PROJECT MANUAL

INCLUDING BIDDING AND CONTRACT REQUIREMENTS AND SPECIFICATIONS
FOR

CONTRACT NO. 2 - HVAC CONSTRUCTION

FOR

MERCER COUNTY AGRICULTURAL AND CONSERVATION COMMUNITY LEARNING CENTER AT MUNNELL RUN FARM

41 MUNNELL RUN LANE
MERCER, PA 16137

FOR THE

MERCER COUNTY COMMISSIONERS

125 SOUTH DIAMOND STREET
MERCER, PA 16137

ENGINEERS HHSDR ARCHITECTS

40 SHENANGO AVENUE
SHARON, PA 16146
PHONE (724) 981-8820

201 CENTURY BUILDING, 130 7TH STREET
PITTSBURGH, PA 15222
PHONE (412) 281-2280

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MAY 29, 2026 COMMISSION NUMBER 4826

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SECTION 000115 - LIST OF DRAWINGS

MERCER COUNTY AGRICULTURAL AND
CONSERVATION COMMUNITY
LEARNING CENTER AT
MUNNELL RUN FARM
41 MUNNELL RUN LANE
MERCER, PA 16137

FOR THE
MERCER COUNTY COMMISSIONERS
125 SOUTH DIAMOND STREET
MERCER, PA 16137
HHSDR #4826

REFER TO DRAWING SHEET CS-1 FOR LIST OF DRAWINGS

END OF SECTION 000115

SECTION 001000 - ADVERTISEMENT

ADVERTISEMENT
MERCER COUNTY
Munnell Run Farm
Agricultural and Conservation Community Learning Center

The County of Mercer is requesting sealed written bids for the Agricultural and Conservation Community Learning Center at Munnell Run Farm, 41 Munnell Run Lane, Mercer, PA 16137.

Bids must conform with the Contract Documents as provided by the County. Bid forms, bid instructions, bid specifications, and the scope of work can be obtained on the County's website at https://www.mercercountypa.gov/rfp/

A pre-bid meeting will take place at the site at Munnell Run Farm, 41 Munnell Run Lane, Mercer, PA 16137 on Thursday, June 18 at 10:00 a.m., at which time prospective bidders may inspect the premises and questions will be answered regarding the scope of work, bidding requirements, and Contract documents.

It is the intent of the County to enter into separate contracts as follows: Contract No.1 -General Construction, Contract No. 2 - HVAC Construction, Contract No. 3 - Plumbing Construction, Contract No. 4 - Electrical Construction.

Pennsylvania Prevailing Wage Rates apply to this Project.

Note, this Project is funded in part by a grant through the ARPA CPF MPCFP, Contract #C000090918. Contractors must follow all applicable federal, state and local laws and regulations, and program guidelines specified in the Contract Documents and the Commonwealth of Pennsylvania.

Bids must be submitted in a sealed envelope, marked "Mercer County Agricultural and Conservation Community Learning Center" as well as the Name of the Bidder, Contract Name and Number and received by Mercer County Controller, Stephen J. Sherman II, at the Mercer County Courthouse, 125 S. Diamond Street, Suite 2, Mercer, PA 16137 by 1:00 p.m. on Thursday, July 2, 2026.

All bids must be accompanied by a certified check or bid bond made payable to the County of Mercer in the amount of 10% of the bid.

Any questions should be directed to HHSDR Architects/Engineers at 40 Shenango Avenue, Sharon, PA 16146, 724-981-8820.

Bids will be opened at the public Commissioners' Meeting at 3:00 p.m., on Thursday, July 2, 2026, in the Mercer County Courthouse, 125 S. Diamond Street, Mercer, PA 16137. It is anticipated that the bid will be awarded at the public Commissioners' Special Meeting scheduled for 3:00 p.m., on Thursday, July 9, 2026, in the Mercer County Courthouse.

Bids must be firm for thirty (30) days following the opening of bids on July 2, 2026. The successful bidder must enter into a contract with the County of Mercer within ten (10) days following notice of the bid award to provide the specified services.

The Mercer County Board of Commissioners reserves the right to reject any and all bids, to waive any informality in the bids, and to award the bid in the best interest of the taxpayers, to the lowest responsible bidder.

MERCER COUNTY BOARD OF COMMISSIONERS
Ann Coleman, Chair
William Finley, Jr.
Timothy M. McGonigle

END OF SECTION 001000

SECTION 002000 - INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.01 INVITATIONS FOR BIDS

A. Sealed bids for Mercer County Agricultural and Conservation Community Learning Center at Munnell Run Farm, 41 Munnell Run Lane, Mercer, PA 16137, for the Mercer County Board of Commissioners, will be received to the attention of Mercer County Controller, Stephen J. Sherman II, at the Mercer County Courthouse, 125 S. Diamond Street, Suite 2, Mercer, PA 16137, Attention: Mercer County Board of Commissioners, until **1:00 PM**, local time, **Thursday, July 2, 2026**.

B. A Pre-bid Conference will be held at the site on **Thursday, June 18, 2026, at 10:00 AM**. The purpose of the meeting will be to review the scope of the proposed project and clarify any items in the Contract Documents.

1.02 OPENING OF BIDS

A. Sealed bids will be publicly opened and read at a meeting in the Mercer County Board of Commissioners Assembly Room on **Thursday, July 2, 2026, at 3:00 PM** prevailing time, at the Mercer County Courthouse, Mercer, PA.

1.03 CONTRACTS

A. It is the intent of the Owner to enter into separate contracts as follows:
Contract No. 1 General Construction.
Contract No. 2 HVAC Construction.
Contract No. 3 Plumbing Construction.
Contract No. 4 Electrical Construction.

B. The Owner may enter into other separate contracts at this or later dates.

1.04 PLANS

A. Contract Documents were prepared by HHSDR Architects and Engineers, 40 Shenango Avenue, Sharon, PA, 16146 (724) 981-8820, and 201 Century Building, 130 Seventh Street, Pittsburgh, PA, 15222 (412) 281-2280.

B. Contract Documents can be obtained on Mercer County's website at https://www.mercercountypa.gov/rfp/.

C. Addenda will be posted to Mercer County's website.

D. The only electronic format Contract Documents will be available in is portable document format (pdf); Contract Documents will not be available in any of these electronic formats AutoCAD, Microsoft Word, Excel, etc.

1.05 BIDDER'S QUALIFICATIONS

A. Each Bidder shall be prepared, if so requested, to present evidence of the Bidder's experience,

qualifications and financial ability to carry out the work in accordance with the terms of the Agreement, within twenty-four (24) hours of the bid opening. Bidder's qualifications, if so requested, shall be submitted as outlined in Section 004513 - Bidder's Proof of Competency.

1.06 BID SECURITY

A. Each bid must be accompanied by a Bid Security Bond, payable to the County of Mercer in an amount of not less than **ten percent (10%)** of the bid (including Base Bid and all Add Alternate Bids).

B. Such Bid Security Bond shall be submitted with the understanding that it shall guarantee that the Bidder's Bid will not be withdrawn for a period of at least **thirty (30)** days after the scheduled closing time for receipt of bids; that if the Bid is accepted, the Bidder will execute the Form of Agreement, as provided by the Owner, with all blanks appropriately filled and will submit the required 100% Performance and Labor and Material Bonds (submitted on A.I.A. Document A312) and 100% Maintenance Bond as specified in Section 007316 Insurance Requirements; and that in the event of withdrawal of said Bid within said period, or the failure to enter into said Agreement and submit said Bonds within ten days after the Bidder has received notice of the acceptance of the Bid, the Bidder shall be liable to the above mentioned Owner for the full amount of such Bond as representing the damage to the Owner on account of the default of the Bidder in any particular hereof. The Bid Bond of all Bidders whose Bids are not accepted will be returned within ten calendar days after the scheduled bid opening date.

1. Contractor's withdrawal of Bid:
    a. A bidder may only withdraw a bid if there is an honest and good-faith mistake (which must be supported by evidence) in the calculation of the bid price. A bidder has two business days from bid opening to withdraw a bid.
    b. The Owner reserves the right to accept or decline the Contractor's Withdrawal of Bid Request and reserves the right to retain the bid bond.
    c. A bidder who withdraws a bid will not be permitted to bid on the project a second time (should it be rebid) or provide any work or materials to the project.
    d. If the Owner chooses to rebid the project, the bid bond of the withdrawing bidder will be forfeited to the Owner to supplement the rebid costs.

1.07 FAMILIARITY WITH PROPOSED WORK

A. Contracts will be awarded with the understanding that the Contractor, prior to submission of bid, has become acquainted with the requirements of the Contract Documents, including those of other Prime Contractors, condition of the site, the building (interior spaces, exterior envelope), terrain, soil conditions, all utilities in existence (including those to which connections are to be made), all other conditions of the Contract and has obtained all information necessary for completion of the work on or before the date specified and shall assume all risks resulting from any changes in the conditions which may occur during the progress of the work.

1. Site Visitation: Bidders are required to attest to the fact that they have visited the site with the submittal of their Bid Form, Section 004116.
2. Site Visitations: Contact Jay Russell, District Manager, Mercer County Conservation District, 724-662-2242 ext.2391, jrussell@mercercountypa.gov, to schedule a site visitation.

B. It is the intent of the Architect and Engineer to fully clarify all conditions of the Contract Documents. It is, therefore, highly recommended that all Bidders contact the Architect and Engineer to discuss any items in question during the bidding period so that any questionable item can be resolved, and if required, Addenda may be issued prior to submission of bids.

1. Manufacturers, suppliers, and sales representatives are not to contact the Owner during bidding

to discuss their products.

C. The Owner and Architect are relying upon the Bidders site investigation to adequately price the work for the purpose of avoiding claims that the Contract Documents provided contain insufficient information regarding existing conditions or that the Bidder incorrectly assumed the existing conditions. The Contractor shall not at any time after submission of its Bid make any claim based on insufficient information or incorrectly assumed conditions that should have been discovered by the Bidder's site investigation. Nor shall the Contractor claim any misunderstanding in regard to the nature, conditions, or character of the work to be done under the Contract.

D. Bidders are responsible for providing all equipment, and the means, necessary to investigate the existing conditions prior to submitting their Bids.

1.08 REGULATIONS

A. The law of the place of building shall govern the construction of this Contract, which is the Pennsylvania Uniform Construction Code (PA UCC). Codes and Standards enforced under the UCC: the 2021 International Codes issued by the International Code Council (ICC), including accessibility provisions in Chapter 11 and Appendix E, ANSI A117.1.

B. The general prevailing minimum wage rates, as determined by the Pennsylvania Department of Labor and Industry, Bureau of Labor Law Compliance for Prevailing Minimum Wage Predeterminations, shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term thereof, refer to Section 007343 for the rates as issued for this Project.

C. The Contractor shall contact the local authorities regarding any requirements for Contractor licenses and/or bonding, and any ordinances which may restrict early morning, late evening, and/or weekend work hours, as well as any restrictions regarding access routes to the site.

D. The Bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances and codes, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they are deemed to be included in the Contract the same as though herein written in full. Section 007216 General Conditions Article 13 provides a non-all-inclusive list of applicable laws, regulations, acts, etc.

1. Due to the fact that the Project is financed, in part, by the Commonwealth of Pennsylvania via a grant from the American Rescue Plan Act-Capital Projects Fund-Multi Purpose Community Facilities Program (ARPA CPF MPCFP), all Contractors (including all subcontractors) shall comply with all applicable Federal and State laws, regulations, and grant requirements. Excerpts from Grant ARPA CPF MPCFP Contract #C000090918 are included following this Section (Attachments C, G, and H).
2. The Contractor shall provide a temporary construction sign that reads "This Project was financed, in part, by a Grant from the American Rescue Plan Act-Capital Projects Fund-Multi Purpose Community Facilities Program. At a minimum, the financing acknowledgment sign shall be constructed of 3/4" fir plywood (A-A INT-APA Paint Grade), edged with 3/4" x 1" exterior wood trim (2'-8" H x 6'-0" W) on treated wood posts. Background shall be painted white (exterior paint). Project Sign shall also include Project Title (Mercer County Agricultural and Conservation Community Learning Center at Munnell Run Farm).
3. Contractors and all subcontractors shall not be currently under suspension or debarment by the Commonwealth of Pennsylvania, any other state, or the federal government.
    a. Bidders shall have no outstanding tax liability to the Commonwealth of Pennsylvania.

b. Bidders shall disclose any violations with Commonwealth of Pennsylvania Department of Labor and Industry wage rates.
c. Bidders shall not appear on the federal website https://www.sam.gov.

E. Pennsylvania's Public Works Employment Verification Law (Act 127 of 2012 and as amended by 2022 Act 141 Article XXIV-C): All contractors and subcontractors shall verify their employees are authorized to work in the United States through the Federal government's Employment Verification Program (EVP) and E-Verify®, an internet-based system, operated by the United States Department of Homeland Security. A copy of the Commonwealth of Pennsylvania Public Works Employment Verification Form as provided by the Pennsylvania Department of General Services is included following this Section. The Form and relevant information are available at https://www.dgs.pa.gov/Materials-Services-Procurement/Public-Works-Employment-Verification.

1. Contractor's execution of the form acknowledges that the Contractor is participating in the E-Verify Program (EVP) and is subject to the requirements of Federal Law governing the use of EVP.
2. Compliance by the Contractor shall be a precondition of Contract Award.
3. In conducting the verification required by this provision, neither Contractor nor any subcontractor may discriminate against any employee on the basis of race, ethnicity, color or national origin.
4. Contractor shall complete said Form and submit it to the Project Owner within twenty-four (24) hours of the bid opening.
    a. Each awarded Contractor's subcontractors shall also submit said form to the Project Owner prior to performing work on site, verifying their employees are authorized to work in the United States.

1.09 COMPLETION OF WORK AND LIQUIDATED DAMAGES

A. The Bidder shall submit his Bid with the understanding that (1) the Work shall be completed in accordance with Section 011000 "Scheduling Requirements of the Work", and the Final Project Completion Date(s) shall be as stated therein, (2) the time for the completion of the Work shall be considered of the essence of this Contract, and (3) for the costs of extra inspection, salaries of contingent forces and other expenses entailed by the Owner by delay in completing the contract, said Owner shall be entitled to liquidated damages in the following amounts:

Final Project Completion Date	**$500.00**
Final Project Closeout Completion Date	**$400.00**

for each and every calendar day's delay from the Final Completion Date(s) specified, not solely caused by the Owner, provided however, that the Contractor shall be entitled to one day in addition to the time stipulated for each work day's delay that may be solely caused by the Owner or conditions beyond the control of the Contractor. Weather conditions will not be considered as reason for extension of time for completion of work. It is further understood, however, that any extensions of time, regardless of cause, must be requested by letter originated by the Contractor, and the Owner must grant such extensions by letter prior to same becoming effective.

B. The Owner's receipt of an Occupancy Permit does not constitute "Completion" of the work by the Contractor. To reach "Completion", the Project must have all work complete, there shall be no missing or incomplete items or temporary items on both the building/structure and site.

1.10 PREPARATION AND PRESENTATION OF BIDS

A. Each bid must be submitted upon the enclosed Bid Forms, one Bid Form required, without duplicates. Bids must be delivered in a sealed opaque envelope on or before the time and at the place stated above. Name of the Bidder, Contract Name and Number shall appear on the face of the bid envelope.

B. Bids containing any omissions, conditions, unexplained erasures or alterations or items not called for in the Bid Form, or irregularities of any kind, may be declared nonresponsive and rejected as being incomplete.

1. Also refer to Section 004513 for additional reasons that may subject the bidder to disqualification and his bid to rejection.

C. Each bid must have the full business address of the Bidder and be signed with the usual signature of the Bidder. Bids by partnerships must furnish the names of all partners and must be signed in the partnership name by an authorized partner or representative. Bids by corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. When requested, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished.

D. In submitting bids, bidder shall record all addenda issued, giving addendum number and date.

1.11 CONTRACT FORMS

A. Contracts will be prepared by the Architect on A.I.A. standard forms and reviewed by the Owner's Solicitor.

1.12 AWARD OF CONTRACT

A. The Contract will be awarded as soon as possible to the lowest responsible Bidder provided the bid is reasonable and it is in the interest of the Owner to accept it.

B. The Owner 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 and Alternates accepted on the date of Contract Award.

C. The Owner reserves the right to waive any informality in bids when such waiver is in the interest of the Owner.

D. The Owner reserves the right to reject any and all bids when such rejection is in the interest of the Owner, and to reject the bid of any Bidder, who in the Owner's judgment, is not in position to perform the Contract.

E. Each Bidder agrees to waive any claim it has or may have against the Owner, the Architect/Engineer, and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any bid.

1.13 DEFINITIONS

A. The Contract Documents consist of the Agreement, the Conditions of the Contract, (General, Supplemental and other Conditions), the Drawings, Project Manual and all Addenda issued, including all

modifications thereof incorporated into the Documents before their execution. These form the Contract Documents.

B. The Owner is the County of Mercer.

C. The Architect / Engineer is HHSDR, Registered Architects and Engineers, 40 Shenango Avenue, Sharon, PA, 16146, (724) 981-8820, and 201 Century Building, 130 Seventh Street, Pittsburgh, PA, 15222, (412) 281-2280.

D. The Contractor is the person, firm or corporation, together with the bonding surety, by whom this Contract has been executed for the performance and completion of the work herein described.

E. The Subcontractor is the person or entity, firm or corporation having a direct contract with the Contractor and it includes one who furnishes material worked to a special design according to the Plans and Specifications of this work, but does not include one who merely furnishes material not so worked.

F. The Project is all the work to be performed under this or other Contracts involving construction and the furnishing and installing of material, equipment and utilities as required for the completion and use of the Owner.

G. Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the Corporation for whom it is intended, or if delivered at or sent by registered mail to the last business address known to the person who gives the notice.

H. The term "work" of the Contractor or Subcontractor includes labor and/or material.

END OF SECTION 002000

ATTACHMENTS FOLLOWING THIS SECTION:

Public Works Employment Verification Form

Excerpts from Grant ARPA CPF MPCFP Contract #C000090918 are included following this Section (Attachments C, G, and H)

Commonwealth of Pennsylvania

Public Works Employment Verification Form

Public Works Employment Verification Office
Department of General Services
Bureau of Procurement 6th floor, Forum Place 555 Walnut Street
Harrisburg, PA 17101-1914
717-346-8115
ra-gsgseverify.pa.gov

Instructions: Complete and return the form to the contracting Public Body prior to the award of the contract.

Business or Organization Name (Employer) _____

Address _____

City _____ State _____ Zip Code _____

Check One:

- ☐ Contractor
- ☐ Subcontractor

Contracting Public Body _____

Contract/Project No. _____

Project Description _____

Project Location _____

Date enrolled in E-Verify _____

As a contractor/subcontractor for the above referenced public works contract, I hereby affirm that as of the above date, our company is in compliance with the Public Works Employment Verification Act ('the Act') through utilization of the federal E-Verify Program (EVP) operated by the United States Department of Homeland Security. To the best of my/our knowledge, all employees hired post January 1, 2013 are authorized to work in the United States.

It is also agreed to that all public works contractors/subcontractors will utilize the federal EVP to verify the employment eligibility of each new hire within five (5) business days of the employee start date throughout the duration of the public works contract. Documentation confirming the use of the federal EVP upon each new hire shall be maintained in the event of an investigation or audit.

I,_____, authorized representative of the company above, attest that the information contained in this verification form is true and correct and understand that the submission of false or misleading information in connection with the above verification shall be subject to sanctions provided by law.

_____ _____

Authorized Representative Signature Date of Signature

INSURANCE AND TAX LIABILITY REQUIREMENTS

LIABILITY INSURANCE

The Grantee's standard liability insurance policies must protect, or be endorsed to protect, the Commonwealth from claims of bodily injury, property damage, or a combination thereof arising out of any activities performed by the Grantee or its employees or agents under this agreement, including business and non-business invitees, and their property and all other property sustaining damage as a direct or indirect result of the execution of the Project when validly present on Grantee's premises whether or not actually engaged in the Project at the time the claim inures. These policies do not include any provision limiting then existing sovereign immunity of the Commonwealth or of its agents or employees. Upon request, the Grantee shall furnish to the Authority proof of insurance as required by this paragraph.

- **Key Takeaway:** The certificate of insurance should list the commonwealth as an additional insured

WORKERS' COMPENSATION INSURANCE

The Grantee shall provide workers' compensation insurance where the same is required and shall accept full responsibility for the payment of premiums for workers' compensation and social security and any other taxes or payroll deductions required by law for its employees who are performing activities specified by this agreement.

KEY COMPLIANCE REQUIREMENTS SUMMARY

Note: All of the Grantee's subcontracts with contractors providing goods or services as part of this project must contain provisions of nondiscrimination/sexual harassment set forth in Attachment G & H and, where applicable, must contain the federal contracting provisions set forth in Attachment G & H.

ATTACHMENT C - PROGRAM SPECIFIC CONDITIONS

PA Prevailing Wage: Work completed as part of this Project is subject to Pennsylvania Prevailing Wage (not Federal Davis Bacon wages). Prevailing wage rates must be included in all bid documents, specifications, and construction contracts pertaining to the project.

ATTACHMENT G - FEDERAL CONTRACTING PROVISIONS

See Section 4 - Required Provisions in Federal Contracts → this should be included in contracts.

ATTACHMENT H - COMMONWEALTH STANDARD TERMS AND CONDITIONS

See Section 3 - Nondiscrimination/Sexual Harassment

See Section 5 - Contractor Responsibility

See Section 11 - Worker Protection and Investment

ATTACHMENT C

PROGRAM SPECIFIC CONDITIONS

1. ELIGIBLE PROJECTS

Eligible projects under this program will include construction or improvements to full-service community buildings, structures, and public spaces. Examples include, but are not limited to, schools, libraries, and community health centers that serve community needs.

2. ELIGIBLE PROJECT COSTS

a. Funds may be used for any of the following eligible costs:

- **i.** Pre-project development costs and uses, including data-gathering; feasibility studies; community engagement and public feedback processes; equity assessments and planning, and needs assessments; permitting, planning, architectural design, engineering design; and work related to environmental, historical, and cultural reviews.
- **ii.** Costs of repair, rehabilitation, construction, improvement, and acquisition of real property, equipment (e.g., devices and office equipment), and facilities.
- **iii.** Ancillary costs necessary to operationalize and put the capital assets to full use, including costs to increase broadband adoption and improve digital literacy.

b. Administrative costs of the Grantee to administer the grant are limited to 2.5 percent of the grant award.

c. Administrative costs include costs to complete the grant application, costs associated with monitoring of and reporting on the project, advertising costs, and personnel costs including salaries and fringe benefits for staff required for carrying out the project.

d. The Grantee may use funds to cover costs incurred during the period beginning March 15, 2021, for one or more eligible Projects. For pre-award costs incurred after March 15, 2021, but prior to execution of this agreement, the Grantee shall provide reasonable assurance that the costs were incurred pursuant to the negotiation of and in anticipation of the Capital Projects Fund award and are necessary for the efficient and timely performance of the Project. These costs are allowable only to the extent they would have been allowable if incurred after the date of the Capital Projects Fund award and only with the written approval of Treasury.

3. EXPENDITURE OF FUNDS

a. Ten percent of awarded funds will be reserved until a final report is submitted to the Authority.

b. All funds must be expended by December 31, 2026, which is the end of the period of performance.

4. SUBSTANTIAL COMPLETION

All projects funded through this program must reach substantial completion before December 31, 2026. Substantial completion is defined as the date for which the project can fulfill the primary operations that it was designed to perform, delivering services to end-users. At substantial completion, facility operations must be operational. Extensions may be granted beyond this timeframe to the extent that factors deemed to be outside of the grantee's control, in the Authority's sole discretion, have impacted project delivery timelines. The Authority will approve extension requests on a case-by-case basis.

5. PROJECT SUSTAINABILITY

a. The Grantee shall incorporate a viable strategy that extends beyond initial investment to demonstrate the continued enabling of work, education, and health monitoring activities at the respective facility. The Grantee shall create sustainability models or long-term plans beyond the period of performance.

b. The Grantee shall provide the Authority a detailed list of intended and observed outcomes, outputs, activities, progress indicators, means of verification, and risks and assumptions associated with the project.

6. FINAL REPORT

The Grantee shall provide a final report three months after project completion. This final report will outline the activities that took place during the project, including a description of all construction that occurred, total project costs, and a description of the use of grant funds. The report will also include a summary of how the project implemented a sustainability plan addressed and enhanced equity in the community. The final 10% of grant funds will be held until the final report has been submitted to and reviewed by the Authority with any questions or concerns having been addressed by the Grantee to the Authority's satisfaction.

7. PROJECT RECORDS

The Grantee shall maintain full and accurate records with respect to the project and shall ensure adequate control over related parties in the project. The Authority requires access to the records, as well as the ability to inspect all work, invoices, materials, and other relevant records at reasonable times and places. Upon request of the Authority, the Grantee shall furnish all data, reports, contracts, documents, and other information relevant to the project.

8. CERTIFICATION OF EXPENSES

The Grantee is required to sign a payment request form certifying that the expenses were incurred and were in accordance with the scope of work approved by the Authority. Prior to final closeout of the grant agreement, the Grantee is required to submit copies of all canceled checks verifying the expenditure of the Program proceeds. Bank statements may also be submitted if electronic payment of the expenditure occurred. Notwithstanding, the Authority reserves the right to conduct a formal project audit of any project in the Authority's sole discretion.

9. PA PREVAILING WAGE ACT

a. While the federal Davis-Bacon Act prevailing wage requirements do not apply to projects funded through this program, the Pennsylvania Prevailing Wage Act (43 P.S. § 165-1 et seq.; 34 Pa. Code § 9.101 et seq.) may apply to projects funded under this program. Prevailing Wage requirements are generally applicable to grants for construction, demolition, reconstruction, alteration, repair work, renovations, build-out and installation of machinery and equipment more than $25,000.

b. The grantee is responsible for including prevailing wage rates in all bid documents, specifications, and construction contracts pertaining to the project. The Pennsylvania Department of Labor and Industry (L&I) has final authority to make prevailing wage applicability determinations. Additional reporting requirements apply to project $5 million or more.

10. AFFORDABILITY WEBSITE

Upon written electronic notification from the Authority to Grantee, Grantee shall have 30 days to demonstrate to the Authority that the Authority's affordability website and accompanying resources can be accessed via the Grantee's public-facing website.

ATTACHMENT G

FEDERAL CONTRACTING PROVISIONS

1. CIVIL RIGHTS COMPLIANCE

a. The Grantee shall comply with the legal requirements relating to nondiscrimination and nondiscriminatory use of Federal funds. Grantee may not deny benefits or services, or otherwise discriminate on the basis of race, color, national origin (including limited English proficiency), disability, age, or sex (including sexual orientation and gender identity) in accordance with the following authorities:

i. Title VI of the Civil Rights Act of 1964, P.L. 88-352 (42 U.S.C. 2000d-1 et. seq.) and related regulations (31 CFR Part 22), which provide that no person in the United States shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Grantee receives Federal financial assistance.

ii. Section 504 of the Rehabilitation Act of 1973 (Section 504), Public Law 93-112, as amended by Public Law 93-516, 29 U.S.C. 794, which provide that no otherwise qualified individual with a disability in the United States as defined in section 7(20) [29 USCS § 705(20)], shall, solely by reason of her or his disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

iii. Age Discrimination Act of 1975, Public Law 94-135, 42 U.S.C. 6101 et seq., and the Department implementing regulations at 31 CFR part 23. no person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity receiving Federal financial assistance.

iv. Pennsylvania Human Relations Act of October 27, 1957, P.L. 744, (43 P.S. 951-963) which provides that no employee, applicant for employment, independent contractor, or any other person shall be discriminated against because of race, color, religious creed, ancestry, national origin, age, or sex.

b. The Grantee will be required to provide a narrative describing its compliance with Title VI.

2. HATCH ACT

The Grantee will comply with the provisions of the Hatch Act, P.L. 85-554 (5 U.S.C 1501 et seq.) which limits the political activity of employees.

3. CONFLICT OF INTEREST

The Grantee will establish safeguards to prohibit employees from using positions for a purpose that is or gives the appearance of being motivated by a desire for private gain for themselves or others, particularly those with whom they have family, business, or other ties. (2 CFR 200.112)

4. REQUIRED PROVISIONS IN FEDERAL CONTRACTS (2 CFR.327)

Not all provisions will apply to all programs and their application is dependent on the requirements of the federal program under which this agreement is executed.

a. Remedies for Breach of Contract

Contracts for more than the simplified acquisition threshold (currently $250,000.00), which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, and found at 48 CFR Subpart 2.101, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for sanctions and penalties as appropriate. (2 CFR 200 Appendix II (A))

b. Termination Provision

For all contracts in excess of $ 10,000, the Grantee must address termination for cause and for convenience, including the manner by which it will be effected and the basis for settlement. (2 CFR 200 Appendix II (B))

c. Equal Employment Opportunity

Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor." (2 CFR 200 Appendix II (C))

d. Davis-Bacon Act, as Amended (40 U.S.C. 3141-3148)

When required by Federal program legislation, all prime construction contracts in excess of $ 2,000 awarded by Grantee must include a provision for compliance with the Davis- Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The Grantee must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The Grantee must report all suspected or reported violations to the Grantor and the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The Grantee must report all suspected or reported violations to the Federal Awarding Agency. (2 CFR 200 Appendix II (D))

e. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708)

Where applicable, all contracts awarded by the Grantee in excess of $100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence. (2 CFR 200 Appendix II (E))

f. Rights to Inventions Made Under a Contract or Agreement

If the Federal award meets the definition of "funding agreement" under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the Federal awarding agency. (2 CFR 200 Appendix II (F))

g. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as Amended

Contracts and subgrants of amounts in excess of $ 150,000 must contain a provision that requires compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency. (2 CFR 200 Appendix II (G))

h. Debarment And Suspension (Executive Orders 12549 And 12689)

A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. (2 CFR 200 Appendix II (H))

i. Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)

Contractors that apply or bid for an award exceeding $ 100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. The disclosures are forwarded from tier to tier up to the

non-Federal award. (2 CFR 200 Appendix II (I))

j. Procurement of Recovered Materials

If the Grantee is an agency of a political subdivision of the Commonwealth of Pennsylvania, the Grantee and its subcontractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency ("EPA") at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines. (2 CFR 200 Appendix II (J)) and (2 CFR 200.323).

k. Prohibition on Certain Telecommunications and Video Surveillance Services of Equipment

Grantee and its subcontractors are prohibited from obligating or expending grant funds for equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. The definition of "covered telecommunication equipment" is telecommunication equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of those entities). More detailed information is available at 2 CFR 200.216. (2 CFR 200 Appendix II (K)) and (2 CFR 200.216)

l. Domestic Preferences for Procurements

As appropriate and to the extent consistent with law, the Grantee should, to the greatest extent practicable under this agreement, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section: (1) "Produced in the United States'' means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. (2) "Manufactured products: means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer- based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber. (2 CFR 200.322)(2 CFR 200 Appendix II (L)) and (2 CFR 200.322).

ATTACHMENT H

Commonwealth Standard Terms and Conditions
Grant Version
(Revised - 10/1/2023)

1. DEFINITIONS

Capitalized terms used in these Commonwealth standard terms and conditions that are not otherwise defined in these provisions have the meanings specified in the agreement to which they are attached.

2. INDEMNIFICATION

The Grantee shall indemnify and defend the Commonwealth against all third-party claims, suits, demands, losses, damages, costs, and expenses, including without limitation, litigation expenses, attorneys' fees, and liabilities, arising out of or in connection with any activities performed by the Grantee or its employees and agents pursuant to this agreement, as determined by the Commonwealth in its sole discretion.

3. NONDISCRIMINATION/SEXUAL HARASSMENT

a. Representations. The Grantee represents that it is presently in compliance with and will remain in compliance with all applicable federal, state, and local laws, regulations, and policies relating to nondiscrimination and sexual harassment for the term of the agreement. The Grantee shall, upon request and within the time periods requested by the Commonwealth, furnish all necessary employment documents and records, including EEO-1 reports, and permit access to its books, records, and accounts by the Commonwealth for the purpose of ascertaining compliance with provisions of this Nondiscrimination/Sexual Harassment Clause.

b. Nondiscrimination/Sexual Harassment Obligations. The Grantee shall not:

i. in any manner discriminate in the hiring of any employee(s) for the performance of the activities required under this agreement or any subgrant agreement, contract, or subcontract, by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the Pennsylvania Human Relations Act ("PHRA") and applicable federal laws, against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

ii. in any manner discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, against or intimidate any of its employees.

iii. in any manner discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, in the provision of services under this agreement or any subgrant agreement, contract, or subcontract.

iv. in any manner discriminate by reason of race, gender, creed, color, sexual orientation, gender identity or expression, or in violation of PHRA and applicable federal laws, against any subgrantee, contractor, subcontractor, or supplier who is qualified to perform the work to which this agreement relates.

v. in any manner discriminate against employees by reason of participation in or decision to refrain from participating in labor activities protected under the Public Employee Relations Act, Pennsylvania Labor Relations Act, or National Labor Relations Act, as applicable, and to the extent determined by entities charged with the Acts' enforcement and shall comply with any

provision of law establishing organizations as employees' exclusive representatives.

c. **Establishment of Grantee Policy.** The Grantee shall establish and maintain a written nondiscrimination and sexual harassment policy that complies with the applicable law and these Nondiscrimination/Sexual Harassment provisions and shall inform its employees in writing of the policy. The policy must contain a provision that states that sexual harassment will not be tolerated and employees who practice it will be disciplined. For the entire period of this agreement, the Grantee shall: (1) post its written nondiscrimination and sexual harassment policy or these Nondiscrimination/Sexual Harassment provisions conspicuously in easily accessible and well- lighted places customarily frequented by employees at or near where the grant activities are performed; or (2) provide electronic notice of the policy or this clause to its employees not less than annually.

d. **Notification of Violations.** The Grantee's obligations pursuant to these provisions are ongoing from the effective date and through the termination date of the agreement. Accordingly, the Grantee shall notify the Commonwealth if, at any time during the term of this agreement, it becomes aware of any actions or occurrences that would result in violation of these provisions.

e. **Cancellation or Termination of Agreement.** The Commonwealth may cancel or terminate this agreement and all money due or to become due under this agreement may be forfeited for a violation of the terms and conditions of these Nondiscrimination/Sexual Harassment provisions. In addition, the granting agency may proceed with debarment or suspension and may place the Grantee in the Contractor Responsibility File.

f. **Subgrant Agreements, Contracts, and Subcontracts**. The Grantee shall include these Nondiscrimination/Sexual Harassment provisions in its subgrant agreements, contracts, and subcontracts with all subgrantees, contractors, and subcontractors providing goods or services under this agreement. The incorporation of these provisions in the Grantor's subgrants, contracts, or subcontracts does not create privity of contract between the Commonwealth and any subgrantee, contractor, or subcontractor, and no third-party beneficiaries are created by those provisions. If the Grantee becomes aware of a subgrantee's, contractor's, or subcontractor's violation of these provisions, the Grantee shall use its best efforts to ensure the subgrantee's, contractor's, or subcontractor's compliance with these provisions.

4. GRANTEE INTEGRITY

a. **Definitions.** For purposes of these Grantee Integrity Provisions, the following definitions apply:

i. "Affiliate" means two or more entities where (a) a parent entity owns more than 50% of the voting stock of each of the entities; (b) a common shareholder or group of shareholders owns more than 50% of the voting stock of each of the entities; or (c) the entities have a common proprietor or general partner.

ii. "Grantee" means the individual or entity, that has entered into this agreement with the Commonwealth.

iii. "Grantee Related Parties" means any Affiliates of the Grantee and the Grantee's executive officers, Pennsylvania officers and directors, or owners of five percent or more interest in the Grantee.

iv. "Financial Interest" means ownership of more than a five percent interest in any business or holding a position as an officer, director, trustee, partner, employee, or holding any position of management.

v. "Gratuity" means tendering, giving, or providing anything of more than nominal monetary value including, but not limited to, cash, travel, entertainment, gifts, meals, lodging, loans, subscriptions, advances, deposits of money, services, employment, or contracts of any kind. The exceptions set forth in the Governor's Code of Conduct, Executive Order 1980- 18, as may be amended, 4 Pa. Code §7.153(b), apply.

vi. "Non-Solicitation Award Process" means a method of awarding grants based on predetermined criteria, without the solicitation of grant applications.

b. Representations and Warranties.

i. **Grantee Representation and Warranties.** The Grantee represents, to the best of its knowledge and belief, and warrants that within the last five years neither the Grantee nor Grantee Related Parties have:

1. been indicted or convicted of a crime involving moral turpitude or business honesty or integrity in any jurisdiction;

2. been suspended, debarred, or otherwise disqualified from entering into any contract with any governmental agency;

3. had any business license or professional license suspended or revoked;

4. had any sanction or finding of fact imposed as a result of a judicial or administrative proceeding related to fraud, extortion, bribery, bid rigging, embezzlement, misrepresentation or anti-trust; and

5. been, and are not currently, the subject of a criminal investigation by any federal, state, or local prosecuting or investigative agency or civil anti-trust investigation by any federal, state, or local prosecuting or investigative agency.

ii. **Grantee Explanation**. If the Grantee cannot make the representations and warranties set forth above at the time of its submission of its grant application or if the agreement is awarded pursuant to a Non-Solicitation Award Process at the time of the execution of the agreement, the Grantee shall submit a written explanation outlining the reasons why it cannot make those representations and warranties. The Commonwealth may, based on its evaluation of the explanation provided, determine whether it is in the Commonwealth's best interest to execute the agreement.

iii. **Further Representations**. By submitting any bills, invoices, or requests for payment pursuant to the agreement, the Grantee further represents that it has not violated any of these Grantee Integrity Provisions during the term of the agreement.

iv. **Notice.** The Grantee shall immediately notify the Commonwealth, in writing, if at any time during the term of the agreement it becomes aware of any event that would cause the Grantee's certification or explanation to change. The Commonwealth may, in its sole discretion, terminate the agreement for cause if it learns that any of the certifications made in these Grantee Integrity Provisions are currently false or misleading due to intervening factual circumstances or were false or misleading or should have been known to be false or misleading when entering into the agreement.

c. **Grantee Responsibilities.** During the term of this agreement, the Grantee shall:

i. maintain the highest standards of honesty and integrity.

ii. take no action in violation of any applicable laws, regulations, or other requirements applicable to the Grantee that govern Commonwealth contracting or grant administration.

iii. establish and implement a written business integrity policy that includes, at a minimum, the requirements of these Grantee Integrity Provisions as they relate to the Grantee's activity with the Commonwealth and Commonwealth employees and ensure that its employees comply with the policy.

iv. not accept, agree to give, offer, confer, agree to confer, or promise to confer, directly or indirectly, any gratuity or pecuniary benefit to any person, or to influence or attempt to influence any person in violation of any federal or state law, regulation, executive order, statement of policy, management directive, or bulletin applicable to the award of grants or the administration of this agreement.

v. not have a financial interest in any other subgrantee, contractor, subcontractor, or supplier providing services, labor, or material under this agreement, unless the financial interest is disclosed to the Commonwealth in writing and the Commonwealth consents to Grantee's financial interest. The Grantee must disclose the financial interest to the Commonwealth at the time of submission of its grant application, or if a Non-Solicitation Award Process is used, no later than the date the Grantee signs the agreement. The Commonwealth shall be deemed to have consented if the required disclosure is received and all of the required Commonwealth signatures are affixed.

vi. comply with the requirements of the Lobbying Disclosure Act (65 Pa.C.S. § 13A01 et seq.) regardless of the method of award.

vii. comply with the requirements of Section 1641 of the Pennsylvania Election Code (25 P.S.§ 3260a) if this agreement was awarded pursuant to a Non-Solicitation Award Process.

viii. immediately notify the Commonwealth or the Office of the State Inspector General, in writing, when the Grantee has reason to believe that any breach of ethical standards as set forth in law, the Governor's Code of Conduct, or these Grantee Integrity Provisions has occurred or may occur, including, but not limited to, contact by a Commonwealth officer or employee, which, if acted upon, would violate the ethical standards.

d. **Investigations.** If a State Inspector General investigation is initiated, the Grantee shall reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of the State Inspector General for investigations of the Grantee's compliance with the terms of this or any other agreement between the Grantee and the Commonwealth that results in the suspension or debarment of the Grantee. The Grantee shall not be responsible for investigative costs for investigations that do not result in the Grantee's suspension or debarment.

i. cooperate with the Office of the State Inspector General in its investigation of any alleged Commonwealth agency or employee breach of ethical standards and any alleged Grantee non-compliance with these Grantee Integrity Provisions and make identified Grantee employees and volunteers available for interviews at reasonable times and places.

ii. upon the inquiry or request of an Inspector General, provide, or if appropriate, make promptly available for inspection or copying, any information of any type or form deemed relevant by the Office of the State Inspector General to Grantee's integrity and compliance with these

provisions. This information may include, but is not limited to, the Grantee's business or financial records, documents or files of any type or form that refer to or concern this agreement.

e. **Termination.** For violation of any of these Grantee Integrity Provisions, the Commonwealth may terminate this agreement and any other contract with the Grantee, claim liquidated damages in an amount equal to the value of anything received in breach of these Grantee Integrity provisions, claim damages for all additional costs and expenses incurred in obtaining another grantee to complete performance under this agreement, and debar and suspend the Grantee from doing business with the Commonwealth. These rights and remedies are cumulative, and the use or non- use of any one does not preclude the use of all or any other. These rights and remedies are in addition to those the Commonwealth may have under law, statute, regulation, or otherwise.

f. **Subcontracts.** The Grantee shall include these Grantee Integrity Provisions in its subgrant agreements, contracts, and subcontracts with all subgrantees, contractors, and subcontractors providing goods or services under this agreement. The incorporation of this provision in the Grantee's subgrant agreements, contracts, and subcontracts shall not create privity of contract between the Commonwealth and any subgrantee, contractor, or subcontractor, and no third-party beneficiaries are created by the inclusion of these provisions. If the Grantee becomes aware of a subgrantee's, contractor's, or subcontractor's violation of these provision, the Grantee shall use its best efforts to ensure their compliance with these provisions.

5. CONTRACTOR RESPONSIBILITY

a. **Definition**. For the purpose of these provisions, the term "Contractor" means as any person, including, but not limited to, a bidder, offeror, loan recipient, grantee or lessor, who has furnished or performed or seeks to furnish or perform, goods, supplies, services, leased space, construction or other activity, under a contract, grant, lease, purchase order or reimbursement agreement with the Commonwealth. The term also includes a permittee, licensee, or any agency, political subdivision, instrumentality, public authority, or other public entity in the Commonwealth.

b. **Contractor Representations.**

i. The Contractor represents for itself and its subgrantees, contractors, and subcontractors required to be disclosed or approved by the Commonwealth, that as of the date of its execution of this agreement, that neither the Contractor, nor any of its subgrantees, contractors, and subcontractors, are under suspension or debarment by the Commonwealth or any governmental entity, instrumentality, or authority and, if the Contractor cannot make this representation, the Contractor shall submit, along with the agreement, a written explanation of why the certification cannot be made.

ii. The Contractor represents that, as of the date of its execution of this agreement, it has no tax liabilities or other Commonwealth obligations, or has filed a timely administrative or judicial appeal, if any liabilities or obligations exist, or is subject to a duly approved deferred payment plan if any liabilities exist.

c. **Notification.** The Contractor shall notify the Commonwealth if, at any time during the term of the agreement, it becomes delinquent in the payment of taxes, or other Commonwealth obligations, or if it or, to the best of its knowledge, any of its subgrantees, contractors, or subcontractors are suspended or debarred by the Commonwealth, the federal government, or any other state or governmental entity. The Contractor shall provide this notification within 15 days of the date of suspension or debarment.

d. **Default.** The Contractor's failure to notify the Commonwealth of its suspension or debarment by the Commonwealth, any other state, or the federal government constitutes an event of default of the agreement with the Commonwealth.

e. **Reimbursement.** The Contractor shall reimburse the Commonwealth for the reasonable costs of investigation incurred by the Office of State Inspector General for investigations of the Contractor's compliance with the terms of this agreement or any other agreement between the Contractor and the Commonwealth that results in the suspension or debarment of the Contractor. These costs include, but are not limited to, salaries of investigators, including overtime; travel and lodging expenses; and expert witness and documentary fees. The Contractor shall not be responsible for investigative costs for investigations that do not result in the Contractor's suspension or debarment.

f. **Suspension and Debarment List.** The Contractor may obtain a current list of suspended and debarred Commonwealth contractors by visiting the eMarketplace website at http://www.emarketplace.state.pa.us and clicking the Debarment list tab.

6. AMERICANS WITH DISABILITIES ACT

a. **No Exclusion.** Pursuant to the Americans with Disabilities Act, 42 U.S. Code § 12101, et seq., no qualified individual with a disability may, on the basis of the disability, be excluded from participation in this agreement or from activities provided for under this agreement.

b. **Compliance.** For all goods and services provided pursuant to this agreement, the Grantee shall comply with Title II of the Americans with Disabilities Act, the "General Prohibitions Against Discrimination" set forth in 28 C. F. R. § 35.130, and all other regulations promulgated under Title II of the Americans with Disabilities Act that apply to state and local governments.

c. **Indemnification.** The Grantee shall indemnify the Commonwealth against all third-party claims, suits, demands, losses, damages, costs, and expenses, including without limitation, litigation expenses, attorneys' fees, and liabilities, arising out of or in connection with the Grantee's failure or its employee's or agent's failure to comply with the provisions of paragraph a, as determined by the Commonwealth in its sole discretion.

7. APPLICABLE LAW AND FORUM

This agreement is governed by and must be interpreted and enforced in accordance with the laws of the Commonwealth of Pennsylvania (without regard to any conflict of laws provisions) and the decisions of the Pennsylvania courts. The Grantee consents to the jurisdiction of any court of the Commonwealth of Pennsylvania and any federal courts in Pennsylvania and waives any claim or defense that such forum is not convenient or proper. Any Pennsylvania court or tribunal has in personam jurisdiction over the Grantee, and the Grantee consents to service of process in any manner authorized by Pennsylvania law. This provision may not be interpreted as a waiver or limitation of the Commonwealth's rights or defenses.

8. RIGHT TO KNOW LAW

a. **Applicability**. The Pennsylvania Right-to-Know Law, 65 P.S. §§ 67.101-3104, ("RTKL") applies to this agreement.

b. **Grantee Assistance.** If the Commonwealth needs the Grantee's assistance in any matter arising out of the RTKL related to this agreement, the Commonwealth shall notify the Grantee that it requires the Grantee's assistance, and the Grantee shall provide to the Commonwealth:

i. access to, and copies of, any document or information in the Grantee's possession (Requested Information) arising out of this agreement that the Commonwealth reasonably believes is a

public record under the RTKL, within ten calendar days after receipt of written notification; and

ii. any other assistance as the Commonwealth may reasonably request, in order to comply with the RTKL with respect to this agreement.

c. **Trade Secret or Confidential Proprietary Information.**

If the Grantee considers the Requested Information to include a Trade Secret or Confidential Proprietary Information, as those terms are defined by the RTKL, or other information that the Grantee considers exempt from production under the RTKL, the Grantee shall notify the Commonwealth and provide, within seven calendar days of receipt of the written notice a written statement, signed by a representative of the Grantee, that explains why the requested material is exempt from public disclosure under the RTKL. If the Commonwealth determines that the Requested Information is clearly not exempt from disclosure, the Grantee shall provide the Requested Information to the Commonwealth within five business days of receipt of written notice of the Commonwealth's determination.

d. **Reimbursement**

i. **Commonwealth Reimbursement.** If the Grantee fails to provide the Requested Information and the Commonwealth is ordered to produce the Requested Information, the Grantee shall reimburse the Commonwealth for any damages, penalties, or costs that the Commonwealth may incur as a result of the Grantee's failure, including any statutory damages assessed against the Commonwealth.

ii. **Grantor Reimbursement**. The Commonwealth will reimburse the Grantee for any costs that the Grantee incurs as a direct result of complying with these provisions only to the extent allowed under the fee schedule established by the Office of Open Records or as otherwise provided by the RTKL.

e. **Challenges of Commonwealth Release.** The Grantee may file a legal challenge to any Commonwealth decision to release a record to the public with the Office of Open Records, or in the Pennsylvania Courts, however, the Grantee shall reimburse the Commonwealth for any legal expenses incurred by the Commonwealth as a result of the challenge, including any damages, penalties or costs that the Commonwealth may incur as a result of the Grantee's legal challenge, regardless of the outcome.

f. **Waiver.** As between the parties, the Grantee waives all rights or remedies that may be available to it as a result of the Commonwealth's disclosure of Requested Information pursuant to the RTKL.

g. **Survival.** The Grantee's obligations contained in this Section survive the termination or expiration of this agreement.

9. **OFFSET**

The Commonwealth may set off the amount of any state tax liability or other obligation of the Grantee, or its subsidiaries, owed to the Commonwealth against any payments due the Grantee under any contract between the Commonwealth and Grantee.

10. AUTOMATED CLEARING HOUSE (ACH) PAYMENTS

a. **Payment Method.** The Commonwealth shall make payments to the Grantee through the Automated Clearing House (ACH). Within 10 days of the grant award, the Grantee must submit or must have submitted its ACH information within its user profile in the Commonwealth's Master Database. The Grantee may enroll to receive remittance information via electronic addenda and email (e- Remittance). ACH and e-Remittance information is available at the following:

https://www.budget.pa.gov/Services/ForVendors/Pages/Direct-Deposit-and-e-Remittance.aspx

b. **Unique Identifier.** The Grantee must submit a unique invoice number with each invoice submitted. The Commonwealth shall list the Grantee's unique invoice number on its ACH remittance advice to enable the Grantee to properly apply the state agency's payment to the respective invoice or program.

c. **ACH Information in the Commonwealth's Master Database.** The Grantee shall ensure that the ACH information contained in Commonwealth's Master Database is accurate and complete. The Grantee's failure to maintain accurate and complete information may result in delays in payments.

11. WORKER PROTECTION AND INVESTMENT

The Grantee shall comply with all applicable Pennsylvania state labor laws and worker safety laws including, but not limited to, the following:

a. Construction Workplace Misclassification Act;
b. Employment of Minors Child Labor Act;
c. Minimum Wage Act;
d. Prevailing Wage Act;
e. Equal Pay Law;
f. Employer to Pay Employment Medical Examination Fee Act;
g. Seasonal Farm Labor Act;
h. Wage Payment and Collection Law;
i. Industrial Homework Law;
j. Construction Industry Employee Verification Act;
k. Act 102: Prohibition on Excessive Overtime in Healthcare;
l. Apprenticeship and Training Act; and
m. Inspection of Employment Records Law.

SECTION 004116.2 - BID FORM

BID FORM

FOR

CONTRACT NO. 2 - HVAC CONSTRUCTION

MERCER COUNTY
AGRICULTURAL AND
CONSERVATION COMMUNITY
LEARNING CENTER AT
MUNNELL RUN FARM
41 MUNNELL RUN LANE
MERCER, PA 16137

FOR THE

MERCER COUNTY COMMISSIONERS
125 SOUTH DIAMOND STREET
MERCER, PA 16137

PROPOSAL OF _____
Bidder's Name

_____
Bidder's Address

Bidder's Federal Tax I.D. Number _____

Mercer County Board of Commissioners
103 Courthouse
Mercer, PA 16137

Sirs:

In conformity with the Contract Documents as prepared by HHSDR Architects / Engineers, 40 Shenango Avenue, Sharon, PA, 16146, and 201 Century Building, 130 Seventh Street, Pittsburgh, PA, 15222, and after an examination of the site of the work, and the Contract Documents including Instructions to Bidders, this form of Proposal and Conditions of Contract, the undersigned submits this proposal and encloses herewith as a proposal guaranty, a bid bond in an amount of not less than **ten percent (10%)** of the total of the hereinafter stated bid (including Base Bid and all Add Alternate Bids) made payable to or indemnifying the County of Mercer (the Owner), which it is understood will be forfeited to and retained by the Owner as liquidated damages, if this proposal or any part thereof is accepted by the Owner and the undersigned shall fail to furnish approved bonds and execute the contract within ten (10) days from the date of issuance of the award. Should the Owner fail to make an award of this project through no fault or failure on the

part of the bidder, the Owner shall return said proposal guaranty.

It is hereby certified that the undersigned is the only person(s) interested in this proposal as principal, and that the proposal is made without collusion with any person, firm or corporation as attested to on the attached executed Non-collusive Affidavit. Bidder hereby agrees to execute the contract and furnish insurance and surety company bonds, as specified, within ten (10) days after mailing by the Owner of notice of award, and to begin work immediately after approval of said bonds and insurance.

Bidder guarantees that, if awarded the contract, the Contractor will furnish and deliver all materials, water, tools, equipment, light, heat, power, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction, pay all fees and do all incidental work, and to execute, construct, and finish in an expeditious, substantial and workmanlike manner, in accordance with the drawings and specifications to the complete satisfaction and acceptance of the Owner for the price hereinafter stated.

For the: Mercer County Agricultural and Conservation Community Learning Center at Munnell Run Farm

It is understood that the Owner reserves the right to reject any or all proposals, or parts thereof or items therein, and to waive technicalities required for the best interests of said Owner. It is further understood that competency and responsibility of bidders will receive consideration before the award of the Contract.

Bidder submits this proposal with the understanding that the General Contractor is designated the Lead Contractor and is responsible for the daily scheduling of work within the broad framework of the Scheduling Requirements of the Work as stated in Section 011000. The Contractor submitting this Proposal has carefully reviewed the Scheduling Requirements of the Work and finds them to be reasonable and achievable. Contractor submitting this Proposal confirms that all equipment and material to be incorporated into the work will be available and accessible to install within the specified completion date(s). This Proposal is submitted with that understanding and is acknowledged by Signature below:

_____ _____

(Name) (Position)

Bidder submits this proposal with the understanding that the work shall be completed in accordance with above stated scheduling requirements and the Final Project Completion Date(s) shall be as stated therein and the time for the completion of the work shall be considered of the essence of this Contract, and that for the costs of extra inspection, salaries of contingent forces and other expenses entailed by the Owner by delay in completing the contract, said Owner shall be entitled to the liquidated damage fixed sums (as specified in Section 002000) for each and every calendar day's delay from the Final Project Completion Date(s) not solely caused by the Owner provided, however, that the Contractor shall be entitled to one day in addition to the time stipulated for each day's delay that may be solely caused by the Owner or conditions beyond the control of the Contractor. It is further understood, however, that any extensions of time, regardless of cause, beyond the above date, must be requested by letter originated by the Contractor and the Owner must grant such extension by letter prior to same becoming effective.

Contractor submitting this Proposal acknowledges that a representative of his company has visited the site during the bidding to become acquainted with the condition of the site, terrain, soil conditions, existing building (interior spaces, exterior envelope), utilities in existence, etc., as specified in Section 002000 “Instructions to Bidders”, Paragraph 1.07.A, and represents said acknowledgement by Signature below:

_____ _____

(Name) (Position)

Contractor submitting this Proposal acknowledges that he has reviewed the hereinafter "Additional Materials/Work" to be included with the Base Bid and has included the items listed in the Base Bid Total. Contractor further acknowledges that the value of all "Additional Materials/Work" items not utilized on the Project shall be deducted from the contract total at the conclusion of the project, and acknowledges same by Signature below:

_____ _____

(Name) (Position)

A Detailed Cost Breakdown sheet of the work and the contract price of the work involved will be submitted to the Architects and Engineers within the time frame specified in Section 011000.

Within 24 hours of the bid opening (if so requested), the apparent low bidder shall present evidence of the Bidder's experience, qualifications and financial ability to carry out the work in accordance with the terms of the Agreement. Bidder's qualifications shall be submitted as outlined in Section 004513 - Bidder's Proof of Competency.

Within 24 hours of the bid opening, the apparent low bidder shall submit a fully executed Public Works Employment Verification Form, as specified in Section 002000, Paragraph 1.08.E.

The Bidder agrees that he will not assign his bid or any of his rights or interests thereunder without the written consent of the Owner.

The Bid as called for is submitted in the space provided below:

BASE BID

For all HVAC Construction Work, complete, as specified and/or shown on Contract Documents, the sum of _____

_____

_____ Dollars ($ _____).

Additional Materials/Work Note: The Base Bid shall include the amounts for the furnishing and installation of additional materials/work within the Contract time, to that shown on drawings, as stated in the following. The cost for additional items as hereafter listed shall be included in the Base Bid sum. The Owner may or may not elect to have this work performed. No material and/or labor shall be supplied until specifically requested by the Owner and/or Architect. Work described below that is not performed will be deducted from the Project total at the end of the Project. In addition to including the cost of additional items as hereafter listed in the Base Bid sum, the Contractor shall also indicate a unit price for the stated work as a basis for adjustment of the Contract amount for addition to or deletion from the additional items included in the Base Bid sum. The additional materials/work and corresponding unit prices shall include all costs, including supervision, overhead, profit, and time.

The Owner's election to have any of the following work performed, does not constitute an extension of time to the Contract.

Item	Description
1)	Furnish and install 150 pounds of acoustic lined sheetmetal ductwork, beyond the extent shown on drawings. Sheetmetal per Section 233113. Duct liner per Section 230700.
2)	Furnish and install 25 linear feet of insulated 1 1/4" HWS & R piping with fittings, beyond the extent shown on drawings. Pipe per Section 232113. Insulation per Section 230700.
3)	Furnish and install 25 linear feet of insulated 3/4" HWS & R piping with fittings, beyond the extent shown on drawings. Pipe per Section 232113. Insulation per Section 230700.

Note: Additional amounts of work as specified above shall be due to existing unsatisfactory conditions as verified and quantified by the Architect and Owner and will not include any area damaged by the Contractor. Any areas damaged by the Contractor's activities shall be repaired by the Contractor at no cost to the Owner.

UNIT PRICES

Unit prices as hereafter listed shall be used as a basis for adjustment of the Contract amount for addition to or deletion from the amount of work on the project. Unit prices stated on this Contract Proposal Form by the Contractor shall be added to or deducted from the Contract Sum only if directed to do so by the Owner or the Architect. Any work described as a unit price item for additional work shall not be considered as part of the Contract unless so indicated by Change Order during the performance of the work. The Owner reserves the right to perform, or otherwise have performed, the work described as unit price work in the Contract Documents.

Unit prices shall include costs of all associated testing as specified for work as listed, all bonds, insurances, overhead, profit and supervision, as well as, shipping and handling and mobilization and/or de-mobilization, and Contract time, as specified in the General Conditions (Section 007216) Article 7, Paragraph 7.3.3.2

UNIT PRICE FOR ITEM 1 – ACOUSTIC LINED SHEETMETAL DUCTWORK

For the adjustment of the amount of poundage of fabricated acoustic lined sheetmetal ductwork, as described above, ADD TO or DEDUCT FROM the Contract price the sum of _____ _____ Dollars ($ _____) per pound.

UNIT PRICE FOR ITEM 2 – 1-1/4" HWS & R PIPE

For the adjustment of the amount of linear footage of 1-1/4" HWS & R piping, as described above, ADD TO or DEDUCT FROM the Contract Price the sum of _____ _____Dollars ($_____) per linear foot.

UNIT PRICE FOR ITEM 3 – 3/4" HWS & R PIPE

For the adjustment of the amount of linear footage of 3/4" HWS & R piping, as described above, ADD TO or DEDUCT FROM the Contract Price the sum of _____ _____Dollars ($_____) per linear foot.

ALTERNATE BIDS

If there is to be no change in the contract price as a result of accepting an Alternate Bid, the bidders shall so indicate by inserting the statement "No Change" in the blank space relating to that particular Alternate.
Note: The Owner reserves the option to add or deduct the successful bidder's Alternate Bid price to/from the awarded contract at any time during the Contract Time.

ALTERNATE BID NO. H - 1

For the performance of work as described in Section 230512, Paragraph 1.4, **ADD TO or DEDUCT FROM** the Base Bid the sum of _____ _____ Dollars ($ _____).
(Dehumidification air handling unit (DAHU-1) in lieu of air handling unit (AHU-1))

ADDENDA

In submitting this proposal, I acknowledge receipt of the following Addenda, and the cost, if any, of such revisions has been included in the bid sum:

Addendum No.	Dated	Addendum No.	Dated	Addendum No.	Dated

SIGNATURES

When the bidder is an individual:

Witness Name	Contractor's Name (Type/Print and Signature) (SEAL)
Witness Address	Contractor's Address
	Phone E-mail

When the bidder is a partnership:

Witness Name	Principal's Name (Type/Print and Signature) (SEAL)
Witness Address	Principal's Address
	Phone E-mail
	Principal's Name (Type/Print and Signature) (SEAL)
	Principal's Address
	Phone E-mail
	Principal's Name (Type/Print and Signature) (SEAL)
	Principal's Address
	Phone E-mail

When the bidder is a corporation:

	Corporate Name
	Corporate Address
	Phone E-mail
Attest:	
Secretary's Name	President's Name (Type/Print and Signature)
Secretary's Address	President's Address

(CORPORATE SEAL)

The _____ is a corporation organized and existing under the laws of _____and has (has not) been granted a certificate of authority to do business in Pennsylvania, as required by the Business Corporation Law, approved May 5, 1933, P. L. 364, as amended.

Non-Collusion Affidavit

1. The Non-Collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antibid-Rigging Act, 73 P.S. 1611 et seq., governmental agencies shall require Non-Collusive Affidavits to be submitted with bids.

2. This Non-Collusion Affidavit must be executed by the member, officer, or employee of the bidder who makes the final decision on prices and the amount quoted in this bid.

3. Bid rigging and other efforts to restrain competition and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assuring himself/herself that each statement is true and accurate, making diligent inquiry as necessary of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval of submission of the bid.

4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.

5. The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

NON-COLLUSION AFFIDAVIT

Contract Name _____ Contract No. _____
State of _____ County of _____
I state that I am _____ of _____
(Title) (Name of Firm)
and that I am authorized to make this affidavit on behalf of this firm, and its owners, directors, and officers. I am the person responsible in this firm for the prices and the amount of this bid. I state that:

(1) The prices and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other bidder or potential bidder.
(2) Neither the prices nor the amount of this bid, and neither the approximate prices nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be discussed before bid opening.
(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
(4) The bid of this firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
(5) _____ (Name of this firm), its affiliates, subsidiaries, officers, directors and employees are not currently under investigation by any government agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect with bidding on any public contract, except as follows: I state that _____ (Name of firm) understands and acknowledges that the above representations are material and important and will be relied on by the County of Mercer in awarding the contract for which this bid is submitted. I understand and this firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the County of Mercer of the true facts relating to the submission of bids for this contract.

_____ _____
(Name) (Position)

_____
(Company name and address)

_____

Sworn to and subscribed before me this _____ day of _____ 2026

_____ My Commission expires _____
(Notary Public)

(Notary Seal)

END OF BID FORM SECTION 004116.2

SECTION 004513 - BIDDER'S PROOF OF COMPETENCY

1.01 COMPETENCY CRITERIA

A. In determining the lowest responsible bidder, the Owner will consider the bidder's integrity, efficiency, experience, promptness, financial responsibility, and ability to successfully and timely complete the project. The Owner will scrutinize the low bidder's information for full disclosure before a bid is awarded.

1.02 BIDDER'S RESPONSIBILITY

A. It is each bidder's responsibility to demonstrate its competency. Accordingly, the low bidder shall furnish to the Owner, if requested, within 24 hours of the bid opening the following information and materials:

1. How many years has your organization been in business as a Contractor?
2. How many years has your organization been in business under its present business name?
   a. Under what other or former names has your organization operated?
3. List the categories of work that your organization normally performs with its own forces.
   a. List the Work that you intend to perform with your own forces if you are awarded the Contract;
   b. List the percentage of the bid amount that represents the work you intend to perform with your own forces.
4. Three architect references, including their names, addresses, telephone numbers, and contact persons.
5. Three project owner references, including their names, addresses, telephone number and contact persons:
6. A current audited financial statement; however, a complete reviewed financial statement may be considered by the Owner if prepared in accordance with Generally Accepted Accounting Principles (including financial statement, footnotes, and auditor's review opinion) provided that additional information is available.
7. A Dunn & Bradstreet report, if available.
8. Evidence of satisfactory credit rating.
9. A statement of the bidder's current bonding limit from the Bidder’s surety or insurance agent; the name of the Bidder’s surety company and insurance company or companies, and proof of the rating of the Bidder’s surety and insurance companies (companies are required to be listed on the most current Federal Register, Circular 570, and hold an A. M. Best & Company rating of A- or Better).
   a) Proof of Insurance and Bonds must be on Surety/Insurance Company’s letterhead.
10. A listing of work in progress or under contract stating the following:
    a) The amount of the original contract
    b) The amount of all change orders to date
    c) The required substantial completion date.
    d) Estimated or anticipated date of certification of substantial completion
    e) Percentage of work completed and
    f) Name, address, telephone number and contact person(s) of the architect and construction manager or clerk of the works (if any).
11. A listing of all work completed during the last six (6) calendar years stating the following:
    a) The amount of the original contract.
    b) The amount of all change orders and their percentage of the Contract's total bid cost.

c) The required substantial completion date.
d) The actual date of certification completion and the date of final payment.
e) The name, address, telephone number and contact person(s) of the architect and construction manager or clerk of the works (if any) and the name, address and telephone number of the Owner.

12. A statement of whether the bidder, whether as a principal or an office of any predecessor or current entity, has defaulted or failed to complete on a construction project within the previous six (6) years and, if so, including information as to:
    a) The project
    b) The project owner
    c) The Architect and Construction Manager or clerk of the works (if any), and
    d) The circumstances of such default.
13. A listing of all claims made against any bonds issued for the bidder's performance, labor and material payment or maintenance within the past six (6) years identifying:
    a) The project and project owner.
    b) The surety, and
    c) The claimant
14. A listing of all arbitration proceedings or court proceedings completed or in progress during the last six (6) calendar years involving the bidder, identifying:
    a) Bidders' role in proceedings
        1) Did/Does bidder's role involve bidder's performance of any construction contract or warranty
    b) The parties to such arbitration or litigation
    c) The arbitrator, court or forum of such arbitration and litigation and
    d) The case or docket number of such arbitration or litigation
15. A listing of all claims made against bidder's workers' compensation and/or general liability insurance polices, and paid by bidder's insurance carrier(s) resulting out of construction projects on which bidder was awarded a contract, within the past six (6) calendar years identifying:
    a) The project and project owner
    b) The type of insurance(s) workers' compensation and/or general liability, and the insurance carrier(s)
    c) The claimant, the date of the claim and the event giving rise to the claim.
16. A listing of the names, titles and experience of officers, other principals and/or other key individuals in bidder's organization.
17. A listing of all construction projects within at least the six (6) prior calendar years on which the bidder has worked, identifying all items asked for in Sub-items 1.02.A.10 and 1.02.A.11 above, as well as the following:
    a) An identification of all change orders that resulted in the extension of time of completion of the project, and the aggregate number of days by which the original substantial completion date was extended thereby.
18. A statement regarding the bidder's prior experience working on a construction project involving multiple contractors.
19. A statement regarding the bidder's adherence to the Occupational Safety Health Act; the Pennsylvania Prevailing Wage Act; the Pennsylvania Steel Products Procurement Act; applicable federal and/or state statutes and regulations prohibiting discrimination on a Pennsylvania public works project; and/or all other applicable laws, regulations, acts as listed in the non-all-inclusive list of Article 13 in Section 007216 General Conditions.
    a) Regarding Bidder's adherence to OSHA requirements, Bidders shall submit their safety record, claims history, and any OSHA violations that have occurred in the past five years.

20. Include the following statement and signature lines verbatim as part of Bidder's Proof of Competency submission.

THIS IS TO AUTHORIZE THE PERSONS AND REFERENCES IDENTIFIED HEREIN, AS WELL AS ANY OTHER REPRESENTATIVES OF BUSINESSES/AGENCIES WITH PROJECTS WITH WHICH I OR MY COMPANY HAVE BEEN INVOLVED, TO SPEAK FREELY AND WITHOUT HESITATION TO REPRESENTATIVES OF THE OWNER, INCLUDING ITS ARCHITECT AND ATTORNEY RELATIVE TO ANY OF THE ABOVE MATTERS OR ANY OTHER SUCH PROJECTS, HEREBY RELEASING ALL PERSONS, FIRMS AND CORPORATIONS WHETHER NAMED HEREIN OR NOT, FROM LIABILITY OR FROM ANY ACTION, SUIT, CLAIM OR DEMAND ARISING OUT OF THE RELEASE OF SUCH INFORMATION.

_____

By:_____
(Title)

_____
(Address)

1.03 BID REJECTION

A. The failure to fully provide the foregoing information to the Owner or its representatives, may result in the rejection of the bidder's bid, at the sole discretion of the Owner.

1. Failure to disclose a past or current project in default or in arbitration/court proceedings is grounds for disqualification.

B. Additionally, any of the following shall subject the bidder to disqualification and his bid to rejection:

1. A bidder’s failure in the past to have timely completed the work in accordance with the construction contract documents, on a contract awarded to him by the Owner.
2. A bidder’s failure in the past to have prosecuted the work in accordance with the construction contract documents, on a contract awarded to him by the Owner.
3. A bidder who was awarded a construction contract with the Owner in the past, and whose contract with the Owner was terminated for cause.
4. A bidder who was awarded a construction contract with the Owner in the past, and whose contract with the Owner was declared to be in default.
5. A bidder on whose Performance Bond provided for the benefit of the Owner on a construction contract awarded by the Owner in the past, a claim was made and paid or otherwise adjusted by the Surety.
6. A bidder who has no prior, satisfactory experience working on a construction project involving multiple contractors.
7. Where a bidder has been involved on a construction project on which a significant delay existed between the date of issuance of a Certificate of Substantial Completion for the bidder’s work, and issuance of Final Payment to that bidder.
8. A bidder who has failed to comply with the Occupational Safety Health Act and/or its implementing regulations, and who has consequently been fined or otherwise subjected to civil penalties because of such noncompliance.

9. A bidder who has failed to fully comply with the Pennsylvania Prevailing Wage Act.
10. A bidder who has failed to fully comply with the Pennsylvania Steel Products Procurement Act.
11. A bidder who has failed to fully comply with applicable federal and/or state statutes and regulations prohibiting discrimination on a Pennsylvania public works project.
12. A bidder who has otherwise failed to fully comply with federal, state and/or local statutes, ordinances and/or regulations applicable to a Pennsylvania public construction project.
13. A bidder who has filed for bankruptcy, or who has been involuntarily placed into bankruptcy by his/its creditors, within five (5) years of the date of submission of his/its bid. This provision shall encompass predecessor corporations, partnerships, and/or other entities, and each of the principals involved in the bidding corporation, partnership or other entity.
14. A bidder who has, within the ten (10) years preceding the submission of his/its bid, been convicted by a federal or state court of a crime relating to his/its prosecution of a public works project in any jurisdiction within the United States. This provision shall apply to the entity submitting the bid, as well as to each of the principals involved in the bidding corporation, partnership or other entity.
15. A bidder who has a significant history of insurance claims paid, including but not limited to workers' compensation claims.
16. A bidder who has no prior satisfactory experience with critical path method (CPM) scheduling methods.
17. A bidder's failure to sign the Bid Form shall be conclusively treated as a nonresponsive Bid and the Bid shall be rejected.
18. A bidder who is currently under suspension or debarment by the Commonwealth of Pennsylvania, any other state, or the federal government, as specified in Section 002000.

C. By the submission of any bid, the bidder agrees that in the event its bid is rejected by the Owner for any reason and such rejection is contested by the bidder through the commencement of legal proceedings, whether in law or equity, the Owner shall be entitled to an award of reasonable attorney's fees and costs if the Owner's rejection of the contested bid is upheld, affirmed or otherwise not set aside.

END OF SECTION 004513

SECTION 007216 - GENERAL CONDITIONS

MERCER COUNTY AGRICULTURAL AND
CONSERVATION COMMUNITY
LEARNING CENTER AT
MUNNELL RUN FARM
41 MUNNELL RUN LANE
MERCER, PA 16137

FOR THE
MERCER COUNTY COMMISSIONERS
125 SOUTH DIAMOND STREET
MERCER, PA 16137
HHSDR #4826

The following AIA Document A201-2017, "General Conditions of the Contract for Construction" has been modified for specific requirements for this Project.

Any reference throughout the Contract Documents to a provision of AIA Document A201–2017, shall be to this modified AIA Document A201-2017.

Attachments following this Section:

Detailed Cost Breakdown Form

Material Source of Supply and Subcontractor Approval Form

Assignment of Rights Sales Use/Tax Refund Form

Contractor's Request for Stored Material Payment Form

Subcontractor/Supplier Payment Certification and Waiver of Liens Form

Payroll Certification Forms:
PA Department of Labor & Industry - Form LLC-25 Weekly Payroll Certification for Public Works Projects (formerly Form LIPW-128)

Request for Information (RFI) Form

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
Mercer County Agricultural and
Conservation Community
Learning Center at
Munnell Run Farm
41 Munnell Run Lane
Mercer, PA 16137

HHSDR #4826

THE OWNER:
Mercer County Board of Commissioners
125 South Diamond Street
Mercer, PA 16137

THE ARCHITECT:

HHSDR, Inc.»« »
«40 Shenango Avenue
Sharon, PA 16146

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

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

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™–2017, Guide for Supplementary Conditions.

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User Notes: (6a072d8a3e51419369bf80f4)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. **The Contract Documents shall include Bidding Requirements, including, but not be limited to, advertisement or Invitation to Bid, Instructions to Bidders, the Contractor's Bid and Addenda or portions of the Addenda relating to any Bidding Documents.**

§ 1.1.2 The Contract

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

.1 If the Contractor has remedies available pursuant to the Agreement between the Owner and Contractor including these General Conditions, then the Contract Documents or other information supplied to the contractor in connection with this Project, including any deficiency, inconsistency or misrepresentation therein, shall not create any cause of action in favor of or against any third party whether such action may be for breach of contract, breach of warranty, negligence, misrepresentation or other tort, or otherwise including claims against the architect and its consultants, and their employees, officers and representatives.

.2 Except when Contractor is required to pursue a claim directly against another Contractor as directed elsewhere in the Contract Documents or its own subcontractors, Contractor agrees that any and all claims, disputes or legal actions filed or pursued by the Contractor in connection with this contract, the Contract Documents or the project, shall be filed or pursued only against the named Owner of the Project under the claims procedures set forth in this Agreement and that no claims or legal actions will be filed or pursued against the Owner's administrators, officers, directors, their employees, representatives, or its architect and/or their consultants, or their employees or representatives. Contractor agrees that this paragraph shall survive termination of this agreement. Contractor also agrees that this paragraph shall be binding whether or not it claims prior breach of this contract and that this paragraph shall apply to any and all claims including breach of contract, breach of warranty, negligence, misrepresentation or other tort, or otherwise.

§ 1.1.3 The Work

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

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and

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dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

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

a. In the event of inconsistencies in the Contract Documents and/or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall: (1) provide the better quality or greater quantity of work and; (2) comply with the more stringent requirements, in accordance with the Architect's interpretation. The terms and conditions of this Paragraph, however, shall not relieve the Contractor of any of the obligations set forth in Paragraphs 3.2 and 3.7.

§ 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.

§ 1.2.4 MISCELLANEOUS DEFINITIONS

.1 The term "product" includes materials, systems and equipment.

.2 The term "provide" includes furnishing and installing a product complete in place, tested and approved.

.3 The term "building code" and the term "code", refer to regulations of governmental agencies having jurisdiction.

.4 The terms "approved", "required", and "as directed" refer to and indicate the work or materials that may be approved, required or directed by the Architect acting as the agent of the Owner.

.5 The term "similar" means in its general sense and not necessarily identical.

.6 The terms "shown", "indicated", "detailed", "noted", "scheduled" and terms of similar import, refer to requirements contained in the Contract Documents.

.7 Where reference to "the Contractor" is made in AIA General Conditions of the Contract for Construction, Supplementary General Conditions and Instructions to Bidders, it shall mean "each" Contractor, unless specified otherwise.

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§ 1.2.5 The Contractor represents that it understands that the Contract Documents may (a) contain errors, omissions and/or inconsistencies; (b) that there may be representations made that are determined to be inaccurate or incorrect; and, (c) that the Owner may request that changes be made to the Contract Documents. Consistent with paragraph 1.1.2.1, the Contractor represents that when such issues occur on the project for which extra costs may result to the Contractor, the Contractor will only pursue such extra costs by requesting a change order in strict accordance with the change order requirements of this agreement and, to the extent any such change order is not agreed upon, shall only pursue claims for costs incurred in strict accordance with the claims procedures set forth in this agreement.

.1 Contractor acknowledges that the plans and specifications are intended only to show the intent of the completed Project. Contractor represents that it is qualified to construct the Project as depicted in the Contract Documents and to determine its own means, methods, techniques, sequences and procedures. To the extent that means, methods, techniques, sequences and procedures are identified in the Contract Documents, Contractor is required to independently evaluate those means, methods, techniques, sequences and procedures for the purpose of determining whether the means, methods, techniques, sequences and procedures depicted in the Contract Documents are adequate to construct the Project. Contractor further represents that it has based its bid upon its own determination of the means, methods, techniques, sequences and procedures required to construct the Project.

.2 If the Contractor asserts a claim against the Architect, Contractor agrees to limit the total liability of the Architect, its officers, employees, consultants and insurers to one-hundred thousand dollars ($100,000.00). This limitation of liability is applicable to any and all claims that can be asserted by the Contractor against the Architect. To the extent that a court of competent jurisdiction determines that the aforementioned limitation of liability is unreasonable, the Architect's liability shall be limited to the lowest legally sufficient amount to be an enforceable limitation of liability. The Architect, its officers, agents, servants, or employees shall not be liable to the Contractor for any indirect, special, consequential, or exemplary damages.

§ 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

§ 1.4.1 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.

§ 1.4.2 To the extent that the contractor makes a representation in the conditions of the Contract, any such representation is a contractual obligation required to be performed and is a representation to the Owner and Architect upon which each of them are entitled to rely.

§ 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.

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§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The only electronic format Contract Documents will be available in is portable document format (pdf); Contract Documents will not be available in any of these electronic formats: AutoCAD, Microsoft Word, Excel, etc.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate. 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.

.1 The Owner will expect the successful Contractors to enter into "No Lien" Contracts.

.2 The Bidder agrees and acknowledges that the Owner is a "contracting body" under the Public Works Contractors' Bond Law of 1967, and the Work on the Project is public construction and not subject to the filing of Mechanics Liens, and further agrees to provide and specify in its subcontracts with Subcontractors and Suppliers for their acknowledgment that their sole remedy against the Owner exists only under the provisions of the Bond Law and in accordance with the Payment Bond and to indemnify and hold harmless the Owner from any claim under the Mechanics Lien Law, filed by its Subcontractors and Suppliers.

.3 Contractor shall obtain and have recorded a waiver of liens from all sub-contractors. In addition, Contractor shall post a bond guaranteeing payment for labor and materials provided by subcontractors.

§ 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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

§ 2.3.4 The Owner shall not be responsible for furnishing surveys (unless required for the execution of the work and requested by the Contractor in writing) or other information as to the physical characteristics of, legal limitations of or utility locations for the Project site, but shall furnish or cause to be furnished to the Contractor a legal description of the Project site, which shall not constitute one of the Contract documents. Contractor shall confirm the location of each utility, shall excavate and dispose of each on-site utility and shall cap each off-site utility as required by the Work and as may be included in the Specifications. The Contractor represents that it is familiar with the Project site and has received all information it needs concerning the condition of the Project site. The Contractor represents that it has inspected the location of the Work and has satisfied itself as to the condition thereof, including, without limitation, all structural, surface and subsurface conditions. The Contractor shall exercise special care in executing subsurface work in proximity of known subsurface utilities, improvements, and easements.

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

§ 2.3.6 No hard copies of Contract Documents will be provided to Contractor(s). The Contract Documents are available electronically for the Contractor to print (only in portable document format (pdf). Contractor(s) are required to print hard copies to be maintained on site, to be updated with Contract changes, and to be turned over to the Owner at completion of the work.

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.1 **Each Contractor shall at all times keep a complete set of their Contract Documents on the Project, in good order, in the Project Office for the use of the Architect, the Architect's Representative and the Owner, also refer to Subparagraph 3.11.1.**

.2 **Such other additional instructions or detailed drawings as are necessary for the proper execution of the work will be furnished by the Architect.**

§ 2.3.7 The Owner may have an Owner's Representative (Clerk of the Works) on the Project. Any dispute relative to quality of materials or work, or the manner of performing the work, shall be referred to the Architect for a decision. The Contractor shall extend to the Owner's Representative the same privileges with regard to access and cooperation as are extended to the Architect.

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor 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 where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

.1 **Execution of the Contract by the Contractor is a representation that the Contractor has thoroughly reviewed and evaluated the Contract Documents to determine whether the Contractor needs clarification or additional information of the contract documents or additional interpretation of the intent of the Contract Documents to determine its bid and that it has requested any needed clarification prior to submitting its bid. Contractor represents that it has the knowledge, skill and expertise to perform the work; that it understands that it must make reasonable inferences to determine portions of the work not shown in the Contract**

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Documents that would be required for a proper and complete project, and it has included all costs for such inferences in its bid; and, that contractor is not relying on representations from the contract documents for the purpose of determining the means, methods, sequences or procedures of performing the work.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

.1 The Contractor shall be responsible for all work usual and customary to his specialization, unless specifically designated otherwise, whether it is indicated in the Contractor's Contract Documents or in other Contractor's Drawings. A copy of all related Drawings as listed in Section 000115, List of Drawings, shall be issued to all prospective Contractors for purpose of bidding as well as for construction of the project.

§ 3.2.3 It shall be the obligation of the Contractor to review the Contract Documents to determine and to notify the Owner and the Architect of any discrepancy with the building codes and regulations of which the Contractor has knowledge or should be reasonably able to determine. The Contractor shall not violate any zoning, setback or other locational requirements of applicable laws, codes and ordinances, or any recorded covenants of which the Contractor has knowledge. If the Contractor observes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, rules or regulations, the Contractor shall notify the Owner and Architect in writing, and necessary changes shall be accomplished by appropriate Modification.

§ 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.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

.1 The General Contractor is designated as the Lead Contractor for the Project. The Lead Contractor and other Prime Contractors are responsible for the coordination of the work. The Lead Contractor is responsible for making all coordination decisions not mutually agreed to by the affected Prime Contractors. Disputes between the Lead Contractor and one or more other Prime Contractors, and disputes between two or more Prime Contractors pertaining to the creation, application, and modification of the project schedule, the furnishing of resources to meet the project schedule, job coordination, and all aspects of the coordination, means and methods of construction shall be submitted promptly to the Lead Contractor for a final construction decision. The final construction decision of the Lead Contractor must at all times be consistent with the content and intent of the Contract Documents. The final construction

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decision of the Lead Contractor will be observed, accepted, and fully followed by all Prime Contractors and their Subcontractors on the project. The progress of the work in accordance with the final construction decision of the Lead Contractor shall not be delayed. The contractors, including the Lead Contractor, shall have no right of action against the Owner, Owner's Representative, or Architect in connection with any cost, loss, or delay suffered resulting from issues involving coordination of the Contractors' Work or a decision regarding the coordination of the Contractors' Work.

§ 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.

.1 Contractors whose failure to perform their Work or whose negligence in performing their Work, impacts other Contractors shall be responsible for damages incurred by the other Contractors that are necessary to maintain the project schedules.

.2 Contractors shall be responsible to protect their installed work until such work is turned over to and accepted by the Owner in writing. Any damage to such work shall be corrected by the Contractor initially responsible for the work, regardless of how the damage was sustained. Contractors shall refer to Paragraph 6.2.3.1 regarding claims against each other for work damaged by another Contractor.

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

§ 3.3.4 After Award of Contract, any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered. Contractors, who feel extra time, in any form such as shift work, overtime, and premium time, is necessary to meet Contract requirements regardless of trade, should include these costs in their bids. Contractors must recognize that although their work might not require shift, overtime, or premium time work for completion within the stipulated time frame, it may be required in order to allow other Contractors to complete within the time frame. Contractors must allow for these overtime requirements and include the costs necessary to allow the other Contractors to complete within the specified time. Failure to recognize the extra costs in his bid shall not relieve the Contractor from utilizing shift, overtime, or premium time work in performance of his Contract nor entitle him to additional compensation. Where installation work is part of the contract, all costs associated with meeting the time frames indicated in the construction schedules shall be included in the contract price.

§ 3.3.5 If the Contractor fails to supervise his workmen or subcontractors, the Owner shall withhold monies sufficient to protect the Owner's interest.

§ 3.3.6 No verbal agreement or conversation with any officer, agent or employee of the Owner or Architect, either before or after the execution of the contract, shall affect or modify the terms or obligations herein contained. Failure to comply with any or all of the above requirements will not relieve the contractor from the responsibility of properly estimating the difficulty or cost of successful completion of the work, nor from the responsibility for the faithful performance of the provisions of this contract.

§ 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 **according to Section 012513**.

§ 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.

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§ 3.4.4 The Contractor shall inform all workers on the Project of proper conduct expected of them by the Owner at all times. Obscene gestures, obscene pictorial, printed and/or written expressions and the use of profanity by the workers is forbidden.

§ 3.4.5 Smoking is prohibited from all areas of the facility (interior and exterior) in compliance with state and federal legislation. "Smoking" shall mean all uses of tobacco, including, but not necessarily limited to, cigarettes, cigars, pipes, chewing tobacco, snuff, and electronic nicotine delivery systems (ENDS) or vaping devices.

§ 3.4.6 The Contractor shall assure that his employees comply with the following:

- **.1 The contractor is solely responsible for the safety of his employees and to assure compliance with OSHA rules and regulations as stated in the project specifications.**
- **.2 Construction security means that the Contractor shall be responsible to protect and secure his own tools, equipment and materials. He is also responsible to protect the Owner's property and facilities which he occupies or uses.**
- **.3 Workers shall not operate radios, CD players, "Boom Boxes", or similar devices that may be a nuisance to surrounding buildings.**
- **.4 Stay out of building areas which are not a part of construction.**
- **.5 Dress in accordance with OSHA requirements.**
  - **a. Clothing shall not bear references to tobacco, drugs, alcoholic beverages, and/or profanity.**
- **.6 Do not use any facility, materials or equipment without specific permission.**
- **.7 No use of existing building restrooms.**
- **.8 Workers shall not possess or consume drugs, alcoholic beverages, and/or other controlled substances when on site.**

§ 3.4.7 The Contractor shall be responsible for enforcing the standards of conduct referenced in this Article 3.4.

§ 3.4.8 The Owner shall have the right to have the Contractor remove from the site all workers in violation of the above stated standards of conduct.

§ 3.5 Warranty

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

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

§ 3.5.3 All materials and workmanship shall be guaranteed for a minimum of one year from date of Final Payment for the entire Project, except where a longer period is specified, and each Contractor shall make good without cost to the Owner any defective portion of the work of which he is notified within one year of the date of final payment of contract. Refer to Section 007316 – Insurance Requirements for required "Maintenance Bond". Repair or replacement of such defects shall extend to other work damaged thereby. Owner's rights and remedies hereunder shall be in addition to any other rights and remedies which Owner may have pursuant to law or this contract. Owner shall be entitled to all other rights and remedies provided by this contract and by law, in addition to the Warranty rights and remedies set forth in this paragraph.

§ 3.6 Taxes

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

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§ 3.6.2 Access to Accounting Records: The Contractor shall check all materials, equipment and labor entering into the Work and shall keep such full and detailed accounts as may be necessary for proper financial management under this Agreement, and the system shall be satisfactory to the Owner. The Owner or its representative shall be afforded access to all the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and such similar data relating to this Contract, and the Contractor shall preserve all such records for a period of twelve (12) years, or for such longer period as may be required by law, after final payment.

§ 3.6.3 The Contractor shall be aware that the Project Owner is a Pennsylvania tax exempt entity, and that Pennsylvania Sales and Use Tax must be paid for all materials and equipment with the exception of certain Building Machinery and Equipment (BME) as defined in applicable law (PA Act 45 of 1998). The Contractor is solely responsible to determine whether certain purchases within his Contract may be tax exempt for the Project Owner and whether the Owner may benefit from the Contractors reduction of said taxes in the calculation of his bid.

.1 Contractors are encouraged to take advantage of any sales tax exemptions for which Owner is entitled in computing the bid amount.

.2 Contractors intending to purchase certain BME exempt from sales tax shall recognize that they must submit a Pennsylvania Department of Revenue Sales Tax Exemption Certificate (Form REV-1220) to their supplier(s) in accordance with applicable law, without benefit of the Owner's tax exemption number and/or Federal ID Number (EIN); the form should contain the statement, "Property or services qualify as building machinery and equipment, and will be transferred pursuant to a construction contract to [name of Owner]." The Owner will not provide their tax exemption number and/or Federal ID Number (EIN) to any Contractor, subcontractor, material supplier or other entity in assisting in making of tax-exempt purchases.

.3 Regardless of whether Contractor has taken advantage of certain BME sales tax exemptions in the calculation of his bid, the Contractor shall be required to submit a signed and notarized "Assignment of Rights Sales / Use Tax Refund" form, as hereafter specified, as well as, assist the Owner in filing of all Petitions for Refund with the Commonwealth's Board of Appeals for taxes paid on tax exempt purchases for the Project.

.4 Contractors shall submit to the Owner a letter identifying all materials purchased exempt of sales tax in their Contract, in order to assist the Owner seeking any refund on tax exempt items.

§ 3.6.4 Assignment of Refund Rights: The Contractor agrees to assign and transfer to the Owner all his rights to sales and use tax which may be refunded as a result of a claim for refund for materials purchased in connection with this Contract, regardless of whether Contractor has taken advantage of certain non-taxable Building Machinery and Equipment (BME) in the calculation of his bid. The Contractor further agrees that it will not file a claim for refund for any sales or use tax which is subject to this assignment.

.1 Each Prime Contractor further agrees that he will assist the Owner in the preparation and submission of petitions for refund pertaining to those taxes.

.2 Contractors shall be required to submit a signed and notarized "Assignment of Rights Sales / Use Tax Refund" form, within the time period specified for initial submittals in Section 011000. Sample form included following these General Conditions.

§ 3.6.5 Contracts with Subcontracts: The Contractor agrees to include the "Access to Accounting Records" and "Assignment of Refund Rights" paragraphs, in full, in any contracts with subcontractors.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for all 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.

.1 The Owner shall obtain the Building Permit for the entire project and pay all initial permit fees associated with the Building Permit under the UCC. All Contractors shall assist the Owner in obtaining the permit and shall cooperate in the notification of all required inspections under the scope of their contracts as pertains to the building permit and/or construction work, including paying for required inspections if not included in the initial building permit fee to the Owner. Each Contractor shall be responsible for obtaining and paying for all third party inspections

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required under the scope of their contract as pertains to the UCC, PA Statewide Building Code. Each Contractor shall also be responsible for paying all costs associated with any re-inspections required as a result of incomplete/incorrect work.

.2 Each applicable Contractor shall make cash deposits required by Authorities having jurisdiction and shall pay for any and all fees, permits, road bonds, inspections and certificates as may be required for their work as well as for the repairing of streets, alleys, curbs, sidewalks, underground structures, sewers, mains and public or private property damaged as a result of execution of the work, and shall pay such fees as are required for moving of equipment required for the work. All permits, bonds and certificates must be submitted to the Architect.

.3 Each applicable Contractor(s) shall arrange to obtain all required general construction and/or HVAC, plumbing, and/or electrical equipment/system operating certificates from appropriate agencies, and shall make necessary deposits and pay for fees, permits, inspections and certificates as may be required for the work. All permits and certificates must be submitted to the Owner.

.4 The Contractor shall contact the local authorities regarding any ordinances which may restrict early morning, late evening, and/or weekend work hours, as well as any restrictions regarding access routes to the site.

.5 The General Contractor shall secure and pay for any required permit for temporary site identification signage.

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

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

§ 3.8.1 Cash allowances are not included in the bid specifications.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in

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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.

.1 **The Contractor's Superintendent shall be employed full time on the Project site during performance of all work under the Contractor's responsibility, including but not limited to, all work performed by Contractor's subcontractors. The Superintendent shall, on a full-time basis, manage, supervise, and direct all of the Work being performed by the Contractor's employees and all subcontractors.**

§ 3.9.2 The Superintendent shall be satisfactory to the Architect and Owner, and the Contractor shall not replace the Superintendent without the prior written consent of the Owner, which consent shall not unreasonably be withheld.

§ 3.9.3 The Contractor shall furnish a fully qualified and competent project superintendent subject to the approval of the Owner. At a minimum, the superintendent shall have at least ten (10) years experience of progressive experience as a construction superintendent.

§ 3.9.4 The proposed superintendent shall possess strong supervisory, project scheduling and management skills and excel in planning and directing complex projects. The proposed superintendent shall be able to analyze plans and specifications to determine that time frame, staffing requirements, and appropriate resources are available for various phases of construction; direct and coordinate all construction activities to maintain optimum efficiency of operations and effectively utilize human resources, machinery and equipment; establish work plans for each construction phase, assign duties, provide technical advice, prepare schedules, and set deadlines to ensure timely completion of work.

§ 3.9.5 The Contractor shall submit the qualifications of the project superintendent to the Owner for approval in the form of a resume that shall include a list of major projects, certifications and affiliations. The written qualifications also include a detailed list of training seminars and evidence of certifications/credentials, etc. The Owner also reserves the right to conduct a personal interview of the prospective superintendent , in addition to the above requirements.

§ 3.9.6 Under no circumstances shall work commence on the project site until the contractor's designated project superintendent has been approved by the Owner. If the Owner rejects the Contractor's project superintendent, the Contractor shall submit the name of an alternate superintendent for the Owner's consideration.

§ 3.9.7 The approval of a contractor's project superintendent shall not, under any circumstances, be considered a waiver of the contractor's obligation to perform the work according to the terms of the contract documents.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The **General** Contractor **(Lead Contractor for the Project)**, promptly after being awarded the Contract **(within the time period specified for submittals in Section 011000), shall submit to the Architect and the Owner's Representative a comprehensive construction schedule, indicating dates for beginning and completing the various subdivisions of the work. The scheduling requirements are set forth in detail in the contract and in the specifications. By submitting its bid and by executing the contract the contractor represents that it understands that the scheduling requirements are intended to place the burden of early planning, active coordination and communication regarding the planned work on the Contractor and that the purpose of the scheduling requirements is an essential part of meeting that contractual burden. Any failure by the contractors to comply with any scheduling requirement shall be a material breach of this Contract and if the Contractor fails to comply strictly with any such requirements, Contractor shall not be entitled to make any claim for any damages that occur because of impacts to its work or delays, whether or not the Owner has also materially breached its contract by failing to perform in accordance with its obligations or actively interfering with the contractor's work on the project. Other Contractors shall coordinate the requirements of their work with the General Contractor so that the construction schedule(s) will indicate the obligations of each Contractor for uninterrupted performance of the work to the date of completion. The schedule(s) shall be reviewed by the Owner's Representative, Architect, Owner and all Contractors. Each Contractor, the Owner's Representative, Architect and the Owner shall receive a copy of**

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the reviewed and revised construction schedule(s). The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. **The Schedule shall not be modified or extended without prior approval of the Owner in each instance**.

.1 **Construction schedules representing anything less than a five day work week shall not be permitted.**

.2 **Coordination of the work between contractors shall include, but is not limited to, exchange of information about the extent of work, duration of work, identification of work required by others to facilitate the work and the required start, duration and finish times for the work activities.**

.3 **Contractors shall submit all construction schedule information for coordination with the General Contractor, and the construction schedule shall be approved and signed off by all Contractors and reviewed by the** Owner's Representative**, Architect, and Owner, prior to approval of any Contractor's first payment application. Monthly updates to the construction schedule shall be submitted with Contractor's applications for payment each month, as stated in Paragraph 9.3.1 of this Section.**

.4 **Failure of the Contractor to submit construction schedules by the dates specified shall result in Architect's not approving Contractor's application for payment that month.**

.5 **By submitting an application for payment, Contractor represents that it has met each and every scheduling requirement up to that period covered in the application. Contractor agrees that no waiver of any scheduling requirement can occur unless the contractor indicates in writing that it does not intend to perform such requirement before such requirement is due to be met and OWNER ACKNOWLEDGES IN WRITING THAT THE CONTRACTOR IS RELIEVED OF ITS OBLIGATION TO PERFORM THE REQUIREMENT.**

.6 **The General Contractor shall utilize the Critical Path Method (CPM) for scheduling all work and shall provide, for record purposes, the Architect and** Owner's Representative **with electronic data files (on useable and standard discs) of each submittal of construction schedules (base line, monthly, etc.) in addition to the hard copies specified above.**

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

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

§ 3.11 Documents and Samples at the Site

The Contractor shall maintain and 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 paper copy, available to the Architect and Owner the paper and electronic copies shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

.1 **The Contractor shall submit to the Architect, the names and addresses of all sources of materials, including manufacturers, products, and subcontractors to be used on the Project as stated in Paragraph 5.2.1 of this document. Submissions shall be made within the time period specified for Submittals in Section 011000. No materials shall be delivered to the site prior to the Architect's approval of the source of supply. Forms for submission will be available from**

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the Architect. If the Owner or the Architect has reasonable objection to any proposed material or source of material, or subcontractor, the Contractor shall submit a substitute to whom the Owner or the Architect has no reasonable objection, and the Contract sum shall be unchanged as a result of any such substitutions.

.2 Failure of the Contractor to submit Material Source of Supply, Shop Drawings, and Color Samples by the dates specified shall result in Architect's not approving Contractor's application for payment that month.

§ 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.

.1 All materials submitted as samples shall be properly labeled and delivered to the Architect's office. Materials will be examined by the Architect and, if approved, will be signed, dated and delivered to the project site. Approved samples shall remain on the project site for use in checking the material or equipment incorporated in the work.

.2 In instances where materials will affect the color planning of the work, samples of the colors will be submitted for approval and selection by the Architect within the time period specified for Submittals in Section 011000.

.3 Samples of materials which the Architect deems necessary to be tested shall be submitted in duplicate to approved testing laboratories. The Architects decision as to those materials requiring laboratory testing shall be final. The Contractor shall prepare and forward to testing laboratory all materials requiring tests, shall pay for all expenses involved in connection thereof and shall cause the testing laboratory to forward the results directly to the Architect.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action. **The Contractor's obligations are not changed by an approval of any shop drawing or other submittal. If the contractor intends that a change to the Contract be made by any information in a shop drawing, he will affirmatively state that the shop drawing depicts a change in the work and will submit a written request for change order in sufficient time for the Architect to understand that a change order is being requested before the time the Architect's approval of the shop drawing is required. No notation, mark or other comment by the Architect on a submittal or in a response to a Request for Information shall constitute a change in the Contract. If the Contractor asserts that any notation, mark or comment by the Architect contained in a submittal or response to a Request for Information will change the Contract, the contractor will immediately follow the procedures set forth in paragraph 15.1 to request and pursue a change in the Contract.**

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

.1 Contractor agrees to submit all Submittals to the Architect for review together with all other submittals necessary for the review of the particular Submittal. If all submittals necessary for a review of the particular Submittal are not made simultaneously, the Architect shall return the Submittal with a written request for it to be resubmitted with the particular Submittals necessary for the Architect's review. In such cases, the Architect's time for reviewing the submittal will begin when it receives the necessary submittals for review of the particular Submittal.

.2 All submissions of materials, samples, shop drawings or product data to the Architect shall be accompanied by a letter of transmittal from the Contractor listing Project name, date, items and numbers of drawings or product data sheets contained in the submission.

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.3 The Contractor shall submit to the Architect for his review, Shop Drawings and/or Product Data of all items requested by the Architect and by the appropriate sections of the Specifications. The Shop Drawings, Submittals, and Product Data may be made electronically by email to the Architect's designated representative identified at the Initial Job Conference or as otherwise designated, or by sending two hard copies of the submittal to the Architect's office to the attention of Architect's designated representative identified at the Initial Job Conference or as otherwise designated (one set for the Architect and one set for the Owner). Emailed submittals are preferred in 8 ½" x 11" format, but also acceptable in maximum 11" x 17" format. Submittals larger than 11" x 17" format shall be submitted via two hard copies to the Architect's designated representative. The Architect will return one electronic copy (scanned PDF) showing the Architect's comments and review status of the submittal. The Contractor shall be responsible to produce his own paper copies as required and to coordinate work with all trades. No Shop Drawings or Product Data shall be submitted prior to the submission and Architect's approval of the Source of Supply. Shop Drawing shall give complete information necessary and shall be made in conformity with the best modern practice. Reproduction of any type made directly from the Architect's design documents will not be acceptable as shop drawings. All Shop Drawings and Product Data shall bear the name of the Project. All Shop Drawings and Product Data shall be approved by the Contractor prior to submission and shall bear the Contractor's approval stamp, signature and date of approval, as well as the name of the individual who reviewed the submission and found it to be in compliance with the Contract Documents.

- **a. Contract Documents will not be available in electronic format, i.e., AutoCAD, Microsoft Word, etc., for use by Contractors in preparation of Shop Drawings.**
- **b. Electronic submission of shop drawings will be permitted as set forth above.**
- **c. The Contractor shall not send Submittals of any kind through Project Management Software.**

.4 Once the Architect has reviewed and accepted a Shop Drawing submittal, all copies not required by the Architect, Engineer, and/or Owner's Representative **will be returned to the submitting Contractor. The submitting Contractor shall be responsible for distributing acceptable, as stamped by the Architect or Engineer, Shop Drawings to all other Prime Contractors requiring coordination of said work. "Acceptable" or "Reviewed" as stamped by the Architect or Engineer shall be defined as the Shop Drawing does not require "Resubmission" by the Architect or Engineer.**

.5 Upon completion of the Project, the Contractor shall issue two hard copies of all approved Shop Drawings, Submittals and Product Data with the Operations and Maintenance Manual.

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of

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architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.14.3 Each Contractor is responsible for the size and location of all chases and openings required for the proper installation of all work in their contract and shall be responsible for all cutting and patching for such chases and openings.

.1 Where existing equipment/fixtures are to be removed and no new equipment/fixtures are to be installed in that location, the Contractor removing the item is responsible for patching the opening to match adjacent materials. Surrounding surfaces shall be thoroughly cleaned of all previous paint overruns, caulking, discharged dirt, etc., by said Contractor. Surfaces include exterior and/or interior locations.

§ 3.14.4 The General Contractor, however, will construct or have built into the building walls and partitions in new construction and renovation areas all such chases as are necessary, providing the General Contractor is notified of such openings and chases by the other Contractors.

§ 3.14.5 Contractors requiring chases built into new construction shall furnish the General Contractor with detailed drawings showing the size and location of each and every chase. If this information is not transmitted before the walls, partitions, etc. are built, then the General Contractor will not be liable for the cost of the construction of these chases and openings and they will then be built by the General Contractor but at the expense of the Contractor concerned.

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§ 3.14.6 Unless otherwise provided, each Contractor shall furnish and install all sleeves, thimbles and inserts necessary for the installation of their work at the proper and exact location and in sufficient time as not to impede the work of any other Contractor.

§ 3.14.7 Any cost due to defective or ill-timed work shall be borne by the party responsible.

§ 3.14.8 Site Work Utility Trenches: Trenching and backfilling shall be by the contractor, additionally, trenches occurring in areas not designated to receive new finishes shall be resurfaced/seeded to match existing: Utility trenches (gas, storm, water, sanitary, electric, etc.) installed through existing surfaced areas shall be backfilled with compacted fill and patched with bituminous paving and/or concrete as may be required in a thickness equal to the existing surface material. Trenches installed through existing non-surfaced areas shall be backfilled with compacted fill and re-seeded to match existing.

§ 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.

.1 The General Contractor shall provide rubbish containers, as specified in Section 015000 (Temporary Facilities and Controls), and pay for the removal of rubbish and debris from the project site. All Contractors are responsible for the removal and depositing of their rubbish and debris into containers and establishing a payment plan to the General Contractor for use of said containers, as specified in Section 015000.

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

§ 3.16 Access to Work

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

§ 3.16.2 Job conferences will be held while construction is in progress. Each Contractor's representative shall be in attendance. The Contractor shall cause representative of all Sub-contractors designated by the Architect also to be in attendance. All such representatives shall have such authority as is necessary to bind their respective principals. The schedule of conferences will be determined by the Architect. At the job conferences all representatives shall be prepared to state the amount of their respective portion of work completed during the previous work period and what portion is scheduled to be undertaken during the upcoming work period. Contractors' reports shall reference the corresponding dates and anticipated work itemized on the reviewed comprehensive construction schedule. Problems of co-ordination and clarifications shall be reviewed and discussed at these conferences. Failure by the Contractor to provide such representation shall result in the Architect withholding monies from that Contractor's Monthly Application for Payment and/or withholding certification of the entire monthly application for payment.

§ 3.17 Royalties, Patents and Copyrights

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

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§ 3.18 Indemnification

§ 3.18.1 The Contractor shall indemnify, defend and hold harmless the Owner, Owner's Representative, **Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to, attorneys' fees and defense costs, arising out of or resulting from performance of the Work, to the extent caused in whole or in part by the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts or omissions they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity which would otherwise exist. The Contractor agrees to and does hereby assume on behalf of the Owner and Architect the defense of any action at law or in equity which may be brought against such indemnified parties by reason of claims for which indemnification is owed hereunder, and will pay on behalf of such parties, upon their demand, the amount of any judgment that may be entered against any of them in any such action. In the event that any claim, loss, cost, expense, liability, damage or injury arises or is made, asserted, threatened against the Owner for which the Contractor or its insurer does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from any payments due or to become due to the Contractor an amount sufficient to protect the Owner from such claim, loss, cost, expense, liability, damage or injury, including attorneys' fees and expenses reasonably necessary for the defense thereof.**

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

§ 3.19 SANITARY PROVISIONS

§ 3.19.1 The General Contractor shall provide and maintain sanitary provisions (temporary toilet facilities) as specified in Section 015000 (Temporary Facilities and Controls).

§ 3.20 TEMPORARY UTILITIES (WATER, ELECTRIC, HEATING AND VENTILATING)

§ 3.20.1 Refer to Section 015000 (Temporary Facilities and Controls).

§ 3.21 MAINTAINING EXISTING SYSTEMS

§ 3.21.1 Refer to Section 015000 (Temporary Facilities and Controls).

§ 3.22 FIELD OFFICES AND SHEDS

§ 3.22.1 Refer to Section 015000 (Temporary Facilities and Controls).

§ 3.23 BLASTING

§ 3.23.1 No blasting shall be performed on the Project Site.

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed

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

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. **The Contractor's Request for Information shall be submitted on the form provided by the Architect. The Contractor shall not submit Requests for Information through any Project Management software or upon any other type of form prepared by the Contractor.** The Architect's response to such requests will be made in writing within**fifteen (15) business days of receipt of written request for information**. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information. **No delay shall be recognized concerning the time for the Architect's response, until 15 business days after a written request for information has been received by the Architect and the Architect has not provided a response.**

.1 The Contractor shall submit written Requests For Information (RFI) to the Architect a minimum of fifteen (15) business days prior to requiring the information and/or clarification to carry out the work.

.2 Requests for Information, submitted to the Architect, will not be accepted and will be returned un-answered for any of the following:

i. Dimensions, unless such dimensions cannot be determined from field measurements and/or from associated dimensions shown throughout the drawings, sections, details, and/or technical specifications.

ii. Substitutions. Substitutions may only be submitted on Form 012513.25 according to Section 012513.

iii. Coordination issues between trades/Contractors.

iv. Partial and/or fragmented Shop Drawing submittals, i.e., details, data sheets, etc., are not to be submitted as Requests for Information.

.3 The Architect will charge the Contractor for his time involved in responding to Requests for Information that can be answered from information shown elsewhere throughout the drawings, sections, details, and/or technical specifications; and/or that can be resolved through coordination of trades/Contractors involved.

.4 The Architect's form for "Request for Information" submittals is attached following these General Conditions.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

§ 5.2.1 The Contractor, within the time period specified for submittals in Section 011000, shall furnish in writing to the Owner through the Architect (1) the name, trade, and subcontract amount for each subcontractor, (2) the names of all persons or entities proposed as manufacturers of the products identified in the specifications (including those who are to furnish materials or equipment fabricated to a special design) and, where applicable, (3) the name of the installing subcontractor, on "Material Source of Supply" form as included following these General Conditions and as provided by the Architect. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. **And the Contract sum shall be unchanged as a result of any such substitutions.**

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

§ 5.2.5 The Contractor shall not contract with sub-contractors for more than 85% of the Contractor's Work for this Project. A minimum of 15% of the Contractor's Work must be completed by the Contractor.

.1 100% of a sub-contract must be completed by the sub-contractor's own employees; labor sub-contracts shall not be sub-sub-contracted.

§ 5.3 Subcontractual Relations

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

§ 5.3.2 Contractor must include all provisions of this contract in its Subcontractor agreements binding its subcontractors to the same extent the Contractor is bound herein. In addition, Contractor must specifically insert (and not just incorporate) provisions requiring the Contractor's subcontractors to indemnify, hold harmless and defend the Owner, Architect, and their consultants, administrators, officers and employees (including waiver of worker's compensation statutory protection) to the same extent the Contractor is bound by the Contract.

§ 5.3.3 Except as may be otherwise provided in these General Conditions, Sub-Contractors may make claims only against the Contractor with whom the Sub-Contractor has entered into an agreement to perform work.

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§ 5.4 Contingent Assignment of Subcontracts

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces **with the Lead Contractor of the project. The General Contractor is the Lead Contractor. The Lead Contractor and other Prime Contractors are responsible for the mutual coordination of the work of the Project and with the Owner's own forces. The Lead Contractor and other Prime Contractors shall prepare Construction Schedules as stated in Paragraph 3.10.1. The Lead Contractor is responsible for making all coordination decisions not covered by the mutually prepared Construction Schedule as stated in Paragraph 3.3.1.1.**

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the

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Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3

§ 6.2.3.1 If a Contractor, its agents, servants, employees or sub-contractors, including the sub-contractor's agents, servants or employees, cause damage to the property or Work of another Contractor, cause delay or interference to any other contractor or cause any other additional expense or damage, the Contractor shall make claims only against such other Contractor or Contractors who was or were the cause of such expense or damage in whole or in part, and shall settle by agreement or, if unable to settle, by binding arbitration by filing such unresolved claim with the American Arbitration Association pursuant to the Construction Industry Arbitration Rules then in effect. The Contractor agrees that such disputes will not delay the project. The Contractor acknowledges and agrees that neither the Owner nor the Architect shall be a party to such claim or dispute between the Contractors, even if the Owner or Architect were in part to blame for such damage. The Contractor also acknowledges and agrees that the rights of the Owner to withhold payment to another Contractor, terminate another Contractor, or to demand compliance by another Contractor with the terms of the Owner's contract with that other Contractor are rights of the Owner, and that the Owner is not required to take advantage of or act upon its rights for the benefit of the Contractor. In addition, the failure of the Owner to take advantage of or act upon its rights under contracts with other Contractors shall not constitute active interference of the Owner. It is agreed that the intent of this subparagraph is to create a right of action for the benefit of each of the Contractors on the Project to and for each other to the extent described hereinabove and serves to raise the Contractors on the Project to the status of Third-Party Beneficiary of each of the other Contractors' contracts only as to the right of action described in this subparagraph.

§ 6.2.3.2 The Contractor, by entering into the Contract for Construction assumes duties to cooperate with the other Contractors to coordinate their Work with other Contractors' Work and to accomplish all of the Contractors' Work within the time established in the Contract Documents.

§ 6.2.3.3 The Contractor agrees that the right of action contained in this subparagraph is provided as valuable consideration to the Contractor, and the Contractor, acknowledges and agrees that claims against the Owner and Architect for damages resulting from other Contractors, as described hereinabove, are hereby prohibited.

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order,

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Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

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

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum; and

.3 The extent of the adjustment, if any, in the Contract Time.

.4 No work shall be performed until Change Orders have been issued and signed as per Change Order requirements, except in case of emergency as described in Article 10, subparagraph 10.6.1. In such case the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss.

§ 7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Section 7.3.3. The Contractor represents that any change order agreed between the Owner and Contractor on this project will include all costs associated with the additional work described in the change order, including all costs of associated delay, acceleration, inefficiency and overhead, as well as costs of material, labor and supervision. To the extent that any request for change order or correspondence prior to the signed change order is contrary to this paragraph, such requests or correspondence shall have no effect.

.1 The Contractor represents that it has the skills, expertise and cost accounting programs and/or tools necessary to maintain a record of all costs associated with any change in the work and that it will maintain a complete record of all costs associated with a change at the time such costs are incurred. The Contractor will create a cost item in its cost recording system for each change for which it intends to request a change order. At the time the Contractor requests a change order, it will identify the cost reporting reference number and will provide all supporting documentation maintained by the Contractor for all labor and material costs, including certified payroll, invoices, record of equipment costs and costs for overhead, supervision and tools. The Contractor will update its cost system as necessary to capture all costs associated with a change in the work and will regularly update the Owner as costs are incurred for which it desires to be paid. Once a change order is issued for a change in the work, the contractor shall not be entitled to any other costs or damages, including but not limited to any costs for inefficiencies, acceleration delays or other costs, that result from the change in the work. The Contractor will provide the information required of this provision in strict accordance with the change order provisions of this contract and acknowledges that the Owner and Architect have a right to rely on the Contractor's strict compliance, including compliance with time requirements such that the Owner and Architect have an opportunity to minimize the costs associated with the change request by timely submission of the information required under this paragraph. The intent and requirement of this paragraph is for the contractor to provide all facts, analysis and evidence of this claim as early as is practicable so that the Owner has the opportunity to minimize damages and fully evaluate the contractor's claim without incurring litigation costs. The Contractor shall not reserve rights to damages or present claims for damages or evidence of damages at any arbitration or trial that were not presented to support its Change Order request and Notice of Claim documentation. It is material to this contract that the Owner and Architect be given an opportunity to review the totality of the evidence the Contractor intends to present in connection with any change order request at the time the change order request is being considered.

.2 Payment of a change order shall constitute accord and satisfaction of all claims in connection with the change or changes to the Contract addressed by the change order, and it is understood and agreed that a signed change order form shall be the complete and fully integrated agreement for all related costs and that there are no oral or written understandings, representations or agreements, directly or indirectly, connected with the Change Order that are not affirmatively stated on the signed Change Order form. The contractor's execution of a change order constitutes a representation that it will make no further claims for damages. Contractor shall not be permitted to execute any Change Order with a reservation of rights to later seek damages for impacts, delays, or acceleration of it's work.

.3 Any change (Add and/or Deduct) to the Contract amount as a result of a Change Order shall be based upon the Detailed Cost Breakdown as submitted by the Contractor and reviewed by the Architect.

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.4 **For any Change Order work not itemized on the Detailed Cost Breakdown, the change to the Contract amount shall be an agreed upon amount by the Owner and the Contractor based upon a cost breakdown of labor and/or materials plus ten percent for overhead and profit. Any increase to Bond costs shall be included within the ten percent overhead amount.**

.5 **For Change Order work for Subcontractors, the Contractor shall be entitled to the cost of the Subcontractors work plus five percent for overhead and profit. Any increase to Bond costs shall be included within the five percent overhead amount.**

.6 **If additional time is required as part of a change, the cost impact where additional costs are permitted under a specific section of the contract documents shall be included in the Contractor's overhead and profit. There shall be no additional contract time if the change order states "0" days is added to the Contract.**

§ 7.3 Construction Change Directives

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon; **Unit prices stated on the Contract Proposal Form by the Contractor shall be added to or deducted from the Contract Sum only if directed to do so by the Owner or the Architect. Any work described as a unit price item for additional work shall not be considered as part of the Contract unless so indicated by Change Order during the performance of the work. The Owner reserves the right to perform, or otherwise have performed, the work described as unit price work in the Contract Documents. Unit prices shall include costs of all bonds, insurances, overhead, profit, supervision, and Contract time.**

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. **Cost** for the purposes of this Section 7.3.4 shall be **determined by the Detailed Cost Breakdown as submitted by the Contractor and reviewed by the Architect, and/or Documentation of Costs as specified in 7.2.2.1.**

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

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

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith,

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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 cost, **including overhead and profit credit,** as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

.1 There is intended herein to be a differentiation between "Substantial Completion" and "Final completion". Substantial Completion is as defined in Paragraph 9.8.1. Final Completion shall be when the Contract is fully performed, including all Punch List items.

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.2.4 Cold or freezing weather shall not be considered an excuse for the stopping of work under this contract. The Contractor shall use all such methods of temporary construction as may be necessary and with the use of temporary heat, continue the work throughout the winter. The temporary construction shall be of

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such construction and materials as will properly enclose the work and maintain a temperature of not less than 50° F.

§ 8.2.5 If low temperatures make it impossible to continue operations safely by use of cold weather precautions, the Contractor shall cease work and notify the Architect and Owner by letter. When work is resumed the Contractor shall notify, by letter, the Architect and Owner. Such stoppage shall not constitute an extension of the completion date.

§ 8.3 Delays and Extensions of Time

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

.1 **No Change Order extending the Contract Time shall result in any increased payments to the Contractor for extended overhead, delay damages, "impact" damages, loss of efficiency, loss of productivity or any other similar form of loss, damage or compensation.**

.2 **No payment or compensation or claim for damages shall be made to the Contractor as compensation for damages for any delays or hindrances from any cause whatsoever in the progress of the work, notwithstanding whether such delays be avoidable or unavoidable. The Contractor's sole remedy for delays shall be an EXTENSION OF TIME ONLY, pursuant to, and only in accordance with this Paragraph 8.3, such extension to be a period equivalent to the time lost, day for day, by reason of any and all of the aforesaid causes, as determined by the Architect. In consideration for this grant of time extension, the Owner and/or Architect shall not be held responsible for any loss or damage or increased costs sustained by the Contractor as a result of any delays caused by the Owner or Architect or any other Contractor or on account of the aforesaid causes or any other cause of delay. In the event the Contractor shall choose to litigate this clause or issue to seek compensation for delays, and the Contractor is not the substantially prevailing party in said litigation, the Contractor shall reimburse the Owner and the Architect for their reasonable attorney's and expert witness fees and all other costs and expenses incurred by them in the litigation. Substantially Prevailing shall mean that the Contractor recovers an award that is (1) greater than the highest amount of any settlement offer made to resolve the claim; or, (2) greater than 60% of the Contractor's claim for damages if the highest amount offered to settle the claim is 60% or less of the amount of the Contractor's Claim; that the Contractor has alleged it is entitled to in the litigation.**

.3 **No price adjustments will be made to the Contractor for increased material, fuel, etc., costs resulting from construction delays caused by the Contractor or any of the other Contractors performing work on the site.**

§ 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. **To the extent that Contractor may be entitled to damages for delay, interference, inefficiency or lost productivity, such damages shall be submitted in the Contractor's request for Change Order and Notice of Claim to be included in an appropriately executed Change Order. The legitimate right to such (including the truth of the facts asserted as the basis for the claim) and the accuracy of the amount of such costs or damages shall be verified by affidavit and submitted with appropriate backup information to support any such amount. Contractor acknowledges that it is not entitled to damages for delay, interference, acceleration or inefficiency in any amount other than the amount of any agreed Change Order. To the extent that a Change Order cannot be agreed to, Contractor shall submit a claim in accordance with the provisions of Article 15. For any such claim that is submitted or pursued, Contractor acknowledges that it is not entitled to any amount greater than the verified amount submitted in its request for a Change Order.**

§ 8.3.4 DAMAGE CLAIMS FOR DELAYS CAUSED BY CONTRACTORS, SUBCONTRACTORS AND SUPPLIERS OR AN EMPLOYEE OF ANY OF THEM:

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.1 **The Owner is not responsible for delays caused by any Contractor. The Owner is not responsible for problems caused by the failure of a Contractor to coordinate its work with other Contractors. The Owner is not liable for any damages suffered by a Contractor arising from any Contractor's delays and/or failure to coordinate its work. Contractor hereby waives and releases the Owner from any liability and damages caused by lack of coordination by a Contractor, or between or among the Contractors, including their subcontractors and suppliers.**

.2 **The Architect and the Owner and their representatives shall not be liable to a Contractor for any increased costs or damages for defective work, interference, or delays resulting from any conflict between or among the Contractors, their subcontractors and suppliers. Neither the Owner nor the Architect shall be a party to disputes or actions between or among the Contractors or their subcontractors and suppliers concerning such additional expense or damage.**

.3 **It is agreed by all parties that disputes or actions between Contractors concerning any additional expense or damage herein before mentioned shall not delay completion of the Work, which shall be continued by the parties pending final resolution of a claim including judicial proceedings.**

.4 **Each Contractor hereby waives privity of contract defenses and agrees that other contractors have the right to file claims in a binding arbitration with the American Arbitration Association pursuant to the Construction Industry Arbitration Rules then in effect against Contractor in the event Contractor is alleged to have caused damages to another Contractor by reason of delay or lack of coordination. Neither the Owner nor the Architect shall be a party to such Arbitration.**

.5 **It is agreed by the parties to this Contract (the Owner as promisee and the Contractor as promisor) that the intent of this Section 8.3.4 is to benefit the other and is the mutual intents of the Owner and the Contractor that this Section 8.3.4 raises the Contractor and such other Contractors to the status of third party beneficiaries only as to the terms and conditions of Section 8.3.4. The Contractor agrees that Section 8.3.4 is provided as a benefit to the Contractor and that the Contractor specifically excludes, releases, foregoes and waives any claims against the Owner or the Architect for extended overhead, delay damages, "impact" damages, loss of efficiency, loss of productivity acceleration, or any other similar form of loss, damage or compensation, or other damages related to any delays whatsoever or from any amendment to the Construction Schedule.**

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

Within the time period specified in Section 011000, the Contractor shall submit on the form required by the Architect (sample form included following these General Conditions), a Detailed Cost Breakdown of scheduled value of all items of work entering into the Contract. This detailed breakdown will show quantities of the respective items and the allowance for labor, material and other costs entering into each item. The detailed breakdown, when reviewed by the Architect, shall be used as a basis by the Contractor in preparing monthly estimates for payment and shall, as accurately as possible, reflect the true division of costs of the respective items entering into the Contract. Contractor shall submit Detailed Cost Breakdown by the date specified and prior to submitting any application for payment. No application for payment shall be processed until the Detailed Cost Breakdown is submitted and accepted.

§ 9.3 Applications for Payment

§ 9.3.1 On a specified day of each month, as determined at the Initial Job Conference, the Contractor shall submit to the Architect an itemized Application for Payment **on A.I.A. Document G702,** prepared in accordance with **and accompanied by** the schedule of values **A.I.A. Document G703** for completed portions of the Work. The application shall be notarized and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage provided for in **Paragraph 9.3.1.3 Number of required notarized copies to be submitted to be determined at the Initial Job conference.**

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a) **Contractors shall submit monthly progress construction schedule updates with rough draft (pencil copy) of request for payment application each month for approval by the Architect and Owner prior to submittal of specified hard copy of payment application in order for payment application to be approved. Failure by the Contractor to include updated scheduling information with the monthly payment application request will be cause by the Architect to not approve the payment request.**

b) **Any update to the construction schedule reflecting a revision to the original reviewed comprehensive schedule shall include a narrative as to the revision (cause, corrective action taken, etc.), a statement of coordination resolved among all Prime Contractors regarding the revision, and a verification that Project Completion dates remain intact.**

c) **Any updates/revisions to the construction schedule shall be approved and signed off by all Contractors and reviewed by the Architect and Owner prior to approval of any Contractor's monthly payment application.**

d) **Submittals of all Color Selectors/Samples, Shop Drawings, etc., shall be completed within the time period specified in Section 011000. Should any of these items remain outstanding beyond that time period, no further payments will be processed.**

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

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

.1 **Contractor shall submit with the Application for Payment each month, a Sworn Statement stating that the Contractor has paid all Subcontractors of whatever tier who have performed Work or provided equipment and materials for the Project in the full amount to which the Subcontractors are entitled to date and waives any right that the Contractor, his subcontractor, and/or his suppliers have to file a Mechanic's Lien for the work, material and/or supplies provided to date. (sample form included following these General Conditions)**

§ 9.3.1.3 Estimates for payment Documents will require breakdown of the total work completed to date of submission. From this total will be deducted a ten percent retainage. From the resultant amount will be deducted all previous payments. At such time that the Contractor determines that 50 percent of the work has been completed the Contractor shall notify the Owner, Architect and the Contractor's Surety in writing of this fact and upon the Owner's verification of such completion, retainage shall be reduced from 10% to 5% unless the Contractor is not making satisfactory progress, or unless there is specific cause for greater withholding. The retained five percent will be processed for payment on the issuance of the Certificate of Substantial Completion, unless amounts are withheld as otherwise provided in this agreement.

§ 9.3.1.4 Should the Architect, at any time during the progress of the work, consider the amount withheld on Monthly Estimates for Payment to be in excess of the amount necessary to complete the work, or necessary for the full and ample protection of the Owner, then the Contractor may reduce the percentage retained to an amount sufficient for the Owner's proper protection, as approved by the Architect. Should the Architect, at a later date, consider the amount withheld insufficient to protect the interest of the Owner, the Architect may increase the retained percentage to an amount not to exceed ten percent, or five percent, dependent upon the stage or percentage of contract completion.

§ 9.3.1.5 Pursuant to Section 8.3.4, a dispute based upon increased costs claimed by one Prime Contractor occasioned by delays or other actions of another Prime Contractor may not be brought against the Owner. Should a Prime Contractor still attempt to bring such a claim against the Owner, additional retainage in the sum of one and one-half times the amount of any possible liability may be withheld from the parties directly involved until such time as final resolution is agreed to by all parties directly or indirectly involved unless the Contractor attempting to initiate the claim against the Owner furnishes a bond satisfactory to the Owner to indemnify the Owner against the claim.

§ 9.3.1.6 The Architect/Engineer shall make final inspection within 30 days of receipt of the Contractor's written request for final inspection. If the work is substantially completed, the Architect/Engineer shall issue

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a Certificate of Substantial Completion. As per Section 9.10, regarding Contractor's initial Application for Final Payment, the Architect/Engineer shall issue a Certificate for Payment, less one and one-half times the amount required to complete any then remaining, uncompleted, punch list items, which amount shall be certified by the Architect/Engineer and upon receipt by the Owner of any guarantee bonds which may be required, in accord with the Contract Documents, to insure proper workmanship for a designated period of time, the Owner shall make payment within 45 days thereafter. The certificate given by the Architect/Engineer shall list each uncompleted item and a reasonable cost of completion. Final payment of any amount withheld for the completion of the minor items shall be paid upon completion of the items with submission of the Final Application for Payment in accordance with Section 9.10. Any amounts withheld under this Paragraph are in addition to any amounts withheld under Paragraph 9.3.1.5.

§ 9.3.1.7 The cost of preparation of shop drawings and related information shall not be included in submission for payment until substantial quantities of materials are on the project site.

§ 9.3.2 Materials in reasonable quantities, which are delivered to the site, properly stored, and accepted for incorporation in the work but not yet so used, may be included on Monthly Estimates for Payment. The Contractor shall submit with the Monthly Estimate reflecting the unincorporated material the following:

- **.1 The original and five copies of itemized, paid invoices showing payment of such material by the Contractor and delivery slips certifying to the delivery of the quantities set forth on the estimate to the site of the work.**
- **.2 Payment for materials stored on the site shall be based on actual cost for same as shown by the receipted invoices and shall not exceed the cost of materials as indicated on the reviewed Detailed Cost Breakdown for the particular items involved.**
- **.3 The receipted invoices shall have each item identified and marked with the Contractor's corresponding itemized breakdown number.**
- **.4 Provide Insurance Certificates in the full amount of the materials against theft, loss from any other cause, damage, destruction and/or such other risks as may be involved, which would render the aforesaid materials unfit or unavailable for incorporation in the work.**
- **.5 Statement from the Contractor's Surety Company acknowledging stored materials are being paid and there is no objection.**
- **.6 Request for payment for materials stored off site, in addition to the above requirements, shall include a statement identifying the location of said materials. The Owner and the Architect, or their representatives, shall have full access to the location of said materials.**
- **.7 The Contractor shall mark or identify such materials as being the property of the Owner and shall be solely responsible for their safe keeping and usability at the time it is to be incorporated in the work and shall at his own expense care for and protect the same.**
- **.8 The Contractor shall submit the "Contractor's Request for Stored Material Payment" form, included following these General Conditions, with each request for stored material payment. Failure to submit the form and verification attachments will result in denial of the request.**
- **.9 "Stored Materials" shall be defined as fabricated, primed, and ready for installation.**

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of

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

§ 9.5 Decisions to Withhold Certification

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

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

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

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

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

§ 9.6 Progress Payments

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

- **.1 The Owner shall have no responsibility or liability for interest on late payments pursuant to the Public Works Regulation Law.**

§ 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

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similar manner.

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

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

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

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

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

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

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately.

§ 9.8 Substantial Completion

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

.1 The Owner's receipt of an Occupancy Permit does not constitute "Completion" of the work by the Contractor. To reach "Completion", the Project must have all work complete, there shall be no missing or incomplete items or temporary items on both the building/structure and site.

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

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the

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Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

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

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Contractor shall complete any portion or portions of the work in such order as may be stated in the Contract Documents. All work shall be so arranged and Contractors shall so coordinate their work as to complete the work by the date set forth in the Contract. See Section 011000. The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

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

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

§ 9.9.4. The Contractor shall secure and pay all costs required for all necessary permits, licenses, approvals or certificates required for occupancy or completion of construction as issued or required by any agency having jurisdiction thereof.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 The Contractor, when the work is considered complete, shall submit to the Architect a written certification that:

- **.1 Contract Documents have been reviewed.**
- **.2 Work has been inspected and completed in accordance with the Contract Documents.**
- **.3 Equipment and systems have been tested and operated in the presence of the Owner's representative.**
- **.4 Work is completed and ready for final review.**
- **.5 Request that the Architect make a review to verify the status of completion with reasonable promptness after receipt of such request.**

§ 9.10.2 Should the Architect consider that the work is incomplete or defective:

- **.1 The Architect will notify the Contractor in writing listing the incomplete or defective work.**

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.2 The Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Architect that the work is complete.
.3 The Architect will again review the work.

§ 9.10.3 Should the Architect perform more than one review to those listed above due to failure of the work to comply with the claims of status of completion made by the Contractor, and/or additional services more than 60 days beyond the specified completion date for the Project, due to failure of the work to comply with the Contract Documents:

.1 The Owner will compensate the Architect for such additional services.
.2 The Owner will deduct the amount of such compensation from the final payment to the Contractor.

§ 9.10.4 Following Substantial Completion, in the event the Contractor or its subcontractor fails to complete the list of items of the work instructed by the Architect to be corrected or completed within 30 days after the date of Substantial Completion, the Owner may (I) exercise any available remedies to correct or complete deficient work or retain a third party to correct or complete such work at the cost of the defaulting contractor, and (II) retain and deduct from any payments or retention otherwise due to the defaulting contractor any fees and expenses for services required to be provided by the Architect more than 30 days after the specified Completion Date.

§ 9.10.5 When the Architect finds that the work is acceptable under the Contract Documents, the Architect shall request the Contractor to make closeout Submittals:

.1 Evidence of compliance with requirements of governing authorities.
.2 Bound and indexed Operation and Maintenance Manuals, including all extended Warranties issued by Contractors and/or manufacturers.
.3 Record Drawings incorporating As-Built Revisions to drawings and/or specifications, including change orders.
.4 Contractor's Affidavit of Payment of Debts and Claims, A.I.A. Document G706.
.5 Contractor's Affidavit of Release of Liens, A.I.A. Document G706A.
.6 Consent of Surety Company to Final Payment, A.I.A. Document G707, with effectively dated powers of attorney attached.
.7 Application and Certification for Final Payment, A.I.A. Documents G702 and G703.

§ 9.10.6 Final payment shall be based upon full completion of the Project. The final payment shall not be due and payable until the Contractor's satisfactory completion of the requirements listed under final review above. Final payment to the Contractor shall not relieve any Surety of its obligation to the Owner as set forth in the Surety Bonds

§ 9.10.7 Where one or more claims against the Contractor, which are in controversy appear unsatisfied, the Architect shall have the discretion to direct final payment to be made, or a partial payment to be made from the monies due, should it be determined that the withholding of the entire final payment would work a hardship on the Contractor or delay the final payments required under this paragraph. The Contractor shall itemize the claims which remain unsatisfied, giving the reason therefore, and the statements of the Surety Companies shall provide that the final payment, or partial payment, as the case may be, shall not relieve any Surety of any obligations to the Owner as set forth in the Surety Bonds. If only partial payment is permitted under this paragraph, the final payment shall not be made until the Contractor shall have furnished satisfactory evidence and a statement from the Surety that all claims against the Contractor have been paid and that payment to the Contractor of the Contract balance shall not relieve the Surety of any of its obligations to the Owner as provided in the Surety's Bond.

§ 9.10.8 The acceptance by the Contractor of the final payment shall be and shall operate as a release to the Owner and every member and agent thereof from all claims and all liability to the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, however, shall operate to release the Contractor or the Contractor's Sureties from any obligations under this Contract or the Performance and Payment Bond.

§ 9.10.9 Final Completion liquidated damages, as specified in Section 002000, shall begin to be assessed on the Final Project Completion Dates as specified in Section 011000. The definition of 'Final Project Closeout Completion' shall be the state when the Project should be completely closed out to receive Final Payment as specified above in Paragraph 9.10.6.

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ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.1.2 The Contractor shall comply with the Federal Occupational Safety & Health Act (OSHA) of 1970 and perform associated recording and reporting requirements.
§ 10.1.2.1 The presence of lead based paint may exist at the site. It is the contractor's responsibility to perform his work in accordance with OSHA Regulations CFR 1926.62.

§ 10.1.3 The Contractor shall not install any known product or materials, as currently defined by current State and Federal regulations, in the execution of the Contract which might have a harmful, hazardous or toxic affect upon tradespersons working on the Project, or upon any other occupants or future occupants of the building, regardless of materials approved for use or specified.

§ 10.1.4 Any hazardous materials brought to the workplace for use during the construction of the project shall be identified by Material Safety Data Sheets which shall be turned over to the Owner's Representative. **Full responsibility and liability for storage and use of such hazardous materials shall be with the Contractor bringing such materials onto the project site.**

§ 10.1.5 The Contractor shall submit certified letters to the Owner that there is no asbestos, lead or toxic substance in any materials installed on the project.

§ 10.2 Safety of Persons and Property

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

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose

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duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

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

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

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

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

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

§ 10.4 Emergencies

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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.

.1 **In an emergency situation, all NESHAP regulations published on November 20, 1990, will be followed. Violators of the NESHAP regulations will be subject to significant fines and enforcement action from EPA, as well as the applicable State or Local air agencies.**

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 **Section 007316 – Insurance Requirements**. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.1.1 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work.

§ 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 **Section 007316 – Insurance Requirements**. 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.

§11.1.2.1 Certificates of bonds acceptable to the Owner shall be filed with the Owner prior to commencement of the Work.

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§11.1.4.1 The Contractor's Insurance Company shall provide written notification to the Owner and Architect a minimum of 30 days prior to any cancellation of any required insurance.

§ 11.2 Owner's Insurance

§ 11.2.1 See paragraph 11.4.

§ 11.3 Waivers of Subrogation

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

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or

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

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

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

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 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,

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the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

§ 13.1.1 The Contract shall be governed by the law of the place where the Project is located.

§ 13.1.1.1 The following laws and/or acts shall be incorporated in the Contract:

a. PENNSYLVANIA PREVAILING WAGE RATES (Act No. 442 of 1961, P.L. 987, amended by Act 342 of 1963, P.L. 653): This regulation and the general prevailing minimum wage rates, as determined by the Secretary of the Pennsylvania Department of Labor and Industry, Bureau of Labor Law Compliance for Prevailing Minimum Wage Predeterminations (hereafter referred to as "the Secretary"), which shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term thereof in the locality in which public work is performed, are made part of this Contract.

1) The general prevailing minimum wage rates including contributions for employee benefits as shall have been determined by the Secretary must be paid to the workmen employed in the performance of the Contract.

2) Workmen shall be paid no less than such general prevailing minimum wages and such other provisions to assure payment thereof as heretofore set forth.

3) These provisions shall apply to all work performed on the Contract by the Contractor and to all work performed on the Contract by all Subcontractors.

4) The Contractor shall insert in each of the Contractor's Subcontracts all of the provisions contained in these required provisions and such other stipulations as may be required.

5) No workmen may be employed on the Project except in accordance with the classifications set forth in the decisions of the Secretary. In the event that additional or different

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classifications are necessary the procedure set forth in Section 7 of the Regulations shall be followed.

6) **All workmen employed or working on the Project shall be paid unconditionally, regardless of whether any contractual relationship exists or the nature of any Contractor, Subcontractor and workmen, not less than once a week without deduction or rebate, on any account, either directly or indirectly, except authorized deductions, the full amount due at the time of payment, computed at the rate applicable to the time worked in the appropriate classification. Nothing in the Contract, the Act or the Regulations shall prohibit the payment of more than the general prevailing wage rates as determined by the Secretary to any workmen on the Project.**

7) **The Contractor and each Subcontractor shall post for the entire period of construction the wage determination of the Secretary, including the effective date of any changes thereof, in a prominent and easily accessible place or places at the site of the work and at such place or places used by them to pay workmen their wages. The posted notice of wage rates must contain the following information:**
   a) **Name of Project.**
   b) **Name of Owner.**
   c) **The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determinations for the particular project.**
   d) **The general prevailing minimum wage rates determined for each craft and classification and the effective date of any change.**
   e) **A statement advising workmen that if they have been paid less than the prevailing minimum wage rate for their job classification or that the Contractor and/or Subcontractor are not complying with the Act or the Regulations in any manner whatsoever they may file a protest with the Secretary of Labor and Industry. Any workmen paid less than the rate specified in the Contract shall have a civil right of action for the difference between the wage paid and the wages stipulated in the Contract, which right of action must be exercised within six months from the occurrence of the event creating such right.**

8) **The Contractor and Subcontractors shall keep an accurate record showing the name, craft and/or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with the Project and such record must include any deductions from each workman. The record shall be preserved for two years from the date of payment and shall be open at all reasonable hours to the reviewed of the Owner and to the Secretary or his duly authorized representative. Weekly payroll certifications shall be submitted, to the Owner, on Form LLC-25, copy included following these General Conditions.**

9) **Apprentices shall be limited to the numbers as shall be in accordance with a bona fide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14,1961 (Act No. 304) and the Rules and Regulations issued pursuant thereto shall be employed on the Project. Any workman using the tools of a craft who does not qualify as an apprentice within the provision of this subsection shall be paid the rate predetermined for journeymen in that particular craft and/or classification.**

10) **Employers not parties to a contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workmen.**

11) **Payment of compensation to workmen for work performed on the Project on a lump sum basis, or a piece work system, or a price certain for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the Act and these Regulations, regardless of the average hourly earnings resulting therefrom.**

12) **Each Contractor and each Subcontractor shall file a statement each week and a final statement at the conclusion of the work on the Contract with the Owner, under oath, and in form satisfactory to the Secretary, certifying that all workmen have been paid wages in strict conformity with the provisions if any wages remain unpaid to set forth the amount of wages due and owing to each workman respectively.**

b. **COMPETENT WORKMEN: No workmen shall be regarded as competent first class, within the meaning of this Act, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours work as shall be**

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established and current rates of wages paid for such hours by employers of organized labor in doing similar work in the district where work is being done.

c. DISCRIMINATION PROHIBITED: According to 62 Pa. C.S.A. § 3701, the Contractor agrees that:

1) In the hiring of employees for the performance of work under the contract or any sub-contract, no contractor, sub-contractor, or any person acting on behalf of the contractor or sub-contractor shall by reason of gender, race, creed or color discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

2) No contractor or sub-contractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the contract on account of gender, race, creed or color.

3) The contract may be canceled or terminated by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.

d. HUMAN RELATIONS ACT: The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744) (43 P.S., Section 951, et seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability, by employers, employment agencies, labor organizations, contractors, and others. The Contractor shall agree to comply with the provisions of this Act as amended that is made part of this specification. Your attention is directed to the language of the Commonwealth's non-discrimination clause in 16 Pa. Code 49.101.

e. PROVISION FOR THE USE OF STEEL AND STEEL PRODUCTS MADE IN THE U.S.:

1) In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the Contract, only those produced in the United States as defined therein shall be used or supplied in the performance of the Contract or any Subcontracts thereunder.

2) In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States.

3) Act 144 of 1984 further defines "steel products" to include machinery and equipment. The act also provides clarifications and penalties.

f. POLLUTION CONTROL - PRESERVATION OF NATURAL RESOURCES:

1) In compliance with Act No. 247 of the 1972 Session of General Assembly of the Commonwealth of Pennsylvania, a list of Federal and/or State statutes, rules or regulations dealing with the prevention of environmental pollution and preservation of public natural resources that may affect the Specifications are found in Section 007353. The Contractor shall fully comply with the latest revisions of said Acts and shall ensure compliance by all of the Contractor's Subcontractors.

2) All demolition and construction waste materials and/or rubbish shall be disposed of off the project site. All demolition and construction waste materials and/or rubbish shall be disposed of in accordance with the latest Pennsylvania Solid Waste Laws at an approved facility.

3) Contractors shall maintain a plan for soil erosion control acceptable to the Pennsylvania Department of Environmental Protection on the Project Site at all times and shall be responsible for complying with all laws, regulations and guidelines of the Department.

g. As specified in Section 002000, all contractors and subcontractors shall verify their employees are authorized to work in the United States (requires verification of citizenship or lawful immigration status), utilizing the U.S. Department of Homeland Security's E-Verify internet program. Contractors' forms shall be submitted within the time period specified in Section 002000; all subcontractors' forms shall be submitted prior to performing work on site.

§ 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.

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§ 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 Except as specifically provided elsewhere in the Contract Documents, the Owner's, Architect's and Owner's Representative's duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

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

§ 13.4 Tests and Inspections

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

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

§ 13.5 Interest

The Owner shall have no responsibility or liability for interest on late payments pursuant to the Public Works Regulation Law, as stated in Article 9, Paragraph 9.6.1.1.

§ 13.6 USE OF STANDARD A.I.A. DOCUMENTS

§ 13.6.1 In addition to standard A.I.A. Documents required for submission under other procedures noted herein and/or additional A.I.A . standard Documents to be utilized on this Project are as follows:

Standard Form of Agreement Between Owner and Contractor, Document A101

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Bid Bond, Document A310
Performance Bond and Labor and Material Payment Bond, Document A312 with Section 6 amended as recommended by the A.I.A.
Change Order, Document G701
Application and Certificate for Payment, Document G702 and G703
Certificate of Substantial Completion, Document G704
Maintenance Bond in accord with Document G704
Supplemental Attachment for Acord Certificate of Insurance 25-S, Document G715
Contractor's Affidavit of Payment of Debts and Claims, Document G706
Contractor's Affidavit of Release of Liens, Document G706A
Consent of Surety Company to Final Payment, Document G707
Consent of Surety to Reduction In or Partial Release of Retainage, Document G707A

§ 13.6.2 A.I.A. Documents may be obtained from the American Institute of Architects, Pittsburgh Chapter, 925 Liberty Avenue, Suite 700, Pittsburgh, Pennsylvania 15222, (412) 471-9548; aiapgh.org/aia-documents/. Unless otherwise specified all documents shall be the latest edition.

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 Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor 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 and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.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.

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§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

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. **Claims must be initiated by written notice.** 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

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damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Contractor shall commence all Claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the **Owner** arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement and within the period specified by applicable law,. The Contractor waives all Claims and causes of action not commenced in accordance with this Section 15.1.2.

.1 There are no statute of limitations on claims by the Owner against the Contractor.

§ 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 written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party 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 written notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.3.3 Failure to timely initiate a claim, in writing, shall constitute waiver of such claim. A statement at a meeting, a change order request or correspondence that does not strictly comply with the notice of claim provisions shall not constitute sufficient or timely notice of a claim.

§ 15.1.3.4 The written notice shall contain the following information and shall be verified under penalty of perjury by a person with authority to act on behalf of the Contractor that the facts and information contained in or relied upon in the notice is true and correct.

- **.1 The date that the event giving rise to the claim commenced and the date upon which it was first recognized by the contractor.**
- **.2 The cause of the event giving rise to the claim.**
- **.3 The effect of the event giving rise to the claim on the construction progress including the identity of all elements of work that have been and will be impacted by the event and a specific explanation as to why and to what extent such work has been or will be impacted by the event giving rise to the claim.**
- **.4 If the event giving rise to the claim has impacted the schedule, a proposal for schedule recovery from the event that impacted the schedule that shall include a description of the means by which the Contractor intends to prevent further delay in the work.**

§ 15.1.3.5 If the Contractor is claiming additional costs for delay, interference or inefficiency and the Contractor's notice of claim for delay, interference or inefficiency is timely submitted to the Architect pursuant to section 15.1.3, the Contractor shall submit a weekly Status Report until recovery from the delay, interference or inefficiency has been achieved. The Status Report shall be in writing and accompanied by an Affidavit subject to the penalty of perjury. The Status Report shall:

- **.1 Explain the efforts taken to recover from the delay, interference or inefficiency.**
- **.2 Identify the cause of any continuation of the delay, interference or inefficiency or any hindrance to the Contractor's proposed recovery plan.**
- **.3 Include a breakdown of the costs resulting from the delay, interference or inefficiency for any and all costs for which it is making a claim, attaching cost reports, certified payroll and invoices that support the costs.**
- **.4 The final Status Report shall identify the date that recovery from the delay, interference or inefficiency was achieved.**

§ 15.1.3.6 As a part of the Contractor's initial notification and status updates thereafter, the Contractor shall include in the information submitted with its claim, and any supplemental information provided, a detailed description of the specific reason that caused the additional damages requested and shall also fully

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identify any other causes, including inefficiencies caused by, other contractors, its own forces, or those of its subcontractors. The Contractor shall provide scheduling information that shows the critical impact to the schedule at the time it first provides notice and the impact anticipated at that time for future work. As a part of its status update of information required to support its request, the Contractor will provide a regular update of the schedule analysis showing continued critical impact on a monthly basis, showing both the impact that occurred as of that update and the continued anticipated impact for future work from the date of update. The Contractor acknowledges that the impact of the inefficiency of each change order shall be identified at the time of a change order request, and that the Contractor shall make no claim for any inefficiency based on a cumulative impact of the change orders.

§ 15.1.3.7 Even though formulas or means of calculating damages other than the records described in this contract are expressly prohibited and are contrary to the terms of this Agreement, the Owner understands that courts may still permit the contractor to present damages for inefficiencies. Contractor agrees to the following with regard to any claim for inefficiency:

- **.1 Claims for inefficiencies must be made within the time requirements of this Article 15.1.3 herein or other applicable provision of this contract. To the extent the full amount of inefficiency cannot be determined, the Contractor must provide a proper notice of its first occurrence of inefficiency costs even if the full amount of the claim cannot be determined. The Contractor must provide monthly updates of the amounts of inefficiency it has incurred in the prior month, with full documentation and invoices for labor, supervision and other inefficiency costs.**
- **.2 To the extent the Contractor uses a "measured mile" approach, or any similar formula to calculate damages such as earned value or similar analysis, the Contractor will identify the unimpacted activity period at the time it first makes its claim. The Contractor acknowledges that the use of such methods for calculating inefficiency require the identification of a period unimpacted by inefficiency and that such unimpacted period must occur prior to the period of inefficiency for such a method to be valid.**
- **.3 The Contractor shall not pursue any change order or claim relying on the Eichley formula, Manshul formula or other similar formula in pursuing any overhead amounts, since these formulas do not calculate overhead amounts with any degree of reasonable certainty. The Contractor agrees that any amounts for overhead, including home office overhead, are included in the Contractor's mark-up for overhead and profit as described in this agreement.**

§ 15.1.3.8 Payment of a change order shall constitute accord and satisfaction of all claims in connection with the change or changes to the Contract addressed by the change order, and it is understood and agreed that a signed change order form shall be the complete and fully integrated agreement for all related costs and that there are no oral or written understandings, representations or agreements, directly or indirectly, connected with the Change Order that are not affirmatively stated on the signed Change Order form. The contractor's execution of a change order constitutes a representation that it will make no further claims for damages inconsistent with this paragraph.

§ 15.1.3.9 Strict compliance with the provisions of 15.1.3 and all of its subparts is a condition precedent to the presentation of any claim for delay, interference or inefficiency.

§ 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.

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§ 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. **Refer to Article 8, Paragraph 8.3.** In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. **Contractor must also provide documentation regarding the weather that the Contractor anticipated and the information upon which the Contractor based his anticipation of weather conditions.**

§ 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. **It is understood and agreed that Contractor's waiver of consequential damages against the Owner shall extend to the benefit of the Architect, its owners, directors and employees, and the Architect's consultants.**

.3 The Contractor represents that its agreement to pursue costs, damages or claims in strict accordance with Article 15 herein or any other provision of the Contract is material to the award of the contract to the Contractor and that the Owner and Architect are entitled to rely upon this representation. The Contractor further agrees that this paragraph shall survive termination or rescission of this agreement even in the event of a material breach of contract by the Owner.

§ 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 litigation of any Claim. 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.

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

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

§ 15.2.6 Either party may file for litigation of an initial decision at any time, subject to the terms of Sections 15.1.2 and 15.2.6.1.

§ 15.2.6.1 The Owner may, within 30 days from the date of receipt of an initial decision, demand in writing that the Contractor file litigation. If such a demand is made and the Contractor fails to file for litigation within 30 days after receipt thereof, then the Contractor waives its rights to commence litigation notwithstanding Section 15.1.2 of these General Conditions with respect to the initial decision. Litigation shall be before the Court of Common Pleas of Mercer County, PA.

§ 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.

END OF SECTION

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DETAILED COST BREAKDOWN

40 Shenango Avenue, Sharon, PA 16146 Phone (724) 981-8820

130 7th Street, 201 Century Building, Pittsburgh, PA 15222 Phone (412) 281-2280

INSTRUCTIONS FOR USE

1. **Use as many first pages as required plus (1) second (signature) page.**

DETAILED COST BREAKDOWN

40 Shenango Avenue, Sharon, PA 16146
Voice (724) 981-8820

130 7th Street, Suite 201, Pittsburgh, PA 15222
Voice (412) 281-2280

Contractor's Name
Address 1
Address 2
City, State & Zip
Phone:
Fax:

HHSDR Architects / Engineers
Project Name:
HHSDR Project No.:
Contract.:
(General, Heating, Plumbing, Electric, Etc.)
Contractor's Job No.:

(A) Item No.	(B) Description	(C) Quantity	(D) Units	(E) Cost Per Unit = F + G	Division of Unit Cost		(H) Total Amount = C x E
					(F) Materials	(G) Labor, Etc.	
1	Description 1 (*Example*)	10	SF	$3.00	$1.00	$2.00	$30.00
2	Description 2 (*Example*)	15	EACH	$4.25	$3.13	$1.12	$63.75

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Contractor's Name
Address 1
Address 2
City, State & Zip
Phone:
Fax:

HHSDR Architects / Engineers
Project Name:
HHSDR Project No.:
Contract.:
(General, Heating, Plumbing, Electric, Etc.)
Contractor's Job No.:

(A) Item No.	(B) Description	(C) Quantity	(D) Units	(E) Cost Per Unit = F + G	Division of Unit Cost		(H) Total Amount = C x E
					(F) Materials	(G) Labor, Etc.	

TOTAL CONTRACT PRICE _____

I HEREBY CERTIFY THAT THE ABOVE IS AN ACCURATE BREAKDOWN OF CONSTRUCTION PRICES. I ALSO HEREBY ACKNOWLEDGE AND CONFIRM THAT THE ABOVE INFORMATION SHALL BE USED AS REFERENCED IN THE SPECIFICATIONS GENERAL CONDITIONS ARTICLE 7. THE CONTRACTOR IS RESPONSIBLE FOR ALL ACTUAL QUANTITIES REQUIRED FOR THE PROJECT.

Submitted
Contractor Date

Reviewed By
HHSDR ARCHITECTS / ENGINEERS Date

MATERIAL SOURCE OF SUPPLY AND SUB CONTRACTOR APPROVAL

40 Shenango Avenue, Sharon, PA 16146 Phone (724) 981-8820
130 7th Street, 201 Century Building, Pittsburgh, PA 15222 Phone (412) 281-2280

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MATERIAL SOURCE OF SUPPLY AND SUB-CONTRACTOR APPROVAL

40 Shenango Avenue, Sharon, PA 16146
Voice (724) 981-8820

130 7th Street, Suite 201, Pittsburgh, PA 15222
Voice (412) 281-2280

Contractor's Name
Address 1
Address 2
City, State & Zip
Phone:
Fax:

HHSDR Architects / Engineers

Project Name:
HHSDR Project No.:
Contract.:
(General, Heating, Plumbing, Electric, Etc.)
Contractor Job No.:

I propose to install the following items and/or I also propose to enter into a contract with the following Sub-Contractors, with the understanding that the Owner does not, in agreeing to such sub-contract, release me from any of the obligations of my contract with the Owner and that I assume all responsibility of such sub-contract.

Item No.	Spec. Number	Type of Material or Work	Check one		Name & Address of Mfg. or Sub-Contractor	For Architect's Use Only
			Mfg.	Sub-Contractor		

MATERIAL SOURCE OF SUPPLY AND SUB-CONTRACTOR APPROVAL

40 Shenango Avenue, Sharon, PA 16146
Voice (724) 981-8820 Fax (724) 981-4515

130 7th Street, Suite 201, Pittsburgh, PA 15222
Voice (412) 281-2280 Fax (412) 281-2334

Contractor's Name
Address 1
Address 2
City, State & Zip
Phone:
Fax:

HHSDR Architects / Engineers

Project Name:
HHSDR Project No.:
Contract.:
(General, Heating, Plumbing, Electric, Etc.)
Contractor Job No.:

I propose to install the following items and/or I also propose to enter into a contract with the following Sub-Contractors, with the understanding that the Owner does not, in agreeing to such sub-contract, release me from any of the obligations of my contract with the Owner and that I assume all responsibility of such sub-contract.

Item No.	Spec. Number	Type of Material or Work	Check one		Name & Address of Mfg. or Sub-Contractor	For Architect's Use Only
			Mfg.	Sub-Contractor		

Contractor's Signature

Date

Approved, HHSDR Architects & Engineers

Date

Condition #1 - Approved to meet contract requirements.
Condition #2 - The Source of Supply is acceptable subject to submission of samples and approval of same.
Condition #3 - Source of Supply is acceptable subject to submission and approval of shop drawings and/or catalog information.
Condition #4 - Item disapproved. Contractor shall resubmit request for these items in such a manner as to permit approval.
Condition #5 - Submit name of manufacturer.
Condition #6 - References shall be submitted by manufacturers or sub-contractors. If then found acceptable, the Contractor shall be notified by Architect in writing.

ASSIGNMENT OF RIGHTS
SALES/USE TAX REFUND

For value received, the undersigned, having authority to execute this assignment, does hereby assign and transfer to the **Name/Address of Owner**, all his, its or their rights to sales and use tax which may be refunded for the following project(s):

Contract Name/Project Name and Commission Number

The undersigned further agrees that he, it or they have not and will not file a claim for refund for any sales and/or use tax which is the subject of this assignment.

Dated: _____

_____
(Signature)

CORPORATE SEAL

_____
(Title)

_____
(Signature)

_____
(Title)

_____
(Business Name)

STATE OF)
) SS.
COUNTY OF)

On this, the ____ day of _____, 20___ before me _____,
(Notary Name)
the undersigned officer, personally appeared _____ known to me (or
(Company Official)
satisfactorily proven) to be the person(s) whose name(s) is/are subscribed to the within instrument,

and acknowledged that he/she executed the same for the purpose herein contained,

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

(Notary Signature)
My Commission Expires:

CONTRACTOR'S REQUEST FOR STORED MATERIAL PAYMENT

TO BE SUBMITTED ONLY AFTER PRIOR APPROVAL OF THE ARCHITECT

40 Shenango Avenue, Sharon, PA 16146
Voice (724) 981-8820

130 7th Street, Suite 201, Pittsburgh, PA 15222
Voice (412) 281-2280

Contractor's Name
Address 1
Address 2
City, State & Zip
Phone:
Fax:

HHSDR Architects / Engineers

Project Name:
HHSDR Project No.:
Contract for:
(General, Heating, Plumbing, Electric, Etc.)
Contractor Job No.:
Application No.:
Period to:

Item No.	Description	Quantity	Cost Per Unit	Value	Stored Location

Total: _____

Verification Attachments

_____ Paid Invoice for Requested Item(s).

_____ Insurance Certificates for Requested Item(s).

_____ Consent of Surety for Payment to Contractor for Requested Item(s).

I HEREBY CERTIFY THAT THE ABOVE IS AN ACCURATE LISTING OF MATERIAL COSTS AND STORAGE LOCATONS.

Submitted

Contractor _____ Date

SUBCONTRACTOR/SUPPLIER PAYMENT CERTIFICATION
AND
WAIVER OF LIENS

Project Name _____
Project Address _____

HHSDR # _____

Contract Name and Number _____

Contractor Name _____
Contractor Address _____

Contractor Phone Number _____

The undersigned, having authority to execute this certification, does hereby attest that all subcontractors who have performed work and all suppliers who have provided equipment and/or materials for the above referenced Contract of the Project, have been paid the full amount to which they are entitled to date.

Furthermore, the undersigned waives and releases any right that Contractor, and any subcontractor, supplier, materialman, or laborer have or may have to file a Mechanic's Lien or any other lien for the work, material, labor, and/or supplies provided to date.

Date: _____

_____
(Signature)

CORPORATE SEAL (if Corporation)

_____
(Title)

_____
(Signature, if Partnership)

_____
(Title)

STATE OF)
) SS.
COUNTY OF)

On this, the ____ day of _____, 20___ before me _____,
(Notary Name)
the undersigned officer, personally appeared _____ known to me (or
(Company Official)
satisfactorily proven) to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged that he/she executed the same for the purpose herein contained,
IN WITNESS WHEREOF, I hereunto set my hand and official seal.

_____
(Notary Signature)
My Commission Expires:_____

WEEKLY PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

☐ Contractor or ☐ Subcontractor (Please check one) **ALL INFORMATION MUST BE COMPLETED**

CONTRACTOR ADDRESS	SUBCONTRACTOR ADDRESS	
PAYROLL NUMBER / WEEK ENDING DATE	PROJECT AND LOCATION PROJECT SERIAL # PROJECT #	

DEPARTMENT OF LABOR & INDUSTRY
COMMONWEALTH OF PENNSYLVANIA
BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGE DIVISION
7TH & FORSTER STREETS
HARRISBURG, PA 17120
1-800-932-0665

EMPLOYEE NAME	APPR. RATE (%)	WORK CLASSIFICATION	DAY AND DATE / HOURS WORKED EACH DAY	S-TIME 0-TIME	BASE HOURLY RATE	TOTAL FRINGE BENEFITS (C=Cash) (FB=Contributions)*	TOTAL DEDUCTIONS	GROSS PAY FOR PREVAILING RATE JOB(S)	CHECK #
						C: FB:			
						C: FB:			
						C: FB:			
						C: FB:			
						C: FB:			

*SEE REVERSE SIDE

PAGE NUMBER _____ OF _____

THE NOTARIZATION MUST BE COMPLETED ON FIRST AND LAST SUBMISSIONS ONLY. ALL OTHER INFORMATION MUST BE COMPLETED WEEKLY.

*FRINGE BENEFITS EXPLANATION (FB): Bona fide benefits contribution, except those required by Federal or State Law (unemployment tax, workers' compensation, income taxes, etc.)

Please specify the type of benefits provided and contributions per hour:

1) Medical or hospital care _____
2) Pension or retirement _____
3) Life insurance _____
4) Disability _____
5) Vacation, holiday _____
6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

1. The undersigned, having executed a contract with _____
(AWARDING AGENCY, CONTRACTOR OR SUBCONTRACTOR)

_____ for the construction of the above-identified project, acknowledges that:

(a) The prevailing wage requirements and the predetermined rates are included in the aforesaid contract.

(b) Correction of any infractions of the aforesaid conditions is the contractor's or subcontractor's responsibility.

(c) It is the contractor's responsibility to include the Prevailing Wage requirements and the predetermined rates in any subcontract or lower tier subcontract for this project.

2. The undersigned certifies that:
   (a) Neither he nor his firm, nor any firm, corporation or partnership in which he or his firm has an interest is debarred by the Secretary of Labor and Industry pursuant to Section 11(e) of the PA Prevailing Wage Act, Act of August 15, 1961, P.L. 987 as amended, 43 P.S.§ 165-11(e).

   (b) No part of this contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation or partnership in which such subcontractor has an interest is debarred pursuant to the aforementioned statute.

3. The undersigned certifies that:
   (a) the legal name and the business address of the contractor or subcontractor are: _____
   _____

   (b) The undersigned is: ☐ a single proprietorship ☐ a corporation organized in the state of _____
   ☐ a partnership ☐ other organization (describe) _____

   (c) The name, title and address of the owner, partners or officers of the contractor/subcontractor are:

NAME	TITLE	ADDRESS

The willful falsification of any of the above statements may subject the contractor to civil or criminal prosecution, provided in the PA Prevailing Wage Act of August 15, 1961, P.L. 987, as amended, August 9, 1963, 43 P.S. § 165.1 through 165.17.

_____
(DATE)

_____
(SIGNATURE)

_____
(TITLE)

_____
SEAL

Taken, sworn and subscribed before me this _____ Day

of _____ A.D., _____

REQUEST FOR INFORMATION

RFI # _____ **Please type or print legibly**

TO: _____ **DATE:** _____

PROJECT: _____

LOCATION: _____

COMM. No. _____

FROM: _____ **SUBJECT:** _____

SPEC. REF. _____

DWG. REF. _____

QUESTION:

List all drawings, sections, details, and/or technical specifications associated with above question to illustrate that question can not be discerned from the Contract Documents: _____

Cite all trades/Contractors involved with work in question to illustrate that coordination of work has been conducted and work remains in question: _____

COPIES TO: _____ _____

REPLY

TO: _____ **ATTN:** _____

FROM: _____ **DATE:** _____

RESPONSE:

1. ☐ **YOU ARE AUTHORIZED TO PROCEED WITH THE WORK IDENTIFIED IN THE REPLY TO THIS RFI PROVIDED NO CHANGE IN THE CONTRACT AMOUNT OR COMPLETION DATES IS REQUIRED. IF THE REPLY WILL CAUSE AN IMPACT TO THE CONTRACT AMOUNT OR COMPLETION DATE, NOTIFY THE ARCHITECT PRIOR TO PROCEEDING.**
2. ☐ **DO NOT PROCEED WITH THIS WORK UNTIL YOUR COST PROPOSAL FOR THIS CHANGE HAS BEEN RECEIVED AND APPROVED.**

REPLY COPIES TO:

_____ _____

SECTION 007316 – INSURANCE REQUIREMENTS

The following constitute the Insurance Requirements formerly included in AIA Document A101-2017 Exhibit A, "Insurance and Bonds". The awarded Contractor's Contract – AIA Document A101-2017 "Standard Form of Agreement Between Owner and Contractor" shall provide for the following:

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth herein. The term General Conditions refers to AIA Document A201™–2017 (Section 007216 of the Specifications), 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.

§ 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 Refer to Section A.3.3.2.1 for Contractor's responsibility to purchase and maintain property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and/or an Installation Floater Coverage sufficient to cover the total value of the entire Project on a replacement cost basis.

§ A.2.3.1.3 Upon Final Completion, the Owner shall maintain property insurance written for the total value of the Project.

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 and The Commonwealth of Pennsylvania as additional insureds on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

a. Contractor's insurances shall be maintained until final payment has been made as provided in Section 9.10 of AIA Document A201-2017 (Section 007216 of the Specifications).
b. Waivers of Subrogation: Refer to Section 11.3 of AIA Document A201-2017 (Section 007216 of the Specifications).

§ 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. The Contractor shall be responsible for any and all deductible amounts.

§ 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 Commonwealth of Pennsylvania, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided 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, CG 20 32 07 04. (Form versions 12 19 also acceptable).

§ 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.

§ 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:

- **a.** **For Contracts up to $1,000,000:** policy limits shall be not less than $500,000 ($500,000 each occurrence), $1,000,000 ($1,000,000 general aggregate), and $1,000,000 ($1,000,000 aggregate for products-completed operations hazard.
- **b.** **For Contracts over $1,000,000 and up to $2,000,000:** policy limits shall be not less than $1,000,000 ($1,000,000 each occurrence), $2,000,000 ($2,000,000 general aggregate), and $2,000,000 ($2,000,000 aggregate for products-completed operations hazard.
- **c.** **For Contracts over $2,000,000 and up to $5,000,000:** policy limits shall be not less than $5,000,000 ($5,000,000 each occurrence), $7,000,000 ($7,000,000 general aggregate), and $7,000,000 ($7,000,000 aggregate for products-completed operations hazard.
- d. The limits can be met by combination of General Liability and Umbrella Liability policies.
- e. The policy shall provide 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;
  - **.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 (Section 007216 of the Specifications).

§ 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 (Section 007216 of the Specifications) 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 $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 $1,000,000 each accident, $1,000,000 each employee, and $1,000,000 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 $1,000,000 per claim and $1,000,000 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 $1,000,000 per claim and$1,000,000 in the aggregate.

§ 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 $1,000,000 per claim and $1,000,000 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 $1,000,000 per claim and $1,000,000 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$1,000,000 per claim and $1,000,000 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 final payment has been made as provided in Section 9.10 of AIA Document A201-2017 (Section 007216 of the Specifications). Insurances shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 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.

§ A.3.3.2.1 Property Insurance:

a. **The General Contractor** shall provide Property Insurance written on a Builder's Risk "All-Risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others under the contract, comprising total value of the contract for the Project at the site on a replacement cost basis without optional deductibles. Property insurance shall include, without limitation, insurance against the perils of fire (with extended coverage), explosion, and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, to building systems from testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. The Owner shall be an additional insured.
b. **All other Prime Contractor(s)** shall provide an Installation Floater covering the replacement value of property installed, fabricated or erected. Coverage shall remain in force until the installation work is accepted by the Owner or when the insured's interest in the property installed ceases. The Owner shall be an additional insured on the installation floater. Installation floater shall be in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications.
c. The Builder's Risk Property Insurance and all Installation Floater Coverages shall provide for: Material purchased by the Contractor and paid for by the Owner and stored but not installed on the job, or stored off the site shall be insured by the Contractor to include the Owner's interest with a Certificate furnished, prior to the payment of the materials.
d. Certificates of Insurances shall be issued in duplicate.

§ A.3.3.2.2 Insurance for physical damage to property while it is in storage (on and off the site) and in transit to the construction site on an "all-risks" completed value form.

§ A.3.3.2.3 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

§ A.3.3.2.4 Umbrella Liability Insurance (to sit as excess of General Liability, Auto Liability, and Employer's Liability), with policy limits of not less than $2,000,000 per claim and $2,000,000 in the aggregate.

§ A.3.3.2.5 Railroad Protective Liability Insurance, with policy limits of not less than $2,000,000 per claim and $6,000,000 in the aggregate, for Work within fifty (50) feet of railroad property.

§ A.3.4 Performance Bond and Payment Bond

§ A.3.4.1 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 and as approved by the Commonwealth's Department of Insurance to do business in Pennsylvania, as follows:

Type	Penal Sum ($0.00)
Payment Bond (Labor & Material)	100% of Contract Amount
Performance Bond	100% of Contract Amount

§ A.3.4.2 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.

§ A.3.4.3 Certificates of Bonds shall be issued in duplicate, prior to commencement of the work.

§ A.3.4.4 100% Performance & Payment Bonds.

§ A.3.5 MAINTENANCE BOND

§ A.3.5.1 The Contractor shall provide a Maintenance Bond providing additional coverage in the full amount of the Contract (100% of the Contract Amount) assuring against defective or inferior materials or workmanship which may develop during the period of one year from the date of final payment.

§ A.3.5.2 Final completion date(s) shall be established for the Project when completed. The date of final payment shall establish Bond and Warranty periods for all work completed in each designated portion, notwithstanding the phased construction and the resulting beneficial usage by the Owner prior to the final acceptance.

§ A.3.5.3 Certificates of Bonds shall be issued in duplicate, prior to commencement of the work.

END OF SECTION 007316

SECTION 007343 - PREVAILING MINIMUM WAGE DETERMINATION RATES

MERCER COUNTY AGRICULTURAL AND
CONSERVATION COMMUNITY
LEARNING CENTER AT
MUNNELL RUN FARM
41 MUNNELL RUN LANE
MERCER, PA 16137

FOR THE
MERCER COUNTY COMMISSIONERS
125 SOUTH DIAMOND STREET
MERCER, PA 16137
HHSDR #4826

The wage rates, included herewith, are as issued by the PA Department of Labor and Industry, Bureau of Labor Law Compliance for Prevailing Minimum Wage Predeterminations. Any questions pertaining to wage rates should be addressed to the Bureau, reference the Project Name, Serial Number and County as stated on the following wage rates. The Bureau may be reached on-line at www.dli.pa.gov or toll free phone at 1-800-932-0665.

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project Name:	Mercer County Agricultural and Conservation Community Learning Center at Munnell Run Farm
General Description:	Complete interior and exterior renovations to 2 existing buildings. Site excavation and concrete sidewalks, utility trenching. 4 Prime Contracts - GC, HC, PC, & EC
Project Locality	Mercer
Awarding Agency:	Mercer County Board of Commissioners
Contract Award Date:	7/9/2026
Serial Number:	26-05268
Project Classification:	Building/Heavy/Highway
Determination Date:	5/29/2026
Assigned Field Office:	Pittsburgh
Field Office Phone Number:	(412)565-5300
Toll Free Phone Number:	(877)504-8354
Project County:	Mercer County

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-05268 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	8/1/2024		$41.36	$29.51	$70.87
Asbestos & Insulation Workers	8/1/2025		$43.06	$30.31	$73.37
Boilermakers	6/1/2016		$40.90	$27.61	$68.51
Bricklayer	6/1/2025		$39.25	$25.62	$64.87
Bricklayer	12/1/2025		$39.75	$26.12	$65.87
Bricklayer	6/1/2026		$40.40	$26.47	$66.87
Carpenter	6/1/2024		$37.20	$19.92	$57.12
Carpenters - Piledriver/Welder	1/1/2025		$43.38	$22.72	$66.10
Carpenters - Piledriver/Welder	1/1/2026		$44.63	$23.47	$68.10
Carpenters	6/1/2025		$38.33	$20.52	$58.85
Cement Masons	7/1/2024		$34.57	$25.09	$59.66
Cement Masons	6/1/2025		$35.52	$25.64	$61.16
Drywall Finisher	1/1/2025		$34.01	$24.63	$58.64
Drywall Finisher	6/1/2025		$35.16	$25.98	$61.14
Electricians	12/29/2025		$51.45	$30.17	$81.62
Electricians	12/28/2026		$53.95	$30.94	$84.89
Electricians	12/27/2027		$56.55	$31.75	$88.30
Elevator Constructor	1/1/2025		$61.07	$40.05	$101.12
Elevator Constructor	1/1/2026		$63.71	$40.89	$104.60
Glazier	6/1/2013		$25.56	$13.98	$39.54
Iron Workers	6/1/2024		$34.83	$27.87	$62.70
Iron Workers	6/1/2025		$36.26	$28.64	$64.90
Iron Workers	6/1/2026		$37.76	$29.35	$67.11
Laborers (Class 01 - See notes)	1/1/2025		$27.32	$19.96	$47.28
Laborers (Class 01 - See notes)	1/1/2026		$27.82	$20.46	$48.28
Laborers (Class 02 - See notes)	1/1/2025		$27.47	$19.96	$47.43
Laborers (Class 02 - See notes)	1/1/2026		$27.97	$20.46	$48.43
Laborers (Class 03 - See notes)	1/1/2025		$30.47	$19.96	$50.43
Laborers (Class 03 - See notes)	1/1/2026		$30.97	$20.46	$51.43
Laborers (Class 04 - See notes)	1/1/2021		$23.57	$19.32	$42.89
Landscape Laborer (Skilled)	1/1/2025		$25.79	$18.78	$44.57
Landscape Laborer (Skilled)	1/1/2026		$26.79	$19.03	$45.82
Landscape Laborer (Tractor Operator)	1/1/2025		$26.09	$18.78	$44.87
Landscape Laborer (Tractor Operator)	1/1/2026		$27.09	$19.03	$46.12
Landscape Laborer	1/1/2025		$25.37	$18.78	$44.15
Landscape Laborer	1/1/2026		$26.37	$19.03	$45.40
Millwright	6/1/2020		$41.68	$20.32	$62.00
Operators (Class 01 - see notes)	6/1/2025		$42.72	$24.79	$67.51
Operators (Class 01 - see notes)	6/1/2026		$43.74	$25.29	$69.03
Operators (Class 02 -see notes)	6/1/2025		$36.67	$24.79	$61.46
Operators (Class 02 -see notes)	6/1/2026		$37.67	$25.29	$62.96
Operators (Class 03 - See notes)	6/1/2025		$33.88	$24.79	$58.67
Operators (Class 03 - See notes)	6/1/2026		$34.88	$25.29	$60.17
Painters Class 6 (see notes)	6/1/2024		$32.14	$24.93	$57.07

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-05268 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Painters Class 6 (see notes)	6/1/2025		$34.16	$25.81	$59.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		$62.82	$22.72	$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		$64.70	$23.47	$88.17
Piledrivers	1/1/2025		$41.88	$22.72	$64.60
Piledrivers	1/1/2026		$43.13	$23.47	$66.60
Plasterers	6/1/2024		$33.14	$21.04	$54.18
plumber	6/1/2025		$53.28	$25.87	$79.15
plumber	6/1/2026		$56.38	$25.87	$82.25
plumber	6/1/2027		$59.48	$25.87	$85.35
Pointers, Caulkers, Cleaners	6/1/2025		$40.66	$21.99	$62.65
Pointers, Caulkers, Cleaners	12/1/2025		$41.50	$22.50	$64.00
Pointers, Caulkers, Cleaners	6/1/2026		$42.20	$22.80	$65.00
Roofers	4/1/2024		$29.81	$19.04	$48.85
Roofers	4/1/2025		$30.31	$19.04	$49.35
Sheet Metal Workers	6/1/2024		$36.89	$29.32	$66.21
Sheet Metal Workers	6/1/2025		$38.36	$30.10	$68.46
Sign Makers and Hangars	7/15/2024		$32.32	$25.82	$58.14
Sign Makers and Hangars	7/15/2025		$33.48	$26.41	$59.89
Sprinklerfitters	4/1/2025		$49.75	$29.21	$78.96
Sprinklerfitters	4/1/2026		$52.82	$30.56	$83.38
Steamfitters	6/1/2024		$48.15	$29.57	$77.72
Steamfitters	6/1/2025		$50.20	$31.02	$81.22
Stone Masons	12/1/2022		$38.56	$23.61	$62.17
Terrazzo Finisher	12/1/2025		$42.75	$19.51	$62.26
Terrazzo Finisher	6/1/2026		$43.82	$19.94	$63.76
Terrazzo Mechanics	12/1/2025		$42.15	$21.76	$63.91
Terrazzo Mechanics	6/1/2026		$43.22	$22.19	$65.41
Tile Finisher	12/1/2025		$33.99	$18.71	$52.70
Tile Finisher	6/1/2026		$34.82	$18.98	$53.80
Tile Setter	12/1/2025		$40.80	$23.25	$64.05
Tile Setter	6/1/2026		$41.66	$23.49	$65.15
Truckdriver class 1(see notes)	1/1/2025		$36.43	$23.21	$59.64
Truckdriver class 1(see notes)	1/1/2026		$37.93	$23.71	$61.64
Truckdriver class 2 (see notes)	1/1/2025		$36.89	$23.52	$60.41
Truckdriver class 2 (see notes)	1/1/2026		$38.39	$24.02	$62.41
Window Film / Tint Installer	6/1/2019		$24.52	$12.08	$36.60

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-05268 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter	1/1/2025		$41.35	$22.09	$63.44
Carpenter	1/1/2026		$42.60	$22.84	$65.44
Carpenter Welder	1/1/2025		$42.85	$22.09	$64.94
Carpenter Welder	1/1/2026		$44.10	$22.84	$66.94
Carpenters - Piledriver/Welder	1/1/2025		$43.38	$22.72	$66.10
Carpenters - Piledriver/Welder	1/1/2026		$44.63	$23.47	$68.10
Cement Finishers	1/1/2024		$35.14	$26.30	$61.44
Cement Finishers	1/1/2025		$35.94	$27.50	$63.44
Cement Masons	1/1/2020		$32.84	$21.10	$53.94
Electric Lineman	9/2/2024		$66.56	$30.17	$96.73
Electric Lineman	9/1/2025		$68.06	$32.29	$100.35
Iron Workers	6/1/2024		$34.83	$27.87	$62.70
Iron Workers	6/1/2025		$36.26	$28.64	$64.90
Laborers (Class 01 - See notes)	1/1/2025		$33.70	$26.00	$59.70
Laborers (Class 01 - See notes)	1/1/2026		$34.70	$27.00	$61.70
Laborers (Class 02 - See notes)	1/1/2025		$33.86	$26.00	$59.86
Laborers (Class 02 - See notes)	1/1/2026		$34.86	$27.00	$61.86
Laborers (Class 03 - See notes)	1/1/2025		$34.25	$26.00	$60.25
Laborers (Class 03 - See notes)	1/1/2026		$35.25	$27.00	$62.25
Laborers (Class 04 - See notes)	1/1/2025		$34.70	$26.00	$60.70
Laborers (Class 04 - See notes)	1/1/2026		$35.70	$27.00	$62.70
Laborers (Class 05 - See notes)	1/1/2025		$35.11	$26.00	$61.11
Laborers (Class 05 - See notes)	1/1/2026		$36.11	$27.00	$63.11
Laborers (Class 06 - See notes)	1/1/2025		$31.95	$26.00	$57.95
Laborers (Class 06 - See notes)	1/1/2026		$32.95	$27.00	$59.95
Laborers (Class 07 - See notes)	1/1/2025		$34.70	$26.00	$60.70
Laborers (Class 07 - See notes)	1/1/2026		$35.70	$27.00	$62.70
Laborers (Class 08 - See notes)	1/1/2025		$36.20	$26.00	$62.20
Laborers (Class 08 - See notes)	1/1/2026		$37.20	$27.00	$64.20
Millwright	6/1/2024		$47.59	$23.72	$71.31
Millwright	6/1/2025		$49.72	$23.72	$73.44
Operators (Class 01 - see notes)	1/1/2025		$40.39	$24.23	$64.62
Operators (Class 01 - see notes)	1/1/2026		$41.96	$24.66	$66.62
Operators (Class 02 -see notes)	1/1/2025		$40.13	$24.23	$64.36
Operators (Class 02 -see notes)	1/1/2026		$41.70	$24.66	$66.36
Operators (Class 03 - See notes)	1/1/2025		$36.48	$24.23	$60.71
Operators (Class 03 - See notes)	1/1/2026		$38.05	$24.66	$62.71
Operators (Class 04 - See notes)	1/1/2025		$36.02	$24.23	$60.25
Operators (Class 04 - See notes)	1/1/2026		$37.59	$24.66	$62.25
Operators (Class 05 - See notes)	1/1/2025		$35.77	$24.23	$60.00
Operators (Class 05 - See notes)	1/1/2026		$37.34	$24.66	$62.00
Operators Class 1-A	1/1/2025		$43.39	$24.23	$67.62
Operators Class 1-A	1/1/2026		$44.96	$24.66	$69.62
Operators Class 1-B	1/1/2025		$42.39	$24.23	$66.62

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-05268 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators Class 1-B	1/1/2026		$43.96	$24.66	$68.62
Painters Class 2 (see notes)	6/1/2025		$40.36	$25.81	$66.17
Painters Class 3 (see notes)	6/1/2025		$43.68	$25.81	$69.49
Painters Class 4 (see notes)	6/1/2019		$28.20	$20.06	$48.26
Painters Class 5 (see notes)	6/1/2019		$22.91	$20.06	$42.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		$62.82	$22.72	$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		$64.70	$23.47	$88.17
Piledrivers	1/1/2025		$41.88	$22.72	$64.60
Piledrivers	1/1/2026		$43.13	$23.47	$66.60
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		$48.43	$40.28	$88.71
Truckdriver class 1(see notes)	1/1/2025		$36.43	$23.21	$59.64
Truckdriver class 1(see notes)	1/1/2026		$37.93	$23.71	$61.64
Truckdriver class 2 (see notes)	1/1/2025		$36.89	$23.52	$60.41
Truckdriver class 2 (see notes)	1/1/2026		$38.39	$24.02	$62.41

SECTION 007353 - ANTI-POLLUTION

PART 1 GENERAL

1.01 NOTICE TO BIDDERS

A. Section 3301 of the CPC (62 Pa. C.S. 3301) requires that bidders on construction projects for the Commonwealth of Pennsylvania be advised of the Federal and Commonwealth statutes, rules and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources that apply to the project on which bids are being received.

1.02 HISTORY

A. Title 62 “Procurement” of the Commonwealth Procurement Code Chapter 33 “Prevention of Environmental Pollution” was added May 15, 1998, P.L.358, Act No.57, repealing the previous Act No. 247, House Bill number 1969, enacted into law October 26, 1972, and effective as of November 25, 1972.

1.03 SCOPE / REQUIREMENTS

A. The Bidder shall thoroughly acquaint himself with the terms of the statutes, rules, and regulations enumerated in this Section, and shall include in his bid price all costs of complying with the terms of the listed statutes, rules, and regulations. No separate or additional payment will be made for such compliance. In the event that the listed statutes, rules, and regulations are amended, or if new statutes, rules, and regulations become effective, which cause the contractor to perform additional work, the Owner may issue a change order or deviation request setting forth the additional work that must be undertaken. This change order or deviation request shall not invalidate the Contract.

B. It is the responsibility of the Contractor to determine what local ordinances, if any, will affect his work. He shall check for any county, city, borough, or township rules or regulations applicable to the area in which the Project is being constructed, and, in addition, for any rules or regulations of other organizations having jurisdiction, such as chambers-of-commerce, planning commissions, industries, or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

C. The Contractor will be required to comply with the acts and regulations enumerated on the following list (Paragraph 1.04). This list is comprised of two parts: Part I listing Pennsylvania statutes and Part II listing Federal statutes. The list is illustrative only and in no way limits the Contractor’s responsibility to comply with all federal, state, and local laws, rules, and regulations, as set forth hereof.

D. Each separate contractor shall comply with the regulations and standards of Title 25 “Environmental Protection” of the Pennsylvania Code, Pennsylvania State Agencies (including, but not limited to, Bureau of Air Quality, Office of Pollution Prevention and Energy Assistance, DEP's Environmental Cleanup and Brownfields Program, DEP's Office of Active and Abandoned Mine Operations (AAMO), DEP's Office of Oil and Gas Management, DEP's Bureau of Radiation Protection Bureau of Waste Management, and the Office of Water Management plans), and other regulations and standards of the Department concerning anti-pollution measures all as amended to date. Each Contractor will be solely responsible for any violations and shall be responsible for securing permits, when required.

E. Burning - On-site burning is not permitted by the Owner. Burning of materials from clearing and grubbing operations, periodic and final clean-up and all related construction at any other location shall be governed by local codes and ordinances and the Regulations of the Department. For each day that the Contractor may contemplate open burning, he shall secure written approval from the appropriate Department's Regional Air Quality Control Engineer. Failure to secure permission for open burning will require each separate Contractor to remove material from project site and dispose of it in a manner acceptable to the Department's Regional Air Quality Control Engineer, and in compliance with the Solid Waste Management Act, Act dated July 7, 1980 (P.L. 380, No. 97), as amended, 35 P.S. 6018.101 et seq. If burning is permissible in a State Forest, it shall be performed in a manner approved by the Commonwealth's Department of Conservation and Natural Resources' local district forester.

F. Solid Waste - Storage, collection, transportation, processing and final disposal of solid waste shall be in accordance with regulations and standards of the Solid Waste Management Act. Immediately upon notice of award of Contract, the Contractor shall apply for the necessary permit from the Department's Regional Waste Management Coordinator and conduct waste disposal on sites approved under the permit. A copy of this permit must be submitted to the Engineer before commencing waste disposal (as specified in Section 024200), copy of the permit must also be submitted to the Department's Representative. The Department's Regional Waste Management Coordinator shall be contacted for permit and for information concerning sites already approved for conducting waste disposal.

G. If, in the Department's opinion, a dust condition develops at the site, the contractor shall utilize specific control methods including, but not limited to, water trucks and mechanical brooms to control the creation of dust.

1.04 REGULATIONS

In addition to statutes, rules, and regulations enumerated above, Contractors shall comply with the following:

A. ABBREVIATIONS

§	Section
CPC	Commonwealth Procurement Code
C.S.	Consolidated Statute
et seq.	"and the following"
No.	Acts are numbered consecutively within the year of their legislative action
P.L.	Pamphlet Law
P.S.	Pennsylvania Statute
T	Title (generally designated as a number)

B. PART I - PENNSYLVANIA STATUTES

1. Key Pennsylvania Pollution Prevention Statutes & Regulations and hereinafter listed Purdon's Statutes:

   Environmental Rights Amendment (Article I, Section 27) of the Pennsylvania Constitution

   Pennsylvania Code - Title 25 Environmental Protection

Air Pollution Control Act (Title 35 P.S., Chapter 23)

Pennsylvania's Clean Streams Law (35 P.S. §§ 691.1–691.1001)

Solid Waste Management Act (35 P.S. §§ 6018.101-6018.1003); Solid Waste Management Act of 1980

Small Business and Household Pollution Prevention Program Act (Act 190 of 1996)

Land Recycling and Environmental Remediation Standards Act — governs cleanup and reuse of contaminated sites.

Hazardous Sites Cleanup Act — addresses contamination at sites posing environmental risk.

Storage Tank and Spill Prevention Act — regulates storage tanks and requires cleanup of petroleum or hazardous substance spills.

Pennsylvania Safe Drinking Water Act — protects groundwater and drinking water sources.

Environmental regulations in Title 25 of the Pennsylvania Code implementing these statutory programs (e.g., DEP air and water quality rules).

Water Pollution (25 Pa. Code § 91.34, 91.6, 92a.10)

Covered Device Recycling Act

2. Purdon's Statutes - Title 3 (Agriculture)

PA Pesticide Control Act of 1973, Act of March 1, 1974 (P.L. 90, No. 24), as amended, 3 P.S. 111.21 et seq.

Agricultural Liming Materials Act, Act of March 17, 1978 (P.L. 15, No. 9), as amended, 3 P.S. 132-1 et seq.

Noxious Weed Control Law, Act of April 7, 1982 (P.L. 228, No. 74), as amended, 3 P.S. 255.1 et seq.

Plant Pest Act, Act of December 16, 1992 (P.L. 1228, No. 162), as amended, 3 P.S. 258.1 et seq.

Conservation District Law, Act of May 15, 1945 (P.L. 547), as amended, 3 P.S. 849 et seq.

(Relating to Weather Modification), Act of January 19, 1968 (P.L. (1967) 1024), as amended, 3 P.S. 1101 et seq.

(Relating to Nutrient and Odor Management), Act of July 6, 2005 (No. 38), as amended, 3 Pa. C.S. 501 et seq.

Soil and Plant Amendment Act, Act of December 13, 2001 (P.L. 876, No. 97), as amended, 3 Pa. C.S.A. 6901 et seq.

Seed Act, Act of November 29, 2004 (P.L. 1302, No. 164), as amended, 3 PA. C.S.A. 7101 et seq.

3. Purdon's Statutes - Title 16 (Counties)

   (Relating to Land Use), Act of January 13, 1966 (P.L. (1965) 1292), as amended, 16 P.S. 11941 et seq.

4. Purdon's Statutes - Title 18 (Crimes and Offenses)

   The Crimes Code, Act of December 6, 1972 (P.L. 1482, No. 334), as amended, 18 Pa. C. S. A. 101 et seq.

5. Not Used

6. Purdon's Statutes - Title 30 (Fish)

   The Fish and Boat Code, Act of October 16, 1980 (P.L. 996, No. 175), as amended, 30 Pa. C. S. A. 101 et seq.

7. Purdon's Statutes - Title 32 (Forests, Waters and State Parks)

   (Relating to Water Power and Water Supply Permits), Act of June 14, 1923 (P.L. 704), as amended, 32 P.S. 591 et seq.

   Water Well Drillers License Act, Act of May 29, 1956 (P.L. (1955) 1840), as amended, 32 P.S. 645.1 et seq.

   (Relating to Flood Control), Act of August 7, 1936 (P.L. 106, 1st Ex. Sess., No. 46), as amended, 32 P.S. 653 et seq.

   Flood Plain Management Act, Act of October 4, 1978 (P.L. 851, No. 166), as amended, 32 P.S. 679.101 et seq.

   Storm Water Management Act, Act of October 4, 1978 (P.L. 864, No. 167), as amended, 32 P.S. 680.1 et seq.

   Dam Safety and Encroachments Act, Act of November 26, 1978 (P.L. 1375, No. 325), as amended, 32 P.S. 693.1 et seq.

   (Relating to Stream Clearance), Act of June 5, 1947 (P.L. 422), as amended, 32 P.S. 701 et seq.

   (Relating to Potomac River Pollution), Act of May 29, 1945 (P.L. 1134), as amended, 32 P.S. 741 et seq.

   (Relating to Schuylkill River Pollution), Act of June 4, 1945 (P.L. 1383), as amended, 32 P.S. 751.1 et seq.

   (Relating to Delaware River Pollution), Act of April 19, 1945 (P.L. 272), as amended, 32 P.S. 815.31 et seq.

Delaware River Basin Compact, Act of July 7, 1961 (P.L. 518), as amended, 32 P.S. 815.101 et seq.

Ohio River Valley Water Sanitation Compact, Act of April 2, 1945 (P.L. 103), as amended, 32 P.S. 816.1 et seq.

Great Lakes Protection Fund Act, Act of July 6, 1989 (P.L. 215, No. 34), as amended, 32 P.S. 817.11 et seq.

Brandywine River Valley Compact, Act of September 9, 1959 (P.L. 848), as amended, 32 P.S. 818 et seq.

Wheeling Creek Watershed Protection and Flood Prevention District Compact, Act of August 2, 1967 (P.L. 189), as amended, 32 P.S. 819.1 et seq.

Susquehanna River Basin Compact, Act of July 17, 1968 (P.L. 368, No. 181), as amended, 32 P.S. 820.1 et seq.

Chesapeake Bay Commission Agreement, Act of June 25, 1985 (P.L. 64, No. 25), as amended, 32 P.S. 820.11 et seq.

(Relating to Preservation and Acquisition of Land for Open Space Uses), Act of January 19, 1968 (P.L. (1967) 992), as amended, 32 P.S. 5001 et seq.

Land and Water Conservation and Reclamation Act, Act of January 19, 1968 (P.L. (1967) 996), as amended, 32 P.S. 5101 et seq.

Bluff Recession and Setback Act, Act of May 13, 1980 (P.L. 122, No. 48), as amended, 32 P.S. 5201 et seq.

Wild Resource Conservation Act, Act of June 23, 1982 (P.L. 597, No. 170), as amended, 32 P.S. 5301 et seq.

Cave Protection Act, Act of November 21, 1990 (P.L. 539, No. 133), as amended, 32 P.S. 5601 et seq.

Rails to Trails Act, Act of December 18, 1990 (P.L. 748, No. 188), as amended, 32 P.S. 5611 et seq.

8. Purdon’s Statutes - Title 34 (Game)

   The Game and Wildlife Code, Act of July 8, 1986 (P.L. 442, No. 93), as amended, 34 Pa. C.S.A. 101 et seq.

9. Purdon’s Statutes - Title 35 (Health and Safety)

   (Related to Public Eating and Drinking Places), Act of May 23, 1945 (P.L. 926), as amended, 35 P.S. 655.1 et seq.

   The Public Bathing Law, Act of June 23, 1931 (P.L. 899), as amended, 35 P.S. 672 et seq.

   The Clean Streams Law, Act of June 22, 1937 (P.L. 1987), as amended, 35 P.S. 691.1 et seq.

PA Safe Drinking Water Act, Act of May 1, 1984 (P.L. 206, No. 43), as amended, 35 P.S. 721.1 et seq.

Phosphate Detergent Act, Act of July 5, 1989 (P.L. 166, No. 31), as amended, 35 P.S. 722.1 et seq.

Plumbing System Lead Ban and Notification Act, Act of July 6, 1989 (P.L. 207, No. 33), as amended, 35 P.S. 723.1 et seq.

PA Sewage Facilities Act, Act of January 24, 1966 (P.L. (1965) 1535), as amended, 35 P.S. 750.1 et seq.

Publicly Owned Treatment Works Penalty Law, Act of March 26, 1992 (P.L. 23, No. 9), as amended, 35 P.S. 752.1 et seq.

PA Solid Waste-Resource Recovery Development Act, Act of July 20, 1974 (P.L. 572, No. 198), as amended, 35 P.S. 755.1 et seq.

(Related to Pollution from Abandoned Mines), Act of December 15, 1965 (P.L. 1075), as amended, 35 P.S. 760.1 et seq.

Sewage System Cleaner Control Act, Act of May 28, 1992 (P.L. 249, No. 41), as amended, 35 P.S. 770.1 et seq.

Combustible and Flammable Liquids Act, Act of February 11, 1998 (P.L. 58, No. 15), as amended, 35 P.S. 1241 et seq.

(Related to Camp Regulation), Act of November 10, 1959 (P.L. 1400), as amended, 35 P.S. 3001 et seq.

Air Pollution Control Act, Act of January 8, 1960 (P.L. (1959) 2119), as amended, 35 P.S. 4001 et seq.

(Related to Noise Pollution), Act of June 2, 1988 (P.L. 452, No. 74), as amended, 35 P.S. 4501 et seq.

Lead Certification Act, Act of July 6, 1995 (P.L. 291, No. 44), as amended, 35 P.S. 5901 et seq.

Solid Waste Management Act, Act of July 7, 1980 (P.L. 380, No. 97), as amended, 35 P.S. 6018.101 et seq.

(Related to Infectious and Chemotherapeutic Waste Disposal), Act of July 13, 1988 (P.L. 525, No. 93), as amended, 35 P.S. 6019.1 et seq.

Hazardous Sites Cleanup Act, Act of October 18, 1988 (P.L. 756, No. 108), as amended, 35 P.S. 6020.101 et seq.

Storage Tank and Spill Prevention Act, Act of July 6, 1989 (P.L. 169, No. 32), as amended, 35 P.S. 6021.101 et seq.

Hazardous Material Emergency Planning and Response Act, Act of December 7, 1990 (P.L. 639, No. 165), as amended, 35 P.S. 6022.101 et seq.

Oil Spill Responder Liability Act, Act of June 11, 1992 (P.L. 303, No. 52), as amended, 35 P.S. 6023.1 et seq.

Land Recycling and Environmental Remediation Standards Act, Act of May 19, 1995 (P.L. 4, No. 2), as amended, 35 P.S. 6026.101 et seq.

Radiation Protection Act, Act of July 10, 1984 (P.L. 688, No. 147), as amended, 35 P.S. 7110.101 et seq.

Low-Level Radioactive Waste Disposal Act, Act of February 9, 1988 (P.L. 31, No. 12), as amended, 35 P.S. 7130.101 et seq.

Waste Tire Recycling Act, Act of December 19, 1996 (P.L. 1478, No. 190), as amended, 35 P.S. 6029.101 et seq.

Worker and Community Right-to-Know Act, Act of October 5, 1984 (P.L. 734, No. 159), as amended, 35 P.S. 7301 et seq.

10. Purdon's Statutes - Title 36 (Highways and Bridges)

    State Highway Law, Act of June 1, 1945 (P.L. 1242), as amended, 36 P.S. 670-101 et seq.

    (Related to Junkyards Along Highways), Act of July 28, 1966 (P.L. 91, Sp. Sess.), as amended, 36 P.S. 2719.1 et seq.

    Highway Vegetation Control Act, Act of December 20, 1983 (P.L. 293, No. 79), as amended, 36 P.S. 2720.1 et seq.

11. Purdon's Statutes - Title 37 (Historical and Museums)

    History Code, Act of May 26, 1988 (P.L. 414, No. 72), as amended, 37 Pa. C.S.A. 101 et seq.

12. Purdon's Statutes - Title 43 (Labor)

    (Related to General Safety), Act of May 18, 1937 (P.L. 654), as amended, 43 P.S. 25-1 et seq.

    Seasonal Farm Labor Act, Act of June 23, 1978 (P.L. 537, No. 93), as amended, 43 P.S. 1301.101 et seq.

13. Purdon's Statutes - Title 52 (Mines and Mining)

    The Coal Mine Sealing Act of 1947, Act of June 30, 1947 (P.L. 1177), as amended, 52 P.S. 28.1 et seq.

    Coal Refuse Disposal Control Act, Act of September 24, 1968 (P.L. 1040, No. 318), as amended, 52 P.S. 30.51 et seq.

    (Related to Coal Land Improvement), Act of July 19, 1965 (P.L. 216, No. 117), as amended, 52 P.S. 30.101 et seq.

    (Related to Mine Fires and Subsidence), Act of April 3, 1968 (P.L. 92, No. 42), as amended, 52 P.S. 30.201 et seq.

PA Anthracite Coal Mine Act, Act of November 10, 1965 (P.L. 721, No. 346), as amended, 52 P.S. 70-101 et seq.

(Related to Discharge of Coal into Banks of Streams), Act of June 27, 1913 (P.L. 640), as amended, 52 P.S. 631 et seq.

(Related to Caving-in, Collapse, Subsidence), Act of May 27, 1921 (P.L. 1198), as amended, 52 P.S. 661 et seq.

(Related to Subsidence), Act of September 20, 1961 (P.L. 1538), as amended, 52 P.S. 672.1 et seq.

Anthracite Strip Mining and Conservation Act, Act of June 27, 1947 (P.L. 1095), as amended, 52 P.S. 681.1 et seq.

(Related to Control and Drainage of Water from Coal Formations), Act of July 7, 1955 (P.L. 258), as amended, 52 P.S. 682 et seq.

PA Bituminous Coal Mine Act, Act of July 17, 1961 (P.L. 659), as amended, 52 P.S. 701-101 et seq.

(Related to Abandoned Mines), Act of May 7, 1935 (P.L. 141), as amended, 52 P.S. 809 et seq.

(Related to Maps and Plans), Act of June 15, 1911 (P.L. 954), as amended, 52 P.S. 823 et seq.

Surface Mining Conservation and Reclamation Act, Act of May 31, 1945 (P.L. 1198), as amended, 52 P.S. 1396.1 et seq.

The Bituminous Mine Subsidence and Land Conservation Act, Act of April 27, 1966 (P.L. 31, 1st Sp. Sess.), as amended, 52 P.S. 1406.1 et seq.

(Related to Cave-in or Subsidence of Surface Above Mines), Act of July 2, 1937 (P.L. 2787), as amended, 52 P.S. 1407 et seq.

(Related to Coal Stripping), Act of June 18, 1941 (P.L. 133), as amended, 52 P.S. 1471 et seq.

(Related to Coal under State Lands), Act of June 1, 1933 (P.L. 1409), as amended, 52 P.S. 1501 et seq.

(Related to Mining Safety Zones), Act of December 22, 1959 (P.L. 1994), as amended, 52 P.S. 3101 et seq.

(Related to Coal Mine Subsidence Insurance Fund), Act of August 23, 1961 (P.L. 1068), as amended, 52 P.S. 3201 et seq.

Interstate Mining Compact, Act of May 5, 1966 (P.L. 40, Sp. Sess. No. 1), as amended, 52 P.S. 3251 et seq.

Non-coal Surface Mining Conservation and Reclamation Act, Act of December 19, 1984 (P.L. 1093, No. 219), as amended, 52 P.S. 3301 et seq.

14. Purdon's Statutes - Title 53 (Municipal Corporations)

Municipal Waste Planning, Recycling and Waste Reduction Act, Act of July 28, 1988 (P.L. 556, No. 101), as amended, 53 P.S. 4000.101 et seq.

15. Purdon's Statutes - Title 58 (Oil and Gas)

    Oil and Gas Conservation Law, Act of July 25, 1961 (P.L. 825), as amended, 58 P.S. 401 et seq.

    PA Used Oil Recycling Act, Act of April 9, 1982 (P.L. 314, No. 89), as amended, 58 P.S. 471 et seq.

    Coal and Gas Resource Coordination Act, Act of December 18, 1984 (P.L. 1069, No. 214), as amended, 58 P.S. 501 et seq.

    Oil and Gas Act, Act of December 19, 1984 (P.L. 1140, No. 223), as amended, 58 P.S. 601.101 et seq.

16. Purdon's Statutes - Title 63 (Professions and Occupations)

    Waste and Wastewater Systems Operators' Certification Act, Act of November 18, 1968 (P.L. 1052, No. 322), as amended, 63 P.S. 1001 et seq.

17. Purdon's Statutes - Title 64 (Public Lands)

    PA Appalachian Trail Act, Act of April 28, 1978 (P.L. 87, No. 41), as amended, 64 P.S. 801 et seq.

18. Purdon's Statutes - Title 71 (State Government)

    The Administrative Code of 1929, Act of April 9, 1929 (P.L. 177, No. 175), as amended, 71 P.S. 51 et seq.

    Conservation and Natural Resources Act, Act of June 28, 1995 (P.L. 89, No. 18), as amended, 71 P.S. 1340.101 et seq.

19. Purdon's Statutes - Title 72 (Taxation and Fiscal Affairs)

    Project 70 Land Acquisition and Borrowing Act, Act of June 22, 1964 (P.L. 131, Sp. Sess., No. 8), as amended, 72 P.S. 3946.1 et seq.

    (Related to Pollution Control Devices), Act of March 4, 1971 (P.L. 6, No. 2), as amended, 72 P.S. 7602.1 et seq.

20. Purdon's Statutes - Title 73 (Trade and Commerce)

    (Related to Explosives), Act of July 1, 1937 (P.L. 2681), as amended, 73 P.S. 151 et seq.

    (Related to Explosives), Act of July 10, 1957 (P.L. 685), as amended, 73 P.S. 164 et seq.

    (Related to Black Powder), Act of May 31, 1974 (P.L. 304, No. 96), as amended, 73 P.S. 169 et seq.

    (Related to Excavation and Demolition), Act of December 10, 1974 (P.L. 852, No. 287), as amended, 73 P.S. 176 et seq.

Site Development Act, Act of May 6, 1968 (P.L. 117, No. 61), as amended, 73 P.S. 361 et seq.

21. Purdon's Statutes - Title 75 (Vehicles)

    Vehicle Code, Act of June 17, 1976 (P.L. 162, No. 81), as amended, 75 Pa. C.S.A. 101 et seq.

    Snowmobile and All-Terrain Vehicle Law, Act of June 17, 1976 (P.L. 162, No. 81), as amended, 75 Pa. C. S. A. 7701 et seq.

    (Related to Hazardous Materials Transport), Act of June 30, 1984 (P.L. 473, No. 99), as amended, 75 Pa. C.S.A. 8301 et seq.

22. Purdon's Statutes - Title 77 (Workmen's Compensation)

    PA Workmen's Compensation Act, Act of June 2, 1915 (P.L. 736), as amended, 77 P.S. 1 et seq.

    PA Occupational Disease Act, Act of June 21, 1939 (P.L. 566, No. 284), as amended, 77 P.S. 1201 et seq.

C. PART II - FEDERAL STATUTES

Acid Precipitation Act of 1980 (42 U.S.C. 8901-8912)

Act to Prevent Pollution from Ships (33 U.S.C. 1901-1912)

Asbestos Hazard Emergency Response Act of 1986 (see Toxic Substances Control Act Sections 201-214 (15 U.S.C. 2641-2654))

Atomic Energy Act of 1954 (42 U.S.C. 2014, 2021, 2021a, 2022, 2111, 2113, 2114)

Clean Air Act (42 U.S.C. 7401-7642)

Clean Water Act (see Federal Water Pollution Control Act)

Coastal Wetlands Planning, Protection and Restoration Act (16 U.S.C. 3951-3956)

Coastal Zone Management Act of 1972 (16 U.S.C. 1451-1464)

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601-9675)

Emergency Planning and Community Right-To-Know Act of 1986 (42 U.S.C. 11001-11050)

Endangered Species Act of 1973 (16 U.S.C. 1531-1544)

Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. 791-798)

Environmental Quality Improvement Act of 1970 (42 U.S.C. 4371-4375)

Federal Facility Compliance Act of 1992 (42 U.S.C. 6901 note)

Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136-136y)

Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701-1784)

Federal Water Pollution Control Act (33 U.S.C. 1251-1387)

Global Climate Protection Act of 1987 (15 U.S.C. 2901 note)

Hazardous Substance Response Revenue Act of 1980 (see 26 U.S.C. 4611, 4612, 4661, 4662)

Healthy Forest Reforestation Act of 2003 (see 16 U.S.C. 6501-6591)

Lead-Based Paint Exposure Reduction Act (15 U.S.C. 2681-2692)

Lead Contamination Control Act of 1988 (42 U.S.C. 300j-21 to 300j-25)

Low-Level Radioactive Waste Policy Act (42 U.S.C. 2021b-2021d)

Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1401-1445)

Mining and Mineral Resources Research Institute Act of 1984 (30 U.S.C. 1221-1230)

National Climate Program Act (15 U.S.C. 2901-2908)

National Contaminated Sediment Assessment and Management Act (33 U.S.C. 1271 note)

National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4370b)

National Historic Preservation Act (NHPA) - Section 106 (54 U.S.C. 306108)

National Invasive Species Act of 1996 (16 U.S.C. 4701-4751)

National Ocean Pollution Planning Act of 1978 (33 U.S.C. 1701-1709)

Noise Control Act of 1972 (42 U.S.C. 4901-4918)

Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101-10270)

Oil Pollution Act of 1990 (33 U.S.C. 2701-2761)

Outer Continental Shelf Land Act Amendments of 1978 (43 U.S.C. 1801-1866)

Pollution Prevention Act of 1990 (42 U.S.C. 13101-13109)

Public Health Service Act (42 U.S.C. 300f-300j-11)

Renewable Resources Extension Act of 1978 (16 U.S.C. 1671-1676)

Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901-699li)

Safe Drinking Water Act (see Public Health Service Act Sections 1401-1451 (42 U.S.C. 300f-300j-26))

Safe Drinking Water Act Amendments of 1996 (42 U.S.C. 300f-300j-18)

Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001-2009)

Solid Waste Disposal Act (42 U.S.C. 6901-6992k)

Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201-1328)

Toxic Substances Control Act (15 U.S.C. 2601-2692)

Wood Residue Utilization Act of 1980 (16 U.S.C. 1681-1687)

END OF SECTION 007353

SECTION 010000 - REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. Separation of these specifications into divisions and sections is for convenience only and is not intended to establish limits of work. The division of the work is the Contractor's responsibility and the Architect assumes no responsibility to act as arbiter to establish subcontract limits between any sections of the work.

B. Consult index to be certain that set of documents is complete.

1.02 RELATED WORK IN OTHER SECTIONS OR CONTRACTS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Divisions 00 and 02 and all other Sections of Division 01 of these Specifications.

PART 2 PRODUCTS - Not Applicable

PART 3 EXECUTION - Not Applicable

END OF SECTION 010000

SECTION 011000 - SCHEDULING REQUIREMENTS OF THE WORK

PART 1 GENERAL

1.01 SCOPE

A. All work shall be conducted in accordance with the Scheduling Requirements of the Work as hereafter specified. The Contractors shall be responsible for the means, methods and sequences to implement the specified schedule.

1. The General Contractor shall be responsible for submitting a Project Schedule incorporating other Prime Contractor's work and the hereinafter specified milestone dates, as specified in Section 007216 "General Conditions" Article 3. The General Contractor shall incorporate as separate line items within the Construction Schedule scheduling items as listed in Section 013100.
2. Coordination of the work between contractors shall include, but is not limited to, exchange of information about the extent of work, duration of work, identification of work required by others to facilitate the work and the required start, duration and finish times for the work activities.
3. All Contractors shall be responsible for submitting monthly progress schedule updates as specified in Section 007216 "General Conditions" Articles 3 and 9.
4. Note: Construction schedules representing anything less than a five day work week shall not be permitted, see also Section 007216 "General Conditions" Article 3, Paragraph 3.10.

B. The site is limited in size for both the building users and the Contractors. Site access for construction equipment/activities shall be coordinated with the Owner. Construction equipment, trailers, vehicles and material storage, if required, shall be located as directed by the Architect and Owner at the initial Job Conference. Contractors shall be restricted to this area. Only one (1) trailer will be permitted for each Prime Contractor, if needed, and shall be located in the area designated above. All other parking and material storage, which cannot take place within the area(s) designated above, shall take place off site. Failure of a Contractor to police his workmen's parking and material storage requirements shall result in withheld payments and/or fines.

1. All Contractors shall keep all access routes clean and free of debris and material at all times.
2. Temporary signage, fencing, gates, etc., shall be provided by the General Contractor to accommodate safe, on-site traffic and pedestrian movement.
3. The General Contractor shall power wash clean all existing walks and paving soiled from the construction activities on a regular basis and as requested by the Architect during the construction and at the completion of all work.
4. The General Contractor shall take all necessary safety precautions to clearly delineate the construction areas and shall provide barriers (security fences) to prevent unauthorized entry to construction areas. The General Contractor shall provide security fences around work and staging areas to restrict access to these areas.
    a. Contractors shall coordinate their work to allow for continued use of local roadways by the public, as well as access to the site for the Contractors and Owner.
    b. Also refer to Section 015000.
5. Contractors shall repair/restore any area used for staging, storage, parking, etc., as well as any areas damaged by construction activities, to original or better condition at completion of work. Any areas damaged by construction activities shall be replaced by the responsible Prime Contractor as determined by the Architect.
6. Contractors shall maintain the building and site free from soil, dust, dirt, debris, etc., from

construction activities as specified in Section 017413.23 during the construction and at the completion of all work.

C. Coordination drawings shall be completed as per Section 013100 during the timeline specified in Section 011000 so as not to delay work and to resolve field coordination issues. Failure by a Contractor to resolve space conflicts with the coordination drawings will subject the Contractor to paying for all time required by the Architect to resolve the space conflicts. The Contractor shall also make all modifications and relocations that result from lack of coordination with no additional compensation.

D. Prior to the occupancy of the Work by the Owner, the Work shall be inspected by the Code Official to ensure that all life safety items are completed and operational; as well as conduct a final inspection for accessibility.

E. The new ceiling grids shall not be installed until all work above the ceiling is coordinated and installed by all the Prime Contractors. The ceiling panels shall be the last work item installed within the room.

F. Scheduling of all work shall be coordinated with the Owner.
1. Work requiring any shut-offs / shut-downs of heating, plumbing and/or electrical services shall be scheduled with the Owner. Advance notice must be given to the Architect and the Owner when any shut-offs or shut-downs are scheduled.

G. Time Table (All references to “days” shall mean “calendar days”)
1. Submittals:
Contracts, Bonds, Insurances, Detailed Cost Breakdown and Material Source of Supply:

Start		Complete
Notice of Award	-	10 Days

Remaining Submittals, including, but not limited to Construction Schedule, Shop Drawings, Color Selectors/Samples, Coordination Drawings, etc.:

Start		Complete
Notice of Award	-	20 Days

All Shop Drawing Submittals from all Contractors shall include information on the expected lead time of materials/equipment fabrication and/or delivery. Each Prime Contractor is responsible to evaluate and identify priority submittals requiring immediate submission necessary to maintain the project schedule.

2. On-Site Construction:

Start		Complete (including all Punchlist Corrective Work)
Date of Contract	-	November 30, 2026

Completion dates specified above reflect completion of all work, punchlist completion, final cleaning, and Owner moving into all spaces.

3. Final Project Completion Dates:

FINAL PROJECT COMPLETION DATE - NOVEMBER 30, 2026

FINAL PROJECT CLOSEOUT COMPLETION DATE - DECEMBER 31, 2026

"Final Project Closeout Completion" shall be the state when the Project should be completely closed out to receive Final Payment as specified in Section 007216 "General Conditions", Article 9.10.6.

1.02 RELATED WORK IN OTHER SECTIONS

A. Documents affecting work of this Section include, but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

B. Technical Specifications.

1.03 PROCEDURES

A. All work shall be completed by the date(s) specified above.

B. Extreme care shall be taken when working around existing utilities designated to remain.

C. At all times, Contractors shall employ all means necessary to eliminate fumes and dust within the existing building. All debris shall be removed immediately. No construction activity shall be left open to the exterior weather conditions.

D. Contractors shall take all necessary safety precautions to clearly delineate construction areas and provide barriers to prevent unauthorized entry to construction areas and to protect the general public.

E. All work shall be conducted in a manner to protect existing facilities (including but not limited to interior and exterior finishes and site conditions) and adjacent properties from damage from construction operations and demolition.

1. The existing building shall not be permitted to remain open or unprotected (day or night).
2. Contractors shall be responsible for cleaning and protecting existing features, finishes, surfaces, etc.
3. Also refer to Sections 017413.23 and 024200.

F. All construction operations creating excessive noise shall be coordinated with the Owner.

1. Contractors shall contact the local (Township/Borough/Municipality) authorities regarding any ordinances which may restrict early morning, late evening, and/or weekend work hours.

G. The scheduling requirements as outlined above have been established in an effort to cause the least disruption to the Owner. Inadequate or insufficient scheduling by the Contractors to meet the time allowance shall not result in delay claims to be filed against the Owner or the Architect. Contractors desiring to alter the above requirements for the benefit of the Project and Owner, shall submit such in writing for the Owner's and Architect's consideration. Once a revision is approved and implemented, it shall be as binding as the original schedule.

1. Contractors shall include in their bid all extra time, in any form such as shift work, overtime, and premium time, necessary to meet these scheduling requirements. As specified in Section 007216 "General Conditions", Article 3, Paragraph 3.3.2, any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered.
2. Failure to meet the final project completion date for construction work, including punch list work,

shall result with the specified liquidated damages being assessed (Section 002000).

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and work not in accord with Contract Documents, to minimize disruption of Owner's activities.

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 GENERAL

1.01 SCOPE

A. Bids shall be entered in the proper spaces of Proposal for Contract.

B. Refer to drawings and/or see applicable sections of the specifications for labor and materials involved in each Alternate Bid.

C. Amount shown in bid, for each alternate, shall include the making of all changes, and the installation of all materials and equipment necessary to the accomplishment of the alternate requirements in accordance with the contract documents.

1.02 RELATED WORK IN OTHER SECTIONS OR CONTRACTS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

B. It shall be the Contractor's responsibility to review all related documents for the work of all trades involved with each Alternate Bid. The Contractor shall understand the extent of work added or deleted for each trade and shall properly coordinate the work to provide a complete and workable system.

C. It shall be this Contractor's responsibility to secure and review the related alternate bids for all of the other separate contracts for this project. The Contractor shall understand the extent of work added or deleted from all contracts and shall properly coordinate his work to provide a complete and workable system. Plans and specifications for all contracts are available for viewing or purchase as defined in "Instructions to Bidders".

1.03 ALTERNATE BIDS - CONTRACT NO. 1 - GENERAL CONSTRUCTION

A. Alternate Bid No. G-1 shall be the amount to be **ADDED TO** the Base Bid for providing the translucent polycarbonate-panel canopy assembly as specified in Section 107316 and all related work as shown on drawings.

1.04 ALTERNATE BIDS - CONTRACT NO. 2 - HVAC CONSTRUCTION

A. Refer to HVAC Section 230512 - HVAC Alternates, for description of Alternate Bids as follows:
   1. Alternate Bid No. H-1 to provide dehumidification air handling unit (DAHU-1) in lieu of air handling unit (AHU-1). **(ADD or DEDUCT).**

1.05 ALTERNATE BIDS - CONTRACT NO. 3 - PLUMBING CONSTRUCTION

A. There are no Alternate Bids under this Contract.

1.06 ALTERNATE BIDS - CONTRACT NO. 4 - ELECTRICAL CONSTRUCTION

A. Alternate Bid No. E-1 shall be the amount to be **ADDED TO or DEDUCTED FROM** the Base Bid for providing electrical work associated with Alternate Bid No. H-1.

END OF SECTION 012300

SECTION 012513 - PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUBSTITUTIONS

A. Substitution requests shall be submitted on Product Substitution Form - Section 012513.25 within time restrictions as herein described and conforming to requirements specified in this section:

1. Any request for product substitution must be submitted for review, with all necessary documentation, at least ten working days (i.e., Monday through Friday, excluding legal holidays) prior to time for receipt of bids.
2. After end of that period, requests will be considered only in case of product unavailability or other conditions beyond the control of the Contractor.
3. Requests for substitution of materials or products by E-mail must be complete on Architect's forms with all accompanying information edited clearly to indicate equivalency to specified product/fixture/equipment.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Support each request with:

1. Itemized comparison of the proposed substitution with product specified, list all variations.
    a. Product identification, including manufacturer's name and address.
        1) Product description.
        2) Reference standards.
        3) Performance and test data.
    b. Samples: Submit full size working samples for Architect's review of all items requested.
    c. Name and address of similar projects on which product has been used, and date of each installation.
2. Change in construction schedule.
3. Effect of substitution on other separate contracts.
4. List of changes required in other work or products.
5. Accurate cost data comparing proposed substitution with product specified.
    a. Amount of any net change to Contract Sum.

C. A request constitutes a representation that the bidder or Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
6. Cost data is complete, and includes cost related to his contract, but not cost under other separate contracts.

D. Substitutions will not be considered when they are indicated or implied on shop drawings or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitute products which are ordered or installed without written acceptance of Architect/Engineer

shall be rejected and full cost resulting therefrom shall be the contractor's responsibility.

1.02 RELATED WORK IN OTHER SECTIONS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

B. Product Substitution Form - Section 012513.25.

C. In addition to procedures described in this Section, comply with requirements for substitutions as may be specified in Technical Specification Sections of this Project Manual.

END OF SECTION 012513

SECTION 012513.25 - PRODUCT SUBSTITUTION FORM

1. Submissions for approved substitution will be permitted and processed in accord with Section 012513 “Product Substitution Procedures”.

2. Submissions will be "Received Dated" immediately upon arrival at the office of HHSDR, Architects/Engineers.

3. Submissions will be filed until they are reviewed.

4. Submissions will not be reviewed for completeness or compliance after the tenth working day prior to the bid due date at 5:00 PM.

5. Submittals will be reviewed by members of the project teams.

6. The Reviewer's General Criteria for Review will be:

   A. The burden of proof of performance equality and the completeness of this submittal is the responsibility of the submitter.

   B. The reviewer will not be required to complete the submittal, that is, select from options or between models and lines of products.

   C. The reviewer will not be required to seek information from the manufacturer's literature on file in the office, or information from other locations.

   D. The product must be equal, or better in those features and performance which the specified product provides.

   E. When in the reviewer's opinion significant deficiencies are established, further review of submitted data is not required.

7. The reviewer will note action (approval or disapproval), the date, and his initials.

8. If a submittal is disapproved, reviewer will make notations that will be adequate to guide a later reviewer to the same conclusion. Sample notations may be "Submittal vague", "incomplete", or "product equality not substantiated".

9. Approval of a substituted item will be communicated to Bidders in the form of an Addendum.

10. Any substitution requests made after receipt of bids shall be submitted through the awarded Contractor.

END OF TEXT
(FORM FOLLOWS)

SUBSTITUTION REQUEST FORM

PROJECT _____

CONTRACTOR/SUPPLIER _____

We hereby submit for consideration, the following product instead of specified item for above project.

SECTION/DRAWING _____ PARAGRAPH/DETAIL _____ SPECIFIED ITEM _____

Proposed substitution: _____

ATTACHMENTS: (If not applicable, write N/A in space provided)

No.1 Complete Product Data, including technical data and laboratory tests, if applicable.

_____

No. 2 Drawings showing dimensional changes. _____

No. 3 Complete description of changes to drawings and/or specifications which proposed substitution will require for its proper installation.

_____

_____

No. 4 Necessary samples and substantiating data to prove equal quality, performance and appearance to that which is specified. Clearly mark manufacturer's literature to indicate quality in performance. Differences in quality of materials and construction shall be indicated.

_____

_____

No. 5 List of names and address of three (3) similar projects on which product was used, date of installation, and Architect/Engineer's name, address, and telephone numbers.

_____

_____

_____

_____

_____

Fill in blanks below (provide attachments if more space is necessary).

A. Does the substitution affect dimensions indicated on the Contract Drawings?

Yes ____ No _____ If yes, clearly indicate changes: _____

_____

B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

_____

C. What effect does substitution have on other trades, other contracts, and Contract Completion Date?

D. What effect does substitution have on applicable code requirements?

E. List differences between proposed substitution and specified items:

F. Identify manufacturer's guarantees:

G. Identify cost impact:

Undersigned attests function and quality equivalent or superior to specified item.

CERTIFICATION OF EQUAL PERFORMANCE:

Submitted by: Title:
Firm:
Address:

Telephone: Date:

Signature:

* * * * * * * * * * * * *

For Use by the Architect/Engineer:

Accepted: Accepted as Noted

Not Accepted Received Too Late

By: Date:

Remarks:

SECTION 013100 - PROJECT MANAGEMENT & COORDINATION

PART 1 GENERAL

1.01 SCOPE

A. Work included: All Contractors shall coordinate the requirements of their work for uninterrupted performance of the work to the date of completion.

1.02 RELATED WORK IN OTHER SECTIONS

A. Documents affecting work of this Section include, but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

B. Technical Specifications

1.03 COORDINATION

A. The General Contractor is designated as the Lead Contractor for the Project as specified in the General Conditions Section 007216 Article 3, Paragraph 3.3.1.1. The General Contractor shall prepare and submit a comprehensive construction schedule as specified in the General Conditions Section 007216 Article 3, Paragraph 3.10.1. All Contractors shall coordinate the requirements of their work with the General Contractor so that the construction schedule will indicate the obligations of each Contractor for uninterrupted performance of the work to the date of completion.

1. Coordination of the work between contractors shall include, but is not limited to, exchange of information about the extent of work, duration of work, identification of work required by others to facilitate the work and the required start, duration and finish times for the work activities.
2. The General Contractor shall incorporate as separate line items within the Construction Schedule dates as follows:
    a. schedules for construction testing as specified in separate technical sections of each Contract/trade and/or as required by the PA UBC, including but not limited to:
        1) cast-in-place concrete testing (initial field test reports, seven day cylinder test reports and 28 day cylinder test reports;
        2) earthwork proofroll evaluations, foundation design bearing verification reports, and compaction testing.
        3) coordinate with other Prime Contractors to incorporate anticipated dates for HVAC, plumbing, and electrical work as required.
    b. schedules for coordination drawings. The HVAC Contractor shall be the lead contractor in completing Coordination Drawings.
    c. schedules for commissioning dates for applicable systems, as specified in separate technical sections, including but not limited to, HVAC work, electrical systems, etc.
    d. schedules for Punch Lists.
    e. release dates for ordered materials.

B. Each Prime Contractor shall verify that utility requirement 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, such equipment.

C. Each Prime Contractor shall coordinate scheduling, submittals, and Work of the various sections of

specifications to assure efficient and orderly sequence of installation of interdependent construction elements with provisions for accommodating items to be installed later.

D. Each Prime Contractor shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Contract Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

1. Each Prime Contractor shall be responsible for coordinating and reporting the work of their respective sub-contractors.

E. Meetings

1. Job conferences will be held while construction is in progress, as specified in the General Conditions, Section 007216 Article 3, Paragraph 3.16.2. Each Contractor's representative shall be in attendance. Problems of co-ordination and clarifications shall be reviewed and discussed at these conferences.
2. Contractors shall initiate additional coordination meetings as required to resolve interferences in the Work. Each Contractor shall provide all necessary resources to ensure that the coordination process described herein does not delay the Approved Project Schedule.

1.04 COORDINATION DRAWINGS

A. Coordination drawings shall be prepared for review by all Prime Contractors; coordination drawings shall include but not be limited to the following. The Contract Documents will be used as guide, with final approved coordination drawings governing installation sequence.

1. The HVAC Contractor shall be the lead contractor in completing Coordination Drawings. The HVAC, Plumbing, and Electrical Contractors shall each prepare coordination drawings of routing of conduit, ductwork and piping. Ductwork/piping coordination drawings shall be distributed within fifteen (15) days of the Date of Contract. The HVAC Contractor shall provide the final composite coordination drawings within twenty (20) days of the Date of Contract to each Contractor, the Architect, and the Owner. The HVAC Contractor shall prepare CAD coordination drawings to forward to each Prime Contractor for layout of their work; each Prime Contractor shall show his work on the CAD coordination drawings and sign and date his entry. All interference issues shall be resolved.
2. General Contractor shall prepare lay-in ceiling coordination drawings for project use. Coordination drawings shall be distributed within twenty-five (25) days of the Date of Contract. The General Contractor shall show the layout of lay-in ceilings on the HVAC Contractor's CAD coordination drawings.
3. Contract Documents will not be available in certain electronic formats, i.e., AutoCAD, Microsoft Word, etc., for use by Contractors in preparation of Coordination Drawings. Contractors shall have limited access to portable document format (.pdf) files of Contract Documents.

B. Each Contractor shall thoroughly review the coordination drawings of the other Prime Contractors and shall modify his intended routing or installation location to suit the requirements shown. The General and Electrical Contractors shall review the HVAC and Plumbing Contractors' coordination drawings regarding reflective ceiling plans, lighting fixture layout, conduit routing, cable tray routing, etc., sufficient to coordinate the work of all the Prime Contractors. Each Prime Contractor shall add their particular trade item affecting coordination of the work.

C. Once reviewed, commented on, and approved by each Prime Contractor, the HVAC Contractor shall submit two (2) hard copies to the Architect/Engineer with any revisions to Contract Documents clearly

identified for the Architect's/Engineer's review, prior to work proceeding. The HVAC Contractor shall be responsible for distributing the final composite coordination drawings (hard copy format) to each Prime Contractor requiring coordination of said work, the Architect, and the Owner's Representative.

1. Contractors shall maintain on-site, one copy of Final Composite Coordination Drawings as Record Documents (for their Contract), for future reference in the event of conflict between the trades and to record any agreed/approved upon revisions. The HVAC Contractor shall be responsible for coordinating any revisions by all Contractors onto a comprehensive set of Final Composite Coordination Drawings to be turned over to the Owner for the Owner's records at completion of the work. As specified in Section 017700, in addition to submittal of "hard" copies of all documents, Contractor shall submit "CD" of scanned .pdf's of all marked up documents.

1.05 PRE-INSTALLATION CONFERENCES

A. When required in individual specification sections, the Architect shall convene a Pre-installation Conference at the work site prior to commencing work of the section. The purpose of Pre-installation Conferences includes, but is not limited to, review conditions of installation, preparation, installation procedures, and coordination with related work. Pre-installation Conferences include, but may not be limited to the following:

1. Earthwork
2. Cast-in-Place Concrete
3. Roofing
4. Windows
5. Door Hardware
6. Tilework
7. Finish Flooring
8. Painting
9. Seeding
10. HVAC Temperature Controls
11. Lighting & Control Systems
12. A representative of each Prime Contractor is required to attend Pre-installation Conferences on earthwork, concrete, and roofing for the coordination of the work.
13. The Prime Contractor, responsible for performing the work, shall indicate in writing which work of other separate Prime Contractors he will need information about in order to coordinate the work of other Prime Contracts properly.

B. The Prime Contractor responsible for the work to be reviewed during the Pre-installation Conference shall coordinate a meeting date with the Architect and then notify those to attend at least five days in advance of meeting date. Required attendees:

1. Prime Contractor and his sub-contractor responsible for the work; all applicable material suppliers, manufacturer's technical representatives, and testing agency representatives; representative(s) of the Architect/Engineer; Owner's representative; and appropriate representatives of other Prime Contractors as designated in Paragraph 1.05.A.12 and 13.
2. If everything as specified for the pre-installation conference meeting (i.e., all submittals, meeting attendees, etc.) are not in order and the meeting cannot be held and/or cannot be productive, the Prime Contractor responsible for coordinating the meeting will be charged by the Owner and another date will be established.

C. The Architect shall be responsible for the following:

1. Prepare agenda, chair the meeting, record minutes, and distribute copies after conference to participants.

1.06 SITE SAMPLES TO BE REVIEWED PRIOR TO COMMENCEMENT OF WORK

A. When required in individual specification sections, prior to commencement of certain work on site, the Contractor shall prepare sample installations of specified work at the job site for review/approval by the Owner and Architect. Sample locations may be determined at certain pre-installation conferences and/or as coordinated with the Owner and Architect. Completed sample installations shall be reviewed and approved by the Architect and Owner prior to commencing with additional work on site. The reviewed/approved sample(s) shall serve as Standard(s) for the project work. Site samples to be reviewed prior to commencement of work include, but may not be limited to the following:

1. Exposed Concrete Floors – Section 033000
2. Tilework (Sample wall and floor) – Section 093000
3. Painting (Sample Wall) – Section 099000

END OF SECTION 013100

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary ventilation, sanitation facilities, trash facilities, and utilities.

B. Temporary Controls: barriers, security enclosures and fencing, and protection of the work.

1.02 RELATED SECTIONS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

1.03 TEMPORARY VENTILATION

A. Each Prime Contractor, and their Subcontractors, shall provide the necessary equipment to properly ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Also see Paragraphs 1.12.C and 1.19.

1. In any instance, the General Contractor shall employ dehumidification equipment as required to install finishes according to technical specifications and as required to meet construction schedule.

B. Provide temporary fan units as required to maintain clean air for construction operations. Service any permanent equipment, used during construction, at project closeout to brand new condition for new equipment and repair to same or better condition for existing equipment, plus replace filters, including, but not limited to, air handling units, rooftop units, and unit ventilators. Note: permanent mechanical cooling equipment shall not be operated to ventilate spaces under construction, also see Paragraph 1.12.C., Contractors shall employ dehumidification equipment as necessary to maintain specified conditions for installations of finishes.

1.04 TEMPORARY SANITARY FACILITIES

A. The General Contractor shall provide, and maintain in a neat and sanitary condition, portable toilet accommodations for the use of all workmen engaged on the project as may be necessary to comply with all requirements and regulations of the state, local departments of health, OSHA or of agencies having jurisdiction thereof. The General Contractor shall provide necessary janitorial services, toilet paper, etc. The Contractor shall permit no public nuisance or unsanitary conditions to exist on the project site.

B. The General Contractor shall provide and maintain at least one (1) portable toilet unit near the job office trailers and additional facilities as may be required by Authorities having jurisdiction for the total number of workmen involved, including females.

C. At end of construction, remove temporary facilities, return grounds and facilities to same or better condition than adjacent environment.

1.05 BARRIERS

A. General Contractor shall take all necessary safety precautions to clearly delineate the construction areas and shall provide barriers to prevent unauthorized entry to construction areas and to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Each Prime Contractor shall provide barriers as necessary for any site utility trenching and/or excavation performed under their contracts.

C. All Contractors shall:
1. Protect existing facilities and adjacent properties from damage from construction operations and demolition.
2. Protect plant life designated to remain. Replace damaged plant life.
3. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
4. Provide and maintain OSHA approved barriers/protection at all excavations, roofs, etc. If the construction work of any Prime Contractor requires the removal of temporary controls or protection erected by another, the Prime Contractor who removed the temporary control or protection shall replace same to meet the OSHA requirements, at his expense.

D. Barriers include but may not be limited to site fencing, exterior enclosures, interior enclosures, etc., further specified throughout this Section.

1.06 FENCING

A. The General Contractor shall provide and maintain site fencing as required for jobsite safety and security. The General Contractor shall take all necessary safety precautions to protect the general public from the work, as well as, to secure the work from unauthorized access and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Fencing shall include the following:
1. If required by local/state/federal regulations, the Owner and/or Architect, to maintain the safety of the general public, temporary fencing surrounding construction/staging areas shall be Commercial grade chain link fence, 9 gage, 8' minimum height, sufficient size posts to structurally support fence, and any gate as may be required to access the area.
2. Fence all trees or shrubs designated to remain, to an area sufficient to protect the tree or shrub from any possible damage. Fenced areas shall not be used for storage of materials or for any purpose likely to damage tree roots or branches. Leave fencing in place until removal is required to complete fine grading and seeding.
3. Plastic safety fence shall be required around the limits of contract, as well as, around limits of work beyond the chainlink fence as required to secure the work from the general public. Fence shall be Heavy Duty Construction Plastic (HDPE) Fence such as Tenax Orange Sentry HD Safety Fence 4'H, or equivalent product. Provide with green steel posts. Fence Mesh Size: 2.36" x 2.36" maximum.

B. The General Contractor shall be responsible to maintain and relocate, during progress of project, all temporary fencing for the duration of his contract, location and extent of fencing and location of gates shall be in accord with the directions of the Architect.

C. The General Contractor shall remove all temporary fencing at the end of the project and restore site as necessary.

1.07 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Contractors shall provide and maintain vehicular traffic on all local streets during the construction. Contractors shall furnish and install all signs, barricades, flagmen, etc. necessary to control and direct traffic safely. Ingress and egress to existing facility site shall be available at all times. The maintenance and protection of traffic shall be in accordance with PennDOT Pub. 408, Section 901 “Maintenance and Protection of Traffic During Construction”, and PennDOT Pub. 213 “Temporary Traffic Control Guidelines” for work along PennDot roadways.

1.08 EXTERIOR ENCLOSURES

A. All Contractors shall maintain the existing building in a secure, weathertight condition at all times. Construction materials shall be protected during erection to prevent the accumulation of moisture/water/windblown debris within the building construction.

1. Provide temporary insulated weathertight closure of all exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons.

B. Heat within the existing building shall be maintained as specified in Paragraph 1.12.C.

1.09 CONSTRUCTION AIDS

A. Each Prime Contractor shall provide construction aids and equipment required by personnel and to facilitate execution of the work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.

1. Refer to and comply with all applicable local, state, and federal regulations for worker safety, public safety, and fire protection.

B. Relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.

1.10 PROTECTION OF INSTALLED WORK

A. Each Prime Contractor shall:

1. Protect his installed Work and provide special protection as required by individual specification sections.
2. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
3. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
4. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
    a. All new finish flooring materials and/or finished interior exposed concrete slabs, once installed, must be completely covered by the General Contractor with material as specified in Technical Specifications for finish flooring.
    b. For movement of heavy products, lay planking or similar materials in place.
    c. For storage of products, lay tight wood sheathing in place.
    d. Cover walls and floor surfaces used by construction personnel.
5. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

6. Prohibit traffic over landscaped areas.

B. Each Prime Contractor shall be responsible to protect his installed work until such work is turned over to and accepted by the Owner in writing (i.e. Certificate of Substantial Completion). Any damage to such work shall be corrected by the Prime Contractor initially responsible for the work, regardless of how the damage was sustained. Contractors are to refer to Section 007216 General Conditions, Article 6, Paragraph 6.2.3.1 regarding claims against each other for work damaged by another Contractor.

1.11 SECURITY

A. The General Contractor shall provide facilities to protect and secure the Work, and existing facilities, and all construction operations from unauthorized entry, vandalism, or theft. This program shall be to the satisfaction of the Architect and Owner.

B. Each Prime Contractor shall be responsible for the security of their own materials and equipment stored on the project site.

C. Each Prime Contractor shall coordinate with the General Contractor's security program.

1.12 TEMPORARY UTILITES

A. Temporary Water Service
   1. The Plumbing Contractor shall maintain an adequate water supply for all Contractors during the Project. The Plumbing Contractor shall furnish all necessary materials and make connections for water service.
   2. Water lines/connections to equipment shall be installed by the Plumbing Contractor in sufficient time to be available for supplying water for testing and operation of the various systems when needed.
   3. The Owner will pay for costs of all water used during construction.
   4. Should any Contractor require special water service other than that made available, said Contractor shall be responsible for providing the necessary source or means of providing said water, including all equipment, and connections with protection. All costs pertaining to special water service shall be borne by the Contractor.
   5. When temporary lines are no longer required, they shall be removed by the installing Contractor and any part or parts of the ground or building, disturbed or damaged, shall be restored to the original condition by said Contractor.

B. Temporary Light and Power Service
   1. The Electrical Contractor shall extend and terminate temporary electrical power to construction areas (minimum 10 foot candles), at locations acceptable to the General Contractor, Architect and the Owner. The Electrical Contractor shall provide adequate general lighting and general power outlets for all contractors for the proper conduct of their work to the satisfaction of the Architect.
   2. Prohibitive Electric:
      a. Electric welders will not be permitted on the project. Portable units must be used.
      b. Electric temporary heaters are not permitted.
      c. Electric construction equipment/tools featuring excessive amperage (>20 amps) shall be fed from Contractor provided generators.
      d. Electric Service to construction trailers will not be available.

e. In all cases the feeds shall not present a hazardous condition to the construction of and/or movement about the Project.

3. If temporary lighting is still in use at the time that finished coats of paint are being applied, then the temporary lighting shall be of the same source, orientation, and foot candle intensity as the final lighting specified for the space (example: T-8 SP35 fluorescent, ceiling mounted, 50 foot candles). This lighting may be provided in a portable fashion in the area being painted and is not necessarily intended to infer that the whole space be filled to such intensities.
4. The Electrical Contractor shall pick up the source of power for the temporary service from existing power sources. Do not overload the existing panels. Provide adequate fuse protection and necessary ground fault protection required by Code. In all cases the feeds shall not present a hazardous condition to the existing building. The temporary power shall be sized appropriately for the loads served.
5. Any Contractor requiring special power, other than that furnished, shall be responsible for providing the necessary source or means of providing said power and shall provide feeder from same with protection. All costs pertaining to special power service shall be borne by that Contractor.
6. The Owner will pay the cost of all electrical energy used on distribution lines (permanent and/or temporary) installed by the Electrical Contractor until the Project is accepted by the Owner. The Electrical Contractor shall provide and pay for all materials, maintenance, servicing, operation and supervision of the service and distribution facilities (permanent and/or temporary). The Electrical Contractor shall maintain service at all times.
   a. Contractors shall be responsible to turn off lights, etc., each night and on weekends/holidays.
7. When the temporary electrical lines are no longer required they shall be removed by the Electrical Contractor, who shall restore to their original condition any part, or parts of the ground or building disturbed or damaged. All material associated with temporary power distribution facilities not required for the permanent service shall become the property of the Electrical Contractor.

C. Temporary Heat
1. The HVAC Contractor shall maintain heat in the existing building at a minimum temperature of 70˚ F. at all times either by means of the existing heating system, temporary heating equipment or by means of the new permanent system, whichever is appropriate.
   a. The HVAC Contractor shall maintain ventilation in the existing building at all times.
   b. The General Contractor shall provide the necessary equipment to properly ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
   c. Also see Paragraph 1.03 Temporary Ventilation.
2. Prohibitive temporary heat:
   a. The use of electric temporary heaters is strictly prohibited.
   b. Use of open burning type temporary heating units is prohibited.
   c. Provide fire extinguishers during operation of portable heat sources.
3. Note: Permanent HVAC equipment shall not be operated during demolition and until all plastering, parging, sanding, etc., construction in an area is complete and the area cleaned of dust and debris. Permanent mechanical cooling equipment shall not be operated in areas under construction, said equipment shall be operated for check-out and troubleshooting only until commissioning/balancing is complete.
4. If plastering or parging of any surfaces is necessary to enable the HVAC Contractor to install the permanent heating system in a manner to permit its use for supplying temporary heat during the construction period, the plastering or parging of these surfaces shall be done by the General

Contractor sufficiently in advance of the work of the HVAC Contractor so as not to delay the installation of the permanent system. In the event this plastering or parging work is not completed in ample time to make possible the installation of the permanent piping and heating units in a particular area, the HVAC Contractor shall install temporary piping and heating units and cost of such temporary installation shall be paid by the General Contractor.

5. The Owner will pay for all water, electricity and fuel required for the operation of the permanent heating system (existing and/or new).
    a. If portable heating units are used, the HVAC Contractor shall supply and pay for fuel used in these units.

D. Maintaining Existing Systems
1. Existing systems which remain in use, as well as, new systems installed and activated during the construction work, shall be maintained by the Contractor, i.e. HVAC systems; Plumbing systems; and Power, Lighting, Fire Alarm, Sound, etc., systems. Damage to these systems caused by work under this contract shall be repaired at the Contractor's expense.
2. Advance notification shall be given the Architect and Owner when any shut-offs or shut-downs of the building systems are scheduled. Advance notification time frames shall be as specified in the mechanical and electrical technical specifications.

1.13 STAGING AREAS

A. Use only designated construction access roads for construction traffic. Coordinate any possible access restrictions to the site with local city, town, and/or borough requirements.

B. The location of the construction staging/parking area shall be coordinated with the Owner and the Architect.

C. All existing walks and roads on and/or adjacent to the site are to be kept free of soil/debris at all times. The General Contractor shall broom and/or power clean and wash all existing walks and paving soiled from the construction activities. Also refer to Section 017413.23. All trucks leaving the site must remove any soil from wheels before leaving site.

1.14 TRASH

A. The General Contractor shall be responsible for providing trash collection facilities for the project, including other Prime Contractors, relocating said facilities as necessary during Project construction, and removing said facilities at Project completion. The trash from the work of the other Prime Contractors that the General Contractor will provide collection for shall be defined as normal construction debris throughout the work area, i.e. cardboard, crating, metal bands, dirt, paper, etc. Equipment and system items, i.e. boilers, unit ventilators, piping, ductwork, light fixtures, motors, pumps, etc., shall not be defined as trash. Non-trash items shall be collected and disposed of by the Prime Contractor demolishing or removing them. Other Prime Contractors shall coordinate their specific trash needs with the General Contractor and establish a cost and form of payment plan to the General Contractor for such need.

1. Trash collection facilities shall be located in coordination with Owner.
2. Each Prime Contractor or subcontractor will be responsible to collect and to deposit his debris, garbage, litter, rubble, and rubbish in such collection facilities daily.
    a. Contractors shall dismantle crates, crush cardboard boxes, and otherwise attempt to compact all such trash deposited in these collection facilities.
3. Each Prime Contractor will be responsible for the overall cleanliness of the entire jobsite, as specified in Section 017413.23. Those Prime Contractors who do not comply with the overall

procedures and standards shall be reported to the Owner for possible reduction of their Contract Sum.
4. Trash, dust, and dirt of any kind shall not be allowed to accumulate.
5. Contractors shall collect and remove their own liquid waste from the jobsite.
6. No burning of trash, debris, and rubbish is allowed.

B. The Prime Contractor responsible for the cutting and patching demolition work is responsible to collect and deposit the demolition debris, trash, dirt, scrap, rubbish, and dust created by that demolition work in trash collection facilities.

C. The General Contractor shall remove trash collection facilities as required as the project progresses and restore said areas to their original condition, as good or better.

D. Disposal of all waste materials and/or rubbish shall be in compliance with County and State solid waste laws.

1.15 SNOW REMOVAL

A. The General Contractor shall provide snow removal from all site construction areas, the construction staging/parking area to the building construction areas, as well as within the construction and staging/parking areas, as necessary to maintain access and safe working conditions and as required to ensure project completion dates.

B. Each Prime Contractor shall remove all snow accumulations from their excavation areas.

1.16 FIRE PROTECTION

A. The General Contractor will provide general temporary fire protection requirements.
1. Other Prime Contractors and subcontractors will be responsible for their own specialty requirements (such as cutting, welding, burning).
2. All Prime Contractors shall review their fire protection plan with the Local Municipality's Fire Chief before commencing work.

B. The General Contractor shall provide and maintain fire extinguishers in all construction areas.

1.17 PROJECT INFORMATION SIGNS

A. The General Contractor shall provide construction signs as required by law, including:
1. Bulletin boards with protective covers to post safety and code notices, prevailing wage act, OSHA signs, etc., for use by all Prime Contractors.
2. Project funding sign as specified in Section 002000.

1.18 FIELD OFFICES AND SHEDS

A. Contractors may provide their own field office and/or storage shed as required by their needs, if space Is available on site and the Contractor receives the Owner's permission, also refer to Section 011000, only one trailer will be permitted per Contractor. If the Contractor requires any power and/or phone connections to his field office, said Contractor shall arrange for same, at the Owner's approval, and pay all costs associated to said connections as well as all utility usage and service costs. The Contractor shall remove

his trailer, shed, and any temporary utility service when they are no longer required and restore said area to original or better condition.

1. Each Prime Contractor is required to provide his field superintendent with a means to be contacted by the Owner, Owner's Representative (Clerk of the Works), and/or Architect.
2. Contractor's identification sign may be posted on their field office. No other sign, billboard, or advertisement is permitted by any Contractor.

1.19 PREVENTION OF DUST / DIRT ACCUMULATION

A. During construction and/or demolition operations, take necessary precautions/measures to prevent dust or dirt from rising and avoid dust, dirt and debris entering surrounding areas, classrooms, and/or buildings. The following non-all-inclusive list of recommendations is provided to aid in the reduction of construction dust/debris exposure:

1. Wet wipe, and/or use a HEPA filtered vacuum, clean all surfaces in occupied areas.
2. Isolate work areas by sealing doorways (not intended for emergency evacuation exits) with 6 mil polyethylene sheeting.
3. Separate air plenum of work areas from occupied areas; seal with polyethylene sheeting or fiberglass batting.
4. Ventilate work areas using fans to create negative pressure zone exhausting air out of the building; operate fans continuously. See also Paragraph 1.03.
5. While work is being performed, lightly mist with water to aid in controlling dust in the interior work area. Do not water damage construction/materials to remain.
6. Use water saws, not dry saws, to cut concrete, masonry, tile, etc.
7. Place a series of flaps at doorways between work areas and occupied areas.
8. Install carbon monoxide alarms set to 10ppm in work areas utilizing combustion operated equipment. Stop work, if the alarm deploys.

1.20 TEMPORARY EROSION AND SEDIMENT CONTROL

A. Each Prime Contractor performing site excavation work, shall comply with the soil erosion control plan as indicated on drawings, as well as all laws, regulations and guidelines regarding soil erosion control at all disturbed areas under each respective Contract.

1.21 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Each Prime Contractor shall remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Final Completion and Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work. Restore facilities used during construction to original or better condition.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Standard of Quality

B. Products.

C. Transportation and Handling.

D. Storage and Protection.

1.02 RELATED WORK IN OTHER SECTIONS

A. Documents affecting work of this Section include Division 00 and other Sections of Division 01 of these Specifications.

1.03 STANDARD OF QUALITY

A. The various materials and products specified in the Specifications by name or description are given to establish standards of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified, but rather to describe the minimum standard that is desired and acceptable. A material or product of lesser quality would not be acceptable. Where proprietary names are used as requested by the Owner, substitutions will not be acceptable. Proprietary shall be defined by specifying one manufacturer with no opportunity for substitutions of other manufacturers. A bid containing an alternative which does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted but, if an award is made to that bidder, the bidder will be required to replace any alternatives which do not meet the specifications.

1. Materials and products/equipment provided under the Contract shall be new and undamaged, unless specifically specified as salvaged/refurbished/etc.

B. The burden is upon the Bidder to prove such equality. If the Bidder elects to prove such equality, the Bidder must request the Architect's approval in writing to substitute such item(s) for the specified item(s), along with supporting data, and samples, if required, to permit a fair evaluation of the proposed substitution with respect to quality, serviceability, appearance and warranty.

1. Substitution requests shall be submitted according to Section 012513 “Product Substitution Procedures”.

C. The Contractor shall furnish and install construction materials and products in accordance with the Contract Documents and the accessibility provisions of the 2021 International Codes issued by the International Code Council (ICC), including accessibility provisions in Chapter 11 and Appendix E, ANSI A117.1.

1.04 PRODUCTS

A. Products: Means raw material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection

of the Work. Products may also include existing materials or components required for reuse, if so specified.

B. Material and Equipment incorporated into the work shall:
   1. Conform to applicable specifications and standards.
   2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect/Engineer.
   3. Manufactured and Fabricated Products:
      a) Design, fabricate and assemble in accord with the best engineering and shop practices.
      b) Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
      c) Two (2) or more items of the same kind shall be identical, by the same manufacturer.
      d) Products shall be suitable for service conditions.
      e) Equipment capacities, sizes and dimensions shown, or specified, shall be adhered to unless variations are specifically approved in writing.
   4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

D. Provide interchangeable components of the same manufacturer, for similar components.

E. Reference to known ASTM and Federal Standard Specifications shall mean and intend latest edition to such specifications adopted and published to date of Notice to Bidders.

1.05 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with project construction schedules.

B. Transport and handle products in accord with manufacturer's instructions.

C. Promptly inspect shipments to assure that products comply with requirements, are in manufacturer's original containers with identifying labels intact, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.06 STORAGE AND PROTECTION

A. Store and protect products in accord with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight, climate controlled enclosures.
   1. Prefinished materials shall arrive at job site in their original unopened cartons or other protective packaging necessary to protect finishes. Materials should be stored in such packages until time of application.
   2. Flat materials such as panels shall arrive and remain on adequate support to ensure flatness and prevent damage.
   3. Store all materials, equipment and bulk items prior to installation in clean, dry, well ventilated locations away from uncured concrete, masonry or damage of any kind. Where materials are approved for exterior storage, waterproof tarpaulin or polyethylene sheeting must allow for air circulation under covering.

B. For exterior storage of exterior materials/products:
   1. Provide substantial sloped platforms, blocking or skids to support fabricated products above ground, prevent soiling, or staining.
   2. Store loose granular materials on solid surfaces in a well-drained area, provide plywood or sheet materials to prevent mixing with foreign matter.
      a) Provide surface drainage to prevent flow or ponding of rainwater.
      b) Prevent mixing with foreign matter, refuse, chemically injurious materials, or liquids.
   3. Cover products subject to discoloration, or deterioration, from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

C. Store all interior fixtures, equipment, materials, casework, furniture, etc., items in weathertight, climate controlled enclosures.

D. Provide off-site storage and protection when site does not permit on-site storage or protection.

E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

F. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

G. Refer to Technical Specifications for additional storage and protection requirements.

1.07 INSPECTION AND MAINTENANCE STORED PRODUCTS

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on a continuing basis.
   3. Surfaces of product exposed to elements are not adversely affected.
      a) Any weathering of products, coatings, and finishes is not acceptable under requirements of Contract Documents.

END OF SECTION 016000

SECTION 017413.23 - PROGRESS AND FINAL CLEANING

PART 1 GENERAL

1.01 SCOPE

A. Work included: Throughout the construction period, maintain the building and site in a standard of cleanliness as described in this section.

1.02 RELATED WORK IN OTHER SECTIONS OR CONTRACTS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Divisions 00, 01, and 02 of these Specifications.

B. In addition to standards described in this Section, comply with requirements for cleaning as described in Technical Specification Sections.

1.03 STANDARD OF QUALITY

A. Conduct daily inspection to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

B. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

2.02 COMPATIBILITY

A. Use only those cleaning materials and equipment which are compatible with the surface being cleaned.

B. Use only those cleaning materials and methods recommended by manufacturers of the surface being cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

D. All cleaning materials and equipment shall be used according to the manufacturer's printed recommendations.

2.03 TRASH

A. Trash collection facilities shall be provided as specified in Section 015000.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

A. General:
1. Weekly cleanups, as hereinafter specified, shall be manned by a minimum of one representative of each separate Prime Contractor, regardless of whose construction activity has resulted in the accumulation of debris. Failure by the Contractor to provide such manpower shall result in the Architect withholding monies from that Contractor's Monthly Application for Payment and/or withholding certification of the entire monthly application for payment.
2. Each Prime Contractor shall provide storage of their materials. No storage or staging of materials shall be permitted within the building or on the roof. Space for storage or staging of materials on site is limited. Contractors shall review their site staging area and material storage needs with the General Contractor and Owner; material that cannot be stored on site shall be stored off-site by the appropriate Contractor.
3. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
4. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this work.
5. At least twice each month, and more often, if necessary, completely remove all scrap, debris, and waste material from the job site.
6. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the environment.

B. Site:
1. Daily, inspect the site and pick up all scrap, debris and waste material. Remove such items to the place designated for their storage.
2. Weekly, and more often, if necessary, inspect all arrangements of materials stored on the site. Restack, tidy or otherwise service arrangements to meet the requirements of sub-paragraph 3.01 A.1 above.
3. Maintain the site in a neat and orderly condition at all times.
4. The General Contractor shall broom and/or power wash clean all existing walks and paving soiled from construction activities on a regular basis.

C. Structures:
1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage or disposal.
2. Daily, and more often, if necessary, sweep interior spaces clean.
   a. "Clean," for the purpose of this sub-paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a mop.
3. As required preparatory to installing succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
4. Floor protective coverings shall be installed by the General Contractor over new finish flooring installed under the General Contract. Floor protective coverings as specified shall be maintained in good condition until final acceptance by the Owner and Architect.
   a. Protective floor covering shall be cleaned daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
   b. "Clean," for the purpose of this sub-paragraph, shall be interpreted as meaning free from

foreign materials which, in the opinion of the Architect, may be injurious to the finish floor material.

3.02 FINAL CLEANING

A. Final cleaning shall be executed prior to the request for final inspection per final completion.

B. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by professional skilled cleaners using commercial quality building maintenance equipment and materials.

C. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.

D. Site (Work by General Contractor):
1. Remove temporary protection and facilities installed for protection of the work during construction.
2. Broom and/or power wash clean paved/surfaced areas on the site and public paved/surfaced areas adjacent to the site. Remove stains, spills or other foreign deposits.
3. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances.
4. Completely remove resultant debris.

E. Structures:
1. General Contractor shall employ a professional cleaning firm for final cleaning of interior spaces and interior/exterior window/door cleaning. Cleaning firm shall have five years documented experience and satisfactory work as indicated in submittal to the Architect/Engineer. Clean each surface until the condition expected in a normal institutional building cleaning and maintenance program is reached.
2. Exterior:
   a. Visually inspect exterior surfaces including doors and windows and remove all traces of soil, waste materials, smudges and other foreign matter.
   b. Remove all traces of splashed materials from adjacent surfaces.
   c. Clean debris from roofs, gutters, downspouts, and drainage systems.
3. Interior:
   a. Visually inspect interior surfaces, including doors, windows and glass (inside and outside), equipment, etc. and remove all traces of soil, dust, waste materials, smudges and other foreign matter.
   b. Remove all traces of splashed material from adjacent surfaces.
   c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
   d. Remove specified finish flooring protection and mop hard floor surfaces or vacuum carpeted areas.
   e. Remove labels that are not permanent labels (each appropriate prime contractor shall remove labels from equipment/products installed under their contract).
   f. Clean transparent materials, including mirrors and glass, in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
   g. Wipe surfaces of mechanical and electrical equipment. Clean plumbing fixtures to a sanitary condition.
   h. Remove excess lubrication and other substances (each appropriate prime contractor shall

remove excess lubrication from equipment/products installed under their contract).

i. Electrical Contractor shall clean light fixtures and lamps.

F. Ventilating System (Work by HVAC Contractor):

1. Replace permanent filters of ventilation equipment when construction is complete; in addition, clean ducts, blowers and coils. Adjust operating products and equipment to ensure smooth and unhindered operation.

G. Refer to Technical Specification Sections of each Prime Contract for additional cleaning requirements.

H. Schedule final cleaning as approved by the Architect to enable the Owner to accept completely clean work.

3.03 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Contractor re-enter an area to work after the Owner has occupied the area, then the Contractor shall be responsible for all interim and final cleaning required from the work undertaken.

END OF SECTION 017413.23

SECTION 017700 - PROJECT CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SCOPE

A. In general, the Contractor shall submit written certification that Contract Documents have been reviewed, that the Work has been inspected and completed in accord with the Contract Documents and is ready for review by the Architect/Engineer, for Substantial as well as Final Completion.

B. When the Architect finds the work acceptable under the Contract Documents, the Architect will request the Contractor make closeout submittals, including but not limited to the following:

1. Evidence of compliance with requirements of governing authorities.
2. Project Record Documents (As-Built Drawings)
3. Warranties
4. Operation and Maintenance Manuals
5. Extra Stock Materials
6. Closeout Affidavits
7. Final payment application and adjustment of Contract Sum

1.02 RELATED WORK IN OTHER SECTIONS

A. Documents affecting work of this Section include, but are not necessarily limited to: All Sections in Division 00 and all other Sections of Division 01 of these Specifications.

B. Technical Specifications

1.03 CLOSEOUT PROCEDURES

A. The following closeout procedures apply per Project Phase as well as Final Project Completion. All notices, certifications, submittals, requests, etc., shall be addressed to the Architect/Engineer. Failure by the Contractor to complete the work and/or furnish submittals by the dates specified shall result in the liquidated damages as specified in Section 002000 “Instructions to Bidders” being deducted from the Contract Sum for each and every calendar day's delay.

B. Substantial Completion: Shall be as specified in Section 007216 - General Conditions, Article 9.8, and generalized as follows:

1. When the Contractor considers the work, or designated portion thereof, to be substantially complete in order to accommodate Owner occupancy, he shall submit written notice of same and attach a comprehensive list of items yet to be completed and/or corrected.
2. Upon receipt of such notice, the Architect/Engineer will make an inspection to determine the status of completion.
3. Should the Architect/Engineer determine that the work is not substantially complete:
   a. He will promptly notify the Contractor, in writing, giving the reasons, therefore.
   b. Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion.
   c. The Architect/Engineer will reinspect the work.
4. When the Architect/Engineer determines that the work is substantially complete, the

Architect/Engineer will:

a. Prepare a Certificate of Substantial Completion (A.I.A. Form G704) accompanied by Contractor's list of items to be completed or corrected within 30 days of the date of Substantial Completion, as verified and amended by the Architect/Engineer.
b. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in Certificate.

C. Final Completion: Shall be as specified in Section 007216 - General Conditions, Article 9.10, and generalized as follows:

1. When the Contractor considers the work complete, he shall submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been inspected and completed in accordance with the Contract Documents.
   c. Equipment and systems have been tested and operated in the presence of the Owner's Representative. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months.
   d. Operating products and equipment have been adjusted to ensure smooth and unhindered operation.
   e. Instruct Owner’s Representative on maintenance of products, equipment, or systems. Use initial operation and maintenance manuals as hereafter specified as basis for instruction.
      1) Submit evidence that applicable operating instructions/demonstration have been given to Owner's personnel, refer to Paragraph 1.05.
   f. Initial Operation and Maintenance Manuals that include Air and Water Balance Reports, Valve Tag Charts, and Panel Directories where required.
   g. Work has received final cleaning according to Section 017413.23.
   h. Work is completed and ready for final review.
   i. Request the Architect/Engineer make a review to verify the status of completion with reasonable promptness after receipt of such request.
2. Should the Architect/Engineer consider that the work is incomplete or defective:
   a. The Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
   b. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Architect that work is complete. All outstanding work shall be completed or corrected within 30 days of the date of the final punchlist issued by the Architect.
   c. The Architect/Engineer will again review the work.
3. When the Architect/Engineer finds that the work is acceptable under the Contract Documents, the Architect shall request the Contractor to make closeout submittals as follows.

D. Should the Architect perform more than one review to those listed above due to failure of the work to comply with the claims of status of completion made by the Contractor:

1. The Owner will compensate the Architect for such additional services.
2. The Owner will deduct the amount of such compensation from the final payment to the Contractor.

E. Following Substantial and/or Final Completion, in the event the Contractor fails to complete the list of items of the outstanding work instructed by the Architect to be corrected or completed within 30 days after the Substantial Completion Date and/or within 30 days of the final punchlist issued by the Architect, the Owner may (I) exercise any available remedies to correct or complete deficient work or retain a third party to correct or complete such work at the cost of the defaulting contractor, and (II) retain and deduct from any payments or retention otherwise due to the defaulting contractor any fees and expenses for

services required to be provided by the Architect more than 30 days after the specified completion date(s).

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS

A. When the Architect/Engineer receives written certification from the Contractor that final Punchlist(s) have been completed and the Architect finds that the Contractor's certification of final completion is acceptable under the Contract Documents, the Architect shall request the Contractor to make closeout submittals. All submittals shall be addressed to the Architect/Engineer, unless otherwise specified, and shall be accompanied with transmittal containing project number, title, and Contractor's name. Closeout Submittals shall be as specified in Section 007216 - General Conditions, Article 9.10.5, and as follows:

B. Submit evidence of compliance with requirements of governing authorities:
   1. Certificate of Occupancy.
      a. The Owner's receipt of an Occupancy Permit does not constitute "Completion" of the work by the Contractor. To reach "Completion", the Project must have all work completed as specified in Section 007216 - General Conditions, Article 9.8.1.1.
   2. Certificates of Inspections and/or Operating Certificates where required, including, but not limited to:
      a. Plumbing Utilities (Fire Protection, Sanitary, Water, Gas, etc.)
      b. HVAC Systems
      c. Electrical inspections
      d. Fire Marshall
   3. Compilations of On-site Construction Testing (as required by Specifications and/or IBC), including, but not limited to:
      a. Concrete
      b. Earthwork/foundations
   4. Verification of Final Adjustment of Door Hardware
   5. Inspections and/or Testing Reports shall also be submitted in electronic PDF files, formatted and bound to read/reprint the same as the hard copy.

C. Submit final bound and indexed Operation and Maintenance Manuals, including all extended Warranties and/or Guarantees issued by Contractors and/or manufacturers; manuals shall be assembled according to requirements of Paragraph 1.06. Manuals shall also be submitted in electronic PDF files, formatted and bound to read/reprint the same as the hard copy.
   1. Note: Warranties required by the Contract Documents shall commence on the date of Final Payment of the Entire Project, unless otherwise specified in Section 007216 - General Conditions, Article 9.8.4.
   2. Provide Owner with another, separate Warranty Manual for Owner's quick reference.

D. Submit Record Documents incorporating As-Built Revisions to drawings and/or specifications, including change orders, according to requirements of Paragraph 1.07. Record Documents shall also be submitted in electronic PDF files, formatted and bound to read/reprint the same as the hard copy.

E. Where surplus materials, scraps, extra stock materials, spare parts and/or maintenance materials are specified to be delivered to the Owner, submit evidence that same has been turned over.
   1. Additional material to be furnished to the Owner under the General Contract shall include but not be limited to:
      a. Tile – Section 093000.
      b. Ceiling panels – Section 095100
      c. Resilient flooring – Section 096500

2. Refer to Technical Specifications for additional items under each Contract.

F. General Contractor shall submit Keys and Keying Schedules according to requirements of Section 087100 “Hardware”.

G. Submit Final Payroll Certifications to the Owner (Forms satisfactory to Pennsylvania Department of Labor and Industry and as included in Section 007216). Submit statement that Owner has received Final Payroll Certifications. Refer to Section 007216 for weekly payroll/certification submittals.

H. Submit Contractor's Affidavit of Payment of Debts and Claims, A.I.A. Document G706.

I. Submit Contractor's Affidavit of Release of Liens, A.I.A. Document G706A.

J. Submit Consent of Surety Company to Final Payment, A.I.A. Document G707, with effectively dated powers of attorney attached.

K. Submit Application and Certification for Final Payment, A.I.A. Documents G702 and G703, according to requirements of Paragraph 1.08.

L. Certified letter stating that no Hazardous Materials have been installed on the Project as specified in Section 007216 - General Conditions, Article 10.1.5.

1.05 INSTRUCTIONS/DEMONSTRATIONS TO OPERATING PERSONNEL

A. Use initial operation and maintenance manuals as basis for instruction of products, equipment and systems to Owner’s Representative. Review contents of manual with Owner’s Representative in detail to explain all aspects of operation and maintenance. Prepare and insert additional data in final manuals for submission when need for such data becomes apparent during instruction.

B. Contractor shall coordinate with the Owner and Architect/Engineer regarding time and attendance for instructions/demonstrations. Contractor shall document all instructions/demonstrations to the Owner, submit copy of same to the Architect following instructions/demonstrations, and include copy of same in final submittals of Operation and Maintenance Manuals. Documentation shall include the following:

1. Date of Instruction/Demonstration
2. Names of Owner’s representatives in attendance and their signatures
3. Name of manufacturer’s representative presenting instructions/demonstrations
4. Name of Contractor’s representative in attendance
5. Name of Architect/Engineer’s representative in attendance, if applicable

C. Time of Instructions/Demonstrations shall not be time of testing, cleaning, or adjusting. Refer to Technical Specifications of each Contract for required instructions/demonstrations.

1. Instructions/Demonstrations to be given to the Owner’s representative under the General Contract shall include but not be limited to:
   a. Electronic hardware – Section 087100
   b. Finish Flooring – Section 096500
   c. Window Shades – Section 122400
2. Instructions/Demonstrations to be given to the Owner’s representative under the HVAC Contract shall include but not be limited to:
   a. Instrumentation and Controls (ATC/BMS)

3. Instructions/Demonstrations to be given to the Owner's representative under the Electrical Contract shall include but not be limited to:
    a. Lighting Systems & Lighting Controls

1.06 OPERATION AND MAINTENANCE (O & M) MANUALS

A. Each Prime Contractor shall prepare operation and maintenance data for building products, applied materials and/or finishes, equipment, and systems, for work under their Contract, in the form of an instructional Operation and Maintenance (O & M) Manual, with corresponding Warranties, for submission to the Architect/Engineer, as required by their Technical Specifications, and as specified hereafter.

1. Individual submittals of maintenance instruction sheets, warranties, etc., included with shop drawing submittals will only be accepted as example copies, not as final close out submittals.
2. Written Care (Operation) and Maintenance Manuals, with Warranties, required to be submitted by the General Contractor may be one comprehensive manual for the entire General Contract with all data included under separate tabs, or separate manual submissions grouped according to Specification Division (i.e., all Division 07 Roofing/Accessories/Warranties submitted in one binder and all Division 09 Finishes/Warranties submitted in another). At a minimum, the following work under the General Contract requires submission of written Care (Operation) and Maintenance Manuals:
    a. Hardware – Section 087100
    b. Finish Flooring – Section 096500
3. Where warranties are required by Technical Specifications without the submittal of O & M Manuals, these warranties may be included in the comprehensive O & M manual, and must be included in the separate "Warranty Manual", formatted similar to the O & M Manual.

B. Use initial Operation and Maintenance Manuals as basis for instruction of products, equipment and systems to Owner's Representative as specified in Paragraph 1.05.

1. Submit two (2) sets of initial manuals, unless otherwise specified. For equipment, or component parts of equipment put into service during progress of construction and operated by Owner, submit documents per Phase.
    a. One (1) copy will be returned after final inspection, with the Architect/Engineers' comments. Revise content of documents as required prior to final submittal.
2. Submit three (3) copies of revised volumes of data in final form. Final manuals shall be submitted to the Architect prior to Contractor's request for Final Payment. The Architect will forward all copies of the final O & M Manuals to the Owner.
3. Manuals shall also be submitted in electronic PDF files, formatted and bound to read/reprint the same as the hard copy.

C. Manuals shall be formatted as follows:

1. Bound in heavy-duty vinyl, 8-1/2" x 11" text page three-ring binders, 2" maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
2. Prepare binder covers with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, subject matter of contents, and volume number when multiple binders are required.
3. Internally subdivide the binder contents with tabbed fly leafs with tab titling clearly typed or printed under reinforced laminated plastic tabs for each subdivision. Include a Table of Contents for each volume. Logically organize data, subdivided by specification section, and include the following:
    a. Directory listing names, addresses, and telephone numbers of Architect/Engineer, Prime Contractor, and subcontractor(s) and major equipment supplier(s) for each product or

system. Include telephone numbers for both regular day service and night emergency service.

b. Operation and maintenance instructions by the manufacturer. Identify the following:
   1) Operating instructions for equipment and systems.
      a) Include description of unit or system, and component parts. Identify function, normal operating characteristics and limitations, performance curves, engineering data and tests, complete nomenclature, commercial numbers of replaceable parts, and wiring and flow diagrams.
      b) Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications. Include color coded wiring diagrams as installed.
      c) Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions. Include sequence of operation by controls manufacturer.
      d) Local source of supplies and replacement parts
   2) Maintenance instructions for equipment and systems. Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions. Provide servicing and lubrication schedule, and list of lubricants required.
   3) Maintenance instructions for all finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

c. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
   1) Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
   2) Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams (by controls manufacturer as installed). Do not use Project Record Documents as maintenance drawings. Fold larger drawings to size of text pages. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

d. Provide charts (index) of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

e. Where the HVAC Contractor is responsible for Testing and Balancing, include test and balancing reports (air and water). Minimum of three (3) copies of reports shall be submitted for initial review.

f. Certificates.

g. Refer to Technical Specifications of equipment and systems for additional data that may be required to be included in the operation and maintenance manual.

h. Warranties / Guarantees. (Provide Owner with another, separate Warranty Manual for quick reference, as well as, including warranties in the Operation and Maintenance Manual).
   1) Provide notarized warranties/guarantees, clearly labeled
   2) Provide the name, address and name of manufacturer, length of warranty period, how to file claim, name, address and telephone number of Contractor.
   3) Date warranties begin will be date of Final Payment to the Contractor.
   4) Extended Warranties/Guarantees to be furnished to the Owner under the General Contract shall include but not be limited to:
      a) Section 072100 Rigid Building Insulations - fifteen year Thermal Resistance
      b) Section 073100 Shingles - Specified warranty plus 2 year installer warranty
      c) Section 076200 Sheet Metal Flashing - Specified warranties plus 2 year installer warranty

d) Section 079200 Caulking – 5 year guarantee
e) Section 084113 Aluminum Window Frames – 2 year products; 10 year finish & thermal barrier
f) Section 087100 Door Hardware: Warranties as specified and/or manufacturer's standards
g) Section 088000 Glass – 10 year insulated
h) Section 089000 Louvers – 10 years
i) Section 093000 Tile Floors – 10 years
j) Section 095100 Lay-in Ceilings – 30 years
k) Section 096500:
Rubber Base - 2 years
VCT – 5 years
l) Section 100000 Corner Guards – 5 years
m) Section 102813 Mirrors – 15 years
n) Section 107316 Canopies – 10 Years Panels; 5 Years Aluminum Finish
o) Section 122400 Window Shades – 25 Years
p) Section 123216 Plastic Laminate Casework – 5 years

5) Extended Warranties/Guarantees to be furnished to the Owner under the Mechanical and/or Electrical Contracts shall include but not be limited to:
   a) HVAC Construction:
      i. Compressors – 5 years
      ii. Boiler – 10 years
      iii. ATC / BMS (controls) – 2 years
      iv. Pumps – 3 years
      v. Fabric Ductwork – 20 years
      vi. AHUs – 3 years
   b) Electrical Construction:
      i. Light Fixtures & Controls – 5 years
6) Extended Warranties/Guarantees shall include parts and labor.

1.07 PROJECT RECORD DOCUMENTS

A. As specified in Section 007216 - General Conditions, Article 3.11, Contractors shall maintain on-site, one set of the following Record Documents (for their Contract) for the Owner's records. Clearly label each document "Project Record" and record actual revisions to the Work.

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings and Product Data. (Note maintain two sets for the Owner as required in Section 007216 - General Conditions, Article 3.)
6. Record documents shall be kept clean, neat, and undamaged for submittal.
7. In addition to submittal of "hard" copies of all documents, Contractor shall submit "flash drive" of scanned .pdf's of all marked up documents.
8. Above submittals ARE NOT to be included in Operation and Maintenance Manuals or Warranty Manuals.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record, at each product section, changes made by Addenda, modifications and/or selected alternate bids, as well as, changes made by product substitutions through Change Orders.

E. Reviewed Shop Drawings and Product Data: Clearly indicate the specified Product Section of each to record the actual manufacturer/product installed for each Specification Section/Item.

F. Record Drawings (As-Builts): Legibly mark one set of Contract Drawings to record actual construction including but not limited to:

1. The General Contractor shall submit as-built site plan/storm water drawings, complete with signed and sealed locations/elevations/contours as specified in Sections 312000 and 334000.
2. Measured depths of foundations in relation to finish first floor datum.
3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
5. Field changes of dimension and detail.
6. Details not on original Contract Drawings.
7. Also refer to mechanical/electrical technical specifications for additional As-Built Drawing requirements.

G. Record Drawings (As-Builts) shall be submitted to the Architect/Engineer for review. The Architect will forward reviewed Record Drawings (As-Builts) to the Owner. Contractors shall submit one (1) set of above remaining Record Documents to the Owner and submit evidence to the Architect that said Record Documents have been given to Owner's personnel.

1. Record Documents shall also be submitted in electronic PDF files, formatted and bound to read/reprint the same as the hard copy.

1.08 FINAL ADJUSTMENT OF ACCOUNTS AND FINAL APPLICATION FOR PAYMENT

A. Submit Final Application for Payment reflecting the following:

1. The original Contract Sum.
2. Adjustments to the Contract Sum by way of additions and deductions resulting from:
    a. Previous Change Orders.
    b. Deductions for Owner’s acceptance of nonconforming work.
    c. Deductions for penalties.
    d. Deductions for liquidated damages.
    e. Deductions for reinspection payments.
    f. Other adjustments.
3. Total Contract Sum, as adjusted.
4. Previous Payments.
5. Sum remaining due.

B. The Architect shall prepare a Change Order, reflecting final adjustments to the Contract Sum which were not previously made by Change Orders, including but not limited to:

1. Deductions for Owner’s acceptance of nonconforming work.
2. Deductions for penalties.
3. Deductions for liquidated damages.
4. Deductions for reinspection payments.

5. Deductions for unit price work not required (refer to Bid Form Section 004116).
6. Other adjustments.

C. Final payment shall be made to the Contractor in accordance with the Architect's review of all submittals as previously specified herein and Section 007216 - General Conditions, Article 9.10.

END OF SECTION 017700

SECTION 024200 - DEMOLITION AND SALVAGE MATERIALS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall provide all items, articles, materials, equipment, operations, or methods listed, mentioned, or scheduled on the Drawings and/or herein specified, including all labor and incidentals necessary and required to complete demolition work. The demolition work consists of, but is not necessarily limited to the following:

1. Protecting all trees, monuments, benchmarks and natural features of site areas designated to remain undamaged.
2. Protecting all existing building features and finishes designated to remain.
3. Certain existing materials may require removal and salvaging for re-installation. Refer to Paragraph 3.02.E for protection of materials. Materials removed and salvaged for reuse in the alteration work shall include but not limited to the following:
   a. Face Brick & Glazed Face Brick
4. Materials removed but not salvaged for reuse may remain the property of the Owner - the Owner reserves first right of refusal of all material, equipment, piping and/or fixtures. Contractor shall review all salvageable items with Owner prior to start of demolition work. Owner will instruct Contractor where selected items are to be delivered for storage on-site. All unselected items shall be disposed of by the Contractor off the site.
5. Removal of all materials as indicated on drawings.
6. Remove all rubbish, trash, junk, demolition/construction debris, etc., from the site. Do not bury or burn on site.

1.02 RELATED WORK IN OTHER SECTIONS OR CONTRACTS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Division 00 and Division 01 of these Specifications.

B. Technical specifications.

1.03 REGULATIONS

A. The Pennsylvania Department of Environmental Protection shall be notified a minimum of ten (10) days prior to start of any demolition work, even if no asbestos is present. The General Contractor shall submit said notification and pay the applicable fee. Procedures for Notification:

1. Notification may be made online through the DEP's GreenPort website via the “Asbestos Notification System (PA.GOV | Department of Environmental Protection)”.
2. Instructions are also located at DEP eLibrary (pa.gov).
3. The initial notification must include the payment stated in the instructions.
4. The Pennsylvania Department of Environmental Protection (DEP) regulates the removal, collection, transportation, and disposal of ACMs. DEP’s Air Quality Program has adopted and enforces the federal Environmental Protection Agency (EPA) 40 CFR Part 61 Subpart M, the Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP) regulations, as amended on November 20, 1990.

B. If a Contractor encounters asbestos-containing materials (ACMs) during the demolition work, the Contractor shall report the condition to the Owner and Architect as specified in Section 007216 General Conditions Article 10.3. The Owner will have any demolition of ACMs removed according to NESHAP regulations. The Owner shall be permitted the time to have the presence of ACMs verified and the removal performed.

C. Obtain required approvals/permits from the appropriate authorities for material disposal off-site. Also see Section 007353.

D. The presence of lead-based paint may exist. Contractors shall perform demolition/renovation work in accordance with OSHA Regulations CFR 1926.62, as specified in Section 007216, Article 10; and per federal and state EPA regulations as follows: US Code of Federal Regulations (CFR) & Environmental Protection Agency's Title 40-Protection of Environment, Part 745-LEAD, requirements for working lead safe.

E. Where existing light fixtures are removed/disposed of by the Electrical Contractor: Fluorescent fixture ballasts or capacitors containing PCB's or other hazardous materials shall be properly disposed of as required by the Pennsylvania Department of Environmental Protection Agency.

1. All removal/demolition/transportation/disposal work of hazardous material shall be in accordance with governing regulations and laws, as well as, contacting landfills regarding procedures for disposal of hazardous materials and abiding by all waste handling requirements and documentation reporting.

F. Obtain required approvals/permits from the appropriate authorities for site work construction activities.

G. Conform to any utility company requirements when site work activities affect utility service.

H. Do not close or obstruct emergency entrances, roadways, fire lanes, sidewalks, or hydrants without approval from the Owner or his representative.

I. The Contractor shall comply at all times with applicable federal, state, and local laws, orders, provisions, and policies governing safety and health, including the Federal Construction Safety Act (Public Law 91-54), Federal Register, Chapter XVII, Part 1926 of Title 29 Code of Federal Regulations, Occupational Safety and Health Regulations for Construction, and subsequent publications updating these regulations.

J. It shall be the Contractor's responsibility to contact utility companies prior to any site construction and/or the establishment of site staging areas, as the locations of utilities shown on the plans are approximate and possibly incomplete.

1. Contractors performing excavation shall comply with Senate Bill 242 - Act 50 of 2017 Underground Utility Line Protection Law AKA PA One Call Law, Amending the act of December 10, 1974 (P.L.852, No.287, aka *PA Act 287 of 1974*).
2. Contractor shall contact Pennsylvania One Call System, call 1-800-242-1776 (PA One-Call) or 8-1-1, at least 3 business days, but not more than 10 business days prior to starting excavation.

1.04 BLASTING

A. No blasting shall be performed on the Project Site.

1.05 SUBMITTALS

A. Pennsylvania Department of Environmental Protection's "Asbestos Abatement and Demolition/Renovation Notification" form as specified in Paragraph 1.03.

B. Contractors shall submit copies of Permit(s) obtained from the PA DEP to conduct waste disposal at approved off-site locations, as specified in Section 007353.

C. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

1.05 STORAGE AND PROTECTION

A. All materials delivered to the site shall be covered with waterproof material, carefully piled off the ground in such manner as to insure proper drainage, ventilation and protection from damage and the weather.

B. All materials removed and salvaged for reinstallation shall be carefully removed so as not to damage the item and stored and covered for protection until such work is reinstalled.

PART 2 PRODUCTS

2.01 LUMBER MATERIALS

A. Dimension Lumber:
   1. Blocking and Miscellaneous Framing -
      a. Douglas Fir (WWPA) Std. or Better
      b. Southern Pine (SPIB) Std. or Better
   2. Dimension lumber shall be clearly grade marked.

B. Battens:
   1. Adequate for intended use, minimum 1/4" x 1-1/2".

2.02 ROUGH HARDWARE

A. Provide and set all rough building hardware such as spikes, bolts, nails, lag screws, lagging bolts, and anchors as called for or required to hold woodwork together or to anchor it to other material.

2.03 WEATHER PROTECTION SHEETING

A. Weather Protection Sheeting: Shall be minimum 6 mil woven poly sheeting - reinforced clear plastic. Dura Skrim 2 as manufactured by Raven Industries is acceptable.
   1. Any exterior openings left open overnight shall be enclosed with plywood sheathing and herein specified weather protection sheeting.

PART 3 EXECUTION

3.01 PROCEDURES

A. Before starting demolition:
1. Roofing system to be removed: protect all affected roof drains, etc., as per rules, regulations of authorities having jurisdiction.
2. Site operations: protect all affected storm sewers and underground utility lines as per rules, regulations of authorities having jurisdiction.
3. Building operations: Seal areas of demolition off from remainder of building; protect any existing floor drains in area of demolition, as well as, all HVAC grilles, units, etc.

B. The General Contractor shall remove all existing vegetation (vines, weeds, plants, etc.) from the perimeter of the building as well as the building's façade/envelop.

C. Contractors shall execute demolition work in a manner to ensure the existing building designated to remain, as well as any existing sidewalks, curbs, roadways, etc. designated to remain, against any damages resulting therefrom. If at any time safety of existing building designated to remain and/or roadways appears to be endangered, the Contractor shall cease operations and immediately notify the Architect and Owner, at the same time taking all necessary precautions to support such areas as may be affected. If the Architect and/or Owner considers additional bracing or shoring necessary to safeguard existing structure, the Contractor shall be responsible for installing bracing or shoring at the Contractor's expense.

D. Materials indicated on drawings to be demolished shall be completely removed from the premises unless otherwise directed by Architect and Owner.

E. During demolition operations, take necessary precautions/measures to prevent dust or dirt from rising and avoid dust, dirt and debris entering surrounding buildings. Avoid unnecessary noise.
1. See Also Section 015000.

F. The presence of lead-based paint may exist at the site. Contractors shall perform demolition work in accordance with OSHA Regulations CFR 1926.62, as specified in Section 007216, Article 10; and per federal and state EPA regulations as specified in Paragraph 1.03 above.

3.02 PROTECTION

A. Refer to Section 015000 for Site Fencing and Maintenance and Protection of Traffic requirements by the General Contractor.

B. Contractors shall maintain the existing building in a secure, weathertight condition at all times. Wall/roof openings that are exposed to the outside and unprotected are not acceptable. Construction materials shall be protected during erection to prevent the accumulation of moisture/water/windblown debris within the building construction.
1. Contractors shall provide temporary insulated weathertight closure of all exterior openings.

C. Work within the existing building: Contractors shall be responsible for protecting existing finishes, equipment, etc., designated to remain. Protection shall include but may not be limited to the

following:

1. Protect everything below the ceiling area during overhead work.
2. Cover all equipment, etc., left in place with suitable sheeting protection.
3. Cover walls with suitable means to protect existing finishes.
4. Interior protection and covers shall remain in place during entire period of work.
5. Remove coverings at completion of work. Refer to Section 017413.23 for cleaning required.

D. Contractors shall exercise caution in removing all material so as not to disturb concealed utility lines, electric conduit or structural situations not evident.

E. Existing items noted and/or required to be removed and reinstalled during the construction work shall be carefully removed so as not to damage the item and stored and protected as required until its reinstallation.

F. Repair damage done to Owner's property or any other person or persons property on or off premises by reason of required work. All existing finishes and/or features which are to remain, but are altered, damaged, or exposed due to this construction work shall be repaired to original or better condition.

3.03 REMOVAL OF EXISTING ROOFING SYSTEMS BY THE GENERAL CONTRACTOR

A. All existing roofing and related materials shall be removed from existing roof areas down to the trusses and/or deck as applicable, and surfaces prepared as required to receive the new roofing systems. Certain areas of existing roofing to be removed may consist of multiple layers of existing roof systems; existing roofing systems shall be removed complete down to existing construction as indicated. The existing wood deck at Building 'B' shall be inspected; Areas that appear defective shall be reported immediately to the Architect. The Architect will then determine the amount and type of corrective action to be taken.

1. Should the Architect determine any areas of Building 'B' existing wood deck requires removal, same shall be replaced with plywood as specified in Section 061000.
2. Prior to removal of any existing roof decks for replacement:
   a. Wherever existing roof decks are removed and replaced, all rooftop equipment located on said decks shall be removed, disconnected, re-installed, and re-connected as required.
   b. All existing materials and systems supported from said decks shall be temporarily supported by the Contractor and reinstalled/supported at completion of deck replacement, including but not limited to suspended lay-in ceiling assemblies.

B. Removal of existing roofing materials shall be done in a manner which will preserve the existing roof trusses and/or deck, as applicable, without damage caused by removal of materials.

1. Contractor shall verify electrical conduits and other possible materials (i.e., ceiling fasteners, supports, etc.) that may be fastened to deck below and possibly be damaged by installation of new fasteners and/or require removal and reinstallation during any deck replacement work. Any material altered or damaged due to the work shall be repaired to original or better condition.
2. Removal of existing roofing system(s) shall include cleaning all existing perimeter masonry/stone/concrete areas, flashings, and counterflashings indicated to remain, of all existing asphalt, caulking, mortar, etc., all substrates shall be cleaned as recommended by roofing manufacturer prior to receiving new membrane.

C. No more roofing shall be removed than can be reroofed within the same work period. The Contractor shall provide all necessary protection of the building during removal/replacement of the roofing system

against inclement weather.

1. The Contractor shall be responsible for protecting the interior of the building from rain and debris falling through roof deck during the demolition work and/or through openings during deck replacement, as well as, furnishing and installing all new materials and/or repairing materials and surfaces within the building which become damaged by debris, wind, rain, snow or other such weather related damage during the roofing work.
2. Caution: No storage or staging of construction materials shall be permitted on the roofs. All materials shall be placed to evenly distribute all loads.

3.04 REMOVAL OF EXISTING SITE SURFACES

A. General Contractor shall break up and totally remove existing sidewalks, curbs, paving, and base from areas as shown on drawings to accommodate new construction. Sawcut existing site surfaces to be tied into. Removed materials shall be disposed of off site.

B. Take measures to avoid dust, dirt and debris entering neighboring residences. Avoid unnecessary noise.

3.05 REMOVAL OF EXISTING INTERIOR CONCRETE FLOOR SLABS

A. Prior to beginning any demolition of existing interior concrete slab on grade work, the General Contractor shall assess the existing slab to determine the location of any existing utility lines (i.e., plumbing, electrical, cable, phone, etc.) that may conflict with the demolition /removal work. Potential conflicts shall be investigated and resolved prior to continuing with the demolition work.

B. Take measures to avoid dust, dirt and debris entering neighboring residences. Avoid unnecessary noise.

3.06 REMOVAL OF EXISTING FINISH FLOORING

A. All existing finish flooring materials indicated to be removed, shall be removed by the General Contractor. The General Contractor shall remove existing finish flooring, rubber/vinyl base, adhesive/mastic, and any fillers below the flooring down to the existing substrate. Note: some areas of existing finish flooring to be removed by the General Contractor may have been installed over a “soft, black” filler material; said material removal may include, but not be limited to, scraping and/or shotblasting. The General Contractor shall be responsible for the preparation of all floor substrates to receive new finish materials as specified in applicable technical specifications.

3.07 PATCH AND REPAIR EXISTING SURFACES

A. Prior to beginning any demolition, each Contractor shall assess the location of any existing utility lines (i.e., plumbing, electrical, cable, phone, etc.) that may conflict with the demolition /removal work. Potential conflicts shall be investigated and resolved prior to continuing with the demolition work.

B. Where work requires cutting/patching existing surfaces, each applicable Contractor shall replace any portion of existing floors/ceilings/walls removed to access the work with new to match existing. Work may include, but not be limited to:

1. Existing masonry walls shall be cut out as required for access and patched with “toothed-in”

masonry units to match existing adjacent units; provide a flush sound surface and final painting of concrete masonry units to match existing.

a. Provide Type "S" mortar for concrete block in exterior walls and bearing walls.
b. Provide Type "N" mortar for face brick and tuck pointing.

2. Existing concrete floor slabs: Where work requires removal/replacement of existing interior floor slabs, Contractor shall sawcut areas to be trenched/removed, then break up and totally remove existing slab debris to accommodate new construction.
   a. Provide minimum of 4" – 6" gravel under area to receive new concrete slab on grade.
   b. Provide 15 mil polyolefin film vapor barrier, as approved by Architect, over gravel base on all interior concrete slabs on grade.
   c. Provide 3000psi concrete infill.
   d. Non-Shrink Grout "Sure-Grout" by Kaufman Products, Inc.; "NS Grout" (non-metallic) by The Euclid Chemical Company; Quikrete Non-Shrink Precision Grout Product No. 1585-00; or Masterflow 713 Plus by BASF The Chemical Company.

C. Take measures to avoid dust, dirt and debris entering adjacent areas. Avoid unnecessary noise.

3.08 DEBRIS

A. Remove debris, as it accumulates from demolition operations. Do not store or permit debris to accumulate on site. If Contractor fails to remove excess debris promptly, Architect reserves right to cause same to be removed at Contractor's expense.

B. Disposal of all debris shall comply with Pennsylvania solid waste laws.

END OF SECTION 024200

SECTION 033000.5 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE

A. This section of specifications includes all labor, supervision, equipment, tools, materials and all other means of construction necessary to perform the cast-in-place concrete work as shown on drawings, described in this specification, or as is necessary to complete the work in a first-class manner.

B. Work includes, but is not limited to the following:
1. Each Prime Contractor shall perform cast-in-place concrete work required by their contract, including but not limited to foundations, footings, slabs or pads (interior and/or exterior), curbs, etc.
2. Each Prime Contractor shall repair all existing concrete work (slabs, curbs, etc.) damaged as a result of work of his Contract, outside the limits of the General Contractor's scope of work.

C. Should the completed work of this Section, or any portion thereof, fail to be in compliance (non-conforming) with all the requirements herein specified, but ultimately be accepted by the Owner, the Contractor shall provide a credit to the Owner calculated at $100 per cubic yard for every 100 psi under the specified strength at 28 days, and/or for every 1" over or under the specified slump, if super plasticizers are used, and/or if the air content tests below 5% or greater than 7%. The Contractor shall provide an additional credit to the Owner calculated at $100 per square foot for exterior concrete slab and/or curb work not water cured as herein specified.
1. All cracked concrete shall be replaced as specified in Paragraph 3.013.A.

1.02 RELATED WORK INCLUDED IN OTHER SECTIONS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Divisions 00, 01, and 02 of these Specifications.

B. Earth Moving - Section 312000.5.

1.03 REFERENCE SPECIFICATIONS

A. ACI 301 "Specifications for Structural Concrete" Latest Edition, except as hereinafter modified by these specifications, is hereby incorporated as a part of these specifications and are as much a part of the contract documents as if reproduced herein. Modifications as hereinafter specified shall take precedence over items specified in ACI 301. All ACI 301 items, unless modified as hereinafter specified, are incorporated as written. When any part of any item is modified or voided by these specifications, the unaltered provisions of that part shall apply as written.

B. ACI MNL-15 (formerly SP-15) Field Reference Manual (2016)

C. Concrete shall conform to all provisions of the latest edition of the (ASTM) American Society for Testing and Materials and the (ACI) American Concrete Institute noted within this specification, except where modified as hereinafter specified.

1.04 CODES AND STANDARDS

A. Concrete construction shall be in compliance with ACI 318 (2019) and Chapter 19 of the 2021 IBC (specifically Section 1905 Modifications to ACI 318). In case of conflict between any of the hereinafter specifications and ACI 318 and/or the 2021 IBC, the more stringent requirements shall govern.

B. Wherever testing and evaluations of test results are listed in ACI 318, ACI 301, and/or ACI MNL-15, the following modifications shall take precedence:

1. Strength tests shall be each cylinder tested at 28 days to determine f'c. Laboratory 28 day cylinder breaks shall equal or exceed the specified 28 day design strength f'c for each cylinder tested.
2. Field cured cylinders are not recognized by these specifications.
3. Core testing is only accepted when approved by the Architect.
4. Concrete in an area represented by core tests shall be considered adequate only if testing of all core samples meet or exceed the specified 28 day design strength f'c. Exterior air entrained concrete test results not meeting the 28 day design strength f'c shall be rejected and considered not acceptable.
5. If tests of concrete do not meet herein specified requirements, the Architect can request additional testing of concrete beyond that of standard strength testing. All costs of additional testing shall be at the Contractor's expense.

C. Test results of concrete performed after the specified 28 day testing date are not recognized by these specifications.

1.05 QUALITY ASSURANCE

A. A Pre-Installation Conference shall be held at the job site prior to the placement of any concrete work on-site and submittal of concrete mix designs. The purpose of this meeting shall include, but not be limited to, a discussion on the first class quality expectations of the Architect/Owner regarding concrete work and the Contractor's intent to provide same, evaluation of field conditions, review of the Contractor's proposed methods and procedures for installation of concrete materials, review of the Contractor's proposed curing and protection plans, locations of control joints, finish of exposed concrete slabs, etc. In addition to the Project Architect, the Contractor, his concrete installer, his concrete supplier, and his concrete testing agency shall attend the Pre-Installation Conference along with the building Owner's Representative. A representative of each Prime Contractor affected by the concrete work may also be in attendance for a discussion on the coordination of all Prime Contractors.

B. Protection of Concrete Slabs: The Contractor shall be responsible to protect all concrete slabs (interior and/or exterior) from initial slab pour/finish until final acceptance by Owner, especially slabs intended to remain exposed and receive finish sealers (clear and/or colored slabs). Protection may include but is not necessarily limited to the following:

1. Hydraulic powered equipment shall be diapered to avoid staining the concrete.
2. No vehicles by any trade shall park on the slab. If necessary, drop cloths shall be placed under vehicles at all times.
3. Pipe cutting machines shall not be used on concrete slabs.
4. Steel shall not be stored on slabs to avoid rust stains on slabs.
5. Concrete slabs and/or toppings are not designed to be working platforms during construction. Each trade shall coordinate equipment needs with the General Contractor. The Project Engineer will not provide calculations concerning any slab's ability to hold contractor's

equipment.

C. All work shall be performed to secure for the entire job homogeneous concrete having required strength, durability and weathering resistance, without planes of weakness and other structural defects and free of pronounced honeycombs, air pockets, voids, projections, offsets of plane, and other defacements on exposed surfaces.

1.06 SUBMITTALS

A. Test Reports / Submittals on construction materials (i.e.: aggregates, concrete mixes, strength test results) are to be dated no later than twelve months prior to the Date of Contract for this project.

B. Provide the following submittals in accordance with ACI-301:
1. Mill test reports shall be furnished for all cement and, in addition, the cement shall be subject to inspection and tests by the approved laboratory on the basis of samples taken from shipment. All expenses in connection with inspection and testing shall be borne by the Contractor.
2. Admixture certification. Chloride ion content must be included.
3. Aggregate certification.
4. Concrete mix designs for each class of concrete as well as each class placed by different methods, i.e., “buggy”, “pumped”, etc.
5. Construction and control joint plans for all exposed concrete (interior and exterior), incorporating all joint locations (i.e., corners, columns, etc.) with control joints that may already be shown on drawings.
6. Method of developing bond at joints.
7. Method of adding admixtures.
8. Materials and methods for curing.
9. Testing Agency to perform services required in ACI-301, Section 16.7.
10. Laboratory tests on concrete.

C. Compilations of all Construction Testing as required in Paragraph 3.02 shall be submitted with the Contractor's Closeout Submittals as specified in Section 017700.

D. Shop drawings for reinforcing steel and accessories prepared in accordance with "Details and Detailing of Concrete Reinforcement," ACI 315-99. The shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the Architect that this Contractor has understood the design concept, and to provide the detailed information necessary for the fabrication, assembly and installation of the products or materials specified. Reproductions of any type made from the Architect’s design drawings will not be acceptable as shop drawings. Neither the shop drawings nor comments placed on them by the Architect shall be construed as being change orders. If any deviations, discrepancies or conflicts between the shop drawings, the design drawings, and specifications are discovered, either prior to or after the shop drawings have been reviewed, the design drawings and specifications shall control and shall be followed.

E. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

F. Submit layout drawings/elevations for locations for any and all pipe penetrations through foundations, grade beams, etc.

G. Inclement Weather Concrete Construction Protection Plan: Contractor shall submit to the Architect for review, the Contractor's proposed inclement weather concrete construction protection plan. Submittal shall be made prior to the Pre-Installation Conference specified above, and a minimum of one (1) month prior to cold/hot weather concrete construction.

1.07 CERTIFICATION

A. The Contractor shall furnish notarized certificate executed in triplicate confirming that all concrete produced for the project will not contain any admixtures (addition of any substance) except as herein specified and approved by the Architect. Certificate shall be signed by the producer of the concrete and countersigned by the Contractor. The certificate shall be furnished to the Architect after approval of source of supply and prior to delivery of any concrete to the project site. Any concrete delivered prior to receipt of the certificate will be rejected.

1.08 LABORATORY

A. The Contractor shall retain and pay for the services of a qualified independent laboratory to perform all sampling, testing and inspecting in connection with all materials entering into the concrete work, including cement, aggregates, exact location of pour, mix design type, water, reinforcing, ambient and concrete temperatures, tests of concrete cylinders to determine strength of mix, and curing methods and applications. Such laboratory shall be submitted to the Architect for approval.

B. Concrete tests shall be performed as specified in Paragraph 3.02. Field test reports shall be provided to the Architect the day the concrete is poured. Laboratory test report results shall be delivered, and in the Architects possession, within three (3) days of the seven (7) and twenty eight (28) day cylinder tests for review or the concrete will not be accepted.

1. Cylinders broken and reported by the concrete supplier will not be acceptable and shall be grounds for the concrete to be rejected.
2. The Contractor's testing agency shall electronically distribute, in advance of hard copy mailing, to the Architect and the Owner's Representative, all test reports within 24 hours of testing. Under no circumstances shall the Contractor remove the Architect and/or Owner's Representative from the electronic and/or hard copy distribution of test reports or change the specified frequency of testing. Electronic address(es) for the Architect and the Owner's Representative will be issued during the Initial Job Conference meeting.
3. Compilations of all Construction Testing as required in Paragraph 3.02 shall be submitted with the Contractor's Closeout Submittals as specified in Section 017700.

C. Quality Assurance:

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329-09 "Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
2. Cast-in-place concrete testing and inspection must be performed by a person with a N.I.C.E.T. and/or ACI Certificate and reviewed by a licensed Civil Engineer.
   a. ACI Certificate: ACI Concrete Field Technician – Grade I.
   b. NICET Certificate: Concrete Testing – Level I.
3. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.
4. Contractor shall have on site, during concrete pouring, an authorized, responsible

representative who will determine the acceptance or rejection of each concrete mix truck sent from the approved batching plant.

D. Concrete testing laboratory results shall be limited to reporting just the testing results. The testing laboratory shall only state if the concrete meets or does not meet the 28 day specifications. The concrete testing laboratory report shall not contain language in any form stating that the concrete is acceptable.

1.09 STORAGE AND PROTECTION

A. Miscellaneous materials shall be covered with waterproof material, carefully piled off the ground in such manner as to ensure proper drainage, ventilation and protection from the weather as approved by the Architect.

B. Storage: Storage of cement and aggregates shall be as specified in ACI-301, Paragraph 2.5.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: All cement for exposed concrete to public view to be from the same mill.
   1. Portland Cement: Normal Portland Cement Type 1, 1L, or Type 2 conforming to ASTM Standard Specification Designation C150 shall be used in all items of concrete work. Portland Cement shall not be used which has been retrieved or reclaimed from used bags.
      a. Type 1L cement also known as "portland-limestone cement" or PLC.
   2. The temperature of all cement at the time of delivery to the mixer shall not exceed one hundred and twenty-five (125) degrees Fahrenheit.

B. Water-reducing Admixtures:
   1. Generally, all concrete shall contain the following water-reducing or water-reducing retarding admixture, unless otherwise approved by the Architect:
      a. Water-reducing Admixture: "Eucon WR-75" by The Euclid Chemical Company, "Master Pozzolith 322" by Master Builders, or "Plastocrete 160" by Sika Chemical Corporation. The admixture shall conform to ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
      b. Water-Reducing, Retarding Admixture: "Eucon Retarder-75" by The Euclid Chemical Company, or "Plastiment" by Sika Chemical Corporation. The admixture shall conform to ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
   2. The Architect/Engineer may consider mid-range water reducers in times of extreme weather conditions. Super plasticizers are not permitted.

C. Air Entraining Admixture: Conform to ASTM C260.

D. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted. Accelerators are not permitted. Super plasticizers are not permitted.

E. Fly ash is not permitted as a component of reinforced concrete mixes for this project.

F. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer/Architect.

G. Water: Shall be as specified in ACI-301, Paragraph 2.3.

H. Fine Aggregate: Fine aggregate shall be as specified in ACI-301, Paragraph 2.4. Organic impurities shall be in accordance with ASTM Specification C40. No fine or coarse aggregate containing “slag” or components of “slag” shall be acceptable.

1. Aggregate supplier shall submit certification that aggregates do not contain ferrous sulfide or other expansive properties, such as a petrographic examination per ASTM C295.

I. Coarse Aggregate: Shall be as specified in ACI-301, Paragraph 2.4 and shall consist of crushed limestone in accordance with ASTM Specification C33. No fine or coarse aggregate containing “slag” or components of “slag” shall be acceptable.

1. Aggregate supplier shall submit certification that aggregates do not contain ferrous sulfide or other expansive properties, such as a petrographic examination per ASTM C295.

2.02 MISCELLANEOUS MATERIALS

A. Metal Reinforcement: Metal reinforcement shall conform to the requirements of "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement" (ASTM A615) or "Specification for Rail-Steel and Axel-Steel Deformed Bars for Concrete Reinforcement" (ASTM A996). Grade shall be minimum 60 ksi, unless shown otherwise on the drawings. Standard specification for welded steel wire fabric for concrete reinforcement (ASTM A1064).

1. Reinforcing steel is not permitted to be welded. Two pieces of reinforcing steel shall be lap spiced or couplers used at the ends.

B. Reinforcement Bar Supports: Reinforcement bar supports shall be in accordance with requirements of "The Concrete Reinforcing Steel Institute" Specifications for Bar Support. All supports required for concrete above grade shall be Class "1", protected plastic. Provide in sizes as required.

C. Expansion Joint Filler for Exterior Slabs, Sidewalks, and/or Curbs: Expansion joint fillers shall be full depth of slab and uniform throughout Project sitework.

1. 1/4” Thick Expansion Joint Filler with Pre-scored Removable Strip: Deck-O-Foam by W.R. Meadows, Inc. Flexible, lightweight, non-staining, polyethylene, closed-cell expansion joint filler. Once concrete has cured, remove pre-scored removable strip and install sealant material, as specified in Section 079200, in joint.
2. Joint shall receive Exterior Traffic Bearing Sealant as follows: Shall be two-component, self leveling polyurethane. Acceptable products include the following:
    a. Sonolastic Paving Joint Sealant SL-2 or SL-2 Fast Cure by Sonneborn; or
    b. Tremco THC-901 self-leveling; or
    c. Sikaflex-2c SL by Sika; or
    d. Pur 2 SL by Bondaflex.

D. Non-Shrink Grout: shall be "Sure-Grout" by Kaufman Products, Inc.; "NS Grout" (non-metallic) by The Euclid Chemical Company; Quikrete Non-Shrink Precision Grout Product No. 1585-00; or Masterflow 713 Plus by MBBC. The grout shall conform to CRD C-621, "Corps of Engineers Specification for Non-Shrink Grout". All exposed grout shall be the specified non-metallic type. Grout

shall be formulated to achieve over 5,000 psi compressive strength.

E. Penetrating Water Repellent Sealer for exterior exposed concrete: Acceptable Products:
1. "Baracade WB 244" or “Chemstop WB Regular”, both as carried by The Euclid Chemical Company, water based, deep penetrating liquid sealers of siloxane/silane, to make concrete surfaces repellent to water and salts.
2. MasterProtect H 1000 by Master Builders Solutions, 100% silane penetrating sealer.
3. Baracade Silane 100 C as carried by The Euclid Chemical Company, 100% silane penetrating sealer.

F. Concrete Cleaner Products: Products as hereafter listed are as manufactured by PROSOCO Inc., Kansas City, KS:
1. Sure-Klean Light Duty Concrete Cleaner, nonetching acidic cleaner for smooth concrete surfaces.
2. Sure-Klean Heavy Duty Concrete Cleaner, etching acidic cleaner for textured concrete surfaces.
3. ConcreteScience Oil Stain Remover, mildly alkaline deep penetrating degreaser for concrete, environmentally responsible.
4. Prosoco’s Consolideck PreKlean

G. Gravel Base for under slabs on grade: See Section 312000.5.

H. Foundation Pipe Sleeves: Following are for maximum 6” diameter pipes, all details shall be reviewed with Project Engineer.
1. Steel Pipe, ASTM A53, minimum Schedule 40, hot dipped galvanized according to ASTM A123.

2.03 PROPORTIONING

A. General: Concrete mix submittals are required for each type of concrete, as well as, each type placed by different methods, i.e., submit a concrete mix design for concrete Class C-2 placed by “buggy” and a separate concrete mix design for concrete Class C-2 placed by “pumping”.

B. If trial batches are used, suggested proportions are indicated hereinafter. The specific type, or types of concrete to be supplied for the various parts of the work shall be as follows:

Exterior Slabs, Turndowns, etc.	Class E-2 Air-Entrained	Type 1, 1L, or Type 2 cement

C. Variations in Proportions: The data listed has been computed in accordance with The American Concrete Institute Standard Recommended Practice for Normal and Heavyweight Concrete, ACI 211.1. Quantities of fine and coarse aggregate, as listed, are based on the use of medium sand with a bulk specified gravity of 2.65, and also on a concrete of medium consistency. The percent of fine aggregate must also be adjusted for aggregates of characteristics different than stated above, and also to attain a concrete of a consistency other than medium. The percent of fine aggregate must also be adjusted so as to obtain proper workability and a smooth, dense, homogeneous, plastic mixture, free from segregation. Such variations shall be made in accordance with ACI 211.1 but in no case shall the water content per bag of cement exceed the tabular values and in all cases the listed compressive strengths must be attained. The cement factor listed in the table is minimum and must not be decreased. Approval of Architect must be attained prior to using mixtures in variance to following tables. The mix design proposed on the basis of trial batches must achieve an average compressive

strength 1200 psi greater than the specified strength, f'c.

D. Air-Entrainment shall be used for all exterior concrete as indicated in above schedule. Air-Entrainment shall not be used for interior floor slabs. The air content of the normal weight concrete as discharged from the mixer or ready mix truck shall conform to the following table, and the air content for various size aggregates shall be as follows:

Maximum Size of Coarse Aggregate (Inches)	Total Air Content Percent by Volume
3/8	8 + or - 1
1/2	7 + or - 1
3/4	6 + or - 1
1	5 + or - 1
1-1/2	4.5 + or - 1

Suggested Trial Mixes for Air-Entrained Concrete is based on the following:

1. Medium consistency of the concrete minimum 2" to maximum 4" in slump.
2. A specific gravity of the aggregates of 2.65.
3. A fineness modulus of 2.50.
4. An air content of 6 + or - 1%.

	Class of Concrete E2 A-E
28-day minimum Compressive Strength PSI	4500
Maximum Water (gallon) per 94 lb. Cement (bag)	5.1
Maximum Water to Cement Ratio	0.45
Maximum Size of Aggregate	3/4
Cement Factor Sacks (@ 94lb/sack) Cement per cu. yd. concrete	6.9

2.04 CENTRAL OR TRANSIT MIXED CONCRETE

A. Truck Mixing: Except as otherwise herein specified, ready-mixed concrete shall conform to the ASTM Specification C94.

B. Time of Hauling Ready-Mixed Cement: Concrete transported in a mixer, agitator, or other transportation device, shall be discharged at the job within fifty-five minutes of the completion of mixing. The drum shall not exceed 300 revolutions after the introduction of the water to the cement and aggregates or the introduction of the cement to the aggregates.

1. The temperature of the concrete at the time of delivery from the mixer, agitator, or other transportation device, shall not exceed ninety (90) degrees Fahrenheit, regardless of length of time of transportation travel.

C. The addition of water to a truck shall be prohibited.

2.05 FORMS

A. General: Forms shall be as specified in ACI-301, Chapter 4.

2.06 REINFORCEMENT

A. Shall be as specified in ACI-301, Chapter 5.

B. Steel Fabric for Concrete Slabs: Unless shown otherwise on the drawings, all concrete slabs shall be reinforced with welded wire mesh/fabric, complying with ASTM A1064 / A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete as specified in Paragraph 2.02.A. Size of fabric, number of layers, and placement in slab as detailed on drawings. Sheets of fabric shall lap at least six (6) inches on sides and ends and laps shall be securely wired together.

C. Vertical Reinforcement Bars: Shall be as specified in Paragraph 2.02.A and as scheduled on drawings. Install where detailed on drawings. Reinforcement shall be inspected by the testing laboratory prior to placement of concrete, as specified in Paragraph 3.02.

PART 3 EXECUTION

3.01 PLACING CONCRETE

A. Shall be as specified in ACI-301, Chapter 8.

B. Inclement Weather Installation:
1. Unprotected concrete work shall not occur when inclement (cold, hot, freezing, rain, etc.) weather prohibits the proper placing, forming and curing of concrete work. Unprotected concrete work includes, but may not be limited to, exterior concrete work and/or interior concrete work scheduled prior to proper building enclosure and mechanical heating and ventilating of the enclosed space.
2. No exterior and/or unprotected interior work shall be done when rain is falling or imminent and prohibits the proper finishing of slab work.
3. If temperatures fall below minimum temperatures as required by the nature of the work and/or rain, snow, etc., prohibit unprotected work progress, the Contractor shall adequately temporarily tent/enclose the entire work area and furnish acceptable means to provide sufficient heat to maintain a required temperature to perform the work throughout the duration of work.
    a. The Contractor shall protect concrete work during any/all times that the temperature falls below 50°F, even if the weather raises during that 24 hour period.
    b. The Contractor shall protect concrete work during any/all times that the temperature approaches freezing or below for a minimum period of 5 days.
4. Contractor shall submit his proposed inclement weather concrete construction protection plan as specified in Paragraph 1.06.F of this Section.
5. Additional ACI Documents to be reviewed with the Project Architect upon submittal of the Contractor's Inclement Weather Installation Plan may include the following: ACI 305R Hot Weather Concreting and ACI 306R Cold Weather Concreting.

3.02 TESTS OF CONCRETE

A. During the progress of construction, tests shall be made to determine whether the concrete as being produced complies with standard of quality as specified. These tests shall be made in accordance with ASTM Standard Methods. The Contractor shall cooperate in making of such tests and

the storage and protection of specimens against injury or loss through his operation. Where cylinder molds are required, the Contractor shall pay all expenses in connection with shipping and testing of cylinders by the approved laboratory. The Contractor shall supply approved field water curing storage box for concrete test specimens, including testing laboratory cylinder pickup and transport.

B. Cement shall be subject to inspection and tests by the testing laboratory on the basis of samples taken from shipment. Samples of concrete for test specimens shall be taken at the mixer, or in the case of ready-mixed concrete, from the transportation vehicle during discharge, unless in the opinion of the Architect, it is desirable to take samples elsewhere.

C. The testing laboratory shall conduct the tests as specified. Concrete poured without the requirements of this paragraph will be rejected.

D. The testing laboratory shall inspect the reinforcing steel and wire mesh placement (including but not limited to: grade, placement, location, size, spacing, lap lengths, cover, etc., and coating of steel) prior to the beginning of placement of concrete. The Contractor shall provide ample notice to the testing laboratory and shall make available to the testing laboratory, Shop Drawings of the reinforcing steel placement bearing the approval stamp of the Architect.

1. Three (3) copies of inspection reports and required accompanying information (i.e., Project Name, Testing Agency Name, Prime Contractor Name, date and location of inspection) shall be submitted to the Architect's office.
2. The Contractor shall be required to have said inspections performed and submit reports as specified regardless of whether inspections were performed as a requirement of the building permit obtained by the Owner.

E. Concrete Test Specimens required:

1. Cylinders for laboratory-cured test specimens (refer to Paragraph F for test results and information required):
    a. One set of four standard 6" x 12" cylinders for each compressive strength test, unless otherwise directed by the Architect.
    b. One set for each 50 cu. yd., or portion thereof, of each class of concrete placed in any one day, and/or for each 2,000 sq. ft. of surface area placed.
2. Field test specimens required:
    a. For all air-entrained concrete work, the testing laboratory shall determine air content of concrete per ASTM C231 of each truck of concrete, in addition to the cylinder samples required.
    b. For all concrete slab work, the testing laboratory shall determine the following for each truck of concrete in addition to the cylinder samples required: air content of concrete as stated above, slump, temperature (ambient and concrete), unit weight, and placement location.
    c. If these parameters are not provided, the concrete placed in association with these test specimens will not be accepted, including but not limited to, concrete with slump in excess of 4" (4-1/2" for flat work) will be rejected.
3. Three (3) copies of said test results and required accompanying information (i.e., Project Name, Testing Agency Name, Prime Contractor Name, date and location of test) shall be submitted to the Architect's office, within the time frame specified in Paragraph 1.08. The testing laboratory is required within its report(s) to document if the specimen meets all testing criteria within the Project specifications. Test reports are not considered "acceptable", "pass", etc., unless <u>all</u> testing criteria as herein specified are met; if a specimen does not meet each

or all testing criteria it shall be documented.

a. Refer to Paragraph 1.08 for electronic distribution of test results.

F. Contractor shall provide an insulation box and cooler on-site (with temperature maintained between 60˚ - 80˚ F) for molded and stored cylinder samples for laboratory cured test specimens and to protect samples prior to their delivery to the laboratory. The following test results and information are required: slump, design strength, concrete type and application, % air content of concrete, ambient temperature, concrete temperature, time and date of placement, truck delivery number and ticket/mix certificate, unit weight, and location of pour. These parameters must be recorded for each set of cylinders. If these parameters are not provided, the concrete placed in association with these tested cylinders will not be accepted.

1. The Contractor must insure that the test cylinders are received by the testing laboratory a maximum of twenty-four hours after the test specimens have been molded.
2. Laboratory tests for compressive strength: one specimen shall be tested at seven days, two specimens tested at twenty-eight days and one specimen retained in reserve at the laboratory for later testing if required.

G. All concrete requiring a slump change of more than 2", except when a Mid-Range Water Reducing Admixture has been approved for use, will be rejected.

H. Acceptance of Concrete, Paragraph 17.2, ACI-301 shall be amended to read that acceptable results of each individual twenty-eight day cylinder break shall equal or exceed specified concrete strength.

I. When concrete fails to meet the acceptance criteria specified in Section 17.2, ACI-301, and as above amended, the Architect may order further testing of the concrete in place in accordance with Section 17.3. Concrete may be accepted if test results of each individual core equals or exceeds specified concrete strength. When such tests are ordered, cost of testing shall be paid by the Contractor.

J. Verification, inspection and testing of concrete construction shall also be in compliance with the 2021 IBC (including, but not limited to, Section 110 Inspections and Chapter 17 Special Inspections - Sections 1704 and 1705, specifically 1705.3 Concrete Construction, including Table 1705.3, as applicable to this specific project). In case of conflict between any of the above requirements and the IBC, the more stringent requirements shall govern.

3.03 CONSTRUCTION JOINTS

A. Construction joints shall be as specified in ACI-301, Paragraph 6.1, except as modified herein. Control joints for interior slabs shall be constructed using Zip Joints, saw-cutting of control joints shall not be permitted.

1. Saw-cutting of exterior control joints shall not be permitted; exterior control joints shall be tooled.

B. Locations of Joints: Construction joints shall be located where indicated on drawings or where directed by the Architect. Construction joints and bond breaking material shall be provided at all plumbing, electrical, etc., stub-up and/or drain/floor box locations. These additional joints shall be connected in each direction to another joint or into a wall.

C. Procedure in Forming Joints: The procedure specified under "Depositing Concrete" for bonding new concrete to old shall be followed in the formation of all joints. The reinforcement shall continue through the joint. The specified bonding compound or epoxy adhesive must be used for construction joints in structural members. For concrete without reinforcement, shearing strength shall be provided by means of a concrete key or dowel bars as the Architect may direct.

3.04 EXPANSION JOINTS

A. Install specified expansion joint material at all expansion joints of exterior concrete slabs on grade and curbs and at intersections of slabs and curbs, slabs and buildings, slabs and stairs, other like occurrences and/or at other locations shown on drawings. Caulk joints.

3.05 PROVISIONS FOR OTHER TRADES, WORK, ETC.

A. Provisions for pipes and conduits shall be as follows:
1. When conduits or pipes embedded in slabs are of larger outside diameter than one and one-half (1-1/2) inches or when they come closer than one (1) inch from either upper or lower surface of the slab, expanded metal or wire mesh shall be laid and extended beyond such conduit or piping at least eight (8) inches on all sides. Conduit/pipe greater than 1-1/2” may only be employed for small, limited areas. Long conduit runs in slabs with minimal cover are not permitted.
2. Conduits or pipes shall be spaced not closer than three (3) diameters on center and they must be so placed as to avoid changing the location of the reinforcement from that shown on the drawings.

3.06 ADMIXTURE

A. Water-Reducing Admixture: The admixture shall be used for all concrete when the ambient temperature is below 75°F. Use three fluid ounces per 100 pounds of cement.

B. Water-Reducing, Retarding Admixture: The admixture shall be used for all concrete when the ambient temperature is 75°F. or above as follows:
1. All concrete except floor slabs, stoops and sidewalks use two fluid ounces per sack of cement.
2. For floor slabs, stoops and sidewalks when temperature is between 75°F. and 85°F. use three fluid ounces per sack of cement and when temperature is above 85°F. use four fluid ounces per sack of cement.

3.07 GRAVEL BASE

A. Gravel base under concrete slabs on grade is specified in Section 312000.5.

3.08 CONCRETE SLABS

A. Concrete Slabs shall be installed as follows:
1. The gravel base shall be provided with adequate drainage to prevent accumulation of water under the slabs. The base shall be wetted thoroughly immediately before placing concrete. Wetting shall not be to the extent that surplus or pools of water will be evident.
2. Slabs shall be constructed to have a minimum cross pitch of 1/4" per foot unless otherwise

noted on the drawings.

B. Also refer to “Floor Slab Finishes – General” as hereinafter specified for integral finish of slabs and/or sidewalks.

C. Also refer to “Finishing of Formed Surfaces” as hereinafter specified for rubbed finish of curbs.

3.09 FINISHING OF FORMED SURFACES

A. General: Exposed concrete surfaces shall be true and even, free from open or rough areas, depressions or projections. Exposed surface shall mean those surfaces of structures against which embankment, refill materials or excess excavation will not be placed or be covered by structures or portions of structures or below normal water level.

B. Spade Finish: All surfaces not exposed to general view shall be given a spade finish, which shall be obtained by forcing a flat spade or similar device down adjacent to the form and then pulling the top away from the form to bring mortar to the surface, and after the forms are removed all irregularities in the concrete surfaces shall be corrected satisfactorily.

C. Rubbed Finish: All surfaces which will be exposed to general view unless otherwise indicated on the drawings or specified shall be given a rubbed finish. This finish shall be made upon a previously spaded surface after the concrete has hardened, by rubbing with a carborundum stone to eliminate fins or irregularities. Brush finishing or painting with grout of neat cement will not be permitted. Corners or edges shall be slightly rounded by the use of the carborundum stone to eliminate fins or irregularities. Surfaces to receive a rubbed finish shall commence being rubbed forty-eight (48) hours after placement of concrete. Surfaces to receive rubbed finish shall be kept thoroughly wet until work in each section is completed.

3.010 FLOOR SLAB FINISHES - GENERAL

A. Finish all slabs, interior and exterior, to a tolerance as indicated. Differences in elevation, between two points, shall not exceed .125" in 10'. All floor surfaces shall be within ± .125" of finished floor elevations designated on plans. If variations greater than this exist, the Architect may direct the Contractor to grind the surfaces to bring them within the requirements. Patching of low spots shall not be permitted, except for floor slabs to receive finishes shall be brought to correct elevation with the application of specified patching compound. Grinding shall be done as soon as possible, preferably within three (3) days, but not until the concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

B. The finish of all slabs shall be with an integral finish as hereinafter specified, suitable for the specific slab. All slabs shall be finished the same day as the concrete is poured.

C. Integral Finishes: Integral finishes as herein specified are finishes of the structural concrete slabs obtained without applying a separate topping coat. Finishes for the purpose of these specifications consist of types as follows:

1. The wood floated type of integral finish shall be obtained by working a previously leveled surface with a float until the desired texture is reached. Floating shall begin when the concrete has stiffened sufficiently to permit operation and the water sheen has disappeared. The surface shall be floated at least twice. Surfaces to be left exposed shall receive a broom

finish following second floating. Unless otherwise stipulated, this type finish shall be used for exterior slabs, pads, and similar locations.

3.011 CURING AND PROTECTION OF CONCRETE AND APPLICATION OF SEALERS

A. All concrete shall be so protected that the temperature of the surface will not fall below fifty (50) degrees fahrenheit, or that there will be no loss of moisture from the surface for a period of seven (7) days after placing. During hot weather precautions shall be taken to avoid high temperature in the fresh concrete and to avoid rapid drying. Contractor shall erect temporary sun shades and wind breaks to prevent evaporation of exposed concrete surfaces while they are being finished. Contractor shall erect necessary protection from rain of exposed concrete surfaces while they are being finished.

B. The Contractor shall submit to the Architect for approval the methods he proposes to use for protecting the concrete against low temperatures.

C. The requirements above concerning the temperature at the surface is intended to apply to the placing of concrete in those seasons of the year or in such places where the possibility of freezing or continued low temperatures is to be expected. Concrete must be protected from freezing temperatures at any time during the first one hundred twenty (120) hours. Too rapid cooling of the concrete at the end of the protection period shall be avoided. Cooling at the rate of twenty (20) degrees F. in twenty-four (24) hours is recommended.

D. Preservation of moisture:
   1. Unless otherwise directed by the Architect, or hereafter specified, apply one of the following wet curing procedures to concrete not in contact with forms, immediately after completion of placement and finishing. Cure concrete by preserving moisture for a minimum of seven days. The curing process must begin immediately after final finishing.
      a. Ponding or continuous sprinkling.
      b. Application of absorptive mats or fabric kept continuously wet. Mats/fabric shall be reviewed with Architect prior to application. Plain burlap is not permitted.
      c. Application of sand kept continuously wet.
      d. Continuous application of steam (not exceeding 150 degrees F) or mist spray.
      e. Application of sheet materials conforming to ASTM C171 over concrete surfaces covered with water. Products may be curing paper and/or white-burlap-polyethylene sheet. Plain polyethylene films are not permitted. Products may include, but not be limited to:
         1) UltraCure NCF by McTech Group, Inc., Loganville, GA; or
         2) UltraCure Sun by McTech Group, Inc., for exterior use; or
         3) Transguard by Armorlon, a Division of Reef Industries, Houston, TX.
      f. Application of other moisture-retaining covering as approved by the Architect.
      g. Blankets, mats, fabric, sheet products, coverings, sand, etc., shall maintain100 % contact with the concrete throughout the seven day curing period. “Tiger striping” and/or other discoloration of concrete surfaces to be left exposed will not be acceptable.
      h. Exterior exposed concrete shall be cured by wet curing process as approved by Architect. Final sealer may be applied when recommended by the sealer manufacturer after the full 28 day cure.
   2. Where forms are exposed to the sun, minimize the moisture loss by keeping the forms wet until they can be removed safely. After form removal the concrete shall be cured by one of the methods listed above until completion of moisture preserving time period.

E. General Power Washing and Cleaning Requirements:

1. All entrances, exits, and other openings to the other portions of buildings shall be sealed to prevent cleaning solutions and water from entering other portions of buildings.
2. All storm water inlets and floor drains shall be sealed to prevent cleaning solutions and water from entering the sewer systems.
3. Cleaning products and/or procedures shall be altered, if required, to achieve the desired results.
4. All cleaning solutions shall be used in strict adherence to manufacturer's printed instructions, including but not necessarily limited to preparation, application and cleanup. All cleaning solutions shall be used in strict compliance with any and all Environmental agency requirements.
5. All surfaces adversely affected by the cleaning materials which may come in contact with cleaning materials shall be protected, including plant life.

F. Exterior Water Repellent Sealer: All exterior pads, slabs, and other exterior exposed concrete surfaces shall be sealed with two (2) coats of the specified water repellent sealer. Surface preparation of the slabs and the sealer application shall be in strict accordance with the directions of the manufacturer. Field service shall be provided, upon 5 days notice, by the manufacturer of the sealer to assist the Contractor in obtaining the maximum benefits of the product under the prevailing job site conditions.

1. Application of sealer shall begin when recommended by manufacturer following the 28 day cure.Surface shall first be “bleached” and pressure washed with products/methods acceptable to sealer manufacturer and allowed to dry thoroughly.
2. Take all necessary precautions to prevent environmental factors, i.e., wind, rain, heat, from reducing the effectiveness of the sealer and causing unacceptable finish appearance of the concrete.
3. Existing Concrete shall be pressure washed with water and cleaners as required to remove all foreign substances and allowed to dry thoroughly.

3.012 REPAIR OF SURFACE DEFECTS

A. General: Shall be as specified in ACI-301, Paragraph 9.1.

B. Defective Areas: Shall be as specified in ACI-301, Paragraph 9.2, except that a bonding compound must be used. Note: patching of exposed concrete surfaces shall not be permitted. Any and all defects in concrete surfaces, once forms have been removed, shall be brought to the attention of the Project Engineer prior to any corrective work and/or application of additional finishes.

C. Tie Holes: Shall be as specified in ACI-301, Paragraph 9.3.

D. Structural Repairs: With prior approval of the Architect, as to method and procedures, the compounds used for all structural repairs shall be epoxy adhesive and/or epoxy mortar as approved by the Architect.

3.013 DEFECTIVE MATERIALS AND/OR WORKMANSHIP

A. Concrete work which is not properly formed, true, plumb or level, or which fails to meet specified minimum compressive strength, shows poor workmanship, or carelessness, or contains foreign substances or materials, shall be deemed to be defective and the Contractor shall remove this work

from the site as directed by the Architect, replacing same with new materials complying with the contract specifications and meeting the approval of the Architect. Note: patching of exposed concrete surfaces shall not be permitted.

1. Remove and replace all cracked concrete, whether large or hairline cracks, joint to joint, regardless of cause, at the Contractor's expense, throughout the one year maintenance period.
2. Non-conforming work ultimately accepted by the Owner, in lieu of being replaced by the Contractor as herein specified, shall be credited to the Owner by the Contractor, according to the calculations specified in Paragraph 1.01.C.

B. The Contractor shall pay all costs of correcting rejected work, including all additional testing costs as well as the Architect's additional services thereby made necessary.

3.014 LOADING OF CONCRETE

A. Concrete shall not be loaded until a minimum of 75% of the design strength has been achieved. Refer to OSHA. At the Contractor's option, additional test cylinders may be made at initial pour to determine when 75% of the design strength has been achieved.

END OF SECTION 033000.5

SECTION 230505 - HVAC SCOPE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

A. The work to be performed under these specifications and the accompanying drawings comprises the furnishing of all labor, materials, tools, and other services and facilities necessary for the complete installation of, but not necessarily limited to, the following:

1. The HVAC Contractor shall remove the existing HVAC equipment and systems as indicated in the contract documents. This shall include but not be limited to: terminal heating equipment, steam piping, valves, hangers, insulation, vents, etc. Demolition plans have been provided to give the Contractor the general scope of demolition work required. The Contractor shall visit the site to better understand the work involved. Any discrepancies shall be brought to the attention of the Engineer before proceeding with the work.

2. It is the intent of this project to remove all HVAC systems and components in their entirety.

3. Provide one new wall mounted hot water boiler with packaged primary hot water pump, secondary hot water pump, air separator, expansion tank, and all associated accessories as shown and hereinafter specified. Refer to drawings for more information.

4. Under the base bid, provide one new packaged air handling with DX cooling, gas heat, hot gas reheat, and all associated accessories as shown and hereinafter specified. Refer to drawings for more information.

5. Under the alternate bid, provide one new packaged dehumidification air handling with DX cooling, gas heat, hot gas reheat, and all associated accessories as shown and hereinafter specified. Refer to drawings and specification section 230512 for more information.

6. Provide two new ceiling mounted blower coil units and associated remote condensing units with DX cooling, hot water reheat, and all associated accessories as shown and hereinafter specified. Refer to drawings for more information.

7. Provide piping (hot water, condensate drain lines, and all other piping indicated in the contract documents), and associated valves, traps, pipe accessories, insulation, hangers, miscellaneous structural steel as required and all accessories as shown and hereinafter specified.

8. Provide new fabric ductwork for the aquaponics space as shown, specified and required for complete operating air distribution systems.

9. Provide hot water heating equipment such as horizontal unit heaters. Include all piping,

supports, valves, and all other associated accessories.

10. The installation of all structural components to support newly installed HVAC equipment.

11. The installation of all low velocity ductwork, insulation, grilles, registers, diffusers, intake louvers, dampers, fire dampers, supports, equipment and all other accessories and equipment as shown, specified and required for complete operating air distribution systems.

12. The installation of complete exhaust ventilating systems including general exhaust, and all other miscellaneous systems as shown and specified. Exhaust ventilating systems shall be of the inline and ceiling types and shall include grilles, registers, louvers, dampers, ductwork, roof ventilators, exhaust fans, and all associated accessories and auxiliary equipment as shown and herein specified.

13. Furnish combination starters/disconnect, disconnect switches, manual starters, magnetic starters and fuses to the Electrical Contractor for installation for all heating, air conditioning, ventilating and exhaust systems.

14. The HVAC Contractor must perform all work at the convenience of the Owner. Major outages in utilities (gas, electric, hot water, controls, etc.) shall be performed over at the convenience of the Owner. Outages must be planned 2 weeks in advance with the Owner. The contractors are required work 2nd shift, 3rd shift, and weekends if required to accommodate the Owner's operations. This work shall in no way affect building operations. The HVAC contractor understands that building operations must take precedence over this project and all work is performed at the convenience of the Owner at no additional cost to the District.

15. All wall openings shall be provided by the HVAC contractor to support HVAC work. The HVAC contractor shall also be responsible for all lintels for all wall openings.

16. The HVAC contractor shall be responsible to patch all wall and roof openings where HVAC equipment is removed. Patching shall match existing construction. Where patching occurs in finished spaces, the HVAC contractor shall be required to paint to match existing color.

17. All other equipment, labor, materials, etc. as specified and shown on the drawings.

1.3 WORK BY OTHERS

A. The following construction and equipment related to the work under this Contract will be provided by others.

1. All electric power wiring to all new electrically operated heating, ventilating and air conditioning equipment. (Electrical Contractor) All control and interlock wiring both low and line voltage shall be included under the HVAC Contract as hereinafter specified for the HVAC equipment.

2. The Electrical Contractor shall be responsible for all power wiring and associated terminations to line and load side as well as mounting of all combination starters/disconnects, magnetic starters, VFD's, manual starters, disconnect switches, etc. furnished by the Mechanical Contractor and external to equipment they are designated to

serve. The Electrical Contractor shall make final connections to all equipment as directed by the Mechanical Contractor.

3. In the areas of the building where the General Contractor has a full renovations scope, the following work shall be by the General Contractor:

   a. Furrings around new ductwork and piping.

   b. Final painting of existing interior walls, floors and ceilings where the surfaces are being refinished and remodeled under the General Contract. Where the existing area is to be repainted, the HVAC Contractor must repair his openings ready to paint. Refer to General Construction drawings for finishes.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

END OF SECTION 230505

SECTION 230510 - BASIC HVAC MATERIALS AND METHODS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 HVAC WORK

A. The word "building" used throughout these specifications shall be interpreted to mean the entire Building Complex, including additions and all remodeled existing building areas at the site.

B. The actual runs and locations of all piping, ductwork, equipment, etc., shall be determined at the site and shall be installed to meet the various conditions at the building. It is, however, the HVAC Contractor's responsibility to predetermine the exact locations of ductwork, piping, and equipment, and to notify the other contractors accordingly to avoid confliction with other lines and equipment. Any changes necessary to conceal pipes, ductwork or clear pipes and equipment of other trades shall be made without additional expense to the Owner. This contractor shall be responsible to create ductwork and HVAC piping coordination drawings and distribute to other contractors for coordination and sign off. No piping, ductwork or equipment shall be installed without first obtaining sign off from the other trades. Should such installation occur and then subsequent conflicts arise, this Contractor shall, at his own expense, remove all that is in conflict and reinstall appropriately.

C. All work shall be executed and all equipment constructed and installed in accordance with the requirements of the Department of Labor and Industry, ASME, Department of Environmental Resources, Department of Labor, Safety and Health Regulations for Construction, OSHA, National Fire Protection Association, the National Electrical Code as amended to date of bidding, and all federal, state, county and local ordinances and regulations. Nothing contained in these specifications or shown on the drawings shall be construed to conflict with the aforesaid codes, ordinances, or regulations. Refer to the General Conditions of the Contract, Section 3.7, “Permits, Fees, and Notices”.

D. The Contractor shall carefully examine the general building drawings and all mechanical and electrical drawings, and carry on his work so as not to delay or interfere with the work of other trades. He shall obtain in writing from the other contractors such data as is necessary to coordinate his work with other branches. As the work in the building nears completion, all threading, cutting, etc., shall be done where directed by the Architect.

E. Where the phrase "or approved equivalent," "or equivalent" or "approved" appears in these specifications, it shall refer to the approval of the Architect/Engineer on the material or equipment involved. Non-named manufacturers must be approved prior to bidding. Refer to Section 012513 for Product Substitution Procedures. Submission of non-named suppliers after bidding shall be summarily rejected by the Engineer. All costs associated with the rejection process shall be invoiced to the Contractor.

F. The terms "The Contractor" or "This Contractor" or "the HVAC Contractor" or “Mechanical Contractor” mentioned in these specifications refers to the Contractor responsible for the work and equipment included in these specifications, which is the HVAC Contractor.

G. The HVAC Contractor will provide chases and openings in walls, floors, ceilings, and partitions to receive pipe lines, risers, ducts, and other equipment. This Contractor shall provide the exact

size and location of all chases and openings required for the installation of his work.

H. The HVAC Contractor shall furnish and place all sleeves required for pipes or ducts passing through floors, walls and ceilings. The Contractor shall place all inserts required for hangers and supports, as the construction work progresses, so that unnecessary cutting of construction work will be eliminated.

I. The HVAC Contractor shall furnish and install all necessary structural steel members for the proper support of all piping, ductwork, and equipment furnished and installed under this Contract.

J. This Contractor shall do all cutting and patching required for the installation of his work.

K. Advance work as rapidly as possible to permit the heating and cooling systems to be used when they are required for all areas of the building. The installation of equipment shall follow the phasing schedule. Instruct the Operating Personnel as to the proper care and maintenance of all systems.

L. Equipment and materials of similar types shall be of the same manufacturer unless specifically indicated otherwise on the drawings or herein specified. All materials shall be strictly in accordance with the quality, style, and sizes as specified herein. Manufacturers' names and plate numbers are given in the specifications to denote a standard of quality, style, size, and type and shall not be construed to exclude material of other manufacturers. The Contractor shall make final connections between all equipment furnished under this Contract and equipment furnished under other contracts as noted.

M. The materials used throughout shall be those of reputable manufacturers and shall be new and the best of their respective kinds. All equipment, components and materials shall be installed in a neat and workmanlike manner in accordance with best trade practices, manufacturer's recommendations, and applicable codes and standards and by men skilled in each particular branch of the work assigned to them. All work shall be installed subject to the approval of the Architect.

N. A complete list of materials proposed for each installation shall be submitted to the Architect for approval before delivery to the site. The Contractor shall submit samples of materials for approval at the site as requested by the Architect. Refer to the General Conditions of the Contract, Section 3.12, “Shop Drawings, Product Data, and Samples”.

O. Where the Contractor elects to substitute approved materials or equipment for materials or equipment specified. He must follow the Substitution Procedures as outlined under the General Requirements, Specification Section 012513. He shall be held responsible for all structural, mechanical, and electrical changes required for their installation at no additional cost to the Owner. If additional engineering design is required, the Contractor shall reimburse the design engineer for all costs.

P. The Contractor shall be entirely responsible for all apparatus, equipment and appurtenances furnished by him or his Subcontractors in connection with the work, and special care shall be taken to protect all parts thereof in such manner as may be necessary or as may be directed. Protection shall include covers, crating, sheds, or other means to prevent dirt, grit, plaster, or other foreign substances from entering the working parts of machinery or equipment. Special care shall be taken to keep all open ends of pipes, etc., closed while in storage and during installation. Where equipment must be stored outside the building, it shall be totally covered and secured with heavy waterproof tarps and kept dry at all times. Where equipment has been subjected to moisture, it shall be suitably dried out before placed in service. Materials and

equipment shall be stored in areas designated by the Architect.

Q. Grades, elevations and locations shown on the drawings are approximately correct; however, the Contractor shall field check and otherwise verify all such data at the site before proceeding with the work. The Contractor shall make necessary survey equipment available at all times and shall make use of such equipment wherever necessary to properly install his equipment.

R. The Contractor shall visit the site and thoroughly acquaint himself with conditions existing at the site before submitting his proposal as he will be held responsible for the installation of the work complete in every detail.

S. All work shown on the drawings and not specifically included in the specifications shall be considered a part of the Contract work. All work included in the specifications and not specifically included on the drawings shall also be considered a part of the Contract work.

T. Carefully examine all drawings included under this Contract and drawings included under other contracts and report any discrepancies noticed to the Architect as this contractor shall be responsible for the HVAC system installation in its entirety.

U. Due to the small scale of the drawings, it is not possible to indicate all offsets, fittings, valves, dampers, access panels, and similar parts that may be required. The drawings are diagrammatic and generally indicative of the work to be installed. The Contractor shall carefully investigate the structural and finish conditions affecting the work and arrange all work accordingly, furnishing necessary parts and equipment as may be required to meet the various conditions.

V. Contractor shall layout his work from dimensions of Architectural and Structural Drawings and actual dimensions of equipment being installed. Layouts in congested areas should not be scaled from Mechanical and Electrical Drawings. Clearances shall be provided on all sides of equipment as required for proper maintenance purposes and as required by the Department of Labor and Industry.

W. The Contractor shall furnish the services of manufacturers' representatives for all equipment furnished under these Contract Documents. The amount of factory service provided by the Contractor shall be as normally recommended and furnished by the various equipment manufacturers unless specified otherwise. Testing of such systems and equipment shall be made under the direct supervision of competent authorized service representatives. Any and all expenses incurred by the equipment manufacturers' representatives shall be borne by the Contractor.

X. All equipment and materials shall be manufactured in accordance with national standards established by manufacturer's associations, engineering and testing societies, such as NBMA, NEMA, ASTM, AMCA, ASME, ANSI, ACI, etc., where such standards have been established.

Y. When the installation is reported in writing by the Contractor to be complete and ready for acceptance, tests and inspection shall be made by the Contractor in the presence of the Architect to ascertain whether it complies with the specifications and Contract, and upon its failure to do so, the Contractor shall at once remedy all defects and shortcomings and any additional tests that may be required shall be entirely at the Contractor's expense. All of the testing work shall be done when and as directed by the Architect before the system is accepted.

Z. Include any excavation and backfill as required for work included under this Contract. Work shall conform to all applicable state and local regulations governing safety provisions at

excavation sites.

AA. The Architect/Engineer reserve the right to revise locations of piping, ductwork, locations of equipment, etc., within the building as long as sizes remain the same.

BB. In all cases where equipment and materials are specified in the singular or plural number, it is intended that such reference shall apply to as many such items as are required to complete the installation.

CC. Where piping, ducts, or other equipment pass through fire or smoke barrier stops, walls, floors, or ceilings, this Contractor shall furnish and install sleeves and shall thoroughly seal openings around sleeves, pipes, etc. with fire and smoke resistant materials. Materials shall be furnished by the HVAC Contractor as required to maintain the fire rating of the walls, partitions, ceilings and floors in accordance with the requirements of NFPA, the Pennsylvania Department of Labor and Industry and other applicable codes.

DD. All moving parts of equipment and appurtenances installed under this Contract shall be properly lubricated by the Contractor.

EE. The Contractor will be responsible for the completion of all work included under this Contract and shall employ skilled and qualified tradesmen as necessary to satisfy all work and trades.

FF. The Contractor or his subcontractors will not be permitted to use new or existing corridors as storage areas for their piping, ductwork, materials or equipment. Piping, ductwork, materials and equipment shall be stored in areas as coordinated with the Architect.

1.3 SHOP DRAWINGS AND SUBMITTALS

A. Refer to the General Conditions of the Contract, Section 3.12, “Shop Drawings, Product Data, and Samples”.

B. The Contractor shall submit to the Architect for review, a minimum of seven (7) sets of shop drawings and/or product data. All brochures and formats must be approved by the Architect. Submit the following for each system.

1. Equipment warranties.

2. Contractors' warranties.

3. Parts lists and manuals for all equipment.

4. Operating instructions (in writing).

5. Written instructions on maintenance and care of the systems.

6. Lubrication and recommended spare parts.

C. Submit shop drawings and manufacturer's data for the following items in accordance with the Contract Documents:

1. Boiler (hot water)

2. Automatic temperature control equipment, wiring diagrams, piping diagrams, component descriptions and sequences.

3. Pumps, expansion tanks, make up water stations, and accessories.

4. Air Handling Units

5. Exhaust fans

6. Hangers, supports, inserts, expansion compensators, flexible connectors.

7. Valves, thermometers, pressure gauges, strainers, safety valves, relief valves, balancing devices, mechanical pipe couplings, hydronic system accessories.

8. Fabric Ductwork

9. Exterior Ductwork

10. Air separator and chemical feeder.

11. Thermal insulation.

12. Condensing units

13. Grilles, registers, diffusers, dampers, louvers and air distribution system accessories.

14. Blower Coil Units

15. Coordination drawings.

16. Hot water unit heaters

17. Piping Standards

18. Ductwork standards (low pressure)

19. Ductwork pressure tests.

20. UV lighting systems

21. Bipolar Ionization systems

22. Boiler water softening and chemical treatment packages

23. All other equipment as indicated on drawings and in specifications.

D. The submissions are the Contractor's documents, and the Architect's and Engineer's approval constitutes an acknowledgment that the documents have been submitted and nothing more. It is the Contractor's responsibility to check his own submissions for compliance with the Contract Documents and job conditions.

E. Any deviations from the design documents must be clearly identified so that the Engineer may properly review such items. It shall not be the Engineer’s responsibility to search out these discrepancies. If such changes are not properly flagged for the Engineer’s review, the Contractor shall be completely responsible for all consequences said changes may result in on the project.

1.4 QUESTIONS AND CLARIFICATIONS OF BID DOCUMENTS

A. Bidders shall not rely on any verbal clarification of the Drawings and Specifications. Any questions or clarifications shall be referred to Engineer at least seven (7) working days prior to bidding to allow for issuance of an addendum, if applicable.

1.5 MECHANICAL PLANS

A. The mechanical plans are intended to be diagrammatic and are based on one (1) manufacturer's equipment. They are not intended to show every item in its exact location, the exact dimensions or all the details of the equipment. The Contractor shall verify the actual dimensions of any specified or substituted materials and equipment to ensure that they will fit in the available space. All apparatus shall be located as closely as conditions will permit and deviations there from shall be made only with the consent of the Engineer and without additional charge. The right is reserved by the Engineer to make any reasonable changes in the location of the equipment prior to rough-in without invoking additional expense. This contractor shall be responsible to create and distribute for sign-off amongst other trades ductwork and HVAC piping coordination drawings.

1.6 SPECIAL ENGINEERING SERVICES

A. In the instance of Mechanical and Control systems, such as all major and special equipment, heating equipment, controls, fans, or similar miscellaneous systems and equipment, the installations, final connections and testing of such systems shall be made under the direct supervision of competent authorized service engineers who shall be employed by the respective equipment manufacturer and/or an authorized representative. Any and all expenses incurred by these equipment manufacturers' representatives shall be borne by the Contractor.

1.7 SCHEDULE OF WORK

A. The Contractor shall arrange his work to comply with the Architect’s schedule and the published or revised phasing schedule. The Contractor shall submit a complete schedule of work to the Architect for approval at the beginning of the Contract in accordance with the phasing schedule. The schedule shall clearly indicate the proposed order in which the various parts of the work will be undertaken and the estimated time required for the completion of each particular part of the work. All work shall be coordinated with work being performed by contractors of other trades, with the Owner and phasing schedule.

B. The schedule of work may be revised periodically during the course of construction, but each revised schedule must be approved by the Architect.

1.8 EQUIPMENT GUARDS

A. Equipment guards shall be provided for protection at all belts, chains, gears, or other moving parts of equipment and machinery installed under this Contract. Guards shall be made up of suitable structural shapes and heavy gauge steel welded together and attached to equipment by removable clips and bolts. Guards shall be neat and substantial and shall be securely attached to equipment. After fabrication, guards shall be cleaned of rust and scale and painted with one coat of metal primer followed by two coats of enamel to match the equipment. Guards shall be easily removable for maintenance and service of equipment. All equipment guards shall conform with OSHA requirements.

1.9 PAINTING

A. All painting shall be included under the HVAC Contract as hereinbefore specified, including iron supports for HVAC equipment. Painting of these items shall be by the HVAC Contractor.

B. All steel supports for HVAC equipment shall be painted by the H.C. provide one coat of rust prevention primer and 2 coats rust prevention paint. Color shall be flat black. Paint shall be Rustoleum or equal.

1.10 MISCELLANEOUS IRON WORK

A. Furnish and install all miscellaneous iron work including, but not limited to, piping hangers, piping anchors and guides, ductwork supports, roof top unit, and air handling unit supports, roof mounted condenser supports and all other equipment supports. All additional structural members shall be furnished and installed to support the heating, ventilating and air conditioning equipment without excessive stress or strain on the building construction. Structural beams and other structural members shall be furnished and installed under this Contract for anchors and guides where the building steel is not available or capable of supporting or anchoring pipe lines and equipment. Wide flange frames for major roof equipment shall be ASTM A992, hot dip galvanized to ASTM A123. All steel hardware shall be hot dipped galvanized according to ASTM A153. This includes roof duct supports. The HVAC Contractor shall hire a qualified independent testing agency to visually inspect all field welds. The testing agency shall submit a report, which shall be issued to the Engineer for review. All deficiencies shall be rectified prior to acceptance or approval of work.

B. All equipment and materials furnished and installed under this Contract which are not mounted on bases or floors shall be securely attached and supported from the main supporting structure of the building by metal hangers, clamps and/or brackets. Metal hangers, clamps and/or brackets shall be of suitable design and of sufficient strength to properly and safely support the materials and equipment involved. Lag screws and bolts shall be used where required at wood construction.

C. Materials

1. Structural steel members for the support of equipment installed under this Contract shall conform to ASTM Specifications A-36 and shall comply with the latest requirements of the American Institute of Steel Construction. Structural steel shall be of standard sections as given in the structural steel manufacturers' handbooks.

D. Priming

1. All steel and iron work shall be primed with Rust-Oleum X-60, or approved equivalent. Before priming all metal shall be thoroughly cleaned free from scale, rust, and dirt.

2. All steel supports (inside the building) shall be painted by the H.C. provide one coat of rust prevention primer and 2 coats rust prevention paint. Color shall be flat black. Paint shall be Rustoleum equal.

E. Anchors

1. The Contractor shall provide all anchors, bolts, screws, dowels, and connecting members and do all cutting and fitting necessary to secure the work to adjoining construction. Build in connecting members to masonry, concrete, and structural steel as the new and remodeling work progresses.

F. Supports and Brackets

1. Supports and brackets shall be neatly constructed of structural shapes to adequately support the equipment intended. All supports must be approved prior to installation. Field conditions will regulate the type of support.

1.11 FLASHINGS

A. The Contractor shall furnish and install roof curbs as required for his equipment.

B. The Contractor shall furnish and install equipment rails and pipe portals as required for his equipment.

C. Flashings and final roofing shall be done by the Roofing Sub-Contractor working for the HVAC Contractor under the HVAC contract. Flashings and final roofing shall be done by the approved roofing sub-contractor on the existing roof. All roof warranties must be maintained.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTORS, STARTERS AND SELECTOR SWITCHES

A. Electric Motors

1. All electrical motors furnished and installed under this Contract shall be manufactured by Reliance, General Electric, U.S. Motors, or approved equivalent and shall be of the proper type and frame of the services involved in accordance with the NEMA and Equipment Manufacturer's recommendations. Motors shall be "energy efficiency" type with 1.15 service factor. Motor windings shall be all copper. Where possible, motors shall be permanently lubricated. Where motors must be lubricated, the manufacturer shall furnish the services of a representative to review the lubrication procedure with the Contractor and the Owner and turn over to both of them all of the necessary maintenance literature. Motors and installation shall conform with all applicable requirements of the National Electrical Code. Motors shall be suitable for across-the-line or reduced voltage starting as applicable in each instance. Provide the Electrical Contractor with all motor data to properly size wiring. The HVAC Contractor shall be responsible for any additional costs to the Electrical Contractor resulting from any changes in motor sizes initiated by the HVAC Contractor, from sizes scheduled on the Drawings.

B. Manual Motor Starters

1. Manual motor starters shall be furnished by this Contractor, for installation by the Electrical Contractor, for single phase fractional horsepower (1/2 horsepower and smaller) motors. Provide all motor electrical characteristics to the Electrical Contractor so the Electrical Contractor may size wiring.

C. Magnetic Motor Starters - Full Voltage

1. Furnish to the Electrical Contractor for installation combination full voltage magnetic starters and fused disconnect switches for all 3 phase motors with service factors of 1.15. Starters shall have three (3) current overload relays and low-voltage release. Starters shall be furnished with hand-off-automatic switch, red run light, overload reset, a set of extra auxiliary contacts consisting of one (1) normally open and one (1) normally closed contacts and a control transformer with 120 volt fused secondary control circuit and fused primary circuit. Starter enclosure shall be NEMA 1 enclosures. Furnish Allen-Bradley

Bulletin 512 starters or equivalent as manufactured by Square D, General Electric or Siemens. Disconnect switches shall be horsepower rated to match the horsepower of the motors plus 1.15 service factors connected thereto as required.

2. Where starters are separately mounted, they shall be of the magnetic type as herein specified.

3. All magnetic motor starters for motors connected to the normal/emergency electrical distribution system shall be provided with an adjustable time delay unit. Time delay unit shall be capable of delaying motor starting from 0 to 180 seconds.

4. All motor starters shall be provided with phase loss protection relays integral to starter.

D. Hand-Off Automatic (H.O.A.) Selector Switches

1. Furnish and deliver to the Electrical Contractor for installation hand-off-automatic selector switches where shown or required and shall be the type that can be changed in the field from two positions and vice versa. Switches shall have padlocking attachment that will permit locking in either the manual or automatic positions. Switches shall be furnished with NEMA Type 1 enclosures where installed remote from starter. Provide Allen-Bradley three (3) position switches, Bulletin 800S-R35X with 800S-N1 padlocking attachment or equivalent as manufactured by Square D, General Electric or Siemens.

E. Safety Switches

Safety Switches shall be furnished by this Contractor for installation by the Electrical Contractor.

1. Safety switches shall be of the fusible or non-fusible type as indicated, quick-make, quick-break in NEMA Type 1 sheet steel enclosure unless otherwise noted. Switches shall be horsepower rated, and of size and number of poles as indicated on the Drawings. Safety switches shall be of type having a direct mechanical linkage between contacts and operating handle. Safety switches shall be as manufactured by Cutler-Hammer, General Electric, or Square D Company. Fuses for all switches shall be of the UL Class RK-5 Low Peak as manufactured by the Bussmann Mfg. Division of the McGraw-Edison Company. Fuses for motors shall be sized to conform with the motor running current and in strict accordance with the recommendations of the fuse manufacturer.

2. Where switches are located at the exterior of the Building or in wet locations, they shall be provided with NEMA 3R or 4 weather tight and weather resistant enclosures. Enclosures for switches located in hazardous areas shall be of the appropriate explosion proof type.

3. Switches used as service entrance switches shall be Underwriters Laboratories listed suitable for Service Entrance Equipment.

2.2 ACCESS PANELS

A. The HVAC Contractor shall furnish and install factory-fabricated access panels for access to all concealed dampers, valves, and other equipment where no other means of access is available. Access panels shall be of appropriate size but not less than 24" flush type, hinged to drop down and out, screwdriver-operated, stainless steel in tile work and prime coated sheet steel in plaster or acoustical tile of all types. The HVAC Contractor shall furnish and install access

panels in new and existing construction. Exact locations and sizes of panels shall be determined by the HVAC Contractor, but panels shall be located for a symmetrical appearance. Access panels are not required at lift-out removable tile ceilings. Where access panels are provided in hard ceilings, paint access panels to match existing ceilings.

B. At locations where access panels are installed in existing or new fire-rated construction, access panels shall contain the 1-1/2 hour fire-rated "B" label; and in addition, shall also be provided with layers of gypsum wall board in a thickness which will supply an additional one and two hour fire rating equal to the fire rating of adjacent construction.

C. Coordinate with the General Contractor on fire ratings of new and existing construction.

2.3 FIRE STOPPING

A. Seal openings of fire rated construction with a material or product that has been tested at an independent testing laboratory, such as UL, FM, etc. Fire stopping shall conform to ASTM E-814 and UL 1479, with fire ratings equal to or exceeding the fire rating of the construction involved. Fire stopping shall be UL classified, and shall be similar to the 3M brand Fire Barrier Penetration Sealing Systems, or approved equivalent. Fire stopping of this type shall also be utilized for openings through smoke rated construction.

B. If desired by the Contractor and approved by local codes, the "Pro Set" piping penetration system also may be utilized. Penetration system shall be UL certified and shall be the "Pro Set" System A. Firestop coupling (sleeve) shall be filled with ceramic fiber material to provide insulation and fire stopping. System shall be capable of maintaining a 3-hour fire rating. Penetration system shall be secure, waterproof, fire rated, and smokeproof and shall allow for pipe expansion and contraction.

PART 3 – EXECUTION

3.1 CLEANING

A. For cleaning, refer to the General Conditions of the Contract, Section 3.15, “Cleaning Up”.

B. At the completion of the work all parts of the installation shall be thoroughly cleaned. All strainers, vents, pumps, etc., shall be cleaned of all dirt. All temporary replaceable air filters shall be removed and new replaceable air filters shall be installed after the areas have been cleaned for occupancy. The system shall be operated for a sufficient period to remove all grease, metal cuttings, and other foreign matter from the system.

C. Any stoppage or any discoloration or other damage to any part of the building, its finish or furnishings due to the Contractor's failure to properly clean the piping, shall be repaired by the Contractor without cost to the Owner.

D. All hot water and chilled water system piping, circulating pumps, boilers, chillers and water passages shall be cleaned by circulating mixtures of a non-acid cleaner (Tempest) through the systems. Refer to Section 232510 – Closed Loop Water Treatment for details.

E. Fill, vent, and circulate system with the solution. Allow solution to reach design or operating temperatures if possible. After system has been circulated for four hours, system shall be drained completely and refilled with fresh water. The system shall be thoroughly vented of all air.

F. All equipment installed under this Contract, and furnishings and finishes soiled or damaged due

to the work included under this Contract shall be thoroughly cleaned as required to remove plaster, dust, paint splashes, labels and debris.

3.2 INSTRUCTIONS TO OPERATING PERSONNEL

A. The Contractor and his subcontractors shall satisfactorily complete the systems so that they are functional and operating to the satisfaction of the Architect. All systems, their controls and their sequencing must be demonstrated to the satisfaction of the Architect.

B. The Contractor shall furnish the services of qualified personnel, approved by the Architect and thoroughly familiar with the completed installation to instruct the permanent operating personnel in the proper operation of all systems included under this Contract and the proper care of all equipment and apparatus. These services shall be furnished for a period of one 8-hour day after the operation of the building has been taken over by the Owner.

C. When instructions are provided under this Contract, the Contractor shall have in his possession three copies of an identifying letter which shall list the names of the Contractor's qualified instruction personnel including manufacturers' representatives and subcontractors that will be giving instructions. Likewise on the same letter, spaces shall be provided for the Owner's personnel who will receive the instructions. After instructions have been given and received for each system, the Contractor's representatives and subcontractors shall sign and date the letter, and the Owner's personnel shall sign and date the letter acknowledging that they have received adequate instructions for operating and maintaining the systems and equipment. One signed copy shall be delivered to the Owner, one copy to the Architect, and one copy shall be retained by the Contractor.

D. In addition to the verbal instructions outlined above, the Contractor and his manufacturers' representatives and subcontractors shall furnish written basic instructions indicating the proper operation of each system and associated equipment. Each manufacturer shall also submit a brochure on his equipment including instructions on operation, lubrication, recommended spare parts, and instructions on preventative, routine, and breakdown maintenance. All brochures and formats must be approved by the Architect.

E. The Contractor shall combine the written instructions and the manufacturers' equipment brochures in complete volumes with hard back binders which shall be turned over to the Owner before final payment of the Contract work. The Contractor shall furnish the Owner with three (3) complete sets of the manuals indexed by equipment and by manufacturer. The Contractor shall obtain two copies of a signed receipt from the Owner for the written instructions and equipment brochures. One copy of the receipt shall be delivered to the Architect and one copy retained by the Contractor.

F. It is the intent that this entire system with its complement of equipment and auxiliary equipment operate properly in accordance with the design concept and functional intent. It is also the intent that the Owner be given complete instructions for the proper operation and maintenance of the entire system.

3.3 RECORD DRAWINGS

A. The Contractor shall maintain a complete set of blue-line prints at the site and shall record all deviations in his work (in RED ink or pencil) from that indicated on the Contract Drawings. Dimensions must be recorded using permanent reference points such as columns, building walls and like items. These record drawings must be turned over to the Owner prior to final payment.

3.4 WARRANTY

A. Warranties for HVAC work shall be one (1) year from date of final payment. Refer to the General Conditions of the Contract, Section 3.5, “Warranty”, for more details.

B. Certain equipment shall be warranted or guaranteed for longer than one (1) year from date of final payment where specifically mentioned in these specifications.

3.5 COORDINATION DRAWINGS

A. Coordination

1. Each Contractor shall familiarize himself with the drawings and specifications of all other contracts relating to this project and shall coordinate with, and be held responsible for his Work which is affected by or dependent on, other contracts.

2. Each Contractor shall provide any dimension, coordination, sleeve, insert, embedded or built-in item, and/or information which is required to be built into, or to complete, the work of another contract in a manner consistent with the Approved Project Schedule. Any additional cost or delay damages arising from a contractor’s failure to so furnish or provide shall be borne by that contractor.

B. Coordination Drawings and Procedures

1. Each Contractor shall prepare composite shop drawings and field installation layouts for his work as directed by the Architect to solve tight field conditions except as modified in Paragraph 3 below. Such drawings shall consist of dimensioned plans and elevations and shall give complete information, particularly to size and location of sleeves, attachments, openings, conduits, ducts, boxes and structural interferences.

2. These composite shop drawings and field installation layouts shall be coordinated in the field among the Contractors to verify the proper relationship to the work of other Contractors based on field conditions, and shall be checked for accuracy and approved by the Contractors as directed by the Architect before submission to the Architect.

3. HVAC, Plumbing, Fire Protection and Electrical Work shall be coordinated as indicated by the following procedure. Each Contractor shall sign each coordination drawing after all work has been laid out and conflicts resolved. The preparation of coordination drawings and layout Work on the coordination drawings shall be performed at the site by each Contractor.

a. The HVAC Contractor shall prepare a CAD drawing of each area, at a scale of 1/4” inch equal 1'-0", showing his work plan and elevation. The HVAC Contractor shall layout and show light fixtures on the drawings.

b. The CAD Drawings referred to in 3. a. above shall then be forwarded to the next succeeding Contractor for layout of their work in the field in the following order; (a) PLUMBING AND FIRE PROTECTION; (b) ELECTRICAL; (c) INTERIOR CONSTRUCTION.

c. By use of color coding, and layering each succeeding Contractor shall show his work on the referenced CAD Drawing and shall sign same to indicate his satisfaction that there is no interference between his work and that of other Contractors. Colors will be assigned by the HVAC Contractor.

d. When all work has been shown and signed off, the HVAC Contractor shall forward each CAD Drawings to the Architect, for review and approval. Copies of approved CAD drawings shall be distributed to the contractors, Architect, and the Owner by the HVAC Contractor.

e. The color coded transparency shall be kept at the Architect's field office for future reference in the event of conflict between the trades. At the completion of the project, all color coded transparencies shall be delivered to the Owner for his records.

f. Coordination drawings shall be completed within 30 days of the start of Contract. No installation work will proceed until ALL contractors have signed off and agreed to the coordination drawings.

C. Meetings

1. Coordination meetings to resolve interferences in the Work will be held at the site in an area to be provided by the Architect. Representatives of each Contractor shall be present at each meeting. Each Contractor shall provide all necessary resources to insure that the coordination process described herein does not delay the Approved Project Schedule.

D. Each Contractor acknowledges that there may be items of Work which have not been drawn, coordinated, clarified or specified with complete detail in the Contract Documents but which are required for the completion of the Work, as inferable from the Contractor Documents. Any such item, when identified as part of the development of the Work, shall be drawn, coordinated, clarified or specified by the Architect in a manner consistent with contemplated kind, quality and customary standards and provided to the Contractor. When such drawing, coordination, clarification or specification is approved by the Owner, the drawing, coordination, clarification or specification so approved shall thereupon be part of the Contract Documents and the item of Work shall be performed by the Contractor as part of the Work without further action or order of the Owner and without any increase in the Contract amount or time as if such drawing, coordination, clarification or specification were originally included in the Contract Documents.

E. Coordination drawings shall be provided for review prior to any installations. Should installation start prior to issuance of coordination drawings, the contractor shall be responsible for any and all changes at no additional cost to the project. This includes provisions of window pockets, bulkheads, and relocation of any and all utilities including work of other prime contractors.

END OF SECTION 230510

SECTION 230511 - RESTORATION AND RETROFIT – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK IN PRESENT BUILDING

A. All work shall be coordinated with the work of other trades and shall be performed in accordance with the Schedule and as required by the Architect and the Owner. The Contractor shall review the phasing schedule and comply with sections of this schedule.

B. The HVAC Contractor shall disconnect and remove existing equipment no longer required and furnish and install new equipment as shown, herein specified and as required to form complete new systems.

C. The Contractor shall visit the site to determine exact locations, sizes and quantities of present equipment and ductwork which must be removed. The HVAC Contractor will be held responsible for the disconnection and removal of existing heating and ventilating systems as noted and the installation of all new piping, ductwork and equipment complete in every detail and in accordance with the phasing schedule.

D. Existing ductwork, piping and conduit for the heating system no longer required and concealed in walls, pipe tunnels, crawl spaces or above fixed ceilings and not interfering with new construction or remodeled work may remain and shall be capped, abandoned and rendered "dead."

E. The Contractor shall arrange the new hangers and supports so that new pipe lines and other equipment are <u>not</u> suspended from the same joists and structural members as present lines and equipment. Hangers and supports shall be arranged to distribute the weight of the new lines and equipment uniformly on the present structure. Additional new structural members shall be furnished and installed as necessary to safely support the new lines and equipment.

F. New ductwork, piping, etc., shall be concealed above the new and existing ceilings. As noted and shown, only piping and ductwork noted as below ceiling can remain exposed.

G. At certain locations, existing ductwork and equipment shall be disconnected and removed, and new piping, ductwork, and equipment shall be furnished and installed under this contract above existing ceilings. The HVAC Contractor will be responsible for restoring the existing ceilings to their present condition where they are removed or damaged by the work included under this Contract. The HVAC Contractor shall also be responsible for repair work to the existing ceilings, as required to maintain the fire rating of the existing ceiling.

H. The Contractor shall clean up the areas as the work progresses and remove all waste and debris daily or when directed.

I. The Contractor shall perform all cutting and patching required for the installation of new piping, ductwork, and equipment, and for the removal of present equipment as herein specified. The HVAC Contractor shall be responsible for maintaining the structural integrity of the Existing

Building where areas such as load bearing walls, and floor construction are patched and repaired under this Contract. All patching shall be done subject to the approval of the Architect. The HVAC Contractor will be responsible for entrance of all new equipment into the building, and for the removal of existing equipment from the building, and for the cutting, patching and repairing of existing construction.

J. Existing useful equipment and materials shall remain the property of the Owner and shall be loaded, handled, unloaded and stored at the site where directed by the Owner and Architect. Equipment shall be stored as complete units with all associated accessories and auxiliary equipment. Equipment shall be disconnected and carefully removed under this Contract and shall be transported to the storage areas as directed. Equipment shall be stored in a neat and workmanlike manner, tagged and identified for future use. Equipment not desired by the Owner shall become the property of the Contractor and shall be removed from the site.

K. In a similar manner, all removed pipe, fittings, hangers, ductwork, grilles, wire and other scrap metal materials and equipment shall be delivered and stored on site where directed by the Owner and Architect.

L. Removed insulation and other nonessential miscellaneous materials and equipment no longer required, or desired by the Owner shall not be reused as a part of the new installation, but shall become the property of the Contractor and shall be immediately removed from the site. The HVAC Contractor shall give due consideration and credit in his proposal for present materials and equipment which will become his property. Existing removed equipment remaining the property of the Contractor shall be dismantled and cut in sections as required for removal from building.

1.3 REMOVAL AND DISPOSAL OF HEALTH HAZARDOUS MATERIALS

A. All asbestos removal work shall be performed by the abatement contractor prior to the start of each construction phase of the project.

B. The HVAC Contractor shall immediately report the presence of any asbestos to the Architect. No asbestos removal is to be included under this Contract.

C. Note that the abatement contractor will be abating portions of floors, fire proofing above the ceilings, and other areas of the building to support HVAC work. This Abatement will happen per phase throughout construction. The HVAC contractor is required to coordinate with the abatement contractor on a room by room basis to ensure that abatement is sufficient to demolish old equipment and install new equipment. The HVAC contractor shall provide sufficient time as required to coordinate with the abatement contractor on a room by room and phase by phase basis as required to complete project. This coordination shall be included in the HVAC contractors bid price.

1.4 CUTTING AND PATCHING

A. The Contractor shall do all cutting and patching for the removal of existing piping, ductwork and equipment and the installation of new piping, ductwork and equipment in the Existing Building.

B. New openings in walls, floors, and partitions for pipe lines, ducts, hangers, supports, and other equipment in the Existing Building shall be provided by this Contractor for the new and remodeled installation. New openings in existing construction and the repair of such openings for the entrance of new heating, ventilating and air conditioning equipment into the building or

for the removal of existing heating and ventilating equipment from the building shall be included in the HVAC Contract. Openings in existing exterior walls shall be cut by the HVAC Contractor. Openings in existing roofs shall be the responsibility of this Contractor.

C. Wherever it becomes necessary to cut out any portions of walls, floors, ceilings, or other portions of the building as may be required to perform the work under this Contract, the Contractor shall do all necessary cutting and fitting, shall remove all excess material, and shall replace all damaged work so as to leave the premises in a finished condition. No cutting shall be done which may in any way affect the building structurally or architecturally without first securing the consent and approval of the Architect. Any damage incident to cutting or other causes in the performance of this Contract shall be made good by replacement or repairs in a manner satisfactory to the Architect. The Contractor must use extra precaution so as not to disturb the bearing quality of existing walls or other construction.

D. Where present equipment is removed and unused openings remain in walls, floors, partitions, etc., the HVAC Contractor shall properly patch and paint all such openings to match their immediate surroundings.

E. All patching and repairing shall be done by workmen skilled in this type of work and shall match present or new finishes.

F. All cutting performed under this Contract shall be done in a neat and workmanlike manner. The size of each new opening shall be kept to minimum size. The location of each new opening must be approved by the Architect before the opening is drilled or cut.

G. Where existing ceilings and walls and similar construction are penetrated for the installation of new hangers, supports, and other equipment, the Contractor shall repair the openings with fireproof materials to maintain the fire rating of the ceiling or wall construction, or similar construction.

H. Patching and repairing shall be done to match present construction and finishes in materials, color, and texture. All cutting, patching, repairing, and painting shall be performed by workmen skilled in that type of work. All patching shall be completed to a neat, finished condition. When providing final painting of patched areas, entire wall or ceiling shall be painted corner to corner and top to bottom so that the entire wall or ceiling is painted. Painting of existing walls or ceilings will <u>not</u> be necessary unless the walls or ceilings are patched and repaired under this Contract.

1.5 DUST, DIRT, AND NOISE

A. The Contractor shall do all cutting and patching and shall make all changes, relocations, and installations with a minimum of noise.

B. All present and new equipment, floors, walls, etc., shall be adequately protected from dust and dirt caused by the work. Protection shall include suitable temporary barriers or coverings. The exterior and interior premises of the building shall be kept as clean as possible during construction. At no time shall the Contractor interfere with the normal operation of the School by allowing debris, etc., to remain on the premises. Contractor shall use industrial type vacuum cleaners for removal of plaster, dust, etc. in the Present Building.

PART 2 – PRODUCTS

2.1 NOT APPLICABLE

PART 3 – EXECUTION

3.1 NOT APPLICABLE

END OF SECTION 230511

SECTION 230512 - HVAC ALTERNATE BIDS

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions", "Special Requirements" and "General Requirements" form a part of this section by this reference thereto and shall have the same force and effect as if printed herewith in full.

1.2 SCOPE

A. Base Bid shall include all labor and materials to complete the project as shown on working Drawings, as herein specified and as covered by complete Contract Documents.

B. Bids shall be entered in the proper spaces of Proposal for Contract.

C. See applicable sections of the specifications for labor and materials involved in each Alternate Bid.

D. Amount shown in bid for each alternate shall include the making of all changes and the installation of all materials and equipment necessary to the accomplishment of the alternate requirements in accordance with the Contract Documents.

1.3 RELATED ALTERNATE BIDS

A. It shall be this Contractor's responsibility to secure and review the related alternate bids for all of the other separate contracts for this project. The Contractor shall understand the extent of work added or deleted from all contracts and shall properly coordinate his work to provide a complete and workable system. Plans and Specifications for all contracts are available for viewing or purchase as defined in "Instructions to Bidders".

1.4 ALTERNATE BID H-1: NEW PACKAGED DEHUMIDIFICATION AIR HANDLING UNIT

A. Alternate Bid H-1 shall be the amount **added to or deducted from** the base bid to provide one new packaged dehumidification air handling unit (DAHU-1) in lieu of an air handling unit (AHU-1). Refer to drawings and specifications for all work pertaining to this alternate.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 – EXECUTION

3.1 NOT APPLICABLE

END OF SECTION 230512

SECTION 230519 - PIPING SPECIALTIES – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The piping specialties for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 GAUGES AND THERMOMETERS

A. Furnish and install all pressure gauges and thermometers as herein specified. All pressure gauges shall be calibrated at the site by the Contractor at the same point of connection. Separable wells shall be installed by the Heating Contractor at each location.

B. All pressure gauges shall be 4-1/2" diameter.

C. Pressure gauges shall be adjustable to zero to compensate for static water pressure. Gauge dial ranges on the water systems shall be graduated 0 to 100 psi with 10 psi figure intervals and 1 psi graduation, for the water system. Accuracy of each gauge shall be 1/2 of 1% over entire scale range. Cases shall be cast aluminum with black finish and chrome ring. Pressure gauges shall be of the bronze bourdon tube type with 4-1/2" diameter dials similar to the 500X Series, each with No. 872-2 pressure snubber, and No. 735-2 needle valve as manufactured by Trerice, Ashcroft, Weksler, or approved equal.

D. Thermometers shall have 9" scales, adjustable angle non-mercury thermometer with "A" Series brass stem. Range for hot water lines and equipment shall be 30 degrees F. to 300 degrees F. Thermometers shall each have a stainless steel front with glass cover and shall be provided with a suitable stainless steel separable socket. Thermometers shall be the BX Series, adjustable angle type, as manufactured by Trerice, Ashcroft, or approved equal.

E. Stem lengths shall range between 30% and 50% of inside diameter of piping, and wells shall be arranged to accommodate stems.

F. Thermometers and gauges shall be installed in a manner that will allow them to be easily read from the operating floor.

G. In lieu of installing a multiple number of pressure gauges at circulating pumps, the Contractor shall have the option of installing one pressure gauge of type herein specified mounted on a multiple port manifold valve constructed of brass and suitable for 175 psig working pressure. Manifold valve shall be furnished with spring return pushbutton ports with 1/4" O.D. compression unions, mounting bracket and capped test port connection for gauge calibration. Furnish and install Type L 1/4" O.D. copper tubing with flared connections from manifold valve ports to locations on pump casing and piping where pressure gauges would normally be installed, generally where indicated on the Drawings. Furnish and install screwed connectors,

compression union and shut-off valve at each connection to piping or pump casing. Copper tubing shall be installed in a neat workmanlike manner and shall be properly supported. Manifold valves shall be mounted on system piping at convenient location to permit easy access for pushbutton operation and pressure gauge observation. The manifold valve shall be as manufactured by Flow Conditioning Corp., or approved equal.

2.2 FLOW METERING SYSTEM

A. Furnish and install complete Venturi flow metering system as manufactured by Gerand, Aeroquip Corporation/Barco Division, FDI, or approved equal.

B. The system shall be a coordinated system and shall include Venturi flow stations in mains and branches at locations noted and a portable meter supplied by one manufacturer. Each Venturi station shall be complete with quick disconnect valves and safety shutoff valve, metal identification tag on chain, giving pipe size, Venturi series, station identification and meter reading at specified flow rate. Venturi stations shall be one-piece brass screwed 1/2" through 2". Sizes 2-1/2" through 10" shall consist of zinc or cadmium plated steel with welding end or Victaulic grooved ends. Size 12" and larger shall be fabricated steel with welding ends. Venturi size and series shall be selected so that design flow rate shall be between 10" and 90" of water pressure differential with permanent pressure loss of not more than 1.0 foot head. Flow stations shall be of the "Self-Cleaning Type". Flow metering system other than the Venturi self-cleaning type, will not be acceptable.

C. Pressure-sensing lines on flow stations in the Mechanical Equipment Room shall be extended along wall with disconnect valves located 5'-0" above floor for convenience of instrumentation.

D. Master meter shall consist of a 6" round dial, dry type bellows meter supplied with scale reading from 0" to 100" of water differential pressure and shall be mounted in a portable water and rotproof fiberglass carrying case, complete with two 10'-0" lengths of 1/4" diameter high-pressure - high-temperature connecting hose, quick disconnect socket valves, venting valves, installation and operating instructions and capacity curves. Master meter shall become the property of the Owner. The indicating pointer shall traverse a 270 degree arc for proper readability.

E. In addition to Venturi flow stations at locations shown on the Drawings, the Contractor shall furnish and install combination pressure and temperature taps on supply and return lines at all terminal equipment and at other locations indicated on the Drawings. Pressure and temperature taps at each location shall consist of a 1/4" NPT fitting to receive either a temperature or a pressure probe 1/8" O.D. The fitting shall be solid brass with two (2) self-closing valve core of Nordel suitable for a temperature of 275 degrees F. and pressure rating of 1,000 psig, fitted with a yellow color-coded and marked cap with gasket. Fitting shall be the "Pete's Plug" Model 110XL, as manufactured by the Peterson Equipment Co., Inc. or approved equal. Fitting shall be capable of passing a no-leakage test by a recognized testing laboratory for a minimum of 80 insertions during a five day period at a pressure of 100 psig and temperature of 240 degrees F.

F. Furnish and deliver to the Owner, a separate Test Kit consisting of a 0-200 psi, 0-230 foot of water pressure gauge with a 1/8 inch O.D. gauge adapter attached, a 0 degree F. to 220 degrees F. pocket testing thermometer, and a protective carrying case. The Contractor shall also supply the Owner with two additional pressure gauge adapters (Model 500XL) with 1/8" O.D. probe and four five inch stem pocket testing thermometers graduated 0 degrees to 220 degrees F. All of the above components shall be as manufactured by Peterson Equipment Co.,

Inc., or approved equal.

2.3 FLEXIBLE CONNECTORS

A. Flexible pipe connectors shall be full-size of pipe and shall have stainless steel bellows with stainless steel wire braiding and flanged ends. Connectors shall be floated free of any pipe or equipment weight, and shall be so designed to minimize pipe vibrations and harmonic hums. Connectors shall be suitable for 1/4" offset. Flexible connectors shall have a minimum water working pressure of 150 psi and shall be Type F/J/R as manufactured by Thermo-Tech, Inc., Flexonics, or approved equal.

B. Couplings shall be floated free of any pipe or equipment weight, and shall be so designed and installed to effectively minimize pipe vibrations and harmonic hums and per manufacturer's recommendations.

2.4 ELECTROLYSIS CONTROL

A. All copper tubing installed or connected under this Contract shall be installed in such a manner that the tubing will not touch or come in contact in any way with ferrous metals. Where copper tubing, piping or fittings are anchored, guided, supported or may come in contact with ferrous metal construction, an insulating nonconductor spacer, similar to rubber or fiber, shall be installed to assure prevention of electrolysis.

B. Copper tubing lines shall not be (even temporarily) supported or secured to ferrous metals. When copper tubing or piping is connected to ferrous piping or equipment, connections shall be made with dielectric unions, couplings or fittings, as manufactured by Epco Sales, Inc., Walter Vallett Company, Watts Regulator Co., Clear-Flow, or approved equal.

2.6 EXPANSION TANKS

A. Furnish and install ASME constructed and equipped expansion tanks as indicated for the hot and chilled water systems. Tanks shall be supported with rod and angle supports and hung from existing structure.

B. Tanks shall be furnished with necessary tappings and shall be equipped with gauge glass, air charging type hose and drain valve, and air control fitting and, where required, air vent tube. The tank supply line from the system shall be fitted with a gate type shut-off valve to facilitate draining the tank individually. Expansion tanks shall be Extrol diaphragm type or approved equivalent.

C. Tanks shall be pre-charged to pressure indicated on Drawings. The installation must conform with the requirements of the Pennsylvania Department of Labor and Industry, including the installation of a relief valve.

2.7 AIR ELIMINATOR AND DIRT SEPARATOR

A. Acceptable Manufacturer:

1. American Wheatley (Basis of Design)

2. Peerless

3. Taco

4. Caleffi

B. Furnish and install as shown on the drawings a coalescing type air eliminator and dirt separator on the hot and chilled water systems.

D. Pipe size is not a factor and all units should be selected at the point of peak efficiency per the manufacturer's recommendations.

E. All combination units shall be fabricated steel, rated for 150 psig working pressure with entering velocities not to exceed 4 feet per second at specified GPM.

F. American Wheatley "HVAD" units specifically designed for high velocity systems may have an entering velocity of up to 10 feet per second.

G. Units shall include an internal bundle filling the entire vessel to suppress turbulence and provide high efficiency. The bundle must consist of a copper core tube with continuous wound copper medium permanently affixed to the core. A separate copper medium is to be wound completely around and permanently affixed to the internal element.

H. Each eliminator shall have a separate venting chamber to prevent system contaminants from harming the float and venting valve operation. At the top of the venting chamber shall be an integral full port float actuated brass venting mechanism.

I. Separator shall have the vessel extended below the pipe connections an equal distance for dirt separation.

2.8 CHEMICAL FEEDER (ONE SHOT TYPE)

A. Furnish and install on the hot and chilled water piping systems, where shown, a "One-Shot" chemical feeder. Feeder shall be complete with tank, wide mouth opening, shutoff valves, drain valve, flow indicator, and nipples.

B. Feeder shall have a capacity of 2-1/2 gallons, and shall be as manufactured by the State Chemical Company or approved equal and shall be installed in strict accordance with the manufacturer's recommendations. Contact Mr. Chris Cascino at 814-242-7542.

C. The Contractor shall have a chemical analysis made of the heating system water, cooling system water and raw building water. Water analysis shall be made after complete system has been cleaned. Two copies of each water analysis along with two copies of the treatment recommended, shall be furnished, one copy delivered to the Owner and one copy delivered to the Engineer. The analysis shall be made by State Chemical Company or approved equal chemical manufacturer.

D. Chemicals for the initial filling of the systems shall be purchased by the Contractor through State Chemical Company or approved equal. All chemical containers shall be marked with the chemical name and appropriate hazard warnings as required by OSHA 29, CFR 1910.1200.

2.9 BACKFLOW PREVENTERS

A. Backflow preventers 2" and under: Reduced pressure type consisting of two independently

operating, spring loaded, “Y” pattern check valves and one hydraulically dependent differential relief valve. The device shall automatically reduce the pressure in the “zone” between the check valves to at least 5 psi lower than inlet pressure. Should the differential between the upstream and the zone of the unit drop to 2 psi, the differential relief valve shall open and maintain the proper differential.

B. Use bronze mainline valve body and caps including relief valve body and cover. Use center stem guided check valve moving member. Internally locate hydraulic sensing passages within the mainline and relief valve bodies and relief valve cover. Construct check valve and relief valve components so they may be serviced without removing the valve body from the line.

C. Rate the device at 175 psi water working pressure and water temperature range from 32° F. to 140° F. Bronze body and trim. Stainless steel springs. Provide air gap drain assembly.

D. Meet the requirements of ASSE Standard 1013; AWWA Standard C506-78 and USC Foundation for Cross Connection Control and Hydraulic Research, Sixth Edition.

E. Install valves as indicated in diagram on the drawings and be as specified herein.

F. Backflow preventers 2-1/2” and larger: Reduced pressure type, consisting of two separate spring loaded “Y” type check valves and one differential relief valve having two diaphragms separated by a spacer. Locate relief valve port below the lowest portion of the first check seat. This device shall automatically reduce the pressure in the “zone” between the check valves. Should the differential between the upstream and the zone of the unit drop to 2 psi, the differential relief valve shall open and maintain the proper differential.

G. Construct check valves and the differential relief valves so they may be serviced without removing the device from the line.

H. Cast iron bodies with internal epoxy coating and bronze trim. Stainless steel springs. Rated to 150 psi working pressure with water temperatures from 32° F. and 140° F. Provide air gap drain assembly.

I. Meet the requirements of ASSE Standard 1013, AWWA Standard C506-78, and USC Foundation for Cross Connection Control and Hydraulic Research, Fifth Edition.

J. Install valves as indicated in diagram on the drawings and be as specified elsewhere herein.

K. Backflow preventers for hose end valves: Brass construction and a primary check valve; atmospheric vent with drainage feature. Backflow preventer shall have a 3/4" standard female and male hose thread. Install backflow preventer on all hose end valves that do not have a vacuum breaker built in spout.

L. Acceptable manufacturers shall be Febco, Rockwell, Hersey or approved equal.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install all equipment per manufacturers recommendation and Best Industry Standards.

END OF SECTION 230519

SECTION 230523 - HVAC VALVES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The valves for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 VALVES AND ACCESSORIES

A. Furnish and install all valves and piping system accessories indicated on the Drawings or as required for proper operation of the systems. Unless otherwise specified, valve numbers in the Specifications are taken from the catalog of Nibco Co., and are intended to denote a standard of quality and type required. Comparable valves of other manufacturers, such as Fairbanks, Milwaukee, Apollo, Grinnell, Victaulic or approved equal will be acceptable. All valves shall be of one manufacturer, except where specified otherwise.

B. In general, ball valves and butterfly valves shall be used on water lines where the service requires valves to be wide open or tightly closed. Cocks shall be used where services require valves to be throttled. Valves in Mechanical Equipment Rooms shall be provided with chain operators to make valves accessible from the floor where valves are located out-of-reach of operating personnel.

C. All valves, except where specified otherwise shall be suitable for at least 150 psi water working pressure. All valves, except on small screwed lines, shall be flanged.

D. Gate valves 2" and smaller shall be bronze body, bronze-mounted, screwed pattern, solid wedge, inside screw, rising stem. Valves 2-1/2" and larger, shall be iron body, bronze-mounted, and flanged. Gate valves 4" and larger shall be O.S.& Y. pattern, iron body, bronze-mounted and flanged.

E. Iron body valves suitable for 125 psi SWP shall be as follows: Gate O.S. & Y. Figure No. F-617-0; Globe Figure No. F-718-B; and Check Figure No. F-918-B.

F. Bronze body valves suitable for a minimum of 125 psi SWP shall be as follows: Gate Figure No. T-111; Globe Figure No. T-211-Y or T-311-Y; Check Figure No. T-413-Y.

G. Valves on copper tubing water lines shall be solder end type as follows: Gate Figure No. S-113; Globe Figure No. S-211-YD; Check Figure No. S-413-Y.

H. Ball valves shall be installed on <u>all</u> water service lines 2" and smaller and shall be two-piece bronze body, bronze ball, with a conventional port, reinforced TFE packing (no "O" ring), with insulated operator, 400 psig WOG. Ball valves shall be suitable for -40 degrees F. to 350 degrees F. Ball valves shall be No. T-580 for threaded ends and No. S-580 for soldered ends

as manufactured by Nibco, Apollo, Watts, or approved equal.

I. Check valves at all pumps and on water piping 2-1/2" and larger shall be of type that controls surge pressures and resulting water hammer. Check valves shall be "Silent Check Valves" as manufactured by Metraflex Company, Miller Valve Co., Techno Corp., or approved equal. Valves shall be iron body, flanged, with bronze trim. Check valves on cold water supply piping shall be Watts Number 7 Series dual check.

J. Cocks at locations on water mains, isolation valve stations, pumps, and on water piping 2-1/2" and larger at terminal equipment, shall be the gland-packed type complete with resilient facing suitable to 250 degrees F. similar to DeZurik Series 100, Keystone "Ballcentric", or approved equal. Cocks 2" and smaller shall be DeZurik Figure 120, Keystone "Ballcentric", or approved equal suitable for 175 psi WWP and shall be provided with bronze bodies, screwed ends, stainless steel bearings, and resilient plugs. Cocks 2-1/2" and larger shall be DeZurik Figure 118, Keystone "Ballcentric", suitable for 175 psi WWP and shall be provided with cast iron bodies, nickel seats, flanged ends, and resilient plugs. Balancing cocks 4" and smaller shall be furnished with a hand lever operator. Balancing cocks 6" and larger shall be furnished with a quarter turn gear operator with hand wheel. All balancing cocks shall be furnished with a disc position/ over-travel indicator to provide visual indication of disc position and to simplify actuator adjustment.

K. Furnish and install one balancing cock at all water terminal equipment coils on 2" and smaller return piping. Balancing cocks shall be suitable for combined indicating, balancing, and tight shutoff. Valves shall be the "Circuit Setter" as manufactured by Bell and Gossett The "Mil-Balancer" as manufactured by Dunham-Bush, or approved equal. Valves shall be suitable for 200 psi water pressure, 240 degrees F. total temperature, and shall have full turn balancing device, lockable in any position. Valves shall be equipped with a visible indicating dial with screwdriver adjustment. Valves shall be repackable under pressure.

L. Butterfly valves shall be furnished and installed on all water lines 2-1/2" and larger. Valves shall be guaranteed for bubbletight shutoff and shall be complete with manual infinite throttling handle and position indicator. Valves shall be suitable for 150 psi WWP, shall be complete with stem seals, bronze bearings, bronze floating discs, Nordel seats suitable for high temperature (250 degrees F.) service, lug type cast iron body, and stainless steel stem. Butterfly valves shall be Fig. 660 as manufactured by DeZurik or HPR Series as manufactured by Nibco only. Bodies shall be furnished with tapped lugs and flange bolts to allow downstream piping to be disconnected leaving the valve in line to control the flow. Bolts shall be installed at each side of the lugs to allow downstream piping to be disconnected. Butterfly valves 4" and smaller shall be furnished with a hand lever operator. Butterfly valves 6" and larger shall be furnished with a quarter turn gear operator with hand wheel. All valves shall be furnished with a disc position/over-travel indicator to provide visual indication of disc position and to simplify actuator adjustment.

M. Furnish and install on cold water makeup piping to the hot and chilled water systems, water pressure reducing valves similar to the Watts Model U5 or U5LP, or approved equal, as required to provide automatic filling of the systems. Pressure reducing valves shall each be suitable for 200 psi WWP, with cast bronze body and bronze trim, sizes shown on the Drawings but not less than 3/4" size. Reducing valves shall be set at pressure indicated on the Drawings. The Heating Contractor shall connect to cold water outlet provided by the Plumbing Contractor.

N. Unions shall be 300 lb. malleable iron ground joint type with bronze-to-iron seat No. 7716 Walworth, or approved equal.

O. Furnish and install Y-type strainers. Baskets in strainers shall be stainless steel, 2" and smaller shall be No. 2O mesh, and 2-1/2" and larger shall have 1/8" diameter perforations. Each strainer shall have a full size gate valve on drain connection with drain line extended to funnel. Valves, nipples and strainer baskets shall be readily removable. Strainers 2" and smaller shall be bronze body, screwed or sweat ends as required, Sarco Type BT, Armstrong, or approved equal. Strainers 2-1/2" and larger shall be cast iron body, flanged, Sarco Type IF-125, Armstrong Type A1FL-125, or approved equal.

P. On all high point of water mains and on coils and other heating terminals furnish and install a 1/4" manual air vent with full sized gate valve. Air vent outlets shall be extended to accessible locations. Air vent outlets shall terminate over funnel or floor drains where possible. Where necessary, hose end adapters shall be provided on vent piping.

Q. Furnish and install on high point of each coil in each cabinet unit heater, unit ventilator, and radiant panel, one manual air vent similar to Dole No. 14, or approved equal. Vents shall be connected to coil vent tappings and extended to an accessible location in each cabinet. Vent tubing shall be coiled and outlet extended to a point near access door. All tubing within the cabinets shall be securely anchored.

R. Furnish and install on each horizontal delivery propeller type hot water unit heater, one automatic float type air vent, similar to Hoffman No. 79, or approved equal. Provide cock at each vent. Vents shall be suitable for 75 psig operating pressure.

S. Automatic air vents on lines at locations shown shall be the Armstrong No. 1-AV with petcock, Sarco No. 13W, Apco No. 50, or approved equal. Air vents shall have 150 psi cast bodies and stainless steel trim.

T. All low points of the piping system shall be provided with drain valves so that the complete system can be drained. Each downfed unit or other equipment shall be provided with drain valves. Drain valves shall be 1/2" with hose end and cap similar to NIBCO No. 73, or approved equal.

2.2 RELIEF VALVES (WATER SERVICE)

A. Relief valves shall be installed on water piping as required by local regulatory agencies having jurisdiction. Relief valves shall serve the dual purpose of relieving over-pressure created by thermal expansion and over-pressure in the form of water. Relief valves shall be ASME rated and shall be similar to Watts Series 174A and 740, Kunkle, Consolidated, or approved equal. Discharge of relief valves shall be pipe to funnel drains or floor drains.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install valves as described above and per manufactured recommendations.

END OF SECTION 230523

SECTION 230529 - HANGERS AND SUPPORTS – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The hangers and supports for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 HANGERS, SLEEVES AND PLATES

A. All new horizontal piping shall be hung from Building construction with suitable beam clamps inserts in concrete, extension rods, and adjustable band ring pipe hangers. Hangers and supports shall be arranged to distribute the weight of the piping and equipment uniformly on the Building structure.

B. Sleeves and inserts shall be installed in concrete. Sleeves shall be large enough to receive the insulation and jackets.

C. All necessary structural supports and inserts to hang all piping and equipment shall be provided by this Contractor. Hanger rods shall be securely attached to plates. Where cutting is required for the installation of hangers, piping and supports all openings must be neatly drilled by the Heating Contractor. Punching or chipping of concrete will not be permitted. All necessary openings shall be drilled in a location and manner satisfactory to the Engineer. All concrete damaged by the Heating Contractor shall be patched, reinforced or replaced as directed by the Engineer. Location of all holes, openings and sleeves shall clear reinforcing steel in floor and roof decks. The Heating Contractor shall coordinate all work with the Engineer and shall determine exact locations of all supports and openings, especially vibration isolation.

D. Furnish and install all structural steel members for the support of the piping, ductwork and equipment to suit the structural and vibration isolation conditions. The Contractor shall place all hanger and support inserts in concrete. Special studs "shot" into concrete will not be permitted.

E. All expansion shells shall be of the self-drilling types as manufactured by the Phillips Drill Company, Ramset, Rawlplug, or approved equal. Shells shall be the hammer installed, special flush or hanger rod types. Shells shall be installed with a drill-hammer. Lead expansion shields or lead wedge type shield will not be permitted.

F. Hangers for all steel piping shall be the Modern Hanger Government type hangers, Nos. 404 and 404A, complete with band hangers, adjusters and rods, Penn Pipe Hanger Co., Arrow Pipe Hanger Co., or approved equal. Hanger bands shall be flat and suitable for application of insulation over the hanger and pipe.

G. Hangers for all copper lines shall be the Modern Hanger No. 49, complete with all-copper bands, No. 121 copper-plated, malleable iron adjusters, and rods, Penn Pipe Hanger Co., or

approved equal.

H. Strap hangers, wire hangers, or split-ring hangers will not be acceptable. Clevis hangers are acceptable only as hereinbefore specified for copper tubing.

I. Insulation shall be installed over band hangers and all openings shall be sealed as hereinafter specified.

J. Hangers for pipe 1-1/2" and smaller in size shall be spaced not more than 6'-0" on centers, and hangers for pipe 2" and larger in size shall be spaced not more than 10'-0" on centers. Smaller pipe shall be provided with additional supports to prevent lines from sagging.

K. Beam clamps shall be fixed or adjustable as manufactured by Modern Hangers, Penn Pipe Hanger Co., Arrow Pipe Hanger Co., or approved equal.

L. Hanger rods installed in conjunction with hangers shall be not less than 3/8" for pipe sizes 1/2" to 2"; 1/2" for pipe sizes 2-1/2" and 3"; 5/8" for pipe sizes 4" and 5"; 3/4" for 6" pipe; and 7/8" for 8" to 12" pipe sizes. Hanger rods shall be larger where recommended by the hanger manufacturer.

M. Lines 2" and smaller supported on steel joists shall be hung from one joist with beam clamps. Lines over 2" and 3" in diameter shall be suspended from 1-1/4" steel pipe or steel angle, laid-in and hook-bolted to the web members of the joists. Lines 4" and 5" shall be supported from three joists. Lines 6" and over shall be supported from not less than four joists.

N. Lines along walls shall be supported on neat, substantial wall hangers securely attached to construction by means of inserts or expansion sleeves and bolts. Wall hangers shall be similar to Modern Hanger Corporation Fig. 285, Penn Pipe Hanger Co., Arrow Pipe Hanger Co., or approved equal.

O. All supports directly in contact with copper lines shall be all copper where possible or copper-plated where approved by the Engineer. Ferrous metals shall not be used in contact with copper lines. Hangers shall be all-copper as hereinbefore specified.

P. Where vertical pipes pass through floors in mechanical equipment areas, chases or pipe spaces, the Contractor shall construct watertight sleeves made up of a section of Schedule 40 steel pipe extending 2" above the floor.

Q. Where vertical pipes pass through floors in finished spaces, the Contractor shall construct watertight sleeves made up of a section of steel pipe of proper length to extend through masonry and terminate flush on finish side.

R. Where horizontal pipes pass through walls, sleeves shall be as specified above terminating flush with finish on each side.

S. Where vertical pipes pass through plaster or dry wall ceilings, sleeves shall be No. 18 gauge galvanized steel flush with ceiling.

T. Where piping is insulated, insulation shall be extended through sleeves. Sleeves shall be at least two sizes larger than the pipe or of suitable dimensions to allow the installation of pipe, insulation and sealant.

U. At all locations space between sleeve and pipe shall be filled with sealant to level of sleeve. Sealant shall be Dow Corning 3-6548RTV, or approved equal. Conform with manufacturer's recommended installation procedures.

V. Where exposed pipes pass through walls, floors or ceilings of finished rooms, furnish and install steel chromium-plated setscrew type floor, wall or ceiling plates.

W. Seal all openings through walls of air plenum spaces and relief air shafts, where ducts, pipelines, etc. are installed under this Contract to assure airtight plenum spaces. Coordinate all work with contractors of other trades.

X. Where pipes of any type pass through new fire and smoke barrier stops, ceilings, floors or walls, this Contractor shall thoroughly seal such openings with fire-rated sealant as required to maintain fire-rating of adjacent construction.

Y. Riser clamps with bolts and hex nuts shall be used for support of vertical lines in pipe spaces and other locations required.

Z. All pipe runs 3" or larger connected to mechanical equipment shall be mounted with steel spring isolators. The first three pipe hangers in the main lines near the mechanical equipment shall be Mason Industries type PC3ON (or equal). Horizontal runs in all other locations shall be isolated by Mason Industries type 30N (or equal) hangers. Floor supported piping shall rest on restrained mounts, Mason Industries type SLR (or equal). The first three hangers or mounts near the mechanical equipment shall have the same static deflection as specified for the mountings under the connected equipment. All other hangers and mounts shall have a minimum static deflection of 3/4".

AA. For vertical pipe runs, risers shall be suspended from or supported by steel spring isolators (Mason Industries type PC3ON hangers, type SLR mounts, or equal) and the piping anchored or guided by all-directional anchors (Mason Industries type ADA, or equal). Steel spring deflections shall be 3/4", except in those expansion locations where additional deflection is required to limit deflection or load changes to +/- 25% of the initial stress.

PART 3 – EXECUTION

3.1 INSTALLATION

A. All piping shall be supported from the building construction by the use of beam clamps, concrete inserts, brackets, or other equipment as dictated by the type of building construction.

B. Perforated band iron, wire or chain will not be permitted for hangers or supports of pipe.

C. Trapeze type hangers may be used for multiple parallel line installations. The Contractor shall submit sketches for the proposed hangers indicating the type of construction, number and size of lines, and maximum spacing to the Engineer for approval.

END OF SECTION 230529

SECTION 230548 - SOUND AND VIBRATION CONTROL – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The sound and vibration control for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 VIBRATION AND NOISE CONTROL

A. All equipment shall operate without objectionable noise or vibrations within Noise Criteria Curves listed in Sound and Vibration Control of the latest edition of the ASHRAE Handbook of HVAC Applications. Sound and vibration measurements shall conform with the ASHRAE Handbook of Fundamentals. If such objectionable noise or vibration shall be produced and transmitted to occupied portions of the building by apparatus, piping, ducts or other parts of this work, any necessary changes, as approved, shall be made without cost to the Owner. Noise levels shall conform with the requirements of OSHA.

B. All mechanical equipment shall be isolated in accordance with the Latest Edition of the ASHRAE Handbook of HVAC Applications. Piping for the first three (3) support points away from remotely located mechanical equipment shall be isolated with Type 2 Isolators with a minimum deflection of 1.0 inches. All vibration isolators shall be of the same manufacturer where possible and shall be furnished by Consolidated Kinetics, Korfund, Vibration Eliminator Co. or approved equivalent.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install vibration isolators, flexible connectors, etc. per manufacturers recommendations.

END OF SECTION 230548

SECTION 230553 - EQUIPMENT AND PIPING IDENTIFICATION – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The equipment and piping identification for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 VALVE TAGS

A. The Contractor shall tag each new valve, controller, and other devices requiring adjustment and affecting the performance of equipment furnished under this Contract. He shall prepare a list giving the number of each valve, its location, and the equipment or portion of the system tagged. The list shall be enclosed in a metal frame with glass and shall be hung where directed. Tags shall be of aluminum or brass, 2" in diameter with numbers as large as possible and attached by short, small link aluminum or brass chains or "S" hooks. Numbers and tags shall be coordinated with those being installed under the Plumbing Contract.

B. Prepare a typewritten list giving the number of each valve, its location, and the equipment or portions of the system controlled. The list shall be enclosed in a metal frame with glass. The list shall be hung at location directed by the Engineer.

2.2 EQUIPMENT IDENTIFICATION

A. Where valves, cleanouts, dampers, etc., are located above removable tile ceilings or above access panels the Contractor shall furnish and install identification labels on the corners of the access panels or removable ceiling tiles. Labels shall be provided with the word "VALVES," "RELAY," "DAMPER," etc., so that the equipment may be readily located in the future.

B. Identification labels shall not exceed 3" in length and 1" in height. Black letters shall be 1/4" high on white background. Labels shall be manufactured of engraved Micarta or Bakelite with pressure-sensitive backing and shall be nonabsorbent, nonporous and colorfast. Adhesive backing shall be chemically compounded to hold tight and fast at wide temperature extremes. Labels shall be as manufactured by Seton Name Plate Company, Brady Co., Kimball Systems, or approved equivalent. Labels shall be additionally secured with screws or rivets. Flexible plastic punched tapes will not be acceptable. Labels shall be coordinated with those being installed under other contracts.

C. All major pieces of HVAC equipment shall include, at a suitable and accessible observation point on the equipment, a manufacturer's stamped brass or aluminum identification plate, with all pertinent capacity data stamped on the plate. Identification plate shall include all specific data, such as model number, serial number, motor data, horsepower, capacities, sizes, amperes, power consumption, speed, flows in GPM, temperatures, working pressures, operating pressures, and similar factors as applicable. In addition, pumps shall include total

head in feet and impeller sizes.

D. The Contractor shall be responsible for furnishing and attaching an identification plate for the above mentioned major equipment if not provided by the equipment manufacturer.

E. Equipment marking tags shall be engraved phenolic, 1/16" thick, four edges binded, black with white lettering. The tag shall be securely mounted to the equipment with minimum of two (2) - 3/8" long No. 3 screws. Tags shall provide such information as: "Exhaust Fan - EF1", "Air Handling Unit - AHU 1" and include "date of installation and project number".

F. All starters and disconnects shall be tagged with the unit they serve (i.e. “EF-1”, “AHU-1”, etc.)

2.3 PIPING IDENTIFICATION

A. All piping insulated and uninsulated, installed throughout this Contract, shall be stenciled with the name of the service, such as HWS, HWR, CWS, CWR, CHS, CHR, etc., and with an arrow indicating the direction of flow.

B. Stenciled letters shall, in general, be plain black and shall be located near each branch connection, at each valve, at each change in direction, on each side of walls or floors, and at least every 20' on straight runs of pipe. On smaller runs of piping, center the designations. In lieu of stenciling, snap-around pipe markers by Seton Nameplate Co. "Set Mark", or approved equivalent may be utilized. Identification and colors shall comply with ANSI A13.1. Snap – around markers shall be suitable for exterior use where utilized.

C. Where pipes are adjacent to each other, markings shall be neatly lined up. All markings shall be located in such a manner as to be easily legible from the floor. Markings on black pipes shall be white.

D. All chilled water, hot water, domestic cold and hot water, chilled /hot water, and coil condensate drain piping shall be provided with identification symbols as follows:

Service	Symbol
Hot Water Heating Supply	HWS
Hot Water Heating Return	HWR

E. Refrigerant piping shall be provided with the identification symbols and color codes as follows:

Service	Symbol
Refrigerant Liquid	RL- (Refrigerant Type)
Refrigerant Suction	RS- (Refrigerant Type)
Refrigerant Hot Gas	RHG - (Refrigerant Type)

2.4 DUCTWORK IDENTIFICATION

A. All ductwork insulated and uninsulated, installed throughout this Contract, shall be stenciled with the name of the service, such as Supply, Return, Exhaust, Outdoor Air, Relief, etc., and with an arrow indicating the direction of flow.

B. Stenciled letters shall, in general, be plain black and shall be located near each branch connection, at each damper, at each change in direction, on each side of walls or floors, and at least every 20' on straight runs of duct. On smaller runs of duct, center the designations. In lieu

of stenciling, snap-around pipe markers by Seton Nameplate Co. "Set Mark", or approved equivalent may be utilized. Identification and colors shall comply with ANSI A13.1. Snap – around markers shall be suitable for exterior use where utilized.

C. Where ducts are adjacent to each other, markings shall be neatly lined up. All markings shall be located in such a manner as to be easily legible from the floor. Markings on galvanized ducts shall be black.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install per manufacturers recommendations.

END OF SECTION 230553

SECTION 230593 - TESTING AND BALANCING OF SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 TESTING, ADJUSTING AND DEMONSTRATION

A. All testing shall be as specified herein and in accordance with the aforementioned codes and best trade practices. All balancing shall be performed by an independent Testing and Balancing subcontractor with at least 5 years experience. The Test and Balance contractor shall be a member of the American Air Balance Council, or the National Environmental Balance Council. All balance reports shall be submitted on AABC or NEBC forms.

B. At the completion of the work and before final acceptance, the Test and Balance Contractor shall place all piping, ductwork and equipment in proper operation, adjust all equipment, valves and control systems and make all necessary corrections. All leaks, faulty equipment, poor workmanship shall be repaired or replaced by the installing Contractor. Cost to rebalance due to the above shall be by Mechanical Contractor.

C. With approved supervisory employees, the Contractor shall demonstrate to representatives of the Professional and the Owner that all systems and equipment perform in accordance with their specific use as a part of the overall system and in accordance with the Contract requirements as evaluated and interpreted by the Professional or his representatives. The demonstrations shall continue until the systems operate satisfactorily as determined by the Professional and his representative. The Contractor shall do whatever necessary corrective work is required to demonstrate and prove the systems and equipment perform in an approved manner.

PART 2 – PRODUCTS

2.1 NOT APPLICABLE

PART 3 – EXECUTION

3.1 BALANCING OF AIR AND WATER SYSTEMS

A. All equipment, hot water piping systems, air distribution systems, exhaust systems, and all other heating, ventilating, and air conditioning systems installed under this Contract shall be balanced. The Test and Balancing Contractor shall be held responsible for all balancing and adjusting work. Past performances and qualifications of the proposed balancing firm shall be submitted for review by the Professional. The Contractor must have past qualifications for balancing variable air volume systems.

B. The TAB Contractor shall furnish services for two (2) complete adjustments of the heating and cooling systems, air conditioning system and air distribution and control, and water balance for the first heating and first cooling season. (A written report must be made to the Professional after each visit.) Partial balance shall also be performed at each phase of the project.

C. During all tests, it shall be demonstrated that the systems will operate correctly. The HVAC

Contractor shall make final adjustments to all equipment and controls as may be required for proper operation, maintaining correct temperature in all parts of the building. Controls will be adjusted by the control system manufacturer's mechanics and authorized representatives on the advice of the Balancing Firm.

D. The TAB Contractor shall furnish all labor, and supervision and shall furnish all instruments and provide all instrumentation required to perform the balancing work.

E. The TAB Contractor shall submit three copies of a chart to the Professional indicating the GPM and the pressure drop through each coil of each unit after balancing is completed. Similar charts shall also be submitted for the air systems indicating the CFM at outlet or inlet of each grille, diffuser, and register.

F. The entire air balance shall be completed before the water balance is started.

G. The following work shall be included under the TAB Contract:

1. Supervise and perform the balancing of all water circulation systems and parts thereof installed under the Heating Contract to obtain the water quantities and temperature drops in all parts of the system in accordance with the system design concept and functional intent as determined by the Professional.

2. Supervise and perform the balancing of all air conditioning and ventilating systems to achieve the air quantities specified at each air inlet, outlet and damper shown on the Contract Drawings at the proper conditions of static pressure and temperature differential.

3. Enlist cooperation of equipment manufacturers where needed to obtain proper equipment performance.

4. Study and report on noise and vibration problems which may develop in the course of system balancing.

5. Submit separate reports on all water circulating systems, ATC system, and heating, cooling and ventilating systems. These reports shall certify test methods and instruments used, all readings obtained, temperature and pressure drops, RPM of equipment, amperage of all motors, air quantities at each outlet, supply, return, and air balancing problems encountered and suggestions. Reports shall be submitted to the Professional and shall include data on all tests in the form normally used by AABC; however, varied to suit these Specifications. Reports shall include fan curves for the final speeds developed from the fan manufacturer's performance test data for all major fans.

6. Balancing of heating systems shall be performed when outside temperature is averaging less than 30 degrees F. and on cooling systems when outside temperature is above 80 degrees F.

H. The TAB Contractor shall furnish all instruments and provide all instrumentations required to perform the above work; however, he shall submit to the Professional a list of the balancing equipment and instruments he intends to use. All equipment must be first approved before being used on the project.

I. The following is a list of the minimum instruments required:

1. Combination inclined-vertical manometer.
2. Differential pressure gauges.
3. Pitot tubes.
4. Hook gauges.
5. Magnehelic gauges.
6. Multi-point pyrometers.
7. Thermal anemometers.
8. Inclined manometers.
9. Insertion thermometers.
10. U-tube manometers.
11. Contact pyrometers.
12. Stethoscopes.
13. Velometer with probes.
14. Water pressure gauges.
15. Rotating vane anemometers.
16. Smoke bombs.
17. Clamp-on volt-ammeters.
18. Tachometers and tips.
19. Sling psychrometers.
20. Air pressure gauges.
21. Taps, tubing, valves, cocks, rubber tubing and like miscellaneous items.

3.2 AIR SYSTEM BALANCE REPORTS

A. The air systems set to handle the normal outdoor air quantity, the Testing and Balancing Contractor shall perform the following tests, compile information, and submit written reports to the Professional on the following:

1. Air Handling Equipment

a. Design Conditions

1) CFM Supply Air, and Exhaust Air (Each System)

2) Static Pressure

3) Motor HP

4) Fan RPM

5) Outlet Velocity

b. Installed Equipment

1) Fan Manufacturer, Size, Model Number (Supply and Exhaust)

2) Motor, Frame and Manufacturer

3) Motor Size/Model Number

4) Motor HP, Voltage, Phase, Full Load Amperage, RPM

5) Belt size/Model Number, and number of belts

6) Sheave size and make

7) Sheave bore size

8) Sheave keyway size

c. Field Test

1) Fan Speed

2) No load operation amperes

3) Fan motor operating amperes

4) Calculated BHP

d. Test for Total Air

1) Size of supply air, and exhaust air ducts

2) Number and locations of velocity readings taken, and static pressure readings taken

3) Duct average velocity

4) Supply Air CFM

5) Outside Air CFM

5) Exhaust Air CFM

2. Individual inlets and outlets (Diffusers, Registers and/or Grilles)

a. Identify each outlet or inlet as to location area and fan system.

b. Manufacturer and type

c. Size

d. Free area, core area or neck area

e. Required FPM and test velocity found for each

f. Required CFM and test results for each

B. Testing and adjusting of individual outlets shall be performed under procedures recommended by the manufacturers of the outlets. All outlets shall be set for air pattern required and all air dampers shall be adjusted and set for design CFM indicated. Any required changes in air patterns, settings, or any other miscellaneous changes necessary for achieving correct air balance, shall be provided under this Contract. Total CFM of all outlets shall agree with total CFM of all branches and the grand total shall agree with the air volume for the fans.

3.3 WATER SYSTEM BALANCE REPORTS

A. Water balance shall include all water systems installed under the HVAC Contract.

B. The Contractor shall perform the following tests, compile information and submit written reports to the Professional on the following:

1. Pumps

a. Design Data

1) GPM, Head

2) RPM, BHP

b. Installed Equipment

1) Manufacturer, Size

2) Type Drive

3) Motor HP, Volts, Cycles and Phase

4) Full Load Amperes

c. Field Test

1) Discharge Pressures: Full flow and no flow

2) Suction Pressures: Full flow and no flow

3) Operating Head and GPM

4) No load amperes (where possible)

5) Full flow amperes, no flow amperes

6) Calculated BHP

2. All heat transfer equipment.

a. Design Data

1) MBH specified, GPM specified.

2) Entering Water Temperature (E.W.T.)

3) Entering Air Temperature (E.A.T.)

4) Water Temperature Drop (W.T.D.)

5) Element Type Specified.

b. Field Test

1) Identify each element as to location.

2) Required water temperature drop.

3) Actual entering air temperature and water (GPM) through the coil.

4) Adjust element until required temperature drop is obtained.

3.4 AUTOMATIC TEMPERATURE CONTROL COORDINATION

A. The ATC Contractor shall provide software to be loaded on the Balancing Contractor's computer for use in balancing the VAV system. The Balancing Contractor shall be responsible for delivering his computer to the ATC Contractor's office to have the software loaded and at the same time receive two hours of training on proper use of the software package. During the project, the ATC Contractor shall provide an additional two hours of telephone support to the Balancing Contractor on proper use of the software package. At the end of the project, the Balancing Contractor shall be responsible for delivering his computer back to the ATC Contractor's office to have the balancing software deleted.

B. The ATC Contractor shall include in his bid the services of his on-site technician time to aid the Balancing Contractor in using the DDC system to configure required modes of operation for testing purposes. This time shall be scheduled with the ATC Contractor in advance of the actual need date.

C. The TAB Contractor shall assist the ATC Contractor to establish the outdoor air reset schedule endpoints for AHUs without outdoor airflow stations. The BMS shall use a reset schedule to reset the minimum outdoor air damper position based on supply fan speed. There shall be two

Minimum OA Damper Positions, one when the unit is at full speed and the second when the unit is at approximately half speed. These two points allow the control to linearly reset the position of the OA damper in response to fan speed. When the unit goes into the Occupied mode of operation, the BMS shall monitor the speed of the supply fan and open the Outside Air damper to a calculated minimum position based on the fan speed. This minimum position shall vary as the speed of the fan changes. The damper shall remain at this calculated position as long as the unit is in the occupied mode, and the economizer is not suitable for cooling.

END OF SECTION 230593

SECTION 230700 - HVAC INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The insulation for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 PIPE AND EQUIPMENT INSULATION

A. Air Separator for the hot water systems, expansion tank for the hot water systems, shall be covered with 1-1/2" thickness rigid fiberglass insulation with a density of 6 pounds per cubic foot. Insulation shall be similar to the Owens-Corning Fiberglass Board, or approved equal. Board insulation shall be cut and mitered as necessary to fit the shape of the tank and shall be banded in place in strict accordance with the manufacturer's requirements. All joints shall be pointed with insulating cement. Insulation for the chilled water separator shall be covered with a vapor barrier jacket with all seams overlapped and sealed with Foster Spark Fas Adhesive, Nonflammable Brush, 85-20 vapor barrier adhesive and vapor barrier tape. Vapor barrier jacket shall have a vapor transmission of approximately .02 perms. A heavy 1" mesh galvanized wire screen shall be placed over the insulation and jacket, and insulating cement shall be applied in two 1/4” thick coats to form a total thickness of 1/2” over all parts. Last coat of insulating cement shall be mixed with equal parts of Portland cement and troweled smooth to give a hard surface when completed. A flameproof 8 oz. canvas covering shall be neatly placed over the insulating cement and sealed in place with Foster Seal Fas Coating 30-36. The entire installation of the chilled water air separator and expansion tank shall be free from condensation and shall be complete in all respects.

B. All Concealed, and Exposed Hot Water Supply and Return Piping 1-1/2" and smaller, shall be covered with 1" thickness glass fiber pipe insulation with white Type ASJ jacket. End and transverse joints shall be wrapped with factory-furnished sealing strips of same material as jackets. All horizontal laps and end joints shall be sealed down with Foster 85-20 adhesive. Piping larger than 1-1/2" shall be covered similar to the above except insulation thickness shall be 2".

C. Cold Water Makeup Piping within the Building to the various systems shall be insulated as specified above for hot water mains. Vapor barrier shall be included with the jacket. All joints and overlaps shall be thoroughly sealed down. All fittings, flanges and connections shall be insulated as herein specified for chilled lines with thickness equal the adjoining pipe insulation.

D. All seams, overlaps and end joints shall be thoroughly sealed down with Foster 85-20 or 85-75 vapor barrier adhesive as required. Ends of all pipe insulation shall be sealed off at all valves, fittings, flanges and every 20'-0" on straight runs with Foster Tite-Fit Coating, White 30-35. The entire installation shall be sealed and free of condensation.

E. All insulation shall be applied with Bostitch outward clinched staples, one every 3" and four at

each butt strap.

F. All Fittings on Concealed and Exposed Hot Water piping shall be insulated with fiberglass, factory-fabricated pipe fitting insulators the full thickness of pipe insulation. Insulation fittings shall be held in place with glass gauze wired on or stapled. Gauze shall be covered with a fire-resistant white coating applied in two equal coats in the amount of four gallons per each 100 sq. ft. by brush or spray to entire fitting surface similar to Foster 30-35. Coating shall be covered with a flameproof canvas sealed in place. Canvas shall be wrapped on and sealed with Foster flame resistant sealer. Cloth shall be applied after coating has dried.

G. Fittings on cold water makeup lines shall be insulated similar to that specified above. All joints and overlaps shall be sealed down. Where fitting joins vapor barrier jacketing, complete vapor seal by embedding a four inch wide strip of vapor barrier cloth. Coat shall be Tite-Fit Coating so that the membrane is completely covered.

H. Flanged and Union Connections and Valves on Hot Water piping shall not be insulated; however, insulation shall be neatly tapered at flanges, unions and valves with insulating cement, and held in place by flameproof canvas wrapped on and pasted, as specified for fittings. Flanges and union connections and valves on cold water piping shall be insulated similar to that herein specified for chilled water lines except thickness shall be equal to the adjacent pipe insulation.

I. All Fittings, Flanges and Valves on Concealed and Exposed Chilled Water Piping shall be insulated with Insul-Coustic Insul-Sure or approved equal premolded fiberglass fittings. Premolded fittings shall be held in place with glass reinforcing cloth and insulating cement. Cloth shall be covered with a fire-resistant white vapor barrier coating applied in two equal coats in the amount of four gallons per each 100 square feet by brush or spray to the entire surface. Vapor barrier coating shall be Foster 30-35, or approved equal. Coating shall be covered with 8 oz. flameproof canvas jacket sealed in place. It is the intent of these specifications that all piping and equipment in contact with the chilled water be insulated for such use. This includes pump casings, valves and any other item where condensation is expected.

J. In lieu of premolded insulation fittings, the Contractor will be permitted to insulate pipe fittings with mitered and segmented fiberglass pipe insulation with all elbows and changes of direction mitered, segmented and rounded to a thickness equal to the adjacent insulation, and thoroughly sealed and wrapped. Square cornered mitered joints will not be permitted. Field applied mitered and rounded insulation shall be held in place with reinforced glass cloth and vapor barrier insulating cement applied as specified above for premolded fittings. Coating shall be covered with 8 oz. flameproof canvas jacket sealed in place.

K. Insulation shall be continuous at all hangers and supports on all piping. Extend insulation over pipe and hangers and thoroughly seal joint with a permanent pliable vapor barrier sealer such as Foster Elastolar Sealant, Aluminum 95 X 44, or approved equal.

L. All insulation shall be applied over clean dry surfaces with the pipe at approximately room temperature. The installations shall be sealed and shall be free of condensation.

M. All fittings including tees, 90 degree fittings, 45 degree fittings, etc., shall be covered in strict accordance with the recommendations of the manufacturer of the premolded insulators. All joints and overlaps at fittings shall be buttered with fire resistant vapor barrier sealer.

N. Premolded one-piece PVC insulated fitting covers, with factory-precut and marked fiberglass All-Temp insulation, as manufactured by Zeston, Inc., will be acceptable in lieu of the premolded fittings hereinbefore specified. Insulation shall fully cover the fitting and the covers shall be stapled and taped in place. Tapes shall be off-white and shall be of the pressure sensitive type furnished by the fitting manufacturer. Bands are not permitted. All ends shall be overlapped. Fittings on chilled water and cold water, piping shall have all edges sealed with Zeston Fire-resistant vapor barrier adhesive. The circumferential edges shall be wrapped with Zeston fire-resistant vapor barrier sensitive Z-tape. The tape shall extend over the adjacent pipe insulation and have an overlap on itself at least 2" on the downward side. Chilled water fittings shall have at least two layers of factory-precut All-Temp insulation inserts. All installations shall be sealed and free of condensation. Fittings shall be installed in strict accordance with the fitting manufacturer's recommendations and details. Twine shall be used for securing insulation at chilled water and cold water installations.

O. Pipe Hangers on chilled water piping shall be insulated separately in the same manner as fittings. The insulation shall be applied upward along the vertical hanger rod to a point not less than 6" above the pipe and sealed off in a neat and symmetrical manner. 1/2” thickness Armaflex FR flexible tubing insulation may be used in lieu of fiberglass at pipe hangers. Riser clamps and other supports directly in contact with chilled water piping shall be thoroughly insulated similar to that specified above.

P. Structural members and metal supports or equipment in direct contact with chilled water piping shall be insulated separately with 1-1/2” thick fiberglass blankets with vapor barrier jacket, securely fastened and covered with 8 oz. flameproof canvas. The insulation shall be applied along the members to a point not less than 6" above the pipe and sealed off in a neat and symmetrical manner. Venturi flow stations shall be insulated similar to the above, except at meter connections. Exposed disconnect valves and shutoff valves shall be wrapped with anti-sweat tape and covered with 8 oz. flameproof canvas.

Q. Air conditioning unit drip pans, chilled water pump heads, unit casings, cooling coil frames, and other surfaces subject to sweating, if not factory insulated, shall be thoroughly insulated with 1" thick fiberglass insulation with vapor barrier and cover to prevent condensate from forming. Temperature control valves installed in conjunction with the chilled water system shall be insulated to prevent condensation. All valves and accessories above ceilings and other locations shall be insulated as required to prevent condensation.

R. Branch piping in confined equipment spaces where approved by the Engineer, may be insulated with 3/4" thickness Armaflex FR fire resistant flexible tubing insulation if desired. All ends and joints shall be thoroughly sealed. Armaflex FR flexible tubing insulation shall not be installed in any other locations.

S. Where certain thicknesses of premolded fitting insulators are not available from the manufacturer, the fitting insulation shall be one size smaller than the pipe insulation and shall be built up to the correct thickness with vapor barrier cement. Where necessary, fitting shall be mitered and segmented to a thickness equal to the adjacent insulation and shall be sealed and wrapped. All premolded fittings shall be installed to the satisfaction of the Engineer, and shall be removed and replaced at the direction of the Engineer where the installation is not completed in a neat and workmanlike manner. Premolded fittings shall have all surfaces level, smooth and uniform without bulges, changes in thickness or uniformity.

T. Pipe covering shall not be installed on flanged or screwed fittings until connections have been tested and are free of leaks.

U. Insulation on piping shall extend full size through oversized floor, ceiling or wall sleeves. All piping in all locations shall be fully insulated except where specifically mentioned otherwise.

V. Glass cloth, fireproof canvas, vapor barrier sealer and adhesive shall be of types which can suitably be painted.

W. Thermal conductivity of fiberglass insulation shall not exceed the following:

1. At 250 degrees F mean temperature "K" = .32 Btu/Hr/Sq.Ft./In./Degrees F.

2. At 100 degrees F mean temperature "K" = .26Btu/Hr/Sq.Ft./In./Degrees F.

X. Fiberglass insulation shall be as manufactured by Owens-Corning, CSG Corp., Johns-Manville, or approved equal.

Z. In lieu of sealing all-service jackets with a field applied vapor barrier adhesive, the Contractor may use factory applied pressure sensitive laps provided the pressure sensitive laps are guaranteed to remain sealed for the life of the insulation. Guarantee letters must be submitted in triplicate from the insulation manufacturer and the Heating Contractor. In lieu of the lifetime guarantee, the Contractor may use factory applied sensitive laps and additionally staple all overlaps as hereinbefore specified.

2.2 DUCT INSULATION (DUCT LINER)

A. All rectangular and round low and medium pressure heating and air conditioning supply and return air ducts shall be lined as follows: Ductwork shall be lined with 1.5” thick insulation with a minimum R value of 6.0. All duct lining shall be not less than 1-1/2 lb. density glass fiber with neoprene fire-resistant coating or mat facing. All coatings shall meet the requirements of NFPA No. 90A. Insulation shall have a noise reduction coefficient of not less than 0.70. Duct lining shall be moistureproof, fire-resistant, verminproof and shall have a low coefficient of friction. Insulation shall be installed in all duct runs complete to air outlets or inlets.

B. All transfer air ducts shall be lined similar to the above, except insulation thickness shall be 1/2". Exhaust ducts and relief air shall not be lined.

C. Duct liner may be "formed" for all ducts with largest dimensions not exceeding 12". Ducts shall be lined by carefully adhering the insulation liner in a continuous piece to clean flat metal sheets with a quick-tacking, rubber based adhesive, spread over the entire duct surface and forming the liner with the metal through the brake. Coated side of the duct liner shall face the air stream. Liner shall be additionally attached to the interior of the ducts by means of weld pins installed through the insulation into the ductwork and spaced not over 18" on centers, but not less than two rows per side. Weld pins shall not be used on aluminum ductwork. All exposed edges of insulation shall be covered with adhesive and tape. Gripnails will be acceptable for attaching duct liner to ductwork. Liner installation shall also conform to published SMACNA Standards.

D. Duct liner shall be individually "cut" for all ducts with largest dimensions exceeding 12". Ducts shall be lined by cutting pieces to fit snugly to the interior of the duct surfaces. The liner shall be fastened to the duct with a heavy coat of quick-tacking, rubber-based adhesive spread over the entire duct surface. The top and bottom pieces shall lap the side pieces, and all exposed edges of the insulation at the duct ends shall be covered with adhesive and tape. Individually "cut"

insulation shall be additionally attached to the duct with washers and sheet metal screws or weld pins, as hereinbefore specified. Coated side of liner shall face the air stream.

E. Where ductwork is to be lined with insulation, duct dimensions indicated on the Drawings are inside the insulation. Shape and location of ducts may be changed to suit building conditions, but equivalent area must be maintained.

F. Duct liner shall be as manufactured by Owens-Corning, Knauf, Certainteed Corp., Manville Products, or approved equal.

G. For all medium pressure ductwork, duct liner installation shall include the following:

1. Longitudinal joints in liners shall be coated with adhesive.

2. Metal nosing shall be used on upstream edges of liner at every transverse joint.

2.6 CONDENSATE DRAIN INSULATION

A. Furnish and install fiberglass insulation with vapor barrier for the condensate drain piping systems, all locations, exposed and concealed. All insulation and insulating materials shall be as manufactured by Owens-Corning Company, Knauf, Manville, or approved equivalent. Insulation adhesives, sealers, cements, mastics, and other similar items shall be manufactured by Foster, Childers, Vimasco, or approved equivalent. Thickness shall be 1”. Application of insulation materials shall be in strict accordance with manufacturer’s recommendations.

B. The complete installation of insulation shall be completed by an Insulation Subcontractor experienced in commercial work, responsible to the HVAC Contractor.

C. Materials: All materials shall conform to the following:

1. Piping insulation shall be "heavy density," 1-piece molded fiberglass with factory applied type ASN/SSL "All Service" jacket with self-sealing lap. Average thermal conductivity shall not exceed .25 BTU-in. per square foot per degrees Fahrenheit per hour at a mean temperature of 75 degrees.

2. The insulating system, including insulation, jacket adhesives, mastics and cements, shall have composite fire and smoke hazard ratings as tested under procedure ASTM E-84, NFPA 255, and UL 723, not exceeding:

a. Flame Spread: 25

b. Fuel Contributed: 50

c. Smoke Developed: 50

3. Fittings shall also be 25/50/50 rated as described in the preceding paragraph.

D. Installation: Piping Systems

1. All insulation shall be continuous. Insulation shall be maintained with a continuous unbroken vapor seal. Hangers, supports and equipment shall be insulated and vapor sealed to prevent condensation.

2. All covered pipe shall be located a sufficient distance from walls, other pipes, ductwork, and other obstacles to permit the application of the full thickness of insulation specified; and if necessary, extra fittings and pipes shall be used.

E. Fittings: Fittings and valves shall be insulated with a fiberglass blanket, 1 pound per cubic foot density wrapped firmly under compression (minimum 2:1) to a thickness equal to the adjoining insulation, secured with No. 20 gauge galvanized annealed steel wire and given a smoothing coat of "asbestos-free" insulating and finishing cement and a vapor barrier sealer. Insulated fitting covers, by Zeston, Proto, Speedline, or approved equivalent, will be acceptable.

2.7 REFRIGERANT PIPING INSULATION

A. Insulate refrigerant suction and hot gas piping with 1" thick flexible foamed tubing insulation.

B. Elastomeric Foam: Conforming to ASTM C 534; flexible, cellular elastomeric, molded or sheet.

1. Thermal Conductivity (K value) of 0.255 at 75 degrees F. Mean temperature.

2. Maximum Service temperature of 220 degrees F.

3. Maximum Flame Spread of 25; up to and including 3/4" thickness; per ASTM E 84.

4. Maximum Smoke Developed of 50; up to and including 3/4" thickness; per ASTM E 84.

5. Connection using waterproof, vapor retarder adhesive as needed; Halstead Contact Adhesive or equal.

6. All refrigerant pipe insulation exposed to the weather, shall be painted with the (2) coats of UV protective paint as recommended by insulation manufacturer.

PART 3 – EXECUTION

3.1 INSTALLATION

A. All insulation (except duct liner) shall be installed by an Insulation Subcontractor responsible to the Heating Contractor. All insulation shall be installed in a neat and workmanlike manner by workmen skilled in the installation and handling of commercial and industrial insulation for piping and equipment.

B. The materials, finish and adhesive herein specified, shall be listed and inspected by Underwriters Laboratories Incorporated. Covering, vapor barriers, and adhesives used in this application shall have a flame spread classification of not more than 25 and a smoke developed rating of not more than 50, based on tests in accordance with ASTM Standard E84-61, "Methods of Tests for Surface Burning Characteristics of Building Materials," except as hereinafter specified. Each product shall bear the label Underwriters Laboratories. All products used on this project shall be classified as "non-combustible" by NFPA.

C. Manufacturers' names are indicated herein to denote a standard of quality and type only. Products of other manufacturers not mentioned herein will be acceptable providing they meet the requirements of these Specifications in quality and type.

D. Insulation shall not be applied to any piping or equipment until all pressure tests have been performed and approved by the Engineer. All surfaces shall be clean and dry when insulation is installed.

E. All piping located in walls, in pipe chases, in crawl spaces, or above ceilings shall be considered as concealed. All other locations shall be considered as exposed unless otherwise specified herein.

F. All insulated piping (including piping with vapor barrier jacket) shall be wrapped with factory applied ASJ all-service jackets securely sealed in place with Foster fire-resistant sealer. All-service jackets shall be heavy density, white, suitable for operating temperatures from –60 degrees F. to +450 degrees F., with vinyl coated and embossed vapor barrier laminate. All-service jackets shall be the Owens-Corning Fiberglass ASJ-25, or approved equal. All-service jackets shall have a vapor transmission rating of approximately .02 perms.

G. All piping furnished and installed under this Contract shall be insulated unless specifically indicated otherwise.

END OF SECTION 230700

SECTION 230800 - COMMISSIONING OF HVAC SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

A. General

1. This specification covers commissioning of mechanical systems which are part of this project.

2. Furnish labor and material to accomplish complete HVAC commissioning as specified herein. Complete interim commissioning (for each phase of work) of HVAC systems during initial season operation and follow-up commissioning of required HVAC systems during additional season operation. This shall include all follow-up commissioning once the entire system (all phases) balancing and energy management programming is complete. Refer to phasing plans for the different phases of work.

3. The HVAC Contractor shall hire a certified Commissioning Agent as a sub-contractor to perform commissioning duties. The Commissioning plan shall be submitted as part of the submittal process. The use of the HVAC Contractor's or ATC Sub-Contractor's in-house staff shall NOT be permitted.

B. Definitions

1. Commissioning: the process of ensuring that systems are designed, installed, functionally tested and capable of being operated and maintained to perform in conformity with the design intent. The commissioning begins with planning and includes design, construction, start-up, acceptance, and training, and can be applied throughout the life of the building.

2. Commissioning authority: the designated person, company, or agent who implements the overall commissioning process.

3. Commissioning Plan: A document defining the commissioning process, which is developed in increasing detail as the project progresses through its various phases.

4. Commissioning report: the document that records the results of the commissioning process, including the as-built performance of the HVAC system and unresolved issues.

5. Commissioning specification: the contract document that details the objective, scope, and implementation of the construction and acceptance phases of the commissioning process as developed in the design-phase Commissioning Plan.

6. Commissioning team: those people responsible for working together in carrying out the commissioning process.

7. Design intent: a detailed explanation of the ideas, concepts, and criteria that are defined by the owner to be important. This typically is an expansion of the information provided in the Owner's Program.

8. Design intent document: a detailed written document, evolving throughout the commissioning process, clearly defining items and criteria of the design intent.

9. Functional performance testing (FPT): the process of determining the ability of the HVAC system to deliver heating, ventilating, and air-conditioning services in accordance with the final design intent.

10. Systems Manual: a composite document that expands the scope of the operation manual and maintenance manual by including the additional information gathered by the commissioning process.

11. TAB: Testing Adjusting and Balancing.

12. Verification: that full range of checks and tests carried out to determine if all components, subsystems, systems, and interfaces between systems operate in accordance with the contract documents. In this context, “operate” includes all modes and sequences of control operation, interlocks and conditional control responses, and specified responses to abnormal or emergency conditions.

C. Purpose

The commissioning is a process and its purpose is:

1. to clearly document the design intent

2. to verify that the systems installation and performance is in accordance with the plans, specifications and design intent.

3. to train the owner’s operators so that they fully understand the design intent and the operation and maintenance requirements of the equipment.

D. Scope of Work during Construction Phase

1. review submittals;

2. finalize details of the Commissioning Plan;

3. conduct periodic commissioning team meetings;

4. observe construction, installation, start-up, operation, and testing and balancing; and

5. conduct O&M training.

E. Scope of Work during Acceptance Phase

1. verify the accuracy of the final TAB report,

2. verify that the HVAC system complies with the contract documents,

3. identify and document deficiencies,

4. remedy deficiencies and verify,

5. submit verification report to the commissioning team to review,

6. do functional performance testing,

7. identify and document deficiencies,

8. remedy deficiencies and retest,

9. submit functional performance tests to the commissioning team to review,

10. establish an as-built record of the HVAC system performance,

11. complete the as-built records,

12. complete the commissioning report,

13. complete the Systems Manual, and

14. turn over the building to the Owner

F. Systems to be Included in Commissioning Process

All HVAC systems, sub-systems, and equipment included in Division 23, and not only limited to the following, shall go through commissioning:

1. Hot Water Condensing Boiler

2. Air distribution systems (air handling units)

3. Terminal heating equipment (horizontal unit heater)

4. Exhaust systems

5. Automatic temperature control

6. Hot water pump

7. Blower coil units and condensing units

1.2 QUALITY ASSURANCE

A. Reference:

1. ASHRAE Guideline 1.1-2007: HVAC&R Technical Requirements for the Commissioning

Process

2. ASHRAE Application Handbook – 2011: Chapter 43 – Building Commissioning.

3. ASHRAE Guideline 4-2008: Preparation of Operating and Maintenance Documentation for Building Systems.

1.3 ROLES AND RESPONSIBILITIES

A. Commissioning Authority

1. Develop the commissioning requirements and all related testing, verification and quality control sections.

2. Prepare the mechanical commissioning program required as part of the Commissioning Specification. Include lists of all contractors for commissioning events by name, firm, and trade specialty.

3. Execute the mechanical commissioning program, through organization of all tests, meetings, demonstrations, training events and performance verifications described in the Contract Documents and the approved HVAC commissioning program. Organizational Responsibilities include preparation of agendas, attendance lists, arrangements for facilities and timely notification to participants for each commissioning event. The Commissioning Authority shall act as chairman at all commissioning events and assure the execution of all agenda items. The Commissioning Authority shall prepare minutes of every commissioning event and send copies to all those in attendance and the Owner within 5 work days of the event.

4. Review the design documents for their effect on the commissioning process and the final performance of the HVAC system. The includes ensuring that appropriate commissioning guidelines have been followed, and that there are adequate devices included in the design to ensure the ability to properly test, adjust and balance the systems, and to document the performance of each piece of equipment and each system. Any items required but not shown shall be brought to the attention of the Contractor prior to submittal of shop drawings.

5. Review all submittals (e.g. equipment, ductwork, piping, automatic controls, and TAB procedures) for their effect on the commissioning process and the final performance of the HVAC system.

6. Schedule the Construction Phase coordination meeting within 90 days of the award of the contract, at some convenient location and at a time suitable to the Contractor and Design Professional. This meeting shall be for the purpose of reviewing the complete mechanical commissioning program and establishing tentative schedules for mechanical system orientation and inspections, O&M submittals, training sessions, system flushing and testing, job completion, test, adjust and balance (TAB) work and verification and functional performance testing.

7. Schedule the initial Owner training session so that it will be held immediately before the

mechanical system orientation and inspection. This session shall be attended by the Owner's O&M personnel, the mechanical Contractor, the Design Professional, and the Commissioning Authority. The Design Professional shall conduct this session giving an overview of the system, the system design goals and the reasoning behind the selection of the equipment.

8. Conduct periodic inspections of work in progress to ensure that all systems are installed according to specifications.

9. Conduct the Mechanical system orientation and inspection following the initial training session. The Mechanical system orientation and inspection shall be conducted by the mechanical Contractor. The emphasis of this Mechanical system orientation and inspection shall be an observation of the equipment location with respect to accessibility. Prepare minutes of this meeting, with separate summary of deficiency findings by the Owner and Commissioning Authority. Distribute to attendees and the Owner.

10. Receive and review the Operation and Maintenance (O&M) manuals as submitted by the contractor, ensuring that they follow the specified outline and format. Insert systems description as provided by the Design Professional.

11. Adequate accessibility for maintenance and component replacement or repair is the Contractor's responsibility and shall be checked by the Commissioning Authority.

12. Witness equipment and system start-up and testing. Ensure the results are documented (including a summary of deficiencies), and incorporated in the O&M manuals.

13. Prior to initiating the TAB work, the Commissioning Authority shall meet with the Owner, mechanical Contractor, Design Professional, and TAB Contractor. The TAB Contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority. Ensure that the TAB Contractor has all forms required for the job database and understands their importance and use.

14. Schedule the O&M training sessions. These training sessions are to be attended by the Owner, Commissioning Authority, Design Professional, Contractors and equipment suppliers as necessary. The format shall follow the outline in the O&M manuals. This mechanical system orientation and inspection should include hands on training.

15. Submit detailed verification test procedures and data sheets for review by the Design Professional.

16. Submit detailed FPT procedures for review and acceptance by the Design Professional.

17. Upon receipt of notification from the Design Professional that the mechanical systems have been completed and are operational, the Commissioning Authority shall proceed to verify the TAB report and operation of the control systems in accordance with the Commissioning Specification.

18. Conduct Verification tests.

19. Submit verification test data for review to the Design Professional for review and acceptance.

20. Provide detailed checklists data sheets to document verification tests.

21. Provide and install calibrated test instrumentation to monitor and record data as necessary.

22. The Commissioning Authority shall certify that the mechanical systems are ready for Functional Performance Testing.

23. Conduct Functional Performance Tests.

24. Submit functional performance test report for review to the design professional.

25. Re-test if performance deficiencies are found, corrected and additional testing is requested.

26. Review as-built drawings for accuracy with respect to installed systems. Review revisions to achieve accuracy.

27. Ensure that the O&M manuals and all other as-built records have been updated to include all modifications made during the construction phase.

28. Repeat Functional Performance Tests to accommodate seasonal tests and/or correct any performance deficiencies. Revise and re-submit the commissioning report.

29. Prepare the final commissioning report.

30. Assemble the final project documentation which shall include the commissioning report and all as-built records. Submit this documentation to the Design Professional for review and acceptance.

B. Mechanical Contractor

1. Include cost of commissioning requirements in the contract price.

2. Include requirements for submittal data, O&M data, and training in each purchase order or sub-contract written.

3. Ensure cooperation and participation of specialty sub-contractors such as sheet metal, piping, refrigeration, water treatment, and TAB

4. Ensure participation of major equipment manufacturers in appropriate training and testing activities.

5. Attend Construction Phase coordination meeting scheduled by the Commissioning Authority.

6. Assist the Commissioning Authority in all verification and functional performance tests.

7. Prepare preliminary schedule for mechanical system orientations and inspections, O&M manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, TAB and task completion for use by the Commissioning Authority. Update schedule as appropriate throughout the construction period.

8. Attend initial training session.

9. Conduct mechanical system orientation and inspection at the equipment placement completion stage.

10. Update drawings to the record condition to date, and review with the Commissioning Authority.

11. Gather O&M data on all equipment, and assemble in binders as required by the Commissioning Specification. Submit to Commissioning Authority prior to the completion of construction.

12. Notify the Commissioning Authority a minimum of two weeks in advance, so that the witnessing equipment and system start-up and testing can begin.

13. Notify the Commissioning Authority a minimum of two weeks in advance of the time for start of the TAB work. Attend the initial TAB meeting for review of the official TAB procedures.

14. Participate in, and schedule vendors and Contractors to participate in the training sessions as set up by the Commissioning Authority.

15. Provide written notification to the Owner's representative, Engineer, and Commissioning Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.

    a. HVAC equipment including all fans, air handling units, blower coil units, ductwork, dampers, terminals, and all Division 23 equipment.

    b. Refrigeration equipment, pumping systems and heat rejection equipment.

    c. Fire stopping in the fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.

    d. Fire detection and smoke detection devices furnished under this division.

    e. That building control systems are functioning to control mechanical equipment.

16. Provide a complete set of as-built records to the Commissioning Authority.

C. Test, Adjust, and Balance Contractor

1. Include cost for commissioning requirements in the contract price.

2. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.

3. Submit the TAB procedures to the Commissioning Authority and Design Professional for review and acceptance.

4. Attend the TAB review meeting scheduled by the Commissioning Authority. Be prepared to discuss the procedures that shall be followed in testing, adjusting, and balancing the HVAC system.

5. Participate in training sessions as scheduled by the Commissioning Authority.

6. At the completion of TAB work, and the submittal of the final TAB report, notify the Mechanical Contractor and the Construction Manager.

7. Participate in verification of the TAB report, which will consist of repeating any selected measurement contained in the TAB where required by the Commissioning Authority for verification or diagnostic purposes.

D. Automatic Controls and Building Automation System Contractors (Subcontractor to Mechanical Contractor)

1. Include cost for commissioning requirements in the contract price.

2. Review design for controllability with respect to selected manufacturers equipment;

a. Verify proper hardware specification exists for functional performance required by specification and sequence of operation.

b. Verify proper safeties and interlocks are included in design.

c. Verify proper sizing of control valves and actuators based on design pressure drops. Verify control valve authority to control coil properly.

d. Verify proper sizing of control dampers. Verify damper authority to control air stream. Verify proper damper positioning for mixing to prevent stratification. Verify actuator vs. damper sections for smooth operation.

e. Verify proper selection of sensor ranges.

f. Clarify all questions of operation.

3. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.

4. Provide the following submittals to the Commissioning Authority.

a. Hardware and software submittals

b. Control panel construction shop drawings.

c. Narrative description of each control sequence for each piece of equipment controlled.

d. Diagrams showing all control points, sensor locations, point names, actuators, controllers and, where necessary, points of access superimposed on diagrams of the physical equipment.

e. Logic diagrams showing the logic flow of the system.

f. A list of all control points, including analog inputs, analog outputs, digital inputs, and digital outputs. Include the values of all parameters for each system point. Provide a separate list for each stand alone control unit.

g. A complete control language program listing including all software routines employed in operating the control system. Also provide a program write-up, organized in the same manner as the control software. This narrative shall describe the logic flow of the software and the functions of each routine and sub-routine. It should explain individual math or logic operations that are not clear from reading the software listing.

h. Hardware operation and maintenance manuals.

i. Application software and project applications code manuals.

5. Verify proper installation and performance of controls/BMCS hardware and software provided by others.

6. Integrate installation and programming schedule with construction and commissioning schedules.

7. Provide thorough training operating professionals on hardware operations and programming, and the application program for the system.

8. Demonstrate system performance to Commissioning Authority including all modes of system operation (e.g. normal, abnormal, emergency)

9. Provide control system technician for use during system verification and functional performance testing.

10. Provide systems modifications as required.

11. Provide support and coordination with TAB contractors on all interfaces between their scopes of work. Provide all devices, such as portable operators terminals, for TAB use in completing TAB procedures.

12. Additional trend logs may be required to facilitate the commissioning process.

1.4 DOCUMENTATION

A. The Commissioning Authority shall oversee and maintain the development of commissioning documentation. The commissioning documentation shall be kept in three ring binders, and organized by system and sub-system when practical. All pages shall be numbered, and a table of contents page(s) shall be provided. The commissioning documentation shall include, but not be limited to, the following:

1. A detailed description of the design intent for the project, listing operating parameters, control sequences, occupancy conditions etc.

2. A complete description of how the HVAC system is intended to operate.

3. Approved test and balance report for the building being commissioned.

4. All accepted shop drawings of mechanical equipment. Shop drawings shall be full size sheets folded as required to fit in binders.

5. All pre-functional performance test checklists, signed by indicating personnel, organized by system and sub-system.

6. All verification and functional performance test checklists/results, signed by indicated personnel, organized by system and sub-system.

7. Three copies of the operation and maintenance (O&M) manuals specified in other sections of these specifications shall be included with the commissioning documentation. The manuals shall be incorporated in the commissioning documentation prior to commencement of O&M training required in this and other sections of the specification. Preparation of O&M manuals shall be as specified in section 3.7 of these specifications.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. The appropriate Contractor(s) shall furnish all special tools and equipment required during the commissioning process. A list of all tools and equipment to be used during commissioning shall be submitted to the Commissioning Authority for approval. The owner shall furnish necessary utilities for the commissioning process.

2.2 TEST EQUIPMENT – PROPRIETARY

A. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate it's use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the owner upon completion of the commissioning process.

PART 3 – EXECUTION

3.1 GENERAL

A. A pre-construction meeting of all commissioning team members shall be held at a time and place designated by the Professional Team. The purpose shall be to familiarize all parties with the commissioning process, and to ensure that the responsibilities of each party are clearly understood.

B. The Contractor shall complete all phases of work so the systems can be started, tested, balanced, and acceptance procedures undertaken. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc. per the contract documents and related directives, clarifications, and change orders.

C. A Commissioning Plan shall be developed by the Commissioning Authority. The Contractor shall assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the actual equipment and installation. If contractor initiated system changes have been made that alter the commissioning process, the commissioning Authority shall notify the Contracting Officer.

D. Acceptance procedures are normally intended to begin prior to completion of a system and/or sub-systems, and shall be coordinated with the Division 23 contractor. Start of acceptance procedures before system completion does not relieve the contractor from completing those systems as per the schedule.

3.2 PARTICIPATION IN ACCEPTANCE PROCEDURES

A. The Contractor shall provide skilled technicians to start-up and debug all systems within Division 23. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program. Work schedules, time required for testing, etc. shall be requested by the Commissioning Authority and coordinated by the contractor. Contractor shall ensure that the qualified technician(s) are available and present during the agreed upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.

B. System performance problems and discrepancies may require additional technician time, Commissioning Authority time, reconstruction of systems, and/or replacement of system components. The additional technician time shall be made available for subsequent commissioning periods until the required system performance is obtained.

C. The Commissioning Authority reserves the right to question the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians shall include expert knowledge relative to the specific equipment involved and a willingness to work with the Commissioning Authority. Contractor shall provide adequate documentation and tools to start-up and test the equipment, system, and/or sub-system.

3.3 DEFICIENCY RESOLUTION

A. In some systems, improper adjustments, misapplied equipment, and/or deficient performance under varying loads will result in additional work being required to commission the systems. This work shall be completed under the direction of the Contracting Officer, with input from the contractor, equipment supplier, and Commissioning Authority. Whereas all members shall have input and the opportunity to discuss, debate, and work out problems, the Contracting Officer shall have final jurisdiction over any additional work done to achieve performance.

B. Corrective work shall be completed in a timely fashion to permit the completion of the commissioning process. Experimentation to demonstrate system performance may be permitted. If the Commissioning Authority deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Authority shall notify the Contracting Officer, indicating the nature of the problem, expected steps to be taken, and suggested deadline(s) for completion of activities. If the deadline(s) pass without resolution of the problem, the Contracting Officer reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs incurred to solve the problems in an expeditious manner shall be the contractor's responsibility.

3.4 ADDITIONAL COMMISSIONING

A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The contractor(s) suppliers and Commissioning Authority shall include a reasonable reserve to complete this work as part of their contractual obligations.

3.5 SEASONAL COMMISSIONING

A. Seasonal commissioning pertains to testing under full load conditions during peak heating and peak cooling seasons, as well as part load conditions in the spring and fall. Initial commissioning shall be done as soon as contract work is completed, regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.

B. Heating equipment shall be tested during winter design extremes. Cooling equipment shall be tested during summer design extremes with a fully occupied building. Each contractor and supplier shall be responsible to participate in the initial and the alternate peak season tests of the systems as required to demonstrate performance.

3.6 ACCEPTANCE PROCEDURES

A. <u>Verification Tests</u>

1. Scope of verification tests

c. Operating tests and checks to verify that all components, equipment, systems, sub-systems, and interfaces between systems, operate in accordance with contract documents. These tests are to include all operating modes, interlocks, specified control responses, specific responses to abnormal or emergency conditions and verifications of the proper response of the building automation system controllers and sensors.

d. Verify the validity of the TAB report.

2. Participants in verification tests

The Commissioning Authority shall be responsible for preparing the scope of these tests. The Commissioning Authority shall schedule the tests and assemble the commissioning team members who shall be responsible for the tests. Participating contractors, manufacturers, suppliers, etc. shall include all costs to do the work involved in these tests in their proposals. Following is a list of tasks and supporting information that shall be required.

c. Mechanical contractor – provide the services of a technician(s) who is (are) familiar with the construction and operation of this system. Provide access to the contract plans, shop drawings, and equipment cut sheets of all installed equipment.

d. Controls contractor – provide the services of a controls engineer who is familiar with the details of the project. Provide details of the control system, schematics, and a narrative description of control sequences of operation.

3. Documentation and Reporting Requirements.

c. Provide checklists for each component, piece of equipment, system, and sub-system, including all interfaces, interlocks, etc. Each item to be tested shall have a different entry line with space provided for comments. Separate checklists shall be prepared for each mode of operation. Provide space to indicate whether the mode under test responded as required or not. Also, provide space for all necessary parties to sign off on each checklist.

d. Data sheets used in verification of the proper operation of the control system shall include each controller to be verified, and it's location. For each controller, provide space for recording the readout of the controller, the reading at the controller's sensor(s), and any comments. Also, provide space for all necessary parties to sign off on each checklist.

e. All test procedures and data sheets shall be submitted to the design professional for review and acceptance.

4. Instrumentation

c. The Commissioning Authority shall furnish all measurement instrumentation for the verification tests. All instruments will have calibrated within the six month period prior to these tests.

5. Verification Procedures

c. The Commissioning Authority shall direct and witness the verification operating tests and checks for all equipment and systems.

1) Set the system equipment (i.e., boiler, pumps, fans, etc.) into the operating

mode to be tested, i.e. normal shut down, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions.

2) The Commissioning Authority shall inspect and verify the position of each device and interlock identified on the checklist. Each item shall be signed off as acceptable (yes), or failed (no).

3) This test shall be repeated for each operating cycle that applies to the mechanical system being tested.

4) Operating checks shall include all safety cutouts, alarms and interlocks with smoke control and life safety systems during all modes of operation of the mechanical system.

5) If during a test an operating deficiency is observed, appropriate comments shall be added to the checklist data sheet.

6) Verification of the interface of the monitoring and control system, and the TAB criteria shall include the following:

7) Verify supply and return flow rates for constant volume systems in all modes of operation of the HVAC system.

8) Verify operation of the terminal units in both heating and cooling cycles.

9) Verify minimum outdoor air intake air all modes of operation and at minimum and maximum total air flow rates.

10) Verify building pressurization.

11) Verity total exhaust air flow, and total outdoor air intake.

12) Verification of the proper responses of monitoring and control system controllers and sensors shall be as follows:

13) For each controller or sensor, record the indicated monitoring and control system reading, and the test instrument reading.

14) If the initial test indicates that the test reading is outside of the control range of the installed device, the calibration of the installed device shall be checked and adjusted as required. The deficient device shall be re-tested and the results recorded on the checklist data sheet.

b. The Commissioning Authority shall direct and witness the field verification of the final TAB report.

1) The Commissioning Authority shall select, at random, 10 percent of the report data for verifications.

2) The TAB contractor shall be given sufficient advance notice of the date of field verification. However, they shall not be informed in advance of the data points to be verified. The TAB contractor must use the same instruments (by model and serial number) that were used when the original data were collected.

3) Failure of an item is defined as:

a) For all readings other than sound, a deviation of more than 10 percent.

b) For sound pressure readings, a deviation of 3 decibels. (Note: variations in background noise must be considered).

4) A failure of more than 10 percent of the selected items shall result in the rejections of the final TAB report.

c. If the deficiencies are identified during verification, the General Contractor must be notified, and action taken to remedy the deficiency. The final tabulated checklist data sheets shall be reviewed by the Design Professional and the Commissioning Authority, to determine if verification is complete, and the operating system is functioning in accordance with the contract documents.

B. Functional Performance Testing

1. Scope of Functional Performance Testing

c. Functional performance tests shall determine if the HVAC system is providing the required cooling and heating services in accordance with the final design intent. They shall also determine the installed capacity of the cooling and heating plant, and heat transfer components. Following is a list of test examples:

1) Determine capability of hot water system to deliver hot water at the design supply temperature, and required rate of flow.

2) Determine the ability of the HVAC unit of deliver the cooling and/or heating services to the distribution system, at the design supply air temperature, required static pressure, and proper outside air ventilation rate.

2. Submittals

c. Detailed procedures for each series of tests shall be submitted to the Commissioning Authority for review and acceptance. The procedures shall include samples of the data sheets that will be part of the reports.

3. Participants in Functional Performance Tests

c. Participants in the functional performance tests shall be the same as those listed in the verification tests.

4. Instrumentation

c. In addition to the instrumentation requirements detailed under verification, the Commissioning Authority may need to provide data acquisition equipment to record data for the complete range of testing.

5. Functional Performance Test Procedures

c. The Commissioning Authority shall supervise and direct all functional performance tests.

d. For each test, the Commissioning Authority shall install the measuring instruments and logging devices to record test data for the required test period. The instrumentation shall monitor and record all operating conditions to allow for complete evaluation of the test results.

e. Measurement will be required to allow for calculation of total capacity of the system for each mode of operation under test.

6. Documentation and Reporting Requirements

c. All measured data, data sheets, and a comprehensive summary, describing the operation of the HVAC system at the time of testing shall be submitted to the Commissioning Authority.

d. A preliminary functional performance test report shall be prepared by the Commissioning Authority and submitted to the Design Professional or review. Any identified deficiencies need to be evaluated by the Design Professional and Construction Manager to determine if they are part of the contractor's contractual obligations. Construction deficiencies shall be corrected by the responsible contractor(s) and the specific functional performance test repeated.

e. If it is determined that the HVAC system is constructed in accordance with the contract documents, and the performance deficiencies are not part of the contract documents, the Contracting Officer must decide whether any required modifications needed to bring the performance of the HVAC system up to the finalized design intent shall be implemented, or if the test shall be accepted as submitted. If corrective work is performed, the Contracting Officer shall determine if a portion or all required functional performance tests should be repeated, and a revised report submitted.

3.6 OPERATING AND MAINTENANCE MANUAL:

A. The operating and maintenance manual shall consist of a sturdy binder with 8-½" x 11" sheets containing the following major sections:

1. <u>System Descriptions</u>:

a. Each major system shall be described, typewritten, in general terms, including

major components, interconnections, theory of operation, theory of controls, unusual features and major safety precautions. This information should correlate with information provided in the manufacturer's instruction book. This section shall include, but not limited to, the following data:

1) Detailed description of each system and each of it's components showing piping, valves, controls, and other components, with diagrams and illustrations where applicable.

2) Wiring and control diagrams with data to explain detailed operation and control of each component.

3) Control sequences describing start-up, all modes of operation, and shut down.

4) Corrected shop drawings.

5) Approved products data including all performance curves and rating data.

6) Copies of approved certifications and laboratory test reports (where applicable).

7) Copies of warranties.

f. System diagrams, described in 3.7 B2 following, shall be incorporated in the appropriate systems descriptions. These should be reduced in size or folded to usefully fit into the manual.

2. Operating Instructions:

a. Condensed, typewritten, suitable for posting, instructions shall be provided for each major piece of equipment. Where more than one (1) common unit is installed, one instruction is adequate. The instructions shall provide procedures for:

1) Starting up the equipment/system.

2) Shutting down the equipment/system.

3) Operating the equipment in emergency or unusual conditions.

4) Safety precautions.

5) Trouble shooting suggestions.

6) Other pertinent data applicable to the operation of particular systems or equipment.

b. The instructions shall be suitable for posting adjacent to the equipment concerned. The Contractor shall provide instructions for:

1) Exhaust fans.

2) Boiler

3) Automatic temperature controls

4) Pump

5) Rooftop units

6) Other specialized or uncommon equipment.

7) Terminal heating equipment

c. Ongoing and preventive Maintenance

d. Condensed, typewritten procedures for recommended ongoing and preventive maintenance actions shall be provided for each category of equipment/system listed in 3.7 A2 above.

e. This information shall include, but not be limited to the following:

1) Maintenance and overhaul instructions.

2) Lubricating schedule including type, grade, temperature, and frequency range.

3) Part list, including source of supply and recommended spare parts.

4) Name, address, and 24 hour telephone number of each subcontractor who installed equipment and systems, and local representative for each type of system.

5) Other pertinent data applicable to the maintenance of particular systems or equipment.

f. These recommended preventive maintenance actions shall be categorized by the following recommended frequencies:

1) Weekly

2) Monthly

3) Quarterly

4) Semi-Annual

5) Annual

6) Other

B. Posted Operating Instructions and Diagrams:

1. Operating Instructions

a. Copies of operating instructions provided in the operating manual (3.7 A above) shall be posted in the near vicinity of each piece of applicable equipment. The instructions shall be mounted nearly in frames under Plexiglas, where they can be easily read by operating personnel. Instructions mounted outdoors shall be suitably protected form weather.

2. Posted Systems Diagrams:

a. Simplified one (1) line diagrams of the systems listed shall be developed and transcribed on transparent “D” sized erasable sepia film and posted neatly under Plexiglas in the main or most appropriate equipment room for each reference by operating and maintenance personnel. These drawings shall be done in a professional manner which is acceptable to the Maintenance Division staff. The diagrams shall show each component including all valves installed in the system, with name and identifying number. If space does not permit valve numbers on the diagrams, valve charts shall be provided. Explanatory notes, where needed, shall be provided.

b. These diagrams shall be suitable for reduction in size and use in the operating manual system descriptions previously covered.

3.7 OPERATING AND MAINTENANCE TRAINING

A. The Mechanical Contractor, and appropriate sub-contractors, shall provide comprehensive operating and maintenance instruction on building systems prior to delivery. The instruction shall include classroom instruction deliver by competent instructors based upon the contents of the operating manual. Emphasis shall be placed upon overall systems diagrams and descriptions, and why systems were designed as they were. This overall systems instructions shall preferably be delivered by the consulting engineers. The classroom instructions shall also include detailed equipment instruction by qualified manufacturer representatives for all equipment for which operating instructions are provided. The manufacturer representative training shall emphasize operating instructions, and preventive maintenance as described in the operating manual. At a minimum, the training sessions shall cover the following items:

1. Types of installed systems.

2. Theory of operation

a. Design intent

b. Occupied vs. unoccupied or partial occupancy

c. Seasonal modes of operation

d. Emergency conditions and procedures

e. Comfort conditions

f. Indoor air quality

g. Energy efficiency

h. Other issues important to facility operation.

3. System operations.

4. Use of control system.

a. Sequence of operation

b. Problem indicators

c. Diagnostics

d. Corrective actions

5. Service, maintenance, diagnostics and repair.

6. Use of reports and logs.

7. Troubleshooting, investigation of malfunctions, and determining reasons for the problems.

B. Each classroom training period shall be followed by an inspection, explanation and demonstration of the system concerned by the instructors. All equipment listed in 3.7 A shall be started up and shut down.

C. The contractor shall be responsible for organizing, arranging, and delivering manner on a schedule agreeable to the Contracting Officer.

D. The contractor shall provide, at or before substantial completion, a proposed agenda and schedule of the above training for approval by the Commissioning Authority and the Contracting Officer.

E. The Commissioning Agent shall be present for all owner training. The Agent, along with the Owner, shall provide sign off that all training sessions were acceptably conducted. The Agent's bid price shall include sufficient monies to cover follow-up trips to insure the Owner fully comprehends the systems installed and the operations thereof.

END OF SECTION 230800

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. The intent of this project to provide standalone controls for all HVAC equipment provided under this project. The building will NOT have a DDC or BMS system. However, all control components shall be provided for a fully functioning and complete standalone HVAC system. The Mechanical Contractor shall coordinate between equipment manufacturers, wiring sub-contractors, and all other suppliers to ensure that all components are provided, coordinated, and installed.

C. All work of this Section shall be coordinated and provided by the single Mechanical Sub-Contractor.

D. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other sections/trades. Reference the Division 23 and Division 26 Sections for details.

E. The work of this Section shall be as required by the Specifications, Drawings, Point Schedules, Sequences of Operation and Mechanical Systems Commissioning activities.

F. The contract documents and the sequences of operation are for conveying general concept only and are not meant to be inclusive of all hardware requirements or all functional sequence requirements. Refer to the complete package of contract drawings. Items mentioned in Sections 230900, shown on the contract documents, mentioned in the sequences of operation, or shown on other HVAC drawings shall become part of the work of this project without the necessity of being separately detailed in each of those applicable sections of the contract documents. Reference in one section of the contract documents shall be interpreted to include reference in all other applicable sections. Any additional hardware and/or software required to accomplish functional intent shall be provided (without additional cost to the owner) just as though it were fully detailed throughout the contract documents.

G. The design drawings indicate control panels throughout the building. These locations have been coordinated with the electrical drawings. The electrical drawings indicate power and data connections to them. Should the Mechanical Contractor revise the locations of these panels or need additional panels, it is their responsibility to coordinate with the E.C. to get power and data to the locations they need. Should this coordination not happen, it is the responsibility of the Mechanical Contractor to provide power and data as needed to complete their system at no additional cost to the project

H. If the Mechanical Contractor believes there are conflicts or missing information in the project documents, the Mechanical Contractor shall promptly request clarification and instruction from the design team prior to the submission of bids.

I. Where conflict exists among section 230900 and the contract drawings, and questions were not raised during the bidding period to obtain clarification, the most stringent interpretation shall apply thereafter.

1.2 REFERENCES

A. All work shall conform to the following Codes and Standards, as applicable:

1. National Fire Protection Association (NFPA) Standards.
2. National Electric Code (NEC) and applicable local Electric Code.
3. Underwriters Laboratories (UL) listing and labels.
4. UL 268 Smoke Detectors.
5. UL 916 Energy Management
6. NFPA 70 - National Electrical Code.
7. NFPA 90A - Standard For The Installation Of Air Conditioning And Ventilating Systems.
8. American National Standards Institute (ANSI).
9. National Electric Manufacturer's Association (NEMA).
10. American Society of Mechanical Engineers (ASME).
11. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and ASHRAE 62 IAQ as applicable.
12. Air Movement and Control Association (AMCA).
13. Institute of Electrical and Electronic Engineers (IEEE).
14. American Standard Code for Information Interchange (ASCII).
15. Electronics Industries Association (EIA).
16. Occupational Safety and Health Administration (OSHA).
17. American Society for Testing and Materials (ASTM).
18. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.
19. Americans Disability Act (ADA)
20. ANSI/ASHRAE Standard 195-2004 (BACnet)

B. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

C. All work shall meet the approval of the Authorities Having Jurisdiction (AHJ) at the project site. The Mechanical Sub-Contractor shall be responsible for gaining system approval from the AHJ.

1.3 SUBMITTALS

A. Shop Drawings, Product Data, and Samples

1. The Mechanical Contractor shall submit shop drawings within 90 days of contract award. Shop drawing submittal shall be complete for the full scope of the project work and shall be provided as ONE COMPLETE PACKAGE. Package shall include the work of Sections 230900 in order to verify integrated performance requirements. Partial or incomplete submittals shall be returned unchecked.

2. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the Mechanical Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.

3. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.

    a. Sequentially numbered systems schematics, sequences and flow diagrams with an index identifying pages for each drawing for the project.

4. The Mechanical Contractor shall correct any errors or omissions noted in any review submission.

5. Shop drawing submittals shall be complete and fully detailed so as to establish all required information to provide a fully engineered, coordinated and integrated distributed processing HVAC control system. All terminal-to-terminal and one-line wiring diagrams and flow diagrams shall be submitted in AUTOCAD or VISIO format (latest version). At a minimum, submit the following:

    a. Provide a schematic wiring diagram for each controlled system. Each schematic shall have all elements labeled. Where a control element is the same as that shown on the control system schematic, it shall be labeled with the same name. All terminals shall be labeled.

    b. Provide an instrumentation list for each controlled system. Each element of the controlled system shall be listed in table format. The table shall show element name, type of device, manufacturer, model number.

    c. Include a complete description of the operation of the control system, including sequences of operation. The description shall include a schematic diagram of the controlled system.

    d. Details of all interfaces and connections to the work of other trades.

6. Submittals shall be developed in conjunction with the requirements of the owner's commissioning process. In addition, all submittals, "as-builts" and O & M Manuals shall clearly indicate the location of all controllers and field devices (in Room 123, above corridor ceiling outside Room 456, etc.).

1.4 RECORD DOCUMENTATION

A. Operation and Maintenance Manuals

1. Two (2) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following:

    a. Table of contents.

    b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.

    c. Manufacturer’s product data sheets or catalog pages for all products including software. Where product data sheets apply to multiple devices, those devices specific to this project shall be clearly highlighted for ease of reference to the appropriate data.

    d. System Operator’s manuals.

    e. Archive copy of all site-specific databases and sequences.

2. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

3. The Mechanical Contractor shall provide O & M manuals that are organized in a logical, concise easy to use format. Where changes have occurred from the original submittal package, those changes shall be reflected on the appropriate unit/system/sub-system drawings and not just grouped as a series of partial drawings (i.e. changes only) at the end of the drawing package. In like fashion, new terminal devices shall be logically inserted into the specification data sheet sections according to the type of device(s) involved and not just grouped as a series of new pages at the end of the previous data sheet submittal section. In addition, the drawings shall accurately reflect “as-built” conditions. To the extent that the original submittal package must be totally redone in order to satisfy these requirements, the Mechanical Contractor shall make the necessary changes at no additional cost to the owner.

4. All submittals, “as-builts” and O & M Manuals shall clearly indicate the location of all controllers and field devices (in Room 123, above corridor ceiling outside Room 456, etc.)

PART 2 - PRODUCTS

2.1 DEVICES

A. Field Equipment Controller

1. The Field Equipment Controller (FEC) with display shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.

2. The FEC shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences.

3. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.

4. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

5. The FEC shall include a removable base to allow pre-wiring without the controller.

6. The FEC shall include troubleshooting LED indicators to identify the following conditions:

    a. Power On

    b. Power Off

    c. Download or Startup in progress, not ready for normal operation

    d. No Faults

    e. Device Fault

    f. Field Controller Bus - Normal Data Transmission

    g. Field Controller Bus - No Data Transmission

    h. Field Controller Bus - No Communication

    i. Sensor-Actuator Bus - Normal Data Transmission

    j. Sensor-Actuator Bus - No Data Transmission

    k. Sensor-Actuator Bus - No Communication

7. The FEC shall accommodate the direct wiring of analog and binary I/O field points.

8. The FEC shall support the following types of inputs and outputs:

    a. Universal Inputs - shall be configured to monitor any of the following:

        1) Analog Input, Voltage Mode, 0 - 10 VDC

        2) Analog Input, Current Mode, 4 – 20 mA

        3) Analog Input, Resistive Mode

        4) Binary Input, Dry Contact Maintained Mode

        5) Binary Input, Pulse Counter Mode

    b. Binary Inputs - shall be configured to monitor either of the following:

1) Dry Contact Maintained Mode

2) Pulse Counter Mode

c. Analog Outputs - shall be configured to output either of the following

1) Analog Output, Voltage Mode, 0 – 10 VDC

2) Analog Output, current Mode, 4 – 20 mA

d. Binary Outputs - shall output the following:

1) 24 VAC Triac

e. Configurable Outputs - shall be capable of the following:

1) Analog Output, Voltage Mode, 0 – 10 VDC

2) Binary Output Mode, 24 VAC Triac

9. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).

a. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.

b. The FC Bus shall support communications between the FECs and the NAE.

c. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE.

d. The FC Bus shall support a minimum of 100 IOMs and FECs in any combination.

e. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the FEC and the furthest connected device.

10. FEC shall be available in a 10-point version (2 UI, 1 BI, 3 BO, 4 CO) and a 17-point version (6 UI, 2 BI, 3 BO, 2 AO, 4 CO). FEC shall be able to expand I/O point capacity via the addition of Input/Output Modules and Network Sensors.

11. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).

a. The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.

b. The SA Bus shall support a minimum of 10 devices per trunk.

c. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the FEC and the furthest connected device.

12. The FEC shall have the capability to execute complex control sequences involving direct

wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.

13. The FEC shall support, but not be limited to, the following:

    a. Hot water, chilled water/central plant applications

    b. Air handling units for special applications

    c. Terminal unit applications

    d. Special programs as required for systems control

14. The Controls Sub-Contractor shall provide FECs with unused Input/Output Module (IOM) capacity such that IOMs can be added to any existing FEC to achieve additional point capacity of 15% for each type of point (AI, BI, AO, BO, PI) currently part of the FEC input/output configuration. NO EXCEPTIONS. Additional IOM capacity shall be detailed for each FEC as part of the submittals.

15. Where indicated, or dictated by application requirements, BMS Sub-Contractor shall provide Network Control Engine(s) in lieu of FEC(s).

B. Input/Output Module

1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the associated FEC/NCE.

2. The IOM shall communicate with the FEC over the SA Bus using BACnet Standard protocol SSPC-135, Clause 9.

3. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

4. The IOM shall be available in 4-point (4 BI), 6-point (2 UI, 2UO, 2 RO), 12-point (4 UI, 4 UO, 4 RO) and 17-point (6 UI, 2 BI, 2 AO, 3 BO, 4 CO) versions.

5. The IOM shall support the following types of inputs and outputs:

    a. Universal Inputs - shall be configured to monitor any of the following:

        1) Analog Input, Voltage Mode, 0-10 VDC

        2) Analog Input, Current Mode, 4-20 mA

        3) Analog Input, Resistive Mode

        4) Binary Input, Dry Contact Maintained Mode

    b. Binary Inputs - shall be configured to monitor either of the following:

        1) Dry Contact Maintained Mode

2) Pulse Counter Mode

c. Analog Outputs - shall be configured to output either of the following

1) Analog Output, Voltage Mode, 0-10 VDC

2) Analog Output, current Mode, 4-20 mA

d. Binary Outputs - shall output the following:

1) 24 VAC Triac

e. Universal Output - shall be configured to output any of the following

1) Analog Output, Voltage Mode, 0-10 VDC

2) Analog Output, Current Mode, 4-20 mA

3) Binary Output Mode, 24 V AC/DC FET

f. Relay Output – 120/240 VAC

g. Configurable Outputs - shall be capable of the following:

1) Analog Output, Voltage Mode, 0-10 VDC

2) Binary Output Mode, 24 VAC Triac

6. The IOM shall include troubleshooting LED indicators to identify the following conditions:

a. Power On

b. Power Off

c. Download or Startup in progress, not ready for normal operation

d. No Faults

e. Device Fault

f. Normal Data Transmission

g. No Data Transmission

h. No Communication

C. Temperature Sensors

1. General Requirements:

a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations. (BMS Sub-Contractor shall utilize

transmitters where distances involved exceed maximum recommended wire run lengths.)

b. The temperature sensor shall be of the resistance type and shall be either two-wire 1000-ohm nickel RTD, or two-wire 1000-ohm platinum RTD.

c. Thermistor type sensors shall be acceptable for room terminal equipment space temperature sensors provided they meet the accuracy specifications below.

d. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion.

Point Type	Accuracy
Room Temp	+/- 0.5°F
Duct Temperature	+/- 0.5°F
Water Temperature *	+/- 0.5°F
All Others	+/- 0.75°F

D. Network Sensors

1. The Network Sensors (NS) shall have the ability to monitor the following variables as required by the systems sequence of operations:

   a. Zone Temperature

   b. Zone setpoint

2. The NS shall transmit the zone information back to the controller on the Sensor-Actuator Bus (SA Bus) using BACnet Standard protocol SSPC-135, Clause 9.

3. The Network Sensors shall include the following items:

   a. An LED to indicate the status of the Override feature.

   b. A button to toggle the temperature display between Fahrenheit and Celsius.

   c. A button to initiate a timed override command

4. The NS shall be available with either screw terminals or phone jack.

5. The NS shall be available in either surface mount or wall mount styles.

E. Electronic Damper Actuators

1. Electronic damper actuators shall be direct shaft mount.

2. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally

closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.

3. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication.

4. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as “quick acting,” shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.

5. All actuators used on outdoor air intake or relief dampers or actuators used on terminal equipment (air handling units and other equipment with outdoor air intakes, etc.) control valves shall be of the spring return to fail-safe position type. Non-spring return actuators shall not be acceptable. Batteries used to provide fail safe operation shall not be acceptable.

6. Acceptable manufacturers: Honeywell, Johnson Controls, Schneider Electric or Siemens.

F. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated. All valves shall be fully modulating unless otherwise indicated. BMS Sub-Contractor shall be responsible for selection of proper control valves for project, in accordance with the parameters defined by the following paragraphs, including sizing, pressure rating, flow coefficient, flow characteristic, close-off rating and allowable leakage factor. Valve construction shall be as follows with NO EXCEPTIONS.

1. Control Ball Valves 3 inches and smaller (2 inches for 3-way valves): Forged brass body (CuZn39Pb2), chrome plated brass ball and blowout proof stem and EPDM O-rings with minimum 600 psi rating. Valve shall contain glass filled ball insert capable of providing equal percentage flow. Valves shall have allowable media temperature of 20 Deg F to 250 Deg F.

   a. Medium: Valves shall be used with hot water or cold water with up to 50% glycol.

   b. Sizing:

      1) Minimum 100 psi close off on 2-way valves and 70 psi on 3-way valves

      2) Maximum differential shall be 35 psi to ensure quiet operation.

      3) Modulating 3 psig. design, with 4 psig maximum pressure drop at design flow rate. Two position valves shall be line size.

   c. Flow Characteristics: 2-way vales shall have equal percentage characteristics. 3-

way valves shall have an equal percentage characteristic through the control port and a linear characteristic through the bypass port.

2. Actuation: Valve actuators shall be selected to provide proper control, and close-off as required by the application. All valves actuators shall be provided with position indication. Actuators shall be provided with weatherproof option where dictated by the device location.

    a. Modulating and two-position actuators shall be provided as required by the sequence of operations. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction and a gear release to allow manual positioning.

    b. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication.

    c. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Actuators shall be spring return.

    d. All actuators used on air handling units and other equipment with outdoor air intakes or entrance ways, etc. control valves shall be of the spring return to fail-safe position type. Non-spring return actuators shall not be acceptable. Batteries used to provide fail safe operation shall not be acceptable. Actuators on VAV's, and other equipment without outdoor air intakes can be fail in place.

    e. Acceptable manufacturers: Honeywell, Johnson Controls, Schneider Electric, Belimo or Siemens or approved equal.

G. Programmable Thermostat

1. The programmable thermostat shall have 7-day schedule and keypad lockout.

2. Two stages of heat (one stage modulating), one stage cool and fan control

3. Power shall be 20 to 30 VDC

4. Shall have remote sensor capability and thermostat shall be mounted in control panel

H. Thermostats

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

PART 3 – PERFORMANCE / EXECUTION

3.1 SEQUENCES OF OPERATIONS

A. Occupied/Unoccupied Changeover

1. The controller shall provide warm-up/cool-down/occupied/ unoccupied changeover for the zones indicated below. Zone temperature sensors shall function to provide representative space temperature information for each zone to the controller. The controller shall optimize changeover times based on zone temperature. Each zone shall be provided with its own discrete optimization program. Exhaust fans shall not be energized until Occupied scheduled operation. Zoning scheme shall be approved by the Owner prior to implementation of any application programming by the BMS Sub-Contractor.

   a. Classroom (BCU-1)

   b. Computer Room (BCU-2)

   c. Aquaponics (Base Bid: AHU-1. Alt Bid: DAHU-1)

2. The controller shall include provisions, on a per zone basis, for the user to enter an override time interval which will cause the zone to operate in the occupied mode when it was otherwise scheduled to be in the unoccupied mode.

3. The controller shall include separate Holiday Schedule provisions for the administration areas, multipurpose areas and the rest of the school. This shall allow the administration areas and multipurpose areas to follow their own occupied/unoccupied schedules during the summer months while the rest of the building remains in an extended unoccupied mode. Holiday Schedule scheme shall be approved by the Owner prior to implementation of any application programming by the BMS Sub-Contractor.

B. Hot Water System

1. Boiler control panel shall include a time clock or a time clock in the controller to index the system between the occupied and unoccupied mode of operation. The controller shall be standalone.

2. The hot water system shall be provided with fully functioning factory controls by the equipment manufacturer.

3. The hot water system shall have the ability to be started and stopped automatically via time clock or manually through the unit control panel. The packaged controls shall automatically start and stop the hot water circulating pump and enable the boiler control system.

4. The building hot water heating system consists of one (1) hot water boiler with boiler runaround pump.

5. System hot water shall be supplied via one (1) constant speed hot water pump with a VFD. The VFD shall be used to provide soft start ramp capabilities for the pump. Upon pump start-up, the unit controls ramp pump speed to setpoint as established by the TAB Contractor.

6. A current switch across the pump shall provide pump proof of operation.

7. The boiler shall cycle off when the pump is off.

8. The Boiler Control Panel, provided by the boiler equipment supplier, shall control operation of the boilers. A relay field installed on each boiler shall provide boiler proof of operation. Boiler runaround pump shall remain on as long as the boiler is required. When the boiler is no longer required and the burner has been stopped for 2 minutes (adj.), the boiler runaround pump shall be stopped.

   a. The fully adjustable hot water reset schedule is as follows:

   Occupied Schedule

OAT	HW Supply Temperature
0 deg F	180 deg F
60 deg F	155 deg F

   Unoccupied Schedule

OAT	HW Supply Temperature
0 deg F	160 deg F
60 deg F	140 deg F

   The boilers shall not be operated below a 135 deg F returning water supply temperature as sweating may occur.

9. Emergency Shutdown System: Shall be furnished and installed by boiler supplier.

10. All required Interlock and control wiring of the boiler and the Boiler Control Panel shall be provided by the boiler equipment supplier.

11. The Boiler Control Panel shall provide an auxiliary contact to indicate activation of the Emergency Shutdown System. The BMS shall interface to this contact closure. An alarm shall be generated at the BMS whenever the emergency shutdown system is activated.

BOILER CONTROL PANEL POINTS MATRIX

ITEM	GENERAL POINT DESCRIPTION	Active/Inactive or UNITS	TYPE
1	Outdoor Air Temperature	Degrees F.	AI
2	Heating System On or Off	On/Off	BO
3	Building Hot Water Return Temperature	Degrees F.	AI
4	Building Hot Water Supply Temperature	Degrees F.	AI
5	Hot Water Supply Temperature Setpoint	Degrees F.	AV
6	Boiler Enabled /	Enabled/Disabled	BO

	Disabled		
7	Boiler Status	On/Off	BI
8	Boiler Firing Percentage	Percent	AI
9	Boiler Fuel Valve Status	Open/Closed	BI
10	Boiler Down on Failure	Normal/Alarm	BV
11	Boiler Flame Failure	Normal/Alarm	BI
12	Boiler Fill Pressure	PSI	AI
13	Boiler Run Around Pump Command	Start/Stop	BO
14	Boiler Run Around Pump Status	On/Off	BI
15	Occupied Reset Schedule Required	On/NA	BV
16	Unoccupied Reset Schedule Required	On/NA	BV
17	Hot Water Pump VFD Start/Stop	On/Off	BO
18	Hot Water Pump VFD Status	On/Off	BI
19	Hot Water Pump VFD Speed Control	Percent	AO
20	Hot Water Pump VFD Alarm	Normal/Alarm	BI
21	Emergency Boiler Shut Down	Normal/Alarm	BI

C. Blower Coil Units

1. The blower coil units shall be provided with fully functioning factory controls by the equipment manufacturer.

2. BCU control panel shall include a time clock or a time clock in the controller to index the system between the occupied and unoccupied mode of operation. The controller shall be standalone.

3. Heating Mode Occupied Cycle: When indexed to the occupied heating mode, the unit fan shall run continuously and the outdoor air damper shall open to its scheduled minimum outdoor air position (adj.). The return air damper shall be positioned accordingly. When the room temperature is below the effective heating setpoint (adj.), the hot water coil control valve shall modulate to maintain space temperature setpoint. On a rise above room temperature setpoint (adj.), the hot water coil control valve shall close to the coil. DX cooling shall be disabled.

4. Heating Mode Unoccupied Cycle: When indexed to the unoccupied heating mode, the outdoor air damper shall be closed, the return air damper shall be open, and the unit fan

shall be cycled, with the hot water coil modulating to maintain a reduced temperature setpoint (adj.). DX cooling shall be disabled.

5. Cooling Mode Occupied Cycle: When indexed to the occupied cooling mode, the unit fan shall run continuously and the outdoor air damper shall open to its scheduled minimum outdoor air position (adj.). The return air damper shall be positioned accordingly. When the room temperature is above the effective cooling setpoint (adj.), the DX cooling shall be cycled to maintain space temperature setpoint. On a drop below room temperature setpoint (adj.), the DX cooling shall be de-energized. The hot water coil control valve shall be closed to the coil.

6. Cooling Mode Unoccupied Cycle: When indexed to the unoccupied cooling mode, the outdoor air damper shall be closed, the return air damper shall be open, and the unit fan shall be cycled with the DX cooling cycled to maintain an elevated temperature setpoint (adj.). The unoccupied cooling setpoint shall be capable of being set sufficiently high so as to effectively disable cooling during the unoccupied mode.

7. Dehumidification Control: The DDC system shall maintain space humidity at 55% RH maximum (adj.). When a dehumidification process is initiated, the DX cooling shall be fully enabled with the hot water reheat coil modulating to maintain space temperature setpoint during operation in the dehumidification mode. The dehumidification mode shall be terminated when the space humidity reaches setpoint (adj.).

8. Safeties

    a. Low-limit thermostats (freezestats) serpentined on the heating coil discharge shall de-energize the fans, close the outside air damper, open the return air damper, and fully open the heating coil control valve to the coil, if coil discharge temperature drops below 40 deg F (adj.). DX cooling shall be disabled.

    b. The unit shall be provided with refrigerant leak detection system by the unit manufacturer. Upon activation of the leak detection system, the BCU fans shall energize (if not already running), disable the DX cooling, open the hot water coil control valve, close the outdoor air damper, and open the return air damper.

9. Exhaust fans shall be interlocked with the associated BCU to run whenever in the occupied mode. Motor operated discharge damper shall first open before exhaust fan can be energized.

10. Each DDC controller and associated control devices shall be powered from the power circuit provided to each blower coil unit. The BMS Sub-Contractor shall extend and transform the power circuit as required.

    (Typical for each blower coil unit)
    AO Outdoor Air Damper Control
    AO Return Air Damper Control
    AI Mixed Air Temperature
    BO DX Cooling Enable/Disable (one BO per stage of DX Cooling)
    BI Refrigerant Leak Detection System Status
    AO Hot Water Reheat Coil Valve Control
    BI Freezestat
    BO Supply Fan Start/Stop *

BI Supply Fan Status ~
AI Unit Supply Air Temperature ~
AI Room Temperature ~
AI Room Temperature Setpoint
AI Space Humidity
BO Exhaust Fan Start/Stop *
BO Exhaust Fan Discharge Damper Open/Close

D. Packaged Air Handling Unit (AHU-1)

1. The packaged air handling unit shall be provided with fully functioning factory controls by the equipment manufacturer.

2. AHU control panel shall include a time clock or a time clock in the controller to index the system between the occupied and unoccupied mode of operation. The controller shall be standalone.

3. Heating Mode Occupied Cycle: When indexed to the occupied heating mode, the unit supply fan shall run continuously and the modulating outdoor air damper shall be controlled to maintain a scheduled minimum outdoor air position (adj.). The DX cooling shall be de-energized. When the space temperature is below the effective heating setpoint (adj.), the gas valve shall open to the gas heater and the outside air damper shall be controlled to maintain a minimum open position. As the space temperature rises to the desired setpoint, gas valve shall close to the gas heater. A mixed air thermostat shall limit the outside air damper if mixed air temperature drops below heating coil scheduled entering air temperature (adj.).

4. Heating Mode Unoccupied Cycle: When indexed to the unoccupied heating mode, the unit supply fan shall run continuously, the outdoor air damper shall be closed, the return air damper shall be open, and the space temperature sensor shall control the gas valve(s) on the gas heater to maintain a reduced temperature setpoint (adj.). DX cooling shall be disabled.

5. Cooling Mode Occupied Cycle: When indexed to the occupied cooling mode, the unit supply fan shall run continuously and the modulating outdoor air damper shall be controlled to maintain a scheduled minimum outdoor air position (adj.). With the outdoor air temperature below economizer enable setpoint (adj.), the economizer shall be modulated, subject to the mixed air low limit control function, to maintain space temperature setpoint. A mixed air thermostat shall close the outside air damper if mixed air temperature drops below 55 deg F (adj.). On a rise in the outdoor air temperature above the economizer enable setpoint (adj.), the outdoor air damper shall be positioned to its scheduled minimum outdoor air position and the mechanical cooling shall be cycled to maintain space temperature setpoint. If mechanical cooling is not available, the outdoor and return air dampers shall modulate in an attempt to maintain mixed air setpoint.

6. Cooling Mode Unoccupied Cycle: When indexed to the unoccupied cooling mode, the unit supply fan shall run continuously, the outdoor air damper shall be closed, the return air damper shall be open, and the space temperature sensor shall stage the DX cooling system to maintain an elevated temperature setpoint (adj.). The unoccupied cooling setpoint shall be capable of being set sufficiently high so as to effectively disable cooling during the unoccupied mode.

7. Dehumidification Control: The DDC system shall maintain space humidity at 55% RH maximum (adj.). When a dehumidification process is initiated, the DX cooling shall be fully enabled with the hot gas reheat modulating to maintain space temperature setpoint (adj.). The dehumidification mode shall be terminated when the space humidity reaches setpoint (adj.). Dehumidification will be disabled whenever the outdoor air temperature drops below 55 deg F (adj.).

8. Safeties

   a. The EC shall furnish and install fire alarm control modules at each fan motor VFD to de-energize the fans as per the fire alarm system requirements. Whenever a supply air or return air smoke detector trips, FACMRs from the FAS shall close appropriate dampers and stop the fans. When fans are de-energized by the fire alarm system, the unit controls shall close the outdoor air damper, open the return air damper, and de-energize the gas heater(s) and the DX cooling. After the smoke detector(s) reset(s), the AHU shall be permitted to restart.

   b. The unit shall be provided with refrigerant leak detection system by the unit manufacturer. Upon activation of the leak detection system, the AHU fans shall energize (if not already running), disable the gas heat and DX cooling, close the outdoor air damper, and open the return air damper.

9. The unit discharge air temperature sensor shall also provide low and high limit temperature control functions. On a rise in discharge air temperature above 130 deg. F. (adj.) or a drop in discharge air temperature below 45 deg. F. (adj.) the unit controls shall de-energize the unit fan, close the outdoor air damper, open the return air damper, and de-energize the gas heater(s) and the DX cooling.

10. Exhaust Fan Control: When the economizer is open greater than 30% (adj.) the unit exhaust fan shall be energized. When the economizer is open less than 25% (adj.) the unit exhaust fan shall be de-energized.

11. Fan Status: A current sensing switch shall provide proof of fan operation and shall enable control loops.

12. Loss of supply fan status indications shall cause the air handler to revert to the unoccupied mode as a reference condition prior to any re-start attempt.

13. Filter Status: Filter status shall be provided via a differential pressure switch installed across the filter bank. Static pressure probes shall be installed on each side of the filter bank in conjunction with the transducer. Copper tubing installed in lieu of static probes is not acceptable.

BI	Return Air Smoke Detector FACMR Status ~
AI	Return Air Temperature ~
BO	Exhaust Fan Start/Stop *
BI	Exhaust Fan Status ~
AO	Outdoor/Return Air Damper Control
AI	Mixed Air Temperature ~
AI	Dirty Filter *
BO	Gas Heater Capacity Control (One BO per stage of heating)

BO DX Cooling Capacity Control (One BO per stage of cooling)
BI Cooling Fail Alarm (one per DX circuit) ~
BI Refrigerant Leak Detection System Status
AO Hot Gas Reheat Control
BO Supply Fan Start/Stop *
BI Supply Fan Status ~
BI Supply Fan FACMR Shutdown Relay Status ~
AI Supply Air Temperature ~
BI Supply Air Smoke Detector FACMR Status ~
AI Space Temperature ~
AI Space Temperature Setpoint
AI Space Humidity

E. Packaged Dehumidification Air Handling Unit (DAHU-1) (Alternate Bid)

1. A Dectron packaged unit with manufacturer's controls shall condition the aquaponics area to provide heating, cooling and dehumidification as needed. The unit shall run 24hrs 7 days a week.

2. The Mechanical Contractor shall mount and wire the remote operator's panel provided with the Dectron unit and wire and terminate wiring as per unit supplier's instructions.

3. The pool unit supplier shall supply outdoor air temperature and humidity sensors for field installation where the sun does not shine and rain does not impact the sensors. The Mechanical Contractor shall install, wire and terminate the sensors to the unit terminals as per unit directions. The Mechanical Contractor shall install and wire any other items shipped loose with the unit requiring field installation and wiring.

F. Ceiling Exhaust Fan – Local Switching

1. Where scheduled on the drawings, exhaust fans shall be controlled by local on/off switch. Provide switch and cover plate to match.

2. The local on/off switch and all interlock wiring and control wiring shall be installed by the Mechanical Contractor.

3. All power wiring, (except for power wiring from the power panel, through the motor protection/control device to the motor, which shall be by the EC) interlock wiring and control wiring shall be by the Mechanical Contractor.

G. Horizontal Unit Heaters

1. A pendant mount single temperature electric thermostat shall control the unit heater. A strap-on aquastat shall prevent fan operation if hot water is not available. On a fall in space temperature below the heating setpoint, the unit fan shall be cycled to maintain space temperature. The reverse sequence shall occur on a rise in space temperature.

2. All control devices will be furnished and installed by the BMS Sub-Contractor.

3. All power (except power from the power panel) interlock and control wiring shall be by the BMS Sub-Contractor.

3.2 START-UP AND CHECK-OUT PROCEDURES

A. The Mechanical Contractor shall be responsible for developing test plans and procedures to establish that all standalone controls systems function as described in the Sequence of Operations. The methodology shall address the observations, measurements, adjustments, calibrations and corrections necessary to accomplish the commissioning process. A detailed item-by-item procedure shall be followed for each item of HVAC equipment. Forms used by the Mechanical Contractor to record the results of the start-up and check-out procedures shall be available for review by the Professional and the owner.

3.3 COMMISSIONING

A. As part of the work of this project, the Mechanical Contractor shall be responsible for providing all labor and materials required to satisfy the commissioning responsibilities of the Mechanical Contractor in support of the work of the owner's commissioning process. Commissioning Package shall be compiled which includes all commissioning documentation as well as a summary of the commissioning results.

3.4 TRAINING

A. The Mechanical Contractor shall provide 4 Hours of on-site training, by a system technician who is fully knowledgeable of the specific installation details of the project. This training shall be "hands' on" type. A mutual agreement on the scheduling of this training class will be made between the Owner and the Mechanical Contractor.

B. The training class will use the actual Operator & Maintenance manual that will be submitted for this project.

C. As a minimum, this training will cover the following topics:

1. System Access

2. Operation Monitoring

3. Operation Override

4. Scheduling

5. Editing Programmed Variables

D. The training class will cover topics in a "hands-on" mode.

E. Proper and adequate documentation must be provided, this will include:

1. Accurate as-built drawings and sequences submitted in hard copy and electronic form (the electronic form can be easily updated via a standard Computer Aided Drafted (CAD) program).

2. Technical specification sheets

3. Signed software license agreement (as required)

4. Operator & Maintenance (O&M) manuals

5. Warranty statement

3.5 WARRANTY

A. Standard Material and Labor Warranty:

1. Provide a two-year labor and material warranty on the controls for a period of two (2) years from the date of final payment.

2. All equipment found to have defects in material or workmanship during this warranty period shall be replaced at no charge to the Owner with equipment of equal type and quality by the local field office. All labor required during the warranty period shall also be included, with the following clarification. Installation labor shall be the responsibility of the trade Sub-Contractor performing the installation.

3. The Mechanical Contractor shall respond to the job site within a 24-hour period for any warranty work relating to the control system.

4. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming, occurs in a timely manner.

3.6 INSTALLATION PRACTICES

A. Wiring: Install new wiring and control devices as required to provide a complete and workable control system to satisfy the requirements of Section 230900 and the contract drawings.

1. All conduit, wiring, accessories and wiring connections required for the installation of the System, as herein specified, shall be provided by the Mechanical Contractor unless specifically shown on the Electrical Drawings under Division 26 Electrical. All wiring shall comply with the requirements of applicable portions of Division 26 and all local and national electric codes, unless specified otherwise in this section.

2. All conduit, fittings, hangers and accessories for control wiring installed under the HVAC Contract shall conform to the levels of quality specified under Division 26.

3. All wiring shall be installed in conduit, and conduit shall be concealed in finished areas. Power or interlock wiring shall be run in separate conduit from sensor wiring.

4. All low voltage conductors shall be types as herein indicated. Other types and sizes shall be submitted for approval. Low voltage two conductor wire shall be black twisted (six turns per foot) 16 AWG or 18 AWG wire, as indicated, 1/32, 80 degrees C., 600-volt PVC insulation. Low voltage three conductor wire shall be red, yellow, blue twisted (six turns per foot) 16 AWG or 18 AWG wire as indicated, 1/32, 80 degrees C., 600-volt PVC insulation. Cable shall be as manufactured by Alpha Wire Company, Belden Wire Company, Standard Wire and Cable or approved equal.

5. All control wiring outside of control panels shall be run in rigid conduit or EMT and installed in strict accordance with the requirements of The National Electrical Code. Wiring for the control system, except the low voltage conductors, shall be single

conductor solid or stranded copper not less than No. 14 AWG, with 600-volt Type THHN insulation, except where the manufacturer requires special types and sizes. Flameproof insulation shall be used where required by the NEC. All wiring in panel construction may be No. 16 or No. 18 AWG copper as recommended by the manufacturer provided same is properly protected and/or is in accordance with the NEC. No temperature control wiring installed under this contract shall be installed in the building lighting and power circuit systems.

6. Conduit shall be supported from or anchored to structural members. Conduit supported from or anchored to piping, duct supports, the ceiling suspension system, is not acceptable.

7. All new construction thermostat drops shall be installed utilizing conduit with an electrical wall box installed within the wall construction. NO EXCEPTIONS. All wall thermostats and wall sensors located in non-public areas shall be mounted with centerline 4'-0" above the finished floor to comply with ADA mounting height requirements. All thermostats and wall sensors located in restrooms, corridors and other public areas shall be mounted with centerline 7'-0" above the finished floor.

8. Where 24 VAC power is required for terminal device controllers, the Mechanical Contractor shall also be responsible for providing a power box to transform the available 120 VAC. Multiple controllers may be powered from the same power box.

9. The Mechanical Contractor shall provide sealing and/or fire-stopping for all conduit/wiring penetrations as required.

B. Automatically controlled dampers shall be furnished and installed by the Mechanical Contractor.

C. A single symbol for electric/electronic actuator(s) indicated on the drawings for damper control is not meant to indicate that only one actuator is required. Rather, it indicates that electric/electronic actuation, in the required quantity, is to be provided at that location. In all instances, the Mechanical Contractor shall provide the quantity of actuators required to supply the torque requirements specified by the damper manufacturer.

END OF SECTION 230900

SECTION 232113 - HVAC PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The pipe and fittings for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 PIPE AND FITTINGS

A. All new hot water supply and return piping, chilled water supply and return piping, drain piping, relief valve piping, and vent piping shall be made up of Schedule 40, welded black steel pipe, conforming to ASTM Specifications A53 or A120. Weight and dimensions shall conform to ANSI Standard B36.10.

B. Chemical feed piping shall be Schedule 80 black steel pipe. PVC or polyethylene rigid pipe and fittings may be used where recommended or required by the chemical treatment equipment manufacturer; however, piping must not be subject to high temperatures beyond the capability of the pipe.

C. Cold water makeup lines shall be Type L hard temper copper tubing assembled with wrought copper solder end fittings.

D. Each section of pipe shall be reamed and cleaned before installation. All steel piping 2-1/2" and larger shall be assembled with welded connections. Seamless forged welding fittings of same material as pipe shall be used for all connections, except Weld-O-Lets or Thread-O-Lets may be used where branch line is at least two sizes smaller than main line.

E. Weld neck flanges shall be employed where welded pipe is joined to flanged valves and equipment.

F. All black steel pipe 2" and smaller shall be assembled with heavy boss, cast iron or malleable screwed fittings.

G. In lieu of using Schedule 40 black steel pipe and fittings for all hot and chilled water system supply and return lines, vent lines, drain lines and relief valve piping, the Contractor shall have the option of using Type L hard temper copper tubing assembled with wrought copper solder end fittings. All solder shall be 95-5 tin-antimony solder. All copper piping shall be supported with flat band all copper hangers as hereinafter specified. Copper plated hangers or plastic coated steel hangers are not acceptable. However, in lieu of all copper band hangers, the Contractor will be permitted to use a steel clevis type hanger with the pipe insulation acting as an isolator to prevent electrolysis between the pipe and hanger. Clevis hanger shall be the Modern Hanger No. 590 complete with hanger, adjuster, rod and insulation protection saddle, Penn Pipe Hanger Co., Arrow Pipe Hanger Co., or approved equal. The Contractor shall

support piping mains as required in accordance with these Specifications.

2.2 PIPING

A. Hot Water Piping:

1. Hot water and chilled water piping system shall be of the two-pipe forced circulating type. Supply and return mains shall be run level. For upfeed connections and risers, branches shall be taken from main with 90 degree top connections and downfeed branches and risers shall be taken from the main with 90 degree bottom connections.

2. All high points and drops of the piping system shall be provided with air vents of type herein specified.

3. Use inverted eccentric reducers in all horizontal lines where reduction or increase in main sizes are shown. Top of pipe shall be level.

4. Ample provision for expansion and contraction of piping by the use of swing joints on all branch connections from mains and risers shall be provided.

5. All piping concealed in walls, partitions, above ceilings and other locations shall be tested with air or nitrogen with pressure held at 150 psig for two hours. Correction shall be made for changes in ambient temperatures.

6. All piping connections at the boilers, up to and including the first valve, shall be code welded in accordance with ASME regulations and as required by the Pennsylvania Department of Labor and Industry. Screwed and flanged connections may be made at the boilers where permitted by the Pennsylvania Department of Labor and Industry.

B. Miscellaneous Cold Water Makeup Piping:

1. From outlets on cold water mains provided by the Plumbing Contractor, furnish and install all cold water makeup piping to the Boilers and chilled water system. Makeup piping shall be complete with all valves, strainers, backflow preventers, pressure-reducing valves, fittings and insulation for complete installations. Flexible connectors on makeup water piping shall be installed as shown.

2.3 JOINTS AND CONNECTIONS

A. Screwed Connections

1. All joints in screwed pipe shall be made up with pipe joint compound applied to male threads only. Taping of joints will not be permitted. Threads shall be cut straight and true with all sections reamed and cleaned before installation.

B. Welded Connections

1. All joints in welded piping shall be assembled by fusion welding using factory-made welding fittings. Pipe shall be reamed and cleaned before erection. Weld-O-Lets or Thread-O-Lets may be used where the branch line is at least two sizes smaller than the main line as hereinbefore specified.

2. All welding shall be done by competent welders in a first-class, workmanlike manner. No welding operator shall be permitted to weld unless he has proved satisfactory experience and/or certified as having fully complied with acceptable qualification tests. When a welder has been approved, he shall not be removed without permission of Engineer.

3. Certification shall indicate that each welder has passed a qualification test as prescribed by National Certified Pipe Welding Bureau, or by other reputable testing laboratories or agencies, using procedures approved by the American Society of Mechanical Engineers or the American Welding Society.

4. The abutting ends of all pipe and welding fittings shall be accurately beveled at an angle of 45 degrees to within 1/16" plus or minus 1/32" of inside pipe wall. All surfaces beveled by the cutting torch shall be properly cleaned of all oxide and unnecessary roughness by grinding, filing or other suitable means.

5. Low carbon steel welding rods shall develop a tensile strength of not less than 45,000 psi cross-section of the metal deposited in the weld. Special and eutectic steel welding rods of good weldability and having a tensile strength greater than 45,000 psi may be used.

6. All circumferential welds shall have a width to 2-1/2 times pipe wall thickness and shall be reinforced approximately 1/16" above outside of pipe wall. Fusion shall extend through entire pipe wall to the outside. Projection of fused metal on inside of pipe must be avoided. There shall be no valley, either at edge or at center of the joint, and weld shall be built up with multiple passes so that weld metal will present a gradual increase in thickness from outside surface of pipe to the center of the weld.

7. Welding procedure shall conform to recommendations of the ANSI Code for Pressure Piping. Gas welding will be acceptable.

C. Flanged Connections

1. Flanged joints at valves, unions, equipment, etc., shall be made up with machine bolts and factory-made ring gaskets similar to Garlock, and of materials recommended for the various services. Flanges shall conform to ANSI B16.5.

D. Solder Connections

1. All joints in copper tubing shall be made up with 95-5 tin-antimony solder. Ends of pipe and fittings shall be cleaned and burnished before solder is applied.

2. T-drill piping connections are not permitted on this project.

3. All mechanically formed branch collars shall be approved by the National Standard Plumbing Code, BOCA, IAMPO, SBCC, and all applicable local codes and regulations. The complete installations of all mechanically formed "tees" must conform with manufacturer's instructions and installation procedures. All tools required for forming the "tees" shall be furnished by the Contractor. Piping shall be thoroughly flushed or blown out upon completion of "tee" connections to remove excess debris.

2.4 MECHANICAL GROOVED PIPE COUPLINGS

A. The HVAC Contractor shall be permitted to furnish and install mechanical grooved pipe

couplings in lieu of welded fittings and flanges on the following steel piping systems:

1. Chilled Water Piping and Heating Hot Water Piping

B. Acceptable Manufacturers:

1. Victaulic (Basis of Design

2. Tyco Grinnell

3. Anvil Gruvlok

C. All grooved joint couplings, fittings, valves, and specialties shall be of the same manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

D. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

E. Mechanical pipe couplings are not permitted in inaccessible spaces such as above plaster ceilings and piping and ductwork shafts unless approved by the Engineer.

F. Pipe shall be of type herein specified, except pipe shall be square-cut or roll grooved to the coupling manufacturer's specifications. The pipe couplings shall be as manufactured by the Victaulic Company of America, or approved equal, and shall be suitable for the type of service intended. Couplings and gaskets shall have a temperature range of -30 degrees F. to +230 degrees F. The couplings shall be installed in a manner which will provide for expansion and contraction of the systems without leakage, in strict accordance with the coupling manufacturer's details, published literature and instruction.

G. Victaulic Installation-Ready Couplings Style 107H/107N (rigid) and 177 & 77 (flexible):

1. 2” through 12”: Rigid type, coupling housings with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with ANSI B3.1, B31.9. Couplings shall be installation ready, for direct stab installation without field disassembly. Gasket shall be Grade “EHP” EPDM compound with red color code designed for operating temperatures from -30 deg F to +250 deg F. Victaulic Style 107H/107N.

2. 2” through 8”: Flexible type, for use in locations where vibration attenuation and stress relief are required. Couplings shall be installation ready, for direct stab installation without field disassembly. Gasket shall be Grade “EHP” EPDM compound with red color code designed for operating temperatures from -30 deg F to +250 deg F. Victaulic Style 177.

3. 10” through 12”: Victaulic Style 77 standard flexible coupling with Grade “E” EPDM gasket with green color code for water services from -30 deg F to +230 deg F.

H. Victaulic AGS Series Fittings, Style W07 Rigid Coupling, and Style W77 Flexible Coupling:

1. AGS grooved ends, for use with Victaulic W07 or W77 couplings and W741 flange adapter. Fittings shall be manufactured of ductile iron conforming to ASTM A-536, factory-fabricated from carbon steel pipe conforming to ASTM A-53. Fittings shall be manufactured to the dimensional standards ASME B16.9. Orange enamel coated or galvanized.

2. AGS Couplings shall consist of two ASTM A-536 ductile iron housing segments, a wide-width elastomer pressure responsive FlushSeal® gasket, and zinc electroplated carbon steel track head bolts and nuts conforming to the physical and chemical requirements of ASTM A-449 and the physical requirements of ASTM A-183. Housings include lead-in chamfer on the housing key.

    a. Victaulic W07 AGS Rigid Coupling: Coupling key shall be designed to fill the wedge shaped AGS groove to provide a rigid joint that corresponds with support spacings as defined by ASME B31.1 and B31.9. Systems incorporating rigid couplings require the calculated thermal growth/contraction of the piping system to be fully compensated for in the design of the piping system through use of adequate flexible components.

    b. Victaulic W77 AGS Flexible Coupling: Coupling key shall be designed to fit into the wedge shaped AGS groove and allow for linear and angular movement, vibration attenuation, and stress relief.

I. Flange adapters shall be suitable for direct connection to Class 125 or 150 flanged components, with ductile iron housings, and pressure responsive gaskets. Victaulic Style 741 / W741.

J. For use with copper tubing 2” and larger sizes, Victaulic Copper-Connection fittings conforming to ASME B16.22 and ASME B16.18, with Style 607H installation-ready coupling with offsetting angle-pattern bolt pads and grade EHP gasket for water service to +250 degrees F.

    1. The system shall be manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.)

K. Gasket Elastomers shall have properties designated by ASTM D-2000. Gasket shall be of the mechanical grooved coupling design, pressure responsive so that internal water pressure serves to increase the seal's water tightness. Gasket supplied shall be EPDM-HP Grade EHP with red and green color code for water service to 250 degrees F and EPDM Grade "E" with green color code identification and conform with ASTM D-2000 designation 2CA615 A25B442 with maximum tensile change as published by the manufacturer for water service to 230 degrees F.

L. Bolts and nuts shall be heat-treated carbon steel conforming to physical properties of ASTM A183 and A449, minimum tensile 110,000 psi. The coupling segments shall be assembled with two or more oval neck track bolts. The nuts shall be tightened to assure firm metal-to-metal contact of the coupling bolt pads.

M. Grooved joints shall be installed in accordance with the manufacturer’s latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks. Gaskets shall be molded and produced by the coupling manufacturer, and shall be verified as suitable for the intended service.

N. The Contractor shall obtain the services of the coupling manufacturer's qualified representative as required to obtain all instructions and details for a complete supervised installation.

O. The representative (direct employee) of the mechanical joint manufacture shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of

grooved piping products. The factory-trained representative shall periodically review the product installation and ensure best practices are being followed.

P. Contractor shall remove and replace any improperly installed products.

Q. A distributor's representative is not considered qualified to conduct the training.

R. The Heating Contractor will be responsible for the installation complete in every detail.

S. All insulation installations and other installation revisions will be the responsibility of the Heating Contractor. All mechanical pipe couplings shall be insulated with Zeston, Knauf, or approved equal, prefabricated fitting covers designed specifically for mechanical couplings. Valves, cocks, and other piping system accessories shall be revised as required to accommodate the coupling installation. The installation must conform with all applicable codes.

T. Sufficient hangers must be installed as required for complete substantial installations.

U. The entire installation shall be free of stress. For water systems, Victaulic flexible couplings may be used to accommodate thermal growth, contraction, and for the elimination of expansion loops. (In accordance with the manufacturer's written recommendations.) Where loops are required, use flexible couplings on the loop.

V. Abrupt type reducer fittings shall not be permitted.

W. The manufacturer's trained representative shall inspect all couplings and sign off on the system prior to start up.

2.5 CONDENSATE DRAIN SYSTEM

A. All condensate drain piping from HVAC equipment shall be Type "L", hard temper, copper tubing, assembled with cast bronze or wrot copper solder end drainage fittings. PVC piping is NOT acceptable.

B. Direct connection to the sanitary drainage system is prohibited. Provide air gaps in accordance with local prevailing code requirements.

C. Unless noted otherwise, drain lines shall be sloped at 1%. Minimum drain line size shall be 1-1/4", except as otherwise specifically noted.

D. Provide a trap in gravity drain line at each piece of equipment. Coordinate depth of trap with equipment manufacturer. Refer to connection details shown on drawings. Traps will not be required on pumped condensate drain lines.

E. Where condensate drain lines are extended to rain conductors, use bronze ball check valves in the condensate drain lines, the Apollo 61-12X, with light spring, or approved equivalent.

2.6 REFRIGERATION PIPING

A. Furnish and install a complete refrigeration piping system from the air-cooled condensing unit to the DX coil in the interior unit. All refrigeration piping and accessories shall be installed in accordance with the refrigeration equipment manufacturer's recommendations and in accordance with the best standard practice. System shall be complete with necessary shutoff

valves, purge valves, charging valves, liquid line solenoid valve, sight glasses, dryers, vents, traps, fittings and other accessories required for a complete installation. System shall be fully charged with refrigerant in accordance with the manufacturer's recommendations and requirements. Refrigerant piping shall be sized as recommended by the equipment manufacturer, and based on total friction loss equivalent to not more 2 degrees F for hot gas line, and 1 degrees F. for liquid line. Refrigeration piping shall be hard temper Type L copper tubing assembled with long radius wrought copper solder end fittings or SAE fittings. Refrigeration lines shall be properly supported.

B. Refrigeration valves shall be back-seating globe valves of the diaphragm packless type, as manufactured by Alco, Superior or approved equivalent. Shutoff valves shall be furnished and installed on all lines at the condensing unit and at the unit ventilator.

C. Suction and liquid piping, valves and accessories shall be insulated with 1" thickness Type FR Armaflex, or approved equivalent, flexible tubing insulation. Insulation exposed to weather shall be painted with two coats of Armaflex Finish, or approved equivalent, protective coating.

D. The Contractor shall include initial startup of the system, final checkout and instruction to the Owner's operating personnel. Maintenance service for the refrigerant piping system shall also be included in the Contractor's bid for the first year from date of final acceptance by the Owner. The approximate refrigerant piping arrangement, sizes, etc., are shown on the drawings. The exact arrangement, and other details shall be in strict accordance with the equipment manufacturer's recommendations.

E. Provide long radius elbows on all refrigerant piping.

PART 3 – EXECUTION

3.1 PIPING SYSTEM INSTALLATIONS

A. All piping installations shall be in accordance with American Code for Pressure Piping No. ANSI B31.1. All piping not specifically mentioned herein shall be installed per the manufacturer's recommendations and applicable recognized codes.

B. All piping and system accessories shall be stored with ends closed tight.

C. Before installation, each length of pipe, each fitting and each accessory (such as a valve) shall be "bore-sighted", inspected and cleaned if debris or dirt is found.

D. After installation of piping, but before valves and accessories are installed, a heavy wad of swabbing cloth shall be pulled through the piping and fittings. All loose scale or debris shall be blown or worked free and removed.

E. After closure, each system shall be flushed clean as herein specified under "Cleaning." Connections shall be installed for this purpose, and all necessary temporary piping shall be furnished, installed and removed after system is approved. The Contractor shall double-check to see that items such as rocks, stones, mud, wood and other debris are not left in the system

F. Equipment such as tanks shall be cleaned in the same manner but the procedure shall be varied to suit the specific item being cleaned. Coils shall be absolutely clean inside and outside before closure and after use for temporary heat, etc.

G. All pipes shall be cut accurately to measurements established at the Building and shall be worked into place without springing or forcing, properly clearing all Building openings. Excessive cutting or other weakening of the Building structure to facilitate piping installation will not be permitted. Threaded pipe shall have full, clean-cut threads. All pipes shall have burrs removed by reaming. All pipes shall be so installed as to provide proper drainage and to permit free expansion and contraction without causing damage. All changes in directions shall be made with fittings. All open ends of pipelines and equipment shall be properly capped or plugged during installation to keep dirt or other foreign matter out of the system.

H. Valves shall be so placed that automatic valves, check valves and equipment may be entirely isolated for repairs while the system is in operation.

I. All piping run within the Building shall be run concealed in the finished portions of the Building, in pipe spaces, furred ceilings or furred chases and exposed only in unfinished areas, Mechanical Rooms, or specifically where shown on the Drawings. The Heating Contractor shall locate all necessary chases or openings in new construction that are to be provided by the General Contractor. No piping shall be run exposed in finished areas of the Building without the consent and approval of the Engineer for each specific installation.

J. Due to the small scale of the Drawings, it is not possible to indicate all offsets, fittings, valves or similar items which may be required to make a complete operating system. The Drawings are generally diagrammatic and indicative of the work to be installed. The Heating Contractor shall carefully investigate all conditions affecting his work and shall install his work in such a manner that interferences between pipes, conduit, ducts, equipment, architectural and structural features will be avoided, and shall furnish and install all such offsets or fittings as may be required to meet the conditions at the Building, so as to avoid such interferences without additional cost to the Owner.

K. Each installation shall be made in a workmanlike manner, according to the best practice of the trade, properly installed and vented to eliminate air pockets or traps and to insure rapid and noiseless circulation throughout.

L. All pipe work shall run parallel with, or at right angles to Building walls and partitions, and all exposed connections, risers or other piping in such areas shall be erected plumb and straight so as to form parallel lines with walls and floors. These requirements refer to long and short runs alike. Piping shall not be run exposed in finished areas unless specifically shown and prior approval is obtained from the Engineer.

END OF SECTION 232113

SECTION 232123 - HVAC PUMPS AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The pumps for the HVAC system shall be as hereinafter described in this section.

PART 2 PRODUCTS

2.1 INLINE PUMPS

A. Acceptable Manufacturers:

1. Wilo (Basis of Design)

2. Patterson

3. Bell & Gossett

4. Taco

B. Furnish and install pumps with capacities as shown on plans. Pumps shall be in-line type, close-coupled, single-stage design, for installation in vertical or horizontal position, and capable of being serviced without disturbing piping connections.

C. Pump casing shall be cast iron. The impeller shall be of cast bronze, enclosed type, dynamically balanced, keyed to the shaft and secured by a locking cap screw.

D. The liquid cavity shall be sealed off at the motor shaft by an internally flushed mechanical seal with ceramic seal seat and carbon seal ring, suitable for continuous operation at 225 degrees F. A bronze shaft sleeve shall completely cover the wetted area under the seal.

E. Pumps shall be rated for minimum of 125 psi working pressure. The pump case shall have gauge tappings at the suction and discharge nozzles and will include vent and drain ports.

F. Motor shall meet NEMA PE specifications and shall be the size, voltage and enclosure called for on the plans. It shall have heavy-duty grease lubricated ball bearings, completely adequate for the maximum load for which the pump is designed.

G. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high-grade machinery enamel prior to shipment.

H. Pumps shall be provided with a 3 year parts and labor warranty starting on the date of final payment.

2.1 GLOBE STYLE CHECK VALVES

A. Globe style center guided check valves shall be installed where shown on plans or required by equipment manufacturers.

B. Check valve shall be certified to be in conformance with NSF 372.

C. Check valve for fire sprinkler applications shall be Factory Mutual approved.

D. Globe Style Center Guided Silent Check Valve shall be as manufactured by American Wheatley, The Metraflex Company or approved equal.

E. Materials:

1. Check valve body shall be ASTM A126 B Cast Iron.

2. Check valve trim.

3. Check valve trim shall be nickel coated ductile iron (recommended).

4. Check valve trim shall be Type 304 Stainless steel.

5. Check valve trim shall be Type 304 Stainless steel with buna seal.

F. Flanges

1. Flanges shall be 125 lb. class cast iron in accordance with ASME B16.5.

2. Flanges shall be 250 lb. class cast iron in accordance with ASME B16.5.

G. Globe style center guided check valves shall be comply to MSS-SP-125-2010.

2.2 FLEXIBLE CONNECTORS

A. Provide a stainless steel braided type flexible connector in every pump suction and discharge, as close to the pump as possible to absorb vibration and prevent noise transmission.

B. Flex connectors shall be as manufactured by Keflex, Metraflex, or Minnesota Flex for the temperatures and working pressures of the systems being installed.

PART 3 EXECUTION

3.1 PUMP INSTALLATION

A. Mount and support inline pumps per manufacturer’s recommendations

3.2 TRIPLE DUTY VALVE INSTALLATION

A. Install the triple duty valve as recommended by the Manufacturer. Provide access to remove the internal parts for service.

3.3 FLEXIBLE CONNECTOR INSTALLATION

A. Mount the flex connectors in the suction and discharge piping as recommended by the manufacturer. Prevent any tension, torsion, or compression on the connectors from the pipe system.

B. Tighten the connecting bolts with a torsion wrench as recommended by the manufacturer.

C. Check the installation for leaks and remake any leaking joints.

END OF SECTION 232123

SECTION 232510 - CLOSED LOOP WATER TREATMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The contractor shall provide chemicals and labor for the pre-operational cleaning of all chilled loops and related equipment piping systems. This cleaning method is not intended for potable water systems. Contractor shall furnish and install all equipment, chemicals and service necessary for a complete water treatment program. A single water treatment company shall provide all products and services for undivided responsibility throughout the contract period. This company shall have an accredited laboratory. The water treatment products and services shall be provided by State Industrial Products, or approved equal.

B. The contractor, as part of this project, shall drain, flush, and refill systems (hot water) as necessary in the building. After refill, the systems (entire building) shall be chemically treated as indicated in this specification.

1.3 ACCEPTABLE MANUFACTURERS

A. State Industrial Products - Water treatment products and services (NO SUBSTITUTIONS)

1. Contact Mr. Chris Cascino at 814-242-7542

1.4 SUBMITTALS

A. The Contractor shall provide submittals for the following products required by this specification:

1. Nitrite Test Kit

2. 2-1/2 Gallon Filter Feeder

3. Cleaning Solution

4. Closed Loop Inhibitor

PART 2 – PRODUCTS

2.1 PRE-OPERATIONAL CLEANING

A. Preparation for Clean-Out

1. All systems must be prepared prior to the introduction of the chemical cleaner.

2. Contractor shall flush all systems, including mud from drop legs. Remove, clean and replace all strainers. All systems shall contain the highest quality of water available.

3. Complete circulation must be achieved during the cleaning procedure. A minimum flow

rate of 2 feet per second shall be maintained to ensure the cleaning chemicals will work properly. All electric, air, and thermostatic operated valves shall be open. All dead end runs shall be looped together with piping not less than 1/3 the size of the run. This piping is to remain in place until the cleaning is complete.

4. A minimum of 1 ½" ball or gate valve is to be permanently installed in the low point of each system for the purpose of draining the system.

B. Cleaning Chemicals

1. A pre-operational cleaner shall be used to remove light grease, cutting oils, loose mill scale, organics and extraneous construction debris. The cleaner shall contain an organic phosphate, an organic corrosion inhibitor, a dispersant and an oil emulsifier, such as Tempest, or approved equal. Sufficient cleaner shall be used to treat all piping to remove oil and grease and to permit a uniform passivating film to form. This film aids in the prevention of flash corrosion when the system is most vulnerable to attack.

C. Pre-Operational Cleaning Procedure

1. Add recommended quantity of cleaning chemical directly into the closed loop before the recirculating pumps to ensure rapid mixing and distribution throughout the system. A small amount of antifoam may be added to prevent excessive foaming. Refer to MSDS for safety information.

2. Recirculate the system for 16-24 hours.

3. Open and drain mud legs and low points periodically during the cleaning process. Drain system completely paying particular attention to mud from drop legs and all low points.

4. Refill the system with clean potable water. Clean all strainers. Re-circulate for 8-12 hours and completely drain the system.

5. Refill the system. The length of time between the completion of the cleaning procedure and the addition of the corrosion inhibitor shall not exceed 24 hours.

6. Add the recommended level of closed loop inhibitor. The system is now ready for operation.

7. A service report shall be generated on-site by the water treatment representative certifying that the system has been cleaned in accordance with the above procedure and shall be copied to the mechanical contractor.

2.2 WATER TREATMENT PROGRAM

A. Chemical Feed and Control Equipment

1. A 2 1/2 gal Chemical Filter-Feeder shall be used. This filter-feeder shall be floor mounted only and consist of the filter-feeder body, internal stainless steel retaining screen, and 3 1/2" fill cap. A minimum of 4 filter bags will be provided with the filter-feeder for use. Filter-Feeder shall be supplied by State Chemical, #102456.

2. Chemical feeder shall be mounted on the floor, or on an interior wall. If wall mounted, the feeder opening shall not exceed 3' (three feet) from the operating floor.

3. Isolation valves, for purposes of feeder operation will be at a level approximately equal to, or slightly below the top of the feeder cap and a close as practical to the chemical feeder, as a means of limiting excessive air addition when feeding chemicals. A flow indicating device will be installed on the water inlet to the chemical filter feeder to ascertain flow.

4. A drain line from the chemical feeder shall be installed and run to a sanitary drain.

5. A properly sized water meter shall be installed on the closed loop make-up water line to provide measurements of make-up water to the system.

B. Water Treatment Chemicals

1. Furnish a one year supply of a liquid closed loop inhibitor for control of scale and corrosion in a closed recirculating system. Formulations shall not contain any ingredient which may be harmful to system materials of construction. The corrosion inhibitor shall contain a multi-functional blend of nitrite, molybdate, tolyltriazole, anionic polymer and buffering agents. Inhibitor shall be HWS-135, or approved equal. A MSDS shall be provided for all chemical products. No system shall be operated without the benefits of chemical protection.

C. Test Equipment

1. Furnish water test equipment, including storage case and spare reagents for maintaining control of the program standards in the closed loop system. Test kits shall include reagents and apparatus for the determination of nitrite level in the closed loop system.

D. Water Treatment Service Program

1. Provide start-up service and regular service visits to include:

a. Recommendations for installation and system start-up.

b. Initial treatment dosages.

c. Training of operating personnel on proper feed and control techniques.

d. Service visits and consultation meetings as required.

e. Provide necessary log sheets and record forms.

f. Provide laboratory and technical assistance as required.

g. All services shall be provided by a qualified full time representative of the approved chemical company.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install all equipment per manufacturers recommendation and Best Industry Standards.

END OF SECTION 232510

SECTION 233113 – DUCTWORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The ductwork for the various HVAC systems shall be as hereinafter described in this section.

1.3 GENERAL REQUIREMENTS

A. The Contractor shall furnish and install all sheet metal work as required for proper operation of the heating, ventilating and air conditioning system, supply air, return air, outside air, relief air and exhaust ventilating systems.

B. The Contractor shall be held responsible to construct the air handling systems in accordance with UL requirements for the particular combinations on the Project. Fire dampers must be UL listed and approved for each particular type of installation in accordance with the UL regulations and NFPA requirements including NFPA 90A.

C. Ductwork shall include low and medium velocity heating and air conditioning supply, outdoor air, return, relief, transfer, and exhaust ventilation, mains, branches, access doors, dampers, wall sleeves, canvas connections, accessories, as hereinafter specified, and all necessary supports, bracing, stiffeners and hangers to provide neat vibration-proof air distribution systems. All supply ductwork shall be insulated as air conditioning ductwork.

D. The Heating Contractor shall be responsible for notifying the General Contractor where ductwork or other equipment will be extended through the roof and exterior walls. It will be necessary to coordinate the exact location of structural members to provide clearance for the ductwork.

E. The duct systems shall be arranged to provide all possible clearance for access to various dampers and other accessories. An access door shall be provided to service each damper. Shape and location of ducts may be changed to suit building conditions but area must be maintained. Attention is called to the limited space available for ductwork and close cooperation will be required between this Contractor and contractors for other trades.

F. All sheet metal work shall be fabricated and installed in a neat and workmanlike manner and by men experienced in this type of work.

G. Backdraft dampers shall be provided in exhaust duct discharges and at all exhaust fans to keep tramp air from entering ductwork or rooms. Motor operated dampers shall be provided as shown on Drawings in lieu of backdraft dampers.

H. Where vertical sheet metal ducts pass through floors or masonry construction, supporting angles shall be rigidly bolted to the floor. The horizontal leg of the angle shall be of sufficient width to provide adequate bearing surface for the support of the respective duct. In all possible cases, the supporting angle shall be placed on all four sides of the duct. Where ductwork is

exposed (not enclosed in masonry), a 2" high concrete curb shall be formed around all four sides of opening in floor to prevent water drippage to the ceiling below. Space between ductwork and wall or floor opening shall be filled with Dow Corning 3-6548 RTV sealant, or approved equal, to prevent the passage of flame and smoke. Where horizontal ducts pass through masonry wall construction, additionally provide sheet metal angles or flanges on each side of wall to completely close opening.

I. Exposed ductwork in areas such as the Entrance Lobbies shall be spiral round ductwork lined with 1 1/2" of duct liner. See insulation specifications for duct liner requirements. Exposed ductwork shall be primed and painted to the custom color selected by the Architect. The HVAC contractor shall provide priming and painting.

PART 2 - PRODUCTS

2.1 LOW VELOCITY DUCTWORK

A. All low velocity ductwork shall be constructed and installed in strict accordance with the recommendations and details of SMACNA (Sheet Metal and Air Conditioning Contractors' National Association, Inc., 8224 Old Courthouse Road, Tysons Corner, Vienna, Virginia 22180), except where these Specifications exceed SMACNA requirements. Low velocity ductwork shall consist of outdoor intake ducts, supply ducts, exhaust ducts, transfer ducts, relief air ducts, and return ducts.

B. Metal used in ducts except as otherwise specified shall be galvanized sheet steel conforming to ASTM A527 or aluminum conforming to Aluminum Association Standards Designation #3003-H14.

C. All miscellaneous transitions, shapes and accessories have not been indicated due to the scale of the Drawings; however, the Contractor shall install all sheet metal accessories to complete the systems. Special care shall be exercised to provide tight fitting, well-fabricated well-braced ductwork systems. Adjustment mechanisms, controls and dampers of all kinds must be accessible.

D. Drive slip joints shall not be used for joint connections unless the Contractor thoroughly tapes each joint with 3M or approved equal 4" wide vinyl impregnated cloth duct tape with adhesive back. Two 2" wide overlapped tapes may be used in lieu of 4" wide tape. Taped drive slip joints may be used on ducts up to and including 18" only.

E. All new low velocity ductwork shall be constructed to SMACNA 2" W.G. pressure class standards and shall be neatly built, rigidly braced with structural shapes to prevent vibration and made up of the following gauges:

Steel Gauge	Aluminum Thickness	Maximum Size, Inches	Type of Transverse Joint Connections	Bracing
24	.020"	Up to 12	Plain S Slip, Pocket Lock or Bar Slips on 8'-0" Centers	None

Steel Gauge	Aluminum Thickness	Maximum Size, Inches	Type of Transverse Joint Connections	Bracing
24	.025"	13 to 18	Plain S Slip, Pocket Lock or Bar Slips on 8'-0" Centers	None
24	.025"	19 to 30	Hemmed S Slip, 1" Pocket Lock or 1" Bar Slips on 10'-0" Centers	1" x 1" x 1/8" angles 5'-0" OC max.
22	.032"	31 to 42	1" Pocket Lock or 1" Bar Slips, on 5'-0" Centers	1" x 1" x 1/8" angles 5'-0" OC max.
22	.032"	43 to 54	1-1/2" Angle Connections or 1-1/2" Pocket or 1-1/2" Bar Slips on 5'-0" Max. Centers	1-1/2" x 1-1/2" x 1/8" angles 5'-0" OC max.
20	.040"	55 to 60	1-1/2" Angle Connections or 1-1/2" Pocket or 1-1/2" Bar Slips on 5'-0" Max. Centers with 1-3/8" x 1/8" Bar Reinforcing	1-1/2"x 1-1/2" x 1/8" angles 5'-0" OC max.
20	.040"	61 to 84	1-1/2" Angle Connections or 1-1/2" Bar Slips on 5'-0" Max. Centers with 1-3/8" x 1/8" Bar Reinforcing	1-1/2"x 1-1/2" x 1/8" angles 4'-0" OC max.
18	.051"	85 to 96	1-1/2" Angle Pocket Connections or 1-1/2" Angle Slips or 1-1/2" Bar Slips 5'-0" Max. Centers with 1-3/8" x 3/16" Bar Reinforcing	1-1/2" x 1-1/2" x 3/16" angles 3'-0" OC max.
18	.051	Over 96	2" Angle Pocket Connections or 2" Angle Slips 5'-0" Maximum Centers with 2" x 1/4" Bar Reinforcing	2" x 2" x 1/4" angles 2'-6" OC max.

F. Round low velocity ductwork shall be fabricated of galvanized steel with lock-type spiral seams in accordance with SMACNA details and steel gauge thickness as listed in the SMACNA Manual. Duct system shall be as manufactured by United Sheet Metal, Semco, Hranec SMI or approved equal. No “snap-lock” round ductwork will be accepted. All round fittings shall be pressed or welded. No adjustable elbows or fittings will be accepted.

G. All joints in ductwork shall be airtight and shall be constructed in accordance with SMACNA recommendations, except where SMACNA recommendations are exceeded by these Specifications. All connections between motor-operated equipment and ductwork shall be made through 20 oz. fire-resistant canvas throats, "Ventfab," "Durodyne," or approved equal.

H. All ductwork shall be supported by hanger straps, angles, rods, or bands, attached, sized and spaced in accordance with the SMACNA duct construction standards. Standard sheet metal practices listed and shown in the SMACNA "Duct Manual" shall apply to work to be performed.

2.2 FLEXIBLE DUCTS

A. Flexible ducts shall be used in low velocity systems where specifically indicated on the Drawings or where required to pass ducts around conflicting construction and for connection to air terminals. Ducts shall be suspended with band hangers and wire spaced as recommended by the duct manufacturer and to prevent sagging and kinking. Use of flexible ductwork shall be kept less than 48" in length. Flexible ducts shall be listed by Underwriters' Laboratories under UL181 as a Class 1 flexible air duct material and shall comply with NFPA Standards 90A and 90B. Flexible ducts shall be a factory fabricated assembly consisting of a polymeric liner duct bonded permanently to a coated spring steel wire helix supporting a fiberglass insulating blanket and covered with a fiberglass reinforced metalized film vapor barrier laminate. Flexible ducts shall be Thermaflex Type M-KE, as manufactured by Automation Industries, or approved equal.

PART 3 – EXECUTION

3.1 DUCTWORK TESTING

A. The Contractor shall, at the beginning of the work, construct, erect and leak test a representative sample of the duct construction to be used at the 4-inch w.g. pressure class. The sample specimen shall include at least five transverse joints, typical seams, an access door and at least two typical branch connections plus an elbow. The specimen shall be a portion of a main duct or main branch as submitted by the Contractor and accepted by the Engineer.

B. The leakage shall not exceed the allotted amount for the pressure class, or the allotted amount for that portion of the system whichever is applicable.

Duct Class	2" w.g.	4" w.g.
Seal Class	A	A
Sealing Applicable	Joints, Seams and All Duct Wall Penetrations	Joints, Seams and All Duct Wall Penetrations
Leakage Class		
Rectangular Metal	4	2
Round Metal	4	2

C. Leakage tests are not required for the 2-inch w.g. duct pressure class.

D. Concentrated leakage at any one point, on any duct, will not be permitted and shall be corrected to the satisfaction of the Engineer.

E. Leak test procedures shall follow the outlines and classifications in the SMACNA *HVAC Duct*

Leakage Test Manual – Second Edition 2012.

F. If the specimen fails to meet the allotted leakage level, the Contractor shall modify the ductwork to bring it into compliance and shall retest it until acceptable leakage is demonstrated.

G. Tests and necessary repairs shall be completed prior to concealment of ducts.

3.2 INSTALLATION

A. Install all ductwork per SMACNA Standards.

B. The ends of all ductwork and associated equipment shall be capped plugged, or adequately sealed at fabrication, during shipping, during storage at the site and as construction proceeds to prevent the entrance of dust, dirt, and other foreign matter. All open ends on installed duct work shall be capped, plugged or adequately sealed to prevent the entrance of dust, dirt, and other foreign matter.

C. All ductwork regardless of function or pressure class shall be sealed air tight from fan or unit connections up to and including the register, grille, or diffuser collar.

3.3 UNACCEPTABLE HANGER AND SUPPORT INSTALLATIONS

A. It is unacceptable to support any pipe(s) or duct(s) from other pipe(s) or duct(s).

B. It is unacceptable for this Contractor to support his work from the hangers of other trades. All trades must install their own hangers.

C. Unacceptable hanger and support installations shall be corrected as directed by the Engineer at no cost to the Owner.

END OF SECTION 233113

SECTION 233114 - EXTERIOR DUCTWORK – MANUFACTURED PRE-INSULATED

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes:

1. Exterior ductwork, designed, manufactured, and pre-insulated for thermal efficiency, low leakage, and weather resistance.

2. Pressure Class: 6" w.g. positive and 6” w.g. negative.

3. All exterior ductwork on this project shall be manufactured Pre-Insulated ductwork. Color shall be as approved by Architect.

B. This section does not include:

1. Air passages rated over a continuous internal static pressure of 6" w.g. positive, 6” w.g. negative, or with test pressure rating over: 10" w.g. startup and 10" w.g. negative (as documented on product labeling).

1.2 SUBMITTALS

A. Product data: For each type of product indicated.

B. Shop drawings: Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work including.

1. Duct layout indicating sizes and pressure classes.

2. Elevation of top of ducts.

3. Dimensions of main duct runs from building grid lines.

4. Fittings.

5. Penetrations through fire-rated and other partitions.

C. Coordination Drawings: Plans, drawn to scale, showing coordination general construction, building components, and other building services.

1.3 QUALITY ASSURANCE

A. Installer Qualifications:

1. Exterior ductwork can be installed by competent trained field mechanics who demonstrate competence in the HVAC industry.

1.4 SPECIFICATION COMPLIANCE

A. Duct Leakage Class, follow SMACNA Leakage Class 3 or less.

B. Exterior ductwork shall incorporate a Kingspan KoolDuct fortified inner liner compliant to UL (C-UL) 181 Standard for Safety Listed, Class 1 system, with included testing and passing the following:

1. Test for Surface Burning Characteristics
2. Flame Penetration Test
3. Burning Test
4. Mold Growth and Humidity Test
5. Low Temperature Test and High Temperature Test
6. Puncture Test
7. Static Load Test
8. Impact Test
9. Pressure Test and Collapse (negative pressure) Test
10. High Temperature and Humidity for 90 days
11. Cone Calorimeter
12. ASTM E2257 Standard Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies
13. ASTM E 84 tested, Tunnel Test, Does not exceed 25 flame spread, 50 smoke developed.
14. DW144, Class B
15. NRTL product approval, (Subpart S of 29 CFR Part 1910, OSHA)
16. ASTM C 423 noise reduction
17. ASTM E 96/E 96M Procedure A for permeability
18. ASTM C 1071 for erosion
19. ASTM C 518: 2004, Standard Test Method for Steady–State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
20. UL 723, Test for Surface Burning Characteristics of Building Materials
21. NFPA Compliance:
    a. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
    b. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"

c. NFPA 255, “Standard Method of Test of Surface Burning Characteristics of Building Materials

C. Exterior ductwork outer shell shall be a UV stable 1000 micron high impact resistant titanium infused vinyl with included testing as following;

1. UL-94 Flammability V-0

2. ASTM D-638 Tensile Strength of 6250 psi

3. ASTM D-790 Flexible Strength of 11,000 psi

4. ASTM D-4226 Drop Impact Resistance

5. ASTM D-4216 Cell Classification

1.5 PRODUCT DELIVERY AND STORAGE

A. Prevent objectionable aesthetic damage to the outer surface of duct segments during transport and storage.

B. Store duct segments under cover and protect from excessive moisture prior to installation.

PART 2 – PRODUCTS

2.1 EXTERIOR RECTANGULAR DUCT AND FITTINGS

A. Acceptable Manufacturers: (NO OTHERS WILL BE CONSIDERED)

1. Thermaduct with Kingspan Kooltherm thermoset resin insulated core (Basis of Design)

2. Tuff Duct

3. Dual-Tech by PTM Manufacturing, LLC

4. Pro-R by Duct & Cleats

B. The panel shall be manufactured of CFC-free closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, 1000 micron high impact resistant titanium infused vinyl is factory bonded to the outer surfaces to provide a zero permeability water tight barrier.

C. The thermal conductivity shall be no greater than 0.13BTU • in/Hr •ft2•°F, the thermal conductivity shall be no greater than 0.13BTU • in/Hr •ft2•°F

D. The density of the Kooltherm foam shall not be less than 3.5 PCF with a minimum compressive strength of 28 psi (.2 MPa).

E. The panel thickness, R-value, and other characteristics shall be as follows:

1. Maximum Temperature: Continuous rating of 185 °F inside ducts or ambient temperature

surrounding ducts.

2. Maximum Thermal Conductivity: 0.13 Btu x in./h x sq. ft. x deg F at 75 °F mean temperature.

3. Permeability: 0.00 perms maximum when tested according to ASTM E 96/E 96M, Procedure A.

4. Antimicrobial Agent: Additive for antimicrobial shall not be used but instead, raw product must pass UL bacteria growth testing.

5. Noise-Reduction Coefficient: 0.05 minimum when tested according to ASTM C 423, Mounting A.

6. Required Markings: All interior duct liner shall bear UL label and other markings required by UL 181 on each full sheet of duct panel; UL ratings for internal closure materials.

7. All insulation materials shall be closed cell with a closed cell content of >90%.

8. R-value: 1 ¾" Thick Panel: 12 R

F. Closure Materials:

1. V-Groove Adhesive: Silicone (interior only).

2. UV stable 39 mil high impact resistant titanium infused vinyl (exterior).

a. Factory manufactured seamless corners for zero perms.

b. Cohesive bonded over-lap at corner seam covers for zero perms.

c. Water resistant titanium infused welded vinyl seams.

d. Mold and mildew resistant.

3. Polymeric Sealing System:

a. Structural Membrane: Aluminum scrim with woven glass fiber with UV stable vinyl clad applied

b. Minimum Seam Cover Width: 2 7/8" inches

c. Sealant: Low VOC.

d. Color: As selected by the Architect

e. Water Proof.

f. Mold and mildew resistant.

4. Duct Connectors.

a. Factory manufactured cohesive bonded strips (low pressure only).

b. Factory manufactured all aluminum grip flange.

1) Grip flange

2) F-flange

3) H-flange

4) U-flange

c. Factory manufactured galvanized 4-bolt flange.

G. Outdoor Cladding

1. Duct segments shall incorporate UV stable 39 mil high impact resistant titanium infused vinyl which is introduced during the manufacturing process.

H. Flange coverings

1. Flanges are field sealed airtight before flange covers are installed. Flange covering consists of the following:

a. Foam tape insulation with molded 39 mil covers.

b. Air gap (heating only application) with molded 39 mil covers.

I. Weight

1. Exterior ductwork shall provide low weight stresses on the building framing and support members. Assembled exterior ductwork shall have a weight of 0.86 lbs. per square foot to maximum weight of 2.7 lbs. per square foot (depending on R-value). Hangers and tie-downs are to be detailed on the manufacturer's installing contractors detail drawings prior to installation but not exceeding 13' for duct girth <84" and 8' for duct girth >85" between hangers and designed to carry the weight and wind load of the ductwork.

J. Interior Surface

1. Galvanized steel interior liner.

PART 3 – EXECUTION

3.1 SHOP FABRICATION

A. Certification:

1. Ducts shall be detailed and fully factory manufactured by an authorized manufacturer's facility system. All fabrication labor will be certified "yellow label" building trade professionals, compliant to SMWIA and SMACNA labor guidelines (work preservation observed).

B. Fabrication:

1. Fabricated joints, seams, transitions, reinforcement, elbows, branch connections, access doors and panels, and damage repairs according to manufacturer's written and detailed instructions.

2. Fabricated 90-degree mitered elbows to include turning vanes.

3. Fabricated duct segments in accordance with manufacturer's written details.

4. Duct Fittings shall include 6 inches of connecting material, as measured, from last bend line to the end of the duct. Connections on machine manufactured duct may be 4 inches.

5. Fabricated duct segments utilizing v-groove method of fabrication. Factory welded or cohesively bonded seams will apply to fully manufactured ductwork and fittings. Internal seams will be supplied with an unbroken layer of low VOC silicone or bonding (for paint shop applications). Each duct segment will be factory supplied with either aluminum grip pro-file or pre-insulated duct connectors in accordance with manufacturer's detailed submittal guide. Applied duct reinforcement to protect against side deformation from both positive and negative pressure per manufacturer's design guide based on specified ductwork size and system pressure.

6. Designed and fabricated duct segments and fittings will be in accordance with "SMACNA Duct Construction Standards" latest edition.

7. Both positive and negative ductwork and fittings shall be constructed to incorporate a UL Listed as a Class 1 air duct to Standard for Safety UL 181 liner with an exterior clad for permanent protection against water intrusion.

8. Duct shall be constructed to exceed requirements for snow and wind loads.

3.2 DUCT INSTALLATION

A. Duct segments shall be installed be competent HVAC installers.

B. Install ducts and fittings to comply with manufacturer's installation instructions as follows:

1. Install ducts with fewest possible joints.

2. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

3. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

4. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

5. Use prescribed duct support spacing as described in this specification and manufacturer's recommendations.

6. Air Leakage: Duct air leakage rates to be in compliance with "SMACNA HVAC Duct

Construction Standards" latest version per applicable leakage class based on pressure.

3.3 HANGER AND SUPPORT INSTALLATION

A. Contractor to ensure that the ductwork system is properly and adequately supported.

1. Ensure that the chosen method is compatible with the specific ductwork system requirements per manufacturer's installation detail drawings. Pre-installation should be provided prior to work commencement by installing contractor for approval.

2. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Supports on straight runs of ductwork shall be positioned at centers not exceeding 13 feet (3.96 m) for duct sections when fabricated in 13 foot (3.96 m) lengths with duct girth less than 84". Larger duct sizes and short segments with duct girth greater than 84" are to be supported at 8 foot centers or less, in accordance with the manufacturer's installation details provided prior to work commencement.

C. Ductwork shall be supported at changes of direction, at branch duct connections, tee fittings, parallel under turning vanes and all duct accessories such as dampers, etc.

D. The load of such accessories to the ductwork shall be neutralized by the accessory support.

3.4 FIELD QUALITY CONTROL

A. Inspection: Arrange for manufacturer's representative to inspect completed installation and provide written report that installation complies with manufacturer's written instructions.

1. Remove and replace duct system where inspection indicates that it does not comply with specified requirements.

B. Perform additional testing and inspecting, at the Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.5 DUCT SCHEDULE

A. Outdoor Ducts and Fittings:

1. Exterior Rectangular Ducts and Fittings:

a. Minimum Panel Thickness: 1 ¾ in.

b. Cladding: minimum 0.038 inch

END OF SECTION 233114

SECTION 233300 - SHEETMETAL ACCESSORIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The accessories for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.1 SHEET METAL ACCESSORIES

A. Furnish and install all necessary sheet metal accessories for equalized air distribution.

B. Backdraft Dampers

1. Backdraft dampers shall be factory made of .064" extruded aluminum blades supported on substantial bronze, aluminum, or equivalent rods, in bronze graphite impregnated or nylon bearings, set in extruded aluminum frame and fitted with neoprene or felt on contact edges to prevent noise. Blades shall be 30" in maximum length and 3-1/4" wide. Channel frame shall be fitted to duct, vent or wall opening and edges sealed airtight. Inside dimensions of channel frame shall not be less than the daylight opening of the grille so that frame is not visible with grille in place. Exhaust fans equipped with backdraft dampers shall be furnished with dampers full size of connecting collar.

2. Backdraft dampers shall be as manufactured by C. E. Sparrow Co., Ruskin, or approved equal.

C. Volume Control Dampers

1. Volume control dampers shall be of the factory fabricated opposed blade, multi-louver type, controlled from a single point with an adjusting device. Install end bearings with a rubber gasket on the outside of ducts or frames to prevent air leakage around the damper shaft and for smooth operation. Dampers shall be mounted in heavy galvanized steel channel frames and shall have smooth acting linkage. Blades shall be not less than 16 gauge galvanized, die-formed steel. Volume control dampers shall be as manufactured by Titus, Krueger, Tuttle and Bailey, or approved equal. Adjusting devices shall have locking mechanisms. Adjusting devices on ductwork shall be accessible.

D. Access Doors in Ducts

1. Furnish and install access doors and frames to permit inspection, operation and maintenance of <u>all</u> devices concealed behind the sheet metal work. Provide duct access doors of insulated double panel construction, not less than 20 gauge, galvanized steel. Provide all access doors with sponge rubber gaskets around their entire perimeter. Where ducts are uninsulated or are not lined, insulation in access doors may be omitted.

2. Hang access doors in ductwork in separate frames on heavy flat hinges. Provide "Ventlok No. 100" cast zinc latches. Where space conditions preclude the use of hinges, provide a minimum of 4 heavy window type latches.

3. Provide duct access doors not smaller than 18" x 18". Provide ducts smaller than 18" in width with access doors 2" less in width than the width of the duct. Minimum dimension of one side to be 18".

E. Fire Dampers

1. The Contractor shall furnish and install fire dampers with fusible links, where required by NFPA. Fire dampers must be UL listed and approved for each particular type of installation in accordance with UL and NFPA 90A requirements. The Heating Contractor will be responsible for furnishing and installing dampers and associated sheet metal construction in accordance with UL requirements for the particular combinations on the project and in accordance with SMACNA recommendations. Fire dampers shall, in all cases, be accessible, with suitable means provided for replacing fusible links. Where no other means is available, access doors shall be provided in ductwork. Access doors required in walls or ceilings shall be installed under this Contract.

2. Fire dampers shall be constructed and installed in accordance with applicable requirements of the Pennsylvania Department of Labor and Industry and the National Fire Protection Association including NFPA No. 90A. Dampers generally shall be of the roll form blade design and shall bear the Underwriters' label. Damper blades shall be fabricated of 21 gauge galvanized steel. Frames shall be one piece. Entire assembly shall be given a rustproof protective coating by the manufacturer. Stainless steel blades and accessories conforming with UL and NFPA requirements will be acceptable. Fusible links shall have temperature rating approximately 50 degrees F. above the maximum temperature that would normally be encountered with the system in operation or shutdown but not less than 165 degrees F. unless specifically indicated otherwise. Fire dampers shall be the Low Profile Type 5500-E6-LPC as manufactured by Prefco Products, Inc., Ruskin Model 1BD2-B-Frame, or approved equal. Fire dampers shall be suitable for installation in horizontal and vertical positions. Where fire dampers are installed in conjunction with grilles and registers in walls, it will be necessary for the Contractor to resize grilles and wall openings to accommodate additional area of damper assemblies where blades are stacked.

3. Fire dampers shall have a full opening equal to the duct size or of sizes noted. Blades, in the open position, shall be located and stacked out of the air stream to allow 100% free open area for air flow. Fire dampers installed in masonry walls or air shafts shall be installed and secured to structural steel angles and channels furnished and installed under this Contract.

4. Where necessary, UL approved and labeled fusible link radiation barrier fire dampers and 1/2 inch thickness ceramic thermal insulation blankets shall be furnished and installed where required to conform with UL and NFPA requirements. In the open position the damper shall allow approximately 95% free area of the ductwork with fusible link accessible. Damper frames shall be constructed from 21 gauge steel with 21 gauge steel blades (1-3/4" deep) and connectors. Transition sections to adapt the radiation barrier fire damper to the ductwork shall be furnished and installed by sheet metal subcontractor. Dampers shall be the Ruskin Model CFA5A, or approved equal.

F. Motor Operated Dampers

1. Furnish and install motor operated dampers of the low-leakage type with a leakage rate of not greater than 6 CFM/sq. ft. based on a pressure differential of 4" w.g. Dampers and frames shall both be of extruded aluminum construction with airfoil type blades and plated steel damper shafts which rotate in nylon bushings. The drive shaft shall be extended to the outside of the section to permit connecting of damper motors. Operators and controls shall be as specified under "Automatic Temperature Control." Dampers shall be provided with flexible compression type stainless steel seals installed along the top, bottom, and sides of the frame. Seals along each blade edge shall be extruded vinyl in integral ribbed grooved inserts in blades. Dampers shall be the Model CD-50, as manufactured by Ruskin, Arrow, or approved equivalent.

2. Dampers shall be provided by the HVAC sheetmetal contractor. The ATC contractor will provide the actuators and associated wiring.

G. Turning Vanes

1. Double-wall airfoil (formed) type turning vanes shall be installed at each change in direction of all square or rectangular low velocity ductwork, and shall be factory-fabricated of size to suit ductwork similar to the "Ducturns" as manufactured by Tuttle & Bailey, Titus, Krueger, or approved equivalent. Turning vanes constructed on the job will not be accepted. Turning vanes are not required in ductwork with radius type bends. Turning vanes shall be installed in exhaust ducts only where specifically shown or noted on the Drawings.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install per manufacturers recommendations.

END OF SECTION 233300

SECTION 233400 – FABRIC DISPERSION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 QUALITY ASSURANCE

A. Building Codes and Standards:

1. Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and are also classified in accordance with ICC Evaluation Service AC167 and UL 2518.

2. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.

B. Design & Quality Control

1. Manufacturer must have documented design support information including duct sizing; vent and/or orifice location; vent and/or orifice sizing; length; and suspension. Parameters for design, including maximum air temperature, velocity, pressure and textile permeability, shall be considered and documented.

1.3 WARRANTY

A. Manufacturer must provide a 20 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty. Warranty shall include parts and labor.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design:

DuctSox® Corporation – Represented by Jim Reed @ Pittsburgh Air Systems
Phone: (412) 539-1234 or (412) 303-3636
FAX: (412) 539-1245
www.pittsburghairsystems.com

B. Acceptable Equivalent Supplier

Durkee – Represented by Jay Meenan at IES
Phone: (412) 719-9452

2.2 TEXTILE AIR DISPERSION SYSTEM:

A. SkeleCore IHS (Internal Hoop System): Air diffusers shall be constructed with internal retention system.

1. System shall consist of an internal 360 degree hoop system, spaced 5’ on center.

2. System shall be installed with a one row suspension system located 1.5” above top-dead-center of the textile system.

3. System attachment to cable or U-Track shall be made using Gliders spaced 12 inches.

4. Available for diameters from 8” – 60”.

5. One row suspension options (must specify if multiple on same project)

a. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.

1) Cable suspension options (must specify if multiple on same project)

a) Galvanized steel cable

b) Stainless steel cable

c) Impregnated steel cable (required for natatorium applications)

2) Support lengths available in 5’(standard), 10’, 15’, & 30’.

B. Textile

1. Verona

a. Textile Construction: Filament/filament twill polyester, fire retardant in accordance with UL 2518.

b. Air Permeability: 2 (+2/-1) CFM/ft^2 per ASTM D737, Frazier

c. Weight: 6.2 oz. /yd^2 per ASTM D3776

2. Textile Color

a. Standard: blue, white, tan, red, green, silver, black

b. Custom

C. Textile System Fabrication Requirements

1. Textile system to be constructed in modular lengths (zippered) with proper radial securing clips (inlets, endcaps, and mid-sections) and top access zippers for vertical cable safety attachment.

2. Integrated air dispersion shall be specified and approved by manufacturer. (select only those that apply)

a. Linear Vents

1) Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.

2) Size of vent openings and location of linear vents to be specified and approved by manufacturer.

b. Orifices – 2" & 3" SG's (Sewn-in Grommets)

1) Air dispersion and extended throws are accomplished by reinforced orifices and permeable fabric. Reinforced orifices are to be installed to keep the integrity of opening and withstand laundry processes.

2) Diameter, quantity, and location of reinforced orifices to be specified and approved by manufacturer.

c. Fixed Nozzles

1) Air dispersion accomplished by using conical aerodynamic nozzles and permeable fabric. Diameter of nozzles height to be minimum ½". Due to exact requirements of throw and maximum level of noise alternative flow models are not acceptable.

2) Color of nozzles must match color of fabric. Unless otherwise specifically mentioned on drawings or otherwise in this specification, suppliers standard table is used for selection of color.

3) Location and number of nozzles to be specified and approved by manufacturer.

d. Adjustable Nozzles

1) Air dispersion accomplished by adjustable ball nozzles and permeable fabric. Adjustable ball nozzles to have multiaxial rotation to redirect airflow to desired area. Adjustable ball nozzles are able to completely close off airflow without adding caps or plugs. Adjustable ball nozzles should lock into place once set, preventing constant adjustment. Adjustable ball nozzle should have inset design to be a condensation resistant product.

2) Colors of adjustable nozzles available are white and black. With white material receiving white adjustable nozzles and all other material colors receiving black adjustable nozzles unless otherwise specifically mentioned on drawings or otherwise in the specification.

3) Quantity and location of adjustable ball nozzles to be specified and approved by manufacturer.

3. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener – supplied by contractor.

4. Inlet connection includes zipper for easy removal / maintenance.

5. Lengths to include required intermediate zippers as specified by manufacturer.

6. System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.

7. End cap includes zipper for easy maintenance.

8. Each section of the textile shall include identification labels documenting order number, section diameter, section length, piece number, code certifications and other pertinent information.

D. Design Parameters

1. Textile air diffusers shall be designed from 0.25” water gage minimum to 3.1” maximum, with 0.5” as the standard.

2. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).

3. System overall design; diameter, length, airflow, operating static pressure and dispersion shall be designed or approved by the manufacturer.

4. Do not use textile diffusers in concealed locations.

5. Use textile air dispersion systems only for positive pressure air distribution components of the mechanical ventilation system.

PART 3 – INSTALLATION

3.1 INSTALLATION OF TEXTILE AIR DISPERSION SYSTEM:

A. Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

3.2 CLEANING AND PROTECTION:

A. Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.

B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.

C. If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

END OF SECTION 233400

SECTION 233423 – EXHAUST FANS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The fans for the various HVAC systems shall be as hereinafter described in this section.

PART 2 - PRODUCTS

2.1 INLINE EXHAUST FANS

A. Furnish and install inline type centrifugal exhaust fans. Each unit shall be of such design that it may be fit directly into the duct system in any position. The motor shall be isolated from the airstream and shall be V-belt driven. Uniform velocity shall be maintained through the unit and system.

B. Centrifugal exhaust fans shall be constructed for quiet operation, and shall be of all-aluminum or steel construction, all angle operation, non-overloading centrifugal wheel, with bearing encased within the fan tube, and outlet vanes. Unit shall have AMCA certified ratings, and shall have capacities and characteristics scheduled on the Drawings.

C. Each unit shall be supported with mounting brackets hanger rods, and structural members. All supports shall be provided with vibration arrestors. Each unit shall be arranged and supported so that all weight is free of the ductwork.

D. Each blower shall be connected with companion flanges and airtight "Vent-Glas" flexible connections at inlet and outlet.

E. Each motor shall be wound for electrical characteristics scheduled on the Drawings.

F. Centrifugal straight through exhaust fans shall be similar to Model BSQ as manufactured by Greenheck, Model BSI as manufactured by Twin City or approval equal.

G. Fans shall be controlled as specified under "Automatic Temperature Control."

H. Fans shall be furnished with integral mounted disconnect switch. Line side power connection shall be by the Electrical Contractor and load side connection shall be by the Heating Contractor.

2.7 CEILING MOUNTED EXHAUST FAN

A. Ceiling mounted exhaust fans shall be of the centrifugal direct drive type. The fan housing shall be constructed of steel. The plastic duct collar shall be a tapered sleeve for ease of connection to round ductwork and shall include a backdraft damper. The grille shall be constructed of non-yellowing high strength polymer and attached to the housing with torsion springs.

B. The wheels shall be constructed of high strength polymer. The access for wiring shall be external. The motor disconnect shall be internal and of plug in type. All fans shall bear the AMCA certified Ratings Seal for sound and air performance and shall be U.L. Listed. Fans shall be Model SP-5 or SP-6 as supplied by Greenheck, Model T as manufactured by Twin City or approved equivalent

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install per manufacturers recommendations.

END OF SECTION 233423

SECTION 233425 - NON-PENETRATING ROOFTOP EQUIPMENT AND PIPING SUPPORTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Portable, non-penetrating, rooftop support system for:

1. Mechanical Equipment

2. Piping

B. Acceptable Manufacturers:

1. Big Foot (Basis of Design)

2. Approved Equivalent

1.2 REFERENCES

A. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A 525 - Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

D. ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics.

E. MSS SP-58 - Pipe Hangers and Supports -- Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry.

F. MSS SP-69 - Pipe Hangers and Supports -- Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry.

1.3 SYSTEM DESCRIPTION

A. Support ductwork on roof with an engineered prefabricated PHP-Duct System designed for installation without roof penetrations, flashing or damage to the roofing material. The system shall consist of bases, made of high density polypropylene plastics with UV Protection, and a HDG structural steel frame. Nuts, threaded rods and washers shall be HDG, spring nuts and bolts for spring nuts will be electroplated. System shall be custom designed to fit the load requirements that will be required.

1.4 SUBMITTALS

A. Submit under provisions of Division 01.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Delegated Design to be sealed by an Engineer licensed in Pennsylvania to show installation layout, sizes of units, and details of installation.

D. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment of components.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing pipe support systems, with a minimum of eight years of documented experience.

B. Installer Qualifications: Company approved by manufacturer and with not less than five years of experience in installation of piping support systems.

C. References: Submit list of references comprising not less than 10 installations that have been in use for a minimum of five years. Include contact name and phone numbers for each reference.

D. Pre-Installation Meeting: After approval of submittals, but before beginning installation, conduct a meeting at project site attended by Architect, Contractor, installers of roofing, and mechanical and electrical piping to be installed on pipe support systems.

1. Purpose of meeting is to describe in detail the installation process and to establish agreement, coordination, and responsibilities.

2. Prepare detailed meeting report and distribute copies to the Architect and all attendees.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to project site in manufacturer's original packaging, marked with manufacturer's name, product model names and catalog numbers, identification numbers, and other related information.

B. Store materials under cover until needed for installation.

1.7 WARRANTY

A. See Division 01 for closeout Submittals, for additional warranty requirements.

B. Warranty: Standard Manufacturers Warranty

PART 2 PRODUCTS

2.1 APPLICATION

A. Support pipes, conduit, cable trays, and ducts minimum of 6 inches (150 mm) above roof surface.

1. For Electrical and Gas Lines 2-1/2 inches (64 mm) in Diameter or Less, up to 10 inches (254 mm) above roof: Portable Pipe Hanger Model number: SS8.

2. For Ductwork: Portable Pipe Hanger Model number PPH-D - Goal Post style.

3. For Ductwork: Portable Pipe Hanger Model number PPH-D - Enclosed style.

4. Accessories for PSE Custom and Other Applications when required

a. On Sloped Roof Surfaces, Where Slope Exceeds 1/4 inch per foot (13 mm per 305 mm): Provide base with swivel for slope adjustment. Note: PHP Approved bracing required when using base with swivel.

b. Un-insulated Piping: Roller support or clevis hanger.

c. Insulated Piping: Band hanger supported from horizontal strut or clevis hanger with Insulation Protection Shield.

d. Conduit: Band hanger supported from horizontal strut.

e. Bracing required when using base with swivel, when pipe exceeds 24 inches (610 mm) above roof, or when thermal expansion of pipe is great.

B. Attachment of Base to Roof Surface when required for Seismic and High Wind Application:

1. Adhesive attachment to roof surface.

2. Mechanically fastened to roof deck.

2.2 MATERIALS

A. Portable Support System: Engineered, portable system specifically designed for installation without the need for roof penetrations or flashings, and without causing damage to the roofing membrane.

1. Design system using high density / high impact polypropylene bases with carbon black, anti-oxidants for UV protection, and steel framing for support is 1-5/8 inch (41 mm) B22TH or 1-7/8 inch (48 mm) BTS22TH.

2. Custom design system to fit piping, conduits, equipment, or walkways to be installed and actual conditions of service and loading.

3. Piping Supports: Provide suitable hangers and supports.

4. Duct and Equipment Supports: Factory fabricated to support exact duct sizes and equipment to be installed.

5. Walkways and Platforms: Provide galvanized slotted metal grating, in configurations as indicated, and tubular handrails where indicated.

B. Bases: Injection molded high density / high impact polypropylene with UV- inhibitors and anti-oxidants, conforming to the following:

1. Moisture Content: Negligible.

2. Shrinkage/Swelling Due to Moisture: Negligible.

3. Density: 55.8 lb/cu ft (894 kg/cu m).

4. Insect Resistance: No known insect damage potential.

5. Chemical Resistance (oil, brake fluid, gasoline, diesel, antifreeze, battery acid, and sulfuric acid: No visual or physical change apparent.

6. Flammability: No ignition after 10 minutes, 25 kW/m, when tested in accordance with ASTM D 1929.

7. Sized as required by loading conditions and as indicated on the drawings.

8. Shop fabricated with inserts for square tubing or threaded rods as required.

9. Color: Integral black color as molded.

10. Bases for Mechanical Attachment: Sealant chamber around penetration point, with injection port for sealing after fastening; beveled lip for sealant bead around entire diameter.

11. Do not use bases containing carbonated plastics, press molded recycled rubber and plastics, steel, stainless steel, or any injection molded threaded receivers.

C. Steel Framing:

1. Channel Types: 1-5/8 inch (41.3 mm) B22TH or 1-7/8 inch (47.6 mm) BTS22H, as required for loading conditions.

2. Thickness: 12 gage (2.7 mm).

3. Form: Roll-formed 3-sided or tubular shape, perforated with 9/16 inch (14.3 mm) holes at 1-7/8 inch (47.6 mm) centers on three sides.

4. Finish: Hot dip galvanize in accordance with ASTM A 123 after fabrication, free of roughness, whiskers, unsightly spangles, icicles, runs, barbs, sags, droplets, and other surface blemishes.

5. Do not use tubing or tube steel.

D. Stainless Steel Framing:

1. Channel Types: 1-5/8 inch (41.3 mm) or 1-7/8 inch (47.6 mm), as required for loading conditions.

2. Thickness: 12 gage (2.7 mm).

3. Form: Roll-formed 3-sided or tubular shape.

4. Finish: Mill finish.

5. Do not use tubing or tube steel.

E. Pipe Supports and Hangers: Conform to MSS SP-58 and MSS SP-69 and as follows:

1. Fabricate of carbon steel where framing is carbon steel; fabricate of stainless steel where framing is stainless steel; finished same as framing.

2. Sizes 2-1/2 inch (63 mm) and smaller: Single roller supports for piping subject to expansion and contraction; 3-sided channels and pipe clamps.

3. Sizes 3 inch (76 mm) and larger: Rollers, clevis hangers, or band hangers, to allow for expansion and contraction without movement of the bases or framing.

F. Accessories: Clamps, bolts, nuts, washers, and other devices as required for a complete system.

1. Carbon Steel: Hot-dip galvanized in accordance with ASTM A 153/A 153M.

2. Stainless Steel: Mill finish.

3. For Mechanical Fastening to Deck: On wood and steel decks, use bolts with toggle wings; on concrete decks use threaded rods and adhesive anchors, with rod embedded at least 1-3/4 inches (44 mm) into concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that roofing system is complete and that roof surfaces are smooth, flat, and ready to receive work of this section.

B. Verify that roof surface temperature is at minimum 60 degrees F (15.5 degrees C), for proper adhesive performance.

3.2 PREPARATION

A. Clean surfaces of roof in areas to receive portable support bases.

1. Remove loose gravel from gravel surfaced roofs.

2. Remove dirt, dust, oils, and other foreign materials.

B. Use care in handling portable support system components during installation, to avoid damage to roofing, flashing, equipment, or related materials.

3.3 INSTALLATION

A. Pipe, Duct, Cable, and Conduit Support Systems:

1. Locate bases and support framing as indicated on drawings and as specified herein. Provide complete and adequate support of all piping, ducts, and conduit, whether or not all required devices are shown.

2. The use of wood for supporting piping is not permitted.

3. Provide supports spaced so deflection of piping does not exceed 1/240 of span.

4. Install framing at spacing indicated, but in no case at greater than 10 feet (3 m) on center.

5. Accurately locate and align bases.

   a. Consult manufacturer of existing or new roofing system as to the type of isolation pads required between the roof and base.

   b. Set isolation pads in adhesive if required by manufacturer's instructions.

   c. Place bases on isolation pads.

   d. Adhere or mechanically attach if required by code.

   e. Where applicable, replace gravel around bases.

6. Set framing posts into bases and assemble framing structure as indicated.

7. Use galvanized fasteners for galvanized framing and stainless steel fasteners for stainless steel framing.

B. Duct Support Systems

1. Locate bases and support framing as indicated on drawings and as specified herein. Provide complete and adequate support of all piping, ducts, and conduit, whether or not all required devices are shown.

2. Accurately locate and align bases.

   a. Consult manufacturer of existing or new roofing system as to the type of isolation pads required between the roof and base.

   b. Set isolation pads in adhesive if required by manufacturer's instructions.

   c. Place bases on isolation pads.

   d. Adhere or mechanically attach if required by code.

e. Where applicable, replace gravel around bases.

3. Place pre-assembled support on bases and attach framing post to base bracket with 1/2 inch bolts provided and adjust as needed. Support shall be adjustable to maintain existing elevation and slope.

4. Use galvanized fasteners for galvanized framing and stainless steel fasteners for stainless steel framing.

C. Walkway, Crossover & Equipment Platform Access:

1. Install substructures at spacing indicated, but not greater than 5 feet (1.5 m) on center.

2. Locate bases and support framing as indicated on drawings and as specified herein. Provide complete and adequate support of all structures.

3. Accurately locate and align bases.

a. Consult manufacturer of existing or new roofing system as to the type of isolation pads required between the roof and base.

b. Set isolation pads in adhesive if required by manufacturer's instructions.

c. Place bases on isolation pads.

d. Adhere or mechanically attach if required by code.

e. Where applicable, replace gravel around bases.

4. Set legs of substructures into bases as indicated.

5. Use galvanized fasteners for galvanized framing and stainless steel fasteners for stainless steel framing.

6. Layout and fasten planking to substructures.

7. Where handrails are required, install as follows:

a. Install intermediate rails without tightening.

b. Make minor adjustments as needed, such as spacing of substructures to accommodate intermediate handrails, and install hold-downs.

c. Secure intermediate handrails and install top handrails.

D. Telecommunications

1. Provide portable pipe hangers systems pre-assembled as much as possible.

2. Locate bases and support framing as indicated on drawings and as specified herein. Provide complete and adequate support of all structures.

3. Accurately locate and align bases.

   a. Consult manufacturer of existing or new roofing system as to the type of isolation pads required between the roof and base.

   b. Set isolation pads in adhesive if required by manufacturer's instructions.

   c. Place bases on isolation pads.

   d. Adhere or mechanically attach if required by code.

   e. Where applicable, replace gravel around bases.

4. Attached pre-assembled support to bases and adjust as needed. Note, support shall be adjustable to maintain existing elevation and slope.

5. Lay out bar grating on substructures and attach.

6. Use galvanized fasteners for galvanized framing and stainless steel fasteners for stainless steel framing.

3.4 FIELD QUALITY CONTROL

A. Provide a factory-trained representative of the manufacturer to visit the site while the work is in progress to assure that the installation conforms to the design requirements and the manufacturer's installation requirements.

3.5 CLEANING AND PROTECTION

A. Remove all packaging, unused fasteners, adhesive, and other installation materials from the project site.

B. Remove adhesive from exposed surfaces of supports and bases, and leave the work in clean condition.

C. Provide protection as required to leave the work in undamaged condition at the time of substantial completion.

END OF SECTION 233425

SECTION 233713 - AIR OUTLETS AND INLETS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

PART 2 – PRODUCTS

2.1 EXHAUST, RELIEF, TRANSFER AND RETURN AIR GRILLES AND REGISTERS

A. Furnish and install grilles and registers at exhaust or vent openings. The installation of grilles and registers shall be coordinated with work being done by contractors of other trades. Grilles and registers shall be located symmetrically at centers of ceiling tiles in acoustical tile ceilings. All grilles and registers shall be installed and located subject to the approval of the Architect.

B. Ceiling mounted grilles and registers shall be suitable for installation in types of ceilings indicated on the architectural drawings.

C. All grilles and registers shall be securely attached and supported from associated ductwork or, where not duct connected, shall be attached and supported from the building structural system. Grilles and registers shall not be supported on ceilings of any type.

D. Grilles and register faces shall have a white factory painted finish and shall be provided with foam neoprene or rubber border gaskets.

E. The return and transfer grilles in any wall areas shall be heavy duty type with extra reinforcing bars. Heavy duty grilles shall be Model S480 as manufactured by Krueger, Model RSHA as manufactured by Carnes, Model HD35HO as manufactured by Anemostat or approved equal.

F. Ceiling grilles shall be fabricated from aluminum and have fixed aluminum louvers, spaced 3/4" on centers and fixed at 35 degrees split deflection in ceilings and 35 degrees single deflection in side walls. Grilles shall be similar to Krueger Series S-580 with the style of frames as required for ceiling.

G. Exhaust grilles associated with the Cat Isolation Area shall be similar to above, except they shall be stainless steel.

2.2 PLAQUE STYLE DIFFUSERS

A. Acceptable Manufacturers:

1. Krueger Model PLQ (Basis of Design)

2. Anemostat

3. Price

B. Provide Architectural square panel ceiling diffusers of the sizes and mounting types shown on the plans or outlet schedule. The diffuser shall have an one piece square face plaque not

exceeding 18”x18” for 24”x24” panel sizes and 9”x9” for 12”x12” panel sizes and constructed of 16 gage steel with rounded corners that have a minimum radius of 3/4”. Face plaques that have a secondary wrapper are not acceptable. The face plaque shall not extend below the ceiling more than 3/8” and shall be removable from the back-pan. Optional damper is not required. The diffuser back-pan shall be one piece stamped construction of 22 gauge steel and have an integrally drawn round neck.

C. Directional blow tabs shall be constructed of heavy gage steel and offered to provide 1-way, 2-way 3-way and 4-way throw patterns.

D. The manufacturer shall provide published (printed or electronic) performance data for the diffuser. Performance data shall include 2 - 7 octave band sound power levels. The diffuser shall be tested in accordance to the data standards at the time of product introduction or ANSI/ASHRAE Standard 70.

E. Factory painted finish shall be of color as selected by the Architect.

2.3 SUPPLY AIR REGISTERS

A. Furnish and install in supply ductwork double deflection solid-bar adjustable vertical front louvers and solid-bar adjustable horizontal back louver grilles with frames. Supply registers shall be fabricated and finished as herein specified for exhaust grilles. Supply registers shall be similar to Krueger Manufacturing Co. Series 5880H, Carnes Model RTDB, Anemostat or approved equal. Bars shall pass through supports as required to lock bars firmly in place.

B. Supply registers shall have supply grille faces and be provided with key-operated worm gear mechanism or setscrew locked adjustable opposed-blade dampers. Supply air registers shall be located in a symmetrical manner subject to the approval of the Architect.

2.4 FIXED LOUVERS

A. Heating Contractor shall furnish and install all fixed intake air or discharge air louvers (except for those described below). Louvers shall be the Model ELF375D as manufactured by Ruskin, Model XAD-4-45GL as manufactured by NCA, Model ESD as manufactured by Greenheck or approved equal.

B. Louvers shall be the stationary drainable blade type with a frame depth of 4 inches. Frames and blades shall be .081-inch thick 6063-T5 extruded aluminum alloy. Blades shall be located on a 45E blade angle. Screens shall be provided on the interior of the louver and shall consist of 3/4” mesh aluminum with an extruded aluminum frame. Screens shall be mounted to the frame face and be removable for cleaning. Louver finish shall be baked enamel Kynar of color selected by the architect. Louver colors shall be custom colors and shall be prefinished to the approval of the Architect.

C. Louvers shall pass 1000 FPM with less than 0.2 inch WG pressure drop and shall carry less than .001 ounces of water per square foot free area during a 15 minute period when tested in accordance with AMCA Standard 500. Test criteria shall be based on a 48" square sample with a minimum 45.2 percent free area. Louvers shall bear the AMCA Certified Ratings Seal for both Air Performance and Water Penetration.

D. Furnish all clip angles, mounting hardware and frames for installation. HVAC contractor shall caulk all louvers he installs for a watertight installation.

E. All louvers shall be prefinished and shall be of CUSTOM color as selected by the Architect.

2.7 BRICK VENT

A. Where indicated on drawings, provide Greenheck BVE 4” extruded aluminum brick vent.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install per manufacturer’s recommendations.

END OF SECTION 233713

SECTION 235200 - CONDENSING BOILER

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

PART 2 – PRODUCTS

2.1 BOILER BURNER UNITS WATER TUBE

A. Furnish and install two (1) LAARS Model No. MFTHW199 (Basis of Design) modulating condensing boiler or approved equal by Bradford White or Bosch, suitable for firing with natural gas as scheduled and hereinafter specified.

B. The boiler shall be rated at 200,000 BTU input and output shown on the schedule. The boiler shall modulate between 20% to 100% of full fire. The unit(s) shall be design-certified to comply with the current edition of the Harmonized ANSI Z21.13 / CSA 4.9 Standard for Gas-Fired Low Pressure Steam and Hot Water Boilers.

C. Each boiler shall be test fired and all safety components tested, at the factory. The boiler shall be sealed combustion. The boiler jacket shall be a unitized shell finished with acrylic thermoset paint.

D. The unit(s) shall be designed and constructed in accordance with the ASME Boiler & Pressure Vessel Code, Section IV requirements for 30 psi (207 kPa) maximum working pressure and shall bear the ASME "H" Stamp and be listed by the National Board. The unit(s) shall be constructed to comply with the efficiency requirements of the latest edition of ASHRAE Standard 90.1.

E. The boiler shall be equipped with an ASME certified pressure relief valve set at 30psi (207kPa). The boiler shall be listed with the U.S. Department of Energy as an Energy Star appliance. The boiler shall be listed with AHRI (Air Conditioning, Heating and Refrigeration Institute). The boiler shall have a minimum AFUE of 95%.

F. The fire tube heat exchanger shall be stainless steel with aluminum core fire tubes, rated for 30 psi (207 kPa) working pressure. The heat exchanger shall be a low head loss design. Heat exchanger shall be accessible for visual inspection and cleaning of internal surfaces. The boiler shall be fully condensing design with built-in condensate drain and trap. The heat exchanger shall have a limited 10-year warranty.

G. Boiler shall be packaged with mounted and wired pump inside the boiler jacket. Each boiler shall be test fired and all safety components tested, at the factory. The boiler shall be sealed combustion. The boiler jacket shall be a unitized shell finished with acrylic thermoset paint. Chamber shall include a sight glass for viewing flame. Boiler shall have a condensate trap that does not need to be primed and will not allow flue gases to pass back through unit.

H. Boiler shall operate on 3.5-13" w.c. gas pressure. The boiler shall use a premix ceramic fiber burner and a zero governor gas valve to burn cleanly, with NOx emissions not exceeding 17ppm. The boiler shall meet the emissions requirements of SCAQMD.

I. The boiler shall be designed for vertical or horizontal Category IV venting: Up to 50 equivalent feet with 2" diameter in PVC, CPVC, Polypropylene or stainless steel vent material. Up to 100 equivalent feet with 3” diameter in PVC, CPVC, Polypropylene or stainless steel vent material Air may be taken from the room, or ducted directly to the boiler.

J. Boiler requires 120VAC, single phase, less than 4 Amps (including mounted pump) for connection to a 15A breaker. The control circuit shall be 24VAC. A 3 ft. length 14 AWG plug-in line cord is included for connection to 120VAC/15A receptacle.

K. The boiler shall have built-in gas leakage detection capabilities such that when gas is detected for greater than 5 seconds, or three times within 10 minutes, the boiler will lock out for safety purposes.

L. The boiler control shall be an integrated electronic PID temperature and ignition control with LCD, push buttons and dial and shall control the boiler operation and firing rate. The boiler display shall be visible without the removal of any jacket panels. The control shall have built-in outdoor reset feature with customizable reset curves, based on the outdoor temperature and desired system water temperature. The boiler shall be shipped with the outdoor reset sensor, as standard equipment. The control shall have the ability to accept a 0-10VDC input connection from an external control or building automation system, for remote temperature setpoint control. The boiler shall have a built-in automatic low water cut off (LWCO).

M. The control shall monitor flue gas temperature and shall stop the boiler from firing if temperature is excessive.

N. The control shall easily allow the user to force the boiler into minimum or maximum firing rate, for boiler setup and diagnostic purposes. Control shall have menu structures for user mode and installer mode. Allowable control adjustments shall include: boiler temperature setpoint; °F or °C display; outdoor reset selection; low boiler setpoint temperature (for outdoor reset operation); boiler temperature at high outdoor temperature (for outdoor reset operation); boiler setpoint at low outdoor temperature (for outdoor reset operation). Control diagnostics shall include, at a minimum, the following: ignition failure, grounded flame rod, boiler high limit exceeded, sensor errors (open or shorted), and fan speed proving rate failure.

O. The boiler system will incorporate a #550 manual Low water cutoff and L4006E manual Limit in the supply piping above the boiler as a requirement of Labor & Industry.

P. The boilers shall also be provided with an A2123601 Neutralization Kit which will be piped in PVC to a floor drain. Where a floor drain is inaccessible, a condensate pump should be provided and the condensate diverted with flexible tubing to the nearest drain.

Q. Standard features shall include: Low pressure drop, fire tube heat exchanger design • Sealed combustion chamber • Pre-mix ceramic fiber burner • Direct spark ignition • Customizable Freeze Protection • Anti-short cycling • Large user-interface and display • Accepts external (0-10VDC) temperature setpoint signal • Outdoor reset (sensor included) • Outdoor air reset curve • Manual reset high limit • Wall mount bracket • Field convertible between natural gas and propane • Automatic low water cut-off (LWCO) • 10-Year limited warranty • 5-Year parts warranty

R. A Primary/Secondary piping manifold will be made available from the Manufacturer for the unit(s).

S. A Representative from the factory will be made available for startup instruction with the installing contractor. This Representative will also instruct the maintenance technicians on the proper maintenance of the boiler as well.

T. A boiler protector low water cutout and a separate high limit controller shall be furnished as herein specified, and installed by the Contractor in the piping at each boiler. Boiler feeder low water cutoff switch and a separate high limit temperature switch on boiler piping shall shut down the boiler on a low water or high limit condition in the piping system.

U. High temperature limit switch installed in the piping system and the boiler protector low water cutoff switch for each boiler shall operate only on emergency conditions and shall be coordinated for operation with the boiler controls.

V. Boilers shall be wall mounted under this Contract.

W. This Contractor shall extend gas vent line from the gas train of each boiler. Vent piping from gas train shall be extended to the exterior of the building in accordance with AGA and Gas Company requirements by this Contractor.

X. The boiler manufacturer shall furnish an agent or engineer to provide complete and detailed instructions for the operating personnel in the proper operation, care and maintenance of all equipment. All required service and maintenance for the first complete heating season shall be provided by the Contractor. The boiler manufacturer's representative shall also provide all necessary supervision to the Contractor, for the installation and operation of the boilers. Burners shall be placed in operation and adjusted for maximum burning efficiency by this boiler representative. In the process of effecting these adjustments, a combustion efficiency test shall be conducted with the use of carbon dioxide analyzer. This test shall be conducted under full load conditions and shall extend over a period of not less than one hour. Stack temperature, draft and carbon dioxide shall be recorded at intervals. A written report of the combustion test shall be rendered in duplicate to the Architect. Three (3) sets of operating and maintenance manuals shall be delivered to the Owner.

Y. The boiler manufacturer shall be capable of providing factory service in the immediate vicinity and within a reasonable amount of time on a 24 hour a day emergency basis.

Z. All power wiring to the boilers will be furnished and installed by the Electrical Contractor. All control wiring, including wiring from the separate-mounted low water cutoff switch, high limit switch and all associated safeties shall be furnished and installed under this Contract.

AA. The HVAC Contractor shall make the gas connections to boilers and extend piping to mains as required.

BB. A control panel on the boiler shall be interlocked with the combustion air dampers and the draft assist system by the Contractor. The boiler shall also be interlocked with the building control system to reset hot water temperature and monitor the system.

2.2 COMBUSTION AIR DAMPER OPEN SWITCH

A. This Contractor shall provide and install for each boiler unit and domestic water heater a snap-action switch for positive proof that the combustion air dampers are in the open position prior to unit firing sequence. Switch shall be rated for no less than 15 amp A.C. and shall be affixed directly to one of the damper blades.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install boiler per manufacturer's recommendations.

3.2 INSTRUCTION AND SERVICE

A. The boiler vendor, through the Contractor, shall furnish a start-up engineer to provide complete and detailed instruction for the operating personnel in the proper operation, care, and maintenance of all equipment. All required free service and maintenance of the first complete heating season shall be provided by this Contractor.

B. After each burner and combustion control system has been placed in operation, all equipment shall be adjusted for maximum combustion efficiency. In the process of effecting these adjustments, a combustion efficiency test shall be conducted with the use of an absorption type analyzer capable of measuring carbon dioxide, oxygen, and carbon monoxide. This test shall continue for the length of time necessary to adjust the burner for maximum efficiency at 100, 75, 50, and 25 percent of rating. Stack temperature, overfire draft, carbon dioxide, and oxygen shall be recorded. A written report of the combustion test shall be rendered, in duplicate, to the Engineer.

C. If requested, the boiler vendor shall provide proof of his ability to render competent service for the maintenance and repair of all equipment on a 24-hour basis. He shall further attest that a complete inventory of parts, controls, etc. is maintained locally and that an effective service organization with these qualifications has been maintained locally for five (5) years or more and presently maintains a staff of at least two (2) factory trained service technicians.

D. The boiler supplier shall be responsible for supplying to the HVAC Contractor a comprehensive, interconnecting wiring diagram, which shall indicate all terminal connections for items such as the boiler(s), Emergency Shutdown Switch, combustion air system, Boiler Control Panel, A.T.C., circulating pumps, and any other electrically-powered devices directly related to the operation of the boiler(s).

E. The boiler supplier shall also be responsible for physically wiring all control devices described above within the boiler room. The wiring responsibility shall begin at the transition point where the Electrical Contractor provides power wiring in the boiler room. The boiler supplier shall assume all responsibility in resolving any conflicts within the overall wiring schematics as they pertain to the boiler room.

F. Boiler manufacturer and the ATC Contractor shall coordinate to ensure all controls are compatible and provided for a complete operational system.

3.3 COORDINATION

A. The equipment supplier shall provide all required on site time to coordinate, checkout and confirm BAS communication interface operation to the satisfaction of the project BAS contractor. On site visits shall be scheduled by the BAS contractor through the mechanical contractor as appropriate for the equipment to which the BAS is being interfaced.

B. The equipment supplier shall also provide all required on site time to coordinate, checkout and

confirm BAS communication interface operation to the satisfaction of the project Commissioning Agent. On site visits shall be scheduled by the Commissioning Agent through the mechanical contractor as appropriate for the equipment to which the BAS is being interfaced

END OF SECTION 235200

SECTION 237252 - PACKAGED AIR HANDLING UNIT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 QUALITY ASSURANCE

A. Unit shall be certified in accordance with UL Standard 1995/CSA C22.2 No. 236, Safety Standard for Heating and Cooling Equipment.

B. Unit and refrigeration system shall comply with ASHRAE 15, Safety Standard for Mechanical Refrigeration.

C. Unit shall be certified in accordance with ANSI Z21.47b/CSA 2.3b and ANSI Z83.8/CSA 2.6, Safety Standard Gas-Fired Furnaces.

D. Unit (Seasonal) Energy Efficiency Ratio, (SEER) EER, shall be equal to or greater than prescribed by ASHRAE 90.1, Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.

E. Unit shall be safety certified by ETL and be ETL US and ETL Canada listed. Unit nameplate shall include the ETL/ETL Canada label.

F. Unit and components shall be designed, manufactured, and independently analyzed, rated and certified to meet with the seismic compliance standards of the International Building Code, 2010 edition, Section 1621. If requested, unit shall be provided with Certificate of Compliance indicating that the unit and components meet seismic design requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be shipped with doors bolted shut and outside air hood closed to prevent damage during transport and thereafter while in storage awaiting installation.

B. Follow Installation, Operation and Maintenance manual instructions for rigging, moving, and unloading the unit at its final location.

C. Unit shall be stored in a clean, dry place protected from construction traffic in accordance with the Installation, Operation and Maintenance manual.

1.4 WARRANTY

A. Units shall be provided with a warranty of 3 years starting on the date of final payment. Warranty shall include parts and labor. The compressors shall be warrantied for an additional 2 years (total of 5) and include refrigerant charge.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Products shall be provided by the following manufacturers:

1. Daikin – Basis of Design

2. AAON

3. Carrier

2.2 PACKAGED UNITS

A. Furnish as shown on plans, Daikin Applied Rebel Single zone Heating and Cooling Unit(s) model DPS. Unit performance and electrical characteristics shall be per the job schedule.

B. Configuration: Fabricate as detailed on prints and drawings:

1. Return plenum / economizer section

2. Filter section

3. Cooling coil section

4. Supply fan section

5. Gas heating section.

6. Condensing unit section

C. The complete unit shall be cETLus listed.

D. The unit shall be ASHRAE 90.1-2019 compliant and labeled.

E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-32 Refrigerant and oil.

F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.3 CABINET, CASING, AND FRAME

A. Panel construction shall be double-wall construction for all panels. All floor panels shall have a

solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0 and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

B. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal.

2.4 OUTDOOR/RETURN AIR SECTION

A. Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm / square foot of damper area at 1" differential pressure in according with testing defined in AMCA 500. A barometric exhaust damper shall be provided to exhaust air out of the back of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials. Exhaust damper blades shall be lined with vinyl gasketing on contact edges. Control of the dampers shall be by a factory installed direct coupled actuator. Damper actuator shall be of the modulating, spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for "free" cooling. If outdoor air is suitable for "free" cooling, the outdoor air dampers shall modulate in response to the unit's temperature control system.

B. Daikin Applied UltraSeal low leak dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.

C. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the modulating type. Damper to open when supply fan starts, and close when supply fan

stops.

D. Economizer assembly Fault Detection and Diagnostics (FDD) shall be 90.1, IECC, and California Title 24 compliant. MicroTech IV controls shall display a warning, and write a warning to the BAS, if the economizer malfunctions in accordance with 90.1, IECC, and Title 24 specifications.

2.5 EXHAUST FAN

A. Exhaust fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The exhaust fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

C. The unit DDC controller shall provide building static pressure control. The unit controller shall provide proportional control of the exhaust fans from 25% to 100% of the supply air fan designed airflow to maintain the adjustable building pressure setpoint. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

D. Direct drive axial exhaust fans shall be provided. Blades shall be constructed with fabricated steel and shall be securely attached to fan shafts. All exhaust fan assemblies shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy-duty type, carefully matched to the fan load. Ground and polished steel fan shafts shall be mounted in permanently lubricated and sealed ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds.

2.6 FILTERS

A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2” prefilter and a 4” final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 and 4" MERV 14 filters.

2.7 COOLING COIL

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall

control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

2.8 HOT GAS REHEAT

A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

D. Each coil shall be factory leak tested with high-pressure air under water.

2.9 SUPPLY FAN

A. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

C. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.10 VARIABLE AIR VOLUME CONTROL

A. The unit controller shall proportional control the on the supply fan motor based on space temperature. The unit controller shall increase/decrease the speed of the supply fan in order to maintain the space temperature within its setpoint and dead band. The unit controller shall provide discharge air temperature control with the compressor modulation.

B. The unit manufacturer shall install all power and control wiring.

C. The supply air fan drive output shall be controlled by the factory installed main unit control system and drive status and operating speed shall be monitored and displayed at the main unit control panel.

2.11 HEATING SECTION

A. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.

B. The module shall be complete with furnace controller and control valve capable of 5:1 modulating operation.

C. The heat exchanger tubes shall be constructed of [stainless steel]

D. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.

E. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.

F. The factory installed DDC unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification.The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

2.12 UV LIGHTS

A. Unit shall be provided with UV light to support drain pan cleanliness. Access location to the UV light section shall be provided with safety shutoff switch to disable UV light upon access. A viewport shall be provided to confirm UV light operation visually.

2.13 CONDENSING SECTION

A. Outdoor coils shall be cast aluminum, micro-channel coils. Plate fins shall be protected and brazed between adjoining flat tubes such that they shall not extend outside the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit in ambient conditions up to 125°F]. Mechanical cooling shall be provided to 0°F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

C. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

D. The unit shall have a Daikin scroll compressor. The compressor shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. [The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line. Variable Capacity compressors, two step compressors, fixed speed compressors, or anything other than a variable speed compressor will not be acceptable.

E. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

F. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

G. Each circuit shall be dehydrated and factory charged with R32 Refrigerant and oil.

2.14 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

B. A GFI receptacle shall be unit mounted that is field powered.

C. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

2.15 CONTROLS

A. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or

remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand-alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

1. The keypad interface shall allow convenient navigation and access to the commissioning functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

a. Supply and exhaust fan speed control.

b. All Refrigeration Capacities and control input signals.

c. Refrigeration alarm details.

d. Return air temperature.

e. Discharge air temperature

f. Outdoor air temperature

g. Outdoor enthalpy, high/low.

h. Compressor suction temperature and pressure.

i. Compressor head pressure and temperature.

j. Expansion valve position.

k. Condenser fan speed.

l. Inverter compressor speed.

m. Dirty filter indication.

n. Airflow verification.

o. Cooling status.

p. Control temperature (Changeover).

q. Cooling status/capacity.

r. Unit status.

s. All time schedules.

t. Previous alarms with time and date.

u. Optimal start.

v. System operating hours.

2. The user interaction with the keypad shall provide the following:

a. Controls mode

b. Cooling and heating change-over temperature with deadband.

c. Cooling discharge air temperature (DAT).

d. Supply reset options.

e. Temperature alarm limits.

f. Lockout control for compressors.

g. Compressor interstage timers.

h. Night setback and setup space temperature.

i. Building static pressure.

j. Economizer changeover.

k. Currently time and date.

l. Tenant override time.

m. Occupied/unoccupied time schedule.

n. One event schedule.

o. Holiday dates and duration.

p. Adjustable set points.

q. Service mode.

3. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

a. Zone sensor with tenant override switch.

4. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

a. Airflow.

b. Outside air temperature.

c. Space temperature.

d. Return air temperature.

e. External signal of 1-5 vdc.

f. External signal of 0-20 mA.

g. Network signal.

5. Units shall contain eight programmable input/output control ports to be controlled using the connected building automation system. These ports shall be input/output capable of utilizing the following signal types:

a. mA signal (0-20 mA – Adjustable).

b. VDC (0-10 VDC – Adjustable).

c. 10k Thermistor.

d. Digital on/off.

F. A2L Leak Mitigation Refrigerant Detection System (RDS) for compressorized rooftop equipment using A2L refrigerant.

1. Compressorized rooftop equipment using A2L refrigerant shall come equipped with a factory installed Refrigerant Detection System (RDS) in compliance with UL60335-2-40. The factory-installed unit controller will respond and control the unit to comply with UL60335-2-40 according to the alarm status of the refrigerant detection system. See the unit Operations Manual for a detailed sequence of operations.

2. The Refrigerant Detection System (RDS) shall consist of the following components:

a. Dedicated A2L Refrigerant Detection Control Board.

b. Refrigerant Sensor or Sensors. The number of sensors will vary based on the product and configuration as needed to comply with UL requirements.

3. Operation and Monitoring:

a. The refrigerant sensor or sensors communicate with the refrigerant detection control board. The refrigerant sensors detect the presence of the A2L refrigerant outside of the sealed refrigeration piping and communicate the levels to the refrigerant detection control board.The refrigerant detection controller communicates the RDS status to the factory-installed unit controller.

b. Alarm Communication: The unit controller will communicate RDS alarms based on the RDS status in the same way as any other alarm. Alarms are triggered by the following: 1) Refrigerant detected above 15% of the refrigerant lower flammability level (LFL); 2) Refrigerant Sensor Fault.

c. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.

d. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.

4. Factory unit wiring diagrams must show the refrigerant leak detection system wiring.

2.16 ULTRA-VIOLET LIGHTING AND BI-POLAR IONIZATION

A. Ultra Violet lighting and bi-polar ionization shall be provided with the RTU by the same supplier. Refer to UVC lighting specs for specifics. All wiring shall be provide under factory supervision.

2.17 FACTORY SUPPORT

A. The factory shall provide a factory technician for as long as needed to get the units fully operational to the satisfaction of the Owner, Architect, and Engineer. The factory technician shall coordinate with the HVAC contractor, BMS contractor, Commissioning Agent, and meet them on site for coordination. The bid shall include at least 24 hours of factory technician assistance per unit.

B. The factory shall provide 24 hours of training for the Owner. Training shall be after the units are fully operational to the satisfaction of the Owner.

PART 3 – EXECUTION

3.1 INSTALLATION, OPERATION, AND MAINTENANCE

A. Installation, Operation and Maintenance manual shall be supplied with the unit.

B. Installing contractor shall install unit, including field installed components, in accordance with

Installation, Operation and Maintenance manual instructions.

C. Start up and maintenance requirements shall be complied with to ensure safe and correct operation of the unit.

D. The RTU basis of design for this project incorporates manufacturer provided packaged controls. These packaged controls only address a portion of the overall control sequence requirements for these units. The BMS Contractor shall provide a separate control package and integrate it with the manufacturer provided packaged controls in order to implement the complete control sequence requirements for each RTU. The Sequence of Operation paragraphs layout the general requirements of the integrated control strategy and define the unit's operational intent without regard to the unit manufacturer/BMS Contractor shared responsibility (joint and several liability). Where packaged controls provided by the unit manufacturer are integrated with controls provided by the BMS Sub-Contractor, the end result shall accomplish the intent of the Sequences of Operation to the satisfaction of the Professional and the unit manufacturer and the BMS Sub-Contractor shall refine/revise the integrated controls as required to achieve that objective. It is recognized that different manufacturers may have a slightly different solution to achieve the same end result (terminal strip interface vs. BACnet communication interface vs. terminal strip interface and BACnet communication interface). The control submittal shall clearly document interface between the two control systems in sufficient detail to establish GREATER THAN OR EQUAL TO COMPLIANCE with all specification requirements.

E. Where a unit is provided with manufacturer furnished (factory) controls, the unit manufacturer shall be responsible for evaluating the requirements of the contract documents sequences of operation and defining the read/write operations between the BMS and the factory controls that will be required in order to implement those sequences. Where the BMS vendor will be required to provide/install field hardware to supplement the factory controls, the unit manufacturer will be responsible for providing that information to all BMS vendors listed in the project specifications no later than five (5) days before the bid due date. The manufacturer's control engineer shall meet (telephone conference calls will be acceptable) with the BMS vendor's application programmer, in the presence of the Professional, to define and coordinate those read/write communication requirements and provide a hardcopy record for the project O & M Manuals. The Professional shall continue those discussions as necessary in order to establish that both parties understand their responsibilities in relation to the final working product. Should this coordination not take place, the unit manufacturer shall be responsible for reimbursing the Professional, at standard billing rates, for all time spent researching any field start-up, check-out and commissioning problems that are traced to a lack of the prerequisite coordination defined above. The equipment manufacturer and BMS Sub-Contractor shall provide any and all package control system modifications required, up to and including complete replacement of the factory provided controls, in order to provide satisfactory system operation acceptable to the Owner and the Professional. NO EXCEPTIONS.

F. The unit manufacturer shall be responsible for determining that the factory controls, with proper communication to/from the BMS, are capable of implementing the sequences of operation as defined by the contract documents. Results that merely "approximate the intent" of the required sequences of operation are not acceptable. NO EXCEPTIONS. In addition, the unit manufacturer shall be responsible for maintaining the read/write coordination requirements, as defined for the initial construction process, throughout a ten (10) year period that begins with the start of the warranty period. Any updates to the factory controls during this ten year period shall not require any reprogramming on the part of the BMS vendor. Should any reprogramming be required by the BMS vendor, the unit manufacturer shall be responsible for reimbursing the BMS vendor, at standard billing rates, for all time spent to accomplish the

required reprogramming.

G. The mechanical equipment supplier shall provide factory start-up, check-out and commissioning of the factory furnished controls. The use of third party agents shall not be acceptable. Documentation shall be turned over to the owner and the Professional which clearly indicates how the factory controls have been configured for this project specific application. Generic IOM manuals which merely define all of the factory controls capabilities, without regard to the selections which apply to the specific project at hand and the actual parameters selected, will not be accepted. The factory technician shall also be present while the BMS contractor performs start-up, check-out and commissioning of the integrated controls in order to verify proper parameter selection and communication between the two systems.

H. The mechanical equipment supplier shall provide all required on site time to coordinate, checkout and confirm BMS communication interface operation to the satisfaction of the project BMS contractor. On site visits shall be scheduled by the BMS contractor through the mechanical or electrical contractor as appropriate for the equipment being interfaced to.

I. The mechanical equipment supplier shall also provide all required on site time to coordinate, checkout and confirm BMS communication interface operation to the satisfaction of the project Commissioning Agent. On site visits shall be scheduled by the Commissioning Agent through the mechanical or electrical contractor as appropriate for the equipment being interfaced to.

J. A factory technician shall be provided for no less than 40 hours per unit to observe and direct unit assembly on the site, unit start up at the site, and unit commissioning at the site. Note that these are separate site visits. Should the unit fail to pass commissioning or malfunction in any way, the factory technician shall be available for as much time and as many site visits as needed to repair the unit to the satisfaction of the Owner, Commissioning agent, and the Engineer at no additional cost to the project.

END OF SECTION 237252

SECTION 237312 - BLOWER COIL UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 REFERENCES

A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.

B. UL 181 - Factory-Made Air Ducts and Connectors.

C. UL 1995 - Heating and Cooling Equipment.

D. NMFC item 180: Package Performance Testing in accordance with National Motor Freight Classification.

E. AHRI 260-2001 - Standard for Sound Rating of Ducted Air Moving and Conditioning Equipment.

1.3 QUALITY ASSURANCE

A. Unit designed and tested in compliance with AHRI 430 air delivery ratings per AHRI 430-2014.

B. Unit designed and tested in compliance with AHRI 260-2001.

1.4 SUBMITTALS

A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit Mechanical Specifications for unit and accessories describing construction, components, and options.

C. Submit shop drawings indicating overall dimensions as well as installation, operation, and service clearances. Indicate lift points and recommendations. Indicate unit shipping, installation and operating weights including dimensions.

D. Provide fan curves with specified operating point clearly plotted.

E. Submit data on electrical requirements. Include safety and start-up instructions.

1.5 REGULATORY REQUIREMENTS

A. Unit shall be manufactured to conform to UL 1995 and shall be listed by either UL/CUL or ETL. Units shall be provided with listing agency label affixed to the unit.

B. In the event the unit is not UL/CUL or ETL approved, the contractor shall, at his/her expense, provide for a field inspection by a UL/CUL or ETL representative to verify conformance. If

necessary, contractor shall perform modifications to the unit(s) to comply with UL/CUL or ETL as directed by the representative, at no additional expense to the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags on each section to indicate location and orientation in direction of airflow. Each section shall have lifting points to allow for field rigging and final placement of section.

C. Store in a clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

D. Deliver units to site with electronically commutated fan motors factory mounted in units. If these components are not completely assembled, contractor shall be responsible for all expenses associated with installation, testing, and vibration balancing of fan(s).

1.7 START-UP AND OPERATING REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, condensate properly trapped, piping connections verified and leak-tested, all shipping braces removed, and fan has been test run under observation.

1.8 WARRANTY

A. The equipment manufacturer shall provide, at no additional cost, a STANDARD PARTS WARRANTY that covers a period of one year from unit start-up or 18 months from shipment, whichever occurs first. This warrants that all products are free from defects in material and workmanship and shall meet the capacities and ratings set forth in the equipment manufacturer's catalog and bulletins.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Approved manufacturers shall be Daikin, Carrier, Price, or approved equal. Manufacturers not pre-approved, must obtain written approval from consulting engineer prior to bid day. Alternates must comply with all performance and features as called for in this specification. Job awarded on basis of specified machine. Alternate will be evaluated and considered after job is awarded. Equals will be acceptable from Johnson Controls or Daikin.

B. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to engineer prior to bid date for approval. Mechanical Contractor is responsible for expenses that occur due to exceptions made.

2.2 GENERAL UNIT DESCRIPTION

A. Manufacturer shall provide unit arranged for draw-through application. Unit layout and configuration shall be as defined in project plans and schedule. Blow-through is only acceptable when consideration is given to capturing downstream moisture carryover. Considerations include downstream moisture eliminators and/or extended blank modules with condensate drain pans.

2.3 UNIT CASING

A. The entire air handler shall be constructed of galvanized steel. The removal of access panels shall not affect the structural integrity of the unit once the unit is installed. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.

B. Access panels shall be on side of the unit in all sections to allow easy access to drain pan, filter, coil(s), and motor components for cleaning, inspection, and maintenance.

C. Units shall each ship as fully assembled modules, including all coils, fans, motors, mixing box, attenuators and filters.

D. Access Panels: Removable access panels shall be provided on side of the unit to facilitate service access to drain pans, motors, coil(s). Access panel for filter removal shall be provided on side of the unit.

E. Cabinet: Casing shall be manufactured of heavy gauge galvanized steel.

F. DOUBLE WALL - Unit casing panels shall be 1-inch double-wall construction, with solid galvanized exterior and solid galvanized interior, to facilitate cleaning of unit interior.

2.4 COILS

A. Cooling Coils

1. Cooling performance shall be as specified on the unit schedule.

2. All steel parts exposed to moisture shall be galvanized.

3. Unit shall include a galvanized primary and secondary drain pan. The primary drain pan to be positively sloped in every plane. Primary and secondary drain pans to be insulated with anti-microbial closed-cell insulation. The drain pan shall be designed to ensure no pooling of condensate water per ASHRAE 62.2.

B. Heating Coils

1. Heating performance shall be as specified on the unit schedule.

2. Coil fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Seamless copper tubes shall be mechanically expanded into the fins to provide a continuous primary-to-secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.

3. Coils shall be provided with headers of seamless copper tubing with intruded tube holes to permit expansion and contraction without creating undue stress or strain. Coil connections shall be female pipe thread connections with connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain connections shall be furnished on the coil connection, external to the cabinet. Vent connections shall be provided at the highest point to ensure proper venting. Drain connections shall be provided at the lowest point.

2.5 DRAIN PAN

A. Drain Pan(s) shall be constructed of corrosion resistant material. Acceptable materials include polymer or stainless steel. Units with cooling coils shall have drain pans under complete cooling coil section that extend beyond the air-leaving side of the coil to ensure capture of all condensate in section.

B. Drain pan manufacturer shall either insulate bottom of drain pan with closed cell foam or provide double wall internally insulated construction to eliminate bottom sweating.

C. Drain pan shall be sloped in two planes, pitched toward drain connections to ensure complete condensate drainage when unit is installed level and trapped per manufacturer's installation instructions. Units without drain pans sloped in two planes shall coat drain pans with anti-microbial treatment.

D. Drain pan(s) shall have main and auxiliary drain connections with auxiliary outlet higher than the main connection.

E. Coil(s) shall be mounted above the drain pan to facilitate easy and complete inspection, cleaning, and removal. Coil(s) may not sit in drain pan.

2.6 FANS

A. Supply fans shall be a DWDI forward-curved type. Fan assemblies shall be balance tested dynamically by the manufacturer. Manufacturer must ensure maximum fan RPM is below the first critical speed.

B. The complete fan assembly, including motor and main drain pan shall be easily removable.

C. Fan motor(s) assembly shall be direct-drive style and not include belts, pulleys, or sheaves.

D. Fan motor(s) shall be of Direct Current Brushless type of minimum motor efficiency of 85 percent when rated in accordance of NEMA Standard MG 1-2016 at full load conditions.

E. Manufacturer’s supply fan motor must have means to adjust motor speed for field balancing.

F. Units shall be certified in accordance with the Central Station Air Handler certification program that is based on AHRI Standard 430.

G. Forward-curved fan must be capable of delivering 1.5" w.g. external static pressure and 3.0" w.g. total static pressure at nominal cabinet CFM.

2.7 MOTORS

A. All motors shall be factory-installed and run tested. To facilitate field replacement of motors, a removable fan inlet cone shall be provided on the drive side of the fan/motor assembly.

B. Motor shall be ECM programmable type. The motor shall be preprogrammed in the factory to meet the specified airflow requirements.

C. Fan motor shall have permanently lubricated and sealed bearings, protected by an internal thermal overload.

D. Single phase motors shall be selected to operate continuously at 104 F (40 C) ambient without tripping on overloads. Motors shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

E. Manufacturer shall provide for each fan a nameplate with the following information to assist air balance contractor in star-up and services personnel in maintenance:

1. Fan motor part number

2. Fan design RPM and motor HP

3. Motor Full Load Amps

2.8 FILTERS

A. Provide removable one- or two-inch thick filters easily removable from side of the unit. All units shall use standard filter sizes.

2.9 CONTROLS

A. Controls

1. Unit shall be supplied with a digital controls ready interface. This interface is to be located inside the control box internal to the main unit. This interface shall include a 24VAC transformer and terminal blocks for connections to fan motor control, sensor control, safety switches, valve actuators, and damper control if applicable.

2. Unit shall be furnished with a disconnect switch. The disconnect switch shall be operable from the outside of the cabinet to reduce hazards during field service and commissioning.

3. Unit shall be furnished with a disconnect switch and inline fusing to protect vital electrical components. The disconnect switch shall be operable from the outside of the cabinet to reduce hazards during field service and commissioning.

4. Fan motor control to be furnished as 0-10VDC.

5. Unit shall be supplied with an enclosed leak refrigerant detection system (RDS).

PART 3 - EXECUTION

3.1 SHIPPING

A. Paper copies of the IOM shall also be shipped with each unit.

B. The manufacturer shall identify all shipments with the order number. Enough information shall be provided with each shipment to enable the Mechanical Contractor to confirm the receipt of units when they are received. For parts too small to mark individually, the manufacturer shall place them in containers.

C. To protect equipment during shipment and delivery, unit air inlet and outlet openings shall ship from manufacturer with removable sealed covering. Covering shall not constrain the unit installation process.

D. After loading the equipment for shipment, the manufacturer shall contact the shipping contact on the order and provide the name of the carrier, description of equipment, order number, shipping point, and date of shipment.

3.2 EXAMINATION

A. Verify that surfaces are ready to receive work and opening dimensions are as indicated on the shop drawings and contract documents.

B. Mechanical contractor shall verify that the proper power supply is available prior to starting the fan.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide units with shut-off valve on supply and lockshield balancing valve on return piping if factory packages are not factory provided.

3.4 CLEANING

A. Clean work.

B. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

C. Ensure all shipping materials have been removed.

D. Install new filters.

END OF SECTION 237312

SECTION 237317 - PACKAGED DEHUMIDIFICATION AIR HANDLING UNIT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. This unit shall only be provided if Alternate Bid H-1 is accepted.

B. Furnish and install, where indicated, a factory-assembled, fully-enclosed, packaged environmental control system with energy recovery feature(s) designed for natatorium environment control.

C. Features shall include:

1. Dehumidification by means of a direct expansion evaporator coil

2. Space heating by means of a natural gas furnace in the unit.

3. Cooling mode with heat rejection to a remote outdoor air cooled fluid cooler (dry-cooler). No field refrigeration work shall be required. Submitting an outdoor condenser and increasing the refrigeration charge shall not be allowed.

4. Pool water heating from reclaimed compressor waste heat by means of a full flow titanium heat exchanger.

5. Packaged minimum exhaust fan and purge fan with economizer mode

6. Integral minimum outdoor air connection

7. Integral purge outdoor air connection with economizer mode

8. Heat recovery by means of a glycol run-around loop between the minimum exhaust and minimum outdoor air streams

9. Convenience outlet and light included factory mounted in control cabinet, powered and wired separately.

1.3 QUALITY AND SAFETY ASSURANCE

A. The unit shall be ETL listed.

B. Unit shall be completely factory assembled, wired, piped, and test run prior to shipping. All controls shall be factory adjusted and preset to the design conditions. A factory test report shall be available upon request.

C. Manufacturer shall have a minimum of ten-plus years prior experience making similar

equipment as described in this specification.

D. The system shall have a mechanical vestibule where the electrical panel, compressor(s), pool water heat exchanger(s), receiver(s) and most of the refrigeration controls are out of the process air stream

E. Warranty: The entire system shall have a 12 month parts and labor warranty start on the date of substantial completion.

1. The compressor(s) shall have a 5 year warranty from the date of substantial completion.

a. Any loose terminal devices or equipment supplied by the Pool Air Handling Unit manufacturer, including the remote operator's panel, shall be field installed by the Mechanical Contractor under supervision of the Pool Air Handling Unit Manufacturer's Local Representative.

1.4 BASIS OF DESIGN

A. Basis of design shall be Dectron Inc. (Dry-O-Tron)

B. Pool Pak, Seresco, or Desert Aire may be provided subject to the following conditions:

1. All specification are met. Any changes (Mechanical / Electrical / Controls / Structural / General, etc.) shall be the sole responsibility of the bidding HVAC contractor at no additional cost too the project. No Exceptions.

2. Provide revised layout including details on duct, piping, and power connections. Prior to bid for Engineering review.

3. Provide shall include full disclosure (by paragraph and schedule) prior to bid for Engineering review. Full disclosure shall clearly list and define any exceptions or deviations to the specified equipment and performance.

4. A written guarantee shall be provided by the alternate manufacturer that the alternate product meets or exceeds the operational performance and respects the principles and priorities of the design.

5. Any associated costs for use of alternate equipment shall be the responsibility of the HVAC Contractor. This includes, but is not limited to, engineering, electrical construction, HVAC construction, plumbing construction, general construction, and any other deviations from current design.

PART 2 – PRODUCTS

2.1 GENERAL

A. The aquaponics control system shall include:

a. Mechanical process dehumidification

b. Outdoor cabinet configuration

c. Packaged outdoor air-cooled condenser for AC heat rejection

d. A packaged indirect-fired natural gas duct furnace module installed downstream of the blower, sized as specified by the design engineer to meet the skin losses and outdoor air heating loads

e. Coaxial condensing heat exchanger(s) for pool water heating using reclaimed compressor waste heat

f. Air filtration via MERV-13 pleated panel filters for return

g. Minimum outdoor air connection

h. Minimum exhaust fan(s)

i. A service vestibule where the compressor, refrigeration specialties, control valves and all electronics are outside of process air stream

j. Active monitoring and control of supply air volume.

2.2 SEQUENCE OF OPERATION

A. Unit shall be designed and sized to maintain the specified conditions. The unit operation shall be as follows:

1. System Startup

a. Power is turned on or the system is restarted

b. After a short initial delay to allow the sensors to stabilize, the blower starts and operates continuously

c. Based on sensor feedback, the system shall begin or resume operation based on the sequence below

2. Airside Configuration

a. The system continuously delivers the specified supply air volume to the natatorium

b. The minimum exhaust air volume is set to meet the engineer's schedule.

c. The minimum outdoor air volume is set to meet the engineer's schedule.

3. Dehumidification Mode

a. The return air relative humidity is above the humidity setpoint

b. Return air dewpoint is above dewpoint setpoint.

c. The compressor enters the Compressor Start sequence

d. The reheat output will adjust to maintain the space temperature at set point year-round.

4. Air Conditioning Mode

a. The return air temperature is above the room temperature setpoint

b. The compressor starts, if not already operating in Dehumidification Mode

c. Excess compressor hot gas is diverted to the outdoor air cooled condenser for up to 100% heat rejection at summer design ambient conditions

5. Space Heating Mode

a. The return air temperature is below the room temperature setpoint

b. The microprocessor space heating output signal (0-10 volts) is sent to the heating coil controller. The signal output will regulate based on the return air temperature

6. Pool Water Heating Mode

a. The return pool water temperature is below the pool water setpoint and the pool water flow switch or minimum temperature differential is satisfied.

b. If the compressor is already operating due to a Dehumidification or Air Conditioning demand, the control valves will divert the compressor hot gas through the coaxial heat exchanger to heat the pool water, with the remainder rejected at the air reheat coil or the AC heat exchanger. Auxliiary pool water heater will be engaged as a second stage as needed.

c. If there is no pre-existing demand for the compressor to operate, the microprocessor sends a signal to the auxiliary pool water heater (remote by others) to operate. The compressor will not operate solely for a pool water heating demand unless specifically configured to do so at the controller. Aux Pool Heat contact will be closed with insufficient flow. In order to prevent the pool from overheating, it is recommended that a field-installed aquastat (provided by others) be installed in series with these wires.

d. Field-installed pool water temperature sensor(s) are provided to enable the smart pool feature. This feature provides the ability to activate booster pool water pump(s) feeding the unit when pool water heating is in demand.

7. Freeze Protection

a. The supply air temperature falls below the freezestat setpoint

b. Exhaust fan(s) are stopped and outdoor air damper(s) are fully closed

c. When the freezestat alarm is tripped, it must be manually cleared by the operator

2.3 CABINET

A. Cabinet Construction: All cabinet 16, 20 and 24 gauge sheet metal shall be galvanized G90 steel or GalvalumeTM alloy with mill-applied zinc phosphate primer followed by an exterior grade white silicone modified polyester top coat. The sheet metal is engineered to form a cabinet with maximum strength and rigidity. All seams shall be caulked with silicone to prevent air and water leakage or infiltration

1. Base Rails: The cabinet shall have a base frame comprised of formed 12 gauge mill-galvanized G90 steel that allows access to the drain connection through the forklift slots

2. The cabinet walls shall be of double-wall construction using 20 gauge pre-painted steel with a fully painted inner metal liner and 2 inches of fiberglass insulation

3. The cabinet floor shall be of 2-inch double-wall construction using 20-gauge pre-painted steel engineered with structural bends for maximum rigidity, mechanically fastened to the base frame

4. The cabinet roof shall be 20-gauge pre-painted steel, 2-inch double wall engineered with structural bending for maximum rigidity and be mechanically fastened to the base walls of the unit

5. The cabinets shall be mechanically assembled with stainless steel 5/32" sealed blind rivets. Where bolts are required bright zinc plated bolts shall be used

6. Access doors shall be supported on multiple hinges, held shut by compression latches for quick access. Doors shall be provided for entrance to all sections housing components requiring routine maintenance. Full height access doors shall have "hold back" latches to prevent door closure during the performance of service procedures

7. The unit shall have non-corroding protective mesh screens on all air intake openings

B. Outdoor Air Intake:

1. Minimum Outdoor Air connection: motorized damper, filter and time clock

C. Insulation: The unit shall be insulated per the following standards:

1. All exterior cabinet sections shall be insulated with two (2) inch thick fiberglass inside the double walled cabinet

2. Fire resistant rating to conform to NFPA Standard 90A and 90B

3. Sound attenuation coefficient shall not be less than 1.02 at a frequency of 1,000 Hz as per ASTM Standard C423

4. Thermal conductivity shall not exceed 0.26 Btu/hr-sqft-ft at 75 Â°F

D. Cabinet configuration shall include:

1. A filter rack with separate access doors shall be provided for the return air and minimum outdoor air streams

2. Unit shall be equipped with duct collars to admit the minimum outdoor air as scheduled. The outdoor air intake assembly shall have a built in air filter rack with separate access door, manual air balancing device and motorized 2 position extruded aluminum, Insulated, silicone side-sealed damper operated by 24-hour time clock

3. Mechanical vestibule: The unit shall have the compressor, receiver, solenoid valves and the electrical panel in a separate compartment out of the processed air stream. All components shall be serviceable while the unit is in operation without disturbing the airflow

4. Electrical panel: The unit shall have a built-in electrical control panel in a separate compartment in order not to disturb the airflow within the dehumidifier during electrical servicing. All electrical components shall be mounted on a 16 gauge galvanized sub-

panel

E. Filters

1. Wherever possible, air filters shall be standard sized, replaceable, off-the-shelf filters including:

a. Return Air: 2-Inch MERV 13, 90% pleated filters with rust-free non-metallic structure on a slide-in or face-loading rack

b. Outside Air: 2-Inch MERV 13, 90% pleated filters with rust-free non-metallic structure.

c. Dirty air filter switches included on the return air filter for indicating an alarm when pressure drop exceeds a set point.

F. Coils

1. Evaporator/dehumidifier coils shall be designed for maximum moisture removal capacity

a. Coils shall be fully dipped and coated with a polyester/enamel coating for maximum corrosion protection. Coating shall comply with ASTM B117/D1654 and ASTM D2126 for corrosion resistance against common acids, salt and gases

b. Coil shall have galvanized casing and end plates

c. Aluminum fin and copper tubes mechanically bonded to assure high heat transfer.

G. Drain Pans

1. Each evaporator coil shall be provided with a positive draining, compound-sloped, baked powder paint coated aluminum drain pan with fully-welded corners to ensure zero water retention. In no way will stainless steel or galvanized drain pans be acceptable.

H. Blowers and Blower Motors

1. Supply blowers:

a. Each supply blower shall be an impeller plenum fan complete with backward curved, three-dimensional, profiled blades made of a high-performance composite material directly driven via a direct current (DC) electronic commuted (EC) motor. The blower and motor shall be completely corrosion resistant and be maintenance free. The EC-Motor shall be of zero-slippage design with continuously variable speed control when connected to the system's controller. Fans that are not direct drive or EC are not acceptable.

b. Each EC motor shall have maintenance-free electronic circuitry, a rotor with permanent magnets, and an integral controller to provide the windings with electrical current so that, the motor rotates continuously and quietly.

c. Each fan shall be statically and dynamically balanced on precision electronic balancers.

2. Exhaust blowers:

a. The packaged exhaust blower (EF1) shall be sized to maintain the negative pressure requirement in the space during normal operation and its operation tied to the system's occupancy scheduler

b. The fan assembly shall be balanced in Class G 6.3 acc DIN ISO 1940, dynamic on two levels

c. The fan assembly shall be suitable for ambient temperatures of -40Â°C to max. +70Â°C

d. Thermal contacts installed in the windings compliant with THCL 155

e. Drive motor in external rotor principle, sealed in protection class IP54 with moisture protection impregnation of the windings, topical protection

f. High corrosion resistance design with high quality and reliability

g. The exhaust fan shall be controlled from an end switch on the power open of the exhaust air damper. The exhaust dampers shall be protected by louvers to divert rain from the face of the dampers

I. Dampers

1. Internal dampers shall be made from extruded anodized aluminum with a parallel blade configuration and neoprene double-seal tips to minimize leakage. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant

a. The system shall be provided with normally closed outside air and exhaust air dampers equipped with spring-return actuators The dampers adjust between 0% to 100% open position.

b. The outdoor air and exhaust air dampers shall be of opposed blade configuration. Dampers shall have 0.750-inch insulated blades made from extruded anodized aluminum with neoprene double-seal tips to minimize leakage. Damper leakage shall be less than 1% of maximum flow at 4-inch water column differential. Damper blades shall be mounted on steel rods which rotate on nylon bushings. All damper hardware shall be corrosion resistant

J. Pool Water Heater

1. Coaxial heat exchanger with corrosion-resistant cupro-nickel water circuit tubing.

a. Self-purging and self-draining counter flow design

b. Water circuit piping shall consist of transparent braided PVC hose

c. Terminating connections are PVC NPT fittings located at the cabinet wall for easy connection

d. The maximum loop operating pressure is 60 psig

2. Compressors

a. Hermetic, scroll action compressor, suction gas cooled, suitable for refrigerant R-

454B

b. The compressor(s) shall be mounted on rubber-in-shear isolators to limit the transmission of noise and vibration

c. The compressor(s) shall be equipped with removable crankcase heater(s) for liquid migration protection

d. The compressor(s) shall be located outside the conditioned air stream in the system's service vestibule

e. Compressors shall have a 3-year warranty extension for a total of 5 years coverage

f. The compressor manufacturer must have a wholesale outlet for replacement parts in the nearest major city

3. Refrigeration Circuit

a. Each refrigeration circuit shall have pressure transducers monitoring the refrigerant discharge (high) and suction (low) pressures. The refrigeration circuit shall be accessible for diagnostics, adjustment and servicing without the need for service manifold gauges

b. All refrigeration circuits shall have refrigerant control valves, a liquid line filter-drier, a liquid and moisture indicator, an expansion valve, head pressure control feature and pump down feature

c. All refrigeration circuits shall have an externally adjustable balanced port design mechanical thermostatic expansion valve

d. The system shall have an externally adjustable balanced port design mechanical thermostatic expansion valve. The valve shall have a removable power head

e. Tamper proof, hermetically sealed non-adjustable high and low pressure switches and refrigeration service valves shall be installed using Schrader type valves. Refrigeration service valves shall be located outside of the airstream

f. The suction line shall be fully insulated with 0.500-inch closed cell insulation

4. Control Panel

a. The electrical contractor shall be responsible for external power wiring and disconnect switch fusing. Power block terminals shall be provided

b. The system shall include a factory-installed non-fused disconnect

c. Main control panel shall be mounted inside the service vestibule outside of the process air stream

d. Main control panel shall be mounted outside of the process air stream

e. Blower motors shall be protected against overloads.

f. The system shall have a voltage monitor with phase protection

g. Available dry contacts shall include:

1) Alarm

2) Blower interlock

3) Stage 1 & 2 heating

4) Outdoor air damper control

5) Remote exhaust fan #1

6) Remote exhaust fan #2

7) Remote cooler

8) System on

9) Auxiliary pool heater 1

10) Heat recovery

h. Terminals shall be provided to send dry contacts to remote coolers.

i. All wiring shall be installed in accordance with UL or CSA safety electrical code regulations and shall be in accordance with the NFPA All components used in the system shall be UL or CSA listed

j. Wiring diagrams shall be located near the electrical panel(s) on the system. These diagrams shall provide colour-coding and wire numbering for easy troubleshooting. All wires shall be contained in a wire duct.

k. The compressor(s) shall have a time delay on start to prevent short cycling

l. An airflow switch and a dry contact for alarm(s) shall be provided and factory-mounted.

5. Air Heating

a. The packaged indirect-fired natural gas duct furnace module shall be sized to meet the scheduled heating capacity and have the following characteristics:

1) Modulating (0-10V) auxiliary air heat control

2) The duct furnace module shall be a natural gas indirect-fired type using spark ignition with a heating capacity as shown in this submittal and is installed in a 'blow through' configuration downstream from the blower. The heat exchanger tubes are constructed of formed and welded 16-gauge series 409 stainless steel suitable for installation downstream of the cooling coil and satisfactory for air inlet temperatures below 40 Â°F. The burner is the power firing type and incorporates a primary combustion air blower and spark ignition transformer

3) Standard controls shall include a modulating gas valve, intermittent spark ignition, overheat control, rollout flame supervision, combustion air flow

proving switch, positive burner safety switch, pilot cock, main gas cock with 100% shut off, adjustable main and pilot pressure regulators

4) The natural gas duct furnace module shall be an ETL recognized component. The gas train shall be complete with all controls factory mounted to comply with requirements of ETL. The gas train is complete with a modulating main gas valve and is ready for connection to a natural gas supply with pressure between 7 in and 14 in WC

5) The complete system shall be test-fired and preliminary adjustments made prior to leaving the factory

K. Air Conditioning

1. Air-cooled air conditioning via outdoor condenser

a. The system shall be equipped with an air conditioning mode where excess compressor heat is rejected to a factory-packaged, integral outdoor air-cooled condenser. The outdoor air-cooled condenser shall be capable of rejecting 100% of the compressor heat rejection with an air-on temperature at summer design conditions.

b. The system shall be provided with a dry contact rated for 5A at 24VAC to operate the remote outdoor condenser controls

c. Each refrigeration circuit shall include refrigerant valves, a receiver with pressure relief valve set to 650 psig, a pressure control valve and a pressure differential valve, and two manual shutoff valves to isolate the outdoor condenser

d. Coils shall be tested at 600 PSIG and mounted vertically for complete surface utilization. Coils shall be counter flow with a minimum of 10 degrees of liquid sub-cooling and have adequate capacity to dissipate the total heat rejection of the system at design conditions. Condensers shall have guards to protect the coils from vandalism and weather-related damage

e. The fan(s) shall be direct driven axial fan(s) made of aluminum in which the motor and controller are integrated. The fan includes an EC commutated direct-current external rotor motor to provide maximum efficiency and the quietest performance. The EC motor shall have maintenance-free electronic circuitry, a rotor with permanent magnets and an integral controller to provide the windings with electrical current so that the motor rotates continuously and quietly. The fan has an aerodynamically-optimized, sickle-blade profile, patterned with serrated trailing edge and winglets on the blade outer edge for energy and noise-optimized operation

1) The fan assembly shall be balanced in Class G 6.3 acc DIN ISO 1940, dynamic on two levels

2) The fan assembly shall be suitable for ambient temperatures of -40Â°C to max. +70Â°C

3) Thermal contacts installed in the windings compliant with THCL 155

4) Drive motor in external rotor principle, sealed in protection class IP54 with moisture protection impregnation of the windings, topical protection

5) High corrosion resistance design with high quality and reliability

L. Roof Curb

1. The roof curb shall be a prefabricated, perimeter type curb made of 12-gauge galvanized steel with stiffeners, 2.000 in x 2.000 in treated wood nailer strip and not less than 1.500 in of rigid acoustical and thermal fiberglass insulation, knocked-down for shipment. 1.000 in x 0.250 in adhesive gasketing and all necessary hardware shall be provided for field assembly of the curb on the roof decking prior to system shipment

2. Factory Performance Testing

a. The system shall be thoroughly tested under factory test conditions.

2.14 FACTORY PERFORMANCE TESTING

A. The unit shall be thoroughly tested under factory test conditions. A copy of the test report shall be available to the engineer upon request.

B. Microprocessor controls shall be factory adjusted and preset to the design conditions during testing.

C. The unit shall be accessible for real-time monitoring while in the QC test chamber upon request.

PART 3 – EXECUTION

3.1 PRODUCT DELIVERY, ACCEPTANCE, STORAGE AND HANDLING

A. Perform a thorough physical inspection of the unit upon delivery from the shipment carrier.

B. Identify and report any physical damage immediately to manufacturer.

C. If unit is to be stored prior to installation store in a clean, dry place. Protect from weather, dirt, fumes, water, construction, and physical damage.

D. Handle unit carefully during installation to prevent damage, breaking, denting and scoring.

E. Damaged units or damaged components shall not be installed. Contact manufacturer for RMA instructions.

F. Comply with manufacturer's rigging and installation instructions for unloading the unit and moving it to the final location.

3.2 CONNECTIONS

A. Where installing piping adjacent to units, allow space for service and maintenance.

B. Duct connections: Drawings indicate the general arrangements of the ducts. Connect units to ducts with flexible duct connectors. Comply with requirements for flexible duct connectors.

C. Electrical connections: Comply with requirements for power wiring, switches and motor controls in electrical sections.

3.3 INSTALLATION

A. The agency responsible for start-up should work in accordance with the specifications and in accordance with the manufacturer's instructions and only by workers experienced in this type of work.

3.4 START UP

A. Detailed instructions for start up as provided by the manufacturer must be followed.

B. Installing contractor must contact the manufacturer prior to start up to confirm start up procedures.

C. Remote internet access and control must be initiated and confirmed by the factory prior to start up for extended labour warranty to be in effect.

3.5 BUILDING MANAGEMENT SYSTEM

A. The Pool Unit basis of design for this project incorporates manufacturer provided packaged controls. These packaged controls only address a portion of the overall control sequence requirements for these units. The BMS Contractor shall provide a separate control package and integrate it with the manufacturer provided packaged controls in order to implement the complete control sequence requirements for each Pool Unit. The Sequence of Operation paragraphs layout the general requirements of the integrated control strategy and define the unit’s operational intent without regard to the unit manufacturer/BMS Contractor shared responsibility (joint and several liability). Where packaged controls provided by the unit manufacturer are integrated with controls provided by the BMS Contractor, the end result shall accomplish the intent of the Sequences of Operation to the satisfaction of the Professional and the unit manufacturer and the BMS Contractor shall refine/revise the integrated controls as required to achieve that objective. It is recognized that different manufacturers may have a slightly different solution to achieve the same end result (terminal strip interface vs. BACnet communication interface vs. terminal strip interface and BACnet communication interface). The control submittal shall clearly document interface between the two control systems in sufficient detail to establish GREATER THAN OR EQUAL TO COMPLIANCE with all specification requirements.

B. Where a unit is provided with manufacturer furnished (factory) controls, the unit manufacturer shall be responsible for evaluating the requirements of the contract documents sequences of operation and defining the read/write operations between the BMS and the factory controls that will be required in order to implement those sequences. Where the BMS vendor will be required to provide/install field hardware to supplement the factory controls, the unit manufacturer will be responsible for providing that information to all BMS vendors listed in the project specifications no later than five (5) days before the bid due date. The manufacturer’s control engineer shall meet (telephone conference calls will be acceptable) with the BMS vendor’s application programmer, in the presence of the Professional, to define and coordinate those read/write communication requirements and provide a hardcopy record for the project O & M Manuals. The Professional shall continue those discussions as necessary in order to establish that both parties understand their responsibilities in relation to the final working product. Should this coordination not take place, the unit manufacturer shall be responsible for reimbursing the Professional, at standard billing rates, for all time spent researching any field start-up, check-out and commissioning problems that are traced to a lack of the prerequisite coordination defined above. The equipment manufacturer and BMS Contractor shall provide any and all package control system modifications required, up to and including complete replacement of the factory provided controls, in order to provide satisfactory system operation acceptable to the Owner and the Professional. NO EXCEPTIONS.

C. The unit manufacturer shall be responsible for determining that the factory controls, with proper communication to/from the BMS, are capable of implementing the sequences of operation as defined by the contract documents. Results that merely "approximate the intent" of the required sequences of operation are not acceptable. NO EXCEPTIONS. In addition, the unit manufacturer shall be responsible for maintaining the read/write coordination requirements, as defined for the initial construction process, throughout a ten (10) year period that begins with the start of the warranty period. Any updates to the factory controls during this ten year period shall not require any reprogramming on the part of the BMS vendor. Should any reprogramming be required by the BMS vendor, the unit manufacturer shall be responsible for reimbursing the BMS vendor, at standard billing rates, for all time spent to accomplish the required reprogramming.

D. The mechanical equipment supplier shall provide factory start-up, check-out and commissioning of the factory furnished controls. The use of third party agents shall not be acceptable. Documentation shall be turned over to the owner and the Professional which clearly indicates how the factory controls have been configured for this project specific application. Generic IOM manuals which merely define all of the factory controls capabilities, without regard to the selections which apply to the specific project at hand and the actual parameters selected, will not be accepted. The factory technician shall also be present while the BMS contractor performs start-up, check-out and commissioning of the integrated controls in order to verify proper parameter selection and communication between the two systems.

E. The mechanical equipment supplier shall provide all required on site time to coordinate, checkout and confirm BMS communication interface operation to the satisfaction of the project BMS contractor. On site visits shall be scheduled by the BMS contractor through the mechanical or electrical contractor as appropriate for the equipment being interfaced to.

F. The mechanical equipment supplier shall also provide all required on site time to coordinate, checkout and confirm BMS communication interface operation to the satisfaction of the project Commissioning Agent. On site visits shall be scheduled by the Commissioning Agent through the mechanical or electrical contractor as appropriate for the equipment being interfaced to.

G. Bacnet Points (The unit shall be provided with a BACnet connection for the control panel)

1. Analog Input Objects (Sensors)
   Return Air Humidity
   Return Air Temperature
   Refrigerant High Pressure, Compressor 1
   Refrigerant Low Pressure, Compressor 1
   Refrigerant High Pressure, Compressor 2
   Refrigerant Low Pressure, Compressor 2
   Evaporator Temperature, Compressor 1
   Evaporator Temperature, Compressor 2
   Supply Air Temperature
   Suction Temperature, Compressor 1
   Suction Temperature, Compressor 2
   Exhaust Air Temperature
   Reheat Temperature
   Outdoor Air Humidity
   Outdoor Air Dew Point
   Superheat, Compressor 1
   Superheat, Compressor 2
   Return Air Dew Point
   Wall Temperature

2. Analog Value Object (Setpoints)
   Room Temperature Setpoint
   Humidity Setpoint
   Pool Temperature Setpoint
   Heat Recovery Setpoint
   Freezestat Setpoint
   Supply Air Dry Bulb Summer Setpoint
   Supply Air Dry Bulb Winter Setpoint
   Max Dew Point
   A/C Summer Only Setpoint
   Humidity Floating Setpoint

3. Binary Value Objects (Control Status)
   Blower Contactor
   Compressor Contractor, Compressor 1
   Reheat Valve, Compressor 1
   A/C Valve, Compressor 1
   Pump Down Valve, Compressor 1
   Pool Heating Valve
   Compressor Contractor, Compressor 2
   Reheat Valve, Compressor 2
   A/C Valve, Compressor 2
   Pump Down Valve, Compressor 2
   Bypass Damper Adjust Open
   Bypass Damper Adjust Close
   Heat Recovery Pump
   Auxiliary Pool Heater
   Outdoor Air Condenser Fan 1
   Outdoor Air Damper
   Exhaust Fan 1
   Stage 1 Heat
   Stage 2 Heat
   Compressor Cooler, Pre-cooler
   Pump Down Valve, Pre-cooler
   Exhaust Damper 1
   Return Air Damper
   Outdoor Air Condenser Fan 2
   Compressor Pump

4. Binary Value Objects (Mode Status)
   Service Mode
   Purging
   Dehumidification Mode
   A/C Mode
   Heating Mode
   Pool Heating Mode
   Compressor 1 Available
   Compressor 2 Available
   Compressor Cooler Available

5. Binary Value Objects (Commands)

Instance	Name	DS	LD
512	Blower	o	o

515	Compressors Enabled	o	o
516	Occupied	o	o
518	Space Heater	o	o
519	A/C Enabled	o	o
520	Pool 1 Heater	o	o
522	Emergency Heat	o	o
523	Blower Override		
524	A/C Override	o	o
525	Heat Override	o	o

6. Binary Value Objects (Alarms)
   Blower Overload
   No Airflow
   Firestat Alarm
   Freezestat Alarm
   Dirty Filter
   Pool 1 water Flow Fault
   Compressor 1 High Pressure
   Compressor 1 Low Pressure
   Compressor 1 Oil Fault
   Compressor 1 High Discharge Temp
   Compressor 2 High Pressure
   Compressor 2 Low Pressure
   Compressor 2 Oil Fault
   Compressor 2 High Discharge Temp
   Voltage Fault
   Purge Alarm
   Outdoor Air Condenser 1 Overload
   Outdoor Air Condenser 2 Overload
   Compressor 1 Low Superheat
   Compressor 2 Low Superheat
   Bad Battery
   Exhaust Fan 1 Overload
   Pool 2 Water Flow Fault
   Compressor 1 Pressure Fault
   Compressor 2 Pressure Fault
   Compressor Pump Fault
   Freezestat 2 Alarm
   Compressor Cooler Fault
   Exhaust Fan 2 Overload
   Compressor 1 High Suction Temp
   Compressor 2 High Suction Temp

END OF SECTION 237317

SECTION 238239 – TERMINAL HEATING UNITS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. The equipment for the various HVAC systems shall be as hereinafter described in this section.

PART 2 – PRODUCTS

2.3 HORIZONTAL UNIT HEATERS (HOT WATER)

A. Acceptable Manufacturers:

1. Trane (Basis of Design)

2. Dunham – Bush

3. Sterling

4. Modine

B. Furnish and install suspended horizontal discharge type unit heaters. Unit heaters shall be of the multi-speed type, consisting of fan, fan guard, motor, nonferrous finned tube heating element, cabinet, double deflection discharge louvers, hangers, etc., and shall be constructed for quiet operation. Provision for expansion and contraction of heating elements shall be incorporated in the design of the units.

C. Heating elements shall be submersion tested at the factory at 200 PSIG. Maximum hot water operating pressure shall be 150 PSIG at 320°F.

D. Motors for unit heaters shall be of the multi-speed type. Units shall be controlled as specified under "Automatic Temperature Control."

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install per manufacturers recommendations.

END OF SECTION 238239

SECTION 238241 – REMOTE CONDENSING UNITS FOR BLOWER COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including general and supplementary conditions and other Division 1 Specification Sections apply to this section.

1.2 REFERENCES

A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

B. ANSI/ASHRAE/IES 90 A - Energy Conservation in New Building Design Standard.

C. ARI 210/240 - Unitary Air-Conditioning Equipment and Air-Source Heat Pump Equipment, (units less than 135,000 Btuh).

D. ARI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard (condensing units greater than 135,000 Btuh).

E. ARI 340 - Commercial and Industrial Unitary Heat Pump Equipment, (heat pumps greater than 135,000 Btuh).

F. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.

G. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California.

H. ARI 270 - Sound Rating of Outdoor Unitary Equipment, (units less than 135,00 Btuh).

I. ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).

1.3 SUBMITTALS

A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.

C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

D. Submit data on electrical requirements and connection points. Include recommeded wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on site from physical damage. Protect coils.

1.5 WARRANTY

A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

1.6 REGULATORY REQUIRMENTS

A. Unit shall conform to ANSI Z21.47/UL 1995 for construction of packaged air conditioner.

PART 2 - PRODUCTS

2.1 SUMMARY

A. APPROVED MANUFACTURERS

1. Daikin (Basis of Design)

2. Approved Equal (Johnson Controls, Trane)

2.2 GENERAL UNIT DESCRIPTION

A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressor(s), condensing coil and fan(s), integral subcooling circuit(s), filter drier(s), and controls. Provide expansion valve(s) and check valves for split system heat pump unit(s).

B. Performance Ratings: Energy Efficiency Rating (EER) not less than prescribed by ANSI/ASHRAE 90A.

C. Heat Rejection Capacity: As shown on drawings and/or schedules

2.3 CASING

A. House components in 18-gauge zinc-coated galvanized steel frame and panels with weather resistant, baked enamel finish. Units surface shall be tested 500 hours in salt spray test.

B. Mount controls in weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.4 CONDENSER COILS

A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide subcooling circuit(s). Factory leak test under water to 450 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.

2.5 FANS AND MOTORS

A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.

B. Weatherproof motors suitable for outdoor use, with permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motors shall be either sleeve or ball bearing type.

2.6 COMPRESSORS

A. Compressor(s): Provide direct-drive hermetic, reciprocating or scroll type compressor(s) with centrifugal oil pump providing positive lubrication to moving parts and automotive type pistons and rings to prevent gas leakage. Motor shall be suction gas-cooled with internal temperature and current sensitive motor overloads. External high and low pressure cutout devices shall be provided.

2.7 CONTROLS

A. Provide factory-wired condensing units with 24 volt control circuit with internal fusing and control transformers, contactor pressure lugs and/or terminal block for power wiring.

B. Condensing unit shall accept all cooling calls from an indoor thermostat.

C. Contractor to provide field installed unit mounted disconnect switch. Units shall have single point power connections.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service.

C. Install units on concrete base as indicated.

D. Provide connection to refrigeration piping system and evaporators.

END OF SECTION 238241

SECTION 312000.5 - EARTH MOVING

PART 1 GENERAL

1.01 SCOPE

A. This section of the specifications includes all labor, supervision, equipment, tools, materials, transportation and all means of construction necessary to perform the excavation, trenching, backfilling and finish grading as shown on drawings, described in this specification, or as is necessary to install new materials or equipment and to complete the project in a first-class manner.

B. Work includes, but is not limited to the following:
1. Earthwork as required by each Prime Contractor's Contract.
2. Coordinate excavation and trenching with the General Contractor.
3. Comply with all laws, regulations and guidelines regarding soil erosion control at all disturbed areas under each respective Contract.

1.02 CONTRACTOR'S RESPONSIBILITY

A. It is the intent of these specifications to produce satisfactory stable fills and embankments, and these specifications shall be considered minimum requirements which shall be supplemented by the Contractor with additional work if necessary, in order to secure stable fills and embankments.

B. In addition to satisfying and complying with all other requirements, conditions, and provisions contained in the contract documents, the Contractor shall, without extra compensation, reconstruct all fills and embankments that are displaced by any reason or cause whatsoever during their construction or within one (1) year after the entire contract work is completed and accepted.

1.03 RELATED WORK INCLUDED IN OTHER SECTIONS OR CONTRACTS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Divisions 00, 01, and 02 of these Specifications.

B. Cast-In-Place Concrete - Section 033000.5.

C. Lawn Repair - Section 329200.5.

1.04 CODES AND REGULATIONS

A. The Contractor shall comply with the Federal Occupational Safety & Health Act (OSHA) requirements for excavation, trenches, and earthwork.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

B. Test Reports: Submit certified laboratory test reports as necessary to show compliance with specified

requirements.

C. Test Reports / Submittals on construction materials (i.e.: aggregates, soils) are to be dated no later than one year prior to construction starting date of this project..

D. Three (3) samples of all aggregate base and fill materials.

E. Compilations of all Construction Testing as specified herein shall be submitted with the Contractor's Closeout Submittals as specified in Section 017700.

1.06 CONTRACTOR'S TESTING LABORATORY/AGENCY

A. The Contractor shall retain and pay for the services of an independent qualified laboratory/agency to perform initial and final subgrade evaluations (proof roll), sampling, testing and inspecting of materials entering into the placing of compacted, controlled fill, finish grading materials, utility backfills, and other services as required for quality control. Such laboratory/agency shall be submitted to the Architect for approval.

B. Quality Assurance:
1. The testing laboratory/agency will be qualified to the Owner's approval in accordance with ASTM E329-21 "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection."
2. Earth work testing and inspection must be performed under the supervision of a qualified person with a degree in geology or civil engineering.
3. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.07 TEST REQUIREMENTS

A. In-place compaction density tests shall be performed on all fill materials. Tests shall be performed in locations and in quantities as selected by the testing laboratory/agency. The Contractor shall include in the amount of the Base Bid, the number of compaction tests required to comply with the following frequencies:
1. Fill and backfill material within the building footprint and 10'-0" beyond: compacted to 95% of maximum dry density, at moisture content within 2% of optimum, per Modified Proctor Test ASTM D1557 - minimum of one (1) test location per every lift per 500 square feet.
2. Fill and backfill material within site areas to be surfaced and minimum 3'-0" beyond (10'-0" beyond any structure footprint): compacted to 95% of maximum dry density, at moisture content within 2% of optimum, per Modified Proctor Test ASTM D1557 - minimum of one (1) test location per every lift per 2,000 square feet.
3. Fill and backfill material within non-surfaced areas 10'-0" beyond the building footprint: compacted to 90% of maximum dry density, at moisture content within 3% of optimum, per Modified Proctor Test ASTM D1557- minimum of one (1) test location per lift per 5,000 square feet.
4. Fill and backfill material within trenches: Place in 6" loose lifts and compact to density as required above dependent upon location of trench - minimum of one (1) test location per every two vertical feet (2'-0") per fifty lineal feet (50'-0") of trench on center.

B. Three (3) copies of said test results shall be submitted to the Architect's office with required

accompanying information (i.e., Project Name, Testing Agency Name, Prime Contractor Name, date and location of test).

1. The Contractor's testing agency shall electronically distribute, in advance of hard copy mailing, to the Architect and the Owner's Representative, all test reports within 24 hours of testing. Under no circumstances shall the Contractor remove the Architect and/or Owner's Representative from the electronic and/or hard copy distribution of test reports or change the specified frequency of testing. Electronic address(es) for the Architect and the Owner's Representative will be issued during the Initial Job Conference meeting.
2. Compilations of all Construction Testing as specified herein shall be submitted with the Contractor's Closeout Submittals as specified in Section 017700.

C. Verification, inspection and testing of soils and aggregates shall also be in compliance with the 2021 IBC (including, but not limited to, Section 110 Inspections and Chapter 17 Special Inspections - Sections 1704 and 1705, specifically 1705.6 Soils, including Table 1705.6, as applicable to this specific project). In case of conflict between any of the above requirements and the IBC, the more stringent requirements shall govern.

1.08 BASIS OF CONTRACT

A. The excavation work shall be performed on an "Unclassified Basis", that is, the removal of soil, shale, rock formations regardless of type or hardness of such formations, existing foundations, abandoned septic tanks, construction debris, fill, topsoil, deleterious material, and every kind of subsurface condition encountered in the Contract area, which includes conditions below the footing elevations - the cost of such excavations being included in the contract price at the time of bidding. No extra or additional compensation for excavation will be paid under this Contract. Contractor must assume all risks in excavating and make his own investigation of sub-surface conditions. Such investigations may be performed only under time schedules and arrangements approved in advance by the Owner.

1.09 QUALITY ASSURANCE

A. A Pre-Installation Conference shall be held at the job site prior to any earthwork on-site. The purpose of this meeting shall include, but not be limited to, a discussion on the coordination of all Prime Contractors and evaluation of field conditions. In addition to the Project Architect, Each Prime Contractor, his earthwork subcontractor, and his testing agency shall attend the Pre-Installation Conference along with the building Owner's Representative.

1. A second Pre-Installation Conference shall be held prior to finish grading and the placement of topsoil and subsequent seeding as specified in Section 329200.

B. Contractors shall coordinate all excavation requirements with the General Contractor.

C. It shall be the Contractor's responsibility to contact utility companies prior to any construction as the locations of utilities shown on the plans are approximate and possibly incomplete. Contractors shall call 1-800-242-1776 (PA One-Call) three days prior to earth work activity on the Project Site.

1.10 SHORING AND PROTECTION

A. Provide all shoring and bracing necessary to prevent cave-in until the backfilling is completed. Erect and maintain fences, guard rails, lights and such other protection as may be necessary for safety and for the protection of the property of the Owner, as well as the property of others.

B. Any surcharged loads from equipment that would be applied to soils near existing foundations, temporary shoring, excavations, etc., shall be determined and verified by the Contractor prior to use. Should the verification require an engineer, the engineer shall be hired by and paid for by the Contractor. The Contractor shall reinforce, as necessary, temporary shoring prior to bringing any additional equipment on site and near the excavation.

1.11 BLASTING

A. No blasting shall be performed on the Project Site.

1.12 ENGINEERING LAYOUT

A. Prior to beginning any excavation or grading work, the Contractor shall have a Registered Engineer and/or Surveyor establish all construction lines, utility lines, finish grades and elevations for location and construction of the Project. Information shall be provided to the General Contractor to incorporate into his comprehensive as-built site plan.

1.13 PRECAUTIONS

A. Do not damage or disturb any existing monuments, benchmarks, or other markers. Provide suitable protection where required before starting work. Restore any damage to original condition or repair as directed at no additional cost.

B. The Contractor shall execute excavation work in a manner to ensure existing building against any damages resulting therefrom. If at any time, the integrity of existing building and foundation appears to be endangered, the Contractor shall cease operations and immediately notify the Architect and Owner, at the same time taking all necessary precautions to support such areas as may be affected. If the Architect and/or Owner considers additional bracing, underpinning, or shoring necessary to safeguard existing structure, the Contractor shall be responsible for installing bracing, underpinning, or shoring at the Contractor's expense.

C. Any piping or conduit encountered shall be temporarily supported and maintained until permanent support is restored, or piping and conduit to be removed shall be cut off and capped outside the limits of excavation.

PART 2 PRODUCTS

2.01 SHEET PILING

A. Sheet piling, wood or steel and all bracing, shoring or sheeting as required or necessary to conduct the work safely, retain the excavation, and prevent damage to existing structures, and to complete the work, shall be furnished and installed by the Contractor.

2.02 ON SITE MATERIALS

A. Existing excavated soil material from the site may be used for fill and backfill material within non-surfaced areas to be seeded 10’-0” beyond the building footprint, provided that this material contains no topsoil, peat, demolished material, trash, fine or coarse aggregate containing “slag” or components of

"slag", deleterious, carbonaceous, coal, organic and/or latent materials, nor any substance that may break or cause damage or corrosive action to occur to utility pipes, etc., that may be trenched within these areas, is of an acceptable moisture content, will compact to 90% of maximum dry density per modified Proctor Test ASTM D1557, and is approved for such use by the Contractor's testing agency and the Project Engineer. Rocks/stones shall not be over 2" in size. No rocks/stones over 3/4" in size shall be in the top 12" of subgrade. Existing soils may need to be disked or harrowed, dried, re-compacted, or otherwise improved to meet the density and moisture content requirements for re-use. Should the existing excavated materials not meet the compaction and/or moisture content requirements, the Contractor shall furnish and install fill material as hereafter specified.

1. Existing excavated soil materials shall be tested for compliance with hereafter specifications to determine approval for reuse.
2. All costs for reconditioning existing soils to meet the density and moisture content requirements for re-use approval by the Contractor's testing agency and the Project Engineer shall be at the Contractor's expense.
3. Existing excavated soil materials approved for reuse by the Contractor's testing agency and the Project Engineer shall be maintained at optimum moisture content regardless of weather conditions; said material not maintained at optimum moisture content shall not be reused and Contractor shall provide off-site material as hereinafter specified per intended location.

B. Existing excavated topsoil may be re-used. Additional material for topsoil required in excess of acceptable material from excavations on the site, shall be provided by the Contractor from a source as approved by Architect and the Owner and comply with topsoil material as hereafter specified.

1. Existing topsoil shall be screened prior to reuse and must meet requirements for new topsoil as hereafter specified.
2. No rocks/stones of any size shall be in the topsoil.

C. Excess material from excavation not suitable nor required for backfill or other purposes shall be hauled from the site as excavated.

D. The Contractor shall be responsible for complying with all laws, regulations and guidelines required to maintain an acceptable soil erosion control plan at all disturbed areas.

2.03 PIPE EMBEDMENT MATERIAL

A. If not otherwise specified on drawings or in hereafter Technical Sections, Pipe Embedment Material shall be as follows:

1. Embedment material (for PVC and/or polyethylene pipe) shall be Class II, as per ASTM D2321 and ASTM D2487 using suitable material, full draining sands and gravel conforming to AASHTO M43.
2. Embedment material (for steel and/or reinforced concrete pipe) shall be Class I or Class II, as per ASTM D2321 and ASTM D2487 using suitable material, graded crushed stone or gravel, or full draining sands and gravel conforming to AASHTO M43.
3. No fine or coarse aggregate containing "slag" or components of "slag" shall be acceptable.

2.04 EXTERIOR FILL MATERIAL

A. Material for backfilling shall be provided by the Contractor from a source as approved by Architect and the Owner.

1. All fill/backfill materials shall be tested, evaluated, and/or approved by the Contractor's testing

agency in compliance with the following.

2. Submit samples of fill/backfill materials to the Contractor's testing agency and Project Engineer for analysis, to determine the adequacy of material, and to perform moisture density relationship tests.

B. Fill and Backfill Material within non-surfaced areas 10'-0" beyond exterior building walls and/or 3'-0" beyond surfaced areas: Shall be clean earth, containing no vegetable matter, rubbish or debris or other prohibitive materials as identified in Paragraph 2.02.A. All voids shall be thoroughly filled with earth of friable material and compacted as herein provided. Rock shall not be used in fill areas where utility or drainage lines are to be located. Material must compact to 90% of maximum dry density, at moisture content within 3% of optimum, per Modified Proctor Test ASTM D1557, unless otherwise specified.

C. Fill Material within site areas to be surfaced and 3'-0" beyond (and 10'-0" beyond any structure footprint): Shall be Penndot No. 2A Limestone according to Table C of PennDot Specification 408 Section 703 (Latest Edition), quality of materials shall meet requirements of Table B, Type A. No fine or coarse aggregate containing "slag" or components of "slag" shall be acceptable. Material must originate from a PennDot approved quarry; submit verification of quarry meeting PennDot approval. Material must compact to 95% of maximum dry density, at moisture content within 2% of optimum, per Modified Proctor Test ASTM D1557.

1. Above Penndot No. 2A Limestone shall be used for backfill material for trenches, etc., through surfaced areas)

2.05 INTERIOR/ENGINEERED/STRUCTURAL/CONTROLLED FILL MATERIAL

A. Interior/Engineered/Structural/Controlled Fill Material required within any structure footprint, beneath footings, and 10'-0" beyond exterior building walls, including backfilling of walls, trenches, ditches and all areas of disturbed earth shall be tested, evaluated, and approved by Contractors Testing Agency and Project Engineer in compliance with the following:

1. Penndot 2A Limestone according to Table C of Penndot Specification Publication 408 Section 703, quality of materials shall meet requirements of Table B, Type A.
   a. Material must originate from a PennDot approved quarry; submit verification of quarry meeting PennDot approval.
   b. Material shall contain no fine or coarse aggregate containing "slag" or components of "slag" or "quarry waste", or other prohibitive materials as identified in Paragraph 2.02.A.
   c. Material shall be placed at a moisture content within 2% of optimum and compacted to 95% of maximum dry density per Modified Proctor Test ASTM D1557.
2. Submit samples of fill material to the approved testing laboratory for a sieve analysis, to determine the adequacy of material, and to perform moisture density relationship tests. Submit test results and samples to the Architect/Project Engineer.

2.06 TOPSOIL

A. Topsoil: Shall be natural clay loam soil possessing the characteristics of representative soils in the vicinity which produce heavy growth of crops, grass and other vegetation and shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of sub-soil, refuse or any foreign material, free from hard dirt, brush, weeds or clods, and from clay lumps, stumps, roots, stones, or toxic substance, and any other material or substance which may be harmful to plant growth or be a hindrance to planting and maintenance operations.

1. All topsoil shall be screened (new and/or existing).

2. No rocks/stones of any size shall be in the topsoil.
3. Submit samples of topsoil to the Architect for review.

2.07 AGGREGATE/STONE BASES

A. Aggregates - General:
1. All base material must originate from a PennDot approved quarry; submit verification of quarry meeting PennDot approval.
2. No fine or coarse aggregate containing “slag” or components of “slag” shall be acceptable.

B. Gravel Base for under site concrete slabs on grade: Shall be clean washed material AASHTO (American Association of State Highway and Transportation Officials) No. 57 according to Table C of Penndot Specification Publication 408 Section 703, quality of materials shall meet requirements of Table B, Type A.

C. Gravel Base for under interior concrete slabs on grade: Shall be clean washed, angular AASHTO No. 57 Limestone, according to Table C of Penndot Specification Publication 408 Section 703, quality of materials shall meet requirements of Table B, Type A.

PART 3 EXECUTION

3.01 EXCAVATIONS

A. The Contractor shall be responsible for complying with all laws, regulations and guidelines required to maintain an acceptable soil erosion control plan at all disturbed areas.
1. Comply with Pennsylvania Department of Environmental Protection’s Erosion and Sediment Pollution Control Program Manual and the PA Code Chapter 102, Erosion and Sediment Control.

B. Make all necessary excavation on premises to bring the finished grades to the levels shown on drawings; or if not so shown, then to grade as directed by the Architect.

C. Excavations include removal of any old foundations, building construction, building materials, or tree stumps which may be concealed beneath the present grade.
1. Excavations within building addition footprints shall be coordinated with the General Contractor.
2. Extreme care shall be exercised during excavations within and around the existing structure and existing footing elevations. The Contractor shall execute work in a manner to ensure the existing building, designated to remain, against any damages resulting therefrom. The Contractor shall be responsible for repairing any damage to the existing building designated to remain, at the Contractor's expense.
3. Stabilization of existing adjacent foundations exposed during excavations shall be at the Contractor’s expense.
4. Once a subgrade has been stabilized and approved by the Contractor’s testing agency, any reworking of the approved surface recommended by the Contractor’s testing agency shall be the responsibility of the Contractor. All exposed subgrades shall be protected and/or considered sacrificial if exposed for more than one day.

D. The bottom of all excavations shall be leveled off. All loose material within the construction area, which includes those portions below any excavations, shall be removed and the excavations shall be brought into approved condition to receive subsequent materials.

E. Do not excavate to full depth when rain or freezing conditions are imminent and subsequent materials cannot be placed during the same work period. Completed excavation surfaces shall be protected from frost, freezing, and/or rain/water. Where excavation surfaces are damaged by water, mud, or otherwise disturbed, all loose mud or other materials shall be removed and the excavations filled to required elevations with specified fill material, placed in horizontal lifts not exceeding 8" and compacted; backfill and compaction shall be as specified dependent on site location, all corrective work shall be at the Contractor's expense.

F. Excavated material shall be piled away from the edge of the excavated area, a sufficient distance to prevent overloading the bank, and graded in such a way as to prevent surface water from entering the excavated area.

G. Material from excavation not suitable nor required for other purposes shall be hauled from the site as excavated.

H. During excavation and construction, the areas shall be kept well shaped and drained at all times. Existing springs or drainage courses encountered shall be temporarily blocked off or diverted in order to carry out the work. The contractor shall be responsible for establishing acceptable erosion control measures during excavation, grading and construction operations to avoid excessive erosion.

I. Place all subsequent materials the same day excavations are made to prevent degradation of exposed subgrade soils.

J. Every effort shall be made to keep the excavations dry.

3.02 PUMPING

A. Remove all water, including rainwater or sub-surface water encountered during the course of the excavation. Removal shall be by the use of sumps and pumps, drains, and other approved methods, and shall keep the excavation free from water until the construction is completed and the backfilling is finished. The water shall be discharged to catch basins, sewers or other drainage points available, via approved storm water piping and erosion and sedimentation control methods. All dewatering costs are to be included in the Base Bid. Pumps shall be of capacity required to continually lower amount of water encountered.

3.03 BACKFILLING TRENCHES

A. Utility trenches shall be excavated to 4" below required line and grade. Refer to Paragraph 3.01.D for acceptable condition of bottom of trenches.

B. Install pipe/conduit in bedding material, as specified and/or as detailed on drawings.

C. Prior to any backfill, the Architect, Owner and local inspector (when required) shall be notified to inspect installed work 24 hours prior to required inspections.

D. After pipe is installed, inspected and approved, backfill with bedding material in lifts, not to exceed 6", to a minimum of 12" above the top of the pipe, backfill remainder of trench with material herein specified, dependent upon site location of trench, to level of finish grade or to elevations required for installation of additional work: floor slabs, finish grading, paving, sidewalks, etc. Placing and compaction of fill material

shall be performed for specific locations as specified in subsequent Paragraphs; except lifts shall not exceed 6" in thickness.

E. In no case shall underground utilities pass under foundations, unless approved by the Architect. Upon approval by the Architect, Piping running beneath footings shall be thoroughly encased in concrete for entire area disturbed.

1. All underground utilities passing through foundations shall be through galvanized pipe sleeves.

F. Furnish and install a labeled protective ribbon underground, above buried utility piping as required by code and as detailed on drawings.

3.04 EXTERIOR BACKFILLING - NON-SURFACED AREAS.

A. Clean excavation and areas to be filled of all topsoil, vegetable matter, pieces of wood, refuse and debris before placing any fill and backfill.

B. Do not fill or backfill over frozen sub-grade nor use any frozen material in fill or backfill.

C. Perform filling and backfilling carefully and brace as required, so as not to damage other work or affect the stability of any construction. No backfilling against footings or similar areas shall be performed until concrete forms have been removed and the concrete is thoroughly cured. Filling and backfilling shall be installed in maximum of 6” lifts, uniformly spread and compacted and rolled with power roller or pneumatic tamper, and then leveled or sloped as required. No puddling will be allowed. Compact each lift to a density of 90% of the maximum dry density (3% of optimum moisture content), as per modified Proctor Test ASTM D1557.

1. On site in place density tests will be performed by the Contractor’s testing agency. The Contractor shall notify the testing agency when each lift is compacted and ready for testing.

D. Hauling or moving of equipment shall not be allowed over the finished sub-grade.

3.05 EXTERIOR BACKFILLING - SURFACED AREAS

A. “Surfaced Areas” include all pads, pavements, walks, and/or curbs. Compaction, as hereinafter specified, for under paved areas shall extend a minimum of 3'-0 beyond the edge of pavement and/or curb.

B. Clean all areas to be surfaced of all topsoil, vegetable matter, refuse and debris before filling or rough grading. Do not fill over frozen sub-grade nor use any frozen material in the fill.

C. All required backfill shall be installed in maximum of 6” lifts. Each lift shall be uniformly spread and compacted and rolled with power roller or pneumatic tamper and then leveled or sloped as required to match adjacent finish elevations. No puddling will be allowed. Compact each lift to a density of 95% of the maximum dry density (2% of optimum moisture content), as per modified Proctor Test ASTM D1557.

1. On site in place density tests will be performed by the Contractor’s testing agency. The Contractor shall notify the testing agency when each lift is compacted and ready for testing.

D. Hauling or moving equipment shall not be allowed over the finished sub-grade.

3.06 INTERIOR BACKFILLING

A. The engineered/controlled fill shall be placed in horizontal lifts not exceeding 6" in thickness. Each lift shall be thoroughly compacted with vibrating rollers or other mechanical compactors as approved by the Contractor's testing agency.

B. Each 6" lift of engineered/controlled fill at moisture content within 2% of optimum shall be compacted to 95% of the maximum dry unit weight obtained by the Modified Proctor Test ASTM D1557.

1. On site in place density tests will be performed by the Contractor's testing agency. The Contractor shall notify the testing agency when each lift is compacted and ready for testing.

C. Perform filling carefully, brace as required, so as not to damage other work or affect the stability of any construction. Do filling only when walls are fully capable of withstanding the resulting pressure or after bracing has been installed.

3.07 AGGREGATE BASES

A. All aggregate bases for concrete slabs shall be compacted to 100% of maximum dry density, at moisture content within 2% of optimum, per Modified Proctor Test ASTM D1557.

1. Install a minimum depth of gravel as detailed under all concrete slabs on grade.

3.08 FINISH GRADING

A. Topsoil stripped from site and stockpiled, shall be used for topsoil requirements. If additional topsoil is required, it shall meet the requirements specified and shall be supplied by the contractor and shall be included in the contract. If there is an excess of topsoil, it shall be disposed of as directed by Architect. As specified in Paragraph 2.06, all topsoil shall be screened (new and/or existing).

B. Before placement of any topsoil, the finished sub-grade shall be scarified to a depth of 4" by discing or harrowing. All erosion gullies or depressions shall be filled with sub-grade material to produce a uniform base for topsoil. Sub-grade shall be subject to inspection by the Architect before topsoil is placed.

C. Placing and Spreading Topsoil: Place topsoil on the prepared areas and, unless otherwise indicated, spread and compact to a 4" uniform depth $\pm$ 1". Compact with a roller, one weighing not over 120 pounds per foot width of roller, or by other acceptable methods, as directed. Do not place topsoil in a wet or frozen condition.

3.09 DEFECTIVE MATERIAL AND/OR WORKMANSHIP

A. Earthwork which is not properly performed, or which fails to meet specified in place density tests, shows poor workmanship, or contains foreign substances or materials, shall be deemed to be defective and the Contractor shall remove this work from the site as directed by the Contractor's testing agency, replacing same with new materials complying with the contract specifications and meeting the approval of the testing laboratory.

B. The Contractor shall pay all costs of correcting rejected work, including all additional testing costs as well as the Architect's additional services thereby made necessary.

3.10 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.11 CLEAN-UP

A. Any paved area over which hauling operations or other moving equipment are conducted shall be kept clean and any soil or other material which may be brought upon the paved surfaces shall be removed promptly by the Contractor. Upon completion of rough grading, clear away all debris and remove from site.

END OF SECTION 312000.5

SECTION 329200.5 - LAWN REPAIR

PART 1 GENERAL

1.01 SCOPE

A. This section of specifications includes all labor, supervision, equipment, tools, materials and all other means of construction necessary to perform the grass (lawn seeding) work as shown on drawings, described in this specification, or as is necessary to complete the work in a first-class manner.

B. All lawn areas disturbed by construction activities shall be repaired as described herein.

C. Contractors shall coordinate with the General Contractor to verify that the herein specified products are the products actually installed under the General Contractor's scope of work in an effort to provide the Owner with a uniform lawn appearance.

1.02 RELATED WORK INCLUDED IN OTHER SECTIONS

A. Documents affecting work of this Section include but are not necessarily limited to: All Sections in Divisions 00, 01, and 02 of these Specifications.

B. Earth Moving - Section 312000.5.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical data, product specifications, installation instructions, and other pertinent information as applicable for each product or material specified.

B. Test Reports: Submit certified laboratory test reports as necessary to show compliance with specified requirements.

C. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight and percentages of purity, germination, and weed seed for each grass seed species.

1.04 PROTECTION

A. Materials: All materials shall be protected from the weather and shall not be stored in direct contact with the ground.

1.05 PERMANENT PLANTING SEASON

A. Planting periods shall be restricted in the Spring between March 15 and June 1, and in the Fall between August 1 and October 15, except if special instructions to the contrary are issued by the Architect.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fertilizer: Commercial fertilizer conforming to requirements of Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258, No. 86 (3P.S.68.2), as amended.

1. Dry formulation of Ten (10) percent nitrogen, twenty (20) percent available phosphoric acid and twenty (20) percent potash for seeded areas.

B. Lime (pulverized agricultural limestone): Shall have a calcium carbonate equivalent of 89 percent; 95 percent shall pass a No. 20 sieve, 60 percent shall pass a No. 60 sieve, and 50 percent shall pass a No. 100 sieve; conforming to requirements of Agricultural Liming Materials Act of 1978, P.L. 15, No. 9, as amended.

C. Grass seed shall be fresh, clean, new crop seed. Seed may be mixed by approved method on the site or may be mixed by the dealer. If the seed is mixed on the site each variety shall be delivered in the original containers, which shall bear the dealer's guaranteed analysis. If the seed is mixed by the dealer, the contractor shall furnish the Architect the dealer's guaranteed statement of the composition of the mixture and the percentages of purity and germination of each variety at a given date which shall not be more than 90 days prior to date of use.

1. Permanent Seed Mix: PennDot Type 'B'
   Kentucky Bluegrass 53 pounds/acre
   Creeping Red Fescue 29 pounds/acre
   Perennial Ryegrass 20 pounds/acre
2. All mixes shall be 98% Pure Live Seed required, no noxious weeds permitted. Test shall be no older than 30 days.
3. Provide seed complying with tolerance for purity and germination established by Official Seed Analysts of North America.

D. Mulch shall be wheat or oats straw. It shall be free from mature seed bearing stalks or roots of prohibited or noxious weeds as defined in the Pennsylvania Seed Act of 1947.

E. Erosion Control Blankets (aka ECB's, ECM's, Soil Erosion Matting; Rolled Erosion Control Products – RECP's): Shall be SC150BN Double Net Straw Blanket as manufactured by North American Green, or equivalent.

F. Hydroseed Mixture: At the Contractor's option, seed, fertilizer, hydro-mulch, tackifier, and water may be combined into a greenish mixture for a one step application.

1. Seed: As specified above.
2. Fertilizer: As specified above, preferably in a granular state.
3. Lime: If soil PH tests require the application of lime, provide liquid lime product such as New Cal.
4. Tackifier: Used to aid in holding hydroseed mixture in place on hillsides.
5. Mulch: Cellulose fiber mulch made from recycled newsprint is preferred product. Also acceptable are wood fiber mulch or combination of paper and wood fiber mulch.

G. Water: The Contractor shall make whatever arrangements may be necessary to insure adequate supply of potable water to meet the needs of this contract.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until satisfactory conditions are corrected.

3.02 PRECAUTIONS

A. Sidewalks, roads and other paving adjacent to the seed operation shall be kept clean and free of obstructions, mud and debris at all times.

B. Flushing of streets and disposal of dirt or debris into sewers shall not be permitted.

C. Dust shall be controlled by approved means to the satisfaction of the Architect.

3.03 METHODS

A. The top surface of all areas to be seeded shall be thoroughly loosened to a depth of at least 4" by discing or harrowing. All topsoil shall then be screened to remove all roots, coarse materials and stone, in the entire 4" thickness of topsoil. Any ruts or damaged areas resulting from erosion, hauling or other cause shall be repaired by filling with topsoil. Dress areas to even surface conforming to established grades.

B. Lime shall be spread evenly over the surface of all areas to be seeded at the rate necessary to obtain a pH value between 6 and 7, generally at a rate of 4.0 - 6.0 ton/acre. Contractor shall perform soil testing to determine rate.

C. Fertilizer shall be distributed uniformly over all areas to be seeded under this contract at the rate 900 – 1000 pounds/acre.

D. Fertilizer and lime shall be incorporated into the soil to a depth of at least 4" by discing, harrowing or other acceptable method.

E. After all topsoil has been limed and fertilized, topsoil shall be smoothed with a drag or smoothing harrow to prepare the surface to receive seeding.

F. Seed shall be applied with a Brillion seeder calibrated to apply at rates as follows:
   1. Permanent Seeding - 102+ pounds/acre.
   2. Areas inaccessible by machine seeders shall be hand seeded at corresponding rates.
   3. Note: Seed rate is listed as lbs/acre of Pure Live Seed (PLS). Actual seeding rate shall be determined by dividing PLS rate by the %PLS shown on each seed tag of each seed species.

G. Seeded areas shall have half the seed sown at right angles to the direction of the first sowing. Areas seeded shall have the seed raked into a depth of 1/16 of an inch and then the areas shall be lightly rolled, and watered with a fine spray.

H. Proceed with mulching as specified below.

I. At the Contractor's option, seeding may be applied by a hydroseeding system in lieu of methods specified above. Hydroseeding shall be performed by Turbo Turf Hydro Seeding equipment or similar device combining application of seed, fertilizer, hydro-mulch, tackifier, and water in one step. Application of specified straw mulch is eliminated with this process. Application rate of seed and fertilizer shall be as specified above. Application rate of tackifier, hydro-mulch, and water shall be as recommended by spraying system equipment manufacturer.

3.04 MULCHING

A. Mulch shall be applied at the rate of 3 ton/acre (or 1200 lbs/1000 SY) a maximum of 48 hours after seeding and anchored immediately, unless otherwise schedule on drawings. Tractor drawn implement to "crimp" mulch into soil is not permitted on slopes greater than or equal to 3 to 1. Machines that cut mulch into short pieces will not be permitted.

B. Install Erosion Control Blankets over all slopes greater than or equal to 3 to 1 and wherever ponded water may occur, such as swales, channels, lowest area of retention ponds, etc. Blankets shall be installed according to manufacturer's installations and recommendations.

C. Keep seeded and mulched areas undisturbed until a satisfactory stand of grass has been established.

3.05 PROTECTION

A. The contractor shall surround all newly seeded areas with neat temporary stakes connected by cord or wire on which signs shall be hung warning people to "keep off new seeding". These temporary barriers and signs shall be maintained in good order by the contractor until his work has been finally accepted and shall then be removed unless otherwise directed by the Architect.

3.06 WATERING

A. Lawn areas shall be kept wet to a depth of 3" for ten (10) days immediately following the seeding and thereafter as may be necessary during the maintenance period.

3.07 ACCEPTANCE OF SEEDING WORK

A. The Architect and Owner will accept the seeding work when a satisfactory stand of grass has been produced over the area of work. A satisfactory stand of grass shall be a close weed free stand of grasses specified of good color and vigor.

B. It is understood that acceptance of lawn areas as mentioned herein will not relieve the Contractor of responsibility for correction of defects in this phase of the work which may become evident during the effective period of the One-Year Maintenance Bond.

3.08 RESEEDING

A. All areas of lawn which do not show a prompt catch shall be reseeded and this operation shall continue during the one year period of the maintenance bond. Reseeding shall include the repair of washouts, settlements and replacement of topsoil before reseeding.

END OF SECTION 329200.5