut and patch work exposed to view (exterior and interior) in manner resulting in noticeable reduction of aesthetic qualities and similar qualities, as judged by Architect/Engineer.

1. Engage the original Installer/Fabricator, or (if not available) an acceptable equivalent entity, to cut and patch the following categories of exposed work but not limited to

2. Exterior wall materials, ie., curtain wall

3. Finish floor materials, ie., substrate, carpet, ceramic tile

4. Walls

5. Ceilings

F. Limitation on Approvals: Architect's/Engineer's approval to proceed with cutting and patching does not waive right to later acquire removal/replacement of work found to be cut and patched in an unsatisfactory manner, as judged by Architect/Engineer.

2. MATERIALS

A. General: Use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal or better performance characteristics.

3. EXECUTION

A. Inspection: Before cutting, examine surfaces to be cut and patched and conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

B. Temporary Support: To prevent failure provide temporary support of work to be cut.

C. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.

1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

2. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

D. Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installer's recommendations.

1. Where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut and drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

E. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

1. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and finishing.

END OF SECTION

SECTION 017700 – CONTRACT CLOSEOUT

1. DESCRIPTION OF REQUIREMENTS

   A. Provisions of this section apply to the procedural requirements for the actual close out of the Work, not to the administrative matters such as final payment or the change over of insurance. Close out requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the Total work. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

2. PROCEDURES AT SUBSTANTIAL COMPLETION

   A. Prerequisites: Contractor shall comply with the General Conditions and complete the following before requesting inspection of the Work, or a designated portion of the Work, for certification of substantial completion:

      1. submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, releases of liens, tax certification and similar required documentation for specific units of work, and documents needed to enable Owner's unrestricted occupancy and use;

      2. submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items;

      3. complete instructions of Owner's operating personnel, and start up of systems; and

      4. complete final cleaning and remove temporary facilities and tools.

   B. Inspection Procedures: Upon receipt of Contractor's request, Architect/Engineer will either proceed with inspection or advise Construction Manger of prerequisites not fulfilled. Following initial inspection, Architect/Engineer will either prepare certificate of substantial completion, or advise Construction Manager of work which must be performed prior to issuance of certificate. The Architect/Engineer will repeat the inspection when requested and assure that the work has been substantially completed. Results of the completed inspection will form the initial "punch list" for final acceptance.

   C. Punch List Procedures: Each Contractor shall be given a copy of the punch list with its appropriate work identified. Each Contractor shall be given 9 (nine) calendar work days to complete their punch list work. On the 10th day or as determined by the Construction Manager the Construction Manager shall employ other Contractors, as required, to complete any incomplete punch list work and retain from the appropriate Contractors retainage all costs incurred.

3. PROCEDURES AT FINAL ACCEPTANCE

   A. Reinspection Procedure: The Architect/Engineer will reinspect the Work upon receipt of the Contractor's notice that, except for those items whose completion has been delayed due to circumstances that are acceptable to the Architect/Engineer, the Work has been completed, including punch list items from earlier inspections. Upon completion of reinspection, the Architect/Engineer will either recommend final acceptance and final payment, or will advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

4. RECORD DOCUMENTATION

   A. Record Drawings: Contractor shall maintain a complete set of either blue or black line prints of the contract documents and shop drawings for record mark-up purposes throughout the Contract Time. Contractor shall mark up these drawings during the course of the Work to show both changes and the actual installation, in sufficient detail to form a complete record for Owner's purposes giving particular attention to work that will be concealed and difficult to measure and record at a later date, and Work which may require servicing or replacement during the life of the project. Require the entities marking prints to sign and date each mark up. Bind prints into manageable sets, with durable paper cover, appropriately labeled.

B. Installation, Operation and Maintenance Manual: Contractor shall provide 3-ring vinyl covered binders containing required maintenance manuals, properly identified and indexed and including operating and maintenance instructions extended to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system of equipment item.

C. State Tax Certification: Contractor shall provide recent Delaware State Tax Certification form as issued by State of Delaware, Department of Finance, Division of Revenue, Carvel State Office Building, 820 N. French Street, Wilmington, Delaware 19801. To obtain this certificate, the contractor will be required to provide the Division of Revenue with the completed State Form 8821 DE along with a processing fee of $40.

D. AIA Documents: Contractors shall provide the following AIA documents with their final payment application submission:
- AIA G732, Application for Payment for 100% Complete
- AIA G732, Final Application for Payment for Retainage
- AIA G704-CMA, Certificate of Substantial Completion – 4 originals
- AIA G706, Affidavit of Payment of Debts & Claims
- AIA G706A, Affidavit of Release of Liens
- AIA G707, Consent of Surety

E. Release of Liens: Contractors shall provide the following release of liens with their final payment application submission:
- Prime Contractor's Release of Liens
- Subcontractors' & Suppliers' Release of Liens (major subs and suppliers)

5. GENERAL CLOSE OUT REQUIREMENTS

A. Operator Instruction: Contractor shall require each Installer of systems requiring continued operation and maintenance by Owner's operating personnel, to provide on location instruction to Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems. Contractor shall provide instructions for the following categories of work:

1. Mechanical/electrical/electronic systems (not limited to work of Division 15 and 16).

2. Roofing, flashing, joint sealers.

3. Floor finishes.

4. Door hardware

6. FINAL CLEANING

A. At the time of project close out Contractor shall clean or re-clean the Work to the condition expected from a normal, commercial building cleaning and maintenance program. Complete the following cleaning operations before requesting the Architect/Engineer's inspection for certification of substantial completion:

1. Remove non-permanent protections and labels.

2. Polish glass.

3. Clean exposed finishes.

4. Touch up minor finish damage.

5. Clean or replace mechanical systems filters.

6. Remove debris.
7. Broom clean unoccupied spaces.
8. Sanitize plumbing and food service facilities.
9. Clean light fixtures and replace burned out lamps.
10. Sweep and wash paved areas.
11. Police yards and grounds.

END OF SECTION

Reset Print Form

DELAWARE FORM 8821DE

Authorization to Release Tax Information

Completion and submission of this form authorizes the Delaware Division of Revenue to release confidential information of the Taxpayer(s) named below to the authorized person(s) or organization named below for the tax type(s) specified below. This form does not give Power of Attorney and does not grant the authorized person(s) or organization any powers of representation. Unauthorized disclosure of tax information is a criminal offense.

Print or Type

Read the instructions below before completing this form.

Your name or name of entity

Social Security or Federal Employer ID number

Spouse's name, if joint (or corporate officer, partner or fiduciary if a business)

Spouse's Social Security number (if a joint return)

Street address

City State ZIP Code -

Authorized Person or Organization

I authorize the following person or organization to inspect and/or receive private and non-public information in regard to the tax types and periods provided below.

Name of person or organization to receive tax information

Name of firm (if applicable)

Street address

City State ZIP Code -

Phone Number Fax Number

Tax Information

The above person or organization is authorized to receive the following tax information *(check all that apply)*:

Type of Tax	Year(s) or Period(s)			
☐ Individual Income	from	MM DD YY	to	MM DD YY
☐ Corporate Income	from	MM DD YY	to	MM DD YY
☐ Pass-through Return	from	MM DD YY	to	MM DD YY
☐ Gross Receipts	from	MM DD YY	to	MM DD YY
☐ Withholding	from	MM DD YY	to	MM DD YY
☐ Other (*please specify*):	from	MM DD YY	to	MM DD YY

The authorization to release tax information is not valid until it is signed and dated. It will expire 60 days after the information is released. By signing this form, I hereby certify that the Delaware Division of Revenue is authorized to release any and all confidential information concerning the above mentioned release any and all confidential information concerning the above mentioned Taxpayer under penalty of law. A copy of this form will be mailed to the individual(s) authorizing the release.

Sign Here

Your Signature	Date	Spouse's Signature (if joint)	Date
	MM DD YY		MM DD YY
Print Name		Print Spouse's Name (if joint)	
Print Title (if applicable)		Phone	
Phone			

Mail to: Delaware Division of Revenue, 820 North French Street, Wilmington, DE 19801

Form 8821DE Instructions

Purpose of this form

You must complete, sign and return this form if you want to authorize a person ororganization to inspect and/or receive certain private or nonpublic information concerning your state taxes. By completing and signing this form, you are authorizing the Division of Revenueto release tax information to the person or organization you have indicated. Revenue *will* accept copies of the form,including those from a FAX machine. This authorization will expire 60 days after the information is released to the person or organization you have indicated.

Your Signature

The authorization to release tax information is not valid until it is signed and dated. Your spouse must also sign if joint returns are listed.Your signature at the bottom of this form authorizes the individual or organization you designate to only be able to inspect and/or receive confidential tax information on your behalf.

Questions?

If you have questions on how to complete this form or to fax this form, call (302) 577-8200 for a staff contact who will provide you with a fax number. You must include a Division of Revenue contact name on all faxed authorization forms.

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Selective demolition required for new construction, including but not limited to:
      a. Demolition and removal of selected site elements.
      b. Demolition and removal of selected portions of building or structure
      c. Interior partitions, doors, and finishes.
      d. Mechanical, electrical, and fire suppression systems.
      e. Salvage of existing items to be reused.

B. Principal Products:
   1. Existing items to remain or to be reused.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate utility and building service interruptions with Owner.
   1. Notify Owner seven days, minimum, before disrupting building fire protection and life safety systems.
   2. Schedule tie-ins to existing systems to minimize disruption.
   3. Coordinate Work so fire protection and life safety systems remain continuously operational in occupied areas.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

C. Owner will conduct salvage operations before demolition begins to remove materials Owner chooses to retain.

D. Schedule Work to coincide with new construction.

E. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owner’s operation and occupancy of adjoining spaces and buildings.

1.3 ACTION SUBMITTALS

A. Shop Drawings:
   1. Indicate demolition and removal sequence.
   2. Indicate location of items designated for reuse or Owner's retention.
   3. Indicate location and construction of temporary partitions.

B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.

1.4 INFORMATIONAL SUBMITTALS

A. Demolition Materials Recycling: See Section 01 74 19.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities and concealed utilities discovered during demolition.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Conduct demolition to minimize interference with adjacent occupied campus areas.

B. Cease operations immediately if structure appears to be in danger and notify Owner and Architect. Do not resume operations until directed.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Follow the following reference standards:
   1. ANSI/ASSP A10.6.
   2. NFPA 241.
   3. State and local requirements.

B. Conform to applicable code for demolition work, dust control, products requiring utility disconnection and re-connection.

C. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

D. Obtain required permits from authorities having jurisdiction.

3.2 PREPARATION

A. Notify affected utility companies before starting work; follow their requirements.

B. Mark location and termination of utilities.

C. Erect, and maintain temporary barriers and security devices at locations shown, including warning signs and lights, and similar measures, for protection of the public and existing improvements indicated to remain.

D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches of any stressing tendon. Notify Architect three days in advance of cutting post-tensioned concrete.

E. Erect and maintain weatherproof closures for exterior openings.

F. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

G. Provide appropriate temporary signage including signage for exit or building egress.

H. Do not close or obstruct building egress paths.

3.3 SALVAGE REQUIREMENTS

A. Protect designated salvage items from demolition operations until items can be removed.

B. Carefully remove building components and equipment indicated to be salvaged.

C. Disassemble as required to permit removal from building.

D. Package small and loose parts to avoid loss.

E. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

F. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

G. Store salvaged item(s) until required for re-installation.

3.4 DEMOLITION

A. Maintain protected egress from and access to adjacent existing buildings at all times.

B. Do not close or obstruct roadways or sidewalks without permits.

C. Disconnect and remove designated utilities within demolition areas.

D. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

E. Demolish in orderly and careful manner. Protect existing improvements.

F. Carefully remove building components indicated to be reused.
   1. Disassemble components as required to permit removal.
   2. Package small and loose parts to avoid loss.
   3. Mark components and packaged parts to permit reinstallation.
   4. Store components, protected from construction operations, until reinstalled.

G. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

H. Transport friable and dusty demolished materials through building in enclosed containers.

I. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

J. Remove temporary partitions.

END OF SECTION

SECTION 04 05 11 – MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Mortar for masonry.
2. Grout for masonry.

B. Related Requirements:
1. Section 04 20 00 – Unit Masonry

C. REFERENCE STANDARDS
1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2024.
2. ASTM C91 /C91 M - Standard Specification for Masonry Cement; 2025.
3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2025.
4. ASTM C1 44 - Standard Specification for Aggregate for Masonry Mortar; 2025.
5. ASTM C1 50/C1 50M - Standard Specification for Portland Cement; 2024.
6. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.
7. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2025a.
8. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
9. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
10. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2025a.
11. ASTM C1 01 9 - Standard Test Method for Sampling and Testing Grout for Masonry; 2025.
12. ASTM C1 072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength;
13. 2022.
14. ASTM C1 31 4 - Standard Test Method for Compressive Strength of Masonry Prisms; 2024.
15. ASTM C1 71 4/C1 71 4M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 201 9a.
16. 0. ASTM E51 8/E51 8M - Standard Test Methods for Flexural Bond Strength of Masonry; 2022.
17. P. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

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

1.3 QUALITY ASSURANCE

A. Perform Work according to City of Wilmington and DelDOT standards.

B. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

1.4 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00 - Quality Requirements.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
   1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C1 01 9 procedures.
   1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT APPLICATIONS

A. At Contractor's option, mortar and grout may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

B. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Masonry below grade and in contact with earth: Type M.
   2. Exterior, Loadbearing Masonry: Type S.
   3. Exterior, Non-loadbearing Masonry: Type S.

4. Interior, Loadbearing Masonry: Type S.
5. Interior, Non-loadbearing Masonry: Type N.

C. Grout Mix Designs: ASTM C476, High Slump
1. Bond Beams, Lintels, and Reinforced/Grouted Cells: 3,000 psi strength at 28 days; 8-1 0 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
2. Do not substitute mortar for grout

2.2 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1 71 4/C1 71 4M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Color: Standard gray.

B. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

C. Portland Cement: ASTM C1 50/C1 50M.
1. Type: Type I - Normal; ASTM C1 50/C1 50M.
2. Color: Standard gray.

D. Masonry Cement: ASTM C91 /C91 M.

E. Hydrated Lime: ASTM C207, Type S.

F. Quicklime: ASTM C5, non-hydraulic type.

G. Mortar Aggregate: ASTM C1 44.

H. Grout Aggregate: ASTM C404.

I. Water: Clean and potable.

J. Accelerating Admixture: Nonchloride type for use in cold weather.

K. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

L. Bonding Agent: Latex type.

2.3 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
   1. Do not use admixtures that contain chlorides

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

2.4 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
   1. Do not use admixtures that contain chlorides

D. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 - EXECUTION

3.1 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.2 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Do not install grout in lifts greater than 1 6 inches without consolidating grout by rodding.

C. Do not displace reinforcement while placing grout.

D. Remove excess mortar from grout spaces.

3.3 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 1 2 inches.
   2. Limit height of masonry to 1 6 inches above each pour.

3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1 -1 /2 hours.

C. High-Lift Grouting:
1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
2. Hollow Masonry: Limit lifts to maximum 5 feet and pours to maximum height of 1 2 feet.
3. Place grout for spanning elements in single, continuous pour.

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.

C. Test and evaluate grout in accordance with ASTM C1 01 9 procedures.

D. Prism Tests: Test masonry and mortar panels for compressive strength in accordance with ASTM C1 31 4, and for flexural bond strength in accordance with ASTM C1 072 or ASTM E51 8/E51 8M; perform tests and evaluate results as specified in individual masonry sections.

END OF SECTION 04 05 11

SECTION 04 05 11 – MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Concrete block.
2. Mortar and grout.
3. Reinforcement and anchorage.
4. Lintels.
5. Accessories.

B. Related Requirements:
1. Section 04 05 1 1 - Masonry Mortaring and Grouting.

C. REFERENCE STANDARDS
1. ASTM A1 53/A1 53M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
2. ASTM A61 5/A61 5M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2024.
3. ASTM A641 /A641 M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire;
4. 201 9 (Reapproved 2025).
5. ASTM A951 /A951 M - Standard Specification for Steel Wire for Masonry Joint Reinforcement;
6. 2022.
7. ASTM A1 064/A1 064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.
8. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.
9. ASTM C1 29 - Standard Specification for Dry-Cast Nonloadbearing Concrete Masonry Units;
10. 2025.
11. ASTM C1 44 - Standard Specification for Aggregate for Masonry Mortar; 2025.
12. ASTM C1 50/C1 50M - Standard Specification for Portland Cement; 2024.
13. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2024.
14. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
15. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
16. BIA Technical Notes No. 7 - Water Penetration Resistance — Design and Detailing; 201 7.
17. BIA Technical Notes No. 1 3 - Ceramic Glazed Brick Exterior Walls; 201 7.
18. 0. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

1.2 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
E. Manufacturer's Qualification Statement.
F. Installer's Qualification Statement.

1.3 QUALITY ASSURANCE

A. Perform Work according to City of Wilmington and DelDOT standards.

B. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.4 DELIVERYM STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 1 6 by 8 inches and nominal depth of 8 inches.

B. Load-Bearing & Nonload-Bearing Units: ASTM C90, normal weight.
   1. Hollow block, as indicated.
   2. Compressive Strength of Unit = 1 900 psi
   3. Compressive Strength of Masonry f'm = 1 500 psi

2.2 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 05 1 1 .

2.3 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type as specified on Structural drawings; size as indicated on drawings; epoxy finish.
   1. Vertical reinforcement shall extend continuously from footing to top of wall. reinforcing shall be lapped min 40 bar diameters or 24 inches.
   2. Reinforcing bars in bond beams shall be lapped 40 bar diameters or 24 inches, whichever is greater; at corners and intersections, bar splices shall be staggered.

B. Single Wythe Joint Reinforcement: ASTM A951 /A951 M.
   1. Type: Ladder.
   2. Hot Dip Galvanized
   3. 1 6" OC or as indicated on drawings. In addition, place joint reinforcement in first & second horizontal joints above and below openings. Extend minimum 1 6 inches each side of openings.
   4. Use shop fabricated special pieces at all corners and tees

C. Two-Piece Wall Ties: Formed steel wire, 0.1 875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 1 53/A 1 53M, Class B, sized to provide not less than 5/8 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1 -1 /4 in.

2.4 ACCESSORIES

A. All horizontals and vertical reinforcing bars in masonry walls shall be supported by galvanized wire centering devices and caging clips to insure proper coverage of steel.

B. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.

D. Weeps:
   1. Type: Polyester mesh.

E. Cavity Vents:

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

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

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

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

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.4 COURSING

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

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

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

3.5 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. All cells of CMU containing reinforcing shall be filled solid with grout.

D. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

E. Remove excess mortar and mortar smears as work progresses.

F. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

G. Interlock intersections and external corners.

H. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

I. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

J. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

K. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

L. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.6 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 15-feet on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.7 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

3.8 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 1 6 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 1 6 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.

E. Lap joint reinforcement ends minimum 6 inches.

3.9 LINTELS

A. Install steel lintels over openings where indicated on the drawings.

B. Install reinforced unit masonry lintels over openings where indicated on the drawings.

3.10 WATERPRROFING

A. Apply emulsion-type liquid-applied dampproofing membrane in accordance with Section 071113.

3.11 GROUTED COMPONENTS

A. Lap splices minimum 40 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1 /2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

D. At bearing locations, fill masonry cores with grout for a minimum 1 2 inches either side of opening.

3.12 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.13 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

3.14 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

3.15 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

3.16 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 00

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Framing for exterior and interior construction.

B. Principal Products:
   1. Metal studs and track.

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. CFMF: Cold-formed metal framing.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate wall framing member locations with wall-mounted elements.
   2. Coordinate installation of work within or attached to framing system.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Framing components, sizes, materials, finishes, and accessories.
   2. Proprietary firestop track.
   3. Post-installed anchors.

B. Shop Drawings:
   1. Framing layout, components, connections, fastenings, and details.
   2. Components for supporting Work of other Sections.
   3. Method of attaching CFMF to other construction elements.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Welding: Current certificates for required welding processes.
      a. AWS D1.1 - Structural Welding Code - Steel.

b. AWS D1.3 - Structural Welding Code - Sheet Steel.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
1. Protect components from corrosion.
2. Store components elevated above grade, protected from precipitation and stormwater runoff.
3. Store and handle to prevent deformation and damage to coatings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. California Expanded Metal Products Company (CEMCO).
2. ClarkDietrich Building Systems.
3. Marino\WARE.
4. Telling Industries, LLC.

2.2 STEEL FRAMING

A. Framing Members and Components - General: AISI S240.

B. Steel Sheet: ASTM A1003.
1. Grade: ST33H.
2. Metallic Coating: AISI S240, CP 60.

C. Studs: C-shaped with flange returns, web punched for utility access, in depths noted on Drawings.
1. Base Metal Thickness: Selected for performance requirements.
2. Flange Width: See Drawings.

D. Bottom Track: Channel shape, unpunched, straight flanges.
1. Base Metal Thickness: Match studs.
2. Flange Width: 1-1/4 inches, minimum.

E. Top Track: Provide one of the following:
1. Deflection type, deep leg track with slotted screw holes or unstiffened flanges that accommodate plus or minus 1/2-inch movement of overhead structure without damage to framing.
2. Channel shape, unpunched, straight flanges, with clips that accommodate plus or minus 1/2-inch movement of overhead structure without damage to framing.
3. Double Deflection Top Track: Nested inner and outer deep-leg tracks of same thickness as studs.

F. Bracing, Furring, Bridging, and Web Stiffeners: Formed sheet steel, thickness selected for performance requirements.

G. Plates, Gussets, and Clips: Formed sheet steel, thickness selected for performance requirements specified.

2.3 INSTALLATION MATERIALS

A. Fasteners: ASTM C1513; self-drilling, self-tapping screws, hot-dip galvanized.

B. Welding Electrodes: AWS D1.3/D1.3M; type required for materials being welded.

C. Expansion Anchors: Tested per ASTM E488 to sustain load equal to 5 times design load without failure.
   1. Material: Hot-dip galvanized steel.

D. Power-Actuated Anchors: Tested per ASTM E1190 to sustain load equal to 10 times design load without failure.

E. Galvanizing Repair Paint: SSPC Paint 20.

F. Shims: Load-bearing, high-density plastic.

G. Sill Gaskets: Closed-cell neoprene foam 1/4 inch thick in same width as sill track.

2.4 FABRICATION

A. Fabricate assemblies of sizes and profiles required.

B. Cut members square and with tight fit to adjacent framing.

C. Fabricate custom size angles or Z-girts shown for support or anchorage of other construction.

D. Cut members by sawing or shearing.

E. Apply galvanizing repair paint to shop welds.

F. Fabrication Tolerances:
   1. Size: Maximum 1/8 inch deviation in 10 ft, non-cumulative.
   2. Squareness: Maximum 1/8 inch deviation between diagonals.
   3. Member Spacing: Maximum 1/8 inch deviation, non-cumulative.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify substrates and attachment conditions are correctly located and follow installation tolerances.

3.2 INSTALLATION

A. Installation Standard: AISI S240.

B. Erect, brace, and reinforce framing to develop strength to achieve performance requirements.

C. Install wall framing to form plumb, plane surfaces suitable for sheathing.

D. Install ceiling framing to form level, plane surfaces suitable for gypsum board or other finishes.

E. Field Welding: AWS D1.3.
   1. Minimum Thickness: Do not weld components less than 43 mils in thickness.
   2. Stud-to-Track Connections: 1/2 inch fillet weld, full length of each inside flange to track web.

F. Screw Connections: Minimum 3 screws per connection.

G. Shop-Fabricated Assemblies: Handle to prevent racking or other distortion.

H. Track:
   1. Align bottom and top tracks.
   2. Fasten tracks 12 inches on center, maximum.

I. Studs:
   1. Place studs at spacing shown, within 2 inches from abutting walls.
   2. Align studs to face one direction.
   3. Seat studs in contact with bottom track.
   4. Connect studs to top and bottom tracks with screws.
   5. Construct corners using minimum three studs.
   6. Do not splice studs.

J. Install headers above openings and intermediate studs above and below openings to align with wall stud spacing.

K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

L. Install supplementary framing for support or anchorage of wall-supported construction elements.

M. Diagonally brace walls at locations shown for shear construction.

N. Apply galvanizing repair paint to welds and to damaged metallic coatings.

3.3 CLEANING

A. Cleaning:
1. Remove waste and rubbish from track and other horizontal members.
2. Remove mud and other soiling from framing.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Miscellaneous metal fabrications for support and bracing of elements specified in other Sections.

B. Principal Products:
   1. Steel supports and framing.

1.2 QUALITY ASSURANCE

A. Welding Qualifications: Provide copies of welder certificates as informational submittals if requested by Architect.
   1. Steel Fabrications: AWS D1.1, Structural Welding Code - Steel.

1.3 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Structural Wide Flange Shapes: ASTM A992.

B. Steel Hollow Structural Sections: ASTM A500, Grade B.

C. Other Steel Structural Shapes: ASTM A36.

D. Steel Plates: ASTM A36.

E. Steel Pipe: ASTM A53, Grade B.

F. Steel Sheet: ASTM A653, Grade 33 Structural Quality, G40 galvanizing.

G. Steel Bolts: ASTM A307, Grade A or B, heavy hex style.
   1. Finish: Mechanically galvanized.

H. Steel Nuts: ASTM A563, types appropriate for bolts.
   1. Finish: Mechanically galvanized.

I. Welding Materials: AWS D1.1, types as required for materials being welded.

2.2 MATERIALS - STAINLESS STEEL

A. Stainless Steel Bars and Shapes: ASTM A276, Type 304.

B. Stainless Steel Tubing: ASTM A269, Type 304.

C. Stainless Steel Pipe: ASTM A312, welded, Type 304.

D. Stainless Steel Plate, Sheet, and Strip: ASTM A240 or A666, Type 304.

E. Stainless Steel Bolts, Nuts, and Washers: ASTM A354.

F. Welding Materials: ASW D1.6, types as required for materials being welded.

2.3 MISCELLANEOUS MATERIALS

A. Post-Installed Anchors: Torque controlled expansion anchors.
   1. Material: Steel.

B. Anchors for Embedment in Concrete: Wedge type for adjustable bolt location; malleable iron or cast steel. Supply bolts, washers, and shims with ASTM F2329 hot-dip galvanized finish.

C. Zinc Rich Primer: SSPC Paint 20, Type II Organic.

2.4 FABRICATION - GENERAL

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to uniform small radius.

E. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 2.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Tolerances:
1. Squareness: 1/8 inch maximum difference in diagonal measurements.
2. Face Offset: 1/16 inch, maximum.
3. Misalignment of Adjacent Members: 1/16 inch, maximum.
4. Bow: 1/8 inch in 48 inches, maximum.
5. Plane: 1/8 inch deviation in 48 inches, maximum.

2.5 FABRICATION - MISCELLANEOUS STRUCTURAL SUPPORTS

A. Supports: Structural steel sections shown on Drawings; shop primer finish.

2.6 STEEL FINISHES

A. Prepare surfaces to be primed per SSPC SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter before finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime paint items in fabrication shop with one coat except where galvanizing is specified.

E. Galvanizing: ASTM A123; hot dip galvanize after fabrication.

F. Galvanizing for Fasteners, Connectors, and Anchors:
1. Hot-Dipped Galvanizing: ASTM A153.
2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.7 STAINLESS STEEL FINISHES

A. Stainless Steel: NAAMM AMP 503, Number 4 satin directional polish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean and strip metal fabrications where site welding is required.

3.2 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Separate dissimilar exterior metals with non-absorptive gaskets.

C. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

D. Fasten work rigidly and securely to supports.

E. Field weld components shown on Drawings per AWS D1.1.

F. Obtain Architect approval before site cutting or making adjustments not scheduled.

G. After erection, touch up welds, abrasions, and damaged finishes with prime paint or zinc-rich paint to match shop finishes.

H. Miscellaneous Framing and Supports:
   1. Attach supports rigidly and securely to building structural elements.
   2. Brace overhead support framing to prevent movement of supported items.

3.3 INSTALLATION TOLERANCES

A. Plumb: Maximum 1/4 inch deviation per story or for every 12 ft in height, whichever is greater; non-cumulative.

B. Alignment: Maximum 1/8 inch offset.

C. Position: Maximum 1/4 inch deviation.

3.4 ADJUSTING

A. Clean and touch up damaged primer paint with same product applied in shop.

END OF SECTION

SECTION 057300 DECORATIVE METAL RAILINGS

Part 1 - GENERAL:

1.1 Section Includes

Pre-engineered illuminated Bar stainless steel Railing System. All drawings, general and supplementary conditions including division one specifications apply to this section.

1.3 Product References and Design Requirements

1.3.1 Principal items specified in this section are:

a. Stainless steel handrails.
b. Stainless steel and steel guardrails or other ornamental barrier railings.
c. Stainless steel rail with LED light insert.

1.3.2 Design requirements are based on IBC/IRC and ADA standards:

a. Guardrails and handrails shall meet or exceed all applicable building codes.
b. Railings including top rail, end posts, mid posts, cable and cable hardware shall be designed to comply with structural requirements of the building code requirements and
with an appropriate safety margin.
c. Railing and cable hardware shall be designed to withstand loads encountered without excessive deflection or distortion when cables are tensioned to required amounts to conform to building codes.
d. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3.3 Work Included

Provide all materials, labor, and equipment necessary to fabricate and completely install handrails, guardrails, infill panels, and other railing options as shown on drawings or specific herein.

1.3.4 Definitions

Terms and definitions from ASTM E985 and ISO/TC 59 for railing related items apply to this section.

1.4 System Performance Requirements

1.4.1 Railings shall meet or exceed the requirements of all applicable building codes.

1.4.2 Railings shall have high strength stainless steel in order to comply with 1.4.1 with adequate safety margin.

1.4.3 Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 Submittals

1.5.1 Shop Drawings for architectural approval, showing design and details of railing plus anchoring methods of handrails and railings including plans, elevations, sections, details of components and attachments to other units of work.

1.5.2 Product data for stainless steel/wood products to be supplied by the manufacturer including storage and handling requirements and installation methods.

1.5.3 Structural computations or test data/evaluations, material properties, PE (professional engineering) calculations signed/sealed in the State of the project, and other information needed to ensure satisfactory structural compliance to applicable building codes to be supplied by the manufacture, based on final fabrication drawings and documents.

1.5.4 Maintenance instructions: Provide manufacturer‘s maintenance and cleaning instructions.

1.5.5 Warranty: Provide manufacturer‘s warranty effective from completion of work.

1.5.6 Initial selection
Provide sample of railing including post material, top rail and cables demonstrating attachment hardware and method of attachment.

1.5.7 Final verification
Qualification data for authorized installers specified in Quality Assurance is to demonstrate their capabilities and experience. Include list of completed projects with project and architect names.

1.6 Quality Assurance

1.6.1 Single Source Responsibility: To ensure compatibility all Materials and related components shall be supplied by a single source manufacturer.

1.6.2 Execution tolerance plus/minus 5/64” (2 mm).

1.7 Storage

1.7.1 Store handrails and railing systems in a clean, dry location, away from uncured concrete and masonry, protected against damage of any kind.

1.7.2 Materials must be kept in their original packaging until installation.

1.8 Project Conditions

1.8.1 All measurements for handrails and railings should be taken from construction site elements to which railings are to fasten. This information to be recorded on final shop drawings.

1.8.2 Coordinate fabrication schedule with construction progress to avoid delay of work.

Part 2 - PRODUCTS

2.1 Manufacturer

2.1.1. Basis of Design - KOTO Stainless steel cable railing systems by HDI Railing Systems. Manufacturer shall be an established U.S. manufacturer of a custom pre-engineered guardrail and handrail systems, in strict compliance with all technical requirements of the drawings and specifications. Miscellaneous metal fabricators / suppliers will not be acceptable. This standard is based on HDI Railing Systems, 3905 Continental Drive, Columbia PA 17512 (Tel. 717.285.4088 Fax. 717.285.5083).

2.2 Materials for Guardrails and Handrail System

2.2.1 All rails and other tubular components shall be constructed using the following:

2.2.1.1 Stainless steel grade UNS 1.4305, type 304; surface to be 240 grain/grit finish; tubes 1-1/2” (38mm) outside diameter by 5/64” (2 mm) wall thickness.

2.2.1.2 Top rail to be Stainless steel grade AISI, type 304, surface to be 240 grain/grit finish; bar 3” (76mm) by 1/2” (13mm).

2.2.1.3 Optional natural wood handrails are connected to stainless saddles on top of brackets, attached to posts: Optional guard rail wood cap is attached to stainless steel flat bar. Standard wood types are available in natural beech, birch or maple, other wood types available upon request. All custom stains are subject to customer approval and require customer samples. Transitions for top rail to be mitered with hairline joints.

2.2.2 All posts and other components shall be constructed using the following:

2.2.2.1 Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit finish; end posts 3” (76mm) by 1” (25mm) and mid-posts 3” (76mm) by 1/2” (13mm).

2.2.2.2 Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit finish for: Handrail attachment on the post.

2.2.2.3 Stainless steel grade UNS 1.4305, type 304, surface to be 240 grain/grit for post fastening base plate and angles.

2.2.3 Fastening bolts to be stainless steel or other high strength material as determined by engineering requirements.

2.2.4 Exterior and aggressive environments require stainless steel grade 316 or 316L to minimize maintenance requirement; surface to be 240 grain/grit (#6) finish. Powder coating option available upon request.

2.3 Stainless steel cable rails and cable hardware

Stainless steel, type 316, wire rope. 3/16" (5mm) diameter stranded wire with stainless steel thread adjusters and end stops.

2.3.1 Cables
2.3.1.1 Material: 7x19 Type 316 stainless steel stranded
2.3.1.2 Diameter: 3/16 inch (5 mm) diameter cable with a minimum breaking strength of 13KN (2,923 pounds)
2.3.1.3 Finish: mill
2.3.1.4 Orientation: As indicated on the Contract Drawings
2.3.1.5 Spacing: As indicated on the Contract Drawings (max. 3-1/8” - 79mm)

2.3.2 Cable Hardware Components
2.3.2.1 Material: Stainless steel, AISI 316L; Swaged hardware at end of cable
2.3.2.2 Hardware concealed inside end posts where practical.
2.3.2.4 Types of Fittings: Radius head internal thread adjuster; External thread swaged end

2.4 LED lighting inserts

2.4.1 Stainless steel rail with color changing LED light strip inserts grade AISI type 304 or type 316; surface to be # 6 finish (240 grain/grit); tubes 1.5” (38mm) outside diameter by .075“ to .090” (1.5 mm – 2.3mm) wall thickness.

2.4.2 LED light strip inserts with a beam spread of 45 degrees to 90 degrees, or asymmetrical beam spread of 28 degrees and 65 degrees off nadir. Other beam spreads available; please contact the manufacturer.

2.4.3 Standard clear lens; frosted lens optional.

2.4.4 Light output at 42“guard height, lumens per ft as indicated, ranging from 36.8 to 616 lumens per ft dependent on standard or high output and symmetrical or asymmetrical.

2.4.5 Color temperature as indicated, ranging from 2700K (Kelvin) to 6500K, depending on lumens per ft and beam spread required.

2.4.6 Electrical supply for LED strip inserts to be 120-277Volt supply for 24-volt remote power supply. (Power supply range 20-240watts)

2.4.7 Transition sleeves for intermediate supports, backing strips for LED light strips, slotted tube inserts and mounting clips by HDI provided as required.

2.4.8 Power supply low voltage dimmers are available.

2.6 Fasteners

Anchors shall be fabricated from stainless steel or other materials as determined by engineering requirements with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E488.

2.7 Fabrication

2.7.1 Fabricate railing system for compliance with structural requirements of applicable code.

2.7.2 Pre-assemble railings prior to shipping to greatest extent possible to ensure QC. Disassemble units and pack as appropriate for shipping and handling requirements. Clearly mark crates and boxes for re-assembly by location and for coordination with shop drawings.

2.7.3 Stainless steel tubing cuts shall be square, without burrs and where exposed, rounded to produce smooth rigid and hairline joints.

Part 3 – EXECUTION:

3.1 Examination

3.1.1 Do not begin installation until substrates have been properly prepared.

3.1.2 Verify that reinforcement and anchoring devices are the correct type, have been located correctly, and have been installed properly.

3.1.3 If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 Preparation

Provide information on fastening point locations for posts where necessary to relevant parties.

3.3 Installation

Installation shall be by the manufacturer or a qualified, authorized representative of the manufacturer.

3.3.1 Installation must be in accordance with standard or non-standard, yet applicable details (instructions) included on installation/shop drawings provided by the manufacturer.

3.3.2 Install components plumb and in-line, accurately fitted, free from distortion or defects and securely anchored to structure.

3.3.3 Provide anchors, plates, angles, etc., necessary for connecting railings to structure.

3.3.4 Any and all field welding shall be by a certified welder.

3.3.5 Access for anchors that require through bolting either vertically or horizontally to be made available through General Contractor.

Erection tolerances

3.3.6 Maximum variation from plumb shall be 1/4".
3.3.7 Maximum offset from true alignment for every 50-foot of railing shall be 1/4", non-accumulative.

3.4 Cleaning and Protection

3.4.1 Remove manufacturer's protective coverings from exposed surfaces after installation.

3.4.2 Railings shall be cleaned, including infill panels, by contractor to the satisfaction of the owner.

3.4.3 Wipe with moistened cloth only. Do not use cleaning agents with abrasive or acid/alkaline content.

3.4.4 General contractor to provide protective covering on handrails and guardrails if construction is not yet finished in the area where the railings are installed.

3.5 Correction of deficiencies

All deficiencies in work and/or items not meeting specified requirements shall be corrected in order to meet specification requirements at no additional cost to owner.

END OF SECTION 057300

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Carpentry associated with new roof installation.
   2. Blocking and supports for equipment.

B. Principal Products:
   1. Wood blocking and nailers.
   2. Plywood backing panels for support of electrical and telecommunications equipment.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. For each type of process and factory-fabricated product.
   2. For preservative-treated wood products.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store lumber indoors, protected from elements.
   2. Store lumber elevated above grade, protected from moisture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber: DOC PS 20. Grading rules certified by ALSC Board of Review.
   1. Maximum Moisture Content: 19 percent.

B. Plywood: DOC PS 1, Exterior A-C, fire-retardant treated.
   1. Thickness: 3/4 inch.

C. Fire Retardant by Pressure Process:
   1. Exterior Type: ASTM C2898.
   2. Interior Type A: ASTM D3201, 28 percent maximum moisture content at 92 percent relative humidity.
   3. Surface Burning Characteristics per ASTM E84.
      a. Flame Spread: 25.

b. Smoke Developed: 450.
4. Labeling: Testing agency classification.
5. Kiln-dry after treatment.
   a. Lumber: 19 percent maximum moisture content.
   b. Plywood: 15 percent maximum moisture content.
6. Applications:
   a. Concealed blocking.
   b. Plywood utility backing panels.
   c. Wood nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
   d. Items shown on Drawings.

2.2 INSTALLATION ACCESSORIES

A. Fasteners and Anchors:
1. General: Follow requirements for wood member size and type.
   a. ACQ Preservative Treated Wood: Type 304 stainless steel.
   b. Other Applications: ASTM A153/A153M hot-dip galvanized.
2. Power-Driven Fasteners: NES NER-272.
3. Wood Screws: ASME B18.6.1.
4. Screws for Fastening to Metal Framing:
   a. Cold-Formed Metal Framing: ASTM C954.
   b. Other Metal Framing: ASTM C1002.
5. Anchors:
   a. Toggle bolt type for anchorage to hollow masonry.
   b. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
   c. Bolt or ballistic fastener for anchorages to steel.

B. Separation Layer: Butyl Rubber or rubberized asphalt flashing sheet membrane.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Place horizontal members crown side up.

C. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

D. Coordinate curb installation with installation of decking and support of deck openings.

E. Fasten plywood backing panels to substrate with fire retardant classification marking exposed to view; coordinate locations with equipment requiring backing panels.

F. Install continuous flexible flashing separator as follows:
   1. ACQ Wood-Preservative-Treated Lumber: Between wood and metal decking.

G. Follow AWPA M4 for site applied preservative treatment to cut surfaces of SBX preservative-treated lumber.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Plastic-laminate-faced wood casework.

B. Principal Products:
   1. Plastic-laminate-faced panels for a Reception Desk.
   2. Associated hardware.

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. HPDL: High-Pressure Decorative Laminate.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.4 ACTION SUBMITTALS

A. Submittals - General: AWI 100.

B. Product Data:
   1. Panel products.
   2. Adhesives.
   3. Manufactured trim profiles and ornamental components.
   4. Hardware.
   5. Fire retardant treatment.

C. Shop Drawings:
   1. Dimensioned plans and elevations showing architectural woodwork elements locations.
   2. Show materials, profiles, assembly methods, joint details, fastening methods, hardware locations and sizes and locations of cutouts and finishes.

D. Samples:
   1. Plastic Laminates: 8 by 10 inches, minimum.
   2. Hardware: Each type and finish.

3. Fabricated Samples:
   a. Plastic laminate applied to core material with edge banding, 8 by 10 inches, minimum.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: Woodwork fabricator.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: AWI 200.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 WOODWORK GENERAL REQUIREMENTS

A. Quality Standard: Follow AWI 300 - Materials and ANSI/AWI 0620 - Installation for aesthetic grades.

B. Woodwork Grade: Premium.

2.2 PLASTIC LAMINATE FACED CABINETS

A. Article Includes: Reception Desk panels, and other plastic laminate faced items shown on the Drawings.

B. Plastic Laminate Faced Items General Requirements: ANSI/AWI 0641, Duty Level 4.

C. Plastic Laminate:
   1. Manufacturers and Products: See Finish Legend on Drawings.

D. Exposed Exterior: High-pressure decorative laminate.
   1. Horizontal Surfaces Other Than Tops: Grade HGS.
   2. Vertical Surfaces: Grade VGS.
   3. Edge Banding: Types shown on Drawings.

E. Semi-Exposed Surfaces: Thermoset decorative panels.
   1. Edge Banding: Types shown on Drawings.

2.3 SELF-ADHESIVE-BACKED PLASTIC LAMINATE SHEETS

A. Grade: Premium.

B. Exposed Surfaces: High pressure decorative laminate.
   1. Manufacturers and Products:
      a. Wilsonart RE-COVER.
   2. Patterns, Colors, and Finishes: See Finish Legend on Drawings.

2.4 HARDWARE AND ACCESSORIES

A. General: BHMA A159.9 and ANSI/AWI 0641.

B. Cabinet Shelf Supports:
   1. Shelf Rests: BHMA A156.9, B04013 metal.

C. Grommets: Plastic spring loaded cover and outer ring.
   1. Color: Architect selected.

D. Hardware Finishes: BHMA A156.18.
   1. Exposed Hardware: Architect selected.
   2. Concealed Hardware: Manufacturer standard.

2.5 MATERIALS

A. Wood Materials, General: AWI 300 for grade specified.

B. Panel Products:
   1. Hardwood Plywood, Veneer Core, and Veneers: ANSI HPVA HP-1.
   2. Particleboard: ANSI A208.1 Grade M-2 or better.
   3. Medium Density Fiberboard: ANSI A208.2, Grade 130.
   4. Hardboard: AHA 135.4, tempered grade.

C. Interior Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber.

D. High-Pressure Decorative Laminate: NEMA LD 3.

E. Thermally-Fused Melamine Facing: Panels faced with melamine-impregnated decorative paper; NEMA LD3, Grade VGL.

F. Adhesives: Recommended by facing material manufacturers, complying with VOC limitations.

G. Fasteners: Type, size, and material to suit each application.

2.6 LUMBER AND PANEL MATERIAL TREATMENT

A. Fire-Retardant Treatment:
1. Chemically treated and pressure impregnated.
2. Flame Spread: 25, maximum per ASTM E84.
3. Label or otherwise identify fire retardant treated material.
4. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.7 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

C. High-Pressure Decorative Laminate-Finished Faces:
1. Apply HPDL in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; conceal with concealed fasteners. Slightly bevel arises.

2. Apply laminate backing sheet to reverse face of HPDL finished surfaces.

D. Fabrication Tolerances: ANSI/AWI 0620, specified grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with woodwork.

3.2 PREPARATION

A. Surface Preparation: ANSI/AWI 0620.

B. Conditioning:
1. Acclimate products to installation environment per AWI 200 and ANSI/AWI 0620.

3.3 INSTALLATION - GENERAL

A. Follow ANSI/AWI 0620.

B. Installation Grade: Same as item being installed.

3.4 INSTALLATION

A. Install woodwork plumb and level.

B. Scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

C. Cabinets:
1. Anchor wall cabinets to in-wall blocking or with cleats hanging attached to substrates. Secure with wafer-head cabinet installation screws.
2. Secure cabinets to floor using appropriate angles and anchorages.
3. Install finish hardware not installed in shop.

D. Self-Adhering Plastic Laminate Sheets:
1. Prepare substrates as recommended by manufacturer.
2. Remove backing sheet and adhere laminate panel to substrate.
3. Leave 1/16 inch gap between adjacent panels.

3.5 ADJUSTING

A. Test installed work for rigidity and ability to support loads.

B. Lubricate and adjust hardware so doors and drawers operate smoothly.

3.6 CLEANING

A. Cleaning: Clean exposed and semi-exposed surfaces of woodwork.

B. Touch up shop-applied finishes. Replace damaged items that cannot be repaired.

3.7 PROTECTION

A. Protection: Protect installed woodwork from damage due to subsequent construction operations.

END OF SECTION

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Application of an emulsion-type liquid-applied dampproofing membrane.

1.02 RELATED SECTIONS

A. Section 04 20 00 – Unit Masonry.

1.03 REFERENCES

A. Type II – Brush-on or spray-grade dampproofing coating
   1. ASTM D1227 Type II, Class I.

1.04 SUBMITTALS

A. Comply with Section 01330 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Store at temperatures of 40 degrees F (5 degrees C) and above to facilitate handling.

D. Do not store dampproofing at temperatures above 90 degrees F (32 degrees C) for extended periods.

E. Keep away from sparks and flames.

F. Protect materials during handling and application to prevent damage or contamination.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Product is not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply dampproofing when air or surface temperatures are below 50 degrees F (10 degrees C).

C. Do not apply to frozen concrete.

D. Do not apply when rain is forecasted within 24 hours.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis of Design : W. R. MEADOWS, INC., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Website: www.wrmeadows.com.

2.02 MATERIALS

A. SEALMASTIC Emulsion Type I Spray-Grade by W. R. MEADOWS.

B. SEALMASTIC TYPE II Brush/Spray-Grade by W. R. MEADOWS.

C. SEALMASTIC TYPE III Trowel-Grade by W. R. MEADOWS.

2.03 ACCESSORIES

A. Reinforcement Fabric: REINFORCING FABRIC HCR by W. R. MEADOWS.

B. Asphaltic Protection Course: PC-2 PROTECTION COURSE by W. R. MEADOWS.

C. Rolled Matrix Drainage System: MEL-DRAIN™ Rolled Matrix Drainage System by W. R. MEADOWS.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive membrane. Notify the architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to the manufacturer.

D. Concrete surfaces must be clean, smooth, dry and free of standing water.

E. Patch all holes and voids and smooth out any surface misalignments.

F. Where ambient conditions exist, a priming coat of emulsion dampproofing may be required. Dilute emulsion dampproofing one-to-one with clean, potable water.

3.03 SINGLE-PLY APPLICATION

A. Apply Type I dampproofing emulsion at a rate of 70 to 100 square feet per gallon (1.7 to 2.5 liters per square meter). Alternatively, apply Type II and Type III dampproofing emulsion at a rate of 40 to 50 square feet per gallon (1.0 to 1.2 square meters per liter).

A. Spot-adhere drainage panels or asphaltic protection course in accordance with manufacturer’s requirements. Adhere rigid insulation using Type III dampproofing emulsion.

3.04 PROTECTION

A. Protect membrane with immediate application of protection course if no drainage system is used or rolled matrix drainage system.

B. Backfill within 24 to 48 hours after application, using care to avoid damaging the dampproofing.

END OF SECTION 071113

SECTION 071416 – COLD APPLIED FLUID WATER PROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cold-applied rubberized asphalt waterproofing.
   2. Protection course.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site, 300 N Orange Street, Wilmington, DE.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

   1. Show locations and extent of waterproofing.
   2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.

   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COLD-APPLIED RUBBERIZED ASPHALT WATERPROOFING

A. Single-Component, Rubberized Asphalt Waterproofing: Single-component, silyl-terminated polyether complying with ASTM C836/C836M.

2. Including but not limited to AVM Industries, Sika, W.R. Meadows
3. Water Vapor Permeance: 0.03 perm maximum, ASTM E96/E96M.
4. Hydrostatic-Head Resistance: 100 psi average; ASTM D5385/D5385M.

2.2 AUXILIARY MATERIALS

B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory formulated.

2.3 PROTECTION COURSE

A. Protection Course, Semirigid Sheets of Fiberglass or Mineral-Reinforced Asphaltic Core: ASTM D6506, pressure laminated between two asphalt-saturated fibrous liners and as follows:

2.2.1.1.1.1 Soprema, W.R. Meadows
2.2.1.1.1.2 Thickness:
2.2.1.1.1.2.1 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.

2.2.1.1.1.3 Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

2.2.1.1.2 Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

2.2.1.1.3 Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.

2.2.1.1.4 Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

2.2.1.1.5 Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471/C1471M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.

2.2.1.1.6 Install sheet flashing and bond to wall substrates where required in accordance with waterproofing manufacturer's written instructions.

3.2 INSTALLATION OF WATERPROOFING

2.2.1.1.6.1 Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a dry film thickness of 90 mils (2.25 mm).

3.2 PROTECTION

A. Protect waterproofing from damage and wear during remainder of construction period.

3.2.1.1.1 Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 071416

SECTION 072119 – FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Foamed-in-Place Insulation of the Following Types:
   1. Closed-cell, spray-applied, polyurethane foam insulation. (SealTite PRO HFO)

B. Accessories.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   2. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
   3. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
   4. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
   5. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
   6. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
   7. ASTM D2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
   8. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
   9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   10. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
   11. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
   12. ASTM E413 - Classification for Rating Sound Insulation.
   13. ASTM E423 - Standard Test Method for Normal Spectral Emittance at Elevated Temperatures of Nonconducting Specimens.
   14. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   15. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
   16. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. ICC Evaluation Service (ICC-ES):
   1. ICC-ES AC377 - Acceptance Criteria for Spray-Applied Foam Plastic Insulation.

C. International Association of Plumbing and Mechanical Officials (IAPMO).

D. Underwriters Laboratory (UL).

E. Spray Polyurethane Foam Alliance: Professional Certification Program (SPFA PCP).

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's product data and application instructions.

C. Manufacturer's Certification:
   1. Materials comply with specified requirements and are suitable for intended application.
   2. From SPFA PCP as Accredited Supplier Company.

D. Third Party Certification:
   1. Certified Environmental Product Declaration (EPD).
   2. Certified Life-Cycle Assessment (LCA).
   3. UL Greenguard certification for compliance with requirements for low-emitting materials.

E. Compliance with State environmental Regulations: Submit manufacturer's Hydrofluorocarbon (HFC) compliance statement.

F. Product Evaluation Reports: Submit manufacturer's product evaluation reports from accredited evaluation service.

G. Warranty Documentation: Submit manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Manufacturer regularly engaged, for a minimum of 10 years, in the manufacturing of polyurethane foam insulation of similar type to that specified.
   2. Accreditation: SPFA PCP as Accredited Supplier Company.
   3. ISO 9001:2015 Certification.

B. Applicator's Qualifications:
   1. Applicator regularly engaged, for a minimum of 5 years, in application of polyurethane foam insulation of similar type to that specified.
   2. Authorized by manufacturer to install their products.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.5 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two weeks before scheduled commencement of the Work.

B. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, applicator, and manufacturer's representative.

C. Review the Following:
   1. Materials.
   2. Protection of in-place conditions.
   3. Surface preparation.
   4. Application.
   5. Field quality control.
   6. Cleaning.
   7. Protection.
   8. Coordination with other Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until application.
3. Store materials in clean, dry area indoors.
4. Store materials at 70 to 80 degrees F (21 to 27 degrees C) a minimum of 48 hours before use.
5. Store materials out of direct sunlight.
6. Protect materials from freezing.
7. Protect materials during storage, handling, and application to prevent contamination or damage.

1.7 PROJECT CONDITIONS

A. Ambient and Substrate Temperatures: As recommended by Manufacturer.

B. Moisture: Do not apply polyurethane foam insulation when moisture in form of rain, snow, ice, fog, frost, or dew is expected during application.

C. Relative Humidity: Do not apply polyurethane foam insulation when relative humidity over 85 percent is expected during application.

D. Wind: Do not apply polyurethane foam insulation with wind speed above 12 mph (19 kmh).

E. Do not apply polyurethane foam insulation under ambient conditions outside manufacturer's limits.

1.8 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Including but not limited to Carlisle, Dow, Owens Corning and Net Zero.

B. Requests for substitutions will be considered in accordance with provisions of Section 0160 00 - Product Requirements.

2.2 CLOSED-CELL, SPRAY-APPLIED, POLYURETHANE FOAM INSULATION

A. Basis of Design: SealTite PRO HFO as manufactured by Carlisle Spray Foam Insulation.
1. Performance and Design Requirements:
a. Standards Compliance:
1) Acceptance Criteria: ICC-ES AC377.
2) Evaluation Report: IAPMO UES-720.
3) Greenguard Gold.
b. Air Leakage Rate, ASTM E2178: Less than 0.004 cfm per sq ft (0.02 L per sec per sq m) at 1 inch (25 mm).
c. Moisture Vapor Transmission, Permeance, ASTM E96 (Desiccant Method):
1) Thickness, 1 inch (25 mm): 1.00 perm.
d. Core Density, ASTM D1622: 2.0 pcf (32 kg per cu m), nominal.
e. R-Value, Aged, ASTM C518:
1) Thickness, 1 inch (25 mm): 7.2.
2) Thickness, 3.5 inches (76 mm): 25.
3) Thickness, 5.5 inches (140 mm): 40.
f. Compressive Strength, ASTM D1621: 31 psi (214 kPa), nominal.
g. Tensile Strength, ASTM D1623: 39 psi (269 kPa), nominal.
h. Water Absorption, ASTM D2842: Less than 2 percent.
i. Dimensional Stability, ASTM D2126, Change in Volume: Less than 1percent.
j. Closed Cell Content, ASTM D2856: Greater than 90 percent.
k. Surface Burning Characteristics, ASTM E84, 4 Inches (102 mm):
1) Flame Spread Index: Less than 25.
2) Smoke Developed Index: Less than 450.
l. Compliance with State Environmental Regulations.
1) Global Warming Potential: Less than or equal to one (1).
2) Ozone Depletion Potential: Zero (0).
m. Toxicity and Hazardous Materials.
1) Product containing no added urea-formaldehyde.
2) PBDE-free product.
3) Free of flammable blowing agents.
4) Free of trans-1,2-Dichloroethene, TDCE, 1,2-Dichloroethene, 1,2-DCE, and trans-dichloroethylene.
2. Description: Two-component, HFO blown, Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II

2.3 ACCESSORIES

A. Primer: Per manufacturer’s recommendation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive polyurethane foam insulation.

B. Notify Architect of conditions that would adversely affect application.

C. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 PREPARATION

A. Protection of In-Place Conditions:
1. Protect adjacent surfaces from contact with overspray.
2. Protect electrical outlet and junction boxes from contact with polyurethane foam insulation.

B. Surface Preparation:
1. Prepare surfaces in accordance with manufacturer's instructions.
2. Remove dirt, dust, debris, oil, grease, rust, loose scale, ice, frost, moisture, and other surface contaminants which could adversely affect application of polyurethane foam insulation.

3.3 INSTALLATION

A. Spray-apply polyurethane foam insulation in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Material Temperature: Maintain materials in containers at 65 to 85 degrees F (18 to 29 degrees C) while in use.

C. Ensure substrates are dry during application.
1. Total Thickness: Indicated on the Drawings.

D. Apply polyurethane foam insulation to uniform thickness without voids, pinholes, cracks, and crevices.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

B. Inspect completed application of polyurethane foam insulation, including:
1. Total thickness.
2. Free of voids, pinholes, cracks, and crevices.
3. Adhesion to substrate.

3.5 CLEANING AND PROTECTION

A. Promptly clean surfaces that receive overspray of polyurethane foam insulation.

B. Do not use harsh cleaning materials or methods that could damage surfaces.

C. Protect Work of this Section from damage during construction.

END OF SECTION 072119

SECTION 072500 – WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building wrap.

1.2 ACTION SUBMITTALS

A. Product data.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

1.4 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E2556/E2556M, Type I, [ICC-ES AC38, ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction, including but not limited to the following

   1. Dupont Tyvek Commercial Wrap

   2. Grip-Rite ProWrap-SA

   3. GreenGuard Max Building Wrap
   4. Water-Vapor Permeance: Minimum 20 perms (1150 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A).
   5. Flame Propagation Test: Materials and construction to be as tested in accordance with NFPA 285.

B. Acrylic Seam Tape: Composite tape consisting of a pressure-sensitive acrylic adhesive, bonded to a polyethylene or polypropylene film for sealing joints and penetrations in building wrap. Provide tape from same manufacturer as approved wrap product.
   1. Width: 3 inches (76 mm).

1.5 FLEXIBLE FLASHING

A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.0 mm), including but not limited to the following.

1. Dupont Straight Flash

2. GreenGuard Professional Flashing

PART 3 - EXECUTION

1.6 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

1.7 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over water-resistive barrier at bottom and sides of openings.
3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION 072500

SECTION 074213.23 – METAL COMPOSITE MATERIAL WALL PANELS

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 MCM wall panels.

1.3 DEFINITIONS

A. MCM: Metal Composite Material is two sheets of smooth aluminum continuously thermo-bonded to a solid Fire Retardant (FR) core under precise temperature, pressure, and tension.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference:

1. Meet with Owner, Architect, Owner's insurer if applicable, MCM panel Fabricator and Installer, MCM sheet manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects MCM panels, including installers of doors, windows, and louvers.
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. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
4. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect MCM panels.
5. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
6. Review temporary protection requirements for MCM panel assembly during and after installation.
7. Review procedures for repair of panels damaged after installation.
8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. MCM system fabricator to provide shop drawings including fabrication and installation layouts of MCM panels; details of edge conditions, joints, panel profiles, corners, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of MCM panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. MCM Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other MCM panel accessories. Submit custom color samples in paint manufacturer's standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, tests performed by a qualified testing agency.

1. MCM Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance to comparable code sections IBC 1407.14 and IBC 1703.5.
2. MCM System Fabricator's Certified System Tests Reports: Certified system test reports showing system compliance with specific performance or third-party listing documenting compliance code section. Base performance requirements on MCM system type provided.

a. Wet Seal System: Tested to AAMA 501.
b. NFPA 285.

B. Field quality-control reports.

C. Sample Warranties

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For MCM panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. MCM Manufacturer Qualifications: An entity that has successfully manufactured MCM at a domestically located factory for a minimum of 5 years.

B. MCM Fabricator Qualifications: An entity that has successfully fabricated and assembled MCM panels and approved by the MCM manufacturer.

C. MCM Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by MCM Fabricator.

D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for MCM fabrication and installation.

1. Build mockup of typical MCM panel assembly including supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of mockup of MCM panel assembly, testing for water penetration in accordance with AAMA 501.2.
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. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, MCM panels, and other manufactured items so as not to be damaged or deformed. Package MCM panels for protection during transportation and handling.

B. Unload, store, and erect MCM panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack MCM panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store MCM panels to ensure dryness, with positive slope for drainage of water. Do not store MCM panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on MCM panels during installation.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate MCM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Refer to Manufacturer’s standard terms and conditions.

B. Material Warranty: Submit the Manufacturer’s standard form agreeing to furnish fabrication, labor and material to repair or replace MCM that exhibits defects within the specified warranty period.

1. Coverage Includes:

    a. Delamination of metal bond to the fire retardant core.

2. Warranty Period: 10 years from date of Substantial Completion

B. Workmanship Warranty: Submit the Fabricator/Installer’s standard form agreeing to furnish fabrication, labor and material required to repair or replace work which exhibits workmanship defects within the specific warranty period.

1. Warranty Period: 2 years from the date of Substantial Completion.

C. Warranty on Panel Finishes: Submit the Manufacturer's standard form in which manufacturer agrees to repair or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Coverage includes:

    a. Color fading more than (5) Delta E units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of the paint to adhere to the bare metal substrate.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide MCM panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330:

1. Wind Loads: As indicated on Drawings.
2. Panel Deflection Limit: For wind loads, no greater than 1/60. of the span.
3. Framing Member Deflection Limits: For wind loads, no greater than 1/175 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested in accordance with ASTM E283 at a test-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration to room side of assembly when tested for 15 minutes in accordance with ASTM E331 a test-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

D. Thermal Movements: Locate expansion and contraction points to allow for free and noiseless thermal movements from surface temperature changes at a range of 20 deg F to 180 deg F (minus 29 to 82.2 deg C), material surfaces.

E. Fire Propagation Characteristics: MCM wall assembly passes NFPA 285 testing.

2.2 MCM WALL PANELS

A. MCM Wall Panel Systems: Provide shop formed and assembled, MCM panels formed into profiles for the installation method indicated on the construction drawings. Include attachment assembly components**,** panel stiffeners, and accessories required.

1. Basis-of-Design MCM Sheet: Subject to compliance with requirements, provide ALUCOBOND® PLUS manufactured by 3A Composites USA, Inc. (https://www.alucobondusa.com/contact.html), or comparable product by:

   a. Reynobond by Hoover.
   b. Alpolic by Mitsubishi Chemical America.

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- (0.50-mm-) thick aluminum sheet facings.

1. Panel Thickness: 4mm (0.157”)
2. Core: Fire retardant.
3. Exterior Finish: Acceptable coating resins are polyvinylidene difluoride (PVDF), fluorinated ethylene vinyl ether (FEVE), super-durable polyester (SDP), siliconized polyester (SMP) & anodized. The number of coats and film

thicknesses shall comply with the specified warranty period and specified basis-of-design finish(es):

a. Basis-of-design finish:

1) To be selected form manufacturer's standard selections.

4. Peel Strength: 22.5 in-lb/in. (100 N x mm/mm) when tested for bond integrity in accordance with ASTM D1781.
5. Fire Performance: Flame spread less than 25 and smoke developed less than 450, in accordance with ASTM E84.

C. Attachment Assembly Components: Formed from extruded aluminum or other compatible material per the construction drawings and in compliance with all required performance testing.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Sub Framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide Fabricator's standard sections as required for support and alignment of MCM panel system.

B. Panel Accessories: Provide components required for a weathertight panel system including trim and flashing components as indicated on the constructions drawings. Match material and finish of MCM panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, end walls, framed openings, rakes, fasciae, and parapet caps.

1. Basis-of-Design Product: Subject to compliance with requirements, provide ALUCOBOND® AXCENT™ manufactured by 3A Composites USA Inc., or comparable product by one of the following:

a. Arconic Architectural Products.
b. Mitsubishi Chemical Composites.

2. Aluminum Trim: Formed with minimum 0.040-inch (1.00-mm-) thick, coil-coated aluminum sheet unless otherwise indicated on the construction drawings.
3. Basis-of-design Finish: To match MCM wall panel system unless otherwise indicated on the construction drawings.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Joint Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish MCM panels and accessories to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and dimensions on the construction drawings.

B. Fabricate MCM panel joints fully sealed with exposed, continuous caulk that provide a weathertight seal to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and dimensions on the construction drawings.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations or recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces provided by others is acceptable. Variation in appearance from different production batches of finish effects including but not limited to anodized, brushed coil, mica flake, metallic flake, and texture is expected.

C. Allowable finishes for Aluminum Panels and Accessories: See basis-of-design finish selection and warranty requirements. Prepare, pretreat, and apply coatings to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Coil Coated Finishes

a. PVDF Fluoropolymer: AAMA 2605. Containing not less than 70 percent PVDF resin by weight in color coat.
b. FEVE Fluoropolymer: AAMA 2605. Containing 100 percent fluorinated ethylene vinyl ether resin in color coat.
c. SDP Super-durable Polyester: AAMA 2605. Containing carboxyl or hydroxyl functional resin in the color coat.
d. SMP Siliconized Polyester: AAMA 2604. Containing silicone-modified, polyester-enamel in the color coat.

2. Anodized Finish

a. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
b. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating MCM panels to verify actual locations of penetrations relative to seam locations of MCM panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install sub framing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and MCM panel manufacturer's written recommendations.

3.3 MCM PANEL INSTALLATION

A. General: Install MCM panels in accordance with Fabricator's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving MCM panels.
2. Flash and seal MCM panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by MCM panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as MCM panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of MCM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by MCM panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support MCM wall panels to provide a complete weathertight wall system, including subgirts, perimeter flashing components, and panel clips as indicated on the construction drawings.

E. Panel Installation: Attach MCM wall panels to supports at locations, spacings, and with fasteners recommended by Fabricator to achieve performance requirements specified.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete MCM panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by MCM panel Fabricator; or, if not indicated, provide types recommended in writing by MCM system Fabricator.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, or SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Substrate Tolerances: The General Contractor is responsible for providing a substrate with a tolerance of 1/4 inch in 20.0 feet (6mm in 6m), on level, plumb, and location control lines as indicated and within 1/8 inch (3mm) offset adjoining faces of alignment of matching profiles.

B. Field Measurements: Verify locations of wall framing members and wall opening dimensions by field measurements prior to the fabrication of the MCM system. Field measurements to be acquired once all substrate materials and adjacent materials are installed to use as-built data to submit “As Built Shop Drawings” with required adjustments to panel dimensions and layouts.

3.5 FIELD QUALITY CONTROL

A. Water-Spray Test: After installation, test area of assembly for water penetration in accordance with AAMA 501.2.

B. Fabricator's Field Service: Engage a factory-authorized service representative to test and inspect completed MCM wall panel installation, including accessories.

C. MCM wall panels will be considered defective if they do not pass test and inspections.

D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as MCM panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of MCM panel installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.

B. After MCM panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace MCM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.23

SECTION 07 50 00

MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. New membrane roofing.
   2. Patching existing membrane roofing.

B. Principal Products:
   1. EPDM roof membrane.
   2. Cover board.
   3. Insulation.
   4. Substrate board.
   5. Vapor retarder.
   6. Flashing.

1.2 REFERENCES

A. Definitions:
   1. Roofing Terminology: See ASTM D1079 and NRCA "The NRCA Roofing and Waterproofing Manual" glossary.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate installation of new roofing materials and patching or existing roofing.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Roofing membrane and accessory products.
   2. Substrate board.
   3. Vapor retarders.
   4. Roof insulation and cover board.

B. Shop Drawings: Include plans, elevations, sections, details, intersections with adjacent assemblies, terminations, and attachments, including:
   1. Base flashings.
   2. Membrane terminations.
   3. Flat and tapered insulation, including cants and slopes.

C. Samples:
   1. Membrane Sheet: 6 by 6 inch sample of each type and color.
   2. Walkway Materials: 6 by 6 inch sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements:
   1. Installer: Manufacturer authorization.

B. Certificates: Manufacturer affidavit that Project design and conditions have been reviewed and that the installation will be fully warrantable if correctly installed. This submittal may be in the form of a photocopy of manufacturer authorization to Installer to proceed with installation.

C. Manufacturer Reports: Field quality control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Roof system maintenance requirements.

B. Warranty Documentation: For complete roof system.

C. Project Plaque: Provide permanent sign or framed document with the following information attached to wall near primary access to main roof.
   1. Roofing installer name, address, and telephone number.
   2. Roofing system manufacturer name, address, and telephone number.
   3. Starting date of warranty and length of warranty period.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: Licensed, authorized, or approved by roofing manufacturer to install manufacturer roofing system and provide full specified warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: Store roofing system components protected from the elements, precipitation and standing water, freeze/thaw cycling, and protected from sunlight, if required.

1.9 FIELD CONDITIONS

A. Ambient Conditions: Perform work within limitations recommended by manufacturer.

1.10 WARRANTY

A. Manufacturer Warranty: Warrant roofing system against failure.
   1. Total System Warranty: Include primary roof membrane and substrate boards, vapor retarder, roof insulation, cover boards, flashings, metal edge assemblies, and other components of roofing system.
      a. Warranty Period: 20 years.
      b. Dollar Limit: None.

PART 2 - PRODUCTS

2.1 EPDM ROOFING

A. EPDM Sheet: ASTM D4637, Type II, scrim or fabric internally reinforced.
   1. Manufacturers:
      a. Carlisle SynTec Incorporated.
      b. Firestone Building Products.
      c. GenFlex.
      d. Johns Manville.
      e. Versico Incorporated.
   2. Membrane Thickness: 75 mils.
   3. Exposed Face Color: Black.

2.2 COMPONENT MATERIALS

A. General: Provide components of roofing system recommended by manufacturer for a complete system.
   1. Component materials are all compatible with each other and adjacent materials.

B. Adhesive: Manufacturer standard water based bonding adhesive.

C. Seams: Butyl splicing adhesive or 3-inch seam tape, with manufacturer recommended primer.

D. Flexible Flashing: Same material as roofing membrane, manufacturer recommended thickness.

E. Termination Bars: Manufacturer standard stainless steel or aluminum, pre-drilled for included anchors.

F. Fasteners: Compliant with FM Global 4470 for corrosion resistance, including metal or plastic washers, and acceptable to roof system manufacturer.

G. Accessories: Miscellaneous flashing, sealant, reinforcing, sealants, and other accessories as recommended by manufacturer for a complete installation.
   1. Colors: Match roofing membrane color.

2.3 SUBSTRATE BOARDS

A. Substrate Board: ASTM C1177, gypsum core, glass-mat facing, water-resistant.
   1. Manufacturers and Products:
      a. Georgia-Pacific Corporation DensDeck Prime.
      b. National Gypsum Company Gold Bond eXP Extended Exposure Sheathing.
      c. USG Corporation Securock Glass Mat Roof Board.
   2. Thickness: 5/8 inch, Type X.

B. Fasteners: FM Global 4470 compliant for corrosion resistance, including metal or plastic washers.

2.4 VAPOR RETARDER

A. Self-Adhering Sheet Vapor Retarder: ASTM D1970, polyethylene film with rubber asphalt adhesive, slip resistant surface, and paper backing.
   1. Thickness: Minimum 30 mils.
   2. Permeance: 0.1 perm, maximum.
   3. Manufacturer may recommend priming with manufacturer standard primer.

2.5 ROOF INSULATION

A. General: Roof insulation, preformed boards, manufactured or approved by roof membrane manufacturer, manufacturer standard sizes, thicknesses as shown on Drawings.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1 or 2, Grade 2 or 3.
   1. Thickness: 2 inches maximum per layer.

C. Tapered Insulation: Factory formed, tapered insulation boards, 1/4 inch per foot slope or as shown on Drawings.

D. Special Shapes: Provide preformed insulation shapes to form crickets, saddles, tapers, and other shapes to facilitate drainage.

E. Fasteners: FM Global 4470 compliant for corrosion resistance, including metal or plastic washers.

F. Adhesive: Recommended by insulation manufacturer for adhering insulation layers together.
   1. Adhesive Types: Single or multi-component urethane, low-rise, apply in beads or full spread as recommended by manufacturer.

2.6 COVER BOARDS

A. Water Resistant Gypsum Board: ASTM C1177 or ASTM C1278, 1/2 inch thick, factory primed.

B. Polyisocyanurate Cover Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2-inch thick.
   1. Compressive Stength: 80 psi, minimum.

2.7 PERFORMANCE

A. Roof System Design: Certified by testing to resist uplift pressures as follows:
   1. Corners: 99.7 lbf/ sq ft.
   2. Perimeter: 73.2 lbf/ sq ft.
   3. Field: 55.5 lbf/ sq ft.

B. Hail Resistance Rating: SH.

C. Exterior Fire Test Exposure: ASTM E108 or UL 790 testing by a qualified testing agency, Class A, products marked as compliant by testing agency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify conditions for compliance with roof system manufacturer recommendations:
   1. Substrate.
   2. Roof openings and penetrations.
   3. Curbs, nailers, and cants.

3.2 PREPARATION

A. Clean and prepare substrate per manufacturer written instructions.

B. Protect roof drainage and other equipment and surfaces from roofing materials.

3.3 ROOFING INSTALLATION - GENERAL

A. Complete terminations, flashings, roofing installation, and temporary measures by end of each workday and during rain events.

3.4 INSTALLATION - VAPOR RETARDER

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate. Install self-adhering-sheet vapor retarder in place; lap side seams minimum 3-1/2 inches and ends minimum 6 inches. Seal laps by rolling.

B. Install vapor retarder to provide complete seal against air movement at penetrations and terminations.

3.5 INSTALLATION - SUBSTRATE BOARD

A. Install substrate boards with long sides perpendicular to roof slopes in straight lines, stagger end joints. Install with tight butt joints.
   1. Fasten substrate board to top flanges of steel deck per roofing system manufacturer instructions.
   2. Fasten substrate board to steel deck flanges per FM Global "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.

3.6 INSTALLATION - INSULATION

A. Do not allow insulation to be exposed to precipitation or left exposed at the end of the workday.

B. Install tapered insulation under area of roofing to conform to slopes shown on Drawings.

C. Install insulation to required thickness. Where overall insulation thickness is over 2 inches, install in layers with staggered joints from joints of previous layer. Stagger joints a minimum of 6 inches in each direction.

D. Install insulation with long sides in straight rows with end joints staggered between rows, butt joints at edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
   1. Fit insulation by trimming, within 1/4 inch of nailers, obstructions, and penetrations.
   2. Trim and fit insulation at roof drains.

E. Mechanically Fastened and Adhered Insulation: Mechanically fasten first layer of insulation to deck using mechanical fasteners designed and sized for fastening roof insulation to each deck type.
   1. Fasten first layer of insulation to resist uplift pressure in field, corners, and perimeter of roof.
   2. Set each subsequent layer of insulation in bead-applied or full spread adhesive, firmly pressing insulation in place.

3.7 INSTALLATION - COVER BOARD

A. Install cover boards over insulation with long sides in straight lines and end joints staggered between rows. Offset joints from insulation layer below a minimum of 6 inches in each direction. Loosely butt cover boards together.
   1. Adhere cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.8 INSTALLATION - ADHERED ROOFING MEMBRANE

A. Unroll roofing membrane and allow to relax before installing.

B. Start installation of roofing in presence of roofing system manufacturer technical personnel.

C. Align roofing to an accurate layout, maintaining side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing as recommended by manufacturer. Do not apply adhesive at splice areas of roofing.

E. Mechanically fasten adhered roofing securely at terminations, penetrations, perimeters and other areas shown.

F. Apply roofing with uphill side laps overlapping lower layers with slope of roof deck where possible.

G. Repair tears, voids, lapped seams, or defects in roofing that do not follow requirements.

H. Spread sealant or mastic bed over deck-drain flanges at roof drains, and securely seal membrane roofing in place with clamping ring.

3.9 MEMBRANE SEAMING

A. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll laps of overlapping roofing per manufacturer written instructions. Apply lap sealant and seal exposed edges of roofing terminations.
   1. Apply continuous bead of in-seam sealant within splice if required by roofing system manufacturer.

B. Leave seams uncovered until they are inspected by manufacturer technical representative.

3.10 INSTALLATION - BASE FLASHING

A. Adhere flashings and flashing accessories to substrates.

B. Apply adhesive to substrate and underside of sheet flashing, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners per roofing manufacturer recommendations.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets per manufacturer requirements. Seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate using termination bars.

3.11 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Inspections:
   1. Substrate conditions.
   2. Substrate preparation.
   3. Vapor barrier application.
   4. Membrane application.
   5. Flashings.
   6. Protection components.
   7. Penetrations and drainage components.

C. Infrared Roof Moisture Survey: Ground-based, walk-over type, performed per ASTM C1153 Standard Practice for the Location of Wet Insulation in Roofing Systems Using Infrared Imaging.
   1. Record the entire survey on DVD and provide one copy to the Owner with the report.
   2. Include in the report thermograms of all suspect areas and corresponding daytime photos of the same locations.
   3. Inspection to be conducted by an NDT test technician certified to at least Level 2 in Thermal/Infrared test method per American Society for Nondestructive Testing Recommended Practice SNT-TC-1A.

D. Final Roof Inspection: Arrange for roofing system manufacturer or testing agency to inspect completed roofing installation.

E. Repair or remove and replace roofing system components that fail tests or do not follow requirements.

3.12 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period.

B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Flashing for roof membrane.

B. Principal Products:
   1. Coil-coated sheet metal.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Coil-coated sheet metal.
   2. Initial selection color charts or samples.

B. Shop Drawings.
   1. Show fabrication and profiles for each item.
   2. Indicate base metals, thicknesses, and finishes.
   3. Include attachment and connection details.
   4. Include details for corners, changes in plane, expansion joints, and terminations.
   5. Show locations of expansion joints.

C. Samples:
   1. Coil-Coated Trim: 12-inch long sections in required finish.

1.3 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Coil-coated sheet metal finish.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store sheet metal fabrications elevated above grade, protected from precipitation and stormwater runoff.
   2. Handle sheet metal fabrications to prevent twisting, bending, and abrasion.
   3. Prevent contact with materials causing discoloration or staining.

1.5 WARRANTY

A. Include scuppers in warranty for roofing system specified in Section 07 50 00 - Membrane Roofing.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: 20 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Environmental Performance:
   1. Expansion and Contraction: Withstand thermal cycling over 120 degrees F ambient and 180 degrees F on material surfaces.

2.2 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy and temper required for use and finish.
   1. Finish: Two coat fluoropolymer.
   2. Coil Coating Color: Architect selected; custom; non-metallic.

2.3 ACCESSORIES

A. Fasteners for Aluminum: Stainless steel, Type 304.

B. Waterproof Underlayment: Self-adhesive sheets manufactured to withstand high temperature below metal components; minimum 30 mils thick. Supply recommended primer.
   1. Manufacturers and Products:
      a. Carlisle Coatings & Waterproofing Inc CCW WIP 300HT.
      b. GCP Applied Technologies Ice and Water Shield HT.
      c. Henry Company Blueskin PE200 HT.
      d. Owens Corning WeatherLock Specialty Tile & Metal.
      e. Polyguard Products, Inc. Deck-Guard HT Roofing & Watershield Underlayment.

C. Slip Sheet: Rosin-sized building paper.

D. Concealed Sealant: Butyl, ASTM C1311.
   1. Manufacturers and Products:
      a. Pecora Corporation BA-98.
      b. Tremco Butyl Sealant.

E. Exposed Sealant: See Section 07 92 00 - Joint Sealants.

F. Separation Coating: Bituminous paint; SSPC-Paint 12.

G. Plastic Cement: ASTM D4586, Type I.

H. Surface-Applied Reglets: Extruded aluminum with bottom edge drip and top edge sealant recess. Supply with stainless steel screws with neoprene washers and anchorage devices appropriate to substrate.

I. Splash Pads: Precast concrete; minimum 3,000 psi compressive strength; minimum 5 percent air entrainment.

2.4 FABRICATION

A. Fabrication Reference Standards:
   1. SMACNA Architectural Sheet Metal Manual.
   2. NRCA Roofing Manual.

B. Form section shapes shown on Drawings, accurate in size, square, and free from distortion or defects.

C. Fabricate cleats of same material as sheet metal, interlocking with sheet.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners.

E. Moving Joints: Sealed lapped, bayonet-type, or interlocking hooked seams.

F. Non-Moving Joints: Sealed watertight.

G. Fabricate corners, changes in plane, and terminations in shop with minimum 18 inch legs.

H. Counterflashing:
   1. Material:
      a. Aluminum: 0.032 inch base metal thickness.
   2. Fabricate to extend minimum 4 inches over protected construction, with hemmed bottom drip edge.
   3. Shop fabricate interior and exterior corners.

I. Parapet Scuppers: Two-piece fabrications, with mounting flanges. Lap pieces 4 inches minimum in direction of water flow.
   1. Material:
      a. Aluminum: 0.032 inch base metal thickness.

2.5 ALUMINUM FINISHES

A. Color Coating: Two-coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that roof openings, penetrations, and curbs through roof are solidly set, reglets in place, and nailing strips located.

B. Verify that roofing base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Paint concealed uncoated metal surfaces with 15 mil minimum thickness separation coating.

3.3 INSTALLATION

A. Installation Reference Standards:
   1. SMACNA Architectural Sheet Metal Manual.
   2. NRCA Roofing Manual.

B. Install flashing with concealed fasteners.

C. Secure fabrications with concealed fasteners where possible.

D. Separate dissimilar metals with separation coating or non-absorptive gaskets.

E. Counterflashing: Install counterflashing in contact with base flashing.
   1. Anchor counterflashing in reglets with wedges and apply sealant to joint per Section 07 92 00 - Joint Sealants.
   2. Drill counterflashing installed with surface-mounted reglets so that anchorage fasteners go through the sheet metal. Apply sealant to back side of top edge and fasten reglet to wall construction. Apply sealant to top edge per Section 07 92 00 - Joint Sealants.
   3. Lap ends of counterflashing minimum 6 inches.

F. Parapet Scuppers: Anchor securely in place and seal flanges watertight to wall face and to roof base flashing.

3.4 CLEANING

A. Remove soiling, stains, and hand prints.

B. Uncoated Galvanized Steel Sheet: Remove substances that would impair paint bond.

END OF SECTION

SECTION 07 71 00

ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Engineered copings and roof edges designed to resist uplift.
   2. Roof to roof expansion joint.

B. Principal Products:
   1. Aluminum copings.
   2. Aluminum roof edges.
   3. Expansion joint covers.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate work results of this Section with roofing membrane for continuity of protection against water and air infiltration.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting in conjunction with roofing preinstallation meeting.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Manufactured coping system; include information on factory-fabricated termination and transition shapes.
   2. Manufactured edge securement trim for low-slope roofing; include information on factory-fabricated termination and transition shapes.
   3. Pipe penetration boxes.
   4. Initial selection color charts.

B. Shop Drawings: Show profiles and dimensions, joining methods, accessory item locations, anchorage and flashing details, and adjacent construction interfaces.

C. Samples: Specified metal and finish.
   1. Coping Covers: 12-inches long, minimum.
   2. Edge Securement Trim: 12-inches long, minimum.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer or independent testing agency test results showing wind uplift resistance as tested per ANSI/SPRI/FM 4435 ES-1.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Section 07 50 00 roofing system installer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prevent deformation, abrasion, and other damage during handling and installation.

B. Remove strippable finish protection film when recommended by manufacturer.

1.8 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.9 WARRANTY

A. Include roof specialties in roof system warranty specified in Section 07 50 00.

B. Manufacturer Warranty: Warrant against product and installation failure.
   1. Failure includes products blowing off, deforming, leaking, or causing membrane roofing failure when exposed to specified wind conditions.
   2. Warranty Period: 20 years.

C. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: 20 years.

PART 2 - PRODUCTS

2.1 MANUFACTURED ROOF EDGE SYSTEMS

A. Roof Edge Requirements: Engineered systems tested per ANSI/SPRI/FM 4435 ES-1 for roofing membrane securement.

B. Manufactured Coping System: Snap-on cover with concealed gasketed splice plates that accommodate thermal movement and drain water out of system.
   1. Manufacturers:
      a. ATAS International, Inc.
      b. Carlisle - Drexel Metals.
      c. Hickman Edge Systems LLC.
      d. Metal-Era, Inc.
      e. Petersen Aluminum.
      f. SAF Perimeter Systems.
   2. Configuration and Profile: See Drawings.
   3. Cover Material: Aluminum sheet, smooth finish.
   4. Cover Thickness: Required by wind uplift performance.
   5. Cover Finish: PVDF coil coating.
      a. Color: Architect selected.
   6. Securement: Anchor clips spaced for design wind speed.
   7. Anchorage Fasteners: Stainless steel screws.
   8. Accessories: Factory-fabricated units for terminations and changes in direction or plane.

C. Manufactured Roof Edge Trim: Snap-on cover with concealed gasketed splice plates that accommodate thermal movement and drain water out of system; no exposed fasteners.
   1. Manufacturers:
      a. ATAS International, Inc.
      b. Carlisle - Drexel Metals.
      c. Hickman Edge Systems LLC.
      d. Metal-Era, Inc.
      e. Petersen Aluminum.
      f. SAF Perimeter Systems.
   2. Profiles See Drawings.
   3. Cover Material: Aluminum sheet, smooth finish.
   4. Cover Thickness: Required by wind uplift performance.
   5. Cover Finish: PVDF coil coating.
      a. Color: Architect selected.
   6. Securement: Continuous cleats.
   7. Anchorage Fasteners: Stainless steel screws.
   8. Accessories: Factory-fabricated units for terminations and changes in direction or plane.

2.2 EXPANSION JOINT COVERS

A. Roof to Roof Joints: Provide manufacturer recommended and warranted products and installation.
   1. Joint Width: See Drawings.
   2. Movement: Plus or minus 50 percent.

2.3 PERFORMANCE

A. Structural Loads: See Structural Drawings.

B. Environmental Performance:
   1. Expansion and Contraction: Accommodate 180 degree F surface and 120 degree F ambient temperature differential without failure.

2.4 ALUMINUM FINISHES

A. Color Coating: Two-coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that wood blocking for support and anchorage is positioned correctly, securely fastened, level, and in plane.

B. Verify that installation surfaces are clean, dry, and free of foreign matter.

C. Verify that wall air barrier membrane extends under roof membrane flashing on the anchorage blocking.

D. Verify that roof membrane flashing extends over anchorage blocking and is securely fastened to the blocking.

3.2 INSTALLATION

A. Install roof specialties to provide weatherproof performance and prevent water intrusion into building enclosure elements or interior.

B. Copings:
   1. Install copings in straight lines with accurately aligned profiles.
   2. Install anchorage base and cleats with screws.
   3. Install splice plates with continuous gaskets that prevent lateral movement of water to void below cover.
   4. Install covers with full anchorage cleat engagement and uniform joint width.

C. Edge Securement Trim:
   1. Install trim in straight lines with accurately aligned profiles.
   2. Install anchorage base and cleats with screws.
   3. Install splice plates with continuous gaskets that prevent lateral movement of water to void below cover.
   4. Install covers with full anchorage cleat engagement and uniform joint width.

3.3 CLEANING

A. Remove soiling and stains from installed components.

END OF SECTION

SECTION 07 81 00

APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Application of new and patched fireproofing for structural steel.

B. Principal Products:
   1. Gypsum cement SFRM.

1.2 REFERENCES

A. Abbreviations and Acronyms:
   1. SFRM: Sprayed fire-resistive materials.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate SFRM with installation of items attached to structural members.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Additional Agenda Items:
      a. Review designs and fire ratings.
      b. Review scheduling tests and inspections.

C. Sequencing Procedures:
   1. Sequence Work in conjunction with placement of ceiling hanger tabs, partition track, and mechanical and electrical components.

D. Scheduling Procedures:
   1. Schedule SFRM before ducts, piping, equipment, and other items interfering with application of fireproofing.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. SFRM.
   2. Accessory materials.

B. Shop Drawings.
   1. Framing Plans: Show testing agency design number, fire rating, product, and material thickness.
   2. Details: Show interfaces between SFRM and construction specified in other sections.

C. Schedule of Applications: Indicate testing agency designs, SFRM material and thicknesses, and field test acceptance criteria.

1.5 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Manufacturer product certificates.

B. Test and Evaluation Reports: Manufacturer or independent testing agency test results showing products follow requirements.

C. Qualification Statements: Installer.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installers: Qualified by manufacturer.

B. Certifications: From Contractor for specified performance.

PART 2 - PRODUCTS

2.1 FIRE-RESISTANCE-RATED ASSEMBLIES

A. Fire Rated Designs: Tested per ASTM E119 or UL 263. See Drawings for assemblies.

B. Patching and Repairing Existing Fireproofing: Provide materials identical to or compatible with existing fireproofing.

2.2 LOW DENSITY GYPSUM CEMENT SFRM

A. Low-Density Gypsum SFRM: Factory-mixed, wet-applied, gypsum cement and aggregate formulation.
   1. Manufacturers and Products:
      a. Carboline Southwest Type 5GP.
      b. GCP Applied Technologies Monokote MK-6.
      c. Isolatek CAFCO 300 or CAFCO 300 AC.
   2. Flame Spread Index: 10, maximum; ASTM E84.
   3. Smoke Developed: 10, maximum; ASTM E84.
   4. Bond Strength: 150 lbf/sq.ft, minimum; ASTM E736.
   5. Density: 15 lb/cu. ft., minimum; ASTM E605.

6. Air Erosion: 0.025 g/sq. ft., maximum weight loss in 24 hours; ASTM E859.

2.3 INSTALLATION MATERIALS

A. General: SFRM manufacturer recommended materials that follow or are required by tested assembly.

B. Water: Potable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Surfaces are ready to receive SFRM.
1. Allow Owner's special inspectors to perform preinstallation inspections per Field Quality Control article.

B. Verify clips, hangers, supports, sleeves, and other items required to penetrate SFRM are in place.

C. Verify voids and cracks in substrate have been filled. Verify projections have been removed where SFRM will be exposed to view as finish material.

D. Verify roof traffic has ceased and roof mounted equipment is in place.

3.2 PREPARATION

A. Perform adhesion tests per SFRM manufacturer when substrate acceptability is questionable.

B. Surface Preparation:
1. Remove incompatible materials affecting SFRM substrate bond.
2. Apply SFRM manufacturer recommended bonding agent on primed steel.

C. Protect adjacent Work from SFRM contamination.

D. Close off and seal ductwork before applying SFRM.

3.3 APPLICATION - PATCHING EXISTING FIREPROOFING

A. Patch and repair damaged existing SFRM. Restore required fire-resistance rating.

B. Install SFRM manufacturer recommended auxiliary materials needed for fire-resistance rating restoration.

3.4 APPLICATION - SPRAY-ON FIREPROOFING

A. Apply SFRM.

B. SFRM Thickness: Sufficient to achieve fire ratings.

C. Exposed SFRM:
1. Roll sprayed surface to remove drippings and excessive roughness.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
1. Tests and Inspections: Location and frequency per applicable code.
a. Surface Preparation: Visual inspection.
b. Thickness: ASTM E605, minimum per IBC.
c. Density: ASTM E605, minimum as specified.
d. Bond Strength: ASTM E736, minimum as specified.
e. Finished Application: Visual inspection.
2. Do not begin subsequent construction until inspectors have verified compliance of materials.

B. Non-Conforming Work: Remove and replace, and re-test.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Remove SFRM overspray. Clean contaminated surfaces.

3.7 PROTECTION

A. Prevent SFRM damage.

B. Repair damage before concealing SFRM.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Penetration and joint firestopping assemblies.

B. Principal Products:
   1. Firestopping materials required for tested assemblies.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate joint construction and penetrations to accommodate firestopping.

B. Scheduling: Notify Owner's testing agency seven days minimum before firestopping installation and provide access for inspection.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Product characteristics, performance and limitation criteria.
   2. Submit descriptions of tested designs listed in submitted schedule.

B. Engineering Judgements: For conditions not covered by listed designs, provide judgements on systems or assemblies to meet fire protection requirements by a licensed professional engineer, for presentation to authority having jurisdiction.

C. Schedule: List opening locations and sizes, penetrating items, and assembly numbers.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificate: Certify products meet or exceed specified requirements.

B. Installer Certificate: Applicator UL Qualified Firestop Contractor certification or FM Global Approval certification.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For Firestopping.

B. Warranty Documentation: For Firestopping.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Specialty Firestop Contractor: Firm approved per FM Global 4991 or UL Qualified Firestop Program.
   2. Licensed Professionals: Registered in Delaware.

B. Certifications: From Installer that firestopping is installed properly.

C. Field Samples: Construct example of exposed firestopping, minimum size of a standard installation. Demonstrate finish.
   1. Approved samples establish work results standard.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within field conditions recommended by manufacturer of firestopping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Firestopping Product Manufacturers:
   1. 3M Fire Protection Products.
   2. A/D Fire Protection Systems Inc.
   3. Construction Solutions.
   4. Grabber Construction Products.
   5. Hilti, Inc.
   6. HOLDRITE.
   7. NUCO Inc.
   8. Passive Fire Protection Partners.
   9. RectorSeal.
   10. Specified Technologies, Inc.
   11. STC Sound Control.
   12. Tremco, Inc.

2.2 PENETRATION AND JOINT FIRESTOPPING

A. General:
   1. Materials manufactured and installed to resist the spread of fire, smoke, and gasses, that maintain the fire resistance ratings of the horizontal and vertical assemblies into which they are installed.
   2. All firestopping materials and systems are to be compatible with each other and substrates where installed.

B. Fire-Rated Wall Penetrations: Firestopping rated per ASTM E814 or UL 1479, positive pressure differential tested at 0.01 inch wg.
   1. Wall Types: Fire barriers and Fire partitions.
   2. F-Rating: Equal to or greater than assembly where installed.

C. Fire-Rated Horizontal Assembly Penetrations: Firestopping rated per ASTM E814 or UL 1479, positive pressure differential tested at 0.01 inch wg.
   1. Horizontal Assembly Types: Floors.
   2. F-Rating: Equal to or greater than assembly where installed, 1 hour minimum.
   3. T-Rating: Equal to or greater than assembly where installed, 1 hour minimum except floor penetrations that occur within a wall cavity.

D. Fire Rated Joint Assemblies: Firestopping rated per ASTM E1966 or UL 2079.
   1. Fire Resistance Rating: Equal to or greater than assembly where installed.

E. Exposed Firestopping Materials: ASTM E84; Flame Spread 25, Smoke Developed 450, maximum.
   1. Color: Architect selected.

F. Accessory Materials: Firestopping manufacturer materials and components, approved by qualified testing and inspection agency, required for complete installation and fire rating of each firestopping assembly.
   1. Forming and Backing Materials:
      a. Rock wool and mineral wool insulation.
      b. Sealants.
      c. Form boards.
      d. Sealant backers or fillers.
      e. Temporary forms.
   2. Primers.
   3. Collars.
   4. Sleeves.

2.3 PERFORMANCE

A. Provide firestopping systems that are tested by a qualified testing agency acceptable to authorities having jurisdiction.

B. Mark firestopping systems with classification markings by one of the following.
   1. UL “Fire Resistance Directory.”
   2. FM Global “Building Materials Approval Guide.”
   3. Intertek Group “Directory of Building Products.”

2.4 MATERIALS AND COMPONENTS

A. Collars and Sleeves: Factory assembled collars and sleeves, consisting of a metal outer sleeve lined with intumescent material, and flanges and gaskets to mount the unit and seal the ends.

B. Sealants:
   1. Latex: Single component, moisture resistant after curing.
   2. Silicone: Single component, neutral curing, pourable for horizontal and nonsag for vertical or sloped applications.

C. Intumescent Sheets: Composite sheets of galvanized steel and intumescent material designed for various opening sizes.

D. Wrap Strips: Foil faced, intumescent, elastomeric sheets.

E. Pillows: Compressible, intumescent cases.

F. Putties: Non-hardening, water-resistant, dielectric materials containing no inorganic fibers, silicones, or solvents.

G. Mortars: Prepackaged dry mixes of hydraulic cement, binders, and lightweight aggregates, mixed with water at installation site.

H. Silicone Foam: Multicomponent, site-mixed elastomer that expands and cures in-place as a stable, flexible foam.

2.5 MIXING

A. Mix materials to produce product characteristics required by manufacturer and testing agency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Follow manufacturer requirements for each type of firestopping installation.

3.2 PREPARATION

A. Surface Preparation:
   1. Mask surfaces that will remain exposed after installation of firestopping.

3.3 INSTALLATION

A. Forming Materials: Install to retain and properly shape installed firestopping to achieve required fire rating.
   1. Remove combustible or temporary forming materials after curing firestopping.

B. Install firestopping materials to achieve required fire ratings.
   1. Apply materials to adhere to all contact surfaces.
   2. Fill all voids around openings.
   3. Finish firestopping that will be exposed after curing.

3.4 IDENTIFICATION

A. Permanently attach identification labels within 6 inches of edge of firestopping installations. Make labels visible toward the direction from which a person might approach to remove or alter the firestopping.

B. Provide labels that contain the following:
   1. Required Text: “Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage.”
   2. Contact information for installation Contractor.
   3. Firestopping testing agency design designation.
   4. Date of installation.
   5. Name of Manufacturer.
   6. Name of Installer.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.
   2. Do not begin construction until inspectors have verified compliance of materials.
   3. Do not use materials that fail tests and inspections.

B. Tests and Inspections:
   1. Joint Firestopping: ASTM E2393.
   2. Penetration firestopping: ASTM E2174.

C. Repair or replace firestopping that is damaged or removed during inspection and testing.

D. Non-Conforming Work: Make corrections or replace, and re-test.

E. Enclose firestopping after inspection reports confirm firestopping follows requirements.

3.6 CLEANING AND PROTECTION

A. Remove excess firestopping materials. Do not damage adjacent materials.

B. Protect firestopping installations from damage or deterioration. Repair or replace firestopping that is damaged or removed before Substantial Completion.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior Sealing as follows:
      a. Non-staining Silicone: Expansion and control joints in precast concrete, architectural and natural stone, masonry, steel, metal curtain walls, door and window perimeters.
      b. General Purpose Polyurethane: Expansion and control joints, coping joints, window and door perimeters, glazing.
   2. Interior Sealing as follows:
      a. Urethane Latex: Perimeters of door frames, frames and trim for glazing, and frames or trim for other wall and ceiling openings at painted surfaces.

B. Principal Products:
   1. Silicone sealants.
   2. Polyurethane sealants
   3. Urethane sealants.

1.2 ACTION SUBMITTALS

A. Submittal Procedures:
   1. Provide submittals for all sealants, exterior and interior, in a single group, regardless of how many subcontractors will install sealants. Multiple submittals for sealants are not acceptable.

B. Product Data:
   1. Each sealant type.

C. Samples:
   1. Cured sealant custom color ribbons; 12 inches minimum length.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data.

B. Warranty Documentation: Sealants.

1.4 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.

1. Temperature: Perform work within sealant manufacturer temperature limits, but not below 40 deg F.
2. Precipitation: None occurring and none predicted within 24 hours.

1.5 WARRANTY

A. Manufacturer Warranty:
1. Exterior Sealants: Warrant against product failure.
a. Failure includes loss of elastomeric properties and required performance attributes, and discoloration of substrates.
b. Warranty Period - Urethanes: Five years.
c. Warranty Period – Polyurethanes: 20 years.
d. Warranty Period - Silicones: 20 years.

PART 2 - PRODUCTS

2.1 SEALANTS - GENERAL

A. Source Control: Provide one proprietary product for each type of sealant required, regardless of what subcontractor installs the sealant.
1. Installers of joint sealants under subsequent work packages must use the same proprietary sealants used in the first work package that includes joint sealants.

B. Select proprietary sealants for compatibility with other construction products that the sealants will contact.

C. Multiple colors may be required for exposed sealants to coordinate with substrate colors.

2.2 EXTERIOR EXPOSED NONTRAFFIC SEALANTS

A. Multi-Part Urethane Sealant: ASTM C920, Type M, Grade NS, Class 50, Use NT.
1. Manufacturers and Products:
a. Master Builders Solutions MasterSeal NP150.
b. Pecora Corporation DynaTrol II.
c. Tremco Dymeric 240FC.
2. Color: Architect selected.

2.3 EXTERIOR CONCEALED SEALANTS

A. Butyl Sealant: ASTM C1311.
1. Manufacturers and Products:
a. Pecora Corporation BC-158.
b. Tremco Butyl Sealant.

c. C.R. Laurence 888.

2.4 EXTERIOR PREFORMED JOINT SEALS

A. Silicone Extrusion Seals: Cured low-modulus silicone extrusion transition membrane and liquid-applied sealant for exterior wall openings.
   1. Manufacturers and Products:
      a. Dow DOWSIL Silicone Transition System with DOWSIL 758 silicone adhesive.
      b. Pecora Corporation Sil-Span with 864NST silicone adhesive.
      c. Sika Silbridge-300 with Sikasil WS-295.
      d. Tremco Spectrem Simple Seal with Spectrem 1 Silicone Sealant.
   2. Joint Widths: See Drawings.
   3. Applications:
      a. Transitions between air- and water-resistive membrane and fenestration, doors, and louvers.

2.5 INTERIOR SEALANTS AND CAULKING

A. Interior Color Sealant: Silane-modified polymer sealant or urethane; ASTM C920, S, Grade NS, Class 50, Uses T and NT.
   1. Manufacturers and Products:
      a. Master Builders Solutions MasterSeal NP150.
      b. Pecora Corporation DynaTrol I XL Hybrid.
      c. Tremco Dymeric 240FC.
   2. Colors: Architect selected.
   3. Applications:
      a. Interior joints noted as‘sealant’ on Drawings.
      b. Control and expansion joints in tile, except where sanitary sealant is shown.
      c. Terminations of wall coverings at tile and other materials.
      d. Sealant joints in ornamental metals.

B. Paintable Caulking: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
   1. Manufacturers and Products:
      a. Master Builders Solutions MasterSeal NP 520.
      b. Pecora Corporation AC20.
      c. Tremco Tremflex 834.
   2. Applications:
      a. Interior joints noted as 'caulking.'
      b. Joints, crevices, and irregularities wider than hairline joints in or between painted surfaces.
      c. Perimeters of door frames, frames and trim for glazing, and frames or trim for other wall and ceiling openings at painted surfaces.
      d. Ceiling joints between structural precast concrete floor planks.

2.6 INSTALLATION ACCESSORIES

A. Primer: As required by sealant manufacturer.

B. Backer Rod: ASTM C1330, Type C, closed-cell or Type O, open-cell, manufacturer recommended types.

C. Bond Breaker Tape: Self-adhesive plastic tape to prevent sealant from adhering to back of joint.

D. Cleaners: Manufacturer recommended types.

E. Masking: Non-staining, self-adhesive.

2.7 MIXES

A. Multicomponent Sealants: Mix tinting colorant with base sealant to uniform consistency and custom color.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean joint surfaces for optimum adhesion. Remove dirt, moisture, and incompatible substances.

B. Roughen vitreous and glazed joint surfaces as recommended by sealant manufacturer.

C. Remove laitance and form release agents from concrete.

D. Existing Joints: Cut out and remove existing joint sealants down to original substrate. Small amounts of elastomeric sealants left in surface irregularities of concrete and masonry may be left in place subject to Architect's approval, provided that they are securely bonded to surface, are compatible with new sealant, and are tested to demonstrate that suitable adhesion with new sealant can be achieved. Where these conditions cannot be met, remove existing sealants completely.

E. Prime joint surfaces where recommended by sealant manufacturer. Protect adjacent surfaces from misapplication or spillage of primer.

F. Mask surfaces adjacent to joints to receive elastomeric sealants. Remove masking after tooling.

3.2 INSTALLATION

A. Installation Reference Standard: Follow ASTM C1193.

B. General Installation Requirements:

1. Exterior Joint Sealants: Provide continuous, weatherproof seals to prevent infiltration of air and water through the joints.
2. Interior Joint Sealants: Provide continuous seals to prevent air infiltration through the joints in which they are installed. Install sanitary sealant to prevent water infiltration.
3. Appearance: Apply sealants with smooth surfaces free of gaps, voids, bubbles, lumps, crevices, runs, drips, striations, and other irregularities.

C. Set joint filler units at uniform depths in joints to support sealants and maintain proper sealant cross-section shape and depth within the following general limitations, measured at thinnest section of beads.
1. Pavement Joints: Sealant depth equal to 75 percent of joint width, but not more than 5/8 inch deep nor less than 3/8 inch deep.
2. Other Joints: Sealant depth equal to 50 percent of joint width, but not more than 1/2 inch deep nor less than 1/4 inch deep.

D. Set joint filler for sealant neck dimension 1/3 of joint width, maximum.

E. Install joint fillers under compression and friction fit. Do not install filler units that have absorbed water.
1. Do not leave voids or gaps between ends of joint filler units.
2. Do not stretch, twist, puncture, or tear joint fillers.
3. Remove joint fillers that have absorbed moisture or which have ruptured gas cells and install suitable new fillers before sealant application.

F. Install bond breaker tape where joint filler is not used to prevent adhesion to back of joint.

G. Deposit sealants in uniform, continuous ribbons without gaps or air pockets.

H. Tool sealants to ensure full adhesion. Form smooth, slightly concave surface.

I. Cure joint sealants.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
1. Failed Test Retest Cost: Contractor responsibility.
2. Do not use materials that fail tests and inspections.

B. Adhesion Testing: ASTM C1193, Method A in Appendix XI or ASTM C1521, Method A.
1. Report Content:
   a. Presence of voids and discontinuities.
   b. Sealant dimensions and seal shape.
   c. Failures in adhesion and cohesion.

C. Non-Conforming Work: Remove sealants that do not pass tests, reapply sealant, and retest.

3.4 CLEANING

A. Clean spills, misapplications, and material migrations immediately as they occur.

B. Clean marred surfaces by whatever means are necessary to eliminate evidence of spillage.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Metal frames.

B. Principal Products:
   1. Hollow metal frames.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate Work of this Section with gypsum board partitions, glass and glazing, and electrical power and control wiring.

B. Preinstallation Meetings:
   1. Conduct meeting one week, minimum, before starting Work of this Section.
   2. Attendees: partition and wiring installers.
   3. Agenda Items: fire rating, acoustic rating, and electrified hardware wiring requirements.

1.3 ACTION SUBMITTALS

A. Product Data.
   1. Hollow metal frames.

B. Shop Drawings: Show construction, sizes, configurations, reinforcements, anchorages, installation details.
   1. Door elevations showing cutouts.
   2. Door frame elevations.
   3. Hardware mounting locations.

C. Door Schedule: Use same designations as Drawings.
   1. Show door and frame types, sizes, ratings, glazing, and hardware sets.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers: SDI Certified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store and handle door frames maintaining spreader bars in place until installation.

1.6 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 INTERIOR FRAMES

A. Frames: ANSI/SDI A250.8.
   1. Material: Steel sheet, 0.053 inch thick, coating matching door face.
   2. Construction: Face welded, mitered corners.

2.2 OTHER FRAMES

A. Frames: ANSI/SDI A250.8; heavy duty.
   1. Application: Frames for wood doors and borrowed lights.
   2. Material: Steel sheet, 0.053 inch thick, A40 coating.
   3. Construction: Face welded, mitered corners.

2.3 PERFORMANCE

A. Fire Resistance:
   1. Test: NFPA 252 or UL 10C.
   2. Labeling: NFPA 80.
   3. Glazing Size Limits: NFPA 80.

2.4 MATERIALS

A. Steel Sheet: ASTM A653/A653M; hot-dipped galvanealed coating.

B. Fasteners: Manufacturer standard.
   1. Steel Coating: ASTM A153/A153M hot-dipped galvanized.

2.5 FABRICATION

A. Fabricate doors and frames with hardware reinforcement welded in place.
   1. Reinforce frames for surface applied hardware without through bolting.
   2. Hardware Locations: ANSI A250.8.

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

C. Prepare interior frames for silencers, except where sound seals or smoke seals are specified.
   1. Single Door Strike Jambs: 3 silencers.
   2. Paired Door Heads: 2 silencers.

D. Frame Transom Bars: Fixed, profile matching jamb.

E. Attach fire rating label to each fire rated door and frame.

F. Fabrication Tolerances: SDI-117.

2.6 FINISHES

A. Primer Materials: ANSI/SDI A250.10, rust inhibiting.

2.7 ACCESSORIES

A. Removable Stops: Steel sheet, rolled channel shape, mitered corners.

B. Galvanizing Repair Materials: ASTM A780/A780M.

C. Silencers: See Section 08 71 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Verify opening sizes are within tolerance limits.

3.2 INSTALLATION

A. Install frames. Follow ANSI/SDI A250.8.

B. Interface with Other Work:
   1. Coordinate door frame and anchor installation with gypsum board jamb construction.

C. Installation Tolerances: SDI-117.

D. Repair damaged zinc coatings. Follow ASTM A780/A780M.

E. Seal door frames to adjacent partition construction. See Section 07 92 00.

F. Field paint doors and frames. See Section 09 90 00.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Inspections:
   1. Fire Rated Doors: Inspect per NFPA 80.
   2. Egress Doors: Inspect per NFPA 101.

C. Reporting: Prepare code-required reports and submit to Owner.

D. Non-Conforming Work: Make corrections or replace, and re-test.

3.4 ADJUSTING

A. Adjust door for smooth and balanced door movement.

B. Ensure fire rated doors self-close and latch.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Interior flush wood doors in metal frames.

B. Principal Products:
   1. Flush wood doors.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Each type of wood door; indicate veneer, core material, and finish.
   2. Initial color charts or samples.

B. Shop Drawings.
   1. Each wood door type.

C. Schedules: Use same designations as Drawings.

D. Samples:
   1. Finish: Paint grade.
   2. Flush Doors: Corner construction with finished faces and edges; 12 by 12 inches.

1.3 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports: Manufacturer test results showing:
   1. Fire ratings.

1.4 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For flush wood doors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: WDMA-I.S 1A.
   1. Identify doors on bottom edge and packaging with numbering system used on Drawings.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed, wet work complete, and environmental systems maintaining design conditions for Owner occupancy.

1.7 WARRANTY

A. Manufacturer Warranty:
   1. Flush Wood Doors: Warrant against product failure.
      a. Failure includes delamination, warping more than 1/4 inch, screw withdrawal, or telegraphing of core through veneer.
      b. Warranty Period:
         1) Interior Doors: Lifetime.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS - GENERAL

A. Door Standards: ANSI/WDMA I.S. 1A.
   1. Manufacturers:
      a. ASSA ABLOY.
      b. Masonite Architectural.
      c. TruStile.
      d. VT Industries.
   2. Quality Standard: Extra Heavy Duty.
   3. Aesthetic Grade: Premium.

2.2 FLUSH WOOD DOORS FOR PAINTED FINISH

A. Painted Flush Wood Doors.
   1. Thickness: 1-3/4 inches.

2.3 PERFORMANCE

A. Fire Resistance:
   1. Test: NFPA 252 or UL 10C.
   2. Labeling: NFPA 80.

2.4 FABRICATION

A. Factory Fitting: Fit to frame openings with clearances specified in ANSI/WDMA I.S. 1A.
   1. Undercut: 3/8 inch maximum.
   2. Fire-Rated Doors: Comply with NFPA 80.

B. Factory Machining: Machine doors for hardware that is not surface applied.
   1. Verify dimensions for hardware mortises in metal frames before machining.

C. Openings:
   1. Cut and trim openings at factory.

2.5 FINISHES

A. Finish Grade: Field painted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that door frames provided under other Specification sections are plumb, square, and accurate size.

B. Inspect each door before installation for damage and defects per ANSI/WDMA I.S. 1A Section F-6.

3.2 INSTALLATION

A. Installation Reference Standards:
   1. Wood Doors: ANSI/WDMA I.S. 1A.

B. Align doors with uniform vertical and top edge clearance.

C. Verify that each door operates smoothly, do not bind in the frame, and have secure latching.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Reporting: Prepare code-required reports and submit to Owner.

C. Non-Conforming Work: Make corrections or replace, and re-test.

3.4 REPAIR

A. Repair of damage or defects is subject to Architect’s acceptance, including removal of soiling. Provide replacement doors for doors that cannot be satisfactorily repaired.

3.5 CLEANING

A. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Access doors and frames for interior walls and ceilings.

B. Principal Products:
   1. Access panels.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate sizes and locations with controls, valves, traps, dampers, cleanouts, and similar items requiring operation that are located behind finished surfaces.

1.3 ACTION SUBMITTALS

A. Product Data: Sizes, types, finishes, hardware, scheduled locations, fire resistance listings, and details of adjoining Work.

B. Samples: 6 x 6 inch unit with required frame, anchors, and finish.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations and sizes of access doors and panels.

B. Maintenance data.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Fire-Rated Door Inspector: NFPA 80, section 5.2.3.1.

PART 2 - PRODUCTS

2.1 WALL AND CEILING ACCESS DOORS AND PANELS

A. Flush Steel Access Doors: Flush door with exposed frame; non-rated.
   1. Manufacturers and Products:
      a. Babcock-Davis BNT.
      b. Karp Associates DSB-214SM.
      c. Milcor M.
      d. Nystrom NT.
   2. Material: Steel sheet; ASTM A879.
      a. Door: 0.062 inch thick, nominal.
      b. Frame: 0.062 inch thick, nominal.
      c. Finish: Factory powder coat.
   3. Hinge: Continuous.
   4. Latch: screwdriver operation.
   5. Accessories:
      a. Gasketing.
      b. Masonry anchors.

B. Gypsum Board Access Doors: Flush door with frame flanges concealed by gypsum board joint finishing compound.
   1. Manufacturers and Products:
      a. Babcock-Davis BNW.
      b. Karp Associates KDW.
      c. Milcor DW.
      d. Nystrom NW.
   2. Material: Steel sheet; ASTM A879.
      a. Door: 0.062 inch thick, nominal.
      b. Frame: 0.062 inch thick, nominal.
      c. Finish: Factory powder coat.
   3. Hinge: Continuous.
   4. Latch: screw driver operation.

C. Fire-Rated Access Doors: Flush doors with concealed flange.
   1. Manufacturers and Products:
      a. Acudor FB-5060-DW.
      b. Babcock Davis BUW.
      c. Nystrom IW.
   2. Door Construction: Mineral fiber insulation enclosed in sheet metal.
   3. Material: Galvannealed steel sheet; ASTM A653.
      a. Door: 0.04 inch thick, nominal.
      b. Frame: 0.064 inch thick, nominal.
      c. Finish: Powder coat primer.
   4. Hinge: Concealed continuous type.
   5. Latch: Self-closing, self-latching hardware, key operated.
   6. Accessories:
      a. Gasketing.

2.2 PERFORMANCE

A. Fire Rated Access Door Construction: Conform to one of the following:
   1. Wall Access Doors: NFPA 252 or UL 10B.
   2. Ceiling Access Doors: ASTM E119 or UL 263.

B. Installed Fire Rated Access Door Assembly: Conform to NFPA 80 for rating shown on Drawings.

C. Attach label from agency approved by authority having jurisdiction to identify each fire rated access door.

2.3 MATERIALS

A. Steel Sheet: ASTM A1008, cold rolled.

B. Galvanized Steel Sheet: ASTM A653, Structural Quality.

2.4 FABRICATION

A. Welded Units: Fabricate units of continuous welded construction; weld, fill, and grind exposed joints flush and smooth.

B. Size Variations: Obtain acceptance of manufacturer standard size units which vary slightly from sizes shown or scheduled.

C. Provide manufacturer recommended anchorage fasteners for Project applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb and level in opening, with plane of door and panel face parallel to adjacent finished surface.
   1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position units to provide convenient access to concealed work requiring access.

C. Install fire rated units in accordance with NFPA 80 and requirements for fire listing.

3.3 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner will engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Retesting of Failed Tests: Performed at Contractor's expense.

B. Fire-Rated Access Panels: Inspect per NFPA 80, section 5.2.

C. Non-Conforming Work: Remove and replace, and re-test.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior, thermally broken storefront framing.

B. Principal Products:
   1. Storefront framing.
   2. Doors.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Storefront framing, included tested performances.
   2. Initial selection color charts.

B. Shop Drawings:
   1. Plans and elevations for each installation.
   2. Anchorage and support details.

C. Samples:
   1. Typical Framing Member: 12 inches long in required finish.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For framing system and finishes.

B. Warranty Documentation: For framing system.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: Follow AAMA CW-10.
   1. Protect aluminum components from bending and from impact, abrasion, and other harmful contacts.
   2. Maintain factory applied finish protections intact until removal is recommended by manufacturer.

1.6 FIELD CONDITIONS

A. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.7 WARRANTY

A. Manufacturer Warranty: Repair or replace components that do not follow requirements or that fail in materials or workmanship.
   1. Failures under design conditions specified in performance requirements.
      a. Breakage or loss of glass.
      b. Permanent deformation of components or assemblies.
   2. Warranty Period: Ten years.

B. Finish Warranty: Repair deteriorated finishes or replace components.
   1. Deterioration includes the following:
      a. Color Fading: More than 5 Hunter units per ASTM D2244.
      b. Chalking: More than No. 8 rating per ASTM D4214.
      c. Paint cracking, peeling or checking.
   2. Warranty Period: 20 years.

PART 2 - PRODUCTS

2.1 ALUMINUM-FRAMED STOREFRONTS

A. Exterior Storefront: Thermally broken extruded aluminum framing system, reinforced to support loads.
   1. Manufacturers and Products:
      a. Kawneer Trifab 451T and 601T; as basis of design, or equivalent by one of the following.
         1) Arcadia Incorporated.
         2) EFCO Corporation.
         3) Oldcastle BuildingEnvelope.
         4) U.S. Aluminum.
         5) YKK AP.
   2. Construction: Thermally broken.
   3. Glass Installation: 4-side captured, installed from exterior.
   4. Glazing Plane: See Drawings.
   5. Profile Dimensions: See Drawings.

6. Finish: Color coating.
   a. Color: Architect selected.

2.2 GLAZING

A. Glass: Section 08 80 00.

B. Glazing Gaskets:
1. Material: Silicone; PVC not permitted.
2. Color: Black.

2.3 GLAZED ALUMINUM DOORS

A. Doors: Manufactured by storefront manufacturer, sized to coordinate with storefront framing. Provide internal reinforcement needed for hardware.
1. Thickness: 1-3/4 inch.
2. Stiles: See Drawings.
3. Bottom Rail: ADA-compliant.
4. Interior Doors: Prepared for 1/4 inch glass.
5. Glazing Beads: Rectangular profile.
6. Manufacturer Name Plates: Not permitted.
7. Finish: Match framing.

2.4 PERFORMANCE

A. Environmental Performance:
1. Air Infiltration: NFRC 400 or ASTM E283.
   a. Fixed Framing and Glass: 0.06 cfm/sq. ft., maximum at 6.24 lbf/sq.ft. static air pressure differential.
2. Water Penetration: ASTM E331.
   a. Fixed Framing and Glass: No water at 15.0 lbf/sq.ft. static air pressure differential.
3. Thermal Transmission: NFRC 100; 0.38 U-Factor, maximum.
4. Condensation Resistance: NFRC 500; 45, minimum.
5. Expansion and Contraction: Withstand thermal cycling over 120 degrees F ambient temperature and 180 degrees F on material surfaces.

2.5 MATERIALS

A. Aluminum: Manufacturer recommended alloy and temper.
1. Extruded Profiles: ASTM B221.
2. Sheet and Plate: ASTM B209.
3. Structural Items: ASTM B308.

B. Steel Reinforcement: Manufacturer recommended coating to prevent galvanic reaction with aluminum framing.
1. Structural Shapes: ASTM A36/A36M.
2. Cold-Rolled Shapes: ASTM A1008/A1008M.

3. Hot-Rolled Shapes: ASTM A1011/A1011M.

C. Concealed Flashing: Dead-soft stainless steel 0.018 inch thick.

D. Assembly Sealants: Silicone.

E. Fasteners: Stainless steel.
1. Where exposed or semi-exposed, use countersunk flathead screws finished to match adjacent surface.

F. Separation Coating: Bituminous paint; SSPC-Paint 12.

G. Concrete Anchors: Manufacturer recommend expansion or screw anchors.

2.6 FABRICATION

A. Fabricate components for uniform 1/2 inch shim space at jambs and heads.

B. Fabricate joints flush, hairline, and weathertight.

C. Provide internal reinforcements needed for performance requirements.

D. Maintain thermal break of exterior assemblies.

E. Conceal fasteners and attachments from view.

F. Provide flat closure plates for open channel perimeter frame members.

G. Fabricate sheet metal components per SMACNA Architectural Sheet Metal Manual.
1. Fabricate trim and flashing in lengths to minimize number of joints.
2. Fabricate trim to uniform sizes and profiles with smooth, flat surfaces free of oil-canning or other distortion.
3. Fabricate trim for concealed anchorage where possible.

H. Weep Holes: Round or oblong, manufacturer recommended size; manufacturer recommended spacing.

I. Fabrication Tolerances:
1. Square: 1/8 inch maximum difference in diagonal measurements.
2. Corner, Face Offsets: 1/16 inch maximum.
3. Bow in Framing Members: 1/16 inch maximum.
4. Joints: Hairline at permanent connections, 1/16 inch maximum at removable glazing stops.

2.7 FINISHES

A. Anodizing: AAMA 611 Class I or AAMA 612 with electro-deposition organic seal.
   1. Color: Clear.

B. Liquid Color Coating: Two-coat fluoropolymer finish with minimum 70 percent PVDF resin by weight in color; AAMA 2605.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that adjoining air and water barriers are in place and extend into rough openings beyond location of exterior joint seals.

3.2 PREPARATION

A. Separation Coating: Apply bituminous paint to surfaces that will contact concrete or dissimilar metals or provide other permanent isolation material.

3.3 INSTALLATION

A. Do not install damaged or substandard components, including items that have deficient finishes.
   1. Corrections in field are subject to Architect's approval before installation.
   2. Return components to factory for remanufacturing or refinishing or provide new components to replace items that cannot be satisfactorily corrected in field.

B. Install steel reinforcement channels between two abutting frames. Anchor channels to overhead structure and floor.

C. Install assemblies plumb, level, square, and accurately aligned.

D. Anchor assemblies securely to structural elements.

E. Set sill members with two lines of continuous sealant per Section 07 92 00.

F. Fill shim spaces with mineral fiber insulation.

G. Remove debris, dirt, aluminum scraps, and other materials from glazing channels.

H. Tolerances:
   1. Variance from Plumb, Plane, and Level: 1/8 inch in 10 feet and 1/4 inch in 40 feet, maximum.
   2. Variance in Alignment Between Adjacent Units: 1/16 inch, maximum.

3.4 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Clean exposed surfaces. Remove excess sealants, and glazing materials.

3.5 PROTECTION

A. Protect storefronts from contaminating substances and glass damage.

END OF SECTION

SECTION 084229.23 SLIDING AUTOMATIC ENTRANCES

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 types of automatic entrances:
   1. Exterior and interior, single slide and bi-parting, sliding automatic entrances.

1.3 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. Underwriters Laboratories (UL):
   1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.

C. American National Standards Institute (ANSI) / Builders' Hardware Manufacturers Association (BHMA):
   1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
   2. ANSI/BHMA A156.5: Standard for Auxiliary Locks and Associated Products

D. American Society for Testing and Materials (ASTM):
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

E. American Association of Automatic Door Manufacturers (AAADM):

F. National Fire Protection Association (NFPA):
   1. NFPA 101 – Life Safety Code.
   2. NFPA 70 – National Electric Code.

G. International Code Council (ICC):

1. IBC: International Building Code

H. Building Officials and Code Administrators International (BOCA), 1999:

I. International Organization for Standardization (ISO):
1. ISO 9001 - Quality Management Systems
2. ISO 14025 – Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
3. ISO14040 – Environmental Management -- Life Cycle Assessment -- Principles and Framework
4. ISO 14044 – Environmental Management -- Life Cycle Assessment -- Requirements and Guidelines
5. ISO 21930 – Sustainability in Buildings and Civil Engineering Works -- Core Rules For Environmental Product Declarations Of Construction Products And Services

J. National Association of Architectural Metal Manufacturers (NAAMM):
1. Metal Finishes Manual for Architectural and Metal Products.

K. American Architectural Manufacturers Association (AAMA):
1. AAMA 607.1 - Clear Anodic Finishes for Architectural Aluminum.
2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
3. AAMA 701 Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.

L. United Nations Central Product Classification (UNCPC):
1. UNCPC 4212 - Product Category Rules for Preparing an Environmental Product Declaration for Power-Operated Pedestrian Doors and Revolving Doors

1.4 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing, as appropriate.

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door assemblies capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).

C. Opening-Force Requirements for Egress Doors: Force shall be adjustable; but, not more than 50 lbf (222 N) required to manually set swinging egress door panel(s) in motion.

D. Closing-Force Requirements: Not more than 30 lbf (133 N) required to prevent door from closing.

1.6 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.

C. Color Samples for selection of factory-applied color finishes.

D. Closeout Submittals:
1. Owner's Manual.
2. Warranties.

E. Reports: Based on evaluations performed by a qualified agency, for automatic entrance door assemblies.
1. Environmental Product Declaration.
2. Evaluation Report for compliance with IBC.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility compliant with ISO 9001.

C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.

D. Certifications: Automatic sliding door systems shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
1. ANSI/BHMA A156.10.
2. NFPA 101.
3. UL 325 listed.
4. IBC.
5. BOCA.

E. Environmental Product Declaration (EPD): EPD for automatic sliding entrances shall be certified by the manufacturer to comply with the following:
1. Prepared under Product Category Rule (PCR) UNCPC 4212.
2. Conform to ISO standards 14025, 14040, 14044, 21930
3. Life Cycle Assessment Basis: Cradle to Gate, minimum.

F. Source Limitations: Obtain automatic entrance door assemblies through one source from a single manufacturer.

G. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

I. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

1.8 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic entrance door assemblies by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor shall advise of any inadequate conditions or equipment.

1.9 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies.

1.10 WARRANTY

A. Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCES

A. Basis of Design: Stanley Access Technologies; Dura-Glide™ 2000 Series sliding automatic entrances.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Headers, stiles, rails, and frames: 6063-T6.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
   3. Sheet and Plate: ASTM B 209.

B. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Sealants".

2.3 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.

B. Sliding Automatic Entrances:
   1. Single Slide Entrances:
      a. Configuration: One sliding leaf and one full sidelight.
      b. Traffic Pattern: Two-way.
      c. Emergency Breakaway Capability: Sliding leaf only.
      d. Mounting: Between jambs.
   2. Bi-Parting Entrances:
      a. Configuration: Two sliding leaves and two full sidelights.
      b. Traffic Pattern: Two-way.
      c. Emergency Breakaway Capability: Sliding leaves only.
      d. Mounting: Between jambs.

2.4 COMPONENTS

A. Framing Members: Manufacturer’s standard extruded aluminum reinforced as required to support imposed loads.
   1. Nominal Size: 1 3/4 inch by 4 ½” (45 by 115 mm).
   2. Concealed Fastening: Framing shall incorporate a concealed fastening pocket, and continuous flush insert cover, extending full length of each framing member.

B. Stile and Rail Doors and Sidelights: Manufacturer's standard 1 ¾ inch (45 mm) thick glazed doors with extruded-aluminum tubular stile and rail members. Incorporate concealed tie-rods that span full length of top and bottom rails.
   1. Glazing Stops and Gaskets: Snap-on, extruded-security aluminum stops and preformed gaskets.

2. Stile Design: Medium stile; 3 ½ inch (95 mm) nominal width.
3. Bottom Rail Design: Minimum 6 inch (152 mm) nominal height.
4. Muntin Bars: Horizontal tubular rail member for each door; 2 inch (51 mm).

C. Glazing: Furnished under Division 8 Section Glazing. All Glazing furnished under separate section shall be 1 inch (25 mm) tempered / insulated, hermetically sealed for exterior doors, 1/4" tempered for interior doors.

D. Headers: Fabricated from extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
1. Mounting: Concealed, with one side of header flush with framing.
2. Capacity: Capable of supporting up to 220 lb (100 kg) per panel, up to four panels, over spans up to 14 feet (4.3 m) without intermediate supports.

E. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment of at least 1/8 inch (3 mm); consisting of urethane with precision steel lubricated ball-bearing wheels, operating on a continuous roller track. Support panels from carrier assembly by load wheels and anti-riser wheels with factory adjusted cantilever and pivot assembly. Minimum two ball-bearing load wheels and two anti-rise rollers for each active leaf. Minimum load wheel diameter shall be 2 1/2 inch (64 mm); minimum anti-rise roller diameter shall be 2 inch (51 mm).

F. Thresholds: Manufacturer's standard thresholds as indicated below:
1. Continuous standard tapered extrusion square by bevel, with bevel to exterior.
2. Continuous standard tapered extrusion double bevel.
3. All thresholds to conform to details and requirements for code compliance.

G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Self-contained overhead unit powered by a minimum of 1/4 horsepower, permanent-magnet DC motor with gear reduction drive, microprocessor controller; and encoder.
1. Operation: Power opening and power closing.
2. Features:
   a. Adjustable opening and closing speeds.
   b. Adjustable open check and close check speeds.
   c. Adjustable hold-open time between 0 and 30 seconds.
   d. Obstruction recycle.

e. On/Off switch to control electric power to operator.
f. Energy conservation switch that reduces door-opening width.
g. Closed loop speed control with active braking and acceleration.
h. Adjustable obstruction recycle time delay.
i. Self-adjusting stop position.
j. Self-adjusting closing compression force.
k. Onboard sensor power supply.
l. Onboard sensor monitoring.
m. Optional Switch to open/Switch to close operation.
n. Fire alarm interface, configurable to safely open or close the entrance on signal from fire alarm system.

3. Mounting: Concealed.
4. Drive System: Synchronous belt type.

C. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps.

2.6 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.
1. The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
2. Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.

B. Performance Data: The microprocessor shall collect, and store performance data as follows:
1. Counter: A non-resettable counter to track operating cycles.
2. Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
3. LED Display: Display presenting the current operating state of the controller.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.
4. Internal Power Supply Protection.
5. Resettable sensor supply fuse protection.
6. Motor Protection, over-current protection.

D. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

E. Obstruction Recycle: Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

F. Programmable Controller: Microprocessor controller shall be field programmable.
   1. The following parameters may be adjusted:
      a. Operating speeds and forces as required to meet specified ANSI/BHMA standard.
      b. Adjustable and variable features specified.
      c. Reduced opening position.
   2. Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons.

2.7 ACTIVATION AND SAFETY DEVICES

A. Combined Activation and Safety Sensors: Combined activation and safety sensors shall, in a single housing, detect motion and presence in accordance with ANSI/BHMA A156.10. Motion shall be detected using K-band microwave technology, presence by active infrared reflection technology.
   1. Mounting Height: Up to 11.5 feet (3.5 m) above finish floor
   2. Temperature Range: Between -31°F and 131°F (-35°C to 55°C) in all environmental conditions
   3. Relays: Form C, 50V at 0.3A for both activation and safety. Hold time of less than 0.5 seconds.
   4. Detection Pattern: When detection is made in the activation zone, and the entrance opens, the safety zone shall extend through the threshold on each side; creating an X-pattern. When activation and safety zones are cleared and the entrance closes the sensor will ignore the X-pattern safety zones.
   5. Combined motion and presence sensors shall be equal to or better than X-Zone Sensor by Optex.

B. Photoelectric Beams: In addition to the threshold sensor include a minimum of two (2) doorway holding beams. Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting.

C. Presence Sensor Monitoring: Sliding automatic entrances control system shall include a means to verify the functionality of all active presence sensors in accordance with ANSI/BHMA A156.10. A detected fault shall cause automatic operation to cease until the fault is corrected.

2.8 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.

B. Emergency Breakaway Feature: Provide release hardware that allows panel(s) to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 50 lbf (222 N) according to ANSI/BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.
   1. Emergency breakaway feature shall include at least one adjustable detent device mounted in the top of each breakaway panel to control panel breakaway force.
   2. Limit Arms: Limit arms shall be provided to control swing of sliding or non-sliding panels on break-out; swing shall not exceed 90 degrees. Limit arms shall be spring loaded to prevent shock, and include adjustable friction damping.

C. Deadlocks: Manufacturer's standard deadbolt operated by exterior cylinder and interior thumb turn; with minimum 1 inch (25 mm) long throw bolt; ANSI/BHMA A156.5, Grade 1.
   1. Cylinders: As specified in Division 8 Section "Door Hardware."
   2. Hook Latch: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.
   3. Two-Point Locking: On bi-parting entrances, provide locking system that incorporates a device in the stile of active door leaves that automatically extends a flush bolt into overhead carrier assembly.

D. Control Switch: Provide manufacturer's standard header mounted rocker switches and door position switch to allow for full control of the automatic entrance door. Controls to include, but are not limited to:
   1. One-way traffic
   2. Reduced Opening
   3. Open/Closed/Automatic

E. Power Switch: Sliding automatic entrances shall be equipped with a two position On/Off rocker switch to control power to the door.

F. Sliding Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

G. Weather Sweeps: Manufacturer's standard adjustable nylon brush sweep mounted to underside of door bottom.

2.9 FABRICATION

A. General: Factory fabricates automatic entrance door assembly components to designs, sizes, and thickness indicated and to comply with indicated standards.
   1. Form aluminum shapes before finishing.
   2. Use concealed fasteners to greatest extent possible.
      a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
      b. Reinforce members as required to receive fastener threads.

B. Farming: Provide automatic entrances as prefabricated assemblies.
   1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
   2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
   3. Form profiles that are sharp, straight, and free of defects or deformations.
   4. Prepare components to receive concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.

F. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.

2.10 ALUMINUM FINISHES

A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611-98, and the following:
   1. AAMA 607.1
   2. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Do not install damaged components. Fit frame joints to produce joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
   1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
   2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

D. Glazing: Performed under Division 8 Section "Glazing" in accordance with sliding automatic entrance manufacturer’s instructions.

E. Sealants: Comply with requirements specified in Division7 Section "Joint Sealants".

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.10.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish. Comply with requirements in Division 8 Section “Glazing”, for cleaning and maintaining glass.

END OF SECTION 084229.23

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Exterior glass.
   2. Exterior spandrel glass.

B. Principal Products:
   1. Tempered glass.
   2. Insulating glass.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Each type of glass.

PART 2 - PRODUCTS

2.1 BASE GLASS

A. Clear Glass: ASTM C1036, Type I, Class 1, Quality-Q3.

B. Low-Iron Ultra-Clear Glass: ASTM C1036, Type I, Class 1, Quality q3; minimum 90 percent visible light transmission.
   1. Guardian Semi Low Iron.
   2. Pilkington Optiwhite.
   3. Viracon Pure Mid Iron.
   4. Vitro Acuity.

2.2 HEAT TREATED GLASS

A. Heat Treated Glass: ASTM C1048, Type 1, Quality Q3; free of mosaic or pattern distortion visible from fixed viewpoint and other defects caused by roller pick.
   1. Tempered Glass: Kind FT.

B. Roll Ripple Surface Wave Tolerances:
   1. Tempered Glass: 0.005 inch, maximum.

C. Roll Ripple Orientation: Horizontal.

D. Fabricate heat-treated units with permanent label in consistent location at either lower corner.

2.3 COATED GLASS

A. Spandrel Glass: Silicone coating; tested per GANA publication 89-1-6.
   1. Coating Thickness: 8 mil, minimum.
   2. Color: Architect selected.
   3. Insulating Glass Application: 4 surface.

2.4 INSULATING GLASS

A. Insulating Glass Units: Factory assembled double-pane units tested per ASTM E2190.

B. Spacer Strips: Aluminum, black with desiccant fill.

C. Space Fill: Dehydrated air.

D. Edge Seals:
   1. Primary Seal: Polyisobutylene.
   2. Secondary Seal: Silicone.

2.5 GLASS TYPES

A. See Glazing Schedule on Drawings.

2.6 INSTALLATION MATERIALS

A. Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 80 to 90 Shore A durometer hardness.

B. Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; Shore A durometer hardness.

C. Glazing Gaskets: Specified with framing system.

D. Interior Glazing Tape: ASTM C1281 and AAMA 800; butyl based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, coiled on release paper; widths required for installation.
   1. Color: Black.
   2. Supply pre-shimmed tape with continuous spacer for hollow metal glazing frames and other applications recommended by tape manufacturer.

2.7 PERFORMANCE

A. Impact:
   1. Safety Glazing: 16 CFR 1201, Category II.

2.8 FABRICATION

A. Fabricate before delivering glass to site.

B. Provide code-required permanent labels in locations that will be visible but inconspicuous after installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Framing is ready to receive glazing.
   2. Face and edge clearances are sufficient.

B. Examine glass lites for damage and defects before installation.

C. Do not install tempered glass with noticeable roller pick optical distortion.

3.2 PREPARATION

A. Clean glazing channels and rabbets; remove loose materials and moisture.

B. Remove protective coatings on metal surfaces.

C. Clean glass just before installation.

3.3 INSTALLATION - GENERAL

A. Install glass without direct contact on framing surfaces.

B. Maintain manufacturer recommended edge and face clearances between glass and frame members.

C. Set glass centered in openings on setting blocks.

D. Provide edge blocking needed to prevent sideways movement of glass in framing.

3.4 INSTALLATION - GASKET GLAZING

A. Fabricate gaskets to fit openings.

B. Install gaskets in single pieces on each side of opening with joints only at corners.

C. Where recommended by framing system manufacturer, seal corners watertight.

D. Compress gaskets to produce weathertight seal without causing bending stresses in glass.

3.5 INSTALLATION - TAPE GLAZING

A. Install tape on fixed stop form continuous airtight seals. Do not stretch tapes to make them fit.

B. Butt tape corners with full contact.

C. Install tape projecting slightly above sight line.

D. Insert spacer shims between glass and applied stops at 24 inch intervals, but not less than 2 per side, and 1/4 inch below sight line.

E. Install removable glazing stops in full contact with tape.

F. Trim protruding tape edges flush with stops.

3.6 CLEANING

A. Remove nonpermanent labels and clean surfaces after installation.

B. Clean glass on both sides shortly before inspection for Substantial Completion.

3.7 PROTECTION

A. Protect glass vulnerable to damage with streamers attached to framing.

END OF SECTION 088000

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COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Test concrete floor slabs for moisture and alkalinity.
   2. Prepare existing concrete slabs for the following flooring types:
      a. Resilient tile and sheet.
      b. Broadloom or tile carpet.
   3. Remediate concrete floor slabs due to unsatisfactory moisture or alkalinity conditions.

B. Principal Products:
   1. Testing apparatus.
   2. Patching and self-leveling compounds.
   3. Remedial floor coatings.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
      a. Moisture and alkalinity limits and test methods.
      b. Manufacturer required bond/compatibility test procedure.
   2. Remedial Materials:
      a. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.

1.4 INFORMATIONAL SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity test reports.

4. Copies of specified test methods.
5. Recommendations for remediation of unsatisfactory surfaces.
6. Include certification of accuracy by authorized official of testing agency.
7. Submit report to Architect and Owner two business days, maximum after conclusion of testing.

C. Adhesive Bond and Compatibility Test Report.

D. Specimen Warranty: Issued by remedial material manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation: For remedial floor coatings.

1.6 QUALITY ASSURANCE

A. Testing Agency: Owner will employ an independent testing agency to perform moisture and alkalinity testing.
   1. Contractor's Responsibility Relating to Independent Agency Testing:
      a. Provide access for and cooperate with testing agency.
      b. Confirm date of start of testing at least 10 days before actual start.
      c. Allow at least 4 business days on site for testing agency activities.
      d. Achieve and maintain specified ambient conditions.
      e. Notify Owner when specified ambient conditions have been achieved and when testing will start.

B. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer packaging; include installation instructions.

B. Keep materials from freezing.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours before testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours before testing, at not less than 40 percent and not more than 60 percent.

PART 2 - PRODUCTS

2.1 FLOORING PREPARATION MATERIALS

A. Patching and Self-Leveling Compound:
   1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, capable of being installed to thicknesses shown, and feathered to nothing at edges.
   2. Compressive Strength: 4000 psi, minimum after 28 days per ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Alternate Flooring Adhesive: Floor covering or adhesive manufacturer recommended product, suitable for the moisture and pH conditions present.
   1. VOC Content: 50 g/L, maximum.

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination.
   1. Manufacturers and Products: Testing agency recommended or one of the following:
      a. ARDEX Engineered Cements; ARDEX MC ULTRA with ARDEX V 1000.
      b. Custom Building Products; CustomTech Tech MVC with TechLevel 100.
      c. Dependable Floor Products; VAPORSEAL-HM with Dependable SKIMFLOW ES.
      d. Koster American Corporation; Koster VAP I 2000 with Koster SL Premium overlay.
      e. LATICRETE International, Inc; NXT Vapor Reduction Coating with NXT Level.
      f. MAPEI Planiseal VS with Mapei PlaniLevel 560.
      g. UZIN; UZIN PE 460 with UZIN PE 280 and UZIN NC 150.

PART 3 - EXECUTION

3.1 CONCRETE SLAB PREPARATION

A. Follow recommendations of testing agency and ASTM F3010.

B. Perform following operations in this order:
   1. Existing on-grade and elevated concrete slabs with existing floor coverings:
      a. Observe existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
      b. Remove existing floor covering.
   2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
      a. Do not attempt to remove coating or penetrating material.
      b. Do not abrade surface.
   3. Perform preliminary cleaning.
   4. Internal Relative Humidity Testing: Three tests in the first 1000 square feet and one test in each additional 1000 square feet, or flooring manufacturer recommended frequency.
   5. Alkalinity Tests: Relative humidity test locations.
   6. Specified remediation, if required due to relative humidity test result.
   7. Patching, smoothing, and leveling.

8. Other preparation specified in finish flooring sections.
9. Adhesive bond and compatibility test.
10. Apply protection.

C. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct before doing any other remediation; re-test after correction.
2. Excessive Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
3. Excessive Alkalinity:
   a. If remedial floor coating is necessary to address excessive moisture, no additional remediation is required for pH.
   b. If an adhesive that is resistant to the pH level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.2 EXISTING FLOOR COVERINGS REMOVAL

A. Follow local, State, and federal regulations and RFCI "Recommended Work Practices for Removal of Resilient Floor Coverings," applicable to floor covering being removed.

3.3 PRELIMINARY CLEANING

A. Clean floors, remove adhesion-inhibiting substances.

B. Do not use solvents for cleaning.

3.4 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer requirements conflict with either the referenced test method or this specification, follow the manufacturer requirements.

B. Testing: ASTM F2170 Procedure A. Calcium Chloride and electrical impedance or resistance testing may not be substituted.

C. If test values exceed floor covering manufacturer limits, perform remediation. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

D. Report the information required by the test method.

3.5 ALKALINITY TESTING

A. Where the floor covering manufacturer requirements conflict with either the referenced test method or this specification, follow the manufacturer requirements.

B. Use a wide range alkalinity test paper, its associated chart, and distilled or deionized water.

C. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity test paper into the water, remove it, and compare immediately to chart to determine alkalinity reading.

D. In the event that test values exceed floor covering manufacturer limits, perform remediation. In the absence of manufacturer limits, perform remediation if alkalinity test value exceeds 10.

3.6 PREPARATION

A. See individual floor covering sections for additional requirements.

B. Follow recommendations of testing agency.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.7 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Follow requirements and recommendations of floor covering manufacturer.

3.8 APPLICATION OF REMEDIAL FLOOR COATING

A. Mix and apply remedial floor coating.
   1. Prohibit traffic during application.
   2. Honor substrate control, isolation and expansion joints.
   3. Prime substrate, and apply floor coating in layers as recommended by manufacturer.
   4. Allow coating to cure before applying finish flooring.

3.9 PROTECTION

A. Cover prepared floors with building paper or other durable covering until finish flooring is installed.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Gypsum board faced metal framed partitions.

B. Principal Products:
   1. Steel stud framing.
   2. Backing.
   3. Gypsum wallboard.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Shop Drawings:
   1. Grid suspension system.

C. Samples:
   1. Trim Accessories: 12-inch lengths of trim other than edge beads and control joints.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: ASTM C840.

PART 2 - PRODUCTS

2.1 FRAMING - GENERAL

A. Framing Members and Components - General: AISI S220.
   1. Protective Coating: ASTM A653/A653M, G40, hot-dip galvanized. EQ coatings following AISI S220 that have ICC-ES Evaluation Reports are acceptable.

2.2 PARTITION FRAMING

A. Contractor Option: Use standard steel studs and tracks or high-strength embossed steel studs and tracks.

B. Standard Studs and Tracks:
1. Depth: See Drawings.
2. Thickness: 33 mils, minimum.

C. Deflection Top Track: Provide one of the following:
1. Single Long-Leg Track: Steel top track with 3 inch deep flanges; studs friction fit.
2. Single Slotted Track: Steel top track with 3 inch deep slotted flanges; studs fastened through slots.
3. Double Track: Steel top track system with inside track fastened to studs and outside track fastened to structure.
a. Outside Track: 3 inch flanges.
b. Inside Track: Flanges 1/2 inch shorter than outside track.
4. Steel Thickness: Match studs.

D. Hat-Shaped Furring Channels:
1. Minimum Thickness: 18 mils.
2. Depth: 7/8 inch.

E. Bridging: Cold-rolled steel channels, 54 mil thick, with minimum 1/2 inch wide flanges.
1. Depth: 1-1/2 inches.

2.3 SUSPENSION SYSTEMS

A. Anchorage Devices: Power-actuated fasteners, fabricated with loops for attaching wire hangers.

B. Wire Hangers: ASTM A641, zinc coated, 0.16 inch minimum diameter.

C. Cold-Rolled Carrying Channels:
1. Minimum Thickness: 54 mils.
2. Depth: See Drawings.

D. Hat-Shaped Furring Channels:
1. Minimum Thickness: 33 mils.
2. Depth: 7/8 inch.

E. Grid Suspension System: Direct-hung, pre-engineered ceiling suspension system.
1. Manufacturers and Products:
a. Armstrong World Industries Drywall Grid Systems.
b. Rockfon Chicago Metallic Drywall Grid.
c. USG Drywall Grid.

2.4 GYPSUM BOARD

A. Fire-Resistant Gypsum Board: ASTM C1396.
   1. Core: 5/8 inch, Type X; locations shown on Drawings.

B. Ceiling Board: ASTM C1396.
   1. Thickness: 1/2 inch regular.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C1396.
   1. Manufacturers and Products:
      a. CertainTeed M2Tech Mold Resistant.
      b. Georgia-Pacific Gypsum ToughRock Mold-Guard.
      c. National Gypsum Gold Bond XP.
      d. USG Corp Sheetrock MoldTough.
   2. Core: 5/8 inch Type X.
   3. Mold Resistance: 10 per ASTM D3273.

2.5 BACKING

A. Contractor Option: Use manufactured, preformed sheet steel backing, manufactured flexible wood backing system, and flat strap backing plates.

B. Manufactured, Preformed Sheet Steel Backing: 6 inch wide, 68 mil steel, formed to fit stud spacing.
   1. Manufacturers and Products:
      a. Perfect Wall, Inc. Flush-Mount Flat Reinforced Backing.

C. Wood Backing System: Fire-retardant treated wood and predrilled steel clips.
   1. Manufacturers and Products:
      a. ClarkDietrich Danback.
      b. SCAFCO Kwik-Back.

D. Flat Strap Backing Plates: Steel sheet screwed to studs.
   1. Width: 6 inches minimum or as needed for secure anchorage of wall-mounted items.
   2. Thickness: 63 mils minimum where supporting the following items.
      a. Handrails, grab bars, and other items that support live loads.
      b. Wall-supported counter tops and cabinets.
      c. Electrical panels.
      d. Electrically-operated fixtures, furnishings, or equipment.
      e. Large lighting fixtures.
      f. Wall mounted televisions and monitor screens.
      g. Mirrors.
      h. Large artwork.
   3. Thickness: 33 mils minimum where supporting the following items.
      a. Wood trim.
      b. Toilet and bath accessories, other than grab bars.
      c. Small lighting fixtures.
      d. Anchorage for base cabinets.
      e. Small artwork.

2.6 PERFORMANCE

A. Select stud thicknesses and spacing from manufacturer load and deflection tables to meet performance requirements, including wall-mounted element supports such as handrails and wall cabinets.

B. Structural Design Criteria:
   1. Horizontal Partition Load: 5 psf.
   2. Vertical Ceiling Load: Supported material dead load.
   3. Shaft Sustained Air-Pressure Loads: 5 lbf/sq ft.
   4. Partition Horizontal Deflection Limits:
      a. Tile and Stone Finished Partitions: 1/360 of wall height.
      b. Other Partitions: 1/240 of wall height.
   5. Ceiling Vertical Deflection Limits: 1/360 of span.

C. Fire Resistance: Assemblies tested per ASTM E119.
   1. Fire Ratings: See Drawings.

D. Acoustic Performance:
   1. STC: Tested per ASTM E90, classified per ASTM E413. See Drawings for STC ratings.

2.7 FIRESTOPPING COMPONENTS

A. Wall Head Joint Firestopping: Section 07 84 00.

B. Firestop Track: One of the following types.
   1. Top track manufactured to accommodate structural deflection while maintaining fire-resistance-rated assembly continuity.
      a. Manufacturers and Products:
         1) CEMCO FAS-Track.
         2) ClarkDietrich BlazeFrame DL 2.
         3) Fire Trak Corp Fire Trak System.
         4) Metal-Lite The System.
   2. Intumescent Firestop Seal: One-piece, pre-formed foam seal fitting over top tracks.
      a. Manufacturers and Products:
         1) Hilti, Inc. Model CFS-TTS, Firestop Top Track Seal.
      b. Width: Accommodating track depth.

2.8 ACOUSTICAL FRAMING COMPONENTS

A. Resilient Furring Channels: Asymmetrical, 1/2 inch deep.

2.9 INSTALLATION COMPONENTS

A. Framing Installation:
   1. Anchors: Framing manufacturer recommended types for substrates.
   2. Fasteners: ASTM C1002; Type S or GA-216; length to suit application.

3. Tie Wire: ASTM A641, zinc coated, 0.062 inch diameter, minimum.
4. Acoustic Gaskets: Closed-cell foam self-adhesive strips allowing fastener penetration without foam displacement, 1/8 inch thick minimum, widths to match stud sizes.
5. Exterior Wall Isolation Strips:
   a. Asphalt-Saturated Organic Felt: ASTM D226, Type I, #15 asphalt felt, nonperforated.
   b. Foam Gaskets: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, stud-appropriate width.

B. PVC Trim: ASTM C1047 and ASTM D3678.
1. Manufacturers:
   a. ClarkDietrich.
   b. Plastic Components, Inc.
   c. Trim-Tex Inc.
2. Shapes: Cornerbead and LC-bead.

C. Partition to Mullion Termination Trim: Acoustic, extruded aluminum mullion caps.
1. Manufacturers and Products:
   a. Gordon Inc. Mullion Mate Series 60 to glazing and Series 30 to mullions.
2. STC: Match adjacent partitions.
3. Color: Match mullion.

D. Sound Attenuation Blankets: ASTM C665, Type I, unfaced semi rigid mineral wool or fiberglass, thickness shown on Drawings, sized for friction fit.
1. Surface Burning Characteristics: ASTM E84.
   a. Flame Spread: 25 maximum.
   b. Smoke Developed: 50 maximum.
2. Fire Rated Partitions: Insulation type required by fire resistance designs referenced on Drawings.
3. Thickness:
   a. Walls: Full depth.
   b. Ceilings: 3 1/2 inches.

E. Acoustic Sealant: ASTM C834; nonsag, paintable, nonstaining, butyl-free, latex sealant.
1. Manufacturers and Products:
   a. Accumetric LLC BOSS 824 Acoustical Sound Sealant.
   b. GE Construction Sealants RCS20.
   c. Grabber Construction Products Acoustical Sealant GSC.
   d. Hilti, Inc. CP509 Smoke and Acoustical Sealant.
   e. Pecora Corporation AC-20 FTR.
   f. Specified Technologies, Inc. Smoke N Sound Acoustical Sealant.
   g. USG Corporation SHEETROCK Acoustical Sealant.

F. Electrical Box Pads: Moldable non-curing one component, intumescent, fire-rated material for through-penetration fire stop systems and sound attenuation systems; self-adhering; 1/8 inch thick, minimum.
1. Manufacturers and Products:
   a. Kinetics Noise Control Fire-Rated Isobacker.
   b. Specified Technologies, Inc. SpecSeal Firestop Putty Pads.

G. Gypsum Board Fasteners:
   1. Metal Framing 33 mils Thick and Less: ASTM C1002, Type S.
   2. Metal Framing Greater than 33 mils Thick: ASTM C954.

H. Joint Materials:
   1. Interior Gypsum Board: ASTM C475/C475M; products compatible with substrate and other coatings applied to surface.
      a. Skim Coat For Final Coat of Level 5 Finish: Spray-applied high-build coating.
   2. Tile Backer Board: Product recommended by backer unit manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough-in utilities in are proper locations.

B. Shaft Wall Assemblies: Verify substrates are ready and follow installation tolerances, including slabs and structural framing.
   1. Verify that elements within shafts are ready to be enclosed.

C. Examine panels for moisture and mold; discard damaged panels.

3.2 PREPARATION

A. Remove sprayed fireproofing to the extent required to install gypsum assemblies. Patch damaged fireproofing.

3.3 INSTALLATION - PARTITION FRAMING

A. Framing to Structure: Extend partition framing to underside of structure. Attach ceiling track to structure.

B. Brace stud framing system rigid; attach bridging to prevent stud rotation.

C. Orient stud flanges the same direction within wall assembly.

D. Stud Spacing:
   1. Single-Layer Applications: See Drawings.
   2. Multi-Layer Applications: See Drawings.
   3. Tile Backer Applications: See Drawings.

E. Install backing where shown and where supporting wall-mounted fixtures, furniture, equipment, or other construction.

F. Fire-Resistance-Rated Partitions: Tested assembly requirements.

G. Firestop Track: Tested assembly requirements.

H. Acoustic Accessories and STC-Rated Assemblies: Follow tested assembly requirements.

1. Acoustical Sealant Beads: ASTM C919. Close off sound-flanking paths.
2. Electrical Box Seals:
   a. Install seals before installing gypsum board.
   b. Overlap front edge of box so that seals will be compressed around edges of box as gypsum panels are installed.
3. Sound Attenuation Blankets:
   a. Install after one side of gypsum is installed and mechanical and electrical work is complete in framing spaces.
   b. Fit tight around cut openings and penetrations, and behind and around electrical and mechanical items.
   c. Pack around door and window frames, between jamb studs, in boxed headers, and in other voids.

I. Deflection Accommodation: Install deflection top track systems to prevent axial loading of finished assemblies.

J. Framed Openings:
1. Install two studs at each jamb or as shown on Drawings.
2. Headers: Install track on top of header for installation of cripple studs.

3.4 INSTALLATION - INTERIOR GYPSUM BOARD

A. Follow ASTM C840.
1. Fire-Rated Partitions: Install per tested designs referenced on Drawings.
2. Acoustically-Rated Partitions: Install per tested designs referenced on Drawings.

B. Cut panels to fit obstructions and openings without tearing face paper or cracking core.

C. Install panels with face side out with lightly butted joints.

D. Stagger joints on opposite sides of partitions.

E. Locate panel ends over support framing.

F. Fit panels to ducts, pipes, conduit, and other penetrations and obstructions with maximum 1/4 inch joints.

G. Attach gypsum board to framing and to supplementary framing and blocking provided for additional support at openings and cutouts.

H. Form control joints and expansion joints with space between edges of boards, prepared to receive trim accessories.

I. Isolate perimeter of non-loadbearing drywall partitions from structural members. Provide 1/4 to 1/2-inch space and trim edge with edge bead. Seal joints with acoustical sealant.

J. Single Layer Installation:
1. Install panels vertically with long edges on continuous supports.
2. Attach panels to framing with screws.

K. Double Layer Installation:

1. Attach base layer to framing with screws.
2. Offset second layer joints and attach panels with screws.
3. At walls taller than 10 feet, install panels horizontally and provide control joints at floor lines.

3.5 INSTALLATION - TRIM

A. Vertical Trim: Install in single pieces where length is 9 feet or less.

B. Control Joints: Install per ASTM C840 and as follows.
   1. Locations of control and expansion joints in substrate or framing.
   2. Walls:
      a. At changes in backup material.
      b. Above one jamb of doors.
      c. Maximum 30 feet on center.
   3. Ceilings:
      a. At locations where ceiling framingchanges direction.
      b. Maximum 50 feet on center.

C. Corner Bead: Outside corners.

D. Casings: Install at termination joints with other construction or where edges are exposed.

3.6 GYPSUM BOARD FINISHING

A. Reference Standard: ASTM C840.

B. Finish panel joints, inside corners, trim flanges, fastener heads, and surface defects to provide smooth, continuous surfaces of monolithic appearance that are suitable for applied finishes.

C. Do not fill spaces around penetrations through fire resistive assemblies with joint compound. Leave space for firestopping.

D. Finish Levels:
   1. Level 1: Surfaces in plenums and other concealed areas.
   2. Level 2: Surfaces that receive tile.
   3. Level 3: Not used.
   4. Level 4: Surfaces that receive flat or low sheen paint.

3.7 IDENTIFICATION

A. Identify fire rated walls and partitions and other walls required to have protected openings or penetrations.
   1. Locations: Within 4 ft of corners and maximum 12 feet between on both sides.
      a. In spaces without ceilings, locate signs minimum 10 ft above finish floor and not blocked from view by ducts, structure, or other elements.
   2. Signs: Painted stencil signs with minimum 4-inch high letters and 1/2-inch strokes, or as required by authorities having jurisdiction, or approved self-adhesive signs.

3. Text: Use following or as required by authorities having jurisdiction.
   a. 1-HOUR FIRE BARRIER – FIRESTOP ALL PENETRATIONS.
   b. 2-HOUR FIRE BARRIER – FIRESTOP ALL PENETRATIONS.

3.8 ADJUSTING

A. Water-Exposed Products: Remove entire panels; do not cut and patch gypsum board.

3.9 CLEANING

A. Remove spills, spatters, and misapplications of finishing materials as they occur.

B. Repair other finish surfaces damaged during drywall operations.

3.10 PROTECTION

A. Protect adjacent surfaces from gypsum panel compounds, adhesives, and sealants.

B. Protect finished gypsum panels from being marred from ongoing work.

END OF SECTION 092116

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Acoustical panel ceilings.

B. Principal Products:
   1. Suspension grid.
   2. Acoustical panels.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate work results of this Section with ceiling-supported elements and work above ceilings.

B. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

C. Sequencing:
   1. Complete ceiling suspension system installation after overhead HVAC, electrical, and fire-suppression work is tested and approved.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Acoustical panels.
   2. Suspension grid and trim.

B. Shop Drawings.
   1. Show grid layout and panel identification for each acoustical panel ceiling.
   2. Include mechanical and electrical items installed in ceilings.
   3. Installation details for seismic design loads sealed by professional engineer responsible for seismic attachment and bracing design.

C. Samples:
   1. Each acoustical panel type, standard size.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty Documentation.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Acoustical Panels: Unused panels plus minimum 96 square feet of each product installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products after building is fully enclosed.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS

A. Acoustical Panels:
   1. Manufacturers and Products: See Finish Legend on Drawings.

2.2 SUSPENSION GRID

A. Non-Fire-Rated Grid: ASTM C635.
   1. Manufacturers and Products: See Finish Legend on Drawings.
   2. Material: Steel; ASTM A653 G30 hot dip galvanized.
   3. Cap Color: White.

2.3 CEILING TRIM

A. Wall Moldings:
   1. Material: Steel, painted finish matching grid.
   2. Profile: Stepped profile for rabbet-edge panels.

2.4 INSTALLATION MATERIALS

A. Hanger Attachment: Five times design load per ASTM C635, Table 1.

B. Wire Hangers: Galvanized steel wire.
   1. Diameter: Sized for three times hanger design load per ASTM C635, Table 1.

C. Touch-up Paint: Type and color to match acoustic and grid units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that hanger layout will not interfere with other work.

B. Examine acoustical panels; discard panels that are wet, damaged, or exhibit mold.

C. Verify that major work above ceiling is complete and inspected before installing grid.

3.2 INSTALLATION

A. Installation Reference Standards:
   1. ASTM C636.
   2. CISCA Ceiling Systems Handbook.
   3. Seismic Standard: ASTM E580.

B. Fully Loaded Deflection: 1/360, maximum.

C. Grid Layout:
   1. Locate system according to reflected plan.

D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible face plane displacement between adjacent members.

E. Where ducts or other equipment prevent regular hanger spacing, reinforce hangers to span extra distance or suspend steel channels horizontally and fasten hangers to channels.

F. Install decorative edge trim with plumb faces, concealed fasteners, and aligned joints.

G. Install grid so that components are level and accurately aligned.

H. Support tees on perimeter molding flanges.

I. Perimeter Moldings: Fasten to substrates 16 inches on center, maximum.
   1. Install edge moldings at intersections of ceiling and vertical surfaces in acoustical sealant bed or with continuous gasket.
   2. Use longest practical lengths.

3. Outside Corners: Miter or overlap molding.
4. Inside Corners: Cut flanges and bend webs.

J. Place acoustical panels with edges resting flat on suspension grid in uniform plane free of warping.

K. Cutting Acoustical Panels:
1. Cut to fit irregular grid and perimeter edge trim.
2. Cut profiles to match factory edges.
3. Field paint exposed cut edges.

3.3 ADJUSTING

A. Touch up minor scratches and abrasions to match factory finish.

B. Provide new components to replace damaged components that cannot be satisfactorily cleaned or repaired.

END OF SECTION 095113

SECTION 095423 – LINEAR METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section Includes

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Acoustical metal ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems

11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

1.4 SYSTEM DESCRIPTION

Continuous/Wall-to-Wall

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

a. Surface Burning Characteristics: ASTM E 84 and complying with ASTM E 1264 Classification.

C. Acoustic Panels: As with other architectural features located at the ceiling, may obstruct, or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.7 DELIVERY, STORAGE AND HANDLING

A. The ceiling planks should be stored in a dry interior location and shall remain in cartons prior to installation to avoid damage. The cartons shall be stored in a flat, horizontal position. The planks should not be removed from the carton until the suspension system is installed.

B. Proper care should be taken when handling the planks to avoid damage and soiling. It is recommended to hold the planks in the vertical orientation to avoid possibly bending the plank.

C. White cotton or latex gloves are recommended for handling. It is recommended that two installers handle the 96" planks.

1.8 PROJECT CONDITIONS

A. Areas to receive ceilings shall be free of construction dust and debris. The ceilings should only be installed in closed and acclimatized buildings. This product is not intended for exterior purposes.

B. Interior systems cannot be used where standing water is present or where moisture will come in direct contact with the ceiling.

1.10 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping

2. Grid System: Rusting and manufacturer's defects.

B. Warranty Period:

1. Acoustical Metal panels: One (1) year from date of substantial completion

2. Grid: One (1) year from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.11 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Metal Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Metal Ceiling Panels:

1. Basis of Design: Armstrong World Industries, Inc.

B. Suspension Systems:

1. Basis of Design: Armstrong World Industries, Inc.

2.2.1 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type LMC

1. 1. Acoustical Panels Type LMC-1:
   a. Surface Texture: Smooth
   b. Composition: Electrogalvanized Steel 0.028”
   c. Color: (Sustain Portfolio): Effects Coriander
   d. Size: 6IN x 96IN
   e. Edge Profile: Linear
   f. Perforation Option: Unperforated-M1
   g. Noise Reduction Coefficient(NRC): 0.70
   h. Ceiling Attenuation Class (CAC) : N/A
   i. Sabin: N/A
   j. Articulation Class (AC): N/A
   k. Flame Spread: ASTM E 1264; Class A (FM)
   l. Light Reflectance White Panel: 0.83
   m. Dimensional Stability: Standard
   n. Basis of Design: Armstrong MetalWorks Linear - Synchro, 8223W06 as manufactured by Armstrong World Industries

2. Infill Metal Panel Accessories:
   a. 8233W06M1___ 6IN End Cap
   b. 8243W06 – 6IN Splice Plate
   c. 7113 – Spreader Hold Down
   d. 7237 – Cut Plank Support
   e. 7277S3MF – Main Beam Carrier 2 (MBCB) -Mill Finish
   f. 5574___-Carrier Molding
   g. 7800___-Hemmed Angle Molding (Seismic Installations only)
   h. XL8926 – 2’ Drywall Cross Tee
   i. XL8926G90 – 2’ Drywall Cross Tee Exterior
   j. 8161 – Metalworks Linear Pressure Spring

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Follow manufacturer installation instructions

B. Install suspension system and panels in accordance with the manufacturer's instructions BPLA-292540, and in compliance with ASTM C636 and with the authorities having jurisdiction.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095423

SECTION 09 66 23

THIN-SET EPOXY TERRAZZO

PART 1 GENERAL

1. 01 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. 02 SUMMARY

A. Section Includes:

1. Thin-set epoxy terrazzo flooring including preparation of substrates.
2. Related accessories.

1. 03 SUBMITTALS

A. Manufacturer's product data for each type of terrazzo and accessory. System will be evaluated on the basis of standards. For tests not listed in published data, manufacturer shall supply missing data according to standard referenced

1. Physical properties.
2. Performance properties.
3. Specified tests.
4. Material Safety Data Sheet.
5. Manufacturer's standard warranty.

B. Shop Drawings. Include terrazzo installation requirements. Include plans, elevations, sections, component details and attachments to other work. Show layout of the following:

1. Divider strips & divider strip sizes
2. Control and expansion joint strips.
3. Pre-cast terrazzo jointing and edge configurations including anchorage details.
4. Terrazzo patterns.

C. Samples for initial selection from manufacturers color plates showing the full range of colors and patterns available for each terrazzo type indicated.

D. Samples for Verification: Match architect's samples for each type, material, color and pattern of terrazzo and accessory required showing the full range of color, texture and pattern variations expected. Label each terrazzo sample to

identify matrix color and aggregate types, sizes and proportions. Prepare samples of same thickness and from same material to be used for the work in size indicated below:

1. Epoxy terrazzo: minimum 6” x 6” (152.4 mm x 152.4 mm) sample of each color and type of terrazzo.
2. Accessories: 6” length (152.4 mm) of each kind of divider strip, stop strip and control joint strip required.
3. 4. Stair Treads: 12” length (304.8 mm) wide sample combination tread/riser with cast-in nosing.

E. Manufacturer Experience:

1. Submit proof of ten years history of associate membership in NTMA.
2. Furnish a list of at least five (5) epoxy terrazzo projects using material being submitted for this project installed during the last five (5) years of the same scope, complexity and at least 50 percent of the square footage.

F. Qualification Data: For qualified installer.

1. Submit proof of ten years history of contractor membership in NTMA.
2. Furnish a list of at least five (5) epoxy terrazzo projects using material being submitted for this project installed during the last five (5) years of the same scope, complexity and at least 50 percent of the square footage.

G. Material Test Reports: For moisture and/or relative humidity of substrate.

H. Maintenance Data: Submit electronic copies of NTMA maintenance recommendations and electronic copies of manufacturer’s instructions

1. 04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is acceptable to architect and epoxy terrazzo manufacturer to install manufacturer’s products.

1. Engage a terrazzo contractor with at least ten (10) years of satisfactory experience in installation of epoxy terrazzo. Terrazzo contractor shall demonstrate experience during last five (5) years of at least five (5) projects of comparable scope and complexity of at least 50 percent of the total square footage of this project
2. Engage an installer who is a contractor member of NTMA.

B. Source Limitations:

1. Engage an epoxy manufacturer with at least ten (10) years of satisfactory experience manufacturing epoxy terrazzo, moisture treatment system and crack isolation membrane.

2. Obtain primary Epoxy Terrazzo Flooring System materials including moisture treatment, membranes, primers, resins and hardening agents from a single manufacturer with proof of NTMA membership.
3. Obtain aggregates, divider strips, sealers and cleaners from source recommended by primary materials manufacturer.

C. Pre-installation Conference: Conduct conference at project site to comply with requirements in Section 01200 – Project Meetings. Review methods and procedure related to terrazzo including, but not limited to, the following:

1. Inspect and discuss installation procedures, joint details, job site conditions, substrate specification, vapor barrier details and coordination with other trades.
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 special terrazzo designs and patterns.
4. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.

D. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

E. Mock-ups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mock-ups for terrazzo including accessories.
a. Size: 25 sq. ft. (9.3 sq. m) of typical poured-in-place flooring condition for TZ-1 at area below extent of new security desk countertop.

2. Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

1. 05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in supplier's original wrappings and containers labeled with source's or manufacturer's name, material or product brand name and lot number if any.

B. Store materials in their original, undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.

1. Storage temperatures should be between 50ºF to 80ºF (10.0ºC to 26.6ºC).

1. 06 PROJECT CONDITIONS

A. Prior to surface preparation, terrazzo contractor shall:

1. Evaluate slab condition, including slab moisture content and extent of repairs required, if any.
2. Maintain the ambient room and floor temperature at 60ºF (15.5ºC) or above for a period extending 72 hours before, during and after floor installation. Concrete to receive epoxy terrazzo shall have cured for at least 28 days and be free of all curing compounds. Test concrete substrate to determine acceptable moisture levels prior to installation. Testing should be conducted according to ASTM F2170 (determining relative humidity in concrete slabs using in situ probes). Proceed with installation only after substrates have a maximum relative humidity measurement reading less than 80%. If relative humidity measurement reading is greater than or equal to 80%, manufacturer's Moisture Vapor Treatment is required. Apply to terrazzo substrates according to manufacturer's instructions.

B. Prior to and during each day of installation, the terrazzo contractor shall verify that the dew point is at least 5ºF (-15ºC) less than the slab and air temperature.

C. Acceptable Substrates:

1. Level tolerance: Concrete sub-floor shall be level with a maximum variation from level of 1/4" in 10 feet (6.4 mm in 3.1m). Any irregularity of the surface requiring patching and/or leveling shall be done using epoxy and sand fill as recommended by manufacturer.
2. Concrete floor shall be prepared mechanically by shot blasting in accordance with ICRI Guideline No. 03732. Specifically, surface preparation results should achieve a CSP3-CSP5 profile.
3. Concrete floor shall receive a steel trowel finish.
4. Concrete shall be cured a minimum of 28 days. No curing agents are to be used in areas to receive terrazzo.
5. Concrete slab shall have an efficient moisture vapor barrier (suggested minimum: 15 mils (.4 mm thickness)) directly under the concrete slab. Moisture barrier shall NOT be punctured.
6. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.

D. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

E. Provide protection from other trades prior to final acceptance by owner.

PART 2 – PRODUCTS

2. 01 EPOXY TERRAZZO

A. Products: Systems Overview: The basis of design is Terroxy® Resin Systems Epoxy Matrix by Terrazzo & Marble Supply Companies, Wheeling, IL (www.tmsupply.com). Acceptable equals below, substitutions will be evaluated.
   1. Crossfield Products Corp., Dex-o-Tex Division; Dex-O-Tex Cheminert Terrazzo; Ranco Dominguez, CA.
   2. TEC Systems

B. Materials:

   1. Primer: Primer
   2. Moisture Vapor Treatment: Moisture Vapor Treatment (MVT).
      a. Contractor to include MVT for all slabs on-grade, light weight concrete and green concrete. MVT System must handle up to 99% R.H. in accordance with MVT Testing.
      b. Physical properties of moisture mitigating primer shall have a maximum of 0.3 perms with 100% RH.

   3. Flexible Reinforcing Membrane: Crack Isolation Epoxy Membrane, for substrate crack preparation and reflective crack reduction.
      a. Reinforcement: fiberglass scrim (optional).
      b. Contractor to include 10% of the total square footage in lineal feet for random crack detailing and repair.
      c. For elevated slab, lightweight concrete conditions, contractor to carry full coverage membrane.

   4. Epoxy Matrix: Epoxy Matrix and in color required for mix indicated.
      a. Physical properties without aggregates. All specimens cured for 7 days at 73-77ºF (22.8-25¬ ºC) and 50 percent plus or minus 2 percent RH. This product shall meet the following requirements:

         Hardness: ASTM D—2240 using Shore-D Durometer
         a. NTMA requirement: 60-85
         b. Terroxy typical result: 75-85

         Tensile Strength: ASTM D-638
         a. NTMA requirement: 3,000 psi min.
         b. Terroxy typical result: 4,800 psi min.

         Compressive Strength: ASTM-D695 Specimen B Cylinder
         a. NTMA Requirement: 10,000 psi min., 69.9 MPa
         b. Terroxy Typical result: 12,000 psi min,. 31.7 MPa

Flexural Strength: ASTM D-790

a. NTMA Requirement: Not specified
b. Terroxy Typical result: 4,500 psi min., 31.7 MPa

Chemical Resistance: ASTM D-1308, seven days at room temperature by immersion method

a. NTMA requirement: No deleterious effects: distilled water, mineral oil, isopropanol, ethanol, 0.025 detergent solution, 1% soap solution, 10% sodium hydroxide, 10% hydrochloric acid, 30% sulfuric acid, 5% acetic acid
b. Terroxy typical result: No deleterious effects: distilled water, mineral oil, isopropanol, ethanol, 0.025 detergent solution, 1% soap solution, 10% sodium hydroxide, 10% hydrochloric acid, 30% sulfuric acid, 5% acetic acid

b. Physical properties with aggregates. For Epoxy Matrix blended with three volumes of Valders marble blended 60% #1 chip and 40% #0 chip, ground and grouted with epoxy resin according to Installation Specifications, finishing to a nominal 3/8” (9.5 mm) thickness. All specimens cured for 7 days at 73-77ºF (22.8-25ºC) and 50 percent RH plus or minus 2 percent RH. This finished Epoxy Matrix shall meet the following requirements:

Flammability: ASTM D-635

a. NTMA Requirement: Self-extinguishing, extent of burning 0.25 inches max.
b. Terroxy typical result: Self extinguishing, extent of burning 0.25 inches max.

Thermal Coefficient of Linear Expansion: ASTM D-696

a. NTMA Requirement: 25x10-6 inches per inch per degrees to 140ºF, 11.4 x 10-7 cm per cm per ºC to 60ºC Max
b. Terroxy typical result: 25x10-6 inches per inch per degrees to 140ºF, 11.4 x 10-7 cm per cm per ºC to 60ºC Max

Bond Strength: ACI COMM 403, Bulletin 59-43 (pages 1139-1141)

a. NTMA Requirement: 300 psi (100% concrete failure), 2.1 MPa (100% concrete failure
b. Terroxy typical result: 300 psi (100% concrete failure), 2.1 MPa (100% concrete failure)

Critical Radiant Flux: ASTM E-648

a. Terroxy typical result: 1.0 watts/cm2

Fire Rating- Test for Surface Burning Characteristics of Flooring: CAN/ULC S102.2-10 Tunnel Test

a. Terroxy typical result: Smoke Developed Classification (SDC) – 175; Flame Spread Rating (FSR) - 5

5. Aggregates: Marble; complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

   a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
   b. 24-Hour Absorption Rate: Less than 0.74 percent.
   c. Dust Content: Less than 1.0 percent by weight.

6. Finishing Grout: Epoxy Matrix or Clear Resin with a broadcast of limestone filler as recommended by manufacturer.

C. Mix: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.

1. Color and pattern schedule: Where the following designations are indicated, provide specified terrazzo matrices matching architect's samples:
   a. TZ-1: As Indicated in Finish Legend
   b. TZ-2: As Indicated in Finish Legend

2. 02 STRIP MATERIALS

A. Thin-set Divider Strips: L-type.
1. Material: [White-zinc alloy] [aluminum] [brass] [plastic]
2. Depth: 3/8" - Coordinate with terrazzo thickness
3. Top width: 1/16", 1/8" and/or 1/4"
4. Guide for commonly used L-type divider strips for Thin-set Epoxy Terrazzo Systems

B. Logo and Artwork
1. Not Used

C. Control/Construction Joints (saw cut, cold joint): Detail joints in accordance with NTMA Tech Bulletin T-24.

1. Option 1. Preferred: Separate double L-type angles back to back with minimum 1/8" (3.2mm) width between. Fill joint and area between strips with semi-flexible joint filler.

2. Option 2. Fill saw cut with 100% solids epoxy. Place single L-type angle strip shouldered on concrete, adjacent to the joint.
3. Option 3. For artwork considerations only. Buried Joint: Fill saw cut with 100% solids epoxy, followed by application of Iso-Crack Membrane (40 mils / 1.0mm) with fiberglass mesh reinforcement embedded into the membrane. Note: Movement from the substrate may reflect through the finished flooring.

D. Expansion Joint Strips: Separate double L-type angles, positioned back to back with minimum 1/8” (3.2 mm) width between. Fill area between strips with semi-flexible joint filler.

E. Random Crack Detail: For cracks over 1/16” width before surface preparation.

1. Fill saw cut with 100% solids epoxy, followed by application of Iso-Crack Membrane (40 mils / 1.0mm) with fiberglass mesh reinforcement embedded into the membrane.
    a. Contractor to include 10% lineal ft for random crack repair

2. Note: Movement from the substrate may reflect through the finished flooring.

F. Special Considerations: For epoxy terrazzo exposed to direct sunlight use strip method B Option 1 (referenced above) every 8’-12’ in each direction to compensate for thermal expansion/contraction.

2. 03 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: 100% solids epoxy resin adhesive recommended by manufacturer.
1. Use adhesive that has a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Anchoring Devices:
1. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by terrazzo contractor for proper anchorage and support of units for conditions of installation and support.

C. Patching and Fill Material: epoxy and sand fill as recommended by manufacturer, meeting minimum compressive strength and maximum aggregate to resin ratio 4:1.

D. Joint Compound: Joint Filler, color to be selected by architect to match/compliment terrazzo.

E. Cleaner: A neutral cleaner with pH factor between 7 and 9.5 specifically designed for terrazzo.

F. Surface Finish System: All terrazzo shall be finished to a minimum 200 Grit finish, with the exception of black terrazzo, which will be finished up to a 400 Grit Finish.

G. Sealer: Slip and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.6 or higher, as measured by the James Machine (ASTM D-2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA's "Terrazzo Specifications and Design Guide."

1. Basis of Design: Terroxy WB Acrylic Plus

PART 3 - EXECUTION

3. 01 PREPARATION

A. Clean substrates of substances, including oil, grease and curing compounds, that might impair terrazzo bond. Provide clean, dry and neutral substrate for terrazzo application.

B. Concrete Slabs:

1. Provide sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil and other contaminants incompatible with terrazzo.
    a. Prepare concrete mechanically by shot blasting. Surface preparation results should achieve a CSP3-CSP5 profile according to International Concrete Repair Institute Guideline No. 03732.
    b. Repair or level damaged and deteriorated concrete according to manufacturer's instructions for thin-set epoxy terrazzo
    c. Repair cracks and non-expansion joints greater than 1/16" (1.6 mm) wide according to NTMA Tech Bulletin T-24.

2. Verify that concrete substrates are visibly dry and free of moisture.

3. Moisture Testing:
    a. Contractor to include moisture vapor treatment for all slab on grade and/or lightweight concrete or green concrete conditions. Moisture vapor treatment should handle up to 99% relative humidity.
    b. Test for moisture at other conditions according to ASTM F2170 (determining relative humidity in concrete slabs using in situ probes).

c. Proceed with installation only after substrates have a maximum relative humidity measurement reading less than 80%. If relative humidity measurement reading is greater than or equal to 80%, moisture vapor treatment is required. Apply to terrazzo substrates according to manufacturer's moisture vapor treatment product data sheet.
d. Install moisture vapor treatment on all slab on grade and/or lightweight concrete conditions.

C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3. 02 EPOXY TERRAZZO INSTALLATION

A. General:
1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
2. Place, rough grind, grout, cure grout, fine grind and finish terrazzo according to manufacturer's instructions and NTMA's "Terrazzo Specifications and Design Guide."
3. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
4. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

B. Thickness: 3/8" Overall

C. Flexible Reinforcing Membrane
1. Membrane application for isolated cracking. Route out all cracks and fill with 100% solids epoxy. Apply manufacturer's crack isolation membrane (spread at 40 mils = 1.0 mm thickness) across the crack allowing 12 inches (304.8 mm) on either side. Imbed fiberglass scrim at a minimum of 9" into wet membrane and saturate with additional membrane.

D. Primer: Apply to terrazzo substrates according to manufacturer's instructions.

E. Strip Materials:
1. Divider and Accessory Strips:
a. Detail joints in accordance with NTMA Tech Bulletin T-24.

2. Install strips in adhesive setting bed without voids below strips or mechanically anchor strips as required to attach strips to substrate.

a. Control/Construction Joints (saw cut, cold joint):

i. Option 1- Preferred: Separate double L-type angles back to back with minimum 1/8” (3.2mm) width between. Fill joint and area between strips with semi-flexible joint filler.
ii. Option 2. Fill saw cut with 100% solids epoxy. Place single L-type angle strip shouldered on concrete, adjacent to the joint.
iii. Option 3. For artwork considerations only. Buried Joint: Fill saw cut with 100% solids epoxy, followed by application of crack isolation membrane. (40 mils / 1.0mm) with fiber-glass mesh reinforcement embedded into the membrane. Note: Movement from the substrate may reflect through the finished flooring.

b. Expansion Joint Strips: Separate double L-type angles, positioned back to back with minimum 1/8” (3.2 mm) width between. Fill area between strips with semi-flexible joint filler.

c. Random Crack Detail: For cracks over 1/16” width before surface preparation. Fill saw cut with 100% solids epoxy, followed by application of crack isolation membrane (40 mils / 1.0mm) with fiber-glass mesh reinforcement embedded into the membrane. Note: Movement from the substrate may reflect through the finished flooring.

d. Special Considerations: For epoxy terrazzo exposed to direct sunlight use strip method B Option 1. (referenced above) every 8’-12’ in each direction to compensate for thermal expansion/contraction.

F. Placing Terrazzo:

1. Mix epoxy matrix with chips and fillers in ratios directed by manufacturer.
2. Trowel apply terrazzo mixture over epoxy primer to provide a dense flat surface to top of divider strips. Allow to cure per manufacturer’s recommendations before rough grinding.

H. Rough Grinding: Grind with 24 grit silicon carbide or 24 grit turbo diamonds until all terrazzo strips and marble chips are uniformly exposed.

I. Grouting, Polishing and Sealing:
1. Cleanse floor with clean water and rinse.
2. Remove excess rinse water by wet vacuum, dry and fill voids with Epoxy Matrix or Clear Resin with a broadcast of limestone filler.
3. Allow grout to cure.
4. With 200 grit diamond polishing pads
or aesthetic equivalent. All grout should be removed from the surface and terrazzo density should reflect a minimum of 70% aggregate exposure.
5. Clean and apply sealer per manufacturer’s instructions.
6. Final inspection and punch list of terrazzo to take place after terrazzo completion.

7. GC to provide protection as specified (Masonite or ram board) for remainder of construction. GC's protection is not to be removed until construction is complete and furniture has been moved into building.

3. 04 CLEANING AND PROTECTION

8. Cleaning: Remove grinding dust from installation and wash all surfaces with Terroxy® Terra Clean or equivalent.

9. Sealing: Apply slip and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.5 or higher, as measured by the James Machine (ASTM D-2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA's "Terrazzo Specifications and Design Guide."
10. Protection: Upon completion, the work shall be ready for final inspection and acceptance by the owner or his agent. Provide final protection and maintain conditions, in a manner acceptable to terrazzo contractor, that ensure terrazzo is without damage or deterioration. GC's protection is not to be removed until construction is complete and furniture has been moved into building.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Entryway Carpet Tile.

B. Principal Products:
   1. Carpet tile.
   2. Adhesive.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Each type of modular carpet tile.

B. Shop Drawings: Mark information on copies of floor plans.
   1. Starting points for layout and alignment of tiles.
   2. Pattern directions.

C. Samples:
   1. Carpet Tiles: Full sized samples of each type.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty documentation.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Carpet Tile: One full carton for each 50 cartons installed, but not less than one carton.
      a. Obtain from same runs as installed carpet tiles.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: International Certified Flooring Installers Commercial II or Master II certification.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store products inside building.

1.7 FIELD CONDITIONS

A. Do not start installation until painting and similar finish work are complete.

B. Ambient Conditions:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

1.8 WARRANTY

A. Manufacturer Warranty:
   1. Carpet Tile: Warrant against product failure, including:
      a. Defective materials.
      b. Excessive fading.
      c. Loss of static control.
      d. Edge raveling.
      e. Runs.
      f. Loss of tuft bind strength.
      g. Loss of face fiber.
      h. Excessive wear.
   2. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Entryway Carpet Tile:
   1. Manufacturers and Products: See Finish Legend on Drawings.

2.2 INSTALLATION MATERIALS

A. Substrate Patching and Leveling: Latex-modified hydraulic cement product.

B. Adhesive: Waterproof, mildew-resistant, latex-based adhesive formulated specifically for installing carpet tiles.
   1. VOC Content: 50 g/L, maximum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Moisture and Alkalinity Testing: Section 09 05 61.

3.2 PREPARATION

A. Concrete Substrates: Section 09 05 61.

3.3 INSTALLATION

A. Follow CRI 104, Section 18, "Modular Carpet Modules".
   1. Installation Method: Glue-down; install every tile with releasable adhesive.

B. Lay out each room or area. Minimize tiles less than one half size.

C. Mix carpet tiles from different cartons.

D. Cut tile clean. Fit tiles tight to intersection with vertical surfaces without gaps.

E. Lay carpet tiles with pile direction as shown on Drawings or as directed by Architect.

F. Lay carpet in pattern as shown on Drawings or as directed by Architect.

G. Locate change of color or pattern between rooms under door centerline.

3.4 CLEANING

A. Remove soiling and stains.

B. Cut loose threads flush with top surface.

C. Clean with commercial vacuum cleaner.

3.5 PROTECTION

A. Protect carpet tile against soiling and wear during remaining construction period.

B. Provide hardboard or other rigid panel protection where subject to wheeled or heavy foot traffic.

END OF SECTION

SECTION 09 72 00

WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Vinyl wallcovering wall finishes.

B. Principal Products:
   1. Wall covering.
   2. Adhesive.

1.2 ACTION SUBMITTALS

A. Product Data: Each type of wall covering.

B. Shop Drawings: Wall elevations with seaming layout.
   1. Include location schedule by room number and wall covering type.

C. Samples:
   1. Wall Coverings: 6 by 6 inches in size.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: Cleaning recommendations.

1.4 MAINTENANCE MATERIALS

A. Extra Stock Materials:
   1. Wall Covering: 5 percent of installed materials; 1 roll, minimum.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials indoors.

B. Protect packaged adhesive from temperature cycling and cold temperatures.

C. Do not store roll goods on end.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.
   2. Lighting: Permanent lighting or temporary illumination providing 80 footcandles at mid-height of wall, minimum.

PART 2 - PRODUCTS

2.1 WALL COVERINGS

A. Wall Covering:
   1. Manufacturers and Products: See Finish Legend on Drawings.

2.2 PERFORMANCE

A. Surface Burning: ASTM E84 Class A.
   1. Flame Spread Index: 25, maximum.
   2. Smoke Developed Index: 50, maximum.

2.3 INSTALLATION MATERIALS

A. Adhesive: Manufacturer recommended type to suit application, mildew-resistant.
   1. VOC Content: 50 g/L, maximum.

B. Substrate Primer and Sealer: See Section 09 90 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces are prime painted and ready to receive work.

3.2 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings before preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces. Remove existing coatings that exhibit loose surface defects.

C. Vacuum surfaces.

3.3 INSTALLATION

A. Install wall covering in roll number sequence or in pattern sequence.

B. Razor trim edges on flat work table, changing blade often to prevent rough cut edges. Do not razor cut on gypsum board surfaces.

C. Apply covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tight.

D. Match pattern 72 inches above finished floor.

E. Horizontal seams are not acceptable.

F. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

G. Install wall covering before installation of bases, cabinets, hardware, and wall-mounted items Install 1/4 inch, minimum, below top of resilient base.

H. Where wall covering tucks into reveals, or metal wallboard or plaster stops, apply wall covering with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.

I. Install termination trim.

J. Remove excess adhesive. Wipe clean with dry cloth.

3.4 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed before work of this section.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Painted walls, ceilings, doors, frames, and other substrates.

B. Principal Products:
   1. Primer.
   2. Paint.

1.2 REFERENCES

A. Definitions:
   1. Sheen Levels: ASTM D523.
      a. Flat: Five gloss units at 60 degrees and 10 gloss units at 85 degrees, maximum.
      b. Eggshell: 10 to 25 gloss units at 60 degrees and 10 to 35 gloss units at 85 degrees.
      c. Satin: 20 to 35 gloss units at 60 degrees and 35 gloss units minimum at 85 degrees.
      d. Semi-Gloss: 35 to 70 gloss units at 60 degrees.
      e. Gloss: 70 gloss units at 60 degrees, minimum.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Samples:
   1. Draw Down Samples: Each type of paint system and each topcoat color and gloss.
      a. Label each Sample for paint type, location, and substrate.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Cleaning, touch-up, and repair instructions for painted and coated surfaces.
   2. Area summary with finish schedule and color samples, designating where each product, color and finish was used.

1.5 QUALITY ASSURANCE

A. Field Samples: Apply each paint systems to substrates, 100 square feet, minimum. Demonstrate color.
   1. Approved samples establish work results standard.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store paint products in sealed containers until ready for use.

1.7 FIELD CONDITIONS

A. Apply materials only when surface and ambient temperatures are within temperature ranges required by paint product manufacturer.

B. Apply exterior coatings when rain or snow are not occurring or forecasted, and when relative humidity is inside humidity ranges, and moisture content of surfaces is within acceptable levels required by paint product manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Colors by Basis of Design Manufacturer Designations: See Finish Legend on Drawings.

B. Products: Scheduled in this Section.

2.2 PAINT, GENERAL

A. Paint Systems: Primers, intermediate coats and topcoats compatible with substrates and one another.

B. Coatings: Ready mixed or field-catalyzed.

C. Preparation:
   1. Mix to soft paste consistency, capable of being readily and uniformly dispersed to homogenous coating.
   2. Blend tints and catalyzers to uniform consistency and color, capable of drying or curing free of streaks or sags.

2.3 SOURCE QUALITY CONTROL

A. Tests:
1. Testing: Owner may engage a qualified testing agency to sample paint materials delivered to project site or taken from supplier's facility.
2. Acceptance Criteria: Products follow specified requirements.

B. Non-Conforming Work: Remove materials from substrates, pay for testing of replacement products, and repaint surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify substrates are ready to receive work.

B. Preinstallation Testing: Test moisture content of substrate does not exceed the following:
1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Gypsum Board: Verify that finishing compound is dried and sanded smooth.

3.2 PREPARATION

A. Surface Preparation: Remove electrical plates, hardware, trim, escutcheons, and fittings. Correct defects in substrates capable of affecting work.

B. Cleaning: Remove substances that could impair paint bond, including dust, oil, grease, and incompatible coatings.
1. Impervious Surfaces: Remove mildew by scrubbing with cleaning solution recommended by finish coating manufacturer. Rinse with clean water and allow surface to dry.
2. Aluminum Surfaces: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
3. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
4. Non-Passivated Galvanized Surfaces: Smooth and hand or power tool clean per ASTM D6386.
5. Passivated Galvanized Surfaces: Remove soluble and insoluble contaminants and corrosion. Sweep blast per ASTM D6386 to achieve uniform 1.0 to 2.0 mil anchor profile.
6. Uncoated Steel: Remove rust and loose mill scale. Clean per SSPC- SP 3 "Power Tool Cleaning".
7. Primed Steel: Clean field welds, fasteners, and abraded shop primer.
8. Wood Surfaces:
a. Wipe off dust and grit. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried.

b. Backprime concealed surfaces.

3.3 APPLICATION

A. Follow manufacturer instructions for application method, thickness of coatings, and number of coats.
   1. Apply finishes when surfaces are dry. Allow applied coats to dry before next coat is applied.
   2. Apply each coat of paint slightly darker than preceding coat.
   3. Apply coatings to uniform appearance.
   4. Sand surfaces lightly between coats.
   5. Leave testing agency, equipment identification, and performance labels unpainted.

B. Appearance:
   1. Apply paints without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, or other imperfections.
   2. Edges and Color Breaks: Produce sharp edges.

3.4 PAINTING MECHANICAL EQUIPMENT

A. Paint the following equipment when exposed in occupied spaces:
   1. Electrical panelboards and switchgear.
   2. Piping.
   3. Ductwork.
   4. Pipe hangers.
   5. Conduit.
   6. Shop-primed equipment.

B. Paint interior surfaces of air ducts visible through grilles with one coat of flat black paint.

3.5 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Owner may engage inspectors to perform tests and inspections and prepare reports. Allow inspectors access to work areas.
   1. Failed Test Retest Cost: Contractor responsibility.

B. Testing: Dry film thickness.

C. Non-Conforming Work: Remove and replace or apply additional coats, and re-test.

3.6 CLEANING

A. Cleaning:
   1. Remove rubbish, empty cans, rags, and other discarded materials.
   2. Remove splattered paints. Protect adjacent surfaces from damage.

3.7 PROTECTION

A. Protection: Protect painted surfaces from subsequent construction work. Touch up and restore damaged painted surfaces.

3.8 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Walls:
   1. Latex Primer:
      a. BEHR: Drywall Plus Interior Primer & Sealer 73.
      b. Benjamin Moore: Ultra Spec 500 Interior Latex Primer N534.
      c. PPG Paints: SPEEDHIDE zero Interior Latex Sealer 6-4900XI.
      d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex Primer B28W02600.
   2. Acrylic-Latex Enamel: Eggshell finish.
      a. BEHR: Behr Pro i300 Interior.
      b. Benjamin Moore: Ultra Spec 500 Series.
      c. PPG Paints: SPEEDHIDE Zero Interior Latex.
      d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.

B. Gypsum Board Ceilings:
   1. Latex Primer:
      a. BEHR: Drywall Plus Interior Primer & Sealer 73.
      b. Benjamin Moore: Ultra Spec 500 Interior Latex Primer N534.
      c. PPG Paints: SPEEDHIDE zero Interior Latex Sealer 6-4900XI.
      d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex Primer B28W02600.
   2. Acrylic-Latex Enamel: Flat finish.
      a. BEHR: Behr Pro i300 Interior.
      b. Benjamin Moore: Ultra Spec 500 Series.
      c. PPG Paints: SPEEDHIDE Zero Interior Latex.
      d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.

C. Steel Doors and Frames:
   1. Pre-Primed Metal: Touch up with same shop primer product used by manufacturer.
   2. Acrylic-Latex Enamel: Semi-gloss finish.
      a. BEHR: PREMIUM Interior/Exterior Direct to Metal Paint.
      b. Benjamin Moore: Ultra Spec HP D.T.M Acrylic Enamel.
      c. PPG Paints: Pitt-Tech Plus Interior/Exterior DTM Industrial Enamel 4216 SG or 90 Series or ADVANTAGE 900.
      d. Sherwin-Williams: Pro Industrial Acrylic.
      e. Tnemec: Series 1029 semi-gloss.

D. Steel Substrates:
   1. Pre-Primed Metal: Touch up with same shop primer product used by manufacturer.
   2. Acrylic-Latex Enamel: Semi-gloss finish.
      a. BEHR: PREMIUM Interior/Exterior Direct to Metal Paint.
      b. Benjamin Moore: Ultra Spec HP D.T.M Acrylic Enamel.
      c. PPG Paints: Pitt-Tech Plus Interior/Exterior DTM Industrial Enamel 4216 SG or 90 Series or ADVANTAGE 900.
      d. Sherwin-Williams: Pro Industrial Acrylic.
      e. Tnemec: Series 1029 semi-gloss.

E. Galvanized Steel Substrates:
   1. Latex Primer:
      a. BEHR: Multi-Surface Interior/Exterior Primer & Sealer 436.
      b. Benjamin Moore: Ultra Spec HP Acrylic Metal Primer HP04.
      c. PPG Paints: Pitt-Tech Plus DTM 4020PF.
      d. Sherwin-Williams: Pro Industrial Pro-Cryl Universal Primer B66-1310 Series.
      e. Tnemec: Series 115 UniBond DF.
   2. Acrylic-Latex Enamel: Semi-gloss finish.
      a. BEHR: PREMIUM Interior/Exterior Direct to Metal Paint.
      b. Benjamin Moore: Ultra Spec HP D.T.M Acrylic Enamel.
      c. PPG Paints: Pitt-Tech Plus EP DTM.
      d. Sherwin-Williams: Pro Industrial Acrylic.
      e. Tnemec: Series 115 UniBond DF.

F. Overhead Construction:
   1. Water Based Interior Dry Fog: Flat finish.
      a. BEHR: Pro HPC Waterborne Dryfall HP210.
      b. Benjamin Moore: Latex Dry Fall.
      c. PPG Paints: Speedhide SuperTech Interior Latex Dry-Fog.
      d. Sherwin-Williams: Pro Industrial Waterborne Acrylic Dryfall.
      e. Tnemec: Series 115 UniBond DF.

G. Wood Trim:
   1. Latex Primer:
      a. BEHR: Drywall Plus Interior Primer & Sealer 73.
      b. Benjamin Moore: Advance Waterborne Interior Alkyd Primer 790.
      c. PPG Paints: Seal-Grip Interior/Exterior Universal Primer/Sealer 17-921XI.
      d. Sherwin-Williams: PrepRite ProBlock Interior/Exterior Latex Primer/Sealer B51-600.
      e. Tnemec: Series 151 Elasto-Grip.
   2. Acrylic-Latex Enamel: Semi-gloss finish.
      a. BEHR: Behr Pro i300 Interior.
      b. Benjamin Moore: Ultra Spec 500 Series.
      c. PPG Paints: SPEEDHIDE Zero Interior Latex.
      d. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex.
      e. Tnemec: Series 1029 semi-gloss.

3.9 HIGH PERFORMANCE EXTERIOR PAINTING SCHEDULE

A. Shop-Primed Ferrous Metal: Pigmented polyurethane over high-build epoxy system.
   1. Epoxy Primer:
      a. BEHR: US Coatings EpoxyGrip 2000 VOC Epoxy Mastic.
      b. Benjamin Moore: Corotech Surface Tolerant Epoxy Mastic V160.
      c. PPG Paints: Amerlock 600.
      d. Sherwin-Williams: Macropoxy 646-100 Fast Cure Epoxy.
      e. Tnemec Series 135 Chembuild.
   2. Polyurethane Topcoat: Semi-gloss finish.
      a. BEHR: US Coatings UreGrip 3010 VOC HS Polyester Polyurethane.
      b. Benjamin Moore: Corotech Aliphatic Acrylic Urethane.

c. PPG Paints: Pitthane Ultra Urethane Enamel 95-812.
d. Sherwin-Williams: Hi-Solids Polyurethane B65-300.
e. Tnemec: Series 73 Endura-Shield.

END OF SECTION

SECTION 09 93 00

STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Sand and stain existing wood door at Command Center SE201F.

B. Principal Products:
   1. Transparent wood stain.

1.2 REFERENCES

A. Definitions:
   1. Sheen Levels: ASTM D523.
      a. Flat: Five gloss units at 60 degrees and 10 gloss units at 85 degrees, maximum.
      b. Eggshell: 10 to 25 gloss units at 60 degrees and 10 to 35 gloss units at 85 degrees.
      c. Satin: 20 to 35 gloss units at 60 degrees and 35 gloss units minimum at 85 degrees.
      d. Semi-Gloss: 35 to 70 gloss units at 60 degrees.
      e. Gloss: 70 gloss units at 60 degrees, minimum.

1.3 ACTION SUBMITTALS

A. Product Data.

B. Samples:
   1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
   2. Apply coats on Samples in steps to show each coat required for system.
   3. Label each coat of each Sample.

C. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 QUALITY ASSURANCE

A. Field Samples: Apply each stain system to substrates as directed by Architect, three existing sills, minimum. Demonstrate color, sheen, and wood appearance.
   1. Final approval of stain color selections will be based on field samples.
      a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.
   2. Approved samples establish work results standard.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store stain products in sealed containers until ready for use.

1.6 FIELD CONDITIONS

A. Apply materials only when surface and ambient temperatures are within temperature ranges required by finish product manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Stain Systems: All components compatible with substrates and one another.

B. Stain Colors: Match new door stain color.

2.2 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates:
   1. Water-Based Varnish over Stain System:
      a. Stain Coat: Stain, semitransparent, for interior wood.
      b. First Intermediate Coat: Water-based varnish matching topcoat.
      c. Second Intermediate Coat: Water-based varnish matching topcoat.
      d. Topcoat: Varnish, water based, clear, satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify substrates are ready to receive Work.

B. Preinstallation Testing: Test moisture content of substrate does not exceed the following:
   1. Wood: 15 percent.

3.2 PREPARATION

A. Surface Preparation: Remove electrical plates, hardware, trim, escutcheons, and fittings. Correct defects in substrates capable of affecting Work.

B. Cleaning: Remove substances that could impair paint bond, including dust, oil, grease, and incompatible coatings.

C. Interior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Apply wood filler paste to open-grain woods to produce smooth, glasslike finish.
3. Sand surfaces exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes.
1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING

A. Cleaning:
1. Remove rubbish, empty cans, rags, and other discarded materials.
2. Remove splattered stains. Protect adjacent surfaces from damage.

3.5 PROTECTION

A. Protection: Protect stained surfaces from subsequent construction Work. Touch up and restore damaged painted surfaces.

END OF SECTION

SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Manual, single-band roller window shades.

B. Principal Products:
   1. Roller window shades.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting Attendees and Procedures:
   1. Conduct meeting one week, minimum, before starting Work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Each roller shade type.

B. Shop Drawings: Show shades on floor plans or reflected ceiling plans.
   1. Each installation area; include anchorage details.
   2. Locations of control stations and units included in control zones.

C. Schedules:
   1. Types by location. Include operation and appearance attributes.

D. Samples:
   1. Shadeband Fabrics: 8 by 8 inch samples of each type.
   2. Finished Metal: 6 by 6 inch samples in required colors.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Include full parts list; shadeband fabric cleaning precautions.

B. Warranty documentation.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: Manufacturer trained.

B. Field Samples: Install roller shades for one group of two or more windows with continuous shades in locations acceptable to Architect.
   1. Approved samples establish work results standard.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Store roller shades inside building after enclosure.
   2. Mark packaging with installation location using Drawing room designations.

1.7 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations:
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer Warranties:
   1. Warrant against product failure.
      a. Hardware: 10 years.
      b. Shadeband Fabric: 10 years.

PART 2 - PRODUCTS

2.1 MANUAL OPERATION SHADES

A. Manually Operated Roller Shades:
   1. Manufacturers and Products: See Finish Legend on Drawings.

B. Shade Type: Single roller.

C. Drop Position: Regular roll.

D. Mounting: See Drawings.

E. Shade Fabrics: Color-fast, impervious to heat and moisture, and able to retain shape under exposure to sunlight through windows; NFPA 701 and WCMA A100.1.
   1. Mold Resistance: 'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC9644, and ATCC9645.
   2. Fire Test Response Characteristics: Passes NFPA 701 small and large-scale vertical burn tests.

F. Shade Fabric Attachment: Replaceable without disassembly.

G. Hembars: Maintain bottom edge straight and flat.
   1. Style: Architect Selected.

H. Clutch Operator: Permanently lubricated, continuous loop chain operation.

I. Accessories:
   1. Fascia: Extruded aluminum; conceals shade mounting and roller without exposed fasteners.
      a. Finish: Powder coat, Architect-selected color.

2.2 FABRICATION

A. Height: Fill openings from head to within 1/2 inch of stool.

B. Width - Between Jambs: Uniform 1/4 gaps.

C. Width - Outside Mount: Lap jambs 3/4 inch.

D. Continuous Windows With Separate Rollers: Butt rollers end to end centered on window mullions.

2.3 FINISHES

A. Powder Coating: Thermoset polyester; AAMA 2603.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify concealed support locations for attachment.

3.2 ERECTION

A. Install roller shades level, aligned with adjacent units, and centered on openings.

B. Install jamb guides plumb and aligned with shadeband drop.

3.3 CLEANING

A. Clean metal and fabric surfaces.

3.4 CLOSEOUT ACTIVITIES

A. Demonstration: Train Owner staff on operation and maintenance.

END OF SECTION 122413

SECTION 12 36 00

COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Work Results:
   1. Countertops and transaction top for Reception Desk

B. Principal Products:
   1. Solid surface material.
   2. Quartz material.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination Procedures:
   1. Coordinate locations of utilities and accessories penetrating countertops.

1.3 ACTION SUBMITTALS

A. Submittals - General: AWI 100.

B. Product Data:
   1. Countertop materials.
   2. Adhesives.

C. Shop Drawings:
   1. Dimensioned plans and elevations showing countertop locations.
   2. Show materials, profiles, assembly methods, joint details, fastening methods, and cutout sizes and locations.

D. Samples:
   1. Countertop Material: 6 inches square.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer: Woodwork fabricator.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements: AWI 200.

1.6 FIELD CONDITIONS

A. Ambient Conditions: Perform work within following limitations.
   1. Building enclosed and environmental systems maintaining design conditions for Owner occupancy.

B. Existing Conditions: Verify field measurements before fabrication. Show field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 COUNTERTOP GENERAL REQUIREMENTS

A. Quality Standard: AWI 300 - Materials and ANSI AWI 620 - Installation for aesthetic grades.

B. Grade: Premium.

2.2 SOLID SURFACE COUNTERTOPS

A. Solid Surface Countertops: IFSA 2-01, homogeneous resin sheets.
   1. Manufacturers and Products: See Finish Legend on Drawings.
   2. Configuration: See Drawings.

2.3 QUARTZ AGGLOMERATE COUNTERTOPS

A. Quartz Agglomerate Countertops: IFSA 3-01, Manufactured quartz sheets.
   1. Manufacturers and Products: See Finish Legend on Drawings.
   2. Configuration: See Drawings.

2.4 COUNTERTOP HARDWARE

A. Countertop Supports: Extruded aluminum Surface-mounted T-brackets, L-shaped configuration.
   1. Manufacturers and Products:
      a. Rakks.
   2. Finish: Mill.

2.5 MATERIALS

A. Installation Materials:
   1. Adhesives: Countertop fabricator recommended.
   2. Fasteners: Type, size, and material to suit each application.

2.6 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, fabricate materials with ample allowance for cutting. Furnish trim for scribing and site cutting.

C. Fabrication Tolerances:
   1. Solid-Surface Countertops: ANSI/AWI 0620, specified grade.

D. Finish exposed edges of countertops and back and end splashes.

E. Quartz Agglomerate Countertop Fabrication:
   1. Natural Stone Institute's "Dimension Stone Design Manual."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of blocking, base cabinets, and brackets to support countertops.

B. Verify location and sizes of utility rough-ins associated with countertops.

3.2 PREPARATION

A. Surface Preparation: Follow ANSI/AWI 0620.

B. Conditioning:
   1. Acclimate products to installation environment per AWI 200 and ANSI/AWI 0620.

3.3 INSTALLATION

A. Follow ANSI/AWI 0620.

B. Installation Grade: Same as item being installed.

C. Cut openings for plumbing fixtures, electrical devices, accessories, and appliances.

D. Install countertop fasteners in concealed locations. Use Z's or angle bracket anchors to base cabinets.

E. Align edge surfaces. Provide supports to prevent deflection and lippage.

F. Interface with Other Work: Seal gaps between tops, splashes, and walls with mildew-resistant sealant specified in Section 07 92 00.

3.4 CLEANING

A. Cleaning: Clean countertops and splashes; remove excess sealant from adjacent surfaces.

3.5 PROTECTION

A. Protection: Protect countertops from soil and damage during remainder of construction.

END OF SECTION 123600

SECTION 21 05 00
COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Above ground piping.

B. Buried piping.

C. Escutcheons.

D. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.

E. Mechanical couplings.

F. Pipe hangers and supports.

G. Pipe sleeves.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

A. ASME A112.18.1 - Plumbing Supply Fittings; 2012.

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.

D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2011.

E. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.

F. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2012.

G. ASME B16.11 - Forged Fittings, Socket-welding and Threaded; 2011.

H. ASME B16.25 - Buttwelding Ends; 2012.

I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.

J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

L. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).

M. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.

N. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

O. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2012.

P. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2012.

Q. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.

R. AWWA C606 - Grooved and Shouldered Joints; 2011.

S. FM (AG) - FM Approval Guide; current edition.

T. ITS (DIR) - Directory of Listed Products; Current Edition.

U. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2010.

V. NFPA 20 - Standard for Installation of Stationary Pumps for Fire Protection; National Fire Protection Association; 2010.

W. NFPA 24 - Standard for the Installation of Private Fire Service Mains and their Appurtenances; 2007.

X. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems; 2011.

Y. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

D. Project Record Documents: Record actual locations of components and tag numbering.

E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum five experience.

C. Conform to UL or FM requirements

D. Valves: Bear UL, FM, and ITS (DIR) or Warnock Hersey product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts and maintenance materials in quantities specified in individual specification sections. Deliver items to project site and place in location as directed by Owner.

B. Provide extra sprinkler heads under provision of NFPA 13. Provide suitable wrenches for each head type.

C. Provide metal storage cabinet for above items in location as directed by Owner.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS

A. Sprinkler Systems: Comply with NFPA 13.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 BURIED PIPING

A. Cement Lined Ductile Iron Pipe: AWWA C151/A21.51.
   1. Fittings: AWWA C110/A21.10, standard thickness.
   2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket.
   3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.
   4. Minimum depth of cover shall be 48 inches.
   5. Valves shall be in accordance with NFPA 24 and shall be indicating type.
   6. Concrete thrust blocks shall be designed and installed in accordance with NFPA 24 and NFPA 13.
      a. The new underground fire protection water main shall be installed with joints anchored in accordance with NFPA 24 and local regulations.

2.03 ABOVE GROUND PIPING

A. Acceptable Manufacturers:
   1. Allied Tube & Conduit
   2. Youngstown Tube Company
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Steel Pipe 2" and smaller: ASTM A53 Schedule 40 or ASTM A795 Schedule 40, black.
   1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
   2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   4. All steel piping shall have a minimum Corrosion Resistance Ratio (CRR) of 1.00. Equipment data sheets for piping as required for shop drawing submittals shall indicate the CRR.

C. Steel Pipe 2-1/2" and larger: ASTM A53 Schedule 40 or ASTM A795 Schedule 40, black.
   1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
   2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   4. All steel piping shall have a minimum Corrosion Resistance Ratio (CRR) of 1.00. Equipment data sheets for piping as required for shop drawing submittals shall indicate the CRR.

2.04 ABOVEGROUND PIPE FITTINGS

A. Acceptable Manufacturers:
   1. Central Sprinkler Company (TYCO)
   2. Anvil International, Inc., Gruvlok
   3. Victaulic Fire Protection
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. All fittings shall be listed or approved for the specific pipe and type of system they are to be installed on and shall meet or exceed the standards as listed in NFPA 13.

C. Plain-end, hooker, press-on, key type or slip type fittings are not permitted.

D. All threaded pipe and fittings shall have threads cut to ASME B1.20.1.

E. For pipe sizes 2” and smaller, all fittings shall be either welded or threaded. No mechanical grooved, drilled, clamped or gasketed fittings will be permitted.

F. For pipe sizes 2-1/2” and larger, contractor may use UL listed grooved style fittings. Only “rigid” type couplings are approved.

G. All grooved mechanical fittings and couplings provided shall be the product of a single manufacturer. All fasteners, parts, and materials used shall be the product of the coupling manufacturer, and specifically intended by the manufacturer for the installation with the fitting and coupling.

H. Any leakage repairs required to welded pipe or welded/threaded outlets shall only be repaired by cutting out the damaged area and replacement with a threaded joint.

I. All mechanical fittings and appliances shall be torqued in accordance with the manufacturer’s recommendations.

2.05 UNIONS, FLANGES, AND COUPLINGS

A. Acceptable Manufacturers:
   1. Central Sprinkler Company (TYCO)
   2. Anvil International, Inc., Gruvlok
   3. Victaulic Fire Protection
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Unions: 150 psi malleable iron for threaded ferrous piping.

C. Flanges: 150 psi forged steel slip-on flanges for ferrous piping.

D. Mechanical Grooved Couplings: Rigid, malleable iron housing clamps to engage and lock, only with "C" shaped composition sealing gasket, steel bolts, nuts, and washers.

E. All mechanical fittings and appliances shall be torqued in accordance with the manufacturer’s recommendations.

2.06 SYSTEM CONTROL VALVES

A. Acceptable Manufacturers:
   1. TYCO
   2. NIBCO Inc.
   3. Viking Corporation
   4. Reliable
   5. Victaulic
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. All valves shall be UL listed for their intended use and the specific system they are installed on.

C. Valves shall be of ductile iron in accordance with ASTM A-536. The pressure ratings of all valves shall meet or exceed the maximum working pressures of the sprinkler and/or standpipe systems.

D. All valves controlling connections to water supplies and controlling the flow of water to sprinklers shall be listed indicating type valves and shall be supervised with tamper switches.

E. Drain valves and test valves shall be listed and/or approved for their intended use.

F. Valves listed as supervised shall be provided with a UL listed supervisory switch and shall be connected to the building fire alarm system.

G. All control, drain and test connection valves shall be provided with signs as listed in NFPA 13. Control valves shall have a sign indicating the portion of the system that is controlled by the valve. All drain and test connection valves shall be provided with signs indicating their purpose.

H. Provide auxiliary drain valves at all low points of dry pipe sprinkler piping and at all trapped sections of dry pipe sprinkler piping. Where the capacity of the trapped sections of pipe is less than 5 gallons, the auxiliary drain shall consist of a valve not smaller than ½ inch and a plug or nipple. Where the capacity of the trapped sections of pipe is greater than 5 gallons the auxiliary drain shall consist of two 1" valves and one 2" x 12" condensate nipple and located in accordance with NFPA 13.

I. Valve Operators:
   1. Provide hand wheels for gate, globe (or angle,) and drain valves.
   2. For butterfly valves provide gear operators.
   3. Listed indicating valves shall not close in less than 5 seconds when operated at maximum operating speed from the fully open position.
   4. Provide chain operators for all shut off, isolation and drain valves that are located 10 feet or greater above finished floors.

J. Valve Connections:
   1. Provide valve connections to match pipe joints. Use valves of pipe size.
   2. For copper tube, provide threaded solder adapters for connection to valve.
   3. Provide butterfly valve with tapped lug body when used for isolating service.

2.07 WET PIPE RISER ASSEMBLY

A. The new wet pipe sprinkler system shall be provided with a new riser assembly and coordinated with the new water supply piping and backflow prevention assembly. The riser assembly shall be provided with a butterfly control valve, riser check valve and vane-type water flow switch. Riser check valve shall be provided with trim package which includes the necessary valves, gauges, fittings, drain connections and alarm test connections.

B. The riser assembly shall include a listed control valve and riser check valve. The check valve shall be equipped with a removable cover assembly. The valve shall be listed for installation in the vertical or horizontal position. The check valve shall be equipped with gauge connections on the system side and supply side of the valve clapper.

C. Check valve assembly shall be listed for use in fire suppression systems with a maximum working pressure of 250 psi.

D. Coordinate with Owner and fire alarm contractor for the installation of an electric waterflow alarm bell to be provided on the exterior of the building for local alarm. Exterior alarm bell shall be activated by sprinkler flow switch(s) through the building existing fire alarm control panel.

E. Acceptable Manufacturers:
   1. Viking Corporation
   2. Tyco
   3. Victaulic
   4. Reliable
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 WATERFLOW DETECTOR

A. Provide and install UL listed Vane type waterflow detectors on wet pipe sprinkler systems. Switch shall be installed in accordance with manufacturer's instructions. The detectors shall be capable of being mounted either vertically or horizontally.

B. The waterflow detectors shall have a sensitivity setting to signal a waterflow that equals or exceeds the discharge from one sprinkler head.

C. The detector switch mechanism shall incorporate an instantly recycling pneumatic retard element with an adjustable range of 0 to 75 seconds.

D. Waterflow detectors shall be wired to provide a waterflow alarm and shall be connected to the building fire alarm system control panel.

E. Acceptable Manufacturers:
   1. Viking Corporation
   2. Potter Electric Signal
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.09 TAMPER SWITCH

A. Provide a valve supervisory/tamper switch capable of monitoring the open position of all control and/or sectional valves such as OS&Y valves, butterfly valves and ball type valves. Switch shall be installed in accordance with manufacturer's instructions.

B. The switch shall be equipped with two sets of Form "C" (SPDT) contacts.

C. Tamper switches shall be provided for all valves which control or isolate the various water supplies for the sprinkler systems. Refer to bid drawings for locations. Valves may have tamper switches which are integral to the valve operator or they may be mounted externally on the valve.

D. Switches shall be wired to provide supervisory signal and shall be connected to the building fire alarm system control panel.

E. Acceptable Manufacturers:
   1. Viking Corporation
   2. Potter Electric Signal
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.10 DOUBLE CHECK BACKFLOW PREVENTION ASSEMBLY

A. Backflow prevention shall be in accordance with the local utility requirements. The backflow prevention device shall be a double check assembly and shall consist of two independently operating spring loaded check valves, two shutoff valves and required test cocks. Backflow prevention assembly shall meet or exceed the requirements of AWWA C510-07 and UL listed for fire suppression systems.

B. Assembly shall be approved for use with UL/FM gate valves attached at each end of the combined check valve housing. Housing shall be constructed with either grooved or flanged connections.

C. Shall be approved for horizontal or vertical installations. Assembly shall be installed with adequate clearance and accessibility for maintenance and testing.

D. Means shall be provided downstream of backflow assembly for flow tests at system demand.

2.11 PIPE SLEEVES

A. Vertical Piping:
   1. Sleeve Length: 1 inch (25 mm) above finished floor.
   2. Provide sealant for watertight joint.

B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

C. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

D. Pipe Passing Through Quarry Tile, Terrazzo, or Ceramic Tile Floors:
   1. Brass pipe.
   2. Connect sleeve with floor plate.

E. Not required for wall hydrants for fire department connections or in drywall construction.

F. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch (25 mm) greater than external; pipe diameter.
   3. Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

2.12 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Advance Products & Systems, Inc: www.apsonline.com/#sle.
   2. The Metraflex Company: www.metraflex.com/#sle.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

2.13 ESCUTCHEONS

A. Manufacturers:
   1. Fire Protection Products, Inc: www.fppi.com/#sle.com/#sle.
   2. Tyco Fire Protection Products: www.tyco-fire.com/#sle.
   3. Viking Group Inc: www.vikinggroupinc.com/#sle.

B. Material:
   1. Fabricate from nonferrous metal.
   2. Chrome-plated.
   3. Metals and Finish: Comply with ASME A112.18.1.

C. Construction:
   1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
   2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.14 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 inches (50 mm) and Over: Carbon steel, adjustable, clevis.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D. Wall Support for Pipe Sizes to 3 inches (80 mm): Cast iron hook.

E. Wall Support for Pipe Sizes 4 inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.

F. Vertical Support: Steel riser clamp.

G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.15 MECHANICAL COUPLINGS

A. Rigid Mechanical Couplings for Grooved Joints:
   1. Dimensions and Testing: Comply with AWWA C606.
   2. Minimum Working Pressure: 300 psig (2065 kPa).
   3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
   4. Housing Coating: Factory applied orange enamel.

5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F (minus 34 degrees C) to 230 degrees F (110 degrees C).
6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. All sprinkler system piping shall be arranged for flushing as required in NFPA 13, section 8.16.3.

C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

D. Install piping to conserve building space, to not interfere with use of space and other work.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   2. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   3. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

I. Prepare pipe, fittings, supports, and accessories for finish painting.

J. Do not penetrate building structural members unless indicated.

K. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

L. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.

M. Escutcheons:
   1. Install and firmly attach escutcheons at piping penetrations into finished spaces.

2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 UNDERGROUND WATER SUPPLY

A. This facility has an existing underground fire water supply that is intended to remain. The fire protection contractor shall replace the existing double check backflow device with a new device and re-configure the above ground water service to accomodate the new room housing this device.

B. A double-check backflow assembly shall be installed on the interior fire protection supply main located in the receiving area of the building. Backflow assembly shall conform to local public utility requirements and be coordinated with the installation of the new sprinkler systems.

C. Fire suppression system design shall be based on the flow tests obtained by the Fire Suppression Contractor.

3.04 CLOSEOUT PROCEDURES AND ACCEPTANCE TESTING

A. Submit schedule to Owner prior to starting any acceptance testing and closeout procedures. Coordinate all testing with Owner before starting.

B. Remove waste and surplus materials, rubbish, and construction equipment from the building.

C. Verify and adjust all valves and other operating equipment to ensure smooth and unhindered operation.

D. Perform all required acceptance testing documentation as listed in these specifications and as required by NFPA standards.

E. All fire suppression system alarm, supervisory and trouble conditions, both local and remote, shall be simulated to demonstrate proper operation and interface with the new fire alarm panel and offsite monitoring service.

F. Provide Hydraulic Design Information signs for each system at the main risers. Hydraulic signs shall meet the requirements of NFPA 13.

G. Provide signage in accordance with these specifications and NFPA standards for each valve on the fire suppression systems.

H. The installing contractor shall provide a general information sign in accordance with NFPA 13 section 24.6.1. Sign shall be located at the main risers in receiving area. Coordinate final location with Owner.

I. Complete AHJ final inspections and testing. Provide copies of all AHJ closeout documentation and approvals to Owner.

3.05 FIRE SUPPRESSION SYSTEM TESTING

A. All underground water supply and aboveground sprinkler system work that is installed and completed for each phase of the project shall have the completed systems tested as required by these specifications, NFPA 13, NFPA 24, and the AHJ.

B. Prior to starting the acceptance testing for the new underground water supply and sprinkler systems, the contractor shall as a minimum complete the following:
   1. All piping shall be flushed as per NFPA 13 and NFPA 24 in order to remove any foreign materials that may have entered the piping during installation. All flushing of piping shall be witnessed by the Owner and/or Owners representative and the contractors job superintendent.

2. All systems shall be visually inspected to verify that they are complete and have been properly installed and supported.
3. All equipment shall be checked for proper identification, operation and accessibility.
4. Contractor shall verify that the required alarm, supervisory and notification devices are installed and operational and are interfaced with the building fire alarm systems.
5. Complete all preliminary testing where required before starting acceptance testing.
6. Contractor shall submit to owner a letter certifying successful completion of the above tests and inspections.

C. Contractor shall perform all acceptance testing as required by NFPA 13, NFPA 24 and the Fire Marshal's office. All acceptance testing shall be performed by qualified personnel from the contractor and by appropriate manufacturer representatives.

D. All testing shall be witnessed by the Owner, Owner representatives and the contractor's job superintendent. Testing shall also be witnessed by Authority Having Jurisdiction where required.

E. All system testing shall be conducted in accordance with approved test protocols as prepared by the contractor. Written test protocols including detailed test procedures, documentation sheets, testing personnel and proposed test schedule shall be submitted to Owner for approval at least 10 working days prior to the start of acceptance testing.

F. System testing shall include, but not be limited to, the operational and supervisory testing of all control equipment, pressure switches, waterflow devices, remote signaling devices, valve tamper switches, auxiliary functions, system wiring and power supplies. Proper operation of all equipment is to be verified through acceptance testing.

G. At the completion of final acceptance testing the contractor shall provide a complete test report documenting the completed acceptance testing. Report shall state that all of the installed systems are complete, fully tested, fully approved and ready for AHJ approval and ready to be placed in service.

H. Contractor and/or manufacturer representative shall provide all testing equipment as required in appropriate NFPA standards. All equipment shall be calibrated as required and all gauges shall bear a label with latest date of calibration.

I. Contractor shall take all precautions required to protect the building structure, building equipment and other trades during acceptance testing.

J. The contractor shall clean and restore all systems and areas to normal conditions after completion of testing.

3.06 HYDROSTATIC TESTING – WET SPRINKLER SYSTEMS

A. Hydrostatically test all sprinkler system for two hours at not less than 200 psi or 50 psi above maximum working pressure with no visible leakage. The hydrostatic pressure shall be measured at the low point of the individual system being tested.

B. Contractor shall provide all instruments, equipment and personnel required for testing of each system. The contractor shall provide a source of water for testing and pumps, if required.

C. All acceptance test documentation and test procedures must be approved by NFPA 13, the Owner and AHJ. All test reports shall be on NFPA Standard forms and copies shall be submitted to Owner at closeout. The test reports shall include, but not be limited to, the following:
1. Identification and location of service, system or portion thereof.
2. Test media and pressures achieved and maintained.
3. List of personnel witnessing test.
4. Approval by Owner or his representative.

D. Before any tests are started, consult with Owner and obtain approval for locations or areas where test water drainage is permissible.

E. All personnel or agencies from which test approval is required shall be notified sufficiently in advance of testing to permit reasonable time for their representative to be present during the test.

F. Tests shall be performed in compliance with the specified codes, standards, and manufacturer's recommendations.

G. Should leaks occur during testing, the test shall stop, the leak shall be repaired and the test shall be repeated, starting at the beginning. All costs pertaining to the repair and repeat of the test shall be borne by the contractor.

3.07 SYSTEM OPERATIONAL TESTS

A. Perform all system operational testing required under provisions of NFPA 13. Provide all documentation required to Owner and AHJ.

B. All tests shall be witnessed by Owner or Owner's representative and by the AHJ when required. All testing shall be coordinated with the Owner and a schedule with test procedures shall be submitted at least 10 days prior to and testing.

C. The sprinkler contractor is responsible for the testing of all devices on each system. Provide all instruments, equipment and personnel required for testing the sprinkler systems.

D. All operational test documentation and test procedures must be approved by NFPA 13. All test reports shall be on NFPA Standard forms and copies shall be submitted to Owner at closeout. The test reports shall include, but not be limited to, the following:
   1. Identification and location of equipment or system being tested.
   2. Test results.
   3. List of personnel witnessing tests.
   4. Approval by Owner or his representative.

3.08 OWNER EDUCATION

A. The contractor shall provide the Owner with a minimum of one, four-hour training class on the sprinkler systems. The training shall include, but not limited to the following:
   1. Overview of system operation.
   2. Overview of Operation and Maintenance manuals.
   3. Detailed maintenance procedures.
   4. Periodic testing and procedures.
   5. Overview of system equipment and device locations.

B. The contractor shall submit a proposed training agenda for Owners review and approval at least 10 days prior to starting the acceptance testing. Training sessions shall be scheduled by the Owner at a time that is mutually agreeable to the contractor and owner. The instruction shall be scheduled for after final acceptance testing but prior to final payment.

C. Each attendee shall receive an instructional certificate indicating attendance and satisfactory completion of the training.

3.09 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 21 05 00

SECTION 21 05 53
IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Stencil paint.

1.03 REFERENCE STANDARDS

A. Delaware State Fire Prevention Regulations; 2012.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2010.

C. NFPA 20 - Standard for Installation of Stationary Pumps for Fire Protection; National Fire Protection Association; 2010.

D. NFPA 24 - Standard for the Installation of Private Fire Service Mains and their Appurtenances; 2007.

E. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems; 2011.

F. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

G. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Control Panels: Nameplates.

B. Major Control Components: Nameplates.

C. Piping: Tags.

D. Pumps: Nameplates.

E. Valves: Nameplates and ceiling tacks where above lay-in ceilings.

2.02 NAMEPLATES

A. Manufacturers:
   1. Kolbi Pipe Marker Company: www.kolbipipemarkers.com/#sle.
   2. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.
   4. Thickness: 1/8 inch (3 mm).
   5. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com/#sle.
   2. Brady Corporation: www.bradycorp.com/#sle.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.
   4. Kolbi Pipe Marker Company: www.kolbipipemarkers.com/#sle.
   5. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com/#sle.
   2. Brimar Industries, Inc: www.pipemarker.com/#sle.
   3. Kolbi Pipe Marker Company: www.kolbipipemarkers.com/#sle.
   4. MIFAB, Inc: www.mifab.com/#sle.
   5. Seton Identification Products, a Tricor Company: www.seton.com/#sle.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Color: Comply with ASME A13.1.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Color code as follows:
   1. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Provide Fire Department Connection sign on exterior of building in compliance with the State of Delaware Fire Prevention Regulations.

E. Provide all signage and labeling of sprinkler system in accordance with NFPA 13.

F. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 21 05 53

SECTION 21 13 00
FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. System design, installation, and certification.

C. Fire department connections.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe and fittings.

C. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.

D. Section 21 30 00 - Fire Pumps.

1.03 REFERENCE STANDARDS

A. FM (AG) - FM Approval Guide; current edition.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2010.

D. NFPA 20 - Standard for Installation of Stationary Pumps for Fire Protection; National Fire Protection Association; 2010.

E. NFPA 24 - Standard for the Installation of Private Fire Service Mains and their Appurtenances; 2007.

F. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems; 2011.

G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:
   1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
   3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.

D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
3. Sprinkler Wrenches: For each sprinkler type.

1.06 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Comply with FM (AG) requirements.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Pennsylvania.

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

E. Installer Qualifications: Company specializing in performing the work of this sectionwith minimum 5 years experienceapproved by manufacturer.

F. Equipment and Components: Provide products that bear FM (AG) label or marking.

G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
1. Tyco Fire Protection Products: www.tyco-fire.com/#sle.
2. Viking Corporation: www.vikinggroupinc.com/#sle.
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for building areas noted.

B. Occupancy: Light hazard; comply with NFPA 13.

C. Water Supply: Determine volume and pressure from water flow test data.

D. Interface system with building fire and smoke alarm system.

E. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Beam Clamps, threaded rods; UL listed, FM approved.
2. Other Types: As required.

2.03 SPRINKLERS

A. Suspended Ceiling Type: Concealed pendant type with matching screw on escutcheon cover plate.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Stainless Steel.
4. Cover Plate Finish: White cover plate with Cleanroom Air and Dust Seal.
5. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

B. Exposed Area Type: Standard upright type .
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Chrome plated.
4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Sidewall Type: Recessed horizontal sidewall type with matching screw on escutcheon plate.

1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Chrome plated.
4. Escutcheon Plate Finish: Enamel, color white .
5. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

D. Guards: Finish to match sprinkler finish.

E. Flexible Drop System: Stainless steel, multiple use, open gate type.
1. Application: Use to properly locate sprinkler heads.
2. Include all supports and bracing.
3. Provide braided type tube as required for the application.
4. Manufacturers:
a. Victaulic Company; Vic-Flex: www.victaulic.com/#sle.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
1. Activate electric alarm.
2. Test and drain valve.
3. Replaceable internal components without removing valve from installed position.

B. Backflow Preventer: Reduced pressure principle valve assembly backflow preventer with drain and OS & Y gate valve on each end.

C. Test Connections:
1. Inspector's Test Connection for Preaction Systems:
a. Provide test connections approximately 6 ft (2 m) above floor for each or portion of each sprinkler system equipped with an alarm device, located at the most remote part of each system.
b. Route test connection to an open-site drain location, excluding janitor sinks, accepting full flow without negative consequences.
c. Supply discharge orifice with same size as corresponding sprinkler orifice.
d. Limit vertical height of exterior wall penetration to 2 ft (0.61 m) above finished grade.
2. Backflow Preventer Test Connection:
a. Provide downstream of the backflow prevention assembly, listed hose valves with 2.5 inch (65 mm) National Standard male hose threads with cap and chain.
b. Furnish one valve for each 250 gpm (16 L/s) of system demand or fraction thereof.
c. Provide permanent sign reading "Test Valve" in accordance with Section 22 05 53.

D. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fire Protection Contractor shall perform a water flow test and prepare shop drawings and hydraulic calculations for the wet sprinkler system based on the flow test data. Submit drawings and calculations to the Engineer and Fire Marshal for review and approval.

B. Install in accordance with referenced NFPA design and installation standard.

C. Install equipment in accordance with manufacturer's instructions.

D. Install buried shut-off valves in valve box. Provide post indicator.

E. Provide approved double check valve assembly at sprinkler system water source connection.

F. Place pipe runs to minimize obstruction to other work.

G. Place piping in concealed spaces above finished ceilings.

H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

J. Flush entire piping system of foreign matter.

K. Hydrostatically test entire system.

L. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

3.03 OWNER EDUCATION

A. The sprinkler contractor shall provide the Owner with a minimum of one, four-hour training class on the sprinkler, water tank and fire pump systems. The training shall include, but not limited to the following:
   1. Overview of system operation.
   2. Overview of Operation and Maintenance manuals.
   3. Detailed maintenance procedures.
   4. Periodic testing and procedures.
   5. Overview of system equipment and device locations.

B. The contractor shall submit a proposed training agenda for Owners review and approval at least 10 days prior to starting the acceptance testing. Training sessions shall be scheduled by the Owner at a time that is mutually agreeable to the contractor and owner. The instruction shall be scheduled for after final acceptance testing but prior to final payment.

C. Each attendee shall receive an instructional certificate indicating attendance and satisfactory completion of the training.

3.04 SCHEDULES

A. System Hazard Areas:
   1. Offices: Light Hazard.
   2. Warehouse: Ordinary Hazard Group 2
   3. Manufacturing Area: Ordinary Hazard Group 2

END OF SECTION 21 13 00

SECTION 22 05 23
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.
B. General requirements.
C. Angle valves.
D. Ball valves.
E. Butterfly valves.
F. Check valves.
G. Globe valves.

1.02 RELATED REQUIREMENTS

A. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
B. Section 22 07 19 - Plumbing Piping Insulation.
C. Section 22 10 05 - Plumbing Piping.
D. Section 22 15 00 - General-Service Compressed-Air Systems.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Non-rising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. SWP: Steam working pressure.
I. TFE: Tetrafluoroethylene.
J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug Wafer, and Butt-Welding; 2007 (Errata 2010).
B. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013.
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2010.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard; 2013.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2017.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
G. ASME B16.34 - Valves - Flanged, Threaded and Welding End; 2017.
H. ASME B31.9 - Building Services Piping; 2014.
I. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2014).
J. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
K. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2015.

L. MSS SP-67 - Butterfly Valves; 2011.
M. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; 2011.
N. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011.
O. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010.
P. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.
Q. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011.
R. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
S. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
T. NSF 372 - Drinking Water System Components - Lead Content; 2024.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.
E. Maintenance Materials: Furnish Owner with one wrench for every ten plug valves, in each size of square plug valve head.
    1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Manufacturer:
    1. Obtain valves for each valve type from single manufacturer.
    2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
    1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
    2. Protect valve parts exposed to piped medium against rust and corrosion.
    3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
    4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
    5. Secure check valves in either the closed position or open position.
    6. Adjust butterfly valves to closed or partially closed position.

1.08 EXERCISE THE FOLLOWING PRECAUTIONS FOR HANDLING:

A. Handle large valves with sling, modified to avoid damage to exposed parts.
B. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
B. Provide the following valves for the applications if not indicated on drawings:
    1. Shutoff: Ball, butterfly, gate.
    2. Throttling: Provide globe or angle.
C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.

D. Required Valve End Connections for Non-Wafer Types:
   1. Steel Pipe:
      a. 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
      b. 5 NPS (125 DN) and Larger: Grooved or flanged ends.
   2. Copper Tube:
      a. 2 NPS (50 DN) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

E. Domestic, Hot and Cold Water Valves:
   1. 2 NPS (50 DN) and Smaller:
      a. Bronze and Brass: Provide with solder-joint ends.
      b. Bronze Angle: Class 125, bronze disc.
      c. Ball: One piece, full port, brass or bronze with stainless-steel trim.
   2. 2-1/2 NPS (65 DN) and Larger:
      a. Iron, 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Provide with threaded or flanged ends.
      b. Iron Ball: Class 150.
      c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, stainless-steel disc.
      d. Iron Grooved-End Butterfly: 175 CWP.
      e. Iron Swing Check with Closure Control: Class 125, lever and spring.
      f. Iron Gate: Class 125, NRS.
      g. Iron Globe: Class 125.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
   1. Gear Actuator: Quarter-turn valves 8 NPS (200 DN) and larger.
   2. Handwheel: Valves other than quarter-turn types.
   3. Hand Lever: Quarter-turn valves 6 NPS (150 DN) and smaller except plug valves.
   4. Wrench: Plug valves with square heads.
   5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

D. Valves in Insulated Piping: With 2 NPS (50 DN) stem extensions and the following features:
   1. Gate Valves: Rising stem.
   2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
   3. Butterfly Valves: Extended neck.
   4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:
   1. Threaded End Valves: ASME B1.20.1.
   2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
   3. Pipe Flanges and Flanged Fittings 1/2 NPS (15 DN) through 24 NPS (600 DN): ASME B16.5.
   4. Solder Joint Connections: ASME B16.18.

F. General ASME Compliance:
   1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
   2. Solder-joint Connections: ASME B16.18.
   3. Building Services Piping Valves: ASME B31.9.

G. Valve Materials for Potable Water: NSF 61 and NSF 372.

2.03 BRONZE ANGLE VALVES

A. Class 125: CWP Rating: 200 psig: (1380 kPa).
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. Ends: Threaded.
   4. Stem: Bronze.
   5. Disc: Bronze.
   6. Packing: Asbestos free.
   7. Handwheel: Bronze or aluminum.

2.04 BRASS BALL VALVES

A. Two Piece, Full Port with chrome plated brass Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig (1035 kPa).
   3. CWP Rating: 600 psig (4140 kPa).
   4. Body: Forged brass.
   5. Ends: Threaded or soldered.
   6. Seats: PTFE or Hostaflon.
   7. Ball: Chrome-plated brass.

2.05 BRONZE BALL VALVES

A. Two Piece, Full Port with chrome plated brass Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig (1035 kPa).
   3. CWP Rating: 600 psig (4140 kPa).
   4. Body: Bronze.
   5. Ends: Threaded.
   6. Seats: PTFE or Hostaflon.
   7. Ball: Chrome plated brass.

2.06 IRON BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psig (1380 kPa).
   3. Body: ASTM A536 Grade 65-45-12, ductile iron.
   4. Ends: Flanged.
   5. Seats: PTFE or Teflon.
   6. Operator: Lever, with locking handle.

2.07 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug type: Bi-directional dead-end service without use of downstream flange.
   1. Comply with MSS SP-67, Type I.
   2. CWP Rating: 200 psig (1380 kPa).
   3. Body: ASTM A126, cast iron or ASTM A536, ductile iron.
   4. Stem: One or two-piece stainless steel.
   5. Seat: EPDM.
   6. Disc: Coated ductile iron.

2.08 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psig (1200 kPa).
   1. Comply with MSS SP-67, Type I.
   2. Body: Coated ductile iron.
   3. Stem: Two-piece stainless steel.
   4. Disc: Coated ductile iron.

5. Disc Seal: EPDM.

2.09 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125 with Lever and Spring-Closure Control.
   1. Comply with MSS SP-71, Type I.
   2. Description:
      a. CWP Rating: 200 psig (1380 kPa).
      b. Design: Clear or full waterway.
      c. Body: ASTM A126, gray iron with bolted bonnet.
      d. Ends: Flanged as indicated.
      e. Trim: Bronze.
      f. Gasket: Asbestos free.
      g. Closer Control: Factory installed, exterior lever, and weight.

2.10 IRON PLATE TYPE CHECK VALVES

A. Class 125 Single-Plate:
   1. Comply with API STD 594.
   2. CWP Rating: 200 psig (1380 kPa).
   3. Design: Wafer, spring-loaded plate.
   4. Body: ASTM A126, gray iron.
   5. Resilient Seat: EPDM.

2.11 IRON GATE VALVES

A. OS & Y:
   1. Comply with MSS SP-70, Type I.
   2. Class 125: CWP Rating: 200 psig: (1380 kPa).
   3. Body: ASTM A126, gray iron with bolted bonnet.
   4. Ends: Flanged.
   5. Trim: Bronze.
   6. Disc: Solid wedge.
   7. Packing and Gasket: Asbestos free.

2.12 IRON GLOBE VALVES

A. Class 125: CWP Rating: 200 psig: (1380 kPa).
   1. Comply with MSS SP-85, Type I.
   2. Body: Gray iron; ASTM A126, with bolted bonnet.
   3. Ends: Flanged.
   4. Trim: Bronze.
   5. Packing and Gasket: Asbestos free.
   6. Operator: Handwheel or chainwheel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

D. Install check valves where necessary to maintain direction of flow as follows:
   1. Lift Check: Install with stem plumb and vertical.
   2. Swing Check: Install horizontal maintaining hinge pin level.
   3. Orient plate-type into horizontal or vertical position, between flanges.

E. Provide chainwheels on operators for valves 4 NPS (100 DN) and larger where located 96 NPS (2400 DN) or more above finished floor, terminating 60 NPS (1520 DN) above finished floor.

END OF SECTION 22 05 23

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

C. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Pipe Markers: 3/4 inch (20 mm) diameter and higher.

2.02 IDENTIFICATION APPLICATIONS

A. Control Panels: Nameplates.

B. Instrumentation: Tags.

C. Piping: Pipe markers.

D. Pumps: Nameplates.

E. Tanks: Nameplates.

F. Valves: Tags and ceiling tacks where located above lay-in ceiling.

G. Water Treatment Devices: Nameplates.

2.03 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.
   4. Plastic: Comply with ASTM D709.

2.04 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
   2. Brady Corporation: www.bradycorp.com/#sle.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.

4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
5. Seton Identification Products: www.seton.com/#sle.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

2.05 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradycorp.com/#sle.
2. Brimar Industries, Inc: www.pipemarker.com/#sle.
3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
4. MIFAB, Inc: www.mifab.com/#sle.
5. Seton Identification Products: www.seton.com.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.

E. Identification Scheme, ASME A13.1:
1. Primary: External Pipe Diameter, Uninsulated or Insulated.
2. Secondary: Color scheme per fluid service.
a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.

F. Color code as follows:
1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
2. Flammable Fluids: Yellow with black letters.
3. Compressed Air: Blue with white letters.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

E. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.

END OF SECTION 22 05 53

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.

E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

A. Manufacturers:

1. CertainTeed Corporation: www.certainteed.com/#sle.
2. Johns Manville Corporation: www.jm.com/#sle.
3. Knauf Insulation: www.knaufusa.com.
4. Owens Corning Corp: www.owenscorning.com.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C547and ASTM C795; rigid molded, noncombustible.
1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
2. Maximum Service Temperature: 850 degrees F (454 degrees C).
3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Insulation: ASTM C547and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
2. Maximum Service Temperature: 650 degrees F (343 degrees C).
3. Maximum Moisture Absorption: 0.2 percent by volume.

D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m).

2.03 JACKETS

A. PVC Plastic.
1. Manufacturers:
a. Johns Manville Corporation: www.jm.com.
b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
a. Minimum Service Temperature: 0 degrees F (Minus 18 degrees C).
b. Maximum Service Temperature: 150 degrees F (66 degrees C).
c. Moisture Vapor Permeability: 0.002 perm inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
d. Thickness: 10 mil (0.25 mm).
e. Connections: Brush on welding adhesive.

B. Canvas Jacket: UL listed 6 oz/sq yd (220 g/sq m) plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
1. Thickness: 0.016 inch (0.40 mm) sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.015 inch (0.38 mm) thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.
1. Exposed piping shall be wrapped with a canvas jacket for field painting.

C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

D. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

F. Inserts and Shields:
   1. Application: Piping 1-1/2 inches (40 mm) diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with canvas jacket sized for finish painting.

I. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

J. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

K. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic Cold Water:
      a. Glass Fiber Insulation: 1-1/2" and smaller shall be 1/2” thick.
      b. Glass Fiber Insulation: 2" and larger shall be 1” thick.
      c. Provide PVC jacket and insulation under sinks exposed to view.
   2. Roof Drainage Above Grade: 1" Thick down to floor
   3. Plumbing sanitary drainage, floor drains, and traps above grade: 1" thick.
   4. All piping exposed to view in occupied space shall be wrapped with canvas jacket for field painting.

END OF SECTION 22 07 19

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary waste piping, buried within 5 feet (1500 mm) of building.

B. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer and vent.
   2. Natural Gas Piping
   3. Flanges, unions, and couplings.
   4. Pipe hangers and supports.
   5. Pipe sleeve-seal systems.
   6. Ball valves.
   7. Butterfly valves.
   8. Balancing valves.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

D. ASME B31.1 - Power Piping; 2014.

E. ASME B31.9 - Building Services Piping; 2014.

F. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.

G. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.

H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.

J. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

K. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

L. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).

M. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

N. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.

O. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.

P. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

Q. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2015.

R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

S. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

T. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2013.

U. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.

V. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.

W. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

X. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

Y. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.

Z. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

AA. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; 2011.

BB. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

CC. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

DD. NSF 372 - Drinking Water System Components - Lead Content; 2024.

EE. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Valve Repacking Kits: One for each type and size of valve.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of Pennsylvania plumbing code.

B. Conform to applicable code for installation of backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

C. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

2.02 STORM DRAINAGE PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 STORM DRAINAGE PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

2.05 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Flanges for Pipe Size Over 1 Inch (25 mm):
   1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
   2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.

2.06 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
3. Trapeze Hangers: Welded steel channel frames attached to structure.
4. Vertical Pipe Support: Steel riser clamp.
5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.

B. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
6. Manufacturers:
   a. Powers Fasteners, Inc: www.powers.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 PIPE SLEEVE-SEAL SYSTEMS

A. Modular Mechanical Seals:
1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
3. Size and select seal component materials in accordance to service requirements.
4. Glass reinforced plastic pressure end plates.

2.08 BALL VALVES

A. Manufacturers:
1. Tyco Flow Control: www.tycoflowcontrol.com.
2. Conbraco Industries, Inc: www.apollovalves.com.
3. Jomarvalve: www.jomarvalve.com
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded ends with union.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Vent piping within a plenum rated ceiling must meet the code required smoke and flame spread ratings. If the material specified to be used does not meet the 25/50 smoke / flame spread rating it will be the installing contractors responsiblity to insulate the portion of this piping within the plenum.

C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

E. Install piping to maintain headroom, conserve space, and not interfere with use of space.

F. Group piping whenever practical at common elevations.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not exposed.

I. Install bell and spigot pipe with bell end upstream.

J. Install valves with stems upright or horizontal, not inverted. See Section 22 05 23.

K. Install water piping to ASME B31.9.

L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

N. Sleeve pipes passing through partitions, walls, and floors.

O. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

P. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Provide copper plated hangers and supports for copper piping.

Q. Pipe Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a watertight seal.
   6. Install in accordance with manufacturer's recommendations.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install globe valves for throttling, bypass, or manual flow control services.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch (10 mm) vertically of location indicated and slope to drain at minimum of 1/4 inch per foot (1:50) slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot (1:400) and arrange to drain at low points.

3.06 FIELD TESTS AND INSPECTIONS

A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.

B. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.07 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
         1) Maximum Hanger Spacing: 6.5 ft (2 m).
         2) Hanger Rod Diameter: 3/8 inches (9 mm).
      b. Pipe Size: 1-1/2 inches (40 mm) to 2 inches (50 mm):
         1) Maximum Hanger Spacing: 10 ft (3 m).
         2) Hanger Rod Diameter: 3/8 inch (9 mm).
      c. Pipe Size: 2-1/2 inches (65 mm) to 3 inches (75 mm):
         1) Maximum Hanger Spacing: 10 ft (3 m).
         2) Hanger Rod Diameter: 1/2 inch (13 mm).
      d. Pipe Size: 4 inches (100 mm) to 6 inches (150 mm):
         1) Maximum Hanger Spacing: 10 ft (3 m).
         2) Hanger Rod Diameter: 5/8 inch (15 mm).
      e. Pipe Size: 8 inches (200 mm) to 12 inches (300 mm):
         1) Maximum hanger spacing: 14 ft (4.25 m).
         2) Hanger Rod Diameter: 7/8 inch (22 mm).
      f. Pipe Size: 14 inches and Over (350 mm and Over):
         1) Maximum Hanger Spacing: 20 ft (6 m).
         2) Hanger Rod Diameter: 1 inch (25 mm).

END OF SECTION 22 10 05

SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General construction and requirements.

B. Applications.

C. Three phase electric motors.

D. Electronically Commutated Motors (ECM).

1.02 RELATED REQUIREMENTS

A. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015 (Reaffirmed 2026).

B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.

C. NEMA MG 00001 - Motors and Generators; 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.

D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

E. Operation Data: Include instructions for safe operating procedures.

F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

A. Conform to NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Electrical Service:
   1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
   2. Motors Larger than 1/2 Horsepower: 208 or 480 volts, three phase, 60 Hz.

B. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 104 degrees F (40 degrees C) environment.
   3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.

C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

D. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

A. Motors located outdoors and in draw through cooling towers: Totally enclosed weatherproof epoxy-sealed type.

2.03 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between 1 and 1-1/2 times full load torque.

B. Starting Current: Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

D. Design, Construction, Testing, and Performance: Conform to NEMA MG 00001 for Design B motors.

E. Insulation System: NEMA Class B or better.

F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

G. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

H. Sound Power Levels: To NEMA MG 00001.

I. Motors to be used with AC drives shall be inverter duty rated and shall conform to the following:
   1. All motors used with AC drives shall be equipped with thermostats in the stator windings.
   2. The motor shall meet NEMA MG-1, Part 31 standards.
      a. 1600 Volt rated magnet wire.

2.04 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Applications:
   1. Commercial:
      a. Roof Top Unit:
         1) Operating Mode: Constant speed.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the roof top unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) RPM: 300 through 1200.
      b. Hydronic Pump:
         1) Operating Mode: Constant speed.

2) Input: Motor manufacturer to coordinate control requirements with the control board of the hydronic pump and/or specified sequence of operation.
3) Flange Configuration: "C".

c. Hydronic Booster Pump:
1) Operating Mode: Constant speed.
2) Input: Motor manufacturer to coordinate control requirements with the control board of the hydronic pump and/or specified sequence of operation.
3) Flange Configuration: "C".

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION 23 05 13

SECTION 23 05 48
VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.

B. Vibration-isolated equipment support bases.

C. Inertia bases.

D. Vibration isolators.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.03 DEFINITIONS

A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
   1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.

C. Shop Drawings - Vibration Isolation Systems:
   1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
   2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.

D. Product Data: Provide schedule of vibration isolator type with location and load on each.

E. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each.

F. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Perform design and installation in accordance with applicable codes.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.

B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:

C. General Requirements:
   1. Select vibration isolators to provide required static deflection.
   2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.

D. Thrust Restraint Applications:
   1. Use thrust restraints to resist horizontal motion due to thrust for fan heads, suspended fans, and base-mounted and suspended air handling equipment operating at 2.0 inches wg (0.5 kPa) or greater total static pressure.
   2. Minimum Static Deflection: Same as static deflection of equipment.
   3. Limit lateral movement to 0.25 inch (6 mm) or less unless otherwise indicated.

2.02 MANUFACTURERS

A. Isolation Technology, Inc: www.isolationtech.com.

B. Kinetics Noise Control, Inc: www.kineticsnoise.com.

C. Mason Industries: www.mason-ind.com.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 PERFORMANCE REQUIREMENTS

A. General:
   1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
   2. Steel springs to function without undue stress or overloading.
   3. Steel springs to operate in the linear portion of the load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
   4. All equipment mounted on vibration isolated bases to have minimum operating clearance of 2 inches (50 mm) between the base and floor or support beneath unless noted otherwise.

2.04 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

A. Vibration-Isolated Concrete Inertia Bases:
   1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
   2. Minimum Base Depth: 6 inches (152 mm).
   3. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.
   4. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.
   5. Concrete: Filled on site with minimum 3000 psi (20 mPa) concrete in accordance with Section 03 30 00.
   6. Pump Applications: Size and configure bases for piping elbow supports as required.

B. Structural Bases:
   1. Construction: Engineered, structural steel frames with welded brackets for side mounting of the isolators.

2. Frames: Square, rectangular or T-shaped.
3. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.

2.05 INERTIA BASES

A. Structural Bases:
1. Construction: Welded structural steel with gusseted brackets, to support equipment and motor, with motor slide rails.
2. Design: Sufficiently rigid to prevent misalignment or undue stress on machine, and to transmit design loads to isolators and snubbers.

B. Concrete Inertia Bases:
1. Construction: Structural steel channel perimeter frame, with gusseted brackets and anchor bolts, reinforcing; concrete filled.
2. Mass: Minimum of 1.5 times weight of isolated equipment.
3. Connecting Point: Reinforced to connect isolators and snubbers to base.
4. Concrete: Minimum 3000 psi (20 mPa) concrete.

2.06 VIBRATION ISOLATORS

A. Restrained Open Spring Isolators:
1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
2. Spring Mounts: Provide with leveling devices, minimum 0.25 inch (6 mm) thick neoprene sound pads, and zinc chromate plated hardware.
3. Sound Pads: Size for minimum deflection of 0.05 inch (1.2 mm); meet requirements for neoprene pad isolators.
4. Restraint: Provide heavy mounting frame and limit stops.
5. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.

B. Spring Hangers:
1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
2. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators.
3. Misalignment: Capable of 20 degree hanger rod misalignment.
4. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.

C. Neoprene Pad Isolators:
1. Rubber or neoprene waffle pads.
a. Hardness: 30 durometer.
b. Thickness: Minimum 1/2 inch (13 mm).
c. Maximum Loading: 50 psi (345 kPa).
d. Rib Height: Maximum 0.7 times width.
2. Configuration: Single layer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Secure fasteners according to manufacturer's recommended torque settings.

D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

E. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
   3. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
   4. Adjust isolators to be free of isolation short circuits during normal operation.
   5. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.03 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions.

B. Bases:
   1. Set steel bases for one inch (25 mm) clearance between housekeeping pad and base.
   2. Set concrete inertia bases for 2 inches (50 mm) clearance between housekeeping pad and base.
   3. Adjust equipment level.

C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.

D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.

E. Provide seismic snubbers for all equipment, piping, and ductwork mounted on isolators. Each inertia base shall have minimum of four seismic snubbers located close to isolators. Snub equipment designated for post-disaster use to 0.05 inch (1.5 mm) maximum clearance. Other snubbers shall have clearance between 0.15 inch (4 mm) and 0.25 inch (7 mm).

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect vibration isolation and/or seismic control components for damage and defects.

C. Vibration Isolation Systems:
   1. Verify isolator static deflections.
   2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.

D. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

E. Inspect isolated equipment after installation and submit report. Include static deflections.

3.05 SCHEDULE

A. Pipe Isolation Schedule.
   1. 1 Inch (25 mm) Pipe Size: Isolate 120 diameters from equipment.
   2. 2 Inch (50 mm) Pipe Size: Isolate 90 diameters from equipment.
   3. 3 Inch (80 mm) Pipe Size: Isolate 80 diameters from equipment.

4. 4 Inch (100 mm) Pipe Size: Isolate 75 diameters from equipment.
5. 6 Inch (150 mm) Pipe Size: Isolate 60 diameters from equipment.
6. 8 Inch (200 mm) Pipe Size: Isolate 60 diameters from equipment.
7. 10 Inch (250 mm) Pipe Size: Isolate 54 diameters from equipment.
8. 12 Inch (300 mm) Pipe Size: Isolate 50 diameters from equipment.

B. Equipment Isolation Schedule.
   1. HVAC Pumps.
      a. Base: Structural steel base.
      b. Base Thickness: 4 inches (_____ mm).
      c. Isolator Type: Restrained open spring isolators.
      d. Isolator Deflection: 2 inches (_____ mm).

END OF SECTION 23 05 48

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2007.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Air Terminal Units: Tags and Ceiling Equipment Markers

C. Control Panels: Nameplates.

D. Heat Transfer Equipment: Nameplates.

E. Major Control Components: Nameplates.

F. Piping: Tags.

G. Pumps: Nameplates.

H. Tanks: Nameplates.

I. Valves: Tags.

J. Water Treatment Devices: Nameplates.

2.02 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.

B. Champion America, Inc: www.Champion-America.com.

C. Seton Identification Products: www.seton.com/aec.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.

2.04 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.05 PIPE MARKERS

A. Color: Conform to ASME A13.1.

B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Color code as follows:
   1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
   2. Compressed Air: Blue with white letters.

2.06 CEILING EQUIPMENT MARKERS

A. Ceiling equipment marker shall identify equipment tag via a 3/4" x 2-1/2" engraved plastic nameplate that is adheard to the lay-in tee bar grid ceiling.

B. Ceiling equipment marker shall be white with black lettering and shall identify the tag of the equipment above the ceiling.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

F. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

G. Identify control panels and major control components outside panels with plastic nameplates.

H. Identify thermostats relating to terminal boxes or valves with nameplates.

I. Identify valves in main and branch piping with tags.

J. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 23 05 53

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic systems.

C. Field quality-control testing of Laboratory fume hoods.

D. Measurement of final operating condition of HVAC systems.

E. Vibration measurement of equipment operating conditions.

F. Commissioning activities.

1.02 RELATED REQUIREMENTS

A. Section 01 91 13 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

B. Section 23 08 00 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods; 2016.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

A. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Expected problems and solutions, etc.
      f. Details of how TOTAL flow will be determined; for example:
         1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
         2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
      g. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
      h. Procedures for formal deficiency reports, including scope, frequency and distribution.

B. Field Quality-control Testing of Laboratory Fume Hoods:
   1. Product Data sheets for all equipment proposed for use in on-site as-installed testing.
   2. List of laboratory fume hoods to be tested. Submit a minimum of one week prior to commencement of testing.

3. Test data demonstrating that each type of fume hood provided for the project has been successfully tested in the factory as per requirements of Section 11 53 13.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   5. Duct systems are clean of debris.
   6. Fans are rotating correctly.
   7. Access doors are closed and duct end caps are in place.
   8. Air outlets are installed and connected.
   9. Duct system leakage is minimized.
   10. Hydronic systems are flushed, filled, and vented.

11. Pumps are rotating correctly.
12. Proper strainer baskets are clean and in place.
13. Service and balance valves are open.

B. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

A. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

B. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 FUME HOOD TESTING (ON SITE)

A. General: Test fume hoods as installed to assess airflow velocity, airflow visualization, and level of containment. Perform tests with static mode (set sash position) conditions. Conduct testing as outlined below for 100% of the hoods provided in the Project.

B. Preparation: Visit the project site to confirm that construction activities related to the fume hood system(s) and equipment are complete. Review design documents and Contractor's submittals. Verify that mechanical ventilation systems serving the space are functioning and operating in the normal mode. Notify Owner in writing, if conditions exist which preclude proper fume hood testing. Starting of testing constitutes acceptance of site conditions.

C. Testing Requirements:
1. Perform the following tests, in order:
   a. Airflow Velocity Test.
   b. Airflow Visualization Test.
   c. Tracer Gas Containment Test.
2. Airflow Velocity Test: Comply with Section 9 of NEBB (FHT) Fume Hood Testing Standard - current edition.
3. Airflow Visualization Test: Comply with Section 10 of NEBB (FHT) Fume Hood Testing Standard - current edition.
4. Tracer Gas Containment Test:
   a. Conduct a static mode test of the hood and laboratory configuration. Conduct testing in accordance with ASHRAE Std 110, except as modified herein:
      1) Test hood with simulated scientific apparatus set-up within the hood. Apparatus to consist of: two (2) each 1 gal. (3.78 L) round paint cans, one (1) 1' by 1' by 1' (305 mm by 305 mm by 305 mm) cardboard box, and three (3) each 6" by 6" by 12" high (152 mm by 152 mm by 305 mm high) cardboard boxes. Position these items from 6 to 10 inches (152 to 254 mm) behind the sash, randomly distributed, and supported off of the work surface by 2 inch by 2 inch by 2 inch (51 mm by 51 mm by 51 mm) block of any material.
      2) 6 liters per minute release rate for tracer gas.
      3) Conduct only at the center position for the manikin.
      4) Each tracer gas test duration to be 5 minutes.
      5) Acceptable test results will be 0.05 PPM or better.
      6) At the conclusion of each 5-minute test there will be three rapid walk-by at 1' (305 mm) behind the manikin. Each walk-by to be spaced 30 seconds apart. If a rise in test gas concentration occurs, it cannot exceed 0.10 ppm and must return to 0.05 ppm within 15 seconds.
      7) There must be a minimum of three and a maximum of five people in the space in which the fume hood is located during the test procedure.
      8) Representatives of the Architect, Engineer, Owner, and Contractor must witness the tests.
      9) Test of Alarm: Shut off the fume hood exhaust and verify that the individual fume hood alarm activates.

10) Test individual controls: Test any controls that are provided at the fume hood such as unoccupied cycle override, alarm override, etc.

b. Conduct a dynamic mode test of the hood to measure performance parameters of fume hood control systems during the following test events:
   1) Sash movement: 25 percent to 100 percent, and 50 percent to 100 percent operating positions.
   2) Rapid walk-by in front of the hood. Conduct only at center position for the manikin.
   3) Opening and closing main space entrance door, to simulate a person entering or exiting the space.

3.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

3.06 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

3.07 COMMISSIONING

A. See Sections 01 91 13 - General Commissioning Requirements and 23 08 00 for additional requirements.

B. Perform prerequisites prior to starting commissioning activities.

C. Fill out Prefunctional Checklists for:
   1. Air side systems.
   2. Water side systems.

D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.

E. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for ___ percent of the air handlers plus a random sample equivalent to 10 percent of the final TAB report data as directed by Commissioning Authority.
   1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
   2. Use the same test instruments as used in the original TAB work.
   3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
   4. For purposes of re-check, failure is defined as follows:
      a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
      b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
      c. Temperatures: Deviation of more than one degree F (0.5 degree C).
      d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
      e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
   5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

F. In the presence of the Commissioning Authority, verify that:
   1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
   2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
   3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

3.08 SCOPE

A. Test, adjust, and balance the following:
   1. HVAC Pumps.
   2. Air Cooled Water Chillers.
   3. Air Coils.
   4. Air Handling Units.
   5. Fans.

3.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.
   6. Service factor.
   7. Starter size, rating, heater elements.
   8. Sheave Make/Size/Bore.

B. Pumps:
   1. Identification/number.
   2. Manufacturer.
   3. Size/model.
   4. Impeller.
   5. Service.
   6. Design flow rate, pressure drop, BHP.
   7. Actual flow rate, pressure drop, BHP.
   8. Discharge pressure.
   9. Suction pressure.
   10. Total operating head pressure.
   11. Shut off, discharge and suction pressures.
   12. Shut off, total head pressure.

C. Chillers:
   1. Identification/number.
   2. Manufacturer.
   3. Capacity.
   4. Model number.
   5. Serial number.
   6. Evaporator entering water temperature, design and actual.
   7. Evaporator leaving water temperature, design and actual.
   8. Evaporator pressure drop, design and actual.
   9. Evaporator water flow rate, design and actual.

D. Heat Exchangers:
   1. Identification/number.
   2. Location.
   3. Service.
   4. Manufacturer.
   5. Model number.
   6. Serial number.
   7. Primary water entering temperature, design and actual.
   8. Primary water leaving temperature, design and actual.

9. Primary water flow, design and actual.
10. Primary water pressure drop, design and actual.
11. Secondary water leaving temperature, design and actual.
12. Secondary water flow, design and actual.
13. Secondary water pressure drop, design and actual.

E. Cooling Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Entering air DB temperature, design and actual.
7. Entering air WB temperature, design and actual.
8. Leaving air DB temperature, design and actual.
9. Leaving air WB temperature, design and actual.
10. Water flow, design and actual.
11. Water pressure drop, design and actual.
12. Entering water temperature, design and actual.
13. Leaving water temperature, design and actual.

F. Heating Coils:
1. Identification/number.
2. Location.
3. Service.
4. Manufacturer.
5. Air flow, design and actual.
6. Water flow, design and actual.
7. Water pressure drop, design and actual.
8. Entering water temperature, design and actual.
9. Leaving water temperature, design and actual.
10. Entering air temperature, design and actual.
11. Leaving air temperature, design and actual.
12. Air pressure drop, design and actual.

G. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.

H. Duct Leak Tests:
1. Description of ductwork under test.
2. Duct design operating pressure.
3. Duct design test static pressure.
4. Duct capacity, air flow.
5. Maximum allowable leakage duct capacity times leak factor.
6. Test static pressure.

7. Test orifice differential pressure.
8. Leakage.

I. Terminal Unit Data:
1. Type, constant, variable, single, dual duct.
2. Identification/number.
3. Location.
4. Model number.
5. Size.
6. Minimum design air flow.
7. Maximum design air flow.
8. Maximum actual air flow.

J. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.

END OF SECTION 23 05 93

SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass Fiber, Flexible.

B. Glass Fiber, Rigid

C. Jackets.

D. Duct insulation.

E. Weather barrier coatings.

1.02 RELATED REQUIREMENTS

A. Section 23 05 53 - Identification for HVAC Piping and Equipment.

B. Section 23 3100 - HVAC Ducts and Casings

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2024.

E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2025.

F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2025.

G. 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; 2017 (Reapproved 2021).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

I. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufusa.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation; SOFTR Duct Wrap FRK: www.owenscorning.com/en-us/#sle.
   4. CertainTeed Corporation;: www.certainteed.com/#sle.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K (Ksi) value: 0.36 at 75 degrees F (0.052 at 24 degrees C), when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 250 degrees F (121 degrees C).
   3. Minimum Density of 1.0 PCF.
   4. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. 0.0032 inch vinyl (0.081 mm vinyl).
   2. Moisture Vapor Permeability: 0.02 perm inch (0.029 ng/(Pa s m)), when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure-sensitive tape.

D. Indoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

E. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

2.03 POLYISOCYANURATE, RIGID

A. Insulation consists of a pre-manufactured panel system consisting of four (4) piece interlocking panels.

B. The interlocking panels shall be constructed of Dow Thermax polyisocyanurate insulation, ASTM D-1622, normal 2 pcf.
   1. Water vapor transmission as permeance less than 0.03, per ASTM E-96;
   2. Water absorption less than 0.3% (24 Hours), per ASTM C-209.
   3. Flexural strenght more than 40 psi, per ASTM C-203.

C. Operating temperature range of -100 deg. F to +250 deg. F.

D. Insulation shall be clad with 0.032" thick embossed aluminum and sealed with vapor barrier compound. All joints shall interlock to ensure a thermal seal with no pass through seams.

E. Panels shall be secured with #10 self-tapping stainless screws with weather seal washers.

F. Manufacturers:
   1. P.T.M. Manufacturing, LLC Model Techna-Duc.
   2. Fab-Rite Exterior Duct Cladding System

3. Substitutions: See Section 01 6000 - Product Requirements.

G. Insulation shall be provided with a 20-year warranty.

2.04 GLASS FIBER, RIGID

A. Manufacturer:
1. Knauf Insulation: www.knaufusa.com.
2. Johns Manville: www.jm.com.
3. Owens Corning Corp: www.owenscorning.com.

B. Insulation: ASTM C612; rigid, noncombustible.
1. K (Ksi) Value: 0.24 at 75 degrees F (0.036 at 24 degrees C), when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 450 degrees F (232 degrees C).
3. Maximum Water Vapor Absorption: 5.0 percent.
4. Maximum Density: 8.0 pcf (128 kg/cu m).

C. Vapor Barrier Jacket:
1. 0.0032 inch vinyl (0.081 mm vinyl).
2. Moisture Vapor Permeability: 0.02 perm inch (0.029 ng/(Pa s m)), when tested in accordance with ASTM E96/E96M.

D. Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight, glass fabric.
2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.05 WEATHER BARRIER COATINGS

A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
1. Manufacturers:
a. H.B. Fuller Construction Products, Inc; Childers - CP Series Weather Barrier Coating: www.fosterproducts.com/#sle.
b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
3. Water Vapor Permeance: Greater than 1.0 perm (57 ng/(Pa s m)) in accordance with ASTM E96/E96M.
4. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.
5. Color: As selected by Architect.

2.06 JACKETS

A. Canvas Jacket: UL listed 6 oz/sq yd (220 g/sq m) plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.
1. Lagging Adhesive:
a. Compatible with insulation.

B. Aluminum Jacket: ASTM B209 (ASTM B209M).
1. Thickness: 0.016 inch (0.40 mm) sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.010 inch (0.25 mm) thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
   1. For rigid polyisocyanurate, installation shall only be completed by manufacturer licensed contractors.

B. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated ducts conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. Ducts Exposed in Finished Spaces: Finish with canvas jacket sized for finish painting.

E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with embossed aluminum.

F. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

3.03 SCHEDULES

A. Exhaust Ducts Within 10 ft (3 m) of Exterior Openings: 2 inches thick, flexible glass fiber or rigid board.

B. Exhaust Ducts Exposed to Outdoor Air: 2 inches thick, flexible glass fiber or rigid board with weather barrier coating and alluminum jacket.

C. Outside Air Intake Ducts: 2 inches thick, flexible glass fiber or rigid board.

D. Supply Ducts within insulated building envelope (R-6 min.): 2 inches thick, flexible glass fiber with vapor barrier.
   1. Exposed ducts to have canvas jacket for field painting.

E. Return Ducts within 10' of unit: 1 inch thick, flexible glass fiber or rigid board.
   1. Exposed ducts to have canvas jacket for field painting.

F. Ducts Exposed to Outdoors (R-8 min): 2 inches thick, rigid polyisocyanurate encased in metal.

END OF SECTION 23 07 13

SECTION 23 09 00
BAS INSTRUMENTATION AND CONTROL

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 13, BAS Instrumentation and Control Devices

B. SECTION 23 09 13.13, BAS Actuators and Operators

C. SECTION 23 09 13.23, BAS Sensors and Transmitters

D. SECTION 23 09 13.33, BAS Control Valves

E. SECTION 23 09 13.43, BAS Control Dampers

F. SECTION 23 09 23, BAS Direct Digital Control System

1.02 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI/ISA 5.5-1985 Graphic Symbols for Process Displays.
   2. ANSI/IEEE 260.1 2004, Standard Letter Symbols for SI and Certain Other Units of Measurements (SI Units, Customary Inch Pound Units and Certain Other Units).

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Acronyms used in BAS.
   1. BAS – Building Automation System
   2. EMCS – Energy Management and Control System
   3. GUI – Graphical User Interface
   4. HVAC - Heating, Ventilation, Air Conditioning
   5. I/O - Input/output
   6. ISA - Industry Standard Architecture
   7. O&M - Operation and Maintenance

1.04 PERMITS AND FEES

A. In accordance with General Conditions of Contract.

B. Submit certificate of acceptance from authority having jurisdiction to Owner.

1.05 GENERAL DESCRIPTION

A. The existing BAS is a Facility Explorer BACNet platform by Johnson Controls. The intent is to provide additional building controllers and expand this system to excompase the controlls related to this project.

B. Refer to control schematics for general system architecture.

C. Work covered by sections referred to above consists of fully operational BAS, including, but not limited to, following:
   1. Control devices as listed in I/O Summaries.
   2. Peripheral devices.
   3. Complete operating and maintenance manuals and field training of operators, programmers and maintenance personnel.
   4. Acceptance tests, technical support during commissioning, full documentation.
   5. Wiring interface co-ordination of equipment supplied by others.
   6. Miscellaneous work as specified in these sections and as indicated.

1.06 US CUSTOMARY MEASUREMENT REFERENCES

A. Conform to NIST Handbook 44 - 2014 Edition Appendix C “General Tables of Units of Measurement”

B. Provide required adapters between US Customary and Metric components.

1.07 STANDARDS COMPLIANCE

A. All equipment and material to be from manufacturer's regular production, UL and/or ULC or CSA certified, manufactured to standard quoted plus additional specified requirements.

B. Where UL and/or ULC or CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.

C. Submit proof of compliance to specified standards with shop drawings and product data. Label or listing of specified organization is acceptable evidence.

D. In lieu of such evidence, submit certificate from testing organization, approved by Owner, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.

E. For materials whose compliance with organizational standards/codes/specifications is not regulated by an organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.

1.08 EXISTING CONTROL COMPONENTS

A. Re-use any existing control wiring and/or piping provided that they conform to applicable codes, standards, and specifications.
   1. Sensors may be reused if the new controller supports a minimum 32 point linear interpolation translation table for the sensors.

B. Field control devices that are usable in their original configuration may be re-used provided that they conform to applicable codes, standards, and specifications. Do not modify original design of any existing devices without written permission from Owner. Provide for new, properly designed device where components are questionable as to reusability. Provide list of equipment so included in bid. Include unit price of all for this equipment.

C. Within 30 days of award of contract, and prior to installation of any new devices, inspect and test all existing devices intended for re-use. Furnish test report listing each component to be re-used and indicating whether it is in good order or requires repair by Owner.

D. Non-functioning items:
   1. Provide with report specification sheets or written functional requirements to support findings.
   2. Owner will repair or replace existing items judged defective yet deemed necessary for BAS.
   3. Assume responsibility for items repaired by Owner.

E. Submit written request for permission to disconnect any controls and to obtain equipment downtime before proceeding with work.

F. Assume responsibility for existing controls to be incorporated into the BAS and it will commence upon approval for disconnection of controls or equipment downtime.
   1. Be responsible for items repaired by Owner.
   2. Be responsible for repair costs due to negligence or abuse of Owner's equipment.
   3. Responsibility for existing devices to terminate upon acceptance of the entire BAS system.

G. Remove existing controls not re-used or not required. Place in Owner’s designated storage. All removed controls will remain the property of the Owner.

1.09 WORK INCLUDED

A. BAS contractor shall provide a new building controller (JACE) and integrate to the existing Facitliy Explorer control system.

B. Provide a new building system to control and monitor this projects mechanical and electrical systems.

C. Provide control valves, control dampers (gravity, fire and smoke control dampers by others), flow switches, thermal wells for temperature control, and air flow stations as necessary.

D. Provide submittal data sheets, control drawings schematics (in AutoCAD), data entry, and electrical installation, programming, start up, test and validation acceptance documentation, as-built documentation, maintenance manuals and system warranties.

E. All labor, material, equipment and services not specifically referred to in this specification or on associated drawings that are required to fulfill the functional intent of this specification shall be provided at no additional cost to the Owner.

F. The work covered by this specification and related sections consists of providing shop drawings, equipment, labor, materials, engineering, technical supervision, and transportation as required to furnish and install a fully operational BAS to monitor and control the facilities listed herein, and as required to provide the operation specified in strict accordance with these documents, and subject to the terms and conditions of the contract. The work in general consists of but is not limited to, the following:
   1. The preparation of submittals and provision of all related services.
   2. Furnish and install all to achieve system operation, any control devices, conduit and wiring, in the facility as required to provide the operation specified.
   3. Furnish complete operating and maintenance manuals and field training of operators, programmers, and maintenance personnel.
   4. Perform acceptance tests and commissioning as indicated.
   5. Provide full documentation for all applications and equipment.
   6. Miscellaneous work as indicated in these specifications.

1.10 WORK BY OTHERS

A. Setting in place of valves and dampers, access doors, flow meters, water pressure and differential taps, flow switches, thermal wells, fire and smoke control dampers, air flow stations, and current transformers shall be by others.

B. Duct smoke detectors shall be provided under Division 26 00 00. Connection of auxiliary terminals of duct smoke detectors shall be wired to the BAS for monitoring purposes only by this section.

C. High and low temperature thermostats shall be provided by this section.

D. Switches, and power wiring to motors, starters, thermal overload switches, and contactors, is specified in Division 26 00 00. This Section includes the furnishing and installation of controls and wiring for automatic controls, electric damper and valve operators, terminal control units, interlocks, starting circuits, and wiring to power consuming control devices.

1.11 BAS CONTRACTOR QUALIFICATIONS

A. Within 14 days of award of the contract the BAS contractor is to:
   1. Provide proof of having a local office within 50 miles of project for at least 5 years, staffed by trained personnel capable of providing instruction, routine maintenance, emergency service on systems,
   2. Provide record of successful installations of similar size, performed by Contractor submitting the tender, showing successful experience with similar computer based systems.
   3. Provide proof of having access to local supplies of essential parts and provide 7 year guarantee of availability of compatible spare parts after manufacturer’s declaration of obsolescence.
   4. Provide proof of having in-house staff with expertise in pneumatic controls where applicable.
   5. Provide Profiles for each employee who will be involved in this project.

1.12 SYSTEM DESIGN RESPONSIBILITY

A. Design and provide all conduit and wiring linking all elements of system, including future capability.

B. Design and provide all material for interfaces to existing pneumatic controls where applicable.

C. Location of controllers to be approved by Owner prior to installation.

D. Provide utility power or emergency power where directed and/or indicated on drawings, to controllers.

1.13 REFERENCE STANDARDS

A. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

PART 2 PRODUCTS

2.01 QUALITY ASSURANCE

A. All new building automation system products on this project shall be provided by a firm that is a registered ISO 9001:2008 manufacturer, for a minimum duration of 5 years, at time of bid.

B. The Building Automation System shall be furnished, engineered, installed, tested and calibrated by factory certified technicians qualified for this work. The contractor shall be Factory Authorized in good standing with the Manufacturer. Factory trained technicians shall provide instruction, routine maintenance, and emergency service within 24 hours upon receipt of request.

1. Upon request, installer shall present records of successful completion of factory training courses including course outlines.
2. Upon request, the installer shall provide a letter from the manufacturer that they are a Factory Authorized installer in good standing with the Manufacturer.

PART 3 EXECUTION

3.01 COORDINATION

A. All work shall be performed at times acceptable to the Engineer/Construction Manager. Provide work schedule at the start of the job for the approval of the Engineer / Construction Manager. Schedule shall show when all staff and sub-contractors shall be on-site.

B. Organize all your sub-contractors and ensure that they maintain the schedule.

C. Full cooperation shall be shown with other sub-contractors to facilitate installations and to avoid delays in carrying out the work.

D. Notify Engineer/Construction Manager of any changes to the schedule. Send any schedule changes and weekly progress reports via e-mail to Engineer/Construction Manager.

E. Where, in the judgment of the Engineer/Construction Manager, the work could disrupt the normal operations in or around the building, contractor shall schedule work to eliminate or minimize interference.

F. When connecting to the existing systems, advise the Engineer/Construction Manager and obtain permission to so. Perform work at a time acceptable to the Engineer/Construction Manager and Owner.

3.02 SUPERVISION OF PERSONNEL

A. Maintain qualified personnel and supporting staff at this project with proven experience in erecting, supervising, testing, and adjusting projects of comparable nature and complexity.

B. Supervisory personnel and their qualifications are subject to the approval of the Owner.

C. All personnel working on-site shall sign in as required by the Owner and shall wear company identification.

D. When requested and for whatever reason, remove personnel and/or support staff from project. Take immediate action.

3.03 SYSTEM DESIGN AND RESPONSIBILITY

A. The drawings do not show conduit size or wire type to link the various elements of the system.

B. The BAS contractor is responsible for designing these links in view of the present and future capabilities.

C. The Contractor is responsible for supplying sufficient Controllers of all types to meet the intent of the specification.

D. The quantity and point content of the Controllers must be approved by the Engineer prior to point installation.

3.04 PRODUCTS

A. Materials and equipment shall be essentially the catalogued products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements.

B. Where two units of the same class of equipment are required, these units shall be products of a single manufacturer, and the component parts of the system shall be the products of a single manufacturer.

C. Each major component of equipment shall have the manufacturer's name and address and the model and serial number on a nameplate securely attached in a conspicuous place.

3.05 ELECTRICAL WORK, WIRING AND SAFETY

A. Electrical work shall be in accordance ANSI/NFPA 70 and the local Electrical Code.

B. Based on project location, Regional Regulation Compliance Certifications (CSA C22.1) will be required.

C. Electrical wiring, terminal blocks and other high voltage contacts shall be fully enclosed or properly guarded and marked to prevent accidental injury to personnel.

D. All wiring shall conform to the most stringent requirements of the local electrical authority having jurisdiction. Refer to Division 26 00 00 for electrical requirements, codes and regulations.

E. All wiring associated with and required by the BAS shall be the responsibility of this contractor.
   1. The term "wiring" shall be construed to include furnishing of wire, conduit, and miscellaneous material and labor as required to install a total working system.
   2. If departures from the contract documents are deemed necessary by the contractor, details of such departures, including changes in related portions of the project and the reasons therefore, shall be submitted with the drawings to the Engineer for approval.

3.06 MANUFACTURER'S RECOMMENDATIONS

A. Installation to be to manufacturer's recommendations. Provide printed copies of recommendations with shop drawings or product data.

3.07 NAMEPLATES

A. Nameplates shall be provided for all control items listed or shown in the submittal and approved control diagrams.

B. Each inscription shall identify its function, such as "mixed air controller", "cold deck sensor" in official languages etc. and when applicable, its position.
   1. Size of nameplates shall be 1 inch by 3 inches minimum.
   2. Lettering shall be minimum ¼ inch high normal black lettering.
   3. Submit duplicate samples of identification tags and lists of wording proposed for approval.

3.08 PRELIMINARY DESIGN REVIEW

A. The BAS contractor shall submit a preliminary design document for review. This document shall contain the following information:

1. Provide a description of the proposed system along with a system architecture diagram with the intention of showing the contractors solution to meet this specification.
2. Provide product data sheets and a technical description of all direct digital controller hardware required to meet specifications listed herein.
3. Provide an overview of the BAS contractor's local/branch organization, local staff, recent related project experience with references, and local service capabilities.
4. Provide information on the BAS contractor's project team including project organization, project manager, project engineer, programmers, project team resumes, and location of staff.
5. Project Schedule of work indicating:
    a. Intended sequence of work items
    b. Start date of each work item
    c. Duration of each work item
    d. Planned delivery dates for ordered material and equipment and expected lead times
    e. Milestones indicating possible restraints on work by other trades or situations

3.09 SUBMITTALS

A. Provide in completely coordinated and indexed package to assure full compliance with the contract requirements.
    1. Piecemeal submittal of data is not acceptable and such submittals will be returned without review.
    2. Information shall be submitted for all material and equipment the contractor proposes to furnish under terms of this contract work.
    3. Arrange the submittals in the same sequence as these specifications and reference at the upper right-hand corner the particular specification provision for which each submittal is intended.
    4. Submittals for each manufactured item shall be manufacturer's descriptive literature (equipment specification), equipment drawings, diagrams, performance and characteristic curves, and catalog cuts, and shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size layout dimension, capacity, specification reference, applicable specification references, and all other information necessary to establish contract compliance.

B. Control System Shop Drawings
    1. Schematic diagram of each controlled system. Label control points with point names.
    2. Bill of Material for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
    3. Specification sheets for each item including manufacturers descriptive literature, drawings, diagrams, performance and characteristic curves, manufacturer and model number, size, layout, dimensions, capacity, etc.
    4. Control schematics with narrative description and control descriptive logic fully showing and describing operation and/or manual procedures available to operating personnel to achieve proper operation of the building, including under complete failure of the BAS.
    5. Shop drawings for each input/output point showing all information associated with each particular point including sensing element type and location; details of associated field wiring schematics and schedules; point address; software and programming details associated with each point; and manufacturer's recommended installation instructions and procedures for each type of sensor and/or transmitter.

3.10 AS-BUILT DOCUMENTATION (OPERATING AND MAINTENANCE (O&M) MANUALS)

A. As-built documentation shall consist of 4 hard copies and one soft copy for all information described below

B. The final documentation package shall include:

1. Hard and soft copies of all control drawings.
2. Manufacturer’s technical data sheets for all hardware and software.
3. Factory operating and maintenance manuals with any customization required.
4. Soft copies of programming and front-end software and each controller’s database. Hard copy output of programming is not necessary.
5. Provide clear, concise, printed and soft copy descriptions of all control sequences in the working language.
6. Soft copy text files shall be in Microsoft Word format.
7. Copy of all graphics files.

C. Each instruction and reference manual shall be bound in hardback, 3 ring, binders or an approved equivalent shall be provided to the Engineer.
   1. Binders to be no more than 2/3 full.
   2. Each binder to contain index to full volume.
   3. One complete set of manuals shall be furnished prior to the time that the system or equipment tests are performed, and the remaining manuals shall be furnished at acceptance.
   4. The identification of each manual's contents shall be inscribed on the cover and spine.
   5. The manuals shall include the names, addresses and telephone numbers of each subcontractor installing equipment systems and of the local representatives for each item of equipment and each system.
   6. The manuals shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject.
   7. Additionally, each manual shall contain a comprehensive index of all manuals submitted in accordance with this paragraph.
   8. Manuals and specifications shall be furnished which provide full and complete coverage of the following subjects:
      a. Operational Requirements: This document shall describe in concise terms, all the functional and operational requirements for the system and its functions that have been implemented. It shall be written using common terminology for building operation staff and shall not presume knowledge of digital computers, electronics or in-depth control theory.
      b. System Operation: Complete step by step procedures for operation of the system, including required actions at each operator station; operation of computer peripherals; input and output formats; and emergency, alarm and failure recovery. Step-by-step instructions for system startup, back-up equipment operation, and execution of all system functions and operating modes shall be provided.
      c. Maintenance: Documentation of all maintenance procedures for all system components including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective module. This shall include calibration, maintenance, and repair or replacement of all system hardware.
      d. Test Procedures and Reports: The test implementation shall be recorded with a description of the test exercise script of events and documented as test procedures. A provision for the measurement or observation of results, based on the published test specification, forms the test reports. The procedures record and the results of these exercises shall be conveniently bound and documented together.
      e. Configuration Control: Documentation of the basic system design and configuration with provisions and procedures for planning, implementing, and recording any hardware or software modifications required during the installation, test, and operating lifetime of the system. This shall include all information required to ensure necessary coordination of hardware and software changes, data link or message format/content changes, and sensor or control changes in the event system modification are required, and to fully document such new system configurations.

3.11 MANUFACTURER TRAINING

A. Manufacturer provided training on the use and operation of all products provided within these specifications shall be available for purchase and attendance by the Owner or his designated agent.
   1. Such training shall be of the same curriculum as the training courses provided by the manufacturer to the Contractor.
   2. A manufacturer certified instructors shall give all training classes.
   3. A list of training courses with detailed course outline and duration with the associated cost shall be provided as part of the BAS submittals.

END OF SECTION 23 09 00

SECTION 23 09 13.13
BAS ACTUATORS AND OPERATORS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 00, BAS Instrumentation and Control

B. SECTION 23 09 13, BAS Instrumentation and Control Devices

C. SECTION 23 09 13.23, BAS Sensors and Transmitters

D. SECTION 23 09 13.33, BAS Control Valves

E. SECTION 23 09 13.43, BAS Control Dampers

F. SECTION 23 09 23, BAS Direct Digital Control System

1.02 REFERENCES

A. Refer to Section 23 09 00 - References

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Refer to Section 23 09 00 - Acronyms, Abbreviations and Definitions

1.04 REFERENCE STANDARDS

A. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).

PART 2 PRODUCT

2.01 ACTUATORS

A. For dampers, the actuators used shall be provided from a single manufacturer

B. For valves, the actuators used shall be provided from a single manufacturer for the following systems:
   1. Chilled Water System (Glycol):
      a. Johnson Controls
      b. Beliemo
   2. Process Cooling Water System (water) - All wetted surfaces shall be 316 Stainless or non metalic.
      a. VSI

C. Actuators shall be provided from a manufacturer registered under ISO9001:2000.

D. Electronic Damper Actuators.
   1. Size for torque required for damper seal at load conditions.
   2. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
   3. Mounting: Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
   4. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent any damage to the actuator during a stall condition.
   5. Fail-Safe Operation: Mechanical, spring-return mechanism. Internal chemical storage systems, capacitors, or other internal non-mechanical forms of fail-safe operation are not acceptable.
   6. Power Requirements (Two-Position Spring Return): 24 or 120 VAC as required.
   7. Power Requirements (Proportional): Maximum 10 VA at 24 VAC or 8 W at 24 VDC.
   8. Temperature Rating: -22 to +122°F (-30 to +50°C)
   9. Housing: Minimum requirement NEMA type 2 / IP54 mounted in any orientation.
   10. Agency Listing: ISO 9001, UL, UL(C) and CSA C22.2 No. 24-93.

E. Electronic Valve Actuators.

1. Size for torque required for valve close off at 150% of total system (head) pressure for 2-way valves; and 100% of pressure differential across the valve or 100% of total system (pump) head differential pressure for 3-way valves.
2. Coupling: Directly couple end mount to stem, shaft, or ISO-style direct-coupled mounting pad.
3. Mounting: Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
4. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to deactivate the actuator at the end of rotation.
5. Fail-Safe Operation: Mechanical, spring-return mechanism. Internal chemical storage systems, capacitors, or other internal non-mechanical forms of fail-safe operation are not acceptable.
6. Power Requirements: Maximum 10 VA at 24 VAC or 8 W at 24 VDC.
7. Maximum 1 VA at 24 VAC or 1 W at 24 VDC.
8. Temperature Rating: -22 to +122°F (-30 to +50°C)
9. Housing: Minimum requirement NEMA type 2 / IP54 mounted in any orientation.
10. Agency Listing: ISO 9001, UL, UL(C) and CSA C22.2 No. 24-93.

F. Terminal Unit Actuators
1. Close-off (Differential) Pressure Rating: 200 psi.
2. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle or an ISO-style direct-coupled mounting pad.
3. Power Requirements: Maximum 1 VA at 24 VAC or 1 W at 24 VDC.
4. Temperature Rating: -22 to +122°F (-30 to +50°C). Housing Rating: Minimum UL94-5V(B) flammability.
5. Agency Listing: CE, UL 60730-1A/-2-14, CAN/CSA E60730-1, CSA C22.2 No. 24-93, CE according to 89/336/EEC.

PART 3 EXECUTION

3.01 ACTUATORS

A. General: Mount actuators and adapters according to manufacturer's recommendations.

B. Electric and Electronic Damper Actuators.
1. Mount actuators directly on damper shaft or jackshaft unless shown as a linkage installation.
2. Link actuators according to manufacturer's recommendations.
3. For low-leakage dampers with seals, mount actuator with a minimum 5° travel available for damper seal tightening.
4. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately the 5° open position, manually close the damper, and then tighten linkage.
5. Check operation of damper-actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
6. Provide necessary mounting hardware and linkages for actuator installation.

C. Valve Actuators.
1. Connect actuators to valves with adapters approved by actuator manufacturer.

END OF SECTION 23 09 13.13

SECTION 23 09 13.23
BAS SENSORS AND TRANSMITTERS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 00, BAS Instrumentation and Control

B. SECTION 23 09 13, BAS Instrumentation and Control Devices

C. SECTION 23 09 13.13, BAS Sensors and Transmitters BAS Actuators and Operators

D. SECTION 23 09 13.33, BAS Control Valves

E. SECTION 23 09 13.43, BAS Control Dampers

F. SECTION 23 09 23, BAS Direct Digital Control System

1.02 REFERENCES

A. Refer to Section 23 09 00 - References

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Refer to Section 23 09 00 - Acronyms, Abbreviations and Definitions

PART 2 PRODUCT

2.01 SENSORS AND DEVICES

A. Input/output sensors and devices shall be closely matched to the requirements of the BAS controller for accurate, responsive, noise-free signal input/output. Control input response shall be high sensitivity and matched to the loop gain requirements for precise and responsive control.

B. Sensors and transmitters shall be manually calibrated on site so that the wiring length does not detract from the sensor accuracy specified.

C. Temperature sensors shall have the following characteristics:
   1. Sensors shall have +/- 1.0 °F accuracy between 32 °F and 212 °F. (Except Cold Box sensors: these sensors shall be capable of reading down to -10°F.)
   2. Space temperature sensors
      a. Shall consist of an element within a ventilated cover.
      b. Space sensors located in mechanical rooms and public shall contain a network jack, but shall have no ability to adjust temperature setpoint (Set Point Adjustment).
      c. Space sensors shall be provided in accordance with the drawings and specifications with the following options:
         1) Sensor complete with Network Jack
         2) Sensor complete with Network Jack, and Set Point Adjustment
         3) Sensor complete with Network Jack, and illuminated Override switch
         4) Sensor complete with Network Jack, Set Point Adjustment, and illuminated Override switch
         5) Sensor complete with Network Jack, Set Point Adjustment, illuminated Override switch and Fan Speed Selection.

D. RTD Transmitter
   1. Where reference is made on the drawings for a RTD transmitter, it shall be interpreted as follows:
   2. Transmitters shall meet at minimum the following requirements.
      a. Provide an RTD transmitter in configurations below meeting the following requirements:
         1) 100 ohm or 1000 ohm PT RTD
         2) 24V ac/dc power supply.
         3) 4-20 mA, 0-10Vdc or 0-5Vdc outputs compatible with BMS.

4) Electronics accuracy of +/-0.1% of span.
5) Operating temperature range of 32°F to 158°F. OSA only - operating temperature range of -40°F to 185°F.
6) Optional LCD display

E. Temperature Sensor – Outside Air
1. Provide outside air temperature sensors as indicated within the field termination schedules and/or controls diagrams.
2. Temperature sensors shall meet, at minimum, the following requirements:
a. Aluminum LB with PVC sun and windscreen.
b. Wall mount weatherproof enclosure with conduit entrance.
c. Thermistor or RTD compatible with BMS

F. Temperature Sensor – Duct Mounted – Single Point
1. Provide duct mounted, single point, temperature sensor as indicated within the field termination schedules and/or controls diagrams as follows:
a. In ducts less than 10 ft² in cross-sectional area.
b. In ducts greater than 10 ft² in cross-sectional area if there is no heating coil and no cooling coil and no mixing of air flows of different temperature upstream.
2. Temperature sensors shall meet, at minimum, the following requirements:
a. 0.25” stainless steel probe of length between one-third and two-thirds of the duct width.
b. Thermistor or RTD compatible with BMS, sealed in probe with 3 part moisture protection system.
c. Duct mounted ABS plenum rated housing with conduit entrance. (Optional metal, weather proof or no enclosure available)

G. Temperature Sensor – Duct Mounted – Averaging
1. Provide duct mounted, averaging, temperature sensor as indicated within the field termination schedules and/or controls diagrams as follows;
a. In ducts greater than 10ft² in cross-sectional area.
2. Temperature sensors shall meet, at minimum, the following requirements:
a. Probe length of 12 feet minimum or 1ft per ft² of duct cross-sectional area, whichever is greater.
b. Copper sheathed or plenum rated flexible construction.
c. Thermistor or RTD compatible with BMS.
d. BMS shall report the monitored temperature with an accuracy of 2.0°F
e. Duct mounted ABS plenum rated housing with conduit entrance. (Optional metal or weather proof available)
f. Suitable supports at all bends and at intermediate points to prevent movement in the air systems.

H. Temperature Sensor – Wall Mounted – Lobby, Hallways Or Security Spaces
1. Provide wall mounted stainless plate temperature sensors for lobbies and lobby vestibule spaces as indicated within the field termination schedules and/or control diagrams as follows.
2. Temperature sensors shall meet, at minimum, the following requirements:
a. Stainless plate sensors to fit 4” X 2” junction box, available with or without tamperproof screws.
b. Thermistor or RTD compatible with BMS.

I. Temperature Sensor – Immersion - Thermowell Mounted
1. Provide thermowell mounted temperature sensors as indicated within the Field termination schedules and/or control diagrams as follows.
2. All wetted surfaces in the process chilled water or DI reclaim system shall be 316 stainless steel.
3. Temperature sensors shall meet, at minimum, the following requirements:

a. Rigid 0.25” stainless steel probe of length, which is, at minimum, 20% of the pipe width.
b. Thermistor or RTD Compatible with BMS sealed in probe with three-part moisture protection system.
c. BMS shall report the monitored temperature with an accuracy of 1.0°F
d. ABS housing with conduit entrance. (Optional metal or weather proof available)
e. Provide Brass or Stainless steel thermowell (316 or 304).
f. Provide with thermal grease to aid temperature sensing.

J. Relative Humidity Sensor – Wall Mounted
1. Provide wall mounted relative humidity sensors as indicated within the Field termination schedules and/or control diagrams. Humidity sensors shall meet, at minimum, the following requirements:
a. White protective enclosure
b. Sensor to be laser trimmed thermoset polymer based capacitive type.
c. 24 Vac/dc power supply
d. 4-20 mA two wire, 0-10 Vdc and 0-5 Vdc output proportional to relative humidity range of 0% to 100% and compatible with BMS.
e. 2% accurate (5-95% RH). (3 & 5 % accurate units available)
f. Operating temperature range of 32°F to 158°F.
g. Reverse voltage protected and output limited.
h. Optional LCD display-SP and RH100A series
i. Optional set point adjustment-SP series
j. Optional push button override-RH100A series

K. Relative Humidity Sensor – Duct Mounted
1. Provide duct mounted relative humidity sensors as indicated within the Field termination schedules and/or control diagrams. Duct mounted relative humidity sensors shall meet, at minimum, the following requirements:
a. ABS housing with conduit entrance.
b. Sensor to be laser trimmed thermoset polymer based capacitive type.
c. 24 Vac/dc power supply.
d. 4-20 mA two wires, 0-10 Vdc and/or 0-5 Vdc output proportional to relative humidity range of 0% to 100% and compatible with BMS.
e. 2% accurate (5-95% RH). (3 & 5 % accurate units available)
f. 9” probe length.
g. Operating temperature range of 32°F to 158°F.
h. Reverse voltage protected and output limited.
i. 60 micron HDPE filter

L. Relative Humidity Sensor – Outside Air
1. Provide OSA relative humidity sensors as indicated within the Field termination schedules and/or control diagrams. Humidity sensors shall meet, at minimum, the following requirements:
a. ABS hinged weatherproof housing with conduit entrance.
b. Sensor to be laser trimmed thermoset polymer based capacitive type.
c. 24 Vac/dc power supply
d. 4-20 mA two wire, 0-10 Vdc and 0-5 Vdc output proportional to relative humidity range of 0% to 100% and compatible with BMS.
e. 2% accurate (5-95% RH).
f. Operating temperature range of 32°F to 185°F.
g. Reverse voltage protected and output limited.

M. Combination Relative Humidity And Temperature Sensors
1. Where there is a requirement for the monitoring of both relative humidity and temperature at the same location, the BMS Contractor shall provide a combination relative humidity

sensor and temperature sensor. The individual sensors must each meet the specifications details above.

N. Static Pressure Sensor – Duct Mounted
   1. Provide duct mounted static pressure sensors as indicated within the Field termination schedules and/or control diagrams. Static pressure sensors shall meet, at minimum, the following requirements:
      a. Input range shall be appropriate for the application. Select range such that it covers from zero duct static pressure relative to the exterior of the duct up to a static pressure of between 20% and 50% in excess of the maximum static pressure that could be encountered in the duct relative to the duct exterior. Typically, for low pressure commercial duct consider using a range of 0 to 2” wc., for medium pressure duct use a range of 0 to 6” wc. and for high-pressure duct use a range of 0 to 10” wc.
      b. 4-20mA, 0-5 or 0-10Vdc output proportional to pressure input range compatible with BMS system.
      c. 1% Full scale output accuracy
      d. Operating temperature range of 32°F to 140°F.
      e. Easily accessible, integral non-interacting zero adjustment.
      f. Minimum over pressure input protection of two times rated input or 20 psi whichever is greater.

O. Room Pressure Sensor
   1. Provide space static pressure sensors as indicated within the Field termination schedules and/or control diagrams. Static pressure sensors shall meet, at minimum, the following requirements:
      a. Input range of -0.2” to + 0.2” wc.
      b. 4-20mA, 0-5 or 0-10Vdc output proportional to pressure input range compatible with BMS system.
      c. 1% accuracy of range
      d. Operating temperature range of 0°C to 60°C.
      e. Operating temperature range of 32°F to 140°F.
      f. Easily accessible, integral non-interacting zero adjustment.
      g. Minimum over pressure input protection of two times rated input or 20 psi whichever is greater.

P. Differential Pressure Sensor – Air (Filter/Coil Monitoring)
   1. Provide air differential pressure sensors as indicated in field termination schedules and/or control diagrams. Air differential pressure sensor shall meet, at minimum, the following requirements:
   2. Sensors used for filter or coil differential pressures shall also have a display of the monitored differential pressure.
   3. Output shall be 4-20mA, 0-10Vdc or 0-5Vdc output proportional to pressure input range compatible with BMS.
   4. Select range as required, taking into consideration pressure drop across filter or coil. Typically 0-2” wc range for low-pressure commercial duct.
   5. Operating temperature range of 32°F to 140°F.

Q. Differential Pressure Switch – Air
   1. Provide air differential pressure switches as indicated in field termination schedules and/or control diagrams. Air differential pressure switches shall meet, at minimum, the following requirements:
      a. An IP54 (NEMA 13) polycarbonate housing.
      b. SPDT switch rated at 250 Vac at 1 amp.
      c. Field adjustable range from 0.02” wc to max range of device. Select range as required, taking into consideration pressure drop across filter or coil. Typically 0.2-2” wc range for low-pressure commercial duct.

d. Temperature range of -4°F to 140°F.
e. Set point adjustment knob with indication.
f. Automatic reset.

R. Air Flow Sensor
1. Provide airflow rate sensors and transducers as indicated in the Field termination schedules and/or control diagrams. Air flow rate sensors and transducer shall meet, at minimum, the following requirements:
a. Hot wire anemometer type.
b. Self-compensation for changes in air temperature.
c. Probe and transducer housing shall be constructed of durable PVC.
d. Probe shall be adjustable from 2” - 7.3”.
e. Power supply shall be 24 Vac/dc.
f. Output signal of 4-20 mA or 0-10Vdc proportional to air flow speed equal to 3150 ft/min or 1575 ft/min jumper selectable.
g. Air temperature range of 14°F to 140° F.
h. 5% accuracy of measured value.

S. Water Pressure Sensor (Process Chilled Water System)
1. Pressure transmitter/indicators shall be gas compressed air service, gage pressure measuring type units with a fully configurable LCD display and high alarm. Pressure measurement range shall be -14.7 to 150 PSIG. Unit process connector shall be 1/2-14 NPT female, 316L SS (CF-3M) material and the isolating diaphragm shall be 316L SS (alloy C276). Fill fluid shall be silicone oil. Provide 4-20 MA DC linear output with digital hart protocol. The transmitter electronics housing shall be NEMA 4x rated, low copper aluminum body with a polyurethane coating and (2) 1/2-14 FNPT conduit connections. Housing cover O-rings shall be buna-N. Rosemont model 2088g or approved equal.

T. Water Pressure Sensor (other than Process Chilled Water)
1. Provide water pressure sensors as indicated within the Field termination schedules and/or control diagrams. Pressure sensors shall meet the following requirements:
a. All wetted surfaces in the process chilled water or DI reclaim system shall be 316 stainless steel.
b. Operating range shall be suitable for the application. Select range such that it covers from zero pressure to twice the amount of pressure desired for control purposes or that could be encountered.
c. 4-20 mA output proportional to water pressure.
d. 0.25% accuracy of range.
e. Temperature range of -40°F to 260°F.
f. Over pressure input protection of a minimum two times rated input.
g. An optional ABS wiring housing is available for an interior application and weatherproof wiring housing is available for an exterior application.
h. 17-4PH stainless steel wetted parts.
i. Burst pressure of a minimum five times rated input.

U. Water Differential/Gage Pressure Sensor
1. Provide water differential or gage pressure sensors as indicated in the Field termination schedules and /or control diagrams. Water differential pressure sensors shall meet, at minimum, the following requirements:
a. All wetted surfaces in the process chilled water or DI reclaim system shall be 316 stainless steel.
b. Output of 4-20 mA, 0-10 or 0-5 Vdc proportional to the pressure sensed.
c. Momentary over pressure protection of five times the rated input.
d. Operating range shall be suitable for the application. Select range such that it covers from zero differential pressure up to a differential static pressure of 20% to 50% in excess of the maximum static pressure that could be encountered. Remember that if

the sensor is used for the control of a chilled water bypass and is located across, for example, a chilled water AHU coil, the pressure drop of both the coil and the associated valve at full design flow have to be taken into account.

e. Accuracy of better than 1% of full-scale reading.
f. Valve tapping shall be furnished and installed by the Mechanical contractor. Coordinate with the Mechanical contractor.

V. Current Relay/Switch
1. Provide current sensing relays as indicated in the Field termination schedules and/or control diagrams. Current sensing relays shall meet, at minimum, the following specifications:
   a. Rated for the applicable load.
   b. The output relay shall have an accessible trip adjustment over its complete operating range. Provide LED indication of relay status.
   c. Current relay shall have input and output isolation via current transformer.
   d. Current relay shall be self-powered with no insertion loss.
   e. Relay shall be in a dustproof housing.
   f. Accuracy to be <2% of full-scale max.
   g. Temperature rating of 5°F to 140°F.
   h. Whenever the status of a single speed motor is monitored it shall be done via a current sensing relay.
   i. The BMS contractor shall provide current sensing relays at the MCC starters.
   j. The BMS contractor shall provide the current sensing relays for motors with local starters and no MCC starter.

W. Current Sensor
1. Provide monitoring of the current as identified in Field termination sheets and/or control drawings. Current monitoring shall meet, at minimum, the following requirements:
   a. 4-20 mA, 0-10 or 0-5 Vdc output proportional to current draw.
   b. Reverse polarity protected and output limited.
   c. 50/60 Hz operation.
   d. Accuracy of better than 1%.
   e. Operating temperature range of -20°F to 120°F.

X. Leak Detection Monitoring – Water
1. Provide water leak monitoring as identified within the Field termination schedules and/or control diagrams. Water leak detection monitors shall meet, at minimum, the following requirements:
   a. Corrosion and abrasion resistant.
   b. Adjustable height-single point model
   c. Configured for normally open or normally closed as required by the application.
   d. Form C output relay rated at 5 am/s @ 120 Vac / 30 Vdc.
   e. Operating temperature range of -40°F to 185°F.
   f. Optional remote mount probe and water sensing cable available in different lengths.

Y. Combination Room Temperature Sensor
1. Occupant-focused, communicating room sensor, providing precise temperature sensing, and optional lighting and shade/blind controls, for an all-in-one room device
   a. Device shall be a combination temperature sensor and input array that communicates with field controller.
   b. On board temperature sensor
      1) Range of 41°F to 104°F.
      2) Accuracy of 0.9°F.
      3) Resolution of 0.18°F.
   c. Dual connector ports for field controller connection shall support both power and communication, with provision for “daisy-chain” connection, so that more than one

communicating sensor can be used with a single field controller. Dual connector ports shall be female RJ45 ports, and shall be compatible with standard Ethernet pinout T568B.

d. Hardware options in combinations in any and all of the following:
    1) Temperature Setpoint Offset Adjustment
        (a) “Infinite” Rotary Knob for setpoint offset
        (b) LED Indication for setpoint offset: 3 Blue LEDs, 1 White LED, 3 Red LEDs
        (c) LED indication can be reset regardless of knob position, to allow for nightly setpoint reset for example.
    2) LED Indicator for Occupancy
    3) “Infinite” Rotary Knob for fan speed adjustment
        (a) LED Indication for fan speed adjustment: 5 LEDs corresponding to Fan settings of Auto, I, II, III, and Off
        (b) LED indication can be reset regardless of knob position, to allow for nightly change to automatic fan speed, for example.
    4) Available support for 8 digital inputs
        (a) Support for dry contact signal from devices such as maintained or momentary switches
        (b) Field wiring shall make use of on-board signal wiring “whip”, to make best use of field connections without the need for screw terminals.
    5) Available support for up to 4 compact attachable modules. Attachable modules shall attach and be electronically connected with communicating sensor without the use of any field wiring. Each attachable module shall consume 2 digital inputs, as described above. Attachable modules shall be of the following types:
        (a) Lighting module, for use with 1 lighting zone; Lighting module shall have engraved icons for indication of usage.
        (b) Blind control module, for use with 1 group of window blinds or shades; Blind control module shall have engraved icons for indication of usage.

Z. Discrete Combination Sensor
1. Discrete communicating sensor combining precise environmental sensing – temperature, humidity and CO2- ideal for applications requiring no occupant driven overrides
2. Dual connector ports for connection to field controller shall support both power and communication, with provision for “daisy-chain” connection, so that more than one communicating sensor can be used with a single field controller.Dual connector ports shall be female RJ45 ports, and shall be compatible with standard Ethernet pinout T568B.
3. Hardware options in combinations of any and all of the following
    a. On board temperature sensor
        1) Range of 41°F to 104°F.
        2) Accuracy of 0.9°F.
        3) Resolution of 0.18°F.
    b. On-board humidity sensor:
        1) Accuracy of 3% RH
        2) Resolution of 1% RH
    c. Carbon Dioxide sensor:
        1) Range of 0-2000 ppm
        2) Operating Elevation 0-16000 ft
        3) Accuracy of 30 ppm in range of 400-1250 ppm, or 3% of reading, whichever is higher
        4) Accuracy of 30ppm +/- 5% of reading in range of 1250 to 2000 ppm
        5) Sensing Method of Non-Dispersive Infrared (NDIR) Absorption with gold-plated optics
        6) Periodic, automatic self-calibration using patented ABC Logic
4. Continuous operating temperature of standard versions shall be 221°F [105°C].

5. Enclosure shall be NEMA-6P [IP 68]v

PART 3 EXECUTION

3.01 INSTALLATION OF SENSORS

A. Install sensors according to manufacturer's recommendations.

B. Mount sensors rigidly and adequately for operating environment.

C. Install room temperature sensors on concealed junction boxes properly supported by wall framing.

D. Air seal wires attached to sensors in their raceways or in the wall to prevent sensor readings from being affected by air transmitted from other areas.

E. Use averaging sensors in mixing plenums and hot and cold decks. Install averaging sensors in a serpentine manner vertically across duct. Support each bend with a capillary clip.

F. Install mixing plenum low-limit sensors in a serpentine manner horizontally across duct. Support each bend with a capillary clip. Provide 1 ft. of sensing element for each 1 ft2 of coil area.

G. Install pipe-mounted temperature sensors in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.

H. Install outdoor air temperature sensors on north wall at designated location with sun shield.

I. Differential Air Static Pressure.
   1. Supply Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
   2. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
   3. Building Static Pressure. Pipe pressure sensor's low-pressure port to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe high-pressure port to a location behind a thermostat cover.
   4. Piping to pressure transducer pressure ports shall contain a capped test port adjacent to transducer.
   5. Pressure transducers, except those controlling VAV boxes, shall be located in control panels, not on monitored equipment or on ductwork. Mount transducers in a vibration-free location accessible for service without use of ladders or special equipment.
   6. Mount gauge tees adjacent to air and water differential pressure taps. Install shut-off valves before tee for water gauges.

J. Smoke detectors, high and low limit thermostats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.

K. Flow Switch Installation
   1. Use correct paddle for pipe diameter.
   2. Adjust flow switch according to manufacturer's instructions.

L. Flow Sensors
   1. Insert-style Impeller Flow Sensor, Liquid
      a. All wetted surfaces in the process chilled water or DI reclaim system shall be 316 stainless steel.
      b. Follow manufacturer’s recommendation for installation and conform to the guidelines provided by the Installation & Operation Manual.
      c. Straight pipe requirement for mounting shall be 10 diameters up stream and 5 downstream.
      d. Sensor shall be located with the least possible circumferential displacement from top-center of pipe; any circumferential location in vertical pipes is acceptable.
      e. Sensor mounted in 2" NPT tap in either pipe saddle or weld on fitting.

f. An insertion depth of 1 1/2" for pipe sizes 2.5" and larger is required for accurate flow monitoring.
g. Sensor orientation shall be such that flow arrow on sensor is aligned with flow direction.

2. Electromagnetic Flow Meter, Liquid
   a. All wetted surfaces in the process chilled water or DI reclaim system shall be 316 stainless steel and shall be manufacturered by Endress+Hauser Promag W 500 Electromagnetic Flow meter.
   b. Follow manufacturer's recommendation for installation. Installation will conform to the guidelines provided by the Installation & Operation Manual.
   c. Straight pipe requirement shall be an equivalent of three diameters on the inlet (upstream) side, and two diameters on the outlet (downstream) side.
   d. For best performance, place meter vertically, with liquid flowing upward and meter electrodes in a closed, full pipe.

END OF SECTION 23 09 13.23

SECTION 23 09 13.43
BAS CONTROL DAMPERS

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 00, BAS Instrumentation and Control
B. SECTION 23 09 13, BAS Instrumentation and Control Devices
C. SECTION 23 09 13.13, BAS Actuators and Operators
D. SECTION 23 09 13.23, BAS Sensors and Transmitters
E. SECTION 23 09 13.33, BAS Control Valves
F. SECTION 23 09 23, BAS Direct Digital Control System

1.02 REFERENCES

A. Refer to Section 23 09 00 - References

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Refer to Section 23 09 00 - Acronyms, Abbreviations and Definitions

PART 2 PRODUCT

2.01 AUTOMATIC CONTROL DAMPERS

A. Manufacturer shall submit leakage data for all control dampers with the temperature con Dampers shall be minimum leakage type to conserve energy and the temperature control trol submittal.
B. Damper leakage ratings shall be certified in accordance with AMCA Standard 500-D.
C. Provide any automatic control dampers not specified to be integral with other equipment.
D. Provide automatic control dampers as specified herein:
    1. Frame construction shall not be less than 14 gauge galvanized steel or extruded aluminum at a minimum 4-1/2” X 1” X 0.125” in thickness.
    2. Blades shall be single skin and not less than 16-gauge galvanized steel roll formed or extruded aluminum. Blades shall not be over: 8” wide, 48” in length and 72” high.
    3. All blade edges and top and bottom of frame shall be provided with compressible seals. Side seals shall be compressible stainless steel of the tight-seal spring type.
    4. Blade seals shall provide for a maximum leakage rate of 10 CFM per square foot at 2.5 inches of WC differential pressure. Dampers and seals shall be suitable for temperature ranges of -40 to 180 °F.
    5. Bearings shall corrosion resistant, molded synthetic sleeve type turning in an extruded hole in the damper frame.
    6. Axles shall be a minimum of ½” diameter and be welded to blade or riveted to blade
    7. Dampers shall be sized to meet flow requirements of the application. The sheet metal contractor shall furnish and install baffles to fit the damper to duct size. Baffles shall not exceed 6".
    8. Where ultra-low leakage dampers are specified the blade edges shall be fitted with replaceable, snap-on, inflatable seals to limit damper leakage to 6 CFM per square foot for dampers in excess of sixteen inches square at 1 inch of WC.
    9. Individual damper sections shall not be larger than 48” X 60”. Provide a minimum of one damper actuator per section.
    10. All proportional control dampers shall be opposed or parallel blade type as hereinafter specified and all two-position dampers shall be parallel blade types.
    11. Combination automatic smoke control dampers, where indicated on the plans, shall conform to the UL555S Leakage Class specified.

PART 3 EXECUTION

3.01 CO-ORDINATION

A. Coordinate delivery of dampers to site.

B. Clearly tag and mark dampers for their purpose and location.

C. Supervise Mechanical Contractor in the installation of the dampers ensuring proper dampers(s) are located and installed in proper location(s)

END OF SECTION 23 09 13.43

SECTION 23 09 13
BAS INSTRUMENTATION AND CONTROL DEVICES

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 00, BAS Instrumentation and Control

B. SECTION 23 09 13.13, BAS Actuators and Operators

C. SECTION 23 09 13.23, BAS Sensors and Transmitters

D. SECTION 23 09 13.33, BAS Control Valves

E. SECTION 23 09 13.43, BAS Control Dampers

F. SECTION 23 09 23, BAS Direct Digital Control System

1.02 REFERENCES

A. Refer to Section 23 09 00 - References

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Refer to Section 23 09 00 - Acronyms, Abbreviations and Definitions

PART 2 PRODUCT

2.01 COMPUTER HARDWARE

A. General Description:
   1. The computer shall consist of commercially available general-purpose equipment manufactured by a recognized manufacturer with factory authorized service centers within 75 miles of the job site.
   2. The server shall be provided for centralized system control, information management, alarm management and data base management functions.
   3. All real time control functions shall be resident in the standalone Network Control Unit (NCU) and local controllers (LCUs and TCUs).

B. Provide a Server as detailed herein complete with software, as described in Section 23 09 13.

C. Provide Operator workstations as detailed herein complete with software, as described in Section 23 09 13

D. The system shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 32 simultaneous users. The BAS shall be provided with a minimum of 32 user licenses.

E. Provide three copies of all Programming Software required for programming LCUs and TCUs as described herein.

F. Any computer with access to the BAS LAN shall be capable of displaying the systems in a graphical and dynamic format utilizing a standard web browser. Screen refresh shall be automatic. Manual refresh is not acceptable

2.02 SERVER HARDWARE REQUIREMENTS

A. The Server shall be a PC with minimum Intel Core i5 Quad core 3.4 GHz processor with 8 GB RAM and a 1TB SATA hard drive with 6 GB/s transfer rate. It shall include a minimum 32X CD-ROM drive and 4-USB 3.0 ports. A minimum 21”, HDMI, DVI-D video interfaces, minimum 1024 x 768 resolution, 4x3 Widescreen, LED color monitor with a minimum 60 Hz refresh rate shall also be included.

B. The server operating system
   1. shall be one of:
      a. Windows 10 Pro 64bit
      b. Windows 10 Enterprise 64bit

2. With VM support
3. With the most recent service packs and system updates.
4. Selected based on availability and project requirements.

C. Latest version of Symantec Antivirus Software that includes a 3 year subscription service to the Symantec software.

D. Acceptable Manufacturers are:
1. Dell
2. Lenovo
3. HP (Hewlett Packard)

E. Connection to the BAS LAN network shall be via an Ethernet network interface card, 100 Mbps.

F. The server shall support all Network Control Units (NCU), OWSs, and 3rd party mechanical / electrical systems connected to the Facility Management Control / Building Automation System Local Area Network.

2.03 UNINTERRUPTABLE POWER SUPPLIES

A. Provide the OWS, Server, and each NCU with individual UPS to provide clean, reliable, noise-filtered power at all times and to protect and maintain systems operation throughout short term power interruptions of up to 15 minutes duration.

B. Acceptable Manufacturer is APC.

2.04 OPERATOR SOFTWARE

A. The software shall employ browser-like functionality for ease of navigation.
1. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database.
2. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills.
a. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.
b. Tagging.

B. An alternate Identification mechanism for advanced or simple query of the EMCS system.

C. Real-Time Displays.
1. Provide a visual graphical representation of buildings, floor layouts, each piece of mechanical equipment and/or mechanical system that duplicates the represented system, presented as a web page via any industry standard web browser, where applicable.
a. Graphics shall include at a minimum the value of each input, each output, each setpoint, alarms and graphical representation of trend logs.
b. The graphic shall provide for the ability to command each point, including both timed and permanent overrides.
c. Provide for all information represented in the graphics in an associated graphical table with links to the equipment graphics and command-able points.
d. Sample graphics shall be provided as part of the submittals for approval by owner.

D. The Operator software, shall at a minimum, support the following graphical features and functions:
1. Graphic screens shall be developed using GIF, PNG, JPG or ICO file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures.
2. Graphic screens shall have the capability to contain objects for text, real-time values, animation, colour spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URLs, and links to other graphic screens.

3. Graphics shall support layering and each graphic object shall be configurable for assignment to one a layer. A minimum of six layers shall be supported.

E. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
   1. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
   2. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

F. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

G. Right-clicking the selected object and using a graphical slider to adjust the value shall make adjustments to analog objects, such as set points. No entry of text shall be required.

H. System Configuration.
   1. At a minimum, the Operator software shall permit the operator to perform the following tasks, with proper password access:
      a. Create, delete or modify control strategies.
      b. Add/delete objects to the system.
      c. Tune control loops through the adjustment of control loop parameters.
      d. Enable or disable control strategies.
      e. Generate hard copy records or control strategies on a printer.
      f. Select points to be alarm-able and define the alarm state.
      g. Select points to be trended over a period of time and initiate the recording of values automatically.

I. On-Line Help.
   1. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system.
      a. On-line help shall be available for all applications and shall provide the relevant data for that particular screen.
      b. Additional help information shall be available through the use of hypertext.
      c. All system documentation and help files shall be in HTML format.

J. Security.
   1. Each operator shall be required to log on to that system with a user name and password in order to view, edit add, or delete data.
   2. System security shall be selectable for each operator.
   3. The system administrator shall have the ability to set passwords and security levels for all other operators.
   4. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object.
   5. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected.
   6. This auto log-off time shall be set per operator password.
   7. All system security data shall be stored in an encrypted format.

K. System Diagnostics.
   1. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers.
   2. The failure of any device shall be annunciate to the operator.

L. Alarm Console.
   1. The system shall be provided with a dedicated alarm window or console.

a. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm.
b. The use of the Alarm Console can be enabled or disabled by the system administrator.
    1) When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator.
c. This window will notify the operator of new alarms and un-acknowledged alarms.
d. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

M. Operator’s software shall contain an easy-to-operate system; allowing configuration of system-wide controllers, including management and display of the controller programming.
    1. This system shall provide the capability to configure controller binary and analog inputs/outputs.

N. The system shall be capable of utilizing third-party Windows-based programs for such things as spreadsheet analysis, graphing, charting, custom report generation, and graphics design packages.
    1. Graphics generation shall be done using standard Windows packages.
    2. No proprietary graphics generation software shall be needed.

O. Provide software, which enables the non-programmer operator to easily perform, tasks which are likely to be part of his daily routine.

P. The operator's console shall provide facilities for manual entries and visual displays enabling an operator to enter information into the system and obtain displays and logs of system information.
    1. All requests for status, analog, graphic displays, logs, and control shall be selected from the operator's console.
    2. The operator interface shall minimize the use of typewriter style keyboard by implementing a mouse or similar pointing device and "point and click" approach to command selection.
    3. The facility shall be provided to permit the operator to perform the following tasks:
        a. Automatic logging of digital alarms and change of status message.
        b. Automatic logging of all analog alarms.
        c. System changes (alarm limits, set-points, alarm lock-outs, etc.).
        d. Display specific points as requested by the operator.
        e. Provide reports as requested by the operator and on Scheduled basis where so required.
        f. Display graphics as requested by the operator.
        g. Display of help information.
        h. Provide trend logs as required by the operator.
        i. Provide manual control of digital and analog outputs as required by the operator.
        j. Direct the hard copy output of information to the device selected by the operator.
        k. Data displayed on monitor to cyclic update as appropriate.

Q. Online changes:
    1. Alarm limits.
    2. Setpoints.
    3. Dead-bands
    4. Changes/deletions/additions of points.
    5. Control and change of state changes.
    6. Time of day, day, month, year.
    7. Control loop control description changes for NCU based CDM's.
    8. Control loop tuning changes
    9. Schedule changes

10. Changes/additions/deletions to system graphics
11. Changes/additions/deletions to total systems

R. It shall be possible for the operator to override automatic analog and digital output commands.
   1. Where the BAS software normally originates these outputs, the provision shall exist for the operator to terminate automatic BAS control of any particular output and to originate a manual analog or digital output command.
   2. The provision shall exist for the operator to return analog or digital output command functions to automatic BAS software control.
   3. It shall be possible for the operator to place any computed system setpoint to a computed basis as and when required.
   4. All above functions shall operate under the password protection system.

S. A vocabulary of at least 25 different descriptions using at least six alphanumeric characters to identify engineering units for analog input and output points. Typical description is as follows: %, °C, KPA, KW, KWH, L/S, CFM, °F, and PSI.
   1. The descriptions shall be alterable from the OWS console with the system on-line.

T. Upon operator's request, the system shall present the condition of any single point, any system, and area or the whole system on printer or Monitor.
   1. The output device shall be by operator's choice.
   2. Analog values and status displayed on the Monitor shall be updated whenever new values are received.
   3. Points in alarm shall be flagged by blinking, inverse video different colour, bracketed, or by some other means to differentiate them from points not in alarm.

U. Error Messages
   1. Inform operator of all errors in data, errors in entry instructions, failure of equipment to respond to requests or commands, or failure of communications between components of BAS.
   2. Error messages to be comprehensive and communicate clearly to operator precise nature of problem.

V. Password Protection
   1. Provide security system that prevents unauthorized use unless operator is logged on.
      a. Access shall be limited to operator’s terminal functions unless user is logged on, including displays as outlined above.
   2. Each operator’s workstation shall provide security for 100 users minimum.
      a. Each user shall have an individual User ID, User Name and Password.
      b. Entries are alphanumeric characters only and are case sensitive (except for User ID).
      c. User ID shall be 8 characters,
      d. User Name shall be a maximum of 29 characters, and Password shall be a maximum of 8 characters long.
      e. Each system user shall be allowed individual assignment of only those control functions and menu items to which that user requires access.
      f. All passwords, user names, and access assignments shall be adjustable online at the operator’s terminal.
      g. Each user shall also have a set security level, which defines access to displays and individual objects the user may control.
      h. System shall include 10 separate and distinct security levels for assignment to users.

W. Trend Data
   1. System shall periodically gather historically recorded selected samples of object data stored in the field equipment (global controllers, field controllers) and archive the information on the operator’s workstation (server) hard disk.
      a. Archived files shall be appended with new sample data, allowing samples to be accumulated over 3 years.

b. Systems that write over archived data shall not be allowed, unless limited file size is specified.
c. Samples may be viewed at the operator's terminal in a trend log.
d. Logged data shall be stored in spreadsheet format.
e. Operator shall be able to scroll through all trend log data.
f. System shall automatically open archive files as needed to display archived data when operator scrolls through the data vertically.
g. All trend log information shall be displayed in standard engineering units.

2. Software shall be included that is capable of graphing the trend logged object data. Software shall be capable of creating two-axis (x,y) graphs that display up to six object types at the same time in different colours and these Graphs shall show object type value relative to time.
3. Operator shall be able to change trend log setup information.
   a. This includes the information to be logged as well as the interval at which it is to be logged.
      1) Minimum interval of 1 minute.
   b. All input, output, and value object types in the system may be logged.
   c. All operations shall be password protected.
   d. Setup and viewing may be accessed directly from any and all graphics object is displayed on.
4. System shall be capable of periodically gathering energy log data stored in the field equipment and archive the information on the operator workstation's hard disk.
   a. Archive files shall be appended with the new data, allowing data to be accumulated over several years.
   b. Systems that write over archived data shall not be allowed unless limited file size is specified.
   c. System shall automatically open archive files as needed to display archived data when operator scrolls through the data.
   d. Display all energy log information in standard engineering units.
5. System software shall be provided that is capable of graphing the energy log data. Software shall be capable of creating two-axis (x,y) graph that show recorded data, relative to time.
   a. All data shall be stored in spreadsheet format for direct use by third-party spreadsheet or other database programs.
   b. Operation of system shall not be affected by this operation.
6. Operator shall be able to change the energy log setup information.
   a. Including the meters to be logged, meter pulse value, and the type of energy units to be logged.
   b. All meters monitored by the system may be logged.
   c. All operations shall be password protected.

X. Graphics
1. The operator's workstation shall display all data associated with the project.
   a. The operator's terminal software shall accept, GIF, PNG, JPG and ICO format graphic files for display purposes.
   b. Graphic files shall be created using scanned, full colour photographs of system installation, AutoCAD or Visio drawing files of field installation drawings and wiring diagrams from as-built drawings.
   c. Operator's workstation shall display all data using 3-D graphic representations of all mechanical equipment.
   d. Displays can be used as templates to produce other displays
2. System shall be capable of displaying graphic file, text, and dynamic object data together on each display.

   a. Information shall be labelled with descriptors and shall be shown with the appropriate engineering units.
   b. All information on any display shall be dynamically updated without any action by the user.
   c. Terminal shall allow user to change all field-resident BAS functions associated with the project, such as setpoints, weekly schedules, exception schedules, etc. from any screen no matter if that screen shows all text or a complete graphic display.
   d. This shall be done without any reference to object addresses or other numeric/mnemonic indications.
3. All displays shall be generated and customized in such a manner by the local DDC system supplier that they fit the project as specified.
   a. Canned displays shall not be acceptable.
   b. Displays shall use Standard English for labelling and readout.
   c. Systems requiring factory programming for graphics are specifically prohibited.
   d. The installing contractor without factory dependency or assistance shall support all graphics and DDC programming locally.
4. Binary objects shall be displayed as ON/OFF/NULL or with customized text.
   a. Text shall be justified left, right or centre as selected by the user.
   b. Allow binary objects to be displayed as individual change-of-state bitmap objects on the display screen such that they overlay the system graphic.
   c. Each binary object displayed in this manner shall be assigned up to three bitmap files for display when the point is ON, OFF or in alarm.
   d. For binary outputs, toggle the objects commanded status when the bitmap is selected with the system digitizer (mouse). Similarly, allow the terminal operator to toggle the object's status by selecting (with the mouse) a picture of a switch or light, for example, which then displays a different picture (such as an ON switch or lighted lamp).
   e. Additionally, allow binary objects to be displayed as an animated graphic.
5. Animated graphic objects shall be displayed as a sequence of multiple bitmaps to simulate motion.
   a. For example: when a pump is in the OFF condition, display a stationary picture of the pump. When the operator selects the pump picture with the mouse, the represented objects status is toggled and the picture of the pumps impeller rotates in a time-based animation.
   b. The operator shall be able to click on an animated graphical object or switch it from the OFF position to ON, or ON to OFF.
   c. Allow operator to change bitmap file assignment and also create new and original bitmaps online.
   d. System shall be supplied with a library of standard bitmaps, which may be used unaltered or modified by the operator.
   e. Systems that do not allow customisation or creation of new bitmap objects by the operator (or with third-party software) shall not be allowed.
6. Analog objects shall be displayed with operator modifiable units.
   a. Analog input objects may also be displayed as individual bitmap items on the display screen as an overlay to the system graphic.
   b. Each analog input object may be assigned to a minimum of five bitmap files, each with high/low limits for automatic selection and display of the bitmaps.
   c. As an example, a graphic representation of a thermometer would rise and fall in response to either the room temperature or its deviation from the controlling setpoint.
   d. Analog output objects, when selected with the mouse, shall be displayed as a prompted dialog (text only) box.
   e. Selection for display type shall be individual for each object.

f. Analog object values may be changed by selecting either the increase or decrease arrow in the analog object spinner box without using the keypad.

7. Analog objects may also be assigned to an area of a system graphic, where the colour of the defined area would change based on the analog objects value.
   a. For example, an area of a floor-plan graphic served by a single control zone would change colour with respect to the temperature of the zone or its deviation from setpoint.
   b. All editing and area assignment shall be created or modified online using simple icon tools.
8. A customized menu label (push-button) shall be used for display selection.
   a. Menu items on a display shall allow penetration to lower level displays or additional menus.
   b. Dynamic point information and menu label push buttons may be mixed on the same display to allow sub-displays to exist for each item.
   c. Each display may be protected from viewing unless operator has appropriate security level.
   d. A separate security level may be assigned to each display and system object.
9. A mouse, or other form of digitizer, shall be used to move the pointer arrow to the desired item for selection of new display or to allow the operator to make changes to object data.
10. Separate Displays shall be supplied, specific to the project, to form the following overall presentation style.
    a. The presentation will contain displays for:
       1) Site Overview
       2) Specific Building(s)
       3) Floor plates within Building(s)
       4) Each controlled Zone
       5) Each controlled System or Sub-System
    b. All Displays will be linked in a logical fashion using hyperlink style (single left mouse click on text/display object/dynamic to load linked display if programmed)
       1) Clicking on a building in the Site Overview displays the specific building display.
       2) Clicking on a floor, displays the floor plate display
       3) Clicking on a zone, displays the specific control system for that zone.
       4) Clicking on a specific system or sub-system coarse representation at the floor plate display level displays a detailed presentation of the system or sub-system.
11. Entire system shall operate without dependency on the operator's terminal. Provide graphic generation software at each workstation.

Y. Alarms
1. Operator’s terminal shall provide audible, visual, electronic and printed means of alarm indication.
2. Any alarm may be handled based on its individual or assigned class actions.
   a. Actions are, but not limited to
      1) Displayed on the Alarm console.
         (a) The system shall be provided with a dedicated alarm window or console.
         (b) This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm.
         (c) The use of the Alarm Console can be enabled or disabled by the system administrator.
         (d) When the Alarm Console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator.
         (e) This window will notify the operator of new alarms and un-acknowledged alarms.

(f) Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.
(g) Printout of alarms shall be sent to the assigned terminal and port.
(h) Delivery by electronic mail (e-mail).
(1) Sent via e-mail to one or more recipients.
(i) Printed.
(1) Printed on local or network printer

3. System shall provide log of alarm messages. Alarm log shall be archived to the hard disk of the system operator's terminal.
   a. Each entry shall include a description of the event-initiating object generating the alarm, time and date of alarm occurrence, time and date of object state return to normal, and time and date of alarm acknowledgement.
4. Alarm messages shall be in user-definable text English or other specified language) and shall be entered either at the operator's terminal or via remote communication.

Z. Scheduling
1. Operator's terminal display of weekly schedules shall show all information in easy-to-read 7-day (weekly) format for each schedule.
   a. This includes all ON/OFF times (to the minute) for each day's events.
2. Exception schedules (non-normal schedules, such as holidays or special events) shall display all dates that are an exception to the weekly schedules.
   a. These speciality schedules shall be displayed at the operator's terminal in a format similar to the weekly schedules, again allowing easy data entry.
   b. Exception schedule data is entered by the following methods:
      1) date entries (one day entries)
      2) date-to-date (a range or span of days)
      3) by weekday (for example, a given day of a given week each month)
   c. User shall be able to scroll easily through the months for each year as a minimum.
3. At the operator's terminal, the system user shall be able to change all information for a given weekly or exception schedule if logged on with the appropriate security access.

AA. Archiving
1. Store back-up copies of all controller databases in at least one OWS and the server.
2. Provide continuous supervision of integrity of all controller databases.
   a. Data base back up and downloading to occur over LAN without operator intervention.
3. Operator to be able to manually download entire controller database or parts thereof.

BB. Reports
1. Provide a report facility to generate and format for display, printing, or permanent storage, as selected by the operator, the reports as specified in this section.
   a. If display output (Monitor) is requested, it shall be scrollable; scroll bars will be used to allow easy and flexible movement within the report.
   b. Output to be sorted by area, system point.
2. Periodic/Automatic Report:
   a. Provide the software to automatically generate any report specified; the user will be able to specify the type of report, start time and date, interval between reports (hourly, daily, weekly, monthly) and output device.
   b. The software will allow the operator to modify the periodic/automatic reporting profile at any time.
3. As a minimum, the following reports shall be configured on the system:
   a. Dynamic Reports: To allow operator to request a display of the dynamic value for the user specified points which shall indicate the status at the time the request was entered and updated at an operator modifiable scan frequency and it shall be possible to select points on the following basis:

1) All points in all areas
2) Area (all points in area)
3) Area system (all points in system)
4) Area system point (individual point)
5) System (all points by system and point type)
6) System point (all points by system and point type)
7) Area point (all points by area and point type).

b. Summary Report:
   1) To permit the display or printing of the dynamic values for the user specified points.
      (a) Reports to be available on same basis as dynamic reports.
      (b) Output will be to the user selected output device.

c. Trend Reports:
   1) To permit the trending of points selected by the operator, including as a minimum digital input and output, analog input and output, set points, and calculated values.

d. Historical Data Collection:
   1) Provision shall be made to ensure historical data is not lost.
      (a) The ability to off-load historical data to removable media, and to later load data previously backed-up, will be provided.
      (b) Historical data values, for an operator specified time range and for operator specified points, may be output the same as for trend data.

e. Critical Alarm Summary:
   1) Provide a summary of those points in the critical alarm state and include as a minimum; point acronym, point description, alarm type, limit exceed, current value, alarm type, time and date of occurrence.

f. Maintenance Alarm Summary:
   1) Provide a summary of those points in maintenance alarm and include as a minimum; point acronym, point description, current value, alarm type, limit exceed, time and date of occurrence.

g. Alarm Summary:
   1) Provide a summary of all points in alarm and include as a minimum; point acronym, point description, current value, alarm type, limit exceeded, and time and date of occurrence.

h. Disable Point Summary:
   1) Provide a summary of all points in the disabled state and include as a minimum point acronym and point description.

i. Run Time Summary:
   1) Provide a summary of the accumulated running time of selected pieces of equipment with point acronym and description, run time to date, alarm limit setting. The run time shall continue to accumulate until reset individually by means of suitable operator selection.

j. Schedule Summary:
   1) Provide a summary of all schedules and indicate as a minimum, which days are holidays and, for each section, the day of the week, the schedule times and associated values; for digital schedules value will be on or off; for analog schedules value will be an analog value.

k. User Record Summary:
   1) Provide a summary of all user records to include as a minimum; user name, password, initials, command access level and point groups assigned.

CC. LCU / TCU Programming Software

1. The Programming software must be able to be seamlessly launched from within the Niagara Framework as a wizard.
   a. Connection methods (Tunneling or by building controller – not direct to controller).
2. Provide programming software for the Local Control Unit (LCU) and the Terminal Control Unit (TCU) that allows for the development of the LCU/TCU control logic and point management and Graphical User Interface screens.
   a. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens.
   b. Access to these functions shall be provided through Graphical User Interface software (GUI).
   c. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool.
   d. Completed applications may be stored in the library for future use.
   e. Graphical User Interface screens shall be created in the same fashion.
   f. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide “real-time” data updates.
   g. Any real-time data value or object property may be connected to display its current value on a user display.
   h. Systems requiring separate software tools or processes to create applications and user interface displays shall not be acceptable.
   i. Programming Methods:
      1) Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user’s application.
      2) Objects shall be linked by a graphical linking scheme by dragging a link from one object to another.
      3) Object links will support one-to-one, many-to-one, or one-to-many relationships.
      4) Linked objects shall maintain their connections to other objects regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification.
   j. Object Configuration
      1) Each object will be done through the object’s property sheet using fill-in the blank fields, list boxes, and selection buttons.
      2) Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.
   k. The software shall provide the ability to view the logic with values being inputted to and outputted from the graphical blocks in real time. (debug mode)
   l. The system shall support object duplication within a client’s database.
      1) An application, once configured, can be copied and pasted for easy re-use and duplication.
      2) All links, other than to the hardware, shall be maintained during duplication.
   m. Provides function to compare and calculate from multiple values from networked controllers (NCU, TCU and/or LCU).
   n. As a minimum, the function shall calculate and compared the values and return the average, sum, highest, lowest, 3 highest, 3 lowest values and multi-state value count.
   o. Auto-linking of objects to graphics
   p. [Can include][] Auto-Encapsulate functionality (the automatic ability to group multiple programming objects into a new singular programming object).
   q. Allow for uploading/downloading to/from multiple controllers

DD. Utility Software
1. Supply and install software products to allow the owner to access and manipulate the control schematic diagrams, and to access product data sheets in an electronic format.

2. Enter all soft copy submissions; including "Record" drawings as specified herein [Shop Drawings, Product Data and Review Process] in OWS.

2.05 NATIVE WEB BROWSER INTERFACE

A. The contractor shall provide web-browser delivered graphical visualization software as part of the operator workstation, server, NAC(s), and/or IP-CTRL devices, as indicated on construction documents. The contractor shall configure the graphical visualization software in accordance with project requirements.

B. The graphical visualization software shall have two operating modes: Studio & Viewer, as described below. For both Studio & Viewer modes, the graphical user interface shall be delivered to the user by pointing a modern web browser to a project-specific URL and logging into the system. The software shall not require any software plugins to be installed in conjunction with the web browser.

C. When delivered to a modern web browser, the software shall implement web development standards, including but not limited to Hypertext Markup Language (HTML) v5, Cascading Style Sheets (CSS) v3, and JavaScript (in compliance with ECMAScript specifications).

D. Studio Mode:
   1. The graphical visualization software shall allow upload of user-generated content such as logos or floorplan background images.
   2. The graphical visualization software shall allow assembly and configuration of repeatable design elements, such as a table row for a points list, or an informative callout for equipment on a floor plan.
   3. The graphical visualization software shall allow for use of dynamic, zoomable, extensible mapping interfaces, such as Google Maps, provided internet connectivity.
   4. The graphical visualization software shall support creation and configuration of multiple chart types, including but not limited to line charts, bar charts, area charts, pie charts, including use of multiple foreground and background colors, legend positioning and color gradients.
   5. The graphic visualization software shall allow both view and manipulation (subject to user access level) of real-time data present on the host, as well as historical trend data. The scope of data shall depend only on whether the host device is an operator workstation, server, NAC, or IP-CTRL device and has been fully configured to meet project-required sequence of operation.
   6. The graphic visualization software shall allow binding of any data and/or data manipulation method to applicable graphical design elements, including but not limited to: text labels, buttons, charts, geographical mapping interfaces, applied against applicable properties including but not limited to: position/size, background image/color, foreground color, foreground font properties, visibility, opacity, animation timing and rotation.
   7. The graphic visualization software shall allow manipulation of position/scaling properties of any and all visual elements, with respect to user's screen size, parent and nested visual elements, and/or "User Agent Type" (designating Web Browser vendor and version), such that graphical screens created may be delivered and perform equally well on laptop screens, large displays, and/or mobile devices.

E. Viewer Mode:
   1. In viewer mode, the graphical visualization software shall deliver content to the user's web browser in a fashion that matches configuration accomplished in Studio Mode.
   2. Scope and amount of content delivered in Viewer mode, and access to data manipulation methods shall be determined by which user has authenticated.

2.06 BAS CONTROLLERS

A. Controllers –BACnet/IP Protocol
   1. Provide BACnet Controllers that are BACnet Testing Laboratory listed (v12 or later) as specified herein:

a. BACnet Building Controller (B-BC)
b. BACnet Advanced Application Controller (B-AAC)
c. BACnet Application Specific Controller (B-ASC)

2. All BACnet/IP Controllers shall use the following communication specifications and achieve performance as specified herein:
   a. All controllers shall be able to communicate peer-to-peer without the need for a Network Control Unit (NCU).
      1) Any controller on the Ethernet Data Link/Physical layer shall be able to act as a Master to allow for the exchange and sharing of data variables and messages with any other controller connected on the same communication cabling. Slave controllers are not acceptable.
      2) Performance
         (a) Each BACnet controller shall have a minimum of 512KB of RAM and 4GB of non-volatile flash memory.
         (b) Each controller shall have a 32-bit microprocessor operating at 600 MHz and support a BACnet protocol stack in accordance with the ANSI/ASHRAE Standard 135-2012 and the BACnet Device Profile supported.
      3) BACnet Controllers shall be provided for Unit Ventilators, Fan Coils, Heat Pumps, Variable Air Volume (VAV) Terminals and other applications as shown on the drawings.
         (a) The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.
      4) Control Unit (LCU) and Terminal Control Unit (TCU)
         (a) Shall be fully programmable and the programming software shall have a library of pre-built, tested, and user re-definable control sequences for a wide range of typical HVAC applications.
         (b) All control sequences programmed into the LCU and TCU shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
         (c) LCU and TCU controllers that are not fully programmable and/or cannot retain programming as outlined in .2 are not acceptable.
      5) BACnet Controllers shall communicate with the Network Control Unit (NCU) via a BACnet/IP connection at a baud rate of not less than 100 Mbps
      6) BACnet TCU to have a communications port for connecting a matching room temperature and/or humidity sensor and does not utilize any of the I/O points of the Controller.
         (a) The TCU and all other devices on the BACnet bus shall be accessible from this communications port.
      7) The Contractor supplying the BACnet Controllers shall provide documentation for each device, with the following information at a minimum:
         (a) BACnet Device; MAC address, name, type and instance number.
         (b) BACnet Objects; name, type and instance number
      8) It is the responsibility of the Contractor to ensure that the proper BACnet objects are provided in each BACnet controller, as required by the Point List located in the POINTS LIST section of this specification.

B. Controllers – BACnet Protocol
   1. Provide BACnet Controllers that BACnet Testing Laboratory listed (v12 or later) as specified herein:
      a. BACnet Building Controller (B-BC)
      b. BACnet Advanced Application Controller (B-AAC)
      c. BACnet Application Specific Controller (B-ASC)

2. All BACnet Controllers shall use the following communication specifications and achieve performance as specified herein:
   a. All controllers shall be able to communicate peer-to-peer without the need for a Network Control Unit (NCU).
      1) Any controller on the MS/TP Data Link/Physical layer shall be able to act as a Master to allow for the exchange and sharing of data variables and messages with any other controller connected on the same communication cabling. Slave controllers are not acceptable.
   b. Performance
      1) Each BACnet MS/TP controller shall have a minimum of 64Kb of RAM and 384Kb of non-volatile flash memory.
      2) Each controller shall have a 32-bit microprocessor operating at 68 MHz and support a BACnet protocol stack in accordance with the ANSI/ASHRAE Standard 135-2012 and the BACnet Device Profile supported.
      3) Each BACnet controller on the BACnet MS/TP communications trunk shall provide a loading characteristic of minimum 1/8th Load.
      4) Manufacturers, who wish to supply LCU and TCU controllers with less than a 32-bit microprocessor and/or a MS/TP loading characteristic of greater than 1/8th Load, may do so as long as they only provide a maximum of 32 controllers on a single bus segment per NCU.
   c. BACnet Controllers shall be provided for Unit Ventilators, Fan Coils, Heat Pumps, Variable Air Volume (VAV) Terminals and other applications as shown on the drawings.
      1) The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals.
   d. Control Unit (LCU) and Terminal Control Unit (TCU)
      1) Shall be fully programmable and the programming software shall have a library of pre-built, tested, and user re-definable control sequences for a wide range of typical HVAC applications.
      2) All control sequences programmed into the LCU and TCU shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.
      3) LCU and TCU controllers that are not fully programmable and/or cannot retain programming as outlined in .2 are not acceptable.
   e. BACnet Controllers shall communicate with the Network Control Unit (NCU) via a BACnet/IP connection at a baud rate of not less than 100 Mbps or via the RS485 MS/TP connection at a baud rate of not less than 76.8 kbps.
   f. BACnet TCU to have a communications port for connecting a matching room temperature and/or humidity sensor and does not utilize any of the I/O points of the Controller.
      1) The TCU and all other devices on the BACnet bus shall be accessible from this communications port.
   g. The Contractor supplying the BACnet Controllers shall provide documentation for each device, with the following information at a minimum:
      1) BACnet Device; MAC address, name, type and instance number
      2) BACnet Objects; name, type and instance number
   h. It is the responsibility of the Contractor to ensure that the proper BACnet objects are provided in each BACnet controller, as required by the Point List located in the POINTS LIST section of this specification.

C. Local Control Units (LCU) (Primary Systems such as AHU, MAU, Chiller, Boiler, Water System)
   1. The Local Control Units (LCU) shall be 32 bit microprocessor-based.

a. They shall also be multi-tasking, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules.
b. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point list.
c. The LCU [can have an optional][will be supplied with a] factory installed integral color operator interface (see 23 09 13 2.11.5.8 for details) that provides real-time access to monitored inputs, setpoints, modes, values, statuses, and outputs.
    1) Alternatively a field mounted display and interface, meeting the specified functionality, shall be supplied for each controller in lieu of this requirement.

2. Each LCU shall have sufficient memory, to support its own operating system and databases, including:
    a. Control processes
    b. Energy management applications
    c. Alarm management applications
    d. Historical/trend data for points specified
    e. Maintenance support applications
    f. Custom processes
    g. Manual override monitoring
3. Each LCU shall support:
    a. Monitoring of the following types of inputs, without the addition of equipment outside the DDC Controller cabinet:
        1) Analog inputs of 4-20 mA, 0-10 Vdc, thermistor and RTD in the range 0 to 350,000 ohm.
        2) Digital inputs from dry contact closure, pulse accumulators, voltage sensing.
        3) Each LCU shall be capable of providing the following control outputs without the addition of equipment outside the DDC controller cabinet:
        4) Digital outputs (contact closure for motor starters up to size 4).
        5) Analog outputs of 4-20 mA and 0-10 Vdc.
4. The LCU analog or universal input shall use a 16 bit A/D converter.
    a. Controllers with less than 16 bit A/D converters must provide all analog input sensors with 4-20ma transmitters.
5. The LCU analog or universal output shall use a 10 bit D/A converter.
6. Each LCU shall have a minimum of 10% spare capacity for each point type for future point connection.
    a. Provide all processors, power supplies and communication controllers complete so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.
    b. As a minimum, provide one of each type of point available on the controller.
7. Provide sufficient internal memory for the specified control sequences and have at least 25% of the memory available for future use.
8. The LCU's [optional][] factory installed color operator interface will provide real-time access to monitored inputs, setpoints, modes, values, statuses, and outputs.
    a. The operator interface shall consist of :
        1) An icon-based, interactive backlit color display.
        2) A turn and select navigation jog dial to access, edit, and modify internal controller functions. The jog dial shall be used to navigate through menus, select options and icons, and change parameters. Scroll buttons (up, down, left and right) shall not be acceptable.
        3) Navigable menus to display, select, edit, and modify values and other controller information.
        4) List-based menus with a minimum of eight (8) lines of text.

5) Icon-based menus.
6) A display with the following minimum characteristics: a resolution of 400 W x 240 H pixels with an effective viewing area of 2.4” L x 1.4” H, and 2.8” diagonal viewing area.

b. The operator interface shall use color-codes with icons and text lists to indicate values and controller statuses.

c. The operator interface shall, at a minimum, have the following functions:
1) Points. The operator interface shall provide points list menus to view the inputs, setpoints, and output values such as hardware inputs/outputs, analog values, binary values, multistate values, Intelligent Space Sensor (ISS) (see section 23 09 13 2.14 Intelligent Space Sensors (ISS)) inputs, and wireless inputs.
(a) The points list menus shall allow the operator to monitor, set, and override controller points and values.
(b) A color-code shall be used to indicate the conditions and statuses of points displayed in the points list menus.
(c) Alarms. The operator interface shall provide a controller’s alarms menu to view details of an alarm, to acknowledge the alarm, and to view the alarm history.
(1) The alarm menu shall allow the operator to view the following type of alarms: active not acknowledged, active acknowledged, and inactive not acknowledged.
(2) The combination of an icon and its color state shall notify the operator of an alarm condition.
(3) The operator shall be able to select a single point in alarm to view further details such as the alarm to/from status, current status, event date and time, alarm event threshold, and alarm event value.
(d) Overrides. The operator interface shall provide an overrides menu to view a list of the controller’s overridden points such as hardware input, hardware output, value, constant, or variable. The menu shall allow the operator to select an overridden point and to modify or release the override on the selected point.
(e) PID loops. The operator interface shall provide a PID Loops menu to view, configure, and adjust the PID parameters. The interface shall also provide visual PID tuning with live system response graphing (live-trend).
(f) The operator interface shall support Latin-based languages and allow the interface user to select from three (3) defined languages.
(g) The operator interface shall allow personalization of a contact information screen with a minimum of eight (8) lines of user configurable text as well as the option to add a color graphic such as a company logo. The tool shall support, but not be limited to; image file formats such as GIF, PNG, JPG, etc.
(h) Favorites. The operator interface shall allow access to a list of bookmarked points.
(i) Weather. The operator interface shall provide a weather menu to view the current weather conditions with a weather status icon. The units shall be configured to be displayed in either metric or US units.
(j) Password protected. The controller operator interface shall provide multi-level password protection, with user-defined, alphanumeric, name/password combinations. The operator interface shall return to lock mode after a user-defined log-off delay. A password icon shall indicate the lock mode state.

(k) Settings. The operator interface shall provide a settings menu to view and configure date and time parameters such as the current time, time zone, and daylight savings time.

9. The LCU shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components.
   a. The controller shall provide both local and remote annunciation of any detected component failures or repeated failure to establish communication.
10. Should the LCU memory be lost for any reason, the user shall have the capability of reloading the controller software via the BAS LAN OWS or Server.
    a. Controller requiring a local port to reload the controller software is not acceptable.
11. Provide an onboard network communication jack for connection to the BACnet Network (RJ-45 or equivalent quick connect)
12. Wireless port supporting a wireless transceiver for communication with wireless sensors/switches
13. Acceptable Products:
    a. BACnet Testing Laboratory (BTL listed) using Device Profile BACnet Building Controller (B-BC) or BACnet Advanced Application Controller (B-AAC)

D. IP Equipment Controller (IP-EQUIP-CTRL)
1. The IP-EQUIP-CTRL shall be 32 bit microprocessor-based operating at a minimum of 600 MHz.
   a. They shall be multi-tasking, real-time digital control processor based supporting a fixed I/O point count.
2. Each IP-EQUIP-CTRL shall have minimum of 512MB memory, with a minimum of 4 GB non-volatile flash, to support its own operating system and databases, including:
   a. Control processes
   b. Maintenance support applications
   c. Custom processes
   d. Energy management applications
   e. Alarm management applications
   f. Historical/trend data for points specified
   g. Embedded Web Server for local hosting of graphics
3. The IP-EQUIP-CTRL shall have a Real Time clock with rechargeable battery.
4. Power Requirements
   a. 24 VAC with local transformer power
5. The IP-EQUIP-CTRL will support the following communications protocols:
   a. BACnet/IP
      1) Supporting IPv4 addressing.
      2) DHCP support and Auto DNS.
      3) 2 - RJ45 ports each capable of supporting 10/100 Base-T.
         (a) Supporting controller daisy-chain topology on the wired IP network via integrated switch functionality.
         (b) Integrated fail-safe should allow for communication when the controller is powered down.
         (c) If the above functionality is not available then appropriate router(s) and switches must be supplied to provide the functionality.
   b. 2 x USB 2.0 Expansion ports for:
      1) 802.11 Wi-Fi Adapter enabling wireless connectivity including:
         (a) ‘Hot Spot’
         (b) Client
         (c) Access Point
         (d) If the above functionality is not available then appropriate wireless router(s) and switches must be supplied to provide the functionality.

6. The IP-EQUIP-CTRL controllers shall be powered from a 24 VAC source and shall function normally under an operating range of 20 to 28 VAC (±15%), allowing for power source fluctuations and voltage drops.
7. The BAS contractor shall provide a dedicated power source and separate isolation transformer for each controller unable to function normally under the specified operating range.
8. The controllers shall also function normally under ambient conditions of -40 °F to 158 °F and 0% to 90% RH (non-condensing).
9. Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly.
10. Provide a minimum of 8 software configurable Universal Inputs capable of supporting the following input signal types:
    a. Digital inputs from dry contact closure, pulse accumulators, voltage sensing.
    b. Analog inputs of 4-20 mA, 0-10 Vdc, thermistor and RTD in the range 0 to 350,000 ohm.
    c. The analog or universal input shall use a 16 bit A/D converter.
        1) Controllers with less than 16 bit A/D converters must provide all analog input sensors with 4-20ma transmitters.
11. Provide a minimum of 2 software configurable Universal Outputs capable of supporting the following output signal types:
    a. Digital outputs.
    b. Analog outputs of 4-20 mA and 0-10 Vdc.
        1) The analog or universal output shall use a 10 bit D/A converter.
12. Provide a minimum of 4 digital/Triac outputs.
13. Provide a minimum of 2 software configurable outputs that can either be utilized as additional digital/Triac outputs or as universal outputs.
14. Provide a minimum of 3 Modbus connected devices.
    a. Provide (optional) on-board RS-485 communication for Modbus RTU communication to a minimum of 3 connected devices on the RS-485 segment.
    b. Provide (optional) Modbus TCP communication to a minimum of 3 connected devices.
15. Provide connection to Intelligent Space Sensors (ISS) (see section 23 09 13 2.14 Intelligent Space Sensors (ISS)) via on-board RJ-45 subnetwork port.
16. Shall contain a “FIPS 140-2 Level 1 Compliant” cryptographic module
17. Shall comply with State of California Senate Bill No. 327, Chapter 886, TITLE 1.81.26. SECURITY OF CONNECTED DEVICE

E. IP Terminal Unit Controller (IP-TU-CTRL) .
1. The IP-TU-CTRL shall be 32 bit microprocessor-based operating at a minimum of 600 MHz.
    a. They shall be multi-tasking, real-time digital control processor based supporting a fixed I/O point count.
2. Each IP-TU-CTRL shall have minimum of 512MB memory, with a minimum of 4 GB non-volatile flash, to support its own operating system and databases, including: .
    a. Control processes
    b. Maintenance support applications
    c. Custom processes
    d. Energy management applications
    e. Alarm management applications
    f. Historical/trend data for points specified
    g. Embedded Web Server for local hosting of graphics.
3. The IP-TU-CTRL shall have a Real Time clock with rechargeable battery.
4. Power Requirements.

a. 24 VAC with local transformer power.

5. The IP-TU-CTRL will support the following communications protocols: .
   a. BACnet/IP.
      1) Supporting IPv4 addressing.
      2) DHCP support and Auto DNS.
      3) 2 - RJ45 ports each capable of supporting 10/100 Base-T.
         (a) Supporting controller daisy-chain topology on the wired IP network via integrated switch functionality.
         (b) Integrated fail-safe should allow for communication when the controller is powered down.
         (c) If the above functionality is not available then appropriate router(s) and switches must be supplied to provide the functionality.
   b. 2 x USB 2.0 Expansion ports for:
      1) 802.11 Wi-Fi Adapter enabling wireless connectivity including: .
         (a) 'Hot Spot'.
         (b) Client
         (c) Access Point.
         (d) If the above functionality is not available then appropriate wireless router(s) and switches must be supplied to provide the functionality..
6. The IP-TU-CTRL controllers shall be powered from a 24 VAC source and shall function normally under an operating range of 20 to 28 VAC (±15%), allowing for power source fluctuations and voltage drops.
7. The BAS contractor shall provide a dedicated power source and separate isolation transformer for each controller unable to function normally under the specified operating range.
8. The controllers shall also function normally under ambient conditions of -40 °F to 158 °F and 0% to 90% RH (non-condensing).
9. Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly.
10. Provide a minimum of 8 software configurable Universal Inputs capable of supporting the following input signal types:
    a. Digital inputs from dry contact closure, pulse accumulators, voltage sensing.
    b. Analog inputs of 4-20 mA, 0-10 Vdc, thermistor and RTD in the range 0 to 350,000 ohm.
       1) The analog or universal input shall use a 16 bit A/D converter.
       2) Controllers with less than 16 bit A/D converters must provide all analog input sensors with 4-20ma transmitters.
11. Provide a minimum of 2 software configurable Universal Outputs capable of supporting the following output signal types:
    a. Digital outputs.
    b. Analog outputs of 4-20 mA and 0-10 Vdc.
       1) The analog or universal output shall use a 10 bit D/A converter.
12. Provide a minimum of 4 digital/Triac outputs.
13. Provide a minimum of 2 software configurable outputs that can either be utilized as additional digital/Triac outputs or as universal outputs.
14. Provide connection to Intelligent Space Sensors (ISS) (see section 23 09 13 2.14 Intelligent Space Sensors (ISS)) via on-board RJ-45 subnetwork port.
15. Shall contain a "FIPS 140-2 Level 1 Compliant" cryptographic module
16. Shall comply with State of California Senate Bill No. 327, Chapter 886, TITLE 1.81.26. SECURITY OF CONNECTED DEVICE

F. Terminal Control Units (TCU) (Secondary Systems such as VAV, Fan Powered VAV, Fan Coil, Radiation, Reheat)

1. Provide Terminal Control Units (TCU) for control of each piece of terminal equipment.
2. The TCU controllers shall be powered from a 24 VAC source and shall function normally under an operating range of 20 to 28 VAC (±15%), allowing for power source fluctuations and voltage drops.
3. The BAS contractor shall provide a dedicated power source and separate isolation transformer for each controller unable to function normally under the specified operating range.
4. The controllers shall also function normally under ambient conditions of 32 °F to 122 °F and 5% to 90% RH (non-condensing).
5. Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly.
6. The Terminal Control Units (TCU) shall be 32 bit microprocessor-based.
7. They shall be multi-tasking, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules.
8. TCU shall have a wireless port supporting a wireless transceiver for communication with wireless sensors/switches
9. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point list.
10. Each TCU shall have sufficient memory, to support its own operating system and databases, including:
    a. Control processes
    b. Maintenance support applications
    c. Custom processes
    d. Manual override monitoring
11. Each TCU shall support:
    a. Monitoring of the following types of inputs, without the addition of equipment:
        1) Analog inputs of 4-20 mA, 0-10 Vdc, thermistor and RTD in the range 0 to 350,000 ohm.
        2) Digital inputs from dry contact closure, pulse accumulators, voltage sensing.
        3) Each TCU shall be capable of providing the following control outputs without the addition of equipment:
        4) Digital outputs (contact closure for motor starters up to size 4).
        5) Analog outputs of 4-20 mA or 0-10 Vdc.
12. The TCU analog or universal input shall use a 16 bit A/D converter.
    a. Controllers with less than 16 bit A/D converters must provide all analog input sensors with 4-20ma transmitters. .
13. The TCU analog or universal output shall use a 10 bit D/A converter.
14. Controllers shall include all point inputs and outputs necessary to perform the specific control sequences.
    a. As a minimum, 25% of the point outputs shall be of the universal type; that is, the outputs may be utilized either as modulating or two-state, allowing for additional system flexibility.
    b. Analog outputs shall be industry standard signals such as 24V floating control, allowing for interface to a variety of modulating actuators.
15. Each controller shall perform its primary control function independent of other NCU controller LAN communication, or if LAN communication is interrupted.
    a. Reversion to a fail-safe mode of operation during LAN interruption is not acceptable.
    b. The controller shall receive its real-time data from the NCU controller time clock to insure LAN continuity.
    c. Each controller shall include algorithms incorporating proportional, integral, and derivative (PID) gains for all applications.

d. All PID gains and biases shall be field-adjustable by the user via terminals as specified herein.
e. This functionality shall allow for tighter control of space conditions and shall facilitate optimal occupant comfort and energy savings.

16. Provide each TCU with sufficient memory to accommodate point databases, operating programs, local alarming and local trending.
    a. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM.
    b. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration.
    c. Operating programs shall be field selectable for specific applications.
    d. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility.
    e. Controllers that require factory changes of all applications are not acceptable.
17. Shall comply with State of California Senate Bill No. 327, Chapter 886, TITLE 1.81.26. SECURITY OF CONNECTED DEVICE

2.07 IP CONNECTED LOCAL DISPLAY UNIT (IP-LDU)

A. The IP Connected Local Display Unit (IP-LDU) shall be provided as a surface mount or flush mount, as noted in construction documents.

B. The IP-LDU shall consist of a touch screen display, with included power adapter port and one RJ45 Ethernet port.

C. The IP-LDU Connected Local Display Unit shall support connectivity to any single supported field controller accessible on the same IP network.

D. The IP-LDU shall support user authentication via credential entry. This authentication will determine the user’s level of access to the connected field controller.

E. The IP-LDU shall support the following functions, without any configuration required, other than IP address configuration and association with a connected field controller:
    1. PID Loop Tuning: The IP-LDU shall provide the ability to view PID Loop Performance on a connected field controller in a timestamped, multi-variable chart, and make adjustments to tuning parameters.
    2. Trend Viewing: The IP-LDU shall provide the ability to view charts for data points on a connected field controller, such as setpoints or hardware inputs and outputs.
    3. Schedule & Calendar Adjustment: The IP-LDU shall provide the ability to view and adjust weekly schedules residing on a connected field controller, as well as calendars (e.g. to make operational exceptions for holidays).
    4. Point Data View & Override: The IP-LDU shall provide the ability to view and override data points on a connected field controller, such as setpoints or hardware inputs and outputs.
    5. Alarm View & Acknowledgement: The IP-LDU shall provide the ability to view and acknowledge alarms present on the connected field controller.

2.08 INTELLIGENT SPACE SENSORS (ISS)

A. Intelligent Space Sensors (ISS) shall communicate on a daisy-chained network connected to any Local Control Unit (LCU) or Terminal Control Unit (TCU) and shall provide ambient space condition sensing without the use of hardware I/O at the LCU or TCU.

B. Each ISS shall provide a white Liquid Crystal Display (LCD), where indicated on the drawings, with the following minimum features:
    1. Minimum 1.4” x 1.18” display area
    2. Backlit

C. The ISS shall be capable of displaying on its LCD the measured space temperature from 50 °F to 104 °F and/or humidity from 0 % RH to 100 % RH with one decimal and/or the CO2 measurement from 0 to 2000 ppm.

D. The ISS with motion sensor shall have a motion indicator LED that provides a visual confirmation whenever motion is detected. A feature used to enable or disable this motion indicator shall be provided.

E. The ISS shall be capable of displaying the following elements:
   1. Space temperature
   2. Cooling space temperature set point
   3. Heating space temperature set point
   4. Current heating or cooling mode
   5. Current occupancy mode
   6. Fan speed
   7. Light status
   8. Blind position
   9. Alarm condition
   10. Current time
   11. Energy consumption indicator

F. Each ISS shall provide a local keypad for local user interface to perform navigation and adjustment of points configured as adjustable.

G. The ISS shall be configured for the LCU or TCU intended application requirements.

H. Provide an ISS where indicated on the drawings each ISS shall provide at a minimum the following on-board integral I/O without the consumption of any inputs and/or outputs at the host LCU or TCU:
   1. Temperature Sensor
      a. Sensing Element: 10k Thermistor
      b. Accuracy: ±0.9 °F
      c. Resolution: ±0.18 °F
      d. Range: 41 °F to 104 °F
   2. Relative Humidity Sensor
      a. Accuracy: ±3 % RH
      b. Resolution: 1 % RH
      c. Range: 10 % RH to 90 % RH
   3. CO2 Sensor
      a. Accuracy: 400 to 1,250 ppm ± 30 ppm or 3% of reading, 1,250 to 2,000 ppm ± 5% of reading + 30 ppm
      b. Range: 0 to 2,000 ppm
      c. Operating elevation: 0 to 16,000 ft
      d. Calibration method: self-calibration method eliminates the need for manual calibration and calibrates the sensor based on baseline concentrations measured during unoccupied periods in the space. Sensor shall not require manual calibration over a minimum product rated life of 15 years.
      e. Temperature dependence: 0.11% FS per °F
      f. Stability: <2% of FS over life of sensor (15 years)
      g. Pressure dependence:0.135% of reading per mm Hg
      h. Sensing method: Non-dispersive infrared (NDIR) absorption and Gold plated optics shall be provided.
   4. Motion Sensor
      a. Type: Passive Infrared (PIR) sensor with Fresnel lens
      b. Vertical detection range: up to 20 ft. x 30 degree detection angle
      c. Horizontal detection range: up to 20 ft. x 120 degree detection angle

I. The ISS shall provide function to fully balance the air flow of a Variable Air Volume (VAV) Terminal Control Unit (TCU).

1. The ISS shall allow the air balancer to control the action of the VAV TCU including the following function: open VAV damper, close VAV damper, go to flow setpoint.
2. The ISS shall allow the air balancer to enter flow related parameters including minimum air flow, maximum air flow and K factor.
3. The ISS shall be capable of operating as a handheld tool for air balancing functions in situations where the ISS is not required as an installed sensor.

J. The ISS menus provide function to configure the Terminal Control Unit (TCU) shall define items such as I/O configurations, set point and delays.

K. The configuration tool or through an Intelligent Space Sensor (ISS) menus shall allow to commission the TCU application and perform action such as inputs calibration, outputs override.

L. The ISS shall provide password protected menus or any other mechanism to prevent a local user to access advanced configuration menus including air flow balancing menu and network addressing.

M. Programmable to display up to ninety six (96) data points in any combination of local and/or networked values from any device on the internetwork.

N. Each ISS shall provide a point of access for a Service Tool, Supervisory Tool, etc. to the internetwork via the ISS communication port.

O. The ISS shall be capable of promoting good energy usage practices to the room occupant by displaying an Energy Consumption Indicator (ECI).
1. The ECI shall be modified in real-time when the room occupant modifies a parameter of the Local Control Unit (LCU) or Terminal Controller Unit (TCU) such as the room temperature setpoint or the fan speed.
2. The ECI shall indicate to the room occupant the energy impact of the parameter changes via a 5 level display icon where a full display (5th level) indicates excellent energy conservation and no display indicating no energy conservation.
3. The ECI follows the algorithm for energy efficiency as outlined in ASHRAE 55-2004.
4. If ECI is not available then:
   a. A stainless steel plate with 4 LEDs must be mounted adjacent to the thermostat.
   b. The plate is to be engraved, adjacent to each LED, with symbology which will encourage the occupant to conserve energy.
   c. ECI level (0 to 4) is to be indicated via digital outputs driving the LEDs.
   d. Algorithm to be used; as defined in ASHRAE 55-2004
      1) Radio EN 300 328 V2.1.1 November 2016

PART 3 EXECUTION

3.01 MANUFACTURER'S RECOMMENDATIONS

A. Installation to be to manufacturer's recommendations. Provide printed copies of recommendations with shop drawings or product data.

3.02 GENERAL WORKMANSHIP

A. Install equipment, piping, and wiring or raceway horizontally, vertically, and parallel to walls wherever possible.

B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.

C. Install equipment in readily accessible locations as defined by National Electrical Code (NEC) Chapter 1 Article 100 Part A.

D. Verify wiring integrity to ensure continuity and freedom from shorts and ground faults.

E. Equipment, installation, and wiring shall comply with industry specifications and standards and local codes for performance, reliability, and compatibility.

3.03 FIELD QUALITY CONTROL

A. Work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances.

B. Continually monitor field installation for code compliance and workmanship quality.

C. Contractor shall arrange for work inspection by authorities having jurisdiction over the work.

3.04 WIRING

A. Control and interlock wiring and installation shall comply with national and local electrical codes, Division 26 00 00, and manufacturer's recommendations. Where the requirements of this Section differ from other Divisions, this Section shall take precedence.

B. NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway as specified by NEC

C. Low-voltage wiring shall meet NEC Class 2 requirements. Sub fuse low-voltage power circuits as required to meet Class 2 current limit.

D. NEC Class 2 (current-limited) wires not in raceway but in concealed and accessible locations such as return air plenums shall be UL listed for the intended application.

E. Install wiring in raceway where subject to mechanical damage and at levels below 3 m (10ft) in mechanical, electrical, or service rooms.

F. Install Class 1 and Class 2 wiring in separate raceways. Boxes and panels containing high-voltage wiring and equipment shall not be used for low-voltage wiring except for the purpose of interfacing the two through relays and transformers.

G. Do not install wiring in raceway containing tubing.

H. Run exposed Class 2 wiring parallel to a surface or perpendicular to it and tie neatly at 10 ft. intervals

I. Use structural members to support or anchor plenum cables without raceway. Do not use ductwork, electrical raceways, piping, or ceiling suspension systems to support or anchor cables.

J. Secure raceways with raceway clamps fastened to structure and spaced according to code requirements. Raceways and pull boxes shall not be hung on or attached to ductwork, electrical raceways, piping, or ceiling suspension systems.

K. Size raceway and select wire size and type in accordance with manufacturer's recommendations and NEC requirements.
   1. Include one pull string in each raceway 1 in. or larger.

L. Use color-coded conductors throughout.

M. Locate control and status relays in designated enclosures only. Do not install control and status relays in packaged equipment control panel enclosures containing Class 1 starters.

N. Conceal raceways except within mechanical, electrical, or service rooms. Maintain minimum clearance of 6 in. between raceway and high-temperature equipment such as steam pipes or flues.

O. Adhere to requirements in Division 16 where raceway crosses building expansion joints.

P. Install insulated bushings on raceway ends and enclosure openings. Seal top ends of vertical raceways.

Q. Terminate control and interlock wiring related to the work of this section. Maintain at the job site updated (as-built) wiring diagrams that identify terminations.

R. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 3 ft in length and shall be supported at each end. Do not use flexible metal raceway less than ½ in. electrical trade size. Use liquid-tight flexible metal raceways in areas exposed to moisture including chiller and boiler rooms.

S. Install raceway rigidly, support adequately, ream at both ends, and leave clean and free of obstructions. Join raceway sections with couplings and according to code. Make terminations in boxes with fittings. Make terminations not in boxes with bushings.

3.05 COMMUNICATIONS WIRING

A. Communication wiring shall be low-voltage Class 2 wiring and shall comply with Article 3.7 (Wiring).

B. Install communication wiring in separate raceways and enclosures from other Class 2 wiring.

C. During installation do not exceed maximum cable pulling, tension, or bend radius specified by the cable manufacturer.

D. Verify entire network's integrity following cable installation using appropriate tests for each cable.

E. Install lightning arrestor according to manufacturer's recommendations between cable and ground where a cable enters or exits a building.

F. Each run of communication wiring shall be a continuous length without splices when that length is commercially available.
   1. Runs that are longer than commercially available lengths shall have as few splices as possible using commercially available lengths.

G. Label communication wiring to indicate origination and destination.

H. Ground coaxial cable according to NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

3.06 FIBER OPTIC CABLE

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125 µm.

B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

C. During installation do not exceed maximum pulling tensions specified by cable manufacturer. Post-installation residual cable tension shall be within cable manufacturer's specifications.

D. Install cabling and associated components according to manufacturers' instructions. Do not exceed minimum cable and unjacketed fiber bend radii specified by cable manufacturer.

END OF SECTION 23 09 13

SECTION 23 09 23
BAS DIRECT DIGITAL CONTROL SYSTEM

PART 1 GENERAL

1.01 RELATED SECTIONS

A. SECTION 23 09 00 BAS Instrumentation and Control

B. SECTION 23 09 13, BAS Instrumentation and Control Devices

C. SECTION 23 09 13.13, BAS Actuators and Operators

D. SECTION 23 09 13.23, BAS Sensors and Transmitters

E. SECTION 23 09 13.33, BAS Control Valves

F. SECTION 23 09 13.43, BAS Control Dampers

1.02 REFERENCES

A. Supplementing 23 09 00 1.2 References requirements.
   1. ANSI/ASHRAE 135-2012, BACnet® - A Data Communication Protocol for Building Automation and Control Networks.

1.03 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. Supplementing 23 09 00 Acronyms, Abbreviations and Definitions requirements
   1. Acronyms used in BAS.
      a. AI - Analog Input
      b. AO - Analog Output
      c. BACnet® - Building Automation and Control Network
      d. BAS - Building Automation System
      e. CAD - Computer Aided Design
      f. CDL - Control Description Logic
      g. COSV - Change of State or Value
      h. CPU - Central Processing Unit
      i. DI - Digital Input
      j. DO - Digital Output
      k. ECU - Equipment Control Unit
      l. IDE - Interface Device Equipment
      m. LAN - Local Area Network
      n. LCU - Local Control Unit
      o. NCU - Network Control Unit
      p. Niagara4 – Software framework for building device-to-enterprise applications and Internet-enabled products.
      q. OS - Operating System
      r. OWS - Operator Work Station
      s. PC - Personal Computer
      t. PCI - Peripheral Control Interface
      u. PCMCIA - Personal Computer Micro Card Interface Adapter
      v. RAM - Random Access Memory
      w. ROM - Read Only Memory
      x. TCU - Terminal Control Unit
      y. USB - Universal Serial Bus
      z. UPS - Uninterruptible Power Supply

B. Definitions:
   1. Point: a point may be logical or physical. Logical points are values calculated by system such as totals, counts, derived corrections i.e. as result of and/or statements in CDL's.

Physical points are inputs or outputs, which have hardware, wired to controllers which are measuring or providing status conditions of contacts or relays providing interaction with related equipment (stop, start) or valve or damper actuators.

C. Symbols and Engineering unit abbreviations utilized in displays: to ANSI/ISAS 5.5.
   1. Printouts: to ANSI/IEEE 260.

1.04 BAS CONTRACTOR QUALIFICATIONS

A. Supplementing 23 09 00 1.12 BAS Contractor Qualifications.
   1. The contractor must be regularly engaged in the service and installation of BACnet and Niagara4 as specified herein,
   2. The Contractor shall have a minimum of 5 years' experience in the sales, installation, engineering, programming servicing and commissioning of Niagara4.
   3. The Contractor must be an authorized factory direct representative in good standing of the manufacturer of the proposed hardware and software components. Provide a letter dated within the last 12 months, from the manufacturer certifying that the Contractor is an authorized factory direct representative.
   4. The Contractor shall a minimum of three (3) technicians who have successfully completed the factory authorized training of the proposed manufactures hardware and software components and have successfully completed Niagara4 certification course(s).
      a. Contractor must provide proof of required training.
      b. The Contractor's capabilities shall include engineering and design of control systems, programming, electrical installation of control systems, troubling shooting and service.
   5. The contractor shall submit a list of no less than three (3) similar (in function, application and design) projects, which have similar Building Automation Systems as specified herein installed by the Contractor.
      a. These projects must be on-line and functional such that the Owner's/User's representative can observe the system in full operation.

1.05 GENERAL DESCRIPTION

A. Supplementing 23 09 00 1.5 General Description requirements.
   1. System to be "Open Protocol".
      a. BACnet® communications protocol will be used for communications.
   2. Work covered by sections referred to above consists of fully operational BAS, including, but not limited to, following:
      a. Building Controllers NCU, LCU, TCU.
      b. OWSs.
      c. Data communications equipment necessary to achieve an BAS data transmission system including LAN hardware and software for a BACnet® system
      d. Software complete with full documentation for software and equipment.

1.06 WORK INCLUDED

A. Supplementing 23 09 00 1.10 Work Included requirements.

B. Provide a new building automation system to control and monitor the building's mechanical and electrical systems.
   1. The system installed shall seamlessly connect devices other than HVAC throughout the building regardless of subsystem type, i.e. HVAC, lighting, and security devices should easily coexists on the same network channel without the need for gateways.
   2. Components not supplied by the primary manufacturer shall be integrated to share common software for network communications, time scheduling, alarm handling, and history logging.

C. The Installer furnishing the BAS network shall meet with the Installer(s) furnishing each of the following products to coordinate details of the interface between these products and the DDC network.

1. The variable frequency drive (VFD) vendor shall furnish VFDs with an interface to the control and monitoring points specified utilizing:
   a. Hardwired connections such as relay(s), 0-10VDC, or 4-20mA.
   b. BACnet/IP network connection.
   c. BACnet MS/TP network connection
2. Energy and utility metering shall interface to the BAS system and provide the monitoring points specified herein utilizing:
   a. Hardwired connections such as relay(s), 0-10VDC, or 4-20mA.
   b. BACnet/IP network connection.
   c. BACnet MS/TP network connection
3. The lighting control vendor shall furnish lighting controls with an interface to the control and monitoring points specified utilizing:
   a. Hardwired connections such as relay(s), 0-10VDC, or 4-20mA.
   b. BACnet/IP network connection.
   c. BACnet MS/TP network connection
4. The Owner or his designated representative shall be present at this meeting.
5. Each Installer shall provide the Owner and all other Installers with details of the proposed interface, hardware and software identifiers for the interface points, network identifiers, wiring requirements, communication speeds, and required network accessories.
6. The purpose of this meeting shall be to insure there are no unresolved issues regarding the integration of these products into the BAS network.
7. Submittals for these products shall not be approved prior to the completion of this meeting.

D. Provide new controllers of the latest revisions with input and output points as specified herein.

E. Operator workstations located as listed in the specifications.

F. Furnish and install all controllers to achieve system operation, any control devices, conduit and wiring, in the facility as required to provide the operation specified.

G. Furnish and load all software required to implement a complete and operational BAS.

1.07 SYSTEM DESIGN RESPONSIBILITY

A. Supplementing 23 09 00 1.13 System Design Responsibility requirements.
   1. Supply sufficient programmable controllers of all types to meet project requirements. Quantity and points contents to be approved by Owner prior to installation.
      a. Local Control Units (LCU) shall be utilized for primary mechanical and electrical systems such as Air handling equipment, Make-up Air Unit, Boiler System Control, and Chiller System Control type of applications.
      b. Terminal Control Units (TCU) shall be utilized for terminal equipment, such as Variable Air Volume, Fan Coil, Heat Pump, Roof Top, and Chilled Ceiling type of applications.
      c. Each LCU and TCU controller shall have a minimum of 10% spare capacity of each point type for future points. As a minimum, each controller shall have one spare of each point type available on the controller.
      d. Each NCU and each LAN shall have the capability of accepting 20% additional LCU/TCU(s) without the necessity of adding additional LAN controllers or LAN wiring.
      e. The LCU and TCU controller programming or configuration tools (see section 23 09 13 2.7.30 LCU / TCU Programming Software) shall be fully accessible through the Operator Workstation and Web Browser Client.
      f. All LCUs and TCUs shall be furnished with extended memory. No LCU/TCU shall be provided with less than 128 MB of RAM. The number of controllers attached to any NCU shall not exceed the following limits:
         1) MAX # OF CONTROLLERS
         2) 25

3) 50
4) 125

2. Regardless of the maximum number of controllers indicated above, it is ultimately the exclusive responsibility of the systems integrator/building controls contractor to ensure that the NCU has adequate resources for the number of controllers attached to it.
3. Niagara4 Network Manager Server software shall be furnished and installed on a server grade PC for applications requiring two or more NCUs.

1.08 BUILDING AUTOMATION SYSTEM (BAS)

A. The contractor shall be responsible for the hardware and software for the enterprise framework and system integration required for the complete Building Automation System.

B. The BAS shall be comprised of Network Control Units (NCU) connected to the Building Automation System local area network (BAS LAN).
1. Access to the BAS, either through a Workstation on the BAS LAN, within the building or through a Wireless Application Protocol device, or remotely through the Internet, shall be accomplished through a standard Web browser.
2. Each NCU shall communicate to BTL Listed BACnet controllers provided under the Programmable Controllers section.
3. Each NCU shall communicate to LonMark Certified LonWorks controllers provided under the Programmable Controllers section.

C. The system includes software and programming of the NCU(s), Operator Workstation(s) (OWS) software and hardware, development of all graphical screens, setup of schedules, trends, logs and alarms, network management and connection of the NCU(s) to the local area network.

1.09 SYSTEM DESIGN

A. The system shall consist of a network of Network Control Units (NCUs), interoperable Local Control Units (LCUs) and Terminal Control Units (TCUs) (VAV Box Controllers, Fan Coil Unit Controllers, etc.). All controllers for terminal units, air handling units (AHU) and controllers shall communicate and share data, utilizing BACnet communications protocols only

B. The intent of this specification is to provide a distributed and networked open Building Automation System, the capability to integrate ANSI/ASHRAE Standard 135, BACnet and ISO/IEC 14908-1: Open Data Communication in Building Automation, Controls and Building Management – Control Network Protocol into a unified system in order to provide flexibility for expansion, maintenance, and service of the system.

C. The proposed system must maintain strict adherence to industry standards including ANSI/ASHRAE Standard 135, Annex L, and Device Profile to assure interoperability between all system components. BACnet system must be tested and listed on BACnet Testing Laboratory (BTL) web site. Systems based on vendor specific proprietary hardware or software will not be considered for this project.

D. Systems utilizing gateways to proprietary communication systems will not be considered for this project. A gateway is considered to be a device or controller where the sole function is mapping of data points from one protocol to another. A gateway device cannot perform higher-level energy management functions such as Outdoor Air Optimization, Electrical Demand Limiting and the like.

E. The supplied system software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI/ASHRAE™ Standard 135, BACnet to assure interoperability between all system components is required.

F. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network. Systems employing a flat single tiered architecture shall not be acceptable. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of

annunciation shall not exceed 10 seconds for network connected user interfaces. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

G. User Access
   1. The supplied system must incorporate the ability to access all data using standard Web browsers without requiring proprietary operator interface and configuration programs.

H. An Open DataBase Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system databases, all controller program graphics and network databases which shall be provided in a Niagara4 Framework format.
   1. This data shall reside on a supplier-installed server for all database access.
   2. Systems requiring proprietary database and user interface programs shall not be acceptable.

I. Software Tools
   1. All software tools needed for full functional use, including programming of controllers, Niagara4 Framework network management and expansion, and graphical user interface use and development, of the BAS described within these specifications shall be provided to the owner or his designated agent.
      a. Any licensing required by the manufacturer now and to the completion of the warranty period, including changes to the licensee of the software tools and the addition of hardware corresponding to the licenses, to allow for a complete and operational system for both normal day to day operation and servicing shall be provided.
      b. Any such changes to the designated license holders shall be made by the manufacturer upon written request by the owner or his agent.
      c. Any cost associated with the license changes shall be identified within the BAS submittals.

J. Software License Agreement
   1. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract.
   2. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.
      a. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s).
      b. In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project.
      c. This shall include all custom, job specific software code, databases and documentation for all configuration and programming that is generated for a given project and/or configured for use with the NCU, Server, OWS and any related LAN/WAN/Intranet and Internet connected routers and devices.
      d. Any and all required User IDs and passwords for access to any component or software program shall be provided to the owner.

1.10 DYNAMIC DATA ACCESS

A. All operator devices, either network resident or connected via dial-up modems, shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment.

1.11 NETWORKS

A. The BAS network(s) must be based on Open Systems.

B. Niagara4 shall be used at the network levels as the manager(s).

C. High-speed data transfer rates for alarm reporting, quick report generation form multiple controllers and upload/download efficiency between network devices.

D. Support of any combination of controllers and operator workstations directly connected to the local area network. A minimum of 50 devices shall be supported on a single local area network.

E. Detection and accommodation of single or multiple failures of workstations, controller panels and the network media. The network shall include provisions for automatically reconfiguring itself to allow all operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.

F. Message and alarm buffering to prevent information from being lost.

G. Error detection, correction, and retransmission to guarantee data integrity.

H. Default device definition to prevent loss of alarms or data, and ensure alarms are reported as quickly as possible in the event an operator device does not respond.

I. Commonly available, multiple sourced, networking components shall be used to allow the system to coexist with other networking applications such as office automation. Ethernet to IEEE 802.3 standard is the only acceptable technology.

J. Synchronization of the real-time clocks in all NCU panels shall be provided.

K. The BAS LAN shall be a 100 Megabits/sec Ethernet network supporting BACnet, Java, XML, HTTP, SOAP, OBIX, SNMP and SMTP Protocols for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Control Units (NCUs), user workstations and where specified, a local server. Local area network minimum physical and media access requirements:
   1. Ethernet; IEEE standard 802.3
   2. Cable; 100 Base-T, UTP-8 wire, category 5
   3. Minimum throughput; 100 Mbps
   4. Provide access to the BAS LAN via a Wireless Application Protocol (WAP) device. Through this connection the BAS LAN will provide authorized staff with the ability to monitor and control the BAS from any location within the through a web browser, or web enabled devices.
   5. Provide access to the BAS LAN from a remote location, via the Intranet or Internet. The owner shall provide (in future) a connection to the Internet to enable access via high-speed cable modem, asynchronous digital subscriber line (ADSL) modem, ISDN line, T1 Line or access to an Internet Service Provider (ISP). If required, the owner will provide a switch/firewall between the building LAN and the BAS LAN. Through this connection the BAS LAN will provide authorized staff with the ability to monitor and control the BAS from a remote location through a web browser, or web enabled devices.

L. Controller Local Area Network (BAS sub LAN)
   1. Provide a network of stand-alone, distributed direct digital controllers that operate on the following protocol using the specified physical layers:
      a. The BAS sub LAN shall employ the BACnet protocol for communication between controllers. BACnet protocol implementation shall adhere to the ANSI/ASHRAE Standard 135. Communications between BACnet devices shall be 76.8 kbps over approved twisted shielded pair cabling utilizing Master/Slave Toke Passing BACnet protocol. BACnet defines a comprehensive set of object types and application services for communication requirements among all levels of control in a distributed, hierarchical Building Automation System. BACnet is intended to provide a single, uniform standard for the BAS to provide the required interoperability.
   2. Strict adherence to industry standards including ANSI/ASHRAE Standard 135, BACnet, certified by BACnet Testing Laboratory (BTL listed) to assure interoperability between all system components. Controllers that are not BTL listed are unacceptable.

3. Provide BAS Controllers that conform to ANSI/ASHRAE Standard. 135, BACnet
   a. Controllers using proprietary protocols or protocols other than listed herein are unacceptable.
4. The design of the BAS sub LAN shall network Local Control Unit (LCU) and Terminal Control Unit (TCU) to a Network Control Unit (NCU).
5. This level of communication shall support a family of application specific controllers and shall communicate bi-directionally with the network through DDC Controllers for transmission of global data.
6. Terminal Control Unit (TCU) shall be arranged on the BAS sub LAN's in a functional relationship manner with Local Control Unit (LCU). Ensure that a Variable Air Volume (VAV) Terminal Control Unit (TCU) is logically on the same LAN or segment as the Local Control Unit (LCU) that is controlling its corresponding Air Handling Unit (AHU).

1.12 REFERENCE STANDARDS

A. IEEE 802.3 - IEEE Standard for Ethernet; 2022, with Amendment (2026).

B. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).

C. ISO/IEC 14908-1 - Information technology - Control network protocol - Part 1: Protocol stack; 2012.

PART 2 PRODUCTS

2.01 QUALITY ASSURANCE

A. Supplementing 23 09 00 2.1 Quality Assurance requirements.
   1. The manufacturer of the Building Automation System digital controllers shall provide documentation supporting compliance with ISO 9001:2000 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing).
   2. Provide a copy of the registration certificate that contains the ISO 9001:2000 Certification bearing the name of the registered auditor.
   3. Control products such as direct digital controllers, control valves, actuators, sensors and transmitters shall be provided from a single manufacturer.
      a. Provide product literature that bears the name of the manufacturer on all direct digital controllers, control valves, actuators, sensors and transmitters.
   4. Provide satisfactory operation without damage at 110% above and 85% below rated voltage and at 3 hertz variation in line frequency. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interference. Bus connected devices shall be AC coupled, or equivalent so that any single device failure will not disrupt or halt bus communication.
   5. All controllers provided as part of this system and used for indoor applications shall operate under ambient environmental conditions of 32 °F to 122 °F dry bulb and 5% to 90% relative humidity, non-condensing as a minimum.
   6. All controllers provided as part of this system and used for outdoor applications shall operate under ambient environmental conditions of -40 °F to 158 °F dry bulb and 5% to 90% relative humidity, non-condensing as a minimum.

2.02 ACCEPTABLE SYSTEM MANUFACTURERS

A. Provide a building automation system supplied by a company regularly engaged in the manufacturing and distribution of building automation systems. The BAS Manufacturer shall meet the following qualifications as a minimum:
   1. The manufacturer of the hardware and software components must be primarily engaged in the manufacture of building automation systems as specified herein, and must have been so for a minimum of five (5) years.
   2. The manufacturer of the hardware and software components as well as its subsidiaries must be a member in good standing of the BACnet International.

3. At least 75% of the manufactured product line shall be produced under their own direction, including R&D and assembly. Rebranding of another manufacture product shall not qualify.

B. The manufacturer of the hardware and software components shall have a technical support group accessible via a toll free number that is staffed with qualified personnel, capable of providing instruction and technical support service for networked control systems.

PART 3 EXECUTION

3.01 PRELIMINARY DESIGN REVIEW

A. Supplementing 23 09 00 3.8 Preliminary Design Review requirements.
   1. The BAS contractor shall submit a preliminary design document for review. This document shall contain the following information in addition to the requirements of 23 09 00:
      a. Provide product brochures and a technical description of the Server, Operator Workstation, and Network Control Unit (NCU) software required to meet this specification. Provide a description of software programs included.
      b. Open Protocols - For all direct digital controller hardware BACnet Protocol Implementation Conformance Statement PICS. Provide complete description and documentation of any proprietary services and/or objects where used in the system.
      c. Submit the Niagara Compatibility Statement (NiCS) verifying that all aspects of the Niagara Framework as provided to maintain an Open System Design. The System as provided shall confirm with the following NiCS properties:
         1) Value
         2) All
         3) All
         4) All
         5) All
   2. Provide a description and samples of Operator Workstation graphics and reports.
   3. Provide a URL address for the engineer to view the proposed functionality via a web based BAS through a standard web browser.

3.02 SUBMITTALS

A. Supplementing 23 09 00 3.9 Submittals requirements.
   1. Control System Shop Drawings
      a. Detailed system architecture and points list showing all points associated with each controller, controller locations, and describing the spare points capacity at each controller and BAS LAN.
   2. Direct Digital Control System Hardware
      a. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of BACnet controller.
      b. Bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
      c. Manufacturer's description and technical data such including product specifications and installation and maintenance instructions for items listed herein:
         1) Direct digital controllers (BACnet and LonWorks)
         2) Sensors and Transmitters
         3) Transducers
         4) Actuators
         5) Automatic Control Valves
         6) Automatic Control Dampers
         7) Air Flow Stations
         8) Control panels
         9) Operator interface equipment

10) Ancillary equipment such as relays, power supplies and wiring

d. Riser diagrams showing control network layout, communication protocol, and wire types.

3. Building Automation System Server and Operator Workstation (OWS)
   a. Complete bill of material indicating quantity, manufacturer, model number, and relevant technical data of equipment used.
   b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
      1) Central Processing Unit (CPU) or web server
      2) Monitors
      3) Keyboards
      4) Uninterruptible Power supplies
      5) Network switches, hubs and routers.
      6) Interface equipment between CPU or server and control panels
      7) Operating System software
      8) Operator interface software
      9) Color graphic software
      10) Third-party software
   c. Network diagram of control, communication, and power wiring for BAS Server and OWS installation.

END OF SECTION 23 09 23

SECTION 23 09 69
VARIABLE FREQUENCY CONTROLLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes solid-state, PWM, VFCs for speed control of three-phase motors.

1.03 DEFINITIONS

A. BMS: Building management system.

B. IGBT: Integrated gate bipolar transistor.

C. LAN: Local area network.

D. PID: Control action, proportional plus integral plus derivative.

E. PWM: Pulse-width modulated.

F. VFC: Variable frequency controller.

1.04 SUBMITTALS

A. Product Data: For each type of VFC, provide dimensions; mounting arrangements; location for conduit entries; shipping and operating weights; and manufacturer's technical data on features, performance, electrical ratings, characteristics, and finishes.

B. Shop Drawings (for each VFC):
   1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Each installed unit's type and details.
      b. Nameplate legends.
      c. Short-circuit current ratings of integrated unit.
      d. UL listing for series rating of overcurrent protective devices in combination controllers.
   2. Wiring Diagrams: Power, signal, and control wiring for VFC. Provide schematic wiring diagram for each type of VFC.

C. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around VFCs where pipe and ducts are prohibited. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.

D. Qualification Data: For testing agency and manufacturer.

E. Field Test Reports: Written reports specified in Part 3.

F. Manufacturer's field service report.

G. Operation and Maintenance Data: For VFCs, all installed devices, and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section " Operation and Maintenance Data," include the following:
   1. Routine maintenance requirements for VFCs and all installed components.
   2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

H. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

I. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that dip switch settings for motor running overload protection suit actual motor to be protected.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.

B. 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.

C. Source Limitations: Obtain VFCs of a single type through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Comply with NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store VFCs indoors in clean, dry space with uniform temperature to prevent condensation. Protect VFCs from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.07 COORDINATION

A. Coordinate layout and installation of VFCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate features of VFCs, installed units, and accessory devices with pilot devices and control circuits to which they connect.

C. Coordinate features, accessories, and functions of each VFC and each installed unit with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.08 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
   1. Spare Fuses: Furnish one spare for every five installed, but not less than one set of three of each type and rating
   2. Indicating Lights: Two of each type installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
   2. Yaskawa, Inc.
   3. Danfoss

2.02 VARIABLE FREQUENCY CONTROLLERS

A. Unit and options shall be UL508 Listed as a complete assembly.

B. Unit shall be listed for minimum 100 KA SCCR without the need for external input fuses.

C. Microprocessor based Bypass Controller - Manual or automatic (selectable) transfer to line power via contactors. A keypad to control the bypass controller is to be mounted on the enclosure door. The bypass keypad shall include a one line diagram and status LEDs to indicate the mode of operation and “External Fault” conditions. When in the “Normal” mode, the bypass contactor is open and the drive output contactor is closed. In the “Test” position, both contactors are open, in the “Bypass” position, the drive output contactor is open, and the bypass contactor is closed. Start/stop via customer supplied maintained contact shall be 24V or 115V compatible and shall function in both the “Normal” and “Bypass” modes. The voltage tolerance of the bypass power supply shall be ± 35% to eliminate the problem of contactor coil burnout. The design shall include single-phase protection in both the AFD and bypass modes.

D. Customer Interlock Terminal Strip – provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. Include fireman’s override and damper control circuit as standard. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, or Bypass modes.

E. Automatic bypass operation shall be selectable in the standard microprocessor based bypass design.

F. Door / cover interlocked circuit breaker disconnect switch which will disconnect all input power from the drive and all internally mounted options. The disconnect handle shall be through the door, and be padlockable in the “Off” position.

G. Fast acting semi-conductor fuses exclusive to the AFD – fast acting semi-conductor fuses allow the AFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs which have no such fuses, or that incorporate fuses common to both the AFD and the bypass will not be accepted. In such designs, a fuse clearing failure would render the bypass unusable.

H. Class 10 or 20 (selectable) electronic motor overload protection shall be included in the microprocessor bypass to protect the motor in bypass mode.

I. 3% DC line reactor

J. Input AC Line Reactor

K. The following operating information displays shall be standard on the AFD digital display. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of two operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
   1. Output Frequency
   2. Motor Speed (RPM, %, or Engineering units)
   3. Motor Current
   4. Calculated Motor Torque
   5. Calculated Motor Power (kW)
   6. DC Bus Voltag
   7. Output Voltage
   8. Heatsink Temperature (0F)
   9. Analog Input Values
   10. Analog Output Value
   11. Keypad Reference Values
   12. Elapsed Time Meter (resettable)
   13. kWh meter (resettable)
   14. mWh meter
   15. Digital input status
   16. Digital output status

L. Communications: Provide an ethernet interface allowing VFC to be used with an external system within a multidrop LAN configuration. Interface shall allow all parameter settings of VFC to be programmed via a BACNet IP BMS. Provide capability for VFC to retain these settings within the nonvolatile memory.

2.03 ENCLOSURES

A. Enclosure: NEMA 250 Type I, with hinged full front access.

2.04 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested VFCs before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas, surfaces, and substrates to receive VFCs for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Anchor each VFC assembly to steel-channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and grout sills flush with VFC mounting surface.

B. Controller Fuses: Install fuses in each fusible switch. Comply with requirements in Division 26 Section "Fuses."

3.03 IDENTIFICATION

A. Identify VFCs, components, and control wiring according to Division 15 Section "Mechanical identification."

B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including pretesting and adjusting VFCs.

B. Test Reports: Prepare a written report to record the following:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

3.05 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Complete installation and startup checks according to manufacturer's written instructions.

3.06 CLEANING

A. Clean VFCs internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.07 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain VFCs.

END OF SECTION 23 09 69

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible ducts.

B. Metal ductwork.

C. Casings and plenums.

D. Duct cleaning.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 09 91 13 - Exterior Painting: Weld priming, weather resistant, paint or coating.

C. Section 09 91 23 - Interior Painting: Weld priming, paint or coating.

D. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

E. Section 23 33 00 - Air Duct Accessories.

F. Section 23 36 00 - Air Terminal Units.

G. Section 23 37 00 - Air Outlets and Inlets.

H. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

E. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

G. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.

H. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

I. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

J. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.

K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

L. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2027.

M. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.

N. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

O. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

P. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for low pressure class and higher systems.

D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.06 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

1.07 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.

B. Duct Shape and Material in accordance with Allowed Static Pressure Range:
   1. Round: Plus or minus 2 in-wc (500 Pa) of galvanized steel.
   2. Rectangular: Plus or minus 2 in-wc (500 Pa) of galvanized steel.

C. Duct Sealing and Leakage in accordance with Static Pressure Class:
   1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
      a. Supply Air: 1 in-wc (250 Pa) pressure class, galvanized steel.
      b. Return and Relief Air: 1 in-wc (250 Pa) pressure class, galvanized steel.
      c. General Exhaust Air: 1 in-wc (250 Pa) pressure class, galvanized steel.
   2. Low Pressure Service: Up to 2 in-wc (500 Pa):
      a. Seal: Class C, apply to seal off transverse joints.
      b. Leakage:
         1) Rectangular: Class 24 or 24 cfm/100 sq ft (680 Lpm/9.3 sq m).

D. Duct Fabrication Requirements:
   1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
   2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
   3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.
   4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

E. Regulatory Requirements: Construct ductwork to comply with {\rs\#1} standards.

F. Low Pressure Supply (System with Cooling Coils): 1 inch w.g. (250 Pa) pressure class, galvanized steel.

G. Medium and High Pressure Supply: 4 inch w.g. (___ Pa) pressure class, galvanized steel.

H. Return and Relief: 1 inch w.g. (250 Pa) pressure class, galvanized steel.

I. General Exhaust: 1 inch w.g. (250 Pa) pressure class, galvanized steel.

J. Outside Air Intake: 1 inch w.g. (250 Pa) pressure class, galvanized steel.

2.02 MATERIALS

A. Un-Galvanized Steel for Ducts: ASTM A1008/A1008M, Designation CS (commercial steel), cold-rolled.

B. Stainless Steel for Ducts: ASTM A666, Type 304.

C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
2. VOC Content: Not more than 250 g/L, excluding water.
3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
4. For Use with Flexible Ducts: UL labeled.
5. Manufacturers:
   a. Carlisle HVAC Products; Hardcast Versa-Grip 181 Water Based Fiber Reinforced Duct Sealant: www.carlislehvac.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

D. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

G. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Material Requirements:
   1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Fire Rated Ducts:
   1. Two-hour, Fire Rated Duct:
      a. UL labeled, construct of 18-gauge, 0.0516-inch (1.31 mm) galvanized steel.
      b. R-Value: 4.5 when tested in accordance with ASTM C177.

C. Round Metal Ducts:
   1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
   2. Round Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

D. Round Spiral Duct:
   1. Round spiral lock seam duct with galvanized steel outer wall.

E. Connectors, Fittings, Sealants, and Miscellaneous:
   1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
   2. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
   3. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
      a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
      b. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
      c. For Use with Flexible Ducts: UL labeled.
   4. Gasket Tape:
      a. Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle ring connections.
   5. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
   6. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
      a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
      b. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
      c. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
      d. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
      e. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
      f. Other Types: As required.

F. Manufactured Non-Metallic Ductwork:
   1. Products:
      a. Ductwork system materials including panels, adhesives, tapes, sealants, flanges and gaskets to be as a matched system listed by Underwriter's Laboratory to the UL-181 standard as a Class 1 air duct.

b. Duct air leakage rates to be in compliance with SMACNA Class 3 HVAC Duct Construction Standards, latest version per applicable leakage class based on pressure.
c. The panel shall be manufactured of CFC/HCFC-free rigid material thermobonded on both sides to a factory-applied .001"(25 micron) aluminum foil facing reinforced with a fiberglass scrim. The thermal conductivity shall be no greater than 0.13BTU in/hr x sq.ft x degree F(.018W/m x deg. C), and the density of the material shall not be less than 3.5 pcf(56 Kg/sq.m) with a minimum compressive strength of 28 psi (.2 MPa).
d. The standard thermal rating to be a minimum of an R-6.0 (1.2 RSI)
e. Installed ducting system must be warranted for a minimum of ten years from installation.

2. Application:
a. All fabricated duct segment fittings shall be designed in accordance with SMACNA HVAC Duct Construction Standards, latest edition.

3. Duct Installation:
a. All exterior mounted ductwork shall be protected against the elements with a non-duct penetrating weatherproof finish. Duct segments shall incorporate 6.0 mils thickness 5-ply aluminum, zero permeability, absolute vapor barrier self-adhesive jacketing. All external seams and joints shall be fully sealed with joint and seam tape during the installation process.

4. Manufacturers:
a. Dual-Tech; www.ptmmanufacturing.com
b. Substitutions: See Section 01 6000 - Product Requirements.

G. Flexible Ducts: UL 181, Class 1, UV-inhibited black polymer film supported by helically wound spring steel wire.
1. Insulation: Fiberglass insulation with aluminized vapor barrier film.
2. Manufacturers:
a. Thermaflex Model M-KC.
b. Hart and Cooley Model F216.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 CASINGS AND PLENUMS

A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.

B. Minimum Fabrication Requirements:
1. Fabricate acoustic plenum or casing with reinforcing turned inward.
2. Provide 16-gauge, 0.059-inch (1.52 mm) sheet steel back facing and 22-gauge, 0.029-inch (0.76 mm) perforated sheet steel front facing with 3/32 inch (2.4 mm) diameter holes on 5/32 inch (4 mm) centers.
3. Construct panels 3 inches (75 mm) thick, packed with 4.5 pcf (72 kg/cu m) minimum glass fiber insulation media, on inverted channel of 16-gauge, 0.059-inch (1.52 mm) sheet steel.
4. Mount floor-mounted plenum or casings on 4-inch (100 mm) high concrete curbs. At floor, rivet panels on 8-inch (200 mm) centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18-gauge, 0.052-inch (1.31 mm) expanded metal mesh supported at 12-inch (300 mm) centers, turned up 12 inches (300 mm) at sides with sheet metal shields.

C. Access Doors:
1. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.
2. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles.
3. Provide clear wire glass observation ports, minimum 6 by 6 inch (150 by 150 mm) size.

D. Mount floor mounted casings on 4 inch (100 mm) high concrete curbs. At floor, rivet panels on 8 inch (200 mm) centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gauge, 0.0478 inch (1.21 mm) expanded metal mesh supported at 12 inch (300 mm) centers, turned up 12 inches (300 mm) at sides with sheet metal shields.

E. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

H. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.

I. Use double nuts and lock washers on threaded rod supports.

J. Connect terminal units to supply ducts directly or with one foot (300 mm) maximum length of flexible duct. Do not use flexible duct to change direction.

K. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet (1.5 m) maximum length of flexible duct held in place with strap or clamp.

L. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

M. Fire Partitions: Provide firestopping sealing. See Section 07 84 00.

N. Duct Accessories, Terminal Units, Inlets, and Outlets: Interconnect as indicated in Sections 23 33 00, 23 36 00, and 23 37 00.

O. Duct Insulation: Provide duct insulation. See Section 23 07 13.

P. Painting: Provide surface finish as indicated on drawings. See Sections 09 91 13 and 09 91 23.

3.02 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.03 PRESSURE TESTING

A. Prior to the balancing of the duct system by the AABC certified balancing contractor all ductwork shall be tested by the mechanical contractor for duct leakage in accordance with SMACNA Standards and AABC Standards Chapter 23. Duct leakage shall not exceed 1% for a duration of (10) ten minutes. Test pressures shall be as per SMACNA, however, not less than the following:

1. Low Pressure Duct:
   a. 25% above system operating pressure, but not less than 2" w.c. (500 Pa).
2. High Pressure Supply Duct:
   a. 25% above system operating pressure, but not less than 4" w.c. (1000 Pa).
3. High Pressure Exhaust Duct:
   a. 25% above system operating pressure, but not less than 2" w.c. (500 Pa).

B. Insulation materials shall not be applied until systems have been witnessed to meet the above testing requirements.

C. The testing and balancing contractor shall witness and certify all duct pressure tests.

D. Additional leak testing requirements:
1. Disassemble, reassemble, and seal segments of duct systems to accomodate leakage testing and for compliance with test requirements.
2. If static pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
3. Provide seven (7) days advance notice for testing.

3.04 SCHEDULES

A. Ductwork Pressure Class:
1. Supply (Low Pressure): 1 inch (downstream of vav terminal unit.)
2. Supply (Medium and High Pressure): 4 inch (between vav terminal unit and air handling unit.)
3. Return Ductwork: 1 inch.
4. General Exhaust: 1 inch.
5. Outside Air Intake: 1 inch (250 Pa).

END OF SECTION 23 31 00

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Industrial blast-suppression dampers.

D. Duct access doors.

E. Duct test holes.

F. Fire dampers.

G. Flexible duct connections.

H. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings.

B. Section 23 36 00 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

B. NFPA 92 - Standard for Smoke Control Systems; 2015.

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

D. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

E. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

D. Project Record Drawings: Record actual locations of access doors and test holes.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Krueger: www.krueger-hvac.com.
   2. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
   3. Ruskin Company: www.ruskin.com.
   4. Titus: www.titus-hvac.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc: www.louvers-dampers.com.
   2. Nailor Industries Inc: www.nailor.com.
   3. Ruskin Company: www.ruskin.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Gravity Backdraft Dampers, Size 18 by 18 inches (450 by 450 mm) or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch (150 mm) width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 INDUSTRIAL BLAST-SUPPRESSION DAMPERS

A. Frame:
   1. Orientation: Horizontal.
   2. Material: 10 gauge, flanged galvanized steel.
   3. Free-area Shape: Circular cross section with grooved line position indicator on shaft-end

B. Blade:
   1. Type: Single-blade round.
   2. Material: 10 gauge, galvanized steel with rubber-based gasket.
   3. Axle: Same blade material with lubricated ball-bearings and axle seals to isolate contaminated air streams at high temperatures.

C. Identification Tag: Custom octagon type, stainless steel, engraved.
   1. Information: Show cfm (L/sec) with fail setting and part number.
   2. Fastened: Beaded chain, stainless steel.

2.04 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.
   1. Manufacturers:
   2. Carlisle HVAC Products; Dynair Test Port with Red Cap with O-Ring Seal: www.carlislehvac.com/#sle.

2.05 FIRE DAMPERS

A. Manufacturers:
   1. NCA, a brand of Metal Industries Inc: www.ncamfg.com/#sle.
   2. Pottorff: www.pottorff.com/#sle.
   3. Ruskin Company, a brand of Johnson Controls: www.ruskin.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Horizontal Dampers: Galvanized steel, 22 gage (0.76 mm) frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.

D. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch (250 Pa) pressure class ducts up to 12 inches (300 mm) in height.

E. Fusible Links: UL 33, separate at 160 degrees F (71 degrees C) with adjustable link straps for combination fire/balancing dampers.

2.06 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric: www.carlislehvac.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
      a. Net Fabric Width: Approximately 2 inches (50 mm) wide.
   2. Metal: 3 inches (75 mm) wide, 24 gage, 0.0239 inch (0.61 mm) thick galvanized steel.

2.07 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc: www.louvers-dampers.com.
   2. Nailor Industries Inc: www.nailor.com.
   3. Ruskin Company: www.ruskin.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch (200 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

E. End Bearings: Except in round ducts 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

F. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as indicated. Provide 4 x 4 inch (100 x 100 mm) for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

K. Provide air turning devices within duct whenever long radius elbows are not utilized.

END OF SECTION 23 33 00

SECTION 23 34 23
HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Laboratory and fume exhaust.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate installation instructions.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 FIELD CONDITIONS

A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 ROOF EXHAUSTERS (GENERAL PURPOSE)

A. Manufacturers:
   1. Greenheck Fan Corporation: www.greenheck.com/#sle.
   2. Twin City Fan & Blower: www.tcf.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch (13 mm) mesh, 0.62 inch (1.6 mm) thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

C. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch (13 mm) mesh, 0.62 inch (1.6 mm) thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

D. Roof Curb: 8 inch (200 mm) high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.

E. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and wall mounted multiple speed switch.

F. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

G. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

H. Performance Ratings: As indicated on drawings.

2.02 ROOF EXHAUSTERS (FUME HOOD)

A. CORROSION RESISTANT COATING
   1. All fan and system components (fan, nozzle, wind band, plenum) shall be corrosion resistant coated with LabCoat™, a two part electrostatically applied and baked, sustainable, corrosion resistant coating system; or Heresite P-413C. Standard finish color to be gray.
      a. All parts shall be cleaned and chemically prepared for coating using a multi-stage wash system which includes acid pickling that removes oxide, increases surface area, and improves coating bond to the substrate.
      b. The first powder coat applied over the prepared surface shall be a zinc rich epoxy primer (no less than 70% zinc) and heated to a gelatinous consistency (partial cure) at which the second powder coat of polyester resin shall be electrostatically applied and simultaneously be cured at a uniform temperature of 400°F.
      c. The coating system, a total thickness of up to 6 mils, is not affected by the UV component of sunlight (does not chalk), and has superior corrosion resistance to acid, alkali, and solvents. Coating system shall exceed 4000 hour ASTM B117 Salt Spray Resistance and must have a 30% gloss retention and no more than a 5 Delta E change after 5 yrs to meet an AAMA 2604 specification.
      d. Note that 10-20 mil thick wet coating systems pollute the environment (air and water), and that these manually applied coatings are not uniform over the impeller surface and can cause fan imbalance and vibration.

B. FAN HOUSING AND OUTLET
   1. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
   2. Fan housing shall be welded steel and meet specification section 2.15 for corrosion resistant coating. No uncoated metal fan parts shall be acceptable.
   3. Fan housings that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and / or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
   4. A high velocity conical discharge nozzle shall be supplied by the fan manufacturer and be designed to efficiently handle an outlet velocity of up to 6000 FPM. Discharge stack caps or hinged covers, impeding exhaust flow shall not be permitted.
      a. Provide housing drain for removal of rain and condensation.
         1) A bolted and gasketed access door shall be supplied in the fan housing allowing for impeller inspection or removal of impeller, shaft and bearings without removal of the fan housing.
         2) Standard finish color to be gray.
         3) 2.3 FAN IMPELLER
         4) Fan impeller shall be centrifugal, backward inclined, with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically per AMCA Standard 204.
         5) Fan impeller shall be manufactured of aluminum (AMCA type B spark resistant), fully welded and meet specification section 2.15 for corrosion resistant coating.
   5. FAN BYPASS AIR PLENUM
      a. For constant volume systems, the fan shall be connected directly to the exhaust duct without the need of a bypass air plenum.

b. For variable volume systems, a bypass air plenum shall be provided as shown on drawings. The plenum shall be equipped with a bypass air damper and intake air hood with bird screen for introducing outside air at roof level upstream of the fan.
c. The plenum shall be constructed of fully welded steel, meet specification section 2.15 for corrosion resistant coating, and mount on roof curb as shown on the project drawings. Plenums that are fabricated of plastics or resins that are combustible and have mechanical properties less than steel shall not be acceptable.
d. The bypass air plenum shall be mounted on factory fabricated roof curb provided by the fan manufacturer, as shown on the project drawings (see section 2.5)
e. Fan designs that use inlet flexible connectors that can leak causing loss of lab exhaust shall not be accepted.
f. Bypass air dampers shall be opposed-blade design, and coated with up to 4 mils of Hi-Pro Polyester resin, electrostatically applied and baked.
g. A fan isolation damper, either gravity back draft or two position actuated, fabricated of steel or aluminum and coated with minimum 4 mils of Hi-Pro Polyester resin, electrostatically applied and baked, shall be provided as shown on the project documents.
h. Blower / Plenum vibration isolation shall be limited to neoprene / cork vibration pads.

6. BYPASS AIR PLENUM CURB
   a. Exhaust system manufacturer shall supply a structural support curb for the plenum, of specified height, as shown on the drawings.
   b. Curb shall be fabricated of a minimum of 14 gauge corrosion resistant coated steel and structurally reinforced.
   c. Curbs shall be insulated.
   d. When properly anchored to the roof structure, the standard curb / plenum / blower assembly shall withstand wind loads of up to 125 mph without additional structural support.
7. FAN MOTORS AND DRIVE
   a. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, TEFC with a 1.15 service factor. A factory-mounted NEMA 3R disconnect switch shall be provided for each fan. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components.
      1) Drive belts and sheaves shall be sized for 200% of the motor horsepower, and shall be readily and easily accessible for service, if required. Drive shall consist of a minimum of two belts under all circumstances.
      2) Shaft to be polished and ground steel.
      3) Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type and be sized for an L-10 life of no less than 100,000 hours. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.
      4) All shaft bearings shall have extended lube lines with zerk fittings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Provide sheaves required for final air balance.

E. Install backdraft dampers on inlet to roof and wall exhausters.

END OF SECTION 23 34 23

SECTION 23 36 00
AIR TERMINAL UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single-duct terminal units.

1.02 RELATED REQUIREMENTS

A. Section 23 05 48 - Vibration and Seismic Controls for HVAC.

B. Section 23 21 13 - Hydronic Piping: Connections to heating coils.

C. Section 23 21 14 - Hydronic Specialties: Connections to heating coils.

D. Section 23 8200 - Convection Heating and Cooling Units: Air Coils.

E. Section 23 31 00 - HVAC Ducts and Casings.

F. Section 23 33 00 - Air Duct Accessories.

G. Section 23 82 00 - Convection Heating and Cooling Units: Air coils.

1.03 REFERENCE STANDARDS

A. ASTM A492 - Standard Specification for Stainless Steel Rope Wire; 1995 (Reapproved 2013).

B. ASTM A603 - Standard Specification for Zinc-Coated Steel Structural Wire Rope; 1998 (Reapproved 2014).

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

D. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

E. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.

1. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 to 4 inch wg (250 to 1000 Pa).

D. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.

E. Project Record Documents: Record actual locations of units and locations of access doors required for access of valving.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant-volume regulators.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for air terminal units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tuttle & Bailey

B. Price

C. Metalaire

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SINGLE DUCT VARIABLE VOLUME UNITS

A. Basic Assembly:
   1. Casings: Minimum 22 gage, 0.0299 inch (0.76 mm) galvanized steel.
   2. Lining: Minimum 1 inch (25 mm) thick neoprene or vinyl coated fibrous glass insulation, 1.5 lb/cu ft (24 g/L) density, meeting NFPA 90A requirements and UL 181 erosion requirements. Face lining with mylar film.
   3. Plenum Air Inlets: Round stub connections for duct attachment.
   4. Plenum Air Outlets: S slip and drive connections.

B. Basic Unit:
   1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
   2. Volume Damper: Construct of galvanized steel with peripheral gasket and self lubricating bearings; maximum damper leakage: 2 percent of design air flow at 1 inches (0.25 kPa) rated inlet static pressure.
   3. Mount damper operator to position damper normally open.

C. Round Outlet: Discharge collar matching inlet size.

D. Hot Water Heating Coil:
   1. Construction: 1/2 inch (13 mm) copper tube mechanically expanded into aluminum plate fins, leak tested under water to 200 psig (1380 kPa) pressure, factory installed.
   2. See drawing schedule for capacity
   3. Provide minimum 2-row heating coils.

E. Automatic Damper Operator:
   1. Electric Actuator: 24 volt with high limit.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are suitable for installation.

B. Verify that field measurements are as indicated on drawings.

C. Verify configuration (Right or Left Hand) with field conditions prior to ordering.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install the inlets of air terminal units and air flow sensors a minimum of four duct diameters from elbows, transitions, and duct takeoffs.

C. Provide ceiling access doors or locate units above easily removable ceiling components.

D. Support units individually from structure with wire rope complying with ASTM A492 and ASTM A603 in accordance with SMACNA (SRM). See Section 23 0548.

E. Do not support from ductwork.

F. Connect to ductwork in accordance with Section 23 31 00.

G. Install heating coils in accordance with Section 23 82 00.

3.03 ADJUSTING

A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to minimum flow identified on drawings.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Provide manufacturer's field representative to test, inspect, instruct, and observe field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training, for additional requirements.

END OF SECTION 23 36 00

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers:
   1. Critical environment diffusers.

B. Rectangular ceiling diffusers.

C. Registers/grilles:
   1. Wall-mounted, grid core exhaust and return register/grilles.

D. Louvers:
   1. Combination louvers.

E. Goosenecks.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2027.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

G. UL 2518 - Standard for Safety Air Dispersion Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

C. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC: www.krueger-hvac.com/#sle.

B. Price Industries: www.price-hvac.com/#sle.

C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.

D. Tuttle and Bailey: www.tuttleandbailey.com/#sle.

E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Square, stamped, multi-core diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.

B. Frame: Inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabrication: Steel with baked enamel finish.

D. Accessories: Provide radial opposed blade volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, and anti-smudging device with damper adjustable from diffuser face.

E. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.03 WALL GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Fixed grilles of 1/2 by 1/2 by 1/2 inch (13 by 13 by 13 mm) louvers.

B. Fabrication: Aluminum with factory clear lacquer finish.

C. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CRITICAL ENVIRONMENTS DIFFUSERS

A. General Requirements:
   1. Diffuser material to comply with ASTM E84, UL 723, UL 2518, NFPA 90A, and NFPA 90B.

B. Laminar Flow Diffusers:
   1. Construction: Stainless steel.
   2. Frame: Provide framing per manufacturer's recommendations.
   3. Dimensions: As indicated.

2.05 LOUVERS

A. Type: 4 inch (100 mm) deep frame with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch (13 mm) square mesh screen over intake or exhaust end.

2.06 COMBINATION LOUVERS

A. Damper-combined, drainable louver:

B. Size: As indicated on the drawings.

C. Material: Extruded galvanized steel.

D. Paint Finish and Color: To be selected by Architect from manufacturer's standard range.

E. Rust Inhibitor Coating: Kynar.

F. Sleeve or Flange: Factory-mounted standard.

G. Duct Transition Fitting: Square.

H. Mounting: Furnish with interior flat flange for installation.

2.07 GOOSENECKS

A. Fabricate in accordance with of minimum 18 gauge, 0.0598 inch (1.21 mm) galvanized steel.

B. Mount on minimum 12 inch (300 mm) high curb base where size exceeds 9 by 9 inch (230 by 230 mm).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION 23 37 00

SECTION 23 74 13
PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

C. Remote panel.

D. Roof mounting curb and base.

1.02 RELATED REQUIREMENTS

A. Section 23 05 48 - Vibration and Seismic Controls for HVAC.

B. Section 26 05 83 - Wiring Connections: Installation and wiring of thermostats and other controls components; wiring from unit terminal strip to remote panel.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2026.

B. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks; 2024, with Errata (2026).

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Daikin; www.daikin.com

B. Fraser-Johnston; www.fraser-johnston.com

C. Addison; www.addison-hvac.com

D. Greenheck; www.greenheck.com

E. Trane Technologies, PLC; _____: www.trane.com/#sle.

F. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MANUFACTURED UNITS

A. General: Roof mounted units having gas burner and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan, return plenum / economizer section.

C. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) no greater than that allowed by federal code.

2.03 FABRICATION

A. Cabinet: Galvanized steel with baked enamel finish, including access panels with screwdriver operated flush cam type fasteners. Structural members shall be minimum 18 gauge, 0.0478 inch (1.21 mm), with access doors or panels of minimum 20 gauge, 0.0359 inch (0.91 mm).

B. Insulation: 2 inch (50 mm) thick neoprene coated glass fiber with edges protected from erosion.

C. Heat Exchangers: Stainless steel, of welded construction.

D. Supply Fan: Backward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch pulley, and rubber isolated hinge mounted high efficiency motor or direct drive; see Section 23 05 48. Isolate complete fan assembly.

E. Air Filters:
   1. 2 inch (50 mm) thick glass fiber disposable media in metal frames.

F. Roof Mounting Curb: 36 inches (_____ mm) high galvanized steel, channel frame with gaskets, nailer strips.

G. Vibration Isolation Rail: 9 inches.

2.04 BURNER

A. Gas Burner: Forced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.

B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after airflow proven and slight delay, allow gas valve to open.

2.05 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 Tons of refrigeration (21 kw) capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 Tons of refrigeration (26 kW) cooling capacity and larger.

2.06 COMPRESSOR

A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

B. Provide step capacity control by hot gas by-pass.

2.07 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.08 MIXED AIR CASING

A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.

B. Gaskets: Provide tight fitting dampers with edge gaskets.

C. Damper Operator: 24 volt with gear train sealed in oil.

2.09 OPERATING CONTROLS

A. Provide terminal strip on unit for connection of operating controls to remote panel by controls contractor. Control shall allow for modulating stages of heating and modulating stages cooling.

B. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.

C. External Point Mapping: Provide mapping table for each parameter included in the local visual interface with software-toggle flag to allow reduced mapping of available points.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that pad is ready to receive work and opening dimensions are as indicated on shop drawings.

B. Verify that proper power supply is available.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.03 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

3.04 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for closeout submittals.

B. See Section 01 79 00 - Demonstration and Training for additional requirements.

END OF SECTION 23 74 13

SECTION 23 81 26.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Forced air furnaces.

B. Air cooled condensing units.

C. Indoor air handling (fan and coil) units for ducted systems.

D. Controls.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2026.

B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.

C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Addendum (2026).

D. ASHRAE Std 23 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Compressor Units; 2022.

E. NEMA MG 00001 - Motors and Generators; 2024.

F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2027.

G. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2027.

H. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

D. Design Data: Indicate refrigerant pipe sizing.

E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

H. Project Record Documents: Record actual locations of components and connections.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturers warranty for condensing units and compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lennox; www.lennox.com

B. Daikin; www.daikincomfort.com

C. York International Corporation / Johnson Controls: www.york.com/#sle.

D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SYSTEM DESIGN

A. Split-System HCooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating: Natural gas fired.
   2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.
   3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

B. Performance Requirements: See Drawings for additional requirements.

C. Electrical Characteristics as noted on drawings.

2.03 INDOOR AIR HANDLING UNITS FOR DUCTED SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
   1. Air Flow Configuration: Upflow.
   2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.

B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
   1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
   2. Motor Electrical Characteristics:

C. Air Filters: 1 inch (25 mm) thick glass fiber, disposable type arranged for easy replacement.

D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturers: System manufacturer.

2.04 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Refrigerant: R-454B.
   2. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23 and UL 207.

B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
   1. Condenser Fans: Direct-drive propeller type.

C. Accessories: Filter drier, high-pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.

D. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.
   2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig (1965 kPa) and off when pressure drops below 140 psig (965 kPa) for operation to 0 degrees F (-18 degrees C).

2.05 GAS FURNACE COMPONENTS

A. Burner: Atmospheric type with adjustable combustion air supply,
   1. Gas valve, single stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
   2. Combustion air damper with synchronous spring return damper motor.
   3. Non-corrosive combustion air blower with permanently lubricated motor.

B. Burner Safety Controls:
   1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
   2. Flame Rollout Switch: Installed on burner box and prevents operation.
   3. Vent Safety Shutoff Sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
   4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

C. Operating Controls:
   1. Cycle burner by room thermostat to maintain room temperature setting.
   2. Supply fan energized from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION 23 81 26.13

SECTION 23 81 29
VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-source outdoor units.

B. Refrigerant piping.

C. Indoor units.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2026.

B. AHRI 1230 - Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment; 2021.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ITS (DIR) - Directory of Listed Products; Current Edition.

E. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 VARIABLE REFRIGERANT FLOW SYSTEM

A. Minimum System Requirements:
   1. System Testing, Capacity Rating, and Performance:
      a. AHRI 1230 when cooling capacity is equal or greater than 65,000 Btu/h (19 kWh).
      b. AHRI 210/240 when cooling capacity is below 65,000 Btu/h (19 kWh).
   2. Safety Certification: Bear UL 1995 tested and ITS (DIR) listed certification label.
   3. Outdoor Units: Furnish installation and surface support hardware products in accordance with ASCE 7 for wind restraint.
   4. Cooling Mode Interior Performance:
      a. Daytime Setpoint: 68 degrees F (20 degrees C), plus or minus 2 degrees F (1 degrees C).
      b. Setpoint Range: 57 degrees F (14 degrees C) to 77 degrees F (25 degrees C).
      c. Night Setback: 78 degrees F (25 degrees C).
      d. Interior Relative Humidity: 20 percent, maximum.

2.02 REFRIGERANT PIPING

A. Two-Pipe Run: Provide low-pressure vapor and high-pressure vapor gas pipes for each indoor unit selected for seasonal heating or cooling service.

B. Three-Pipe Run: Provide low-pressure vapor, high-pressure vapor gas, and liquid pipes for each indoor unit selected for off-season heating and cooling changeover service.

C. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.

2.03 INDOOR UNITS

A. Minimum Unit Requirements:
   1. DX Evaporator Coil:
      a. Copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
      b. 2-, 3-, or 4-row cross fin design with 14 to 17 fins per inch and flare end-connections.

c. Provide thermistor on liquid and gas lines wired into local controller.
d. Refrigerant circuits factory-charged with dehydrated air for field charging.

2. Fan Section:
   a. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
   b. Thermally protected, direct-drive motor with statically and dynamically balanced fan blades.
   c. Minimum-adjustable external static pressure 0.32 in-wc (80 Pa); provide for mounting of field-installed ducts.
3. Local Unit Controls:
   a. Temperature Control: Return air control using thermistor tied to computerized Proportional-Integral-Derivative (PID) control of superheat.
   b. Temperature Zones:
      1) Single Indoor Unit: Set served space(s) as the local temperature zone.
      2) Multiple Indoor Units: For large zones, group and coordinate related indoor units with served spaces as the local temperature zone with each indoor unit as sub-zone.
4. Return Air Filter:
5. Condensate:
   a. Built-in condensate drain pan with PVC drain connection for drainage.
   b. Units With Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.
   c. Units Without Built-In Condensate Pump: Provide built-in condensate float switch and wiring connections.
6. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

B. Ceiling-Concealed Ducted Indoor Units:
1. Type: Ducted unit with DX coil, tubed drain pan, and built-in controls with thermostat remotely coordinated by outdoor air unit to maintain local air temperature setpoint.
2. Ducted horizontal discharge and side or back-end return; galvanized steel cabinet.
3. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
4. Return Air Filter: Manufacturer's standard.
5. Sound Pressure: Measured at low speed at 5 feet (1.5 m) below unit.
6. Provide external static pressure switch adjustable for high efficiency filter operation
7. Condensate Pump: Built-in, with lift of 9 inches (229 mm), minimum.
8. Switchbox accessible from side or bottom.

END OF SECTION 23 81 29

SECTION 26 05 05
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.

B. Section 02 84 00 - Polychlorinate Biphenyl (PCB) Remediation: Removal of equipment and materials containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to those containing PCBs and mercury.

C. Section 07 84 00 - Firestopping.

D. Section 26 05 53 - Identification for Electrical Systems.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as indicated.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on casual field observation and existing record documents. Contractor shall be responsible for field-verification of existing conditions prior to beginning work.

D. Report discrepancies to Owner before disturbing existing installation.

E. Report discrepancies to Architect before disturbing existing installation.

F. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Prior to performing work on electrical circuits, Contractor shall positively identify power sources, turn circuit breakers or switches to "off" and lock out and/or tag out circuits as required.

B. Contractor shall coordinate all electrical demolition work with Owner as well as all other trades involved in Project.

C. Contractor shall keep work area clean and orderly.

D. All electrical demolition work shall be performed in a safe and orderly manner and in accordance with all Owner regulations, local codes, OSHA, International Building Code and National Electrical Code; all being most recent editions adopted by Authoriti(es) Having Jurisdiction, including all applicable amendments and supplements.

E. All electrical demolition work shall be scheduled and coordinated with Owner such that disruption of areas involved is kept to minimum.

F. All power shutdowns affecting areas not within scope of Project shall be coordinated with Owner. Accidental interruptions to services shall be repaired immediately by Contractor at no additional cost to Owner.

G. Disconnect electrical systems in walls, floors, and ceilings to be removed.

H. Coordinate utility service outages with utility company.

I. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

J. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Owner at least 72 hours before partially or completely disabling system.
   2. Make temporary connections to maintain service in areas adjacent to work area.

K. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Notify local fire service.
   3. Make notifications at least 72 hours in advance.
   4. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
   1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
   2. PCB- and DEHP-containing lighting ballasts.
   3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

B. Unless otherwise noted, all electrical items indicated for demolition shall be removed including all associated wiring, controls and accessible conduit and boxes traced back to source. Where removal causes power interruption of electrical items to remain, rewire existing circuits as required to maintain continuity.

C. Conduit and boxes becoming inactive that are inaccessible shall be abandoned in place with open ends filled with firestopping expandable foam.

D. Openings in conduit and boxes remaining active shall be capped with appropriate fittings.

E. Unless otherwise noted, circuit breakers becoming inactive shall have operating mechanisms placed in "off" (de-energized) position and be labeled as "SPARE" in accordance with Section 26 05 53.

F. Contractor shall update panel schedules for all panelboards affected by Project in accordance with Section 26 05 53.

G. Remove, relocate, and extend existing installations to accommodate new construction.

H. All circuits abandoned or not used shall be located, identified, disconnected and removed back to source.

I. Remove abandoned wiring to source of supply.

J. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, fill open ends with firestopping expandable foam and patch surfaces.

K. Remove existing abandoned wiring and conduit designated as obsolete by Owner authorities.

L. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

M. Disconnect and remove abandoned panelboards and distribution equipment.

N. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

O. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

P. Remove abandoned support channel associated with demolished electrical equipment.

Q. Existing branch circuits or circuits of other systems passing through Project area that interferes with new construction shall be relocated as required. All relocation of existing circuits shall be coordinated with Owner and with all other affected trades before proceeding with new construction.

R. Contractor shall be responsible for temporary removal and re-installation of existing ceiling tiles as required to accommodate electrical demolition and/or extension work. Contractor shall be responsible for repair and/or replacement of all ceiling tiles damaged as result of work. Contractor shall inspect existing conditions prior to commencement of work and provide written report of existing damage to Owner.

S. Contractor shall be responsible for patching and painting of all holes, dents, cracks, penetrations, etc. left in surfaces and/or structures after electrical demolition and/or extension work. Surfaces and/or structures to be restored shall include ceilings, walls, floors, columns, roofs, etc. Patching and painting shall restore surfaces and/or structures to original designs and/or finishes, including all fire-resistant and watertight ratings. All openings to building exteriors and through roofs shall be sealed watertight.

T. Repair adjacent construction and finishes damaged during demolition and extension work.

U. Damage caused by Contractor to areas outside area of demolition shall be repaired to original condition by Contractor at no additional cost to Owner.

V. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

W. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

X. All demolished materials not to be turned over to Owner shall be removed from site daily. Salvaged materials shall be stored for re-use.

3.04 CLEANING AND REPAIR

A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION 26 05 05

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SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Armored cable.

C. Metal-clad cable.

D. Variable-frequency drive cable.

E. Wire and cable for 600 volts and less.

F. Wiring connectors.

G. Electrical tape.

H. Heat shrink tubing.

I. Oxide inhibiting compound.

J. Wire pulling lubricant.

K. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 05 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.

C. Section 26 05 26 - Grounding and Bonding: Additional requirements for grounding conductors and grounding connectors.

D. Section 26 05 36 - Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.

E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

F. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.

G. Section 28 46 00 - Fire Detection and Alarm: Fire alarm system conductors and cables.

H. Section 31 23 16 - Excavation.

I. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2024).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2024.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

J. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
         1) Maximum Length: 6 feet (1.8 m).
      b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
   2. In addition to other applicable restrictions, may not be used:
      a. Unless approved by Owner.
      b. Where not approved for use by the authority having jurisdiction.
      c. Where exposed to view.
      d. Where exposed to damage.
      e. For damp, wet, or corrosive locations.

H. Concealed Dry Interior Locations: Use only building wire in raceway or metal clad cable.

I. Exposed Dry Interior Locations: Use only building wire in raceway.

J. Above Accessible Ceilings: Use only building wire in raceway or metal clad cable.

K. Wet or Damp Interior Locations: Use only building wire in raceway.

L. Exterior Locations: Use only building wire in raceway.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide products with insulation and temperature ratings as required per equipment installation instructions where such ratings differ from those indicated herein.

D. Provide new conductors and cables manufactured not more than one year prior to installation.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

F. Comply with NEMA WC 70.

G. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

H. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

I. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.

J. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

K. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

L. Minimum Conductor Size: 12 AWG.
   1. Control Circuits: 14 AWG.

M. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

N. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 480Y/277 V, 3 Phase, 4 Wire System:
         1) Phase A: Brown.
         2) Phase B: Orange.
         3) Phase C: Yellow.
         4) Neutral/Grounded: Gray.
      b. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      c. Equipment Ground, All Systems: Green.
      d. Travelers for 3-Way and 4-Way Switching: Pink.
      e. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
      f. For control circuits, comply with manufacturer's recommended color code.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
   1. Copper Building Wire:
      a. Cerro Wire LLC: www.cerrowire.com/#sle.
      b. Encore Wire Corporation: www.encorewire.com/#sle.
      c. Southwire Company: www.southwire.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:

1. Feeders and Branch Circuits:
   a. Size 10 AWG and Smaller: Solid.
   b. Size 8 AWG and Larger: Stranded.
2. Control Circuits: Stranded.

D. Conductor: Copper.

E. Insulation Voltage Rating: 600 volts.

F. Insulation: NFPA 70, Type THHN/THWN unless otherwise indicated on plans.

2.04 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc: www.afcweb.com/#sle.
2. Encore Wire Corporation: www.encorewire.com/#sle.
3. Southwire Company: www.southwire.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation: Type THHN/THWN.

E. Provide dedicated neutral conductor for each phase conductor where indicated or required.

F. Grounding: Full-size integral green insulated copper equipment grounding conductor.

G. Armor: Aluminum or steel interlocked tape.

H. Description: NFPA 70, Type MC.

I. Conductor: Copper.

J. Insulation Voltage Rating: 600 volts.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors. Tape uninsulated conductors and connector with electrical tape or insulate with heat shrink tubing to 150 percent of insulation rating of conductor.

D. Wiring Connectors for Non-Motor Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.

5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
6. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Wiring Connectors for Motor Terminations: Use motor lead disconnects with slip-on insulating boot, pin and silicone gel. Boot sealant shall be used with all insulating boots.

F. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

G. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

H. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
1. Manufacturers:
a. 3M: www.3m.com/#sle.
b. Ideal Industries, Inc: www.idealindustries.com/#sle.
c. NSI Industries LLC: www.nsiindustries.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

I. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
a. Burndy LLC: www.burndy.com.
b. Ilsco: www.ilsco.com/#sle.
c. Thomas & Betts Corporation; Blackburn Products: www.tnb.com/#sle.
d. Polaris: www.polarisconnectors.com.
e. Substitutions: See Section 01 60 00 - Product Requirements.

J. Compression Connectors: Provide circumferential type or hex type crimp configuration.
1. Manufacturers:
a. Burndy LLC: www.burndy.com.
b. Ilsco: www.ilsco.com/#sle.
c. Thomas & Betts Corporation; Blackburn Products: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

K. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
a. Burndy LLC: www.burndy.com.
b. Ilsco: www.ilsco.com/#sle.
c. Thomas & Betts Corporation; Sta-Kon Products: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

L. Motor Lead Disconnects: Color-keyed compression-type with slip-on insulating boot, pin, silicone gel and boot sealant.
1. Manufacturers:
a. Thomas & Betts Corporation: www.tnb.com.
1) Motor Lead Disconnects: M2D Series.
2) Boot Sealant: MDBOOT-SEAL.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 WIRING ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
a. 3M: www.3m.com/#sle.
b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Burndy LLC: www.burndy.com.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Manufacturers:
      a. Burndy LLC: www.burndy.com.
      b. Ideal Industries, Inc: www.idealindustries.com/#sle.
      c. Ilsco: www.ilsco.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. American Polywater Corporation: www.polywater.com/#sle.
      c. Ideal Industries, Inc: www.idealindustries.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Cable Ties: Material and tensile strength rating suitable for application.
   1. Manufacturers:
      a. Burndy LLC: www.burndy.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that raceway installation is complete and supported.

E. Verify that field measurements are as indicated.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. All exposed raceway shall be run in a neat organized fashion and shall be parrallel with other building systems.
   2. Unless dimensioned, circuit routing indicated is diagrammatic.
   3. When circuit destination is indicated without specific routing, determine exact routing required.
   4. Arrange circuiting to minimize splices.
   5. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
   6. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   7. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   8. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
      a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required to account for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   9. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Installation in Raceway:
   1. Remove existing conductors and cables from raceway before pulling in new (where applicable).
   2. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   3. Pull all conductors and cables together into raceway at same time.
   4. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   5. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles. Support at 6 foot maximum intervals using type MC cable supports designed and listed for the purpose.
2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

H. Terminate cables using suitable fittings.
1. Metal-Clad Cable (Type MC):
   a. Fittings used for connecting type MC cable to boxes, cabinets or other equipment shall be listed and identified for such use. Snap-in connectors or internal box clamps shall not be permitted. All connectors shall be locknut type, designed to secure type MC cable to boxes or enclosures.
   b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
   c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
   d. Provide plastic anti-short bushings on ends of all type MC cable.

I. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

J. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.

K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

M. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   b. For taped connections likely to require re-entering first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
   a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
   b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

3. Wet Locations: Use heat shrink tubing.

O. Insulate ends of spare conductors using vinyl insulating electrical tape.

P. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

Q. Identify conductors and cables in accordance with Section 26 05 53.

R. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

U. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.

V. Protect exposed cable from damage.

W. Clean conductor surfaces before installing lugs and connectors.

X. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Perform field inspection and testing in accordance with Section 01 40 00.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

E. Correct deficiencies and replace damaged or defective conductors and cables.

F. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION 26 05 19

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

F. Ground enhancement material.

G. Ground access wells.

H. Grounding and bonding components.

I. Provide all components necessary to complete the grounding system(s) consisting of:
   1. Metal underground water pipe.
   2. Metal frame of the building.
   3. Rod electrodes.
   4. Concrete encased electrodes (concrete reinforcement steel).

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

C. Section 03 30 00 - Cast-in-Place Concrete.

D. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2025.

B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.

C. NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment And Systems; 2025.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

E. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.

b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.

3. Metal Building or Structure Frame:
   a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
4. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
5. Ground Rod Electrode(s):
   a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
   b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   d. Provide ground enhancement material around electrodewhere required to reduce soil resistivity.
   e. Provide ground access well for first connected electrode.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Common Grounding Busbar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 4 by 12 inches (6 by 100 by 300 mm) unless otherwise indicated or required.
   b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
   c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

F. Service-Supplied System Grounding:
1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

G. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
1. Provide grounding electrode system for each separate building or structure.
2. Provide equipment grounding conductor routed with supply conductors.
3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

H. Separately Derived System Grounding:

1. Separately derived systems include, but are not limited to:
   a. Transformers (except autotransformers such as buck-boost transformers).
2. Provide grounding electrode conductor to connect derived system grounded conductor to common grounding busbar as indicated on drawings. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
3. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
4. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

I. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide green insulated copper equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. All electrical equipment, devices and raceways shall form continuously grounded systems. Neutral and equipment grounding conductors shall be bonded together only at service entrances or at secondary sides of separately derived systems.
6. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
7. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
8. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water piping used as a grounding electrode.
   b. Metal gas piping. NOTE: Contractor shall ensure that interior metal gas piping is electrically isolated from underground metal gas piping in order to prevent underground gas piping from inadvertently becoming a grounding electrode, as is prohibited by NFPA 70.
9. Provide bonding for interior metal air ducts.
10. Provide bonding for metal building frame where not used as a grounding electrode.
11. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.

J. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from common grounding busbar to telecommunications equipment backboard and provide ground bar for termination.
   a. Bonding Jumper Size: As indicated.
   b. Raceway Size: 3/4 inch (21 mm) unless otherwise indicated or required.
   c. Ground Bar Size: 1/4 by 4 by 12 inches (6 by 100 by 300 mm) unless otherwise indicated or required.

d. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

K. Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
a. Exceptions:
1) Use bare copper conductors where installed underground in direct contact with earth.
2) Use bare copper conductors where directly encased in concrete (not in raceway).
2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gage of specified conductors.

C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections or compression connectors for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors or compression connectors for accessible connections.
4. Manufacturers - Mechanical and Compression Connectors:
a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
b. Burndy LLC: www.burndy.com.
c. Harger Lightning & Grounding: www.harger.com/#sle.
d. Thomas & Betts Corporation: www.tnb.com/#sle.
e. Substitutions: See Section 01 60 00 - Product Requirements.
5. Manufacturers - Exothermic Welded Connections:
a. Burndy LLC: www.burndy.com.
b. Cadweld, a brand of Erico International Corporation: www.erico.com/#sle.
c. ThermOweld, a brand of Continental Industries, Inc: www.thermoweld.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.
4. Manufacturers:
a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
b. Erico International Corporation: www.erico.com/#sle.
c. Harger Lightning & Grounding: www.harger.com/#sle.
d. ThermOweld, a brand of Continental Industries, Inc: www.thermoweld.com/#sle.
e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
4. Where rod lengths of greater than 10 feet (3.0 m) are indicated or otherwise required, sectionalized ground rods may be used.
5. Manufacturers:

a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
b. Erico International Corporation: www.erico.com/#sle.
c. Galvan Industries, Inc: www.galvanelectrical.com/#sle.
d. Harger Lightning & Grounding: www.harger.com/#sle.
e. nVent ERICO; _____: www.nvent.com/#sle.
f. Substitutions: See Section 01 60 00 - Product Requirements.

F. Ground Enhancement Material:
1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.
2. Resistivity: Not more than 20 ohm-cm in final installed form.
3. Manufacturers:
a. Erico International Corporation: www.erico.com/#sle.
b. Harger Lightning & Grounding: www.harger.com/#sle.
c. nVent ERICO; GEM: www.nvent.com/#sle.
d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; _____: www.thermoweld.com/#sle.
e. thermOweld®, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com.
f. Substitutions: See Section 01 60 00 - Product Requirements.

G. Ground Access Wells:
1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches (250 mm).
4. Cover: Factory-identified by permanent means with word "GROUND".

H. Oxide Inhibiting Compound: Comply with Section 26 05 19.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify existing conditions prior to beginning work.

E. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 12 inches (300 mm) below finished grade.
2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 05 53.

F. Install ground electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

G. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.

H. Provide bonding to meet requirements described in Quality Assurance.

I. Equipment Grounding Conductor: Provide separate, green insulated copper equipment grounding conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION 26 05 26

SECTION 26 05 29
HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

C. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

D. Conduit and equipment supports.

E. Anchors and fasteners.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supportedwith a minimum safety factor of five times the applied force. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.
   3. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. O-Z/Gedney, a brand of Emerson Electric Co; _____: www.emerson.com/#sle.
      d. Thomas & Betts Corporation: www.tnb.com/#sle.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
   1. Manufacturers:
      a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. O-Z/Gedney, a brand of Emerson Electric Co; _____: www.emerson.com/#sle.
      d. Thomas & Betts Corporation: www.tnb.com/#sle.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Comply with MFMA-4.
   2. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
   4. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.
   5. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Thomas & Betts Corporation: www.tnb.com/#sle.
      c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
      e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
   1. Minimum Size, Unless Otherwise Indicated or Required:
      a. Equipment Supports: 1/2 inch (13 mm) diameter.
      b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
      c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
      d. Trapeze Support for Multiple Conduits: 3/8 inch (10 mm) diameter.
      e. Outlet Boxes: 1/4 inch (6 mm) diameter.
      f. Luminaires: 1/4 inch (6 mm) diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
   1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
   3. Mounting Height: Provide minimum clearance of 12 inches (305 mm) under supported component to top of roofing.
   4. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
      b. Erico International Corporation: www.erico.com/#sle.
      c. PHP Systems/Design: www.phpsd.com/#sle.
      d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

G. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.

4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm) minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
12. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc: www.us.hilti.com/#sle.
    b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
    c. Powers Fasteners, Inc: www.powers.com/#sle.
    d. Simpson Strong-Tie Company Inc: www.strongtie.com/#sle.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:

ANCHOR HARDWARE TABLE

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 30 00.
5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

I. Conduit Support and Attachment: Also comply with Section 26 05 33.13.

J. Box Support and Attachment: Also comply with Section 26 05 33.16.

K. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00.

L. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

M. Secure fasteners according to manufacturer's recommended torque settings.

N. Remove temporary supports.

O. Identify independent electrical component support wires above accessible ceilings with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

E. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
   1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
   2. Do not drill or cut structural members.

F. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

G. Install surface-mounted cabinets and panelboards with minimum of four anchors.

H. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1-5/8" off wall.

I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION 26 05 29

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

I. Conduit, fittings and conduit bodies.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.

C. Section 26 05 26 - Grounding and Bonding.
   1. Includes additional requirements for fittings for grounding and bonding.

D. Section 26 05 29 - Hangers and Supports.

E. Section 26 05 33.16 - Boxes for Electrical Systems.

F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

G. Section 26 21 00 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

H. Section 27 10 00 - Structured Cabling: Additional requirements for communications systems conduits.

I. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2025.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Shop Drawings:
1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.

D. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use rigid PVC conduit.
   2. Exterior, Direct-Buried: Use rigid PVC conduit.
   3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
   4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
   5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
   6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
   7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

D. Embedded Within Concrete:
   1. Within Slab on Grade: Use rigid PVC conduit.
   2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.
   3. Within Concrete Walls Above Ground: Use PVC-coated galvanized steel rigid metal conduit or rigid PVC conduit.
   4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.

E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

I. Exposed, Interior (including unfinished spaces), Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

J. Exposed, Interior (including unfinished spaces), Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet (2.4 m), except within electrical and communication rooms or closets.
      b. Where exposed below 20 feet (6.1 m) in warehouse areas.

K. Exposed, Exterior: Use galvanized steel rigid metal conduit.

L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
   1. Maximum Length: 6 feet (1.8 m).

N. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 18 inches unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.

O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Electrical Service Conduits: Also comply with Section 26 21 00.

B. Communications Systems Conduits: Also comply with Section 27 10 00.

C. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.

D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

E. Provide products listed, classified, and labeled as suitable for the purpose intended.

F. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
   5. Underground, Interior: 3/4 inch (21 mm) trade size.
   6. Underground, Exterior: 1 inch (27 mm) trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit: www.alliedeg.com/#sle.
   2. Republic Conduit: www.republic-conduit.com/#sle.
   3. Wheatland Tube Company: www.wheatland.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
      b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
      c. Thomas & Betts Corporation: www.tnb.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
      a. Do not use die cast zinc fittings.
   4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:

1. Thomas & Betts Corporation: www.tnb.com.
2. Robroy Industries: www.robroy.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).

D. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).

E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
a. Do not use die cast zinc fittings.

D. Description: Interlocked steel construction.

E. Fittings: NEMA FB 1.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.

d. Substitutions: See Section 01 60 00 - Product Requirements.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.

D. Description: Interlocked steel construction with PVC jacket.

E. Fittings: NEMA FB 1.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
2. Republic Conduit: www.republic-conduit.com/#sle.
3. Wheatland Tube Company: www.wheatland.com.
4. Triangle
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
   a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
   b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
   c. Thomas & Betts Corporation: www.tnb.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
   a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use compression (gland) type.
   a. Do not use indenter type connectors and couplings.
   b. Do not use set-screw type connectors and couplings.

D. Description: ANSI C80.3; galvanized tubing.

E. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
1. Cantex Inc: www.cantexinc.com/#sle.
2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
3. JM Eagle: www.jmeagle.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 80 unless otherwise indicated; rated for use with conductors rated 90 degrees C.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

D. Pull Strings: Use 14 AWG zinc-coated steel or 14 AWG zinc-coated steel with average breaking strength of not less than 200 pound-force (890 N).

E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.

F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. All conduit penetrations into equipment enclosures shall be made by the Electrical Contractor.

C. Install conduit securely in a neat and workmanlike manner in accordance with NECA 1.

D. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

G. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated and routing is not shown, determine exact routing required.
   3. Conceal all conduits within finished walls, ceilings and floors unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size.
   9. Arrange conduit to provide no more than 150 feet (46 m) between pull points.

10. Route conduits above water and drain piping where possible.
11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
12. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
13. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
14. Group parallel conduits in the same area together on a common rack.

H. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use conduit strap to support single surface-mounted conduit.
    a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved). All such conduits shall be elevated a minimum of 12 inches above the rooftop where exposed to direct sunlight.
9. Use of spring steel conduit clips for support of conduits is not permitted.
10. Use of wire for support of conduits is not permitted. Remove all wire used for temporary supports.
11. Use of perforated pipe straps for support of conduits is not permitted.
12. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

I. Connections and Terminations:
1. Use fittings compatible with conduit used and suitable for location.
2. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
3. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
4. Use suitable adapters where required to transition from one type of conduit to another.
5. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
6. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
7. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
8. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

9. Bring conduit to shoulders of fittings. Secure joints and connections tightly to provide maximum mechanical strength and electrical continuity. Use bonding bushings or wedges at connections subject to vibration.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. All penetrations through floors or walls shall be core-drilled. Use of jack hammers shall not be permitted. Maximum hole diameters shall not exceed 6 inches. All holes shall be spaced at least 18 inches apart in all directions. Re-use of existing penetrations shall be permitted.
3. Prior to any core drilling through floors or walls, the Electrical Contractor shall visually survey both sides to determine if any pipes, ducts or electrical utilities exist that may present obstacles. The Electrical Contractor shall also indentify locations of existing concrete slab reinforcement or in-slab utilities using a pachometer, x-ray or similar device. All core-drilled penetrations shall be a minimum of 3 inches away from existing concrete slab reinforcement or in-slab utilities.
4. Make penetrations perpendicular to surfaces unless otherwise indicated.
5. Provide steel sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
6. Conceal bends for conduit risers emerging above ground.
7. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
8. Provide suitable modular seal where conduits penetrate exterior wall above or below grade.
9. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
10. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
11. Provide metal escutcheon plates for conduit penetrations exposed to public view.
12. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

K. Stub-Up Connections for Equipment: Extend conductors to equipment with rigid metal conduit (RMC). Flexible metal conduit (FMC) or liquidtight flexible metal conduit (LFMC) may be used 6 inches above the floor.

L. Underground Installation:
1. Provide trenching and backfilling in accordance with Section 31 23 16.13.
2. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 36 inches.
   b. Under Slab on Grade: 36 inches (_____ mm) to bottom of slab.
3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length.

M. Embedment Within Structural Concrete Slabs:
1. Install conduits within middle one third of slab thickness.
2. Secure conduits to prevent floating or movement during pouring of concrete.

N. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

O. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide conduit sealing fittings filled with listed sealing compound at approved and accessible locations near the penetrations to prevent condensation. For concealed conduits, install each fitting in a flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
3. Where conduits penetrate coolers or freezers, or other refrigerated spaces.

P. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

Q. Provide grounding and bonding of conduit in accordance with Section 26 05 26.

R. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

B. Arrange supports to prevent misalignment during wiring installation.

C. Cut conduit square using saw or pipecutter; de-burr cut ends.

D. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

3.06 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

END OF SECTION 26 05 33.13

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

C. Underground boxes/enclosures.

D. Wall and ceiling outlet boxes.

E. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

C. Section 26 05 26 - Grounding and Bonding.

D. Section 26 05 29 - Hangers and Supports.

E. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

F. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

G. Section 26 27 26 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specification for Underground Enclosure Integrity; 2013.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes and junction and pull boxes.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations for pull boxes.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for concealed interior dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for exposed interior dry locations, and for interior and exterior damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
4. Use suitable concrete type boxes where flush-mounted in concrete.
5. Use suitable masonry type boxes where flush-mounted in masonry walls.
6. Use raised covers suitable for the type of wall construction and device configuration where required.
7. Use shallow boxes where required by the type of wall construction.
8. Do not use "through-wall" boxes designed for access from both sides of wall.
9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
13. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
    b. Ceiling Outlets: 4 inch octagonal or square by 2-1/8 inch deep (100 by 54 mm) trade size.
14. Wall Plates: Comply with Section 26 27 26.
15. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com.
    c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com.
    d. O-Z/Gedney, a brand of Emerson Electric Co; _____: www.emerson.com/#sle.
    e. Thomas & Betts Corporation; Steel City Products: www.tnb.com/#sle.
    f. Substitutions: See Section 01 60 00 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
5. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
    c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.
    d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Underground Boxes/Enclosures:

1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
4. Provide logo on cover to indicate type of service.
5. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
   b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com/#sle.
      2) Oldcastle Precast, Inc: www.oldcastleprecast.com/#sle.
      3) Substitutions: See Section 01 60 00 - Product Requirements.
   b. Combination fiberglass/polymer concrete boxes/enclosures are not acceptable. Use all-polymer concrete boxes/enclosures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate and orient boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.

7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated:
    a. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.
    b. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
        1) Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
        2) Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.
8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
9. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

H. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
2. Mount enclosures located in landscaped areas with top at 1 inch (25 mm) above finished grade.
3. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

O. Close unused box openings.

P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

Q. Provide grounding and bonding of boxes, enclosures and cabinets in accordance with Section 26 05 26.

R. Identify boxes in accordance with Section 26 05 53.

S. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.

T. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

U. Coordinate installation of outlet boxes for equipment connected under Section 26 27 17.

V. Set wall mounted boxes at elevations to accommodate mounting heights indicated.

W. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
   1. Adjust box locations up to 10 feet (3 m) if required to accommodate intended purpose.

X. Maintain headroom and present neat mechanical appearance.

Y. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

Z. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

AA. Locate outlet boxes to allow luminaires to be positioned as shown on reflected ceiling plan.

BB. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

CC. Locate flush mounting boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

DD. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

EE. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches (305 mm) of box.

FF. Use gang box with plaster ring for single device outlets.

3.03 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused box openings.

3.04 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.05 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

B. Clean exposed surfaces and restore finish.

END OF SECTION 26 05 33.16

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Large Device Identification.

C. Nameplates and Labels.

D. Wire and cable markers.

E. Voltage markers.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2023.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2023.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2027.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

a. Panelboards:
1) Use typewritten circuit directory to identify load(s) served for panelboards with a door.
2) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device.
b. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.
3) Identify load(s) served. Include location when not within sight of equipment.

2. Use voltage marker to identify highest voltage presentfor each piece of electrical equipment with nominal voltage equal to or greater than 480 V phase-to-phase and 277 V phase-to-ground.
3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazardsfor electrical equipment, such as panelboards or industrial control panels, that are likely to require examination, adjustment, servicing, or maintenance while energized.
a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
6. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
a. At each source and load connection.
b. Within boxes when more than one circuit is present.
c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

C. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduitscontaining conductors with nominal voltage equal to or greater than 480 V phase-to-phase and 277 V phase-to-ground at maximum intervals of 20 feet (6.1 m).
2. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet (6.1 m).
(a) Emergency Power System: Red.
(b) Fire Alarm System: Red.
2) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.
3. Use identification labels or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
4. Use identification labels or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.

D. Identification for Boxes:

1. Use voltage markers or identification labels to identify highest voltage present.
2. Use voltage markers or color coded boxes to identify systems other than normal power system.
    a. Color-Coded Boxes: Field-painted with the same color code used for raceways.
        1) Fire Alarm System: Red.
3. Use identification labels to identify circuits enclosed.
    a. Identify circuits via power source and circuit numbers.
        1) Include voltage and phase for other than 120 V, single phase circuits.
    b. For exposed boxes in public areas, provide identification on inside face of cover.

E. Identification for Devices:
1. Use identification label to identify fire alarm system devices.
2. Use identification label to identify serving branch circuit for all receptacles.
    a. For receptacles with weatherproof covers, provide identification on inside surface of weatherproof cover.
3. Use engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Luminaires:
1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system or with integral emergency battery units.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Manufacturers:
    a. Brimar Industries, Inc: www.brimar.com/#sle.
    b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
    c. Seton Identification Products: www.seton.com.
    d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use plastic nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
    a. Exception: Provide minimum thickness of 1/8 inch (3 mm) when any dimension is greater than 4 inches (100 mm).
4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Manufacturers:
    a. Brady Corporation: www.bradyid.com.
    b. Brother International Corporation: www.brother-usa.com/#sle.
    c. Panduit Corp: www.panduit.com/#sle.
    d. Substitutions: See Section 01 60 00 - Product Requirements.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
    a. Use only for indoor locations.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1.5 inches (38 mm) by 4 inches (100 mm).
2. Legend:

a. System designation where applicable:
1) Fire Alarm System: Identify with text "FIRE ALARM".
b. Equipment designation or other approved description.
c. Voltage and phase (single-phase or 3-phase).
d. Power source and circuit number.
e. Other information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. System Designation: 1 inch (25 mm).
b. Equipment Designation: 1/4 inch (6 mm).
c. Other Information: 1/4 inch (6 mm).
d. Exception: Provide minimum text height of 1 inch (25 mm) for equipment located more than 10 feet (3.0 m) above floor or working platform.
5. Color:
a. Normal Power System: White text on black background.
b. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch (6 mm).
5. Color: White text on blue background unless otherwise indicated.
a. Exceptions:
1) Provide white text on red background for general information or operational instructions for fire alarm systems.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch (13 mm).
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Control Device Identification (toggle switches, motor starters, etc.):
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Load controlled, power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on white background.

G. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Designation indicated and device zone or address.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on white background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
1. Brady Corporation: www.bradyid.com.
2. HellermannTyton: www.hellermanntyton.com.
3. Panduit Corp: www.panduit.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conductors and Cables: Use heat-shrink sleeve type markers suitable for the conductor or cable to be identified.
   1. Do not use self-adhesive type markers.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
   1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch (3 mm).

G. Color: Black text on white background unless otherwise indicated.

H. Locations: Each conductor at pull boxes, junction boxes, and termination or connection points including each load connection.

I. Legend:
   1. Power and Lighting Circuits: Power source and branch circuit or feeder number indicated on drawings.

2.04 VOLTAGE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradyid.com.
   2. Brimar Industries, Inc: www.brimar.com/#sle.
   3. Seton Identification Products: www.seton.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

D. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
   2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
   3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).
   4. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).

E. Legend:
   1. Markers for Voltage Identification: Highest voltage present.
   2. Markers for System Identification:
      a. Emergency Power System: Text "EMERGENCY".
      b. Other Systems: Type of service.

F. Color: Black text on orange background unless otherwise indicated.

G. Location: Furnish markers for each conduit longer than 6 feet (2 m).

H. Spacing: 20 feet (6 m) on center.

2.05 WARNING SIGNS AND LABELS

A. Manufacturers:
   1. Brimar Industries, Inc: www.brimar.com/#sle.
   2. Clarion Safety Systems, LLC: www.clarionsafety.com.
   3. Seton Identification Products: www.seton.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   a. Do not use labels designed to be completed using handwritten text.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Enclosure front.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conduits: Legible from the floor.
   8. Boxes: Outside face of cover.
   9. Conductors and Cables: Legible from the point of access.
   10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws or epoxy cement and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Secure rigid signs using stainless steel screws.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION 26 05 53

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 05 33.13 - Conduit for Electrical Systems.

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 26 28 16.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.

B. Flexible Conduit: As specified in Section 26 05 33.13.

C. Wire and Cable: As specified in Section 26 05 19.

D. Boxes: As specified in Section 26 05 33.16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

E. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

F. Install terminal block jumpers to complete equipment wiring requirements.

G. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION 26 05 83

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

B. Outdoor motion sensors.

C. Time switches.

D. In-wall time switches.

E. Outdoor photo controls.

F. Digital load controllers.

G. Daylighting controls.

H. Lighting contactors.

I. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 05 73 - Power System Studies.

E. Section 26 09 18 - Remote Control Switching Devices: Remotely controlled devices for lighting control, including networked lighting controls, programmable relay panels, and remote control switching relays.

F. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

G. Section 26 51 00 - Interior Lighting.

H. Section 26 56 00 - Exterior Lighting.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

F. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

G. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.

3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.
5. Coordinate lighting control device product selections with luminaire characteristics; see Section 26 51 00 and lighting fixture schedule.
6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Shop Drawings:
   1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
   2. Digital Load Controllers: Provide dimensioned plan views indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing factory and field connections. Include manufacturer product characteristics and application instructions for wired and wireless applications, including start-up and commissioning.
   3. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation and Maintenance Data: Include detailed information on device programming and setup.

F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

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

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

C. Provide five year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
2. Hubbell Incorporated; _____: www.hubbell.com/#sle.
3. Intermatic, Inc: www.intermatic.com/#sle.
4. Legrand North America, Inc: www.legrand.us/#sle.
5. Lutron Electronics Company, Inc; _____: www.lutron.com/#sle.
6. WattStopper; _____: www.wattstopper.com/#sle.
7. Substitutions: See Section 01 60 00 - Product Requirements.

B. All Occupancy Sensors:
1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
2. Sensor Technology:
   a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
   a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
   b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
   c. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
   a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
   b. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:

a. Description: Low profile occupancy sensors designed for ceiling installation.
b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.

2. Passive Infrared/Acoustic Dual Technology Ceiling Mounted Occupancy Sensors:
a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet (41.8 sq m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.

F. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
3. Input Supply Voltage: Dual rated for 120/277 V ac.
4. Load Rating: As required to control the load indicated on drawings.

2.03 OUTDOOR MOTION SENSORS

A. Manufacturers:
1. Acuity Brands, Inc: www.acuitybrands.com/#sle.
2. Hubbell Lighting, Inc; _____: www.hubbelllighting.com/#sle.
3. Legrand North America, Inc: www.legrand.us/#sle.
4. RAB Lighting, Inc: www.rablighting.com/#sle.
5. Lithonia Lighting; _____: www.lithonia.com/#sle.
6. WattStopper; _____: www.wattstopper.com/#sle.

2.04 OUTDOOR PHOTO CONTROLS

A. Manufacturers:
1. Intermatic, Inc; _____: www.intermatic.com/#sle.
2. Tork, a division of NSI Industries LLC; _____: www.tork.com/#sle.

B. Stem-Mounted Outdoor Photo Controls:
1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
2. Housing: Weatherproof, impact resistant polycarbonate.
3. Photo Sensor: Cadmium sulfide.
4. Provide external sliding shield for field adjustment of light level activation.
5. Light Level Activation: 1 to 5 footcandles (10.8 to 53.8 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
6. Failure Mode: Fails to the on position.

2.05 DIGITAL LOAD CONTROLLERS

A. Manufacturers:
1. Hubbell Control Solutions: www.hubbell.com/hubbellcontrolsolutions/en/#sle.
2. Intermatic, Inc: www.intermatic.com/#sle.
3. Sensor Switch Inc: www.sensorswitch.com/#sle.
4. WattStopper: www.wattstopper.com/#sle.
5. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

B. System Description:
1. Stand-alone system, including interconnected modules and accessories, for lighting and plug load low-voltage control as indicated on drawings, schedules, written sequences of operation, and reviewed shop drawings.
2. Product standard system configurations preconfigured out of box, plug-and-play, automatically self-addressing devices for communications, and without need to field

configure or program features, or requiring device setting adjustments. LEDs on unit indicate operation and troubleshooting without software intervention.

3. Provide quantity and configuration of power and slave packs, communication modules, and load expansion modules, including associated wiring, wired and wireless components, and accessories to control loads indicated.

C. General Requirements:
   1. Listed for powering and controlling line-voltage loads, power packs, contactors, relays, and other lighting control devices.
   2. Input Supply Voltage: Dual rated for 120/277 VAC.
   3. Cabling Terminations:
   4. Provide UL 2043 plenum rated control unit with self-contained relay(s) and low-voltage class 2 transformer, compatible with specified wired and wireless sensors, components, and ballasts/drivers.
      a. Comply with NFPA 70 for use in plenum spaces.
      b. Provide UL 2043 plenum rating for associated system control components for control indicated.
   5. Surface Mounting: Standard junction box attachments.
   6. Provide one auxiliary contact closure output where indicated.
   7. Control Inputs:
      a. Digital: Two.
      b. Analog: One.
   8. Output Control Capability:
      a. Single Zone Switching Modules: One programmable channel.
      b. Multi-Zone Switching Modules: Up to three separately programmable channels.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

D. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.
   1. Mounting Heights: Unless otherwise indicated, as follows:
      a. Wall Switch Occupancy Sensors: 48 inches (1.2 m) above finished floor.
   2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

C. Maintain separation of remote-control, signaling, and power-limited circuits.
   1. See manufacturer instructions and Section 26 05 19 for control wiring conductors, wiring methods, and identification requirements.

D. Install lighting control devices in accordance with manufacturer's instructions.

E. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

F. Install lighting control devices plumb and level, and held securely in place.

G. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Occupancy Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.

J. Outdoor Photo Control Locations:
   1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
   2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.

K. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.

L. Daylighting Control Photo Sensor Locations:
   1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for proper control of respective room or area based on manufacturer's recommendations for installed devices.

M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

N. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

O. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

P. Where indicated or required, provide cabinet or enclosure in accordance with Section 26 05 33.16 for mounting of lighting control device system components.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area.

D. Test time switches to verify proper operation.

E. Test outdoor photo controls to verify proper operation, including time delays where applicable.

F. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.

G. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.04 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

D. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by Architect.

E. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.05 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.06 COMMISSIONING

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

C. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
   4. Location: At project site.

END OF SECTION 26 09 23

SECTION 26 27 26
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.16 - Boxes for Electrical Systems.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

C. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

D. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

G. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICES - GENERAL REQUIREMENTS

A. Provide wiring devices suitable for intended use with ratings adequate for load served.

B. Wiring Device Applications:
   1. Receptacles Installed Outdoors or in Damp or Wet Locations: Use weather-resistant GFCI receptacles with weatherproof covers.
   2. Provide GFCI protection for:
      a. Receptacles installed within 6 feet (1.8 m) of sinks.
      b. Receptacles installed in kitchens.
      c. Receptacles serving electric drinking fountains.
   3. Receptacles Serving Computers: Use isolated ground surge protection receptacles.
   4. Single Receptacles Installed on Individual Branch Circuits: Provide receptacle ampere rating equal to branch circuit rating.

C. Wiring Device Finishes:
   1. Provide wiring device finishes as described below, unless otherwise indicated.

2. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
3. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
4. Wiring Devices Installed in Wet or Damp Locations: White with weatherproof cover.
5. Surge Protection Receptacles: Blue.

2.02 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

B. Finishes:

2.03 WALL SWITCHES

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

B. Wall Switches: Extra Heavy Duty Industrial Series, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
1. Body and Handle: Ivory plastic with toggle handle.
2. Ratings:
a. Voltage: 120 volts, AC.
b. Current: 20 amperes.

C. Switch Types: Single pole, 3-way, and 4-way.

2.04 WALL DIMMERS

A. Manufacturers:
1. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com/#sle.

2.05 RECEPTACLES

A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com/#sle.
2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498and where applicable FS W-C-596; types as indicated on the drawings.
1. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
2. Isolated Ground Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
3. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

E. Surge Protection Receptacles:
   1. Surge Protection Receptacles - General Requirements: Listed and labeled as complying with UL 1449, Type 2 or 3.
      a. Diagnostics:
         1) Visual Notification: Provide indicator light to report functional status of surge protection.
         2) Audible Notification: Provide switchable audible alarm to report that surge protection is not functional.
   2. Standard Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Isolated Ground Surge Protection Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, with ground contacts isolated from mounting strap.

F. Receptacles: Extra Heavy Duty Industrial Series, complying with NEMA WD 6 and WD 1.
   1. Device Body: Ivory plastic.
   2. Configuration: NEMA WD 6, type as specified and indicated.

G. Convenience Receptacles: Type 5-20R.

H. Single Convenience Receptacles.

I. Duplex Convenience Receptacles.

J. GFCI Receptacles: 5-20R Duplex Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.06 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
   2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
   3. Lutron Electronics Company, Inc: www.lutron.com/#sle.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
   5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
   6. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   7. Size: Standard.
   8. Screws: Metal with slotted heads finished to match wall plate finish.

B. Decorative Cover Plates: , Smooth stainless steel.

C. Weatherproof Cover Plates: Gasketed cast metal with gasketed device cover.

D. Surface Mounted Device Wall Plates: Stamped steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1, including mounting heights specified in that standard unless otherwise indicated.

C. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.

D. Install wiring devices in accordance with manufacturer's instructions.

E. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

F. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

G. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

H. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

I. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.

J. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

K. Install wiring devices plumb and level with mounting yoke held rigidly in place.

L. Install wall switches with OFF position down.

M. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

N. Do not share neutral conductor on branch circuits utilizing wall dimmers.

O. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

P. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

Q. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

R. Install receptacles with grounding pole on bottom.

S. Connect wiring device grounding terminal to outlet box with bonding jumper.

T. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

U. Connect wiring devices by wrapping conductor around screw terminal.

V. Install galvanized steel cover plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted switches & outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 0537 to obtain mounting heights specified.

B. Install wall switch 48 inches (1.2 m) above finished floor.

C. Install convenience receptacle 18 inches (450 mm) above finished floor.

D. Install convenience receptacle 6 inches (150 mm) above counter.

E. Install telephone jack 18 inches (450 mm) above finished floor.

F. Install telephone jack for side-reach wall telephone to position top of telephone at 54 inches (1.4 m) above finished floor.

G. Install telephone jack for forward-reach wall telephone to position top of telephone at 48 inches (1.2 m) above finished floor.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Operate each wall switch with circuit energized and verify proper operation.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Inspect each surge protection receptacle to verify surge protection is active.

G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

SECTION 27 05 29
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

1.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. TIA-569.
      b. NFPA 70.
      c. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of communications work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit Supports: Straps and clamps suitable for conduit to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.

D. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.

E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

END OF SECTION 27 05 29

SECTION 27 05 33.13
CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Stainless steel rigid metal conduit (RMC).

C. Galvanized steel electrical metallic tubing (EMT).

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete encasement of conduits.

B. Section 07 84 00 - Firestopping.

C. Section 26 05 33.13 - Conduit for Electrical Systems.

D. Section 27 05 29 - Hangers and Supports for Communications Systems.

E. Section 27 10 00 - Structured Cabling.

F. Section 31 23 16 - Excavation.

G. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

H. Section 31 23 23 - Fill: Bedding and backfilling.

I. Section 33 71 19 - Electrical Underground Ducts, Ductbanks, and Manholes.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2025.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.

C. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022, with Addendum (2025).

D. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.

E. BICSI TDMM - Telecommunications Distribution Methods Manual, 15th Edition; 2024.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

G. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. TIA-568.0 - Generic Telecommunications Cabling for Customer Premises; 2020e, with Addendum (2022).

K. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of cables to be installed.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not begin installation of communications cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Shop Drawings:
1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
2. Include proposed locations of roof penetrations and methods for sealing.

D. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2-inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Documents at Project Site: Maintain at project site one copy of manufacturer's instructions and shop drawings.

B. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, manufacturers' instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70 and TIA-569.

B. Provide conduit, fittings, supports, and accessories required for complete communications pathway.

C. Provide products listed, classified, and labeled as suitable for purpose intended.

D. Minimum Conduit Size, Unless Otherwise Indicated:
1. Communications Outlet Box: 1-1/4-inch (35 mm) trade size.
2. Continuous Conduit Homerun Serving One Communications Outlet Box: 1-1/4-inch (35 mm) trade size.

E. Where conduit size is not indicated, size to comply with NFPA 70, TIA-569, and BICSI TDMM, but not less than applicable minimum size requirements specified. Where specified standards differ, comply with most stringent.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International; _____: www.alliedeg.us/#sle.
   2. Nucor Tubular Products; _____: www.nucortubular.com/#sle.
   3. Western Tube, a division of Zekelman Industries; _____: www.westerntube.com/#sle.
   4. Wheatland Tube, a division of Zekelman Industries; _____: www.wheatland.com/#sle.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. ABB; T&B: www.electrification.us.abb.com/#sle.
      b. Allied Tube & Conduit, a division of Atkore International; _____: www.alliedeg.us/#sle.
   2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   3. Material: Use steel or malleable iron.
   4. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
   5. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.04 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression/gland or set-screw type.
      a. Do not use indenter type connectors and couplings.
   4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.

C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.

D. Galvanized Steel Electrical Metallic Tubing (EMT): Install in accordance with NECA 101.

E. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

F. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Use suitable adapters where required to transition from one type of conduit to another.
   4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect cables.
   6. Secure joints and connections to provide mechanical strength and electrical continuity.

G. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Make penetrations perpendicular to surfaces unless otherwise indicated.
   3. Provide sleeves and/or slots for penetrations as indicated or as required to facilitate installation.
   4. Conceal bends for conduit risers emerging above ground.
   5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
   7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 84 00.

H. Underground Installation:
   1. Provide trenching and backfilling; see Section 31 23 16.13.
   2. Provide trenching and backfilling; see Section 31 23 16 and Section 31 23 23.

I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed cables or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

J. Conduit Sealing:
   1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
      a. Where conduits enter building from outside.
      b. Where service conduits enter building from underground distribution system.
      c. Where conduits enter building from underground.
      d. Where conduits may transport moisture to contact live parts.
   2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
      a. Where conduits pass from outdoors into conditioned interior spaces.

b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

K. Provide pull string in each empty conduit and innerduct/cell, and in each conduit where cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

L. Provide grounding and bonding.

M. Identify conduits.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

D. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of cables.

END OF SECTION 27 05 33.13

SECTION 27 10 00
STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications system design requirements.

B. Communications pathways.

C. Communications outlets.

D. Communications grounding and bonding.

E. Communications identification.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 27 26 - Wiring Devices.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2017c.

C. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d.

D. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
   2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
   3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Evidence of qualifications for installer.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.

F. Field Test Reports.

G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and distribution frames.

2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
3. Identify distribution frames and equipment rooms by room number on drawings.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
   1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
   2. Supervisors and installers factory certified by manufacturers of products to be installed.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   2. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F (0 to 60 degrees C) at relative humidity of 0 to 95 percent, noncondensing.
   3. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. System Description:
   1. Offices and Work Areas: Provide one voice outlet and one data outlet in each work area.

C. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
   1. Locate main distribution frame in Telecommunications Room.

D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. Conduit: As specified in Section 26 05 33.13; provide pull cords in all conduit.

2.03 COMMUNICATIONS OUTLETS

A. Outlet Boxes: Comply with Section 26 05 33.16.
   1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.

B. Wall Plates:
   1. Comply with system design standards and UL 514C.
   2. Accepts modular jacks/inserts.
   3. Capacity:
   4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 27 26.

2.04 GROUNDING AND BONDING COMPONENTS

A. Comply with TIA-607.

B. Comply with Section 26 05 26.

2.05 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with Communication Service Provider requirements.

B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:
   1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches (300 mm) from power conduits and cables and panelboards.
   3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
   4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.

B. Outlet Boxes:
   1. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of telecommunications outlets provided under this section.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.
   4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches (3000 mm).

C. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

D. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

SECTION 28 46 00
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modification and/or expansion of existing fire alarm system as indicated.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping: Materials and methods for work to be performed by this installer.

B. Section 14 21 00 - Electric Traction Elevators: Elevator systems monitored and controlled by fire alarm system.

C. Section 14 24 00 - Hydraulic Elevators: Elevator systems monitored and controlled by fire alarm system.

D. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.

E. Section 21 30 00 - Fire Pumps: Supervisory devices.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits; 2025.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

F. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Evidence of designer qualifications.

C. Design Documents: Submit all information required for plan review and permitting to the Office of the State Fire Marshal, including but not limited to floor plans, riser diagrams, and description of operation:

1. Copy (if any) of list of data required by authority having jurisdiction.
2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
4. System zone boundaries and interfaces to fire safety systems.
5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
7. List of all devices on each signaling line circuit, with spare capacity indicated.

8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
12. Certification by Contractor that the system design complies with Contract Documents.

D. Evidence of installer qualifications.

E. Evidence of instructor qualifications; training lesson plan outline.

F. Evidence of maintenance contractor qualifications, if different from installer.

G. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 "Inspection and Test Form," filled out.

H. Operating and Maintenance Data: See Section 01 78 00 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

I. Project Record Documents: See Section 01 78 00 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

J. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
3. Maintenance contract.

K. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.

3. In addition to the items in quantities indicated in PART 2, furnish the following:
   a. All tools, software, and documentation necessary to modify the fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, circuits, and zones, and changes to system description, operation, and evacuation and instructional messages.
   b. One copy, on CD-ROM, of all software not resident in read-only-memory.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer , with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
   1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
   2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
   3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
   4. Contract maintenance office located within 50 miles (80 km) of project site.
   5. Certified in Pennsylvania as fire alarm installer.

C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 5 years after date of Substantial Completion.

C. Provide installer's warranty that the installation is free from defects and will remain so for 2 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units and Accessories:
   1. Siemens Building Technologies, Inc; _____: www.usa.siemens.com/#sle.
   2. Simplex, a Tyco Business; _____: www.simplex-fire.com/#sle.

B. Initiating Devices and Notification Appliances:
   1. Honeywell Security & Fire Solutions/Silent Knight: www.silentknight.com/#sle.
   2. Siemens Building Technologies, Inc; _____: www.sbt.siemens.com/#sle.
   3. Simplex, a brand of Johnson Controls; _____: www.simplex-fire.com/#sle.
   4. Same manufacturer as control units.
   5. Provide initiating devices and notification appliances made by the same manufacturer, where possible.

C. Substitutions: See Section 01 60 00 - Product Requirements.

1. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
   1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
   2. Protected Premises: Entire building shown on drawings.
   3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
      a. ADA Standards.
      b. The requirements of the State Fire Marshal.
      c. Applicable local codes.
      d. Contract Documents (drawings and specifications).
      e. NFPA 101.
      f. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
   4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
   5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
   6. Program notification zones and voice messages as directed by Owner.
   7. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.
   8. Master Control Unit (Panel): New, located as indicated on drawings.
   9. Combined Systems: Do not combine fire alarm system with other non-fire systems.

B. Supervising Stations and Fire Department Connections:
   1. Public Fire Department Notification: By remote supervising station.
   2. Remote Supervising Station: UL-listed central station under contract to facility.
   3. Means of Transmission to On-Premises Supervising Station: Digital alarm communicator transmitter (DACT) 2 telephone lines.
   4. Auxiliary Connection Type: Local energy.

C. Power Sources:
   1. Primary: Dedicated branch circuits of the facility power distribution system.
   2. Secondary: Storage batteries.
   3. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 FIRE SAFETY SYSTEMS INTERFACES

A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
   1. Sprinkler water flow.
   2. Duct smoke detectors.

B. Elevators:
   1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.
   2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
   3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.

C. HVAC:
   1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.04 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

C. Initiating Devices:
   1. Addressable Systems:
      a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
      b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
   2. Manual Pull Stations: Quanity as indicated on drawings.
   3. Smoke Detectors: Quanity as indicated on drawings.
   4. Duct Smoke Detectors: Quanity as indicated on drawings.
   5. Heat Detectors: Quanity as indicated on drawings.

D. Notification Appliances:
   1. Horn/Strobes: Quanity as indicated on drawings.
      a. Provide 2 extra.

E. Circuit Conductors: Copper or optical fiber; provide 200 feet (60 m) extra; color code and label.

F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
   1. Equipment Connected to Alternating Current Circuits: Maximum let through voltage of 350 V(ac), line-to-neutral, and 350 V(ac), line-to-line; do not use fuses.
   2. Initiating Device Circuits, Notification Appliance Circuits, and Communications Circuits: Provide surge protection at each point where circuit exits or enters a building; rated to protect applicable equipment; for 24 V(dc) maximum dc clamping voltage of 36 V(dc), line-to-ground, and 72 V(dc), line-to-line.
   3. Signaling Line Circuits: Provide surge protection at each point where circuit exits or enters a building, rated to protect applicable equipment.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

H. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
   1. Record all system operations and malfunctions.
   2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
   3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
   4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

3.03 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   1. Hands-On Instruction: On-site, using operational system.
   2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.

B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
   1. Initial Training: 1 session pre-closeout.

C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.

D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.04 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
   1. Specified diagnostic period without malfunction has been completed.
   2. Approved operating and maintenance data has been delivered.
   3. Spare parts, extra materials, and tools have been delivered.
   4. All aspects of operation have been demonstrated to Owner.
   5. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
   6. Specified pre-closeout instruction is complete.

3.05 MAINTENANCE

A. See Section 01 77 00 - Closeout Procedures, for additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.

C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   3. Record keeping required by NFPA 72 and authorities having jurisdiction.

D. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 2 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

G. Comply with Owner's requirements for access to facility and security.

END OF SECTION 28 46 00

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for walks, pavements, turf and grasses, and plants.
3. Excavating and backfilling for structures.
4. Subbase course for concrete walks and pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 31 23 16.13 - Trenching

1.2 RELATED DOCUMENTS

A. General: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other fabricated stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
   a. Personnel and equipment needed to make progress and avoid delays.
   b. Coordination of Work with utility locator service.
   c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
   d. Extent of trenching by hand or with air spade.
   e. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.
3. Warning tapes.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D1557.

1.7 QUALITY ASSURANCE

A. Perform Work according to City of Wilmington standards.

B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.8 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

C. Do not proceed with work on adjoining property until directed by Engineer.

D. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

E. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures as specified in the drawings are in place.

F. Do not commence earth-moving operations until plant-protection measures as specified in the drawings are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487 .

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: In accordance with City of Wilmington standards.

E. Base Course: In accordance with City of Wilmington standards. Type B Graded Aggregate DelDOT Standard Specification Section 1005.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; with at least 90 percent passing a 1-1/2-inch sieve and not more than 25 percent passing a No. 200 sieve.

G. Bedding Course: In accordance with City of Wilmington standards. AASHTO No. 8 stone DelDOT Section 1004 e.

H. Drainage Course: In accordance with City of Wilmington standards. AASHTO No. 57 stone DelDOT Section 1004.

I. Sand: ASTM C33/C33M; fine aggregate

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: In accordance with City of Wilmington standards. Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability:
   a. Class 2; AASHTO M 288.
   b. As follows:
      1) Grab Tensile Strength: 200 lbf; ASTM D4632.
      2) Grab Tensile Elongation: 40%; ASTM D4632.
      3) Tear Strength: 50 lbf ; ASTM D4533.
      4) Puncture Strength: 45 lbf; ASTM D4833.
   c. Apparent Opening Size: No. 30-80 sieve, maximum; ASTM D4751.

d. Permittivity: 110 gpm/ft^2, minimum; ASTM D4491.
e. UV Stability: 70 percent after 500 hours' exposure; ASTM D4355.

B. Separation Geotextile: In accordance with City of Wilmington standards. Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability:
   a. Class 2; AASHTO M 288.
   b. As follows:
      1) Grab Tensile Strength: 300 lbf; ASTM D4632.
      2) Grab Tensile Elongation: 15%; ASTM D4632.
      3) Tear Strength: 100 lbf ; ASTM D4533.
      4) Puncture Strength: 150 lbf ; ASTM D4833.
   c. Apparent Opening Size: No. 40-80 sieve, maximum; ASTM D4751.
   d. Permittivity: 6 gpm/ft^2, minimum; ASTM D4491.
   e. UV Stability: 70 percent after 500 hours' exposure; ASTM D4355.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, 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 deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

D. Strip all topsoil, pavements, and vegetation within the project limits prior to grading operations begin. Existing foundations, light poles, and slab-on-grade should removed in their entirety following demolition of the existing structure. Following rough grading and prior to foundation excavation or placement of fill, the subgrade shall be proofrolled using a 10-ton non-vibratory roller in the presence of a qualified soils technician working under the supervision of a geotechnical engineer. The proposed construction area should be proofrolled at least 10 feet beyond the construction perimeters.

E. Yielding, or otherwise unsuitable subgrade conditions encountered shall be undercut to firm subgrade conditions and backfilled with compacted structural fill in accordance with the recommendations in the Geotechnical Report.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives:

1. Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation, removal of obstructions, over-excavation or imported materials required to meet the project specifications.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction.
3. Over excavate unsuitable soils as outlined in the geotechnical report and as determined by the field geotechnical engineer.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
3. Yielding, or otherwise unsuitable subgrade conditions encountered shall be undercut to firm subgrade conditions and backfilled with compacted structural fill in accordance with the recommendations in the Geotechnical Report.
4. Contractor shall perform over-excavations as determined by the field geotechnical engineer, anticipated to be over-excavation of minimum of 12" and backfilled to foundation subgrade elevation with compacted structural fill in accordance with the recommendations in the Geotechnical Report.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots. Use a vibratory knife or other equipment and tools that conform to accepted arboricultural practices to cut roots along the limit it of disturbance.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements plus 5-feet beyond with a minimum of three (3) passes in each direction with 10-ton vibratory roller and in accordance with the recommendation of the project geotechnical evaluation to densify the subgrade and identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by engineer, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2000 psi, may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, to a zone of 2’ below grade, use certified clean fill materials as approved by the Owner’s Representative.
2. Under walks and pavements, use satisfactory soil material.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.12 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Structural Fill and compaction operations to extend 5’ beyond the building footprint

D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D1557:

1. Under structures, building slabs, steps, and pavements to a minimum of 95 percent.
2. Under walkways compact each layer of backfill or fill soil material to 90 percent.
3. Under turf or unpaved areas compact each layer to of backfill or fill soil to 85 percent.
4. For utility trenches in landscape areas, compact each layer of initial and final backfill soil material at 90 percent.

3.14 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch .
2. Walks: Plus or minus 1 inch
3. Pavements: Plus or minus 1/2 inch.

3.15 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course, base course, and geotextile under pavements and walks in accordance with City of Wilmington standards, and as indicated in drawings.

3.16 FIELD QUALITY CONTROL

A. Owner will engage a qualified materials testing and engineering firm to review construction and perform testing of materials for general conformance with these specifications

B. The placement and compaction of structural fill shall be monitored on a fulltime basis

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 31 23 16.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backfilling and Compaction

B. Related Sections:

1. Section 312000 – Earth Moving

1.2 QUALITY ASSURANCE

A. Perform Work in accordance with City of Wilmington standards.

B. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

C. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Delaware.

1.3 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.4 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

B. Revise or adjust affected work as necessary to integrate work of the approved plan.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Subsoil Fill: As specified in Section 312000 Earth Moving.

B. Structural Fill: As specified in Section 312000 Earth Moving.

C. Granular Fill: As specified in Section 312000 Earth Moving.

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Maintain grade alignment of pipe using string line parallel with grade line and vertically above centerline of pipe.

1. Establish string line on level batter boards at intervals of not more than 25 feet
2. Install batter boards spanning trench, rigidly anchored to posts driven into ground on both sides of trench.
3. Set three adjacent batter boards before laying pipe to verify grades and line.
4. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route.
5. Do not locate pipe using side lines for line or grade.

3.2 PREPARATION

A. Call Miss-Utility of Delmarva at 1-800-282-8555 not less than 72 hours before performing work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove unsuitable material as specified in Section 312000 Earth Moving.

C. Perform excavation within 24 inches of existing utility service in accordance with Delmarva's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches to width indicated on Drawings (30" wide for a 12" PVC Pipe). Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 24 inches wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 24 inches above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, notify Architect/Engineer, and request instructions.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with approved structural fill and compact to density equal to or greater than requirements for subsequent backfill material in accordance with the recommendations in the Geotechnical Report and under supervision of a qualified geotechnical engineer.

L. Trim excavation. Remove loose matter.

M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.

N. Remove excess subsoil not intended for reuse, from site.

3.4 SHEETING AND SHORING

A. The design of all sheeting and shoring is fully and completely delegated to the Contractor who shall retain a Professional Engineer licensed in the State of Delaware to execute such design.

B. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

C. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

D. Design sheeting and shoring to be removed at completion of excavation work.

E. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

F. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place fill material in continuous layers and compact.

D. Employ placement method that does not disturb or damage foundation perimeter drainage and utilities in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 50 feet of trench open at end of working day.

G. Protect open trench to prevent danger to the public.

3.6 FIELD QUALITY CONTROL

A. Section 017000 - Execution and Closeout Requirements

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove work, replace, compact, and retest.

3.7 PROTECTION OF FINISHED WORK

A. Section 017000 - Execution and Closeout Requirements

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.8 SCHEDULE

A. Storm and Sanitary Piping:

1. Grassed/Paved Areas:

a. Subgrade: To be reviewed by a qualified technician under the supervision of a geotechnical engineer prior to pipe installation. Install filter stone bedding (6” min) as directed if subgrade conditions warrant.

b. Backfill trench with structural fill in 8” max loose lifts and compact uniformly to minimum 90 percent of maximum density as determined by the Modified Proctor Test (ASTM D 1557) reviewed by a qualified technician under the supervision of a geotechnical engineer.

2. Areas within 5 feet of Building Foundation:

a. Subgrade: To be reviewed by a qualified technician under the supervision of a geotechnical engineer prior to pipe installation. Install filter stone bedding (6” min) as directed if subgrade conditions warrant.

b. Backfill trench with structural fill in 8” max loose lifts and compact uniformly to minimum 95 percent of maximum density as determined by the Modified Proctor Test (ASTM D 1557) reviewed by a qualified technician under the supervision of a geotechnical engineer.

END OF SECTION 31 23 16.13

SECTION 321623 - SIDEWALKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Concrete paving for sidewalks.

B. Related Requirements:
1. Section 31 20 00 – Earth Moving
2. Section 32 11 23 - Aggregate Base Course

1.2 SUBMITTALS

A. Product Data:

1. Submit required information regarding concrete materials, joint filler, admixtures, and curing compounds.
2. Mix Design:

a. Submit concrete mix design for each concrete strength prior to commencement of Work.
b. Submit separate mix designs if admixtures are required for hot- and cold-weather concrete Work.
c. Identify mix ingredients and proportions, including admixtures.

3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

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

C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Qualifications Statement:

1. Submit qualifications for manufacturer and installer.

1.3 QUALITY ASSURANCE

A. Perform Work according to Sections 033000 - Cast-in-Place Concrete.

B. DelDOT Standard Specification Section 1022, Portland Cement Concrete Production – Class B.

C. Obtain cementitious materials from same source throughout.

D. Perform Work according to City of Wilmington and DelDOT standards.

E. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

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

1.5 AMBIENT CONDITIONS

A. Minimum Conditions: Do not place concrete if base surface temperature is less than 35 degrees F, or if surface is wet or frozen.

B. Subsequent Conditions: Maintain minimum 40 degrees F, for not less than 72 hours after placing, and at a temperature above freezing for remainder of curing period.

1.6 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 AGGREGATE SUBGRADE

A. As specified in DelDOT specifications.

2.2 MATERIALS

A. Forms:
   1. Height: Equal to full depth of finished sidewalk or curb.

B. Forms:

   1. Material:

      a. Wood: Straight and free from warping, twisting, loose knots, splits, or other defects.

   2. Profile: To suit conditions.
   3. Joint Filler:

      a. Material: Asphalt-impregnated fiberboard or felt.
      b. Comply with ASTM D1557.
      c. Thickness: ¼ inch.

C. Concrete:

   1. Concrete Materials:

      a. As specified Section on Structural drawings.
      b. DelDOT Standard Specification Section 1022, Portland Cement Concrete Production – Class B
      c. Furnish materials according to City of Wilmington standards.

   2. Cement:

      a. Comply with ASTM C150/C150M.
      b. Type: I – Normal or II - Moderate Portland.
      c. Color: Gray.

   3. Fine and Coarse Aggregates:

      a. Comply with AASHTO M 6.
      b. Coarse Aggregate Maximum Size: 1-1/2 inch.

   4. Concrete Reinforcing Fibers:

a. Description: High-strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete.
b. Comply with ASTM C1116/C1116M.
c. Length: ½ to 1-1/2 inch.
d. Fiber Count: 1.5 lb per cubic yard minimum or as per manufacturer's recommendation

5. Water:

a. Description: Potable.

b. Comply with ASTM C1602/C1603 with following modifications:

Hydrogen ion concentration:	4.5 to 8.5 pH
Total solids:	5000 ppm maximum
Total chlorides:	300 ppm maximum
Total sulfates as SO4:	500 ppm maximum
Total alkalis as Na2O + 0.658K2O:	500 ppm maximum
Organic content (Test Method ASTM D4129):	2000 ppm maximum
Compressive strength, minimum at 7 days:	90% of control specimen
Time of setting:	+/-60 minutes from control and meeting AASHTO M 85, Vicat test

6. Air Entrainment: Comply with ASTM C260/C260M.

7. Fly Ash:

a. Comply with ASTM C618.
b. Class: C or F.
c. Traces of ammonia and oil not permitted in the fly ash.

8. Slag:
a. Description: Ground-granulated blast-furnace slag.
b. Comply with AASHTO M 302.
c. Grade: 100 or 120.

9. Color Pigment:

a. Comply with AASHTO M148 / ASTM 309, Type 2, Class A or B.

b. Resistant to mineral oxides, alkalis, and fading.

c. Color: White.

D. Surface Detectable Warning System:

1. Submit samples of the proposed system to the Engineer for approval prior to the start of work.

2. Submit mortar mix formula for concrete sidewalk applications to the Engineer for approval prior to the start of work.

3. Submit certification that the surface of the system is slip resistant using one of the following standard methods:
   a. ASTM C1028 B Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
   b. ASTM D2047 B Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine
   c. ASTM E303 B Measuring Surface Frictional Properties Using the British Pendulum Tester
   d. VOSI V41.21-98 B Universal Specification / Test Method for Slip Resistant Walkways, in the Field and Laboratory, as measured by a Drag Type Friction Tester (Voices of Safety International (VOSI)

4. Utilize the dome pattern shown in the Standard Construction Details

5. Use one of the following material systems:
   a. Precast concrete or fired clay brick paver units: manufactured with the truncated dome pattern, set on the concrete sidewalk surface.
      1) Use mortar for adhesion to the sidewalk surface and for joint filling.
   b. Cast iron plates: manufactured with the truncated dome pattern, set on the concrete sidewalk surface.
      1) Anchor the plates to the sidewalk surface according to the manufacturer’s recommendations.
   c. Stamping systems, applied membranes and ceramic tiles are not acceptable for work.
   d. The color of the final surface of the system must conform to the following:
      1) For concrete sidewalk surface the detectable warning system color must be brown, dark gray, red, brick red, or black.

6. P.C.C. Sidewalk: Use concrete cast-in place.
   a. Construct the base material of the sidewalk section receiving the detectable warning surface at a lower elevation to allow the thickness of the concrete under the detectable warning system to be the same as the sidewalk (minimum of 6 inches).
   b. Install paver units to achieve a flush surface with the surrounding ramp/sidewalk surfaces.

c. Mortar:
   1) Mix Portland cement mortar in the following proportion: one part Portland cement to three parts fine aggregate, add hydrated lime not to exceed 10 percent of the cement by weight.
   2) Dry mix the fine aggregate, Portland cement, and lime until the mixture assumes a uniform color.
   3) Add water as the mixing continues until the mortar attains a consistency that can be easily handled and spread with a trowel.
   4) Mortar that is not used within 30 minutes after water has been added cannot be used.
   5) Retempering of mortar will not be permitted.
d. Place the mortar to form a firm bond.
e. Set paver units in a bed of mortar and mortar the joints.
   1) Maintain 1/4 inch wide joints, no larger than 3/8 inch. Plastic spacers may be used.
   2) Keep joints uniform and straight in all both directions.
f. Maintain clean surfaces and joints prior to applying grout.
g. Bevel edges of the system with grade changes in between 0.25 and 0.50 inch with a slope no steeper than 2 to 1.
h. Grade changes up to 0.25 inch may be vertical.

2.3 MIXES

A. Concrete:
   1. Mix concrete according to ACI 304, and deliver concrete according to ASTM C94/C94M.
   2. Mix Design:
      a. DelDOT Standard Specification Section 1022, Portland Cement Concrete Production – Class B.
      b. Compressive Strength: 4,~~0~~500 psi at 28 days.
      c. Slump: 1 to 3 inches; Slump may be increased up to 8 inches if Type F or Type G admixtures are used.
      d. Air Entrainment 5.5 percent:
         1) Comply with ASTM C94/C94M.
         2) Exposure Condition: Moderate.
         3) Maximum Variation from Required Air Content: 1.5 percent.
   3. Admixtures:
      a. Use accelerating admixtures in cold weather only if approved by Architect/Engineer in writing.
      b. Use of admixtures will not relax cold-weather placement requirements.
      c. Use calcium chloride only if approved by Architect/Engineer in writing.
      d. Use set-retarding admixtures during hot weather only if approved by Architect/Engineer in writing.In following Subparagraph, Option A requires concrete supplier to provide concrete to specified compressive strength while Option C requires concrete supplier to provide concrete to specified performance criteria, except specifier must identify minimum mix cement content.

2.4 ACCESSORIES

A. Curing Compound:
   1. Comply with ASTM M148/C309.
   2. Type: 2.
   3. Class: A or B.

B. Joint Sealers:
   1. Hot Applied:
      a. Comply with ASTM D6690.
      b. Type: II.
   2. Cold Applied: Comply with ASTM C920.

C. Cover Sheets:
   1. Comply with ASTM C171.
   2. Burlap: Shall be plain weave cloth made of jute or kenaf, weighing 10 ounces per square yard or greater.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify that gradients and elevations of subgrade are as indicated on Drawings.

C. Verify reinforcing placement for proper size, spacing, location, and support.

3.2 PREPARATION

A. Moisten substrate to minimize absorption of water from fresh concrete.

B. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 INSTALLATION

A. Subgrade:

   1. As specified in Section 321123 - Aggregate Base Courses.
   2. Comply with City of Wilmington standards.

B. Forms:

1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
3. Clean forms and coat with form oil each time before concrete is placed.
4. Wood Forms: Thoroughly wet with water before concrete is placed.

C. Placing Concrete:
1. Comply with City of Wilmington and DelDOT standards.
2. Use slip-form technique.
3. Place concrete in forms in one layer.
4. Ensure that reinforcing, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
5. Place concrete continuously over full width of panel and between predetermined construction joints.
6. Do not break or interrupt successive pours such that cold joints occur.
7. Consolidate concrete by tamping and vibration.

D. Joints:
1. Place control joints at 5-foot intervals
2. Place continuous transverse expansion joints at 5-foot intervals or width of sidewalk, whichever is less.
3. Filler:
   a. Place joint filler between paving components and building or other appurtenances.
4. Provide expansion joint between sidewalks and curbs.
5. Provide keyed joints as indicated on Drawings.

E. Finishing:
1. Strike off and float the surface with a wooden, cork or magnesium float. Light broom and trowel edges of joints.
2. Texture Direction: Transverse to paving direction.
3. Ramps: Broom perpendicular to slope.
4. Place curing compound on exposed concrete surfaces immediately after finishing.
5. Edges and Joints:
   a. Edger Radius: 1/8 inch.
   b. Spalled Corners and Edges: Clean and fill with mortar mixture and finish.

F. Curing:
1. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
2. Mats:
   a. Cover exposed surface with two or more layers of wetted burlap, overlapping each other minimum 6 inches.
   b. Maintain burlap continuously saturated and in contact with concrete for minimum seven days.
3. Impervious Sheeting:

a. Wet exposed surface and cover with impervious sheeting material, overlapped minimum 12 inches.
b. Maintain sheet in contact with concrete for minimum seven days.

4. Membrane Curing:
   a. Apply membrane-curing compound uniformly to exposed surface after free water has disappeared from finished surface and before concrete has dried.
   b. Apply compound in two coats, with second coat applied perpendicular to first coat.
   c. If concrete has dried, moisten dried surface and apply curing compound as soon as free water disappears.

G. Backfilling: After curing, backfill, grade, and compact adjacent disturbed area as indicated.

3.4 FIELD QUALITY CONTROL

A. Inspection and Testing:

1. Comply with ASTM C94/C94M.
2. Comply with City of Wilmington standards.
3. Samples:
   a. Sampling Procedures: Comply with ASTM C172/C172M.
   b. Cylinder Molding and Curing Procedures: Comply with ASTM C31/C31M, standard cured.
   c. Sample concrete and make one set of three cylinders for every 150 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area paving.
   d. Make one additional cylinder during cold-weather concreting, and field cure.
4. Cylinder Compressive Strength:
   a. Comply with ASTM C39/C39M.
   b. Acceptance:
      1) Average Compressive Strength of Three Consecutive Tests: Maximum 500 psi less than specified compressive strength.
   c. Acceptance: According to City of Wilmington standards.
   d. Test one cylinder at seven days, and two cylinders at 28 days.
   e. Dispose of remaining cylinders if testing is not required.
5. Slump, Temperature, and Air Content:
   a. Measure for each compressive-strength concrete sample.

b. Slump: Comply with ASTM C143/C143M.
c. Air Content: Comply with ASTM C173/C173M.
d. Temperature: Comply with ASTM C1064/C1064M.

6. Records:

a. Maintain records of placed concrete items.
b. Record date, location of pour, quantity, air temperature, and number of test samples taken.

3.5 PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, rain and flowing water, and mechanical injury.

B. Do not permit traffic over paving until 90 percent design strength of concrete has been achieved.

C. Damaged Concrete:

1. Remove and reconstruct concrete that has been damaged for entire length between scheduled joints.
2. Refinishing damaged portion is not acceptable.
3. Dispose of damaged portions.

END OF SECTION 321623

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Shrubs.
2. Ornamental Grasses.

1.03 DEFINITIONS

A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Balled and Potted Stock: Exterior plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated.

C. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.

D. Finish Grade: Elevation of finished surface of planting soil.

E. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

F. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each of the following:

1. Planting Soil
2. Mulch.

C. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

1. Manufacturer’s certified analysis for standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Qualification Data: For landscape Installer.

E. Planting Schedule: Indicating anticipated planting dates for exterior plants.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size.

Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

F. Observation: The City may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Engineer retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify the City of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver exterior plants freshly dug.
1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

B. Do not prune trees and shrubs before delivery, except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.

C. Handle planting stock by root ball.

D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.07 COORDINATION

A. Planting Restrictions: See plan for planting dates. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

C. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Architect.

1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.08 WARRANTY

A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.

1. Warranty Period for Trees, Shrubs, Perennials, and Ornamental Grasses: Three (3) years from date of Installation Acceptance.
2. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
3. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
4. A limit of one replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.

PART 2 PRODUCTS

2.01 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required and as noted on the Plans. Trees and shrubs of a larger size may be used if acceptable to the City, with a proportionate increase in size of roots or balls.

C. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

D. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

E. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.02 DECIDUOUS SHRUBS

A. Form and Size: As noted on plans.

2.03 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 6 to 7, a minimum of 2.5 percent organic material content; free of stones 1/2-inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

3. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.04 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing through No. 60 sieve.
2. Class: Class O, with a minimum 95 percent passing through No. 8 sieve and a minimum 55 percent passing through No. 60 sieve.

3. Provide lime in form of dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

G. Sand: Clean, washed, natural or manufactured, free of toxic materials.

H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.05 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb of ammonium nitrate or 0.25 lb of ammonium sulfate per cubic foot of loose sawdust or ground bark.

E. 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.

2.06 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a 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 formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular or pelleted 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.

2.07 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Double-Shredded hardwood bark mulch or approved by the City.

2.08 STAKES AND GUYS

A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

B. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

C. Guy Cable: 5-strand, 3/16-inch diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.

D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

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.

C. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain the City's acceptance of layout before planting. Make minor adjustments as required.

D. Lay out exterior plants at locations noted on the Plans directed by the City. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.03 PLANTING BED ESTABLISHMENT

A. Loosen subgrade of planting beds to a minimum depth of 12 inches. Remove stones larger than 1-inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the City's property.

1. Apply fertilizer directly to subgrade before loosening.

2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil mix to a depth of 6 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil mix.

B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.04 TREE AND SHRUB EXCAVATION

A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped, balled and potted, container-grown, fabric bag-grown stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.

B. Subsoil removed from excavations may be used as backfill.

C. Obstructions: Notify the City if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify the City if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.05 TREE AND SHRUB PLANTING

A. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1-inch above adjacent finish grades.

1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

B. Set balled and potted, container-grown stock plumb and in center of pit or trench with top of root ball 1-inch above adjacent finish grades.

1. Carefully remove root ball from container without damaging root ball or plant.
2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.

C. Organic Mulching: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Do not place mulch within 3 inches of trunks or stems.

3.06 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

3.07 GUYING AND STAKING

A. Upright Staking and Tying: Install as indicated on plan.

B. Guying and Staking: Install as indicated on plan.

3.08 PERENNIALS

A. Set out and space ground cover and plants as indicated.

B. Dig holes large enough to allow spreading of roots, and backfill with planting soil.

C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.09 PLANTING BED MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches.

B. Mulch backfilled surfaces of planting beds and other areas indicated.

1. Organic Mulch: Apply 3-inch average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.10 CLEANUP AND PROTECTION

A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.11 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 329300

SECTION 334200 - STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stormwater drainage piping.
2. Manholes.
3. Catch basins.
4. Cleanouts.
5. Bedding and cover materials.

1.2 DEFINITIONS – NOT USED

1.3 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Pipe and Fittings:

1. Basis of Measurement: By linear foot
2. Basis of Payment: Includes excavating, removing soft subsoil, bedding and fill**,** geotextile fabric, pipe and fittings, and accessories.

B. Catch Basin and Cleanout:

1. Basis of Measurement: By each unit for nominal depth of 5 feet.
2. Basis of Payment: Includes excavating, bedding and fill unit installation with accessories, and connecting to sewer piping.

1.4 SUBMITTALS

A. Product Data: Manufacturer information describing pipe, pipe accessories, and catch basins.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Manufacturer Instructions: Special procedures required to install specified products.

D. Qualifications Statement:

1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of pipe runs, connections, catch basins, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Perform Work according to City of Wilmington and DelDOT standards.

B. Contractor shall maintain at all times on site a set of official stamped approved project drawings for all disciplines (civil, architectural, mechanical/electrical, plumbing, etc.).

1.7 QUALIFICATIONS

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

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

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

1.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPING

A. PVC Piping:

1. Pipe:

a. Material: SDR-26 PVC
b. Comply with ASTM D 2729
c. Inside Nominal Diameter: As noted on Drawings.
d. End Connections: Bell and spigot, solvent sealed.

2. Fittings:
a. Materials: SDR-26 PVC

3. Joints:

a. Type: Solvent weld.
b. Comply with ASTM D2680.
c. Solvent Cement: Comply with ASTM D2564.

2.2 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill type, as specified on drawings.
2. Cover: Fill type, as specified on drawings.
3. Soil Backfill from above Pipe to Finish Grade: Soil type, as specified on drawings.
4. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that trench cut is ready to receive Work of this Section.

C. Verify that excavations, dimensions, and elevations are as indicated.

3.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Correct over-excavation with coarse aggregate.

C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

A. Excavation and Bedding:

1. Excavate trench to 4 inches below pipe invert.
2. Hand trim excavation for accurate placement of piping to indicated elevations.
3. Maintain optimum moisture content of bedding material to attain required compaction density.
4. Install pipe on compacted subgrade meeting bedding requirements and cradle bottom 20 percent of diameter.

B. Piping:

1. Pipe, Fittings, and Accessories: Comply with AASHTO M252.
2. Seal joints watertight.
3. Place pipe on minimum 4 inch deep bed of Type 3 filter aggregate.
4. Cradle bottom 20 percent of pipe diameter to avoid point load.
5. Install aggregate at sides and over top of pipe.
6. Install top cover to minimum compacted thickness of 12 inches, and compact to 95 percent maximum density.
7. Backfilling and Compaction: As specified in ASTM D2321, latest edition.

C. Catch Basins and Cleanouts:

1. Form bottom of excavation clean and smooth, and to indicated elevation.
2. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.
3. Level top surface of base pad.
4. Sleeve concrete shaft sections to receive storm sewer pipe sections.
5. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
6. Mount lid and frame level in grout, secured to top section to indicated elevation.

3.4 TOLERANCES

A. Maximum Variation from Indicated Pipe Slope: 1/8 inch in 10 feet.

3.5 FIELD QUALITY CONTROL

A. Inspection:

1. Request inspection by Engineer prior to and immediately after placing aggregate cover over pipe.

B. Testing:

1. Compaction Test:

a. Comply with AASHTO T 180.

2. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

3.6 PROTECTION

A. Section 017000 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 334200