

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

001150	ADVERTISEMENT FOR BIDS
002110	INSTRUCTIONS TO BIDDERS
004113	BID FORM
005000	CONTRACTING FORMS AND SUPPLEMENTS
007310	SUPPLEMENTARY GENERAL CONDITIONS A201-2007
007313	SUPPLEMENTARY CONDITIONS
009000	DE STATE GENERAL REQUIREMENTS
009500	GENERAL AND SPECIAL INSTRUCTIONS

DIVISION 01 - GENERAL REQUIREMENTS

011000	SUMMARY
012000	PRICE AND PAYMENT PROCEDURES
012200	UNIT PRICES
013000	ADMINISTRATIVE REQUIREMENTS
015000	TEMPORARY FACILITIES AND CONTROLS
017800	CLOSEOUT SUBMITTALS

DIVISION 23: HVAC

Section 230200	– General Provisions – HVAC
Section 230210	– Basic Materials and Methods – HVAC
Section 230212	– Gas Piping Systems
Section 230230	– Insulation & Covering – HVAC
Section 230600	– Air Distribution & Accessories – HVAC
Section 230734	– Heat Recovery Rooftop Unit (PoolPak Unit)
Section 230900	– Automatic Temperature Controls (DDC)
Section 230950	– Testing & Balancing of Mechanical Systems

Drawings

M1	- Mechanical Plans
M2	- Schedules and Details
E-1	- Electrical Plans

SECTION 001150
ADVERTISEMENT FOR BIDS

Sealed bids for Concord High School PoolPak Replacement, will be received by the Brandywine School District in The Cafeteria at Concord High School, 2501 Ebright Rd, Claymont DE 19810 until 2:00PM local time on Thursday, November 17, 2016, at which time they will be publicly opened and read aloud. Bidder bears the risk of late delivery. Any bids received after the stated time will be returned unopened.

Project involves Replacement of PoolPak

Attention is called to construction schedule as detailed in the Bid Documents.

A MANDATORY Pre-Bid Meeting will be held at 1:30 PM on Thursday November 3rd, 2016, at the School Pool (meet at the Lobby) at the Concord High School (address above) for the purpose of establishing the listing of subcontractors and to answer questions. ATTENDANCE OF THIS MEETING IS A PREREQUISITE FOR BIDDING ON THIS CONTRACT. Representatives of each party to any Joint Venture must attend this meeting.

Sealed bids shall be addressed to Carol Riddle. The outer envelope should clearly indicate: "SEALED BID - DO NOT OPEN."

Bid documents will be available beginning [October 28], 2016 at <http://bids.delaware.gov>

Contract documents may also be reviewed at the office of Furlow Associates, 1206 Society Dr Claymont DE 19703. For questions call Rob Jordan at 302-798-3515.

Each bid must be accompanied by a bid security equivalent to ten percent (10%) of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent (100%) of the contract price upon execution of the contract.

The Owner reserves the right to reject any or all bids and to waive any informalities therein. The Owner may extend the time and place for the opening of the bids from that described in the advertisement, with not less than two calendar days notice by certified delivery, facsimile machine or other electronic means to those bidders receiving plans.

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

<http://regulations.delaware.gov/AdminCode/title19/4000/4100/index.shtml#TopOfPage>
<<http://regulations.delaware.gov/AdminCode/title19/4000/4100/index.shtml>>

END OF SECTION

Concord High School PoolPak Replacement
Project No. 1226

Brandywine School Dsitric

SECTION 002110
INSTRUCTIONS TO BIDDERS

TABLE OF ARTICLES

1.01 ARTICLE 1:GENERAL

A. DEFINITIONS

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

STATE: The State of Delaware.

AGENCY: Contracting State Agency as noted on cover sheet.

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

ENGINEER:

Furlow Associates

1206 Society Dr

Claymont, DE 19703

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.02 ARTICLE 2: BIDDER'S REPRESENTATIONS

A. PRE-BID MEETING

1. A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is a pre-requisite for submitting a Bid, unless this requirement is specifically waived elsewhere in the Bid Documents.
2. By submitting a Bid, the Bidder represents that:
3. The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.
4. The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's his personal observations with the requirements of the proposed Contract Documents.

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

B. JOINT VENTURE REQUIREMENTS

1. For Public Works Contracts, each Joint Venturer shall be qualified and capable to complete the Work with their own forces.
2. Included with the Bid submission, and as a requirement to bid, a copy of the executed Joint Venture Agreement shall be submitted and signed by all Joint Venturers involved.
3. All required Bid Bonds, Performance Bonds, Material and Labor Payment Bonds must be executed by both Joint Venturers and be placed in both of their names.
4. All required insurance certificates shall name both Joint Venturers.
5. Both Joint Venturers shall sign the Bid Form and shall submit a copy of a valid Delaware Business License with their Bid.
6. Both Joint Venturers shall include their Federal E.I. Number with the Bid.
7. In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.
8. Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.

C. ASSIGNMENT OF ANTITRUST CLAIMS

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

1.03 ARTICLE 3: BIDDING DOCUMENTS

A. COPIES OF BID DOCUMENTS

1. Refer to Advertisement (or Invitation) for Bids for information concerning locations where Bidding Documents may be seen or obtained and under what conditions. Deposits for documents are non-refundable.
2. Bidders shall use complete sets of Bidding Documents for preparation of Bids. The issuing Agency nor the Architect assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
3. Any errors, inconsistencies or omissions discovered shall be reported to the Architect immediately.
4. The Agency and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

B. INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

1. The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.
2. Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to

- the date for receipt of Bids. Interpretations, corrections and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.
3. The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.
 4. Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.
 5. The Owner will bear the costs for all impact and user fees associated with the project.

C. SUBSTITUTIONS

1. The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will be considered, providing that the Bidder certifies that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the proposed substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.
2. Requests for substitutions shall be made in writing to the Architect at least ten days prior to the date of the Bid Opening. Such requests shall include a complete description of the proposed substitution, drawings, performance and test data, explanation of required installation modifications due the substitution, and any other information necessary for an evaluation. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval shall be final. The Architect is to notify Owner prior to any approvals.
3. If the Architect approves a substitution prior to the receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding.
4. The Architect shall have no obligation to consider any substitutions after the Contract award.
5. Bidders shall conform to requirements in Section 01600 MATERIAL AND EQUIPMENT.

D. ADDENDA

1. Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of the Bidding Documents.
2. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
3. No Addenda will be issued later than 4 days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which extends the time or changes the location for the opening of bids.

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

1.04 ARTICLE 4: BIDDING PROCEDURES

A. PREPARATION OF BIDS

1. Submit the bids on the Bid Forms included with the Bidding Documents.
2. Submit the original Bid Form for each bid. Bid Forms may be removed from the project manual for this purpose.
3. Execute all blanks on the Bid Form in a non-erasable medium (typewriter or manually in ink).
4. Where so indicated by the makeup on the Bid Form, express sums in both words and figures, in case of discrepancy between the two, the written amount shall govern.
5. Interlineations, alterations or erasures must be initialed by the signer of the Bid.
6. BID ALL REQUESTED ALTERNATES AND UNIT PRICES, IF ANY. If there is no change in the Base Bid for an Alternate, enter "No Change". The Contractor is responsible for verifying that they have received all addenda issued during the bidding period. Work required by Addenda shall automatically become part of the Contract.
7. Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.
8. Each copy of the Bid shall include the legal name of the Bidder and a statement whether the Bidder is a sole proprietor, a partnership, a corporation, or any legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached, certifying agent's authority to bind the Bidder.
9. Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.
10. In the construction of all Public Works projects for the State of Delaware or any agency thereof, preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State.
11. Each bidder shall include in their bid a copy of a valid Delaware Business License.
12. Each bidder shall include signed Affidavit(s) for the Bidder and each listed Subcontractor certifying compliance with OMB Regulation 4104- "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects." "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

B. BID SECURITY

1. All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the bidder assigned to the agency, for a sum equal to at least 10% of the

bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10% of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the standard OMB form (attached).

2. The Agency has the right to retain the bid security of Bidders to whom an award is being considered until either a formal contract has been executed and bonds have been furnished or the specified time has elapsed so the Bids may be withdrawn or all Bids have been rejected.
3. In the event of any successful Bidder refusing or neglecting to execute a formal contract and bond within 20 days of the awarding of the contract, the bid bond or security deposited by the successful bidder shall be forfeited.

C. SUBCONTRACTOR LIST

1. As required by Delaware Code, Title 29, section 6962(d)(10)b, each Bidder shall submit with their Bid a completed List of Sub-Contractors included with the Bid Form. NAME ONLY ONE SUBCONTRACTOR FOR EACH TRADE. A Bid will be considered non-responsive unless the completed list is included.
2. Provide the Name and Address for each listed subcontractor. Addresses by City, Town or Locality, plus State, will be acceptable.
3. It is the responsibility of the Contractor to ensure that their Subcontractors are in compliance with the provisions of this law. Also, if a Contractor elects to list themselves as a Subcontractor for any category, they must specifically name themselves on the Bid Form and be able to document their capability to act as Subcontractor in that category in accordance with this law.

D. EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

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

E. PREVAILING WAGE REQUIREMENT

1. Wage Provisions: For renovation and new construction projects whose costs exceed the thresholds contained in Delaware Code, Title 29, Section 6960, the minimum

wage rates for various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware

2. The employer shall pay all mechanics and labors employed directly upon the site of work, unconditionally and not less often than once a week and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics.
3. The scale of the wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work.
4. Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll.
5. Wage Rates applicable to this project are attached at the end of this section.

F. SUBMISSION OF BIDS

1. Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid in a sealed opaque envelope. Address the envelope to the party receiving the Bids. Identify with the project name, project number, and the Bidder's name and address. If the Bid is sent by mail, enclose the sealed envelope in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof. The State is not responsible for the opening of bids prior to bid opening date and time that are not properly marked.
2. Deposit Bids at the designated location prior to the time and date for receipt of bids indicated in the Advertisement for Bids. Bids received after the time and date for receipt of bids will be marked "LATE BID" and returned.
3. Bidder assumes full responsibility for timely delivery at location designated for receipt of bids.
4. Oral, telephonic or telegraphic bids are invalid and will not receive consideration.
5. Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids, provided that they are then fully in compliance with these Instructions to Bidders.

G. MODIFICATION OR WITHDRAW OF BIDS

1. Prior to the closing date for receipt of Bids, a Bidder may withdraw a Bid by personal request and by showing proper identification to the Architect. A request for withdraw by letter or fax, if the Architect is notified in writing prior to receipt of fax, is acceptable. A fax directing a modification in the bid price will render the Bid informal, causing it to be ineligible for consideration of award. Telephone directives for modification of the bid price shall not be permitted and will have no bearing on the submitted proposal in any manner.
2. Bidders submitting Bids that are late shall be notified as soon as practicable and the bid shall be returned.
3. A Bid may not be modified, withdrawn or canceled by the Bidder during a thirty (30) day period following the time and date designated for the receipt and opening of Bids, and Bidder so agrees in submitting their Bid. Bids shall be binding for 30 days after the date of the Bid opening.

1.05 ARTICLE 5: CONSIDERATION OF BIDS

A. OPENING/REJECTION OF BIDS

1. Unless otherwise stated, Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids will be made available to Bidders.
2. The Agency shall have the right to reject any and all Bids. A Bid not accompanied by a required Bid Security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
3. If the Bids are rejected, it will be done within thirty (30) calendar day of the Bid opening.

B. COMPARISON OF BIDS

1. After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.
2. The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.
3. An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.
4. The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.
5. No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).

C. DISQUALIFICATION OF BIDDERS

1. An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:
 - a. The Bidder's financial, physical, personnel or other resources including Subcontracts;
 - b. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;
 - c. The Bidder's written safety plan;
 - d. Whether the Bidder is qualified legally to contract with the State;
 - e. Whether the Bidder supplied all necessary information concerning its responsibility; and,
 - f. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.
2. If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A

copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.

3. In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.
 - a. More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.
 - b. Evidence of collusion among Bidders.
 - c. Unsatisfactory performance record as evidenced by past experience.
 - d. If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
 - e. If there are any unauthorized additions, interlineation, conditional or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning.
 - f. If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.
 - g. If any exceptions or qualifications of the Bid are noted on the Bid Form.

D. ACCEPTANCE OF BID AND AWARD OF CONTRACT

1. A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.
2. Per Section 6962(d)(13) a., Title 29, Delaware Code, "The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid."
3. Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.
4. The Agency shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid, plus accepted Alternates.
5. The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. The successful Bidder shall provide two business days prior to contract execution, copies of the Employee Drug Testing Program for the Bidder and all listed Subcontractors. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in affect for period of one year after the date of substantial completion.
6. If the successful Bidder fails to execute the required Contract, Bond, and all required information as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.

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

1.06 ARTICLE 6: POST-BID INFORMATION

A. CONTRACTOR'S QUALIFICATION STATEMENT

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

B. BUSINESS DESIGNATION FORM

1. Successful bidder shall be required to accurately complete an Office of Management and Budget Business Designation Form for Subcontractors.

1.07 ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

A. BOND REQUIREMENTS

1. The cost of furnishing the required Bonds, that are stipulated in the Bidding Documents, shall be included in the Bid.
2. If the Bidder is required by the Agency to secure a bond from other than the Bidder's usual sources, changes in cost will be adjusted as provide in the Contract Documents.
3. The Performance and Payment Bond forms used shall be the standard OMB forms (attached).

B. TIME OF DELIVERY AND FORM OF BONDS

1. The bonds shall be dated on or after the date of the Contract.
2. The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix a certified and current copy of the power of attorney.

1.08 ARTICLE 8: FORM OF AGREEMENT BETWEEN AGENCY AND CONTRACTOR

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

END OF INSTRUCTIONS TO BIDDERS

**SECTION 004113
BID FORM**

FOR BIDS DUE: _____

TO: BRANDYWINE SCHOOL
DISTRICT

FOR: CONCORD HIGH SCHOOL
POOLPAK REPLACEMENT

1311 BRANDYWINE BLVD
WILMINGTON, DE. 19809

2501 EBRIGHT RD
WILMINGTON, DE. 19810

FOR CONTRACT: BSD17001-POOLPAK

NAME OF BIDDER: _____

DELAWARE BUSINESS LICENSE NO.: _____

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

TAXPAYER ID NO.: _____

(OTHER LICENSE NOS.): _____

PHONE NO.: () _____ FAX NO.: () _____

EMAIL ADDRESS: _____

The undersigned, representing that he has read and understands the Bidding Documents, including the complete Project Manual and the Drawings as listed in the Table of Contents, all dated _____, 20_____, and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

BASE BID:

(expressed in words)

(\$ _____)
(expressed in figures)

BID FORM

UNIT PRICE NO. 4: SILT FENCE STANDARD SILT FENCE

BID FORM

SIGNATURE FORM

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

This bid shall remain valid and cannot be withdrawn for 30 days from the date of opening of bids (60 days for School Districts and Department of Education), and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

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

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

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within _____ calendar days of the Notice to Proceed.

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

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

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

By: _____ Trading as: _____

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

(State of Corporation)

Business Address: _____

Witness: _____ By: _____

(Authorized Signature)

(SEAL)

(Title)

Date: _____

Attachments:

Sub-Contractor List.

Non-Collusion Statement.

Affidavit(s) of Employee Drug Testing Program

Bid Security.

BID FORM
NON-COLLUSION STATEMENT

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

All the terms and conditions of this Contract have been thoroughly examined and are understood.

NAME OF BIDDER: _____

AUTHORIZED REPRESENTATIVE
(TYPED): _____

AUTHORIZED REPRESENTATIVE
(SIGNATURE): _____

TITLE: _____

ADDRESS OF BIDDER: _____

PHONE NUMBER: _____

Sworn to and Subscribed before me this _____ day of _____, 20__

My Commission expires : _____ NOTARY PUBLIC _____

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

BID FORM
EMPLOYEE DRUG TESTING PROGRAM

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

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

CONTRACTOR/SUBCONTRACTOR

NAME: _____

CONTRACTOR/SUBCONTRACTOR

ADDRESS: _____

AUTHORIZED REPRESENTATIVE

(TYPED): _____

AUTHORIZED REPRESENTATIVE

(SIGNATURE): _____

Sworn to and Subscribed before me this _____ day of _____, 20__

My Commission expires : _____ NOTARY PUBLIC _____

END OF DOCUMENT

SECTION 005000

CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 LICENSES

- A. Contractor is responsible for obtaining a valid license to use all copyrighted documents specified but not included in the Project Manual.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 007200 - General Conditions for the General Conditions.
- B. See Section 007300 - Supplementary Conditions for the Supplementary Conditions.
- C. The Agreement form is AIA A101.
- D. The General Conditions are based on AIA A201.

1.03 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
- B. Bond Forms:
 - 1. Performance and Payment Bond Form: Conform to those approved by the State of Delaware Office of Management and Budget.
- C. Post-Award Certificates and Other Forms:
 - 1. Application for Payment Form: AIA G702 and G703.
- D. Clarification and Modification Forms:
 - 1. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.
 - 2. Affidavit of Payment of Debts and Claims Form: AIA G706.
 - 3. Affidavit of Release of Liens Form: AIA G706a.
 - 4. Consent of Surety to Final Payment Form: AIA G707.

1.04 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum; 2007.
- B. AIA G701 - Change Order; 2001.
- C. AIA G702 - Application and Certificate for Payment; 1992.
- D. AIA G703 - Continuation Sheet; 1992.
- E. AIA G704 - Certificate of Substantial Completion; 2000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

Concord High School PoolPak Replacement
Project No. 1226

Brandywine School Dsitric

SECTION 007310
SUPPLEMENTARY GENERAL CONDITIONS A201-2007

THE FOLLOWING SUPPLEMENTS MODIFY THE AIA DOCUMENT A201-2007, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION. WHERE A PORTION OF THE GENERAL CONDITIONS IS MODIFIED OR DELETED BY THE SUPPLEMENTARY CONDITIONS, THE UNALTERED PORTIONS OF THE GENERAL CONDITIONS SHALL REMAIN IN EFFECT.

ARTICLE 1: GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

Delete the last sentence in its entirety and replace with the following:

"The Contract Documents also include Advertisement for Bid, Instructions to Bidder, sample forms, the Bid Form, the Contractor's completed Bid and the Award Letter."

Add the following Paragraph:

1.1.2 In the event of conflict or discrepancies among the Contract Documents, the Documents prepared by the State of Delaware, Division of Facilities Management shall take precedence over all other documents.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following Paragraphs:

1.2.4 In the case of an inconsistency between the Drawings and the Specifications, or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.

1.2.5 The word "PROVIDE" as used in the Contract Documents shall mean "FURNISH AND INSTALL" and shall include, without limitation, all labor, materials, equipment, transportation, services and other items required to complete the Work.

1.2.6 The word "PRODUCT" as used in the Contract Documents means all materials, systems and equipment.

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

Delete Paragraph 1.5.1 in its entirety and replace with the following:

"All pre-design studies, drawings, specifications and other documents, including those in electronic form, prepared by the Architect under this Agreement are, and shall remain, the property of the Owner whether the Project for which they are made is executed or not. Such documents may be used by the Owner to construct one or more like Projects without the approval of, or additional compensation to, the Architect. The Contractor, Subcontractors, Sub-subcontractors and Material or Equipment Suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or Material and Equipment Supplier on other

Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and Architect's consultants.

The Architect shall not be liable for injury or damage resulting from the re-use of drawings and specifications if the Architect is not involved in the re-use Project.

Prior to re-use of construction documents for a Project in which the Architect is not also involved, the Owner will remove from such documents all identification of the original Architect, including name, address and professional seal or stamp."

Delete Paragraph 1.5.2 in its entirety.

ARTICLE 2: OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

To Subparagraph 2.2.3 - Add the following sentence:

"The Contractor, at their expense shall bear the costs to accurately identify the location of all underground utilities in the area of their excavation and shall bear all cost for any repairs required, out of failure to accurately identify said utilities."

Delete Subparagraph 2.2.5 in its entirety and substitute the following:

2.2.5 The Contractor shall be furnished free of charge up to five (5) sets of the Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3: CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Amend Paragraph 3.2.2 to state that any errors, inconsistencies or omissions discovered shall be reported to the Architect and Owner immediately.

Delete the third sentence in Paragraph 3.2.4.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following Paragraphs:

3.3.2.1 The Contractor shall immediately remove from the Work, whenever requested to do so by the Owner, any person who is considered by the Owner or Architect to be incompetent or disposed to be so disorderly, or who for any reason is not satisfactory to the Owner, and that person shall not again be employed on the Work without the consent of the Owner or the Architect.

3.3.4 The Contractor must provide suitable storage facilities at the Site for the proper protection and safe storage of their materials. Consult the Owner and the Architect before storing any materials.

3.3.5 When any room is used as a shop, storeroom, office, etc., by the Contractor or Subcontractor(s) during the construction of the Work, the Contractor making use of these areas will be held responsible for any repairs, patching or cleaning arising from such use.

3.4 LABOR AND MATERIALS

Add the Following Paragraphs:

3.4.4 Before starting the Work, each Contractor shall carefully examine all preparatory Work that has been executed to receive their Work. Check carefully, by whatever means are required, to insure that its Work and adjacent, related Work, will finish to proper contours, planes and levels. Promptly notify the General

Contractor/Construction Manager of any defects or imperfections in preparatory Work which will in any way affect satisfactory completion of its Work. Absence of such notification will be construed as an acceptance of preparatory Work and later claims of defects will not be recognized.

3.4.5 Under no circumstances shall the Contractor's Work proceed prior to preparatory Work proceeding prior to preparatory Work having been completely cured, dried and/or otherwise made satisfactory to receive this Work. Responsibility for timely installation of all materials rests solely with the Contractor responsible for that Work, who shall maintain coordination at all times.

3.5 WARRANTY

Add the following Paragraphs:

3.5.1 The Contractor will guarantee all materials and workmanship against original defects, except injury from proper and usual wear when used for the purpose intended, for two years after Acceptance by the Owner, and will maintain all items in perfect condition during the period of guarantee.

3.5.2 Defects appearing during the period of guarantee will be made good by the Contractor at his expense upon demand of the Owner, it being required that all work will be in perfect condition when the period of guarantee will have elapsed.

3.5.3 In addition to the General Guarantee there are other guarantees required for certain items for different periods of time than the two years as above, and are particularly so stated in that part of the specifications referring to same. The said guarantees will commence at the same time as the General Guarantee.

3.5.4 If the Contractor fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner will have the right to replace, repair, or otherwise remedy the failure, defect or damage at the Contractor's expense.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following Paragraphs:

3.11.1 During the course of the Work, the Contractor shall maintain a record set of drawings on which the Contractor shall mark the actual physical location of all piping, valves, equipment, conduit, outlets, access panels, controls, actuators, including all appurtenances that will be concealed once construction is complete, etc., including all invert elevations.

3.11.2 At the completion of the project, the Contractor shall obtain a set of reproducible drawings from the Architect, and neatly transfer all information outlined in 3.11.1 to provide a complete record of the as-built conditions.

3.11.3 The Contractor shall provide two (2) prints of the as-built conditions, along with the reproducible drawings themselves, to the Owner and one (1) set to the Architect. In addition, attach one complete set to each of the Operating and Maintenance Instructions/Manuals.

3.17 ROYALTIES, PATENTS AND COPYRIGHTS

In the second sentence of the paragraph, insert "indemnify and" between "shall" and "hold".

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.2 ADMINISTRATION OF THE CONTRACT

Delete the first sentence of Paragraph 4.2.7 and replace with the following:

SUPPLEMENTARY GENERAL CONDITIONS A201-2007
007310-3

The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples for the purpose of checking for conformance with the Contract Documents.

Delete the second sentence of Paragraph 4.2.7 and replace with the following:

The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work in the activities of the Owner, Contractor or separate Contractors, while allowing sufficient time in the Owner's professional judgment to permit adequate review.

Add the following Subparagraph:

4.2.10.1 There will be no full-time project representative provided by the Owner or Architect on this project.

Add the following to the end of Paragraph 4.2.13:

“and in compliance with all local requirements.”

ARTICLE 5: SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Delete Paragraph 5.2.3 in its entirety and replace with the following:

5.2.3 If the Owner 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, subject to the statutory requirements of 29 Delaware Code § 6962(d)(10)b.3 and 4.

ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

Delete Paragraph 6.1.4 in its entirety.

6.2 MUTUAL RESPONSIBILITY

6.2.3 In the second sentence, strike the word “shall” and insert the word “may”.

ARTICLE 7: CHANGES IN THE WORK

(SEE ARTICLE 7: CHANGES IN WORK IN THE GENERAL REQUIREMENTS)

ARTICLE 8: TIME

8.2 PROGRESS AND COMPLETION

Add the following Paragraphs:

8.2.1.1 Refer to Specification Section SUMMARY OF WORK for Contract time requirements.

8.2.4 If the Work falls behind the Progress Schedule as submitted by the Contractor, the Contractor shall employ additional labor and/or equipment necessary to bring the Work into compliance with the Progress Schedule at no additional cost to the Owner.

8.3 DELAYS AND EXTENSION OF TIME

8.3.1 Strike “arbitration” and insert “remedies at law or in equity”.

Add the following Paragraph:

8.3.2.1 The Contractor shall update the status of the suspension, delay, or interruption of the Work with each Application for Payment. (The Contractor shall

report the termination of such cause immediately upon the termination thereof.) Failure to comply with this procedure shall constitute a waiver for any claim for adjustment of time or price based upon said cause.

Delete Paragraph 8.3.3 in its entirety and replace with the following:

8.3.3 Except in the case of a suspension of the Work directed by the Owner, an extension of time under the provisions of Paragraph 8.3.1 shall be the Contractor's sole remedy in the progress of the Work and there shall be no payment or compensation to the Contractor for any expense or damage resulting from the delay.

Add the following Paragraph:

8.3.4 By permitting the Contractor to work after the expired time for completion of the project, the Owner does not waive their rights under the Contract.

ARTICLE 9: PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Add the following Paragraphs:

9.2.1 The Schedule of Values shall be submitted using AIA Document G702, Continuation Sheet to G703.

9.2.2 The Schedule of Values is to include a line item for Project Closeout Document Submittal. The value of this item is to be no less than 1% of the initial contract amount.

9.3 APPLICATIONS FOR PAYMENT

Add the following Paragraph:

9.3.1.3 Application for Payment shall be submitted on AIA Document G702 "Application and Certificate for Payment", supported by AIA Document G703 "Continuation Sheet". Said Applications shall be fully executed and notarized.

Add the following Paragraphs:

9.3.4 Until Closeout Documents have been received and outstanding items completed the Owner will pay 95% (ninety-five percent) of the amount due the Contractor on account of progress payments.

9.3.5 The Contractor shall provide a current and updated Progress Schedule to the Architect with each Application for Payment. Failure to provide Schedule will be just cause for rejection of Application for Payment.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following to 9.5.1:

.8failure to provide a current Progress Schedule;

.9a lien or attachment is filed;

.10failure to comply with mandatory requirements for maintaining Record Documents.

9.6 PROGRESS PAYMENTS

Delete Paragraph 9.6.1 in its entirety and replace with the following:

9.6.1 After the Architect has approved and issued a Certificate for Payment, payment shall be made by the Owner within 30 days after Owner's receipt of the Certificate for Payment.

9.7 FAILURE OF PAYMENT

F.In first sentence, strike "seven" and insert "thirty (30)".

Also strike "binding dispute resolution" and insert "remedies at law or in equity".

9.8 SUBSTANTIAL COMPLETION

To Subparagraph 9.8.3- Add the following sentence:

"If the Architect is required to make more than 2 inspections of the same portion of work, the Contractor shall be responsible for all costs associated with subsequent inspections, including but not limited to any Architect's fees."

9.8.5 In the second sentence, strike "shall" and insert "may".

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following Paragraphs:

10.1.1 Each Contractor shall develop a safety program in accordance with the Occupational Safety and Health Act of 1970. A copy of said plan shall be furnished to the Owner and Architect prior to the commencement of that Contractor's Work.

10.1.2 Each Contractor shall appoint a Safety Representative. Safety Representatives shall be someone who is on site on a full time basis. If deemed necessary by the Owner or Architect, Contractor Safety meetings will be scheduled. The attendance of all Safety Representatives will be required. Minutes will be recorded of said meetings by the Contractor and will be distributed to all parties as well as posted in all job offices/trailers etc.

10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Paragraph:

10.2.4.1 As required in the Hazardous Chemical Act of June 1984, all vendors supplying any material that may be defined as hazardous must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a caution warning on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in foreseeable emergency situations. Material Safety Data Sheets shall be provided directly to the Owner, along with the shipping slips that include those products.

10.3 HAZARDOUS MATERIALS

Delete Paragraph 10.3.3 in its entirety.

Delete Paragraphs 10.3.6 in its entirety.

ARTICLE 11: INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.4 Strike "the Owner" immediately following "(1)" and strike "and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations."

11.2 OWNER'S LIABILITY INSURANCE

Delete Paragraph 11.2 in its entirety.

11.3 PROPERTY INSURANCE

Delete Paragraph 11.3 in its entirety and replace with the following:

11.3 The State will not provide Builder's All Risk Insurance for the Project. The Contractor and all Subcontractors shall provide property coverage for their tools and equipment, as necessary. Any mandatory deductible required by the Contractor's Insurance shall be the responsibility of the Contractor.

11.4 PERFORMANCE BOND AND PAYMENT BOND

Add the following sentence: "The bonds will conform to those forms approved by the Office of Management and Budget."

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

Add the following Paragraph:

12.2.2.1.1 At any time during the progress of the Work, or in any case where the nature of the defects will be such that it is not expedient to have corrected, the Owner, at its option, will have the right to deduct such sum, or sums, of money from the amount of the Contract as it considers justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

12.2.2.1 Strike "one" and insert "two".

12.2.2.2 Strike "one" and insert "two".

12.2.2.3 Strike "one" and insert "two".

12.2.5 In second sentence, strike "one" and insert "two".

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Strike "except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4" .

13.6 INTEREST

Strike "the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located." Insert "30 days of presentment of the authorized Certificate of Payment at the annual rate of 12% or 1% per month.

13.7 TIME LIMITS ON CLAIMS

Strike the last sentence.

ADD THE FOLLOWING PARAGRAPH:

13.8 CONFLICTS WITH FEDERAL STATUTES OR REGULATIONS

13.8.1 If any provision, specifications or requirement of the Contract Documents conflict or is inconsistent with any statute, law or regulation of the government of the United State of America, the Contractor shall notify the Architect and Owner immediately upon discovery.

ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

Delete Paragraph 14.4.3 in its entirety and replace with the following:

14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and cost incurred by reason of such termination along with reasonable overhead.

ARTICLE 15: CLAIMS AND DISPUTES

15.1.2 THROUGHOUT THE PARAGRAPH STRIKE "21" AND INSERT "45."

15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

Delete Paragraph 15.1.6 in its entirety.

15.2 INITIAL DECISION

Delete Paragraph 15.2.5 in its entirety and replace with the following:

15.2.5 The Architect will approve or reject Claims by written decision, which shall state the reasons therefore and shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be subject to mediation and other remedies at law or in equity.

Delete Paragraph 15.2.6 and its subparagraphs in their entirety.

15.3 MEDIATION

15.3.1 Strike "binding dispute resolution" and insert "any or all remedies at law or in equity."

15.3.2 In the first sentence, delete "administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedure in effect on the date of the Agreement," Strike "binding dispute resolution" and insert "remedies at law and in equity".

15.4 ARBITRATION

Delete Paragraph 15.4 and its sub-sections in its entirety.

END OF SUPPLEMENTARY GENERAL CONDITIONS

SECTION 007313
SUPPLEMENTARY CONDITIONS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

- A. The General Conditions of the Contract for Construction, AIA Document A201, 2007 edition, Articles 1 through 15 inclusive, is a part of this contract and is bound herewith.
- B. References to Articles herein are to Articles in A201.

1.02 SUPPLEMENTARY CONDITIONS

- A. The following provisions modify, change, delete from or add to AIA Document A201. Where any article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these provisions, the unaltered provisions of that article, paragraph, sub-paragraph or clause shall remain in effect.

1.03 REFERENCE TO DIVISION 1 - GENERAL REQUIREMENTS

- A. Certain provisions of Division 1 GENERAL REQUIREMENTS supplement the administrative and work-related provisions of the GENERAL CONDITIONS.
- B. Articles affected are cross referenced in the various Sections of Division 1.

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

Delete last paragraph of 1.1.1. Add to 1.1.1 the following clause:

1.1.1.1 The Invitation to Bid, the bid forms, the contractor's completed bid and all addenda related to bidding requirements are expressly enumerated as contract documents.

Add to 1.1 the following Subparagraphs:

1.1.9 PROVIDE

1.1.9.1 The term "Provide" as used in the Contract Documents shall mean "FURNISH AND INSTALL" and shall include, without limitation, all labor, materials, equipment, transportation, services and other items required to complete the Work.

1.1.10 PRODUCT

1.1.10.1 The term "PRODUCT" as used in the Contract Documents means all materials, systems and equipment.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add to 1.2.4. the following Subparagraph:

1.2.4 In the case of an inconsistency between the Drawings and the Specifications, or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.

ARTICLE 2 - OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

To Subparagraph 2.2.3 - Add the following sentence:

"The Contractor, at their expense shall bear the costs to accurately identify the location of all underground utilities in the area of their excavation and shall bear all cost for any repairs required, out of failure to accurately identify said utilities."

Delete Subparagraph 2.2.5 in its entirety and substitute the following:

2.2.5 The Contractor will obtain Drawings and Project Manuals as described in the Invitation to Bid.

ARTICLE 3 - CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Amend Paragraph 3.2.2 to state that any errors, inconsistencies or omissions discovered shall be reported to the Architect and Owner immediately.

Delete the third sentence in Paragraph 3.2.4.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ADMINISTRATION OF THE CONTRACT

Add the following clause:

4.2.10.1 There will be no full-time project representative provided by the Owner or Architect on this project.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

Delete Paragraph 6.1.4 in its entirety.

6.2 MUTUAL RESPONSIBILITY

6.2.3 In the second sentence, strike the word "shall" and insert the word "may".

ARTICLE 7 - CHANGES IN THE WORK

Add a new Subparagraph 7.1.4 to read as follows:

7.1.4 The additional cost, or credit to the Owner resulting from a change in the work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.

7.1.4.1 "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes direct salary plus customary fringe benefits (prevailing wage rates) and documented statutory costs such as workman's compensation insurance, Social Security/Medicare, and unemployment insurance (a maximum multiplier of 1.27 times DPE).

7.1.4.2 "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity. Rates for equipment that is leased and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.

7.1.4.3 In addition to the above, the General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces. For additional subcontractor work, the Subcontractor is

allowed a fifteen percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding five percent (5%) on the subcontractors work. These mark-ups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc. There will be no other costs associated with the change order."

ARTICLE 8 - TIME

8.2 PROGRESS AND COMPLETION

Add the following subparagraph:

8.2.1.1 Refer to Section 011000 Summary of Work for contract time requirements.

Add the following subparagraph:

8.2.4 If the Work falls behind the Progress Schedule as submitted by the Contractor, the Contractor shall employ additional labor and/or equipment necessary to bring the Work into compliance with the Progress Schedule at no additional cost to the Owner.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Add the following Paragraphs:

9.2.1 The Schedule of Values shall be submitted using AIA Document G702, Continuation Sheet to G703.

9.2.2 The Schedule of Values is to include a line item for Project Closeout Document Submittal. The value of this item is to be no less than 1% of the initial contract amount.

9.3 APPLICATIONS FOR PAYMENT

Add the following Paragraph:

9.3.1.3 Application for Payment shall be submitted on AIA Document G702 "Application and Certificate for Payment", supported by AIA Document G703 "Continuation Sheet". Said Applications shall be fully executed and notarized.

Add the following Paragraphs:

9.3.4 Until Closeout Documents have been received and outstanding items completed the Owner will pay 95% (ninety-five percent) of the amount due the Contractor on account of progress payments.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following to 9.5.1:

.8 a lien or attachment is filed;

.9 failure to comply with mandatory requirements for maintaining Record Documents.

Add the following subparagraphs:

9.5.4 The Contractor shall have the obligation to remove any liens filed against the Project or any part thereof, and shall bear all costs connected with said removal prior to the Owner being obligated to make the next monthly progress payment.

9.5.5 No payment of monies nor any partial or entire use of occupancy of the Project by the Owner shall constitute an acceptance of any Work not in accordance with the Contract Documents.

9.6 PROGRESS PAYMENTS

Delete Paragraph 9.6.1 in its entirety and replace with the following:

9.6.1 After the Architect has approved and issued a Certificate for Payment, payment shall be made by the Owner within 30 days after Owner's receipt of the Certificate for Payment.

9.8 SUBSTANTIAL COMPLETION

To Subparagraph 9.8.3- Add the following sentence:

"If the Architect is required to make more than 2 inspections of the same portion of work, the Contractor shall be responsible for all costs associated with subsequent inspections, including but not limited to any Architect's fees."

9.8.5 In the second sentence, strike "shall" and insert "may".

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following Paragraphs:

10.1.1 Each Contractor shall develop a safety program in accordance with the Occupational Safety and Health Act of 1970. A copy of said plan shall be furnished to the Owner and Architect prior to the commencement of that Contractor's Work.

10.1.2 Each Contractor shall appoint a Safety Representative. Safety Representatives shall be someone who is on site on a full time basis. If deemed necessary by the Owner or Architect, Contractor Safety meetings will be scheduled. The attendance of all Safety Representatives will be required. Minutes will be recorded of said meetings by the Contractor and will be distributed to all parties as well as posted in all job offices/trailers etc.

10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Paragraph:

10.2.4.1 As required in the Hazardous Chemical Act of June 1984, all vendors supplying any material that may be defined as hazardous must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a caution warning on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in foreseeable emergency situations. Material Safety Data Sheets shall be provided directly to the Owner, along with the shipping slips that include those products.

Add the following subparagraph:

10.2.8 The Contractor shall certify to the Owner that materials incorporated into the work are free of all asbestos. This certification may be in the form of Material Safety Data Sheets (MSDS) provided by the product manufacturer for the materials used in construction by the Contractor.

10.3 HAZARDOUS MATERIALS

Delete Paragraph 10.3.3 in its entirety.

Delete Paragraphs 10.3.6 in its entirety.

ARTICLE 11 - INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

Add the following Clause 11.1.2.1 to 11.1.2:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following, or greater if required by law:

Workmen's Compensation:

State: Statutory

Applicable Federal (e.g., Longshoremen's): Statutory

Employer's Liability

\$ 100,000

Comprehensive General Liability (including Premises Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):

Bodily Injury

\$ 500,000 Each Person

\$ 1,000,000 Each Occurrence

\$ 1,000,000 Annual Aggregate

Property Damage

\$ 500,000 Each Occurrence

\$ 500,000 Annual Aggregate

Products and Completed Operations to be maintained for 2 years after final payment.

Property Damage Liability Insurance will provide X, C, or U coverage as applicable.

Contractual Liability:

Bodily Injury

\$ 500,000 Each Person

\$1,000,000 Each Occurrence

\$1,000,000 Annual Aggregate

Property Damage:

\$ 500,000 Each Occurrence

\$1,000,000 Annual Aggregate

Personal Injury, with Employment Exclusion deleted:

\$ 500,000 Each Occurrence

Comprehensive Automobile Liability:

Bodily Injury:

\$1,000,000 Each Person

\$1,000,000 Each Occurrence

Property Damage:

\$ 500,000 Each Occurrence

Subcontractor's policies shall include contingent and contractual liability coverage in the same minimum amounts as 3, above.

Add the following Clauses 11.1.3.1 and 11.1.3.2 to 11.1.3:

11.1.3.1 The Contractor shall furnish one copy each of Certificates of Insurance herein required for each copy of the Agreement which shall specifically set forth

evidence of all coverage required by Subparagraph 11.1.2. The form of the Certificate shall be AIA Document G705 or insurance carrier's standard form, which presents required information. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

11.1.3.2 Certificates of insurance filed with the Owner shall guarantee fifteen (15) days prior notice of cancellation, non-renewal or any change in coverage and limits of liability shown as included on certificates.

Add the following Subparagraphs 11.1.5 through 11.1.8:

11.1.5 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. He shall carry such insurance coverage as he desires on his own property such as his field office, storage sheds or other structures erected upon the project site that belong to him and for his own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.

11.1.6 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverage shall be filed with and approved by the Owner.

11.1.7 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by him or his Subcontractors during the entire construction period on this project.

11.1.8 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, shall not be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and his Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.

11.2 OWNER'S LIABILITY INSURANCE

Delete Paragraph 11.2 and its subparagraphs in their entirety.

Delete Paragraph 11.3 and its subparagraphs in their entirety and replace with the following:

11.3 PROPERTY INSURANCE

11.3.1 The Owner will not provide Builder's All Risk Insurance for the Project. The Contractor and all Subcontractors shall provide property coverage for their tools and equipment, as necessary.

11.4 PERFORMANCE BOND AND PAYMENT BOND

Add the following subparagraphs:

11.4.3 Performance and Payment Bond: Simultaneously with delivery of the executed contract, the contractor must deliver to the Owner an executed performance bond in the amount of 100% of the accepted bid as security for the faithful performance of his contract including the required Warranty and Guaranties; and an executed labor

and material payment bond in the amount of 100% of the accepted bid as security for the payment of all persons performing labor or furnishing materials in connection therewith and conditioned that the contractor shall well and faithfully pay all daily labor employed by him for this contract in full once each week. Performance and payment bond may be in a combined form. The bonding company's standard forms are acceptable provided all coverage requirements are included. The bonds shall be maintained in full force for a period of not less than twelve (12) months after the date of the Certificate for Substantial Completion.

11.4.4 Bonds are to be in favor of the Owner and shall be paid for by the contractor and furnished by a surety company licensed in the State that the project is located. The Owner has the right to demand proof that the parties signing the bonds are duly authorized to do so.

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.6 INTEREST

Strike “the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.” Insert “30 days of presentment of the authorized Certificate of Payment at the annual rate of 6% or 0.5% per month.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

Delete Subparagraph 14.4.3 in its entirety and replace with the following:

14.4.3 In case of such termination for Owner’s convenience, the Contractor shall be entitled to receive payment for work executed, materials purchased and reasonable overhead.

ADD ARTICLE 16- CONTRACTOR RESPONSIBILITIES

16.1 The Contractor shall enforce strict discipline and good order among the Contractor’s employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

16.2 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.

16.3 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.

16.4 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.

16.5 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor’s employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.

16.6 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract.

16.6.1 At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.

16.7 To the fullest extent permitted by law, the Contractor shall indemnify and otherwise hold harmless the Owner, its agents and employees, and the Architect, his agents and employees, from any and all liability, suits, actions or claims, together with all costs, expenses or attorneys' fees, arising out of their performance of work or supplying materials and services in connection with this contract. This agreement to indemnify and hold harmless shall cover all suits, actions, claims or liabilities asserted against the Owner, its agents and employees, and the Architect, his agents and employees, to the extent caused in whole or part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate or abridge other rights or obligations of indemnity which would otherwise exist.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 009000

DE STATE GENERAL REQUIREMENTS

ARTICLE 1: GENERAL

1.01 CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to an extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.
- B. Work including material purchases shall not begin until the Contractor is in receipt of a bonafide State of Delaware Purchase Order. Any work performed or material purchases prior to the issuance of the Purchase Order is done at the Contractor's own risk and cost.

1.02 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

- A. For Public Works Projects financed in whole or in part by state appropriation the Contractor agrees that during the performance of this contract:
 - 1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, sex, color, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.
 - 2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin.”

ARTICLE 2: OWNER

(NO ADDITIONAL GENERAL REQUIREMENTS - SEE SUPPLEMENTARY GENERAL CONDITIONS)

ARTICLE 3: CONTRACTOR

3.01 SCHEDULE OF VALUES

- A. The successful Bidder shall within twenty (20) days after receiving notice to proceed with the work, furnish to the Owner a complete schedule of values on the various items comprising the work.

3.02 SUBCONTRACTS

- A. Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all material, their own and

- those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.
- B. Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.
 - C. The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.
 - D. The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
 - E. The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.
 - F. Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.
 - G. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.
 - H. The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.
 - I. The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.

3.03 STATE LICENSE AND TAX REQUIREMENTS

- A. Each Contractor and Subcontractor shall be licensed to do business in the State of Delaware and shall pay all fees and taxes due under State laws. In conformance with Section 2503, Chapter 25, Title 30, Delaware Code, "the Contractor shall furnish the State Tax Department within ten (10) days after award of the Contract, a statement of the total values of each contract and Subcontract, together with the names and addresses of the contracting parties "

3.04 LARGE PUBLIC WORKS CONTRACT PROCEDURES

- A. The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.
- B. During the contract Work, the Contractor and each listed Subcontractor, shall implement an Employee Drug Testing Program in accordance with OMB Regulation 4104-“Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on “Large Public Works Projects”. “Large Public Works” is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.01 CONTRACT SURETY

- A. Performance Bond And Labor And Material Payment Bond
 - 1. All bonds will be required as follows unless specifically waived elsewhere in the Bidding Documents.
 - 2. Contents of Performance Bonds - The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal, plans, specifications, and bid documents thereof. Each term and condition shall be met at the time and in the manner prescribed by the Contract, Bid documents and the specifications, including the payment in full to every person furnishing materiel or performing labor in the performance of the Contract, of all sums of money due the person for such labor and materiel. (The bond shall also contain the successful bidder's guarantee to indemnify and save harmless the State and the agency from all costs, damages and expenses growing out of or by reason of the Contract in accordance with the Contract.)
 - 3. Invoking a Performance Bond - The agency may, when it considers that the interest of the State so require, cause judgement to be confessed upon the bond.
 - 4. Within twenty (20) days after the date of notice of award of contract, the Bidder to whom the award is made shall furnish a Performance Bond and Labor and Material Payment Bond, each equal to the full amount of the Contract price to guarantee the faithful performance of all terms, covenants and conditions of the same. The bonds are to be issued by an acceptable Bonding Company licensed to do business in the State of Delaware and shall be issued in duplicate.
 - 5. Performance and Payment Bonds shall be maintained in full force (warranty bond) for a period of two (2) years after the date of the Certificate for Final Payment. The Performance Bond shall guarantee the satisfactory completion of the Project and that the Contractor will make good any faults or defects in his work which may develop during the period of said guarantees as a result of improper or defective workmanship, material or apparatus, whether furnished by themselves or their Sub-Contractors. The Payment Bond shall guarantee that the Contractor shall pay in full all persons, firms or corporations who furnish labor or material or both labor and material for, or on account of, the work included herein. The bonds shall be paid for by this Contractor. The Owner shall have the right to demand that the proof parties signing the bonds are duly authorized to do so.

4.02 FAILURE TO COMPLY WITH CONTRACT

- A. If any firm entering into a contract with the State, or Agency that neglects or refuses to perform or fails to comply with the terms thereof, the Agency which signed the Contract may terminate the Contract and proceed to award a new contract in accordance with this Chapter 69, Title 29 of the Delaware Code or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond. Nothing herein shall preclude the Agency from pursuing additional remedies as otherwise provided by law.

4.03 CONTRACT INSURANCE AND CONTRACT LIABILITY

- A. In addition to the bond requirements stated in the Bid Documents, each successful Bidder shall purchase adequate insurance for the performance of the Contract and, by submission of a Bid, agrees to indemnify and save harmless and to defend all legal or equitable actions brought against the State, any Agency, officer and/or employee of the State, for and from all claims of liability which is or may be the result of the successful Bidder's actions during the performance of the Contract.
- B. The purchase or nonpurchase of such insurance or the involvement of the successful Bidder in any legal or equitable defense of any action brought against the successful Bidder based upon work performed pursuant to the Contract will not waive any defense which the State, its agencies and their respective officers, employees and agents might otherwise have against such claims, specifically including the defense of sovereign immunity, where applicable, and by the terms of this section, the State and all agencies, officers and employees thereof shall not be financially responsible for the consequences of work performed, pursuant to said contract.

4.04 RIGHT TO AUDIT RECORDS

- A. The Owner shall have the right to audit the books and records of a Contractor or any Subcontractor under any Contract or Subcontract to the extent that the books and records relate to the performance of the Contract or Subcontract.
- B. Said books and records shall be maintained by the Contractor for a period of seven (7) years from the date of final payment under the Prime Contract and by the Subcontractor for a period of seven (7) years from the date of final payment under the Subcontract.

ARTICLE 5: SUBCONTRACTORS

5.01 SUBCONTRACTING REQUIREMENTS

- A. All contracts for the construction, reconstruction, alteration or repair of any public building (not a road, street or highway) shall be subject to the following provisions:
 - 1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only - street number and P.O. Box addresses not required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.
 - 2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:

- a. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;
 - b. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
 - c. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.
- B. The decision of the awarding Agency as to whether a Bidder who list itself as the Subcontractor for a Subcontractor category shall be final and binding upon all Bidders, and no action of any nature shall lie against any awarding agency or its employees or officers because of its decision in this regard.
- C. After such a Contract has been awarded, the successful Bidder shall not substitute another Subcontractor for any Subcontractor whose name was set forth in the statement which accompanied the Bid without the written consent of the awarding Agency.
- D. No Agency shall consent to any substitution of Subcontractors unless the Agency is satisfied that the Subcontractor whose name is on the Bidders accompanying statement:
1. Is unqualified to perform the work required;
 2. Has failed to execute a timely reasonable Subcontract;
 3. Has defaulted in the performance on the portion of the work covered by the Subcontract; or
 4. Is no longer engaged in such business.
- E. Should a Bidder be awarded a contract, such successful Bidder shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

5.02 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS

- A. Should the Contractor fail to utilize any or all of the Subcontractors in the Contractor's Bid statement in the performance of the Work on the public bidding, the Contractor shall be penalized in the amount of one (1) percent of Contract amount not to exceed \$10,000. The Agency may determine to deduct payments of the penalty from the Contractor or have the amount paid directly to the Agency. Any penalty amount assessed against the Contractor may be remitted or refunded, in whole or in part, by the Agency awarding the Contract, only if it is established to the satisfaction of the Agency that the Subcontractor in question has defaulted or is no longer engaged in such business. No claim for the remission or refund of any penalty shall be granted unless an application is filed within one year after the liability of the successful Bidder accrues. All penalty amounts assessed and not refunded or remitted to the contractor shall be reverted to the State.

5.03 ASBESTOS ABATEMENT

- A. The selection of any Contractor to perform asbestos abatement for State-funded projects shall be approved by the Office of Management and Budget/Division of Facilities Management pursuant to Chapter 78 of Title 16.

5.04 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE PHYSICALLY HANDICAPPED

- A. All Contracts shall conform with the standard established by the Delaware Architectural Accessibility Board unless otherwise exempted by the Board.

5.05 CONTRACT PERFORMANCE

- A. Any firm entering into a Public Works Contract that neglects or refuses to perform or fails to comply with its terms, the Agency may terminate the Contract and proceed to award a new Contract or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the performance Bond.

ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

6.01 CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

- A. The Owner reserves the right to simultaneously perform other construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other Projects at the same site.
- B. The Contractor shall afford the Owner and other Contractors reasonable opportunity for access and storage of materials and equipment, and for the performance of their activities, and shall connect and coordinate their activities with other forces as required by the Contract Documents.

ARTICLE 7: CHANGES IN THE WORK

7.01 CHANGES IN THE WORK

- A. The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.
- B. The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.
- C. The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.
 - 1. "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes direct salary plus customary fringe benefits (prevailing wage rates) and documented statutory costs such as workman's compensation insurance, Social Security/Medicare, and unemployment insurance (a maximum multiplier of 1.35 times DPE).
 - 2. "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment

- leasing entity. Rates for equipment that is leased and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.
3. In addition to the above, the General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces. For additional subcontractor work, the Subcontractor is allowed a fifteen percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding seven point five percent (7.5%) on the subcontractors work. These mark-ups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc. No markup is permitted on the work of a Sub-subcontractor. No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

ARTICLE 8: TIME

8.01 TIME

- A. Time limits, if any, are as stated in the Project Manual. By executing the Agreement, the Contractor confirms that the stipulated limits are reasonable, and that the Work will be completed within the anticipated time frame.
- B. If progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.
- C. Any extension of time beyond the date fixed for completion of the construction and acceptance of any part of the Work called for by the Contract, or the occupancy of the building by the Owner, in whole or in part, previous to the completion shall not be deemed a waiver by the Owner of his right to annul or terminate the Contract for abandonment or delay in the matter provided for, nor relieve the Contractor of full responsibility.

8.02 SUSPENSION AND DEBARMENT

- A. Per Section 6962(d)(14), Title 29, Delaware Code, "Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: 1) failure to supply the adequate labor supply ratio for the project; 2) inadequate financial resources; or, 3) poor performance on the Project."
- B. "Upon such failure for any of the above stated reasons, the Agency that contracted for the public works project may petition the Director of the Office of Management and Budget for Suspension or Debarment of the Contractor. The Agency shall send a copy of the petition to the Contractor within three (3) working days of filing with the Director. If the Director concludes that the petition has merit, the Director shall schedule and hold a hearing to determine whether to suspend the Contractor, debar the Contractor or deny the petition. The Agency shall have the burden of proving, by a preponderance of the evidence, that the Contractor failed to perform or complete the public works project

within the time schedule established by the Agency and failed to do so for one or more of the following reasons: 1) failure to supply the adequate labor supply ratio for the project; 2) inadequate financial resources; or, 3) poor performance on the project. Upon a finding in favor of the Agency, the Director may suspend a Contractor from Bidding on any project funded, in whole or in part, with public funds for up to 1 year for a first offense, up to 3 years for a second offense and permanently debar the Contractor for a third offense. The Director shall issue a written decision and shall send a copy to the Contractor and the Agency. Such decision may be appealed to the Superior Court within thirty (30) days for a review on the record."

8.03 RETAINAGE

- A. Per Section 6962(d)(5) a., Title 29, Delaware Code: The Agency may at the beginning of each public works project establish a time schedule for the completion of the project. If the project is delayed beyond the completion date due to the Contractor's failure to meet their responsibilities, the Agency may hold permanently, at its discretion, all or part of the Contractor's retainage.
- B. This forfeiture of retainage also applies to the timely completion of the punchlist. A punchlist will only be prepared upon the mutual agreement of the Owner, Architect and Contractor. Once the punchlist is prepared, all three parties will by mutual agreement, establish a schedule for its completion. Should completion of the punchlist be delayed beyond the established date due to the Contractor's failure to meet their responsibilities, the Agency may hold permanently, at its discretion, all or part of the Contractor's retainage.

ARTICLE 9: PAYMENTS AND COMPLETION

9.01 APPLICATION FOR PAYMENT

- A. Applications for payment shall be made upon AIA Document G702. There will be a five percent (5%) retainage on all Contractor's monthly invoices until completion of the project. This retainage will become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.
- B. A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor's itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.
- C. Article 6516, Chapter 65, Title 29 of the Delaware Code stipulates annualized interest not to exceed 12% per annum beginning thirty (30) days after the "presentment" (as opposed to the date) of the invoice."

9.02 PARTIAL PAYMENTS

- A. Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.
- B. When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.

1. Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.
- C. If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

9.03 SUBSTANTIAL COMPLETION

- A. When the building has been made suitable for occupancy, but still requires small items of miscellaneous work, the Owner will determine the date when the project has been substantially completed.
- B. If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.
- C. On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.

9.04 FINAL PAYMENT

- A. Final payment, including the five percent (5%) retainage, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):
 1. Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,
 2. An acceptable RELEASE OF LIENS,
 3. Copies of all applicable warranties,
 4. As-built drawings,
 5. Operations and Maintenance Manuals,
 6. Instruction Manuals,
 7. Consent of Surety to final payment.
 8. The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.01 PROTECTION OF PERSONS AND PROPERTY

- A. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions to prevent damage, injury or loss to: workers, persons nearby who may be affected, the Work, materials and equipment to be incorporated, and existing property at the site or adjacent thereto. The Contractor shall give notices and comply with applicable laws ordinances, rules regulations, and lawful orders of public authorities bearing on the safety of persons and property and their protection from injury, damage, or loss. The Contractor shall promptly remedy damage

- and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.
- B. The Contractor shall notify the Owner in the event any existing hazardous material such as lead, PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval.
 - C. As required in the Hazardous Chemical Information Act of June 1984, all vendors supplying any materials that may be defined as hazardous, must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a warning caution on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation. Material Safety Data Sheets must be provided directly to the Owner along with the shipping slips that include those products.
 - D. The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

ARTICLE 11: INSURANCE AND BONDS

11.01 INSURANCE AND BONDS

- A. The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.
- B. Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.
- C. Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.
- D. The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.

- E. Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, shall not be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and their Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.
- F. Certificates of the insurance company or companies stating the amount and type of coverage, terms of policies, etc., shall be furnished to the Owner, within 20 days of contract award.
- G. The Contractor shall, at their own expense, (in addition to the above) carry the following forms of insurance:
1. Contractor's Contractual Liability Insurance
Minimum coverage to be:
 - Bodily Injury\$ 500,000for each person
 - \$1,000,000for each occurrence
 - \$1,000,000aggregate
 - Property Damage\$ 500,000for each occurrence
 - \$1,000,000aggregate
 2. Contractor's Protective Liability Insurance
Minimum coverage to be:
 - Bodily Injury\$ 500,000for each person
 - \$1,000,000for each occurrence
 - \$1,000,000aggregate
 - Property Damage\$ 500,000for each occurrence
 - \$ 500,000aggregate
 3. Automobile Liability Insurance
Minimum coverage to be:
 - Bodily Injury\$ 1,000,000for each person
 - \$ 1,000,000for each occurrence
 - Property Damage\$ 500,000per accident
 4. Prime Contractor's and Subcontractors' policies shall include contingent and contractual liability coverage in the same minimum amounts as 11.7.1 above.
 5. Workmen's Compensation (including Employer's Liability):
 - a. Minimum Limit on employer's liability to be as required by law.
 - b. Minimum Limit for all employees working at one site.
 6. Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.
 7. Social Security Liability
 - a. With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor's business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities

- now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.
- b. Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.
 - c. If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.01 UNCOVERING AND CORRECTION OF WORK

- A. The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.
- B. At any time during the progress of the work, or in any case where the nature of the defects shall be such that it is not expedient to have them corrected, the Owner, at their option, shall have the right to deduct such sum, or sums, of money from the amount of the contract as they consider justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.01 CUTTING AND PATCHING

- A. The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.

13.02 DIMENSIONS

- A. All dimensions shown shall be verified by the Contractor by actual measurements at the project site. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the Owner for adjustment before any work affected thereby has been performed.

13.03 LABORATORY TESTS

- A. Any specified laboratory tests of material and finished articles to be incorporated in the work shall be made by bureaus, laboratories or agencies approved by the Owner and reports of such tests shall be submitted to the Owner. The cost of the testing shall be paid for by the Contractor.
- B. The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by the Owner.

13.04 ARCHAEOLOGICAL EVIDENCE

- A. Whenever, in the course of construction, any archaeological evidence is encountered on the surface or below the surface of the ground, the Contractor shall notify the authorities of the Delaware Archaeological Board and suspend work in the immediate area for a reasonable time to permit those authorities, or persons designated by them, to examine the area and ensure the proper removal of the archaeological evidence for suitable preservation in the State Museum.

13.05 GLASS REPLACEMENT AND CLEANING

- A. The General Contractor shall replace without expense to the Owner all glass broken during the construction of the project. If job conditions warrant, at completion of the job the General Contractor shall have all glass cleaned and polished.

13.06 WARRANTY

- A. For a period of two (2) years from the date of Substantial Completion, as evidenced by the date of final acceptance of the work, the contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the contractor or any of his subcontractors or suppliers. However, manufacturer's warranties and guarantees, if for a period longer than two (2) years, shall take precedence over the above warranties. The contractor shall remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

ARTICLE 14: TERMINATION OF CONTRACT**14.01 TERMINATION OF CONTRACT**

- A. If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.
- B. "If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement."

END OF GENERAL REQUIREMENTS

SECTION 009500

GENERAL AND SPECIAL INSTRUCTIONS

PART 1 - GENERAL

1.01 GENERAL INSTRUCTIONS TO BIDDERS

- A. The general rules and conditions which follow apply to all purchases and become a part of each contract or purchase order
 - 1. Before submitting its bid, the bidder must review all instructions and specifications.
 - 2. A bidder's misinterpretation or ignorance of such instructions or specifications will not excuse the bidder from complying with the instructions and specifications.
 - 3. The bidder must also review applicable state laws. If these instructions or the bid specifications are inconsistent with state law, state law shall control.

1.02 DEFINITIONS:

- A. "District" refers to the Brandywine School District.

1.03 BID PROPOSALS

- A. Use the enclosed Proposal Form in submitting a Bid Proposal. The Bid Proposal must be dated and signed by an authorized representative of the bidder.
- B. Refer to Section 001000, INSTRUCTIONS TO BIDDERS, for additional information.

1.04 "RFP" - REQUESTS FOR PROPOSALS: N/A

1.05 PRE-BID MEETINGS: REQUIRED

1.06 DELIVERY OF BID PROPOSALS

- A. Sealed Bid Proposal must be received at the address listed in the Advertisement for Bid notice, prior to the time set for the Bid Opening. It is the responsibility of the Bidder to make certain that the Bid Proposal is in the location designated above prior to the time set for the Bid Opening. The District accepts no responsibility for any bid entrusted to the United States Postal Service, or any other delivery service or company. Bid Proposals not received in the designated location by the time set for the Bid Opening will not be considered.

1.07 BID OPENING

- A. Bids will be publicly opened at the designated location at the time designated on the Proposal Form, and in the Advertisement for Bids. The purpose of the opening is to reveal the names of those bidders submitting proposals. The opening is not to serve as a forum for determining the responsiveness of each bid, or the apparent low bidder. The aggregate amount of each bid shall be disclosed. Additional information shall be disclosed at the discretion of the District.

1.08 POLICY AND PROCEDURE FOR THE EXAMINATION AND COPYING OF PUBLIC RECORDS

- A. Title 29 § 10003 Delaware Code Freedom of Information Act
 - 1. All public records shall be open to inspection and copying by any citizen of the State during regular business hours by the custodian of the records for the appropriate public body. Reasonable access to and reasonable facilities for copying of these records shall not be denied to any citizen. If the record is in active use or in storage and, therefore, not available at the time a citizen requests access, the custodian shall

so inform the citizen and make an appointment for said citizen to examine such records as expediently as they may be made available. Any reasonable expense involved in the copying of such records shall be levied as a charge on the citizen requesting such copy.

2. It shall be the responsibility of the public body to establish rules and regulations regarding access to public records as well as fees charged for copying of such records. (60 Del. Laws, c. 641 § 1.)

B. Examination of Contract File

1. Any citizen of the State or bidder may review the contract file only after making an appointment to do so with the District. Requests to review the records during an unannounced office visit may be denied if department personnel are busy, or if the file is in active use. Trade secrets and commercial or financial information of a privileged or confidential nature shall not be deemed public.

C. Requests for Bid Tabulations

1. Copies of bid tabulation may be obtained from the District either by mail after receipt of a written request and a self-addressed and stamped envelope, or by making an appointment to pick up copies that will be left at the Receptionist's desk. Bid tabulation and/or contract information other than the name of the successful bidder will not be given out over the telephone. Requests for bid tabulations during an unannounced office visit may be denied if work flow of department personnel will be disrupted.

D. Copying Fees

1. The District reserves the right to charge a reasonable fee for the copying of any public record. Such charges must be paid to the District prior to receiving the copies.

1.09 STATUS OF PROPOSALS

A. Unless otherwise stated in the Special Instructions or on the Proposal Form, the Proposal submitted by bidders shall be binding for a period of 60 days from the date the bids are opened. Requests for Proposals shall be binding for a period of 90 days.

B. Bids may be withdrawn up to the time of the bid opening upon request of the bidder. Such a request must be in writing and received by the District prior to the time stated for the bid opening. Timely requests submitted by facsimile or telegram will be honored.

C. Waiver - The District reserves the right to waive any failure to conform to the instructions or specifications if the waiver: (1) does not involve a mandatory statutory requirement; (2) does not provide a competitive advantage to one or more bidders; and (3) is in the best interest of the District.

D. Bidders may take exception to the terms and conditions of the instructions and/or specifications. Exceptions must be submitted prior to the opening of bids. Exceptions that do not conform to State bid law and/or create inequality in the treatment of bidders will be rejected. The bid of a bidder taking exception may be rejected if the District rejects the exception.

1.10 AWARDING OF BIDS

A. The District reserves the right to award the bid to the lowest qualified bidder meeting specifications by item, in total, or any other method, whichever is deemed by the District to be in its best interest.

- B. The District reserves the right to award the bid to 2 or more firms if the advertisement for bids notifies bidders of the right of the District to make such an award and the criteria for such an award.
- C. The District reserves the right to reject any and all bids, in whole or in part, to make partial awards, to waive any irregularity, to reasonably increase or decrease quantities where estimated quantities are shown or where definite quantities are shown, and may reject any bid which indicates any omission, contains alteration of form or additions not requested or imposes conditions, or where the individual bidder should receive a total award of less than \$500.00, or offers alternate items, and make any award which is deemed to be in the best interest of the District.
- D. In the event of tie bids, the District will decide which bidder is to be awarded the contract by any criteria of its choice.
- E. The contract shall be awarded by the District and its Board(s) within 60 days after the opening of bids. Failure to do so shall be cause for rejection of all bids. Responses to Requests for Proposals shall be awarded within 90 days after the opening of Proposals. Failure to do so shall be cause for rejection of all proposals.

1.11 BID DEPOSIT REQUIRED

1.12 FORMAL CONTRACT AND/OR PURCHASE ORDER

- A. The successful bidder shall execute the formal contract, within twenty (20) days after the award of the contract. No bidder or Vendor is to begin any work until it receives a State of Delaware Purchase Order signed by two authorized representatives of the District, properly processed through the State of Delaware Accounting Office. The Purchase Order shall serve as the authorization to proceed with work in accordance with the bid specifications and the special instructions.
- B. The formal contract or purchase order shall incorporate by reference these General Instructions, as well as the Special Instructions and Specifications and the bidder's Proposal.

1.13 PERFORMANCE AND PAYMENT BONDS REQUIRED

1.14 FAILURE TO COMPLY WITH CONTRACT: NEW AWARD: SUPERVISION

- A. If any person entering into a contract under the authority of this chapter neglects or refuses to perform it or fails to comply with the terms thereof, the District will terminate the contract and proceed to award a new contract in accordance with the provisions of Chapter 69, Title 29 of the Delaware Code, or may require the surety on the performance bond to complete the contract in accordance with the terms of the performance bond.
- B. Should a contractor/supplier fail to perform under the conditions of this contract, the District reserves the right to purchase the item or items on the open market and charge to the contractor/supplier or deduct from any monies owed the contractor/supplier, the difference between the bid price and the purchase price. However, no such action will be taken without first notifying the contractor/supplier by certified letter and giving him reasonable time to reply, but in no event longer than 10 days from the mailing of the certified letter. Failure to supply items as bid may be cause for removal of a bidder from our vendor bid list.

1.15 PREFERENCE FOR DELAWARE LABOR: STIPULATION IN CONTRACT

- A. In the construction of all public works for the State or any political subdivision thereof, or by persons contracting with the State or any political subdivision thereof, preference in employment of laborers, workmen or mechanics, shall be given to bona fide legal citizens of the State, who have established citizenship by residence of at least ninety days in the State. Any person, company or corporation who violates the provisions of this section shall pay a penalty to the Secretary of Finance equal to the amount of compensation paid to any person in violation of this section. (per Delaware Code, Title 29, Chapter 69, Section 6962, Paragraph (d) Subsection (4)b)

1.16 NON-DISCRIMINATION

- A. In performing this work the successful bidder agrees to the following:
- B. The successful bidder will not discriminate against any employee or application for employment because of race, creed, color, sex, national origin, age or disability. The vendor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, sex, national origin, age or disability. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
- C. The successful bidder will, in all solicitations or advertisements for employees place by or on behalf of himself, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, national origin, age or disability.

1.17 EQUAL OPPORTUNITY EMPLOYER

- A. The School District is an equal opportunity employer and does not discriminate or deny services on the basis of race, color, creed, national origin, sex, disability, or age.

1.18 INSURANCE - LIABILITY

- A. The successful bidder shall maintain, at its expense, the following insurance:
 - 1. Public Liability and Automobile Liability Insurance
 - a. The policy is to be provided for both the owner and the contractor.
 - b. Minimum coverage for bodily injury shall be \$500,000 for any one individual and \$1,000,000 for any one accident.
 - c. Minimum coverage for property damage shall be \$500,000 for any one accident.
 - d. Policies shall include completed operations, owners and contractors Protective Liability and Contractual Liability coverage, including protection against claims arising out of the activities of subcontractors in the same minimum amounts stated above.
 - e. If the project involves excavations, deep trenching, or blasting, endorsements to the policy should be obtained to cover these hazards.
 - f. Certificates of insurance must be filed with the owner guaranteeing fifteen (15) days' notice prior to cancellation.
 - 2. Builders Risk Policy
 - a. The builders risk policy shall be an all risk coverage policy.
 - b. The policy shall be in the name of the owner and prime contractor, jointly, "as their interests may appear."

- c. On new construction or complete additions, the policy will be carried on a completed value basis.
 - d. On renovation projects, the policy will be covered by either an installation floater or a separate policy of sufficient dollar amount to fully cover the cost of the materials stored.
 - e. If it is your policy to pay for material not stored on the site, either a separate certificate of insurance must be issued or a rider must be added to the existing builders risk policy. The amount of coverage must be sufficient to cover all materials stored off the site.
 - f. Certificates of insurance must be filed with the owner guaranteeing fifteen (15) days' notice prior to cancellation.
3. Worker's Compensation Including Employee's Liability
- a. Minimum limit on Employee's Liability to be \$100,000 minimum limit for all employees working at one site.
 - b. Certificates of insurance must be filed with the owner guaranteeing fifteen (15) days' notice prior to cancellation.

1.19 LCENSES, FEES, PERMITS, TAXES, AND STATE LAWS AS APPLICABLE

- A. In the performance of this Contract the successful Bidder is required to comply with all applicable Federal, State, and Local laws, ordinances, codes, and regulations. The cost of permits, insurance, taxes, and other relevant costs required in the performance of the Contract shall be borne by the successful Bidder. All Delaware Laws in reference to construction shall be as binding as though quoted in full herein and their application shall be fully adhered to by all parties affected hereby. The vendor shall furnish upon request any or all of the referenced items.

1.20 WAGE SCALE - PREVAILING WAGE RATE

1.21 PATENTS, TRADEMARKS, AND COPYRIGHTS

- A. The supplier shall hold free of any liability, the School District and the officers and employees, of any costs or expenses arising from patent, trademark or copyright infringement incurred by use of any item supplied or process used in performance of this Contract.

1.22 COVENANT AGAINST CONTINGENT FEES

- A. The bidder warrants that no person or selling agency has been employed or retained to solicit or secure the Contract upon an agreement of understanding for a commission or percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the bidder for the purpose of securing business. For breach or violation of this warrantee the School District shall have the right to annul the Contract without liability or at its discretion to deduct from the contract price or otherwise recover the full amount of such commission, percentage, brokerage or contingent fees.

1.23 TAXES - EXEMPT

- A. Since the School District is exempt, prices quoted shall not include Federal taxes or State of Local taxes. Tax Exemption number is (Available from Owner).

1.24 TRADE DISCOUNTS

- A. All prices offered must be lowest net price after trade discounts have been considered.

- B. Bids offering a percentage off list prices will not be accepted unless;
 - 1. Specifically requested in that manner;
 - 2. A copy of the referenced price list accompanies the bid.

1.25 COMMERCIAL WARRANTY AND GUARANTEE CERTIFICATE

- A. The supplier agrees that the supplies or services furnished under the Contract shall be covered by the most favorable commercial warranties the supplier gives to any customer for such supplies or services and that the rights and remedies provided herein are in addition to and do not limit any rights afforded to the District by any other clauses of the Contract. A final payment for performance shall not relieve the successful bidder of responsibility for faulty materials or workmanship.

1.26 INTERPRETATION OF SPECIFICATIONS

- A. Should any bidder be in doubt as to the intention and meaning of the specifications, he may make inquiry to the Architect. Questions received less than three working days before the opening of bids may not be considered. All questions in order to be considered must be submitted in writing.

1.27 EXAMINATION OF SITE AND OTHER CONDITIONS BEARING ON THIS WORK

- A. Before submitting proposal, bidders shall fully inform themselves of the nature of the work by personal examination of the site and by such means as they consider necessary, as to matters, conditions, or considerations bearing on or in any way affecting the preparation of their proposal.
 - 1. A bidder shall not at any time after the submission of his proposal claim that there is any misunderstanding in regard to the location, extent, or nature of the work to be performed.
 - 2. No claims for any extra will be allowed because of alleged impossibilities in the production of the results specified, or because of inadequate or improper plans or specifications, and whenever a result is required, the successful bidder shall furnish any and all extras and make any changes needed to produce, to the satisfaction of the District, the required results at no expense to the District.
- B. Failure of the bidder to thoroughly understand all aspects of the solicitation before submitting their bid shall not be sufficient cause to permit withdrawal of its bid nor secure relief on pleas of error, after the contract is awarded.

1.28 BRAND NAMES AND APPROVED EQUAL

- A. Where a particular manufacturer or several manufacturers, brands or models are referenced, it is to be interpreted as indicating the type or quality of material, and shall be interpreted to include an "approved equal". Bids may be considered on models or brands or products of manufacturers other than those specified if the items being substituted were approved by the designee of the District.
- B. Where a manufacturer, brand, or model is referenced in the bid specifications, the absence of a reference to a different manufacturer, brand, or model in the bidder's proposal shall be interpreted as a bid on the manufacturer, brand, or model specified.
- C. Where several manufacturers or models are referenced as being equally acceptable and the bidder does not indicate what particular model or brand they are offering, the Designee of the District shall have the right to select any brand or model referenced.

- D. Only one bid per item will be considered. If a vendor submits more than one bid on an item, none of the vendor's bids on that item will be considered.
- E. The Board of Education of the District shall be the sole judge as to whether or not items submitted meet specifications or whether or not items being bid are equal. Any attempt to "resell" or disqualify other supplies while the proposals are being analyzed may be reason for your bid to be disqualified.
- F. All items furnished under the Contract must be new and unused, latest models (unless otherwise specified) and free from all defects. The foregoing exempts exchange, normal "rebuilt" items, where specified.

1.29 SAMPLES AND DESCRIPTIVE LITERATURE

- A. When requesting approval to bid models, brands or products of manufacturers other than those specified, such a request must be accompanied by catalog cuts and/or detailed specifications. The District may also request bidders to submit samples for examination and appraisal.
- B. Requested samples shall be submitted at no cost to the District and may be required by the District either prior to, at the time of the bid opening, or within ten calendar days following the request. Time of submission of samples shall be specified in the specifications. Samples shall be specified in the specifications. Samples not provided as requested, will be reason to reject the bid for that item. All such samples shall be identified as to the supplier, model number, bid item number and other information that may be required; these samples will be returned after evaluation. Suppliers shall have the responsibility of picking up their samples within two weeks after notification. Samples not removed after two weeks will automatically become the property of the District at no charge.

1.30 RESPONSIBILITY FOR DAMAGE AND CARE OF SCHOOL PROPERTY

- A. The Supplier in the performance of this Contract will be held financially responsible for any damage to the grounds, buildings, or equipment caused by him, his subcontractors or employees, or other persons engaged in the performance of the Contract.
- B. Every reasonable effort shall be made by workmen to proceed with the work as described in these specifications in a manner accepted in trade circles as the highest level of workmanship. The successful bidder for this work shall be responsible for all damage to other work caused by his workmen or through the neglect of his workmen on the site.
- C. Workmanlike care shall be expected at all times in performing the work. It shall be the responsibility of the successful bidder to repair or replace all damaged property, the damage for which he or anyone working under his direction is responsible.

1.31 SUPPLIER CLEAN-UP

- A. All debris resulting from the supplier's delivery and installation shall be disposed of entirely by the supplier in an efficient and expeditious manner as required and directed by the District Designee. The successful bidder shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work. District-owned trash receptacles are not to be used by the vendor without prior approval.

1.32 STORAGE OF MATERIALS

- A. Every effort shall be made by the successful bidder to schedule delivery of materials so that a minimum of storage space is required. The successful bidder shall not encumber

the premises with his materials and shall store all materials in a place designated by the District or its representative. The District will not be responsible for any damage to or theft of tools or materials used in this work.

1.33 UNPACKING AND ASSEMBLING

- A. All work described in the specifications regarding unpacking, assembling, and placement of all movable furniture and/or equipment must be completed within five (5) days after furniture and/or equipment is received on the site unless prior approval is received.
- B. Any bidder failing to unpack and assemble knockdown equipment and furniture will be charged (deduction will be made from billing) a fee to cover the District's cost of unpacking and assembling.

1.34 SERVICE

- A. Each bidder may be required to submit a signed statement to the effect he can furnish service by factory trained personnel Monday to Friday during the hours of 8:00 a.m. - 4:00 p.m.

1.35 SCHEDULE FOR PERFORMANCE OF WORK

- A. All work described in these specifications must be completed with reasonable promptness. The District shall be the sole judge of what is "reasonably prompt" under the circumstances. If the successful bidder does not begin the work in a reasonable amount of time, it will be notified that if it fails to initiate the work promptly, the contract may be terminated and the District will forthwith proceed to collect for nonperformance of the work.

1.36 ORDERING

- A. All items or services to be furnished under the Contract will be ordered by the issuance of a Purchase Order signed by two authorized representatives of the District. This document must be in the hands of the successful bidder prior to any work commencing on the Contract.

1.37 DELIVERY, INSPECTION, ACCEPTANCE, AND PACKAGING

- A. All supplies, materials, equipment, goods, and services are to be delivered postpaid to the location or locations indicated on the Proposal Form, Specifications, or Purchase Order. No labor will be provided to help unload any product under Contract.
- B. The delivery of goods or items furnished under the terms of the Contract shall not be considered as acceptance thereof until the goods are inspected. The District shall have a reasonable opportunity to inspect. If, for example, goods are delivered on August 1, the District may not have a reasonable opportunity to inspect such goods until September or October. In all events, shipping invoices or other documents sent with goods shall not be controlling with respect to the timing of inspection. The inspection and test by the District of any supplies or lots thereof does not relieve the supplier from any responsibility regarding defects or other failure to meet the Contract requirements, which may be discovered subsequent to delivery. Except as otherwise provided in the Contract, acceptance shall be conclusive except as regards to patent defects, fraud, or such gross mistakes as amount to fraud.
- C. Any item to be supplied as a result of this Contract shall be subject to inspection and test by the Ordering Office, to the extent practicable, at all times and places including the period of manufacture and in any event prior to acceptance.

- D. In case any item or lots of items are found to be defective in material or workmanship or otherwise not in conformity with the requirements of the Contract, the Ordering Office shall have the right to either reject them (with or without instructions as to their disposition) or to require their correction. Items or lots of items which have been rejected or required to be corrected shall be removed or, if required by the Ordering Office as they may deem appropriate, corrected in place by and at the expense of the supplier promptly after notice, and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. If the supplier fails to promptly remove such items or lots of items which are required to be removed, or promptly to replace or correct such items or lots of items, the District either (1) may re-contract or otherwise, replace or correct such items and charge the supplier the cost occasioned the District thereby, or (2) may terminate the Contract for default as provided in the clause of the Contract entitled "Failure to comply with Contract".
- E. Acceptance or rejection of any items shall be made as promptly as practicable after delivery, except as otherwise provided in the Contract; but failure to inspect and accept or reject items shall neither relieve the supplier from responsibility for such items as are not in accordance with the Contract requirements nor impose liability on the District therefore.
- F. Neither the School District nor other Ordering Office will assume responsibility for damage to any rejected delivery caused by weather, improper warehousing, or mishandling.
- G. All outer packs of items delivered under the Contract (except subsistence items delivered to cafeterias) must be marked with the Purchase Order/Contract number and item identification.
 - 1. Failure to provide adequate identifying markings may result in refusal of the delivery.
- H. Unless otherwise stated, all prices include delivery and placement within the ship-to-address in that area specified in the Contract or Purchase Order.
- I. Collect shipments will not be accepted.
- J. All shipments shall be F.O.B. point of destination as indicated in the Proposal or on the Purchase Order.

1.38 INVOICES

- A. Invoices must be completely identifiable, supported by delivery receipts where specified, and contain the following minimum information:
 - 1. Purchase Order/Contract number.
 - 2. Delivery destination as it appears on the Purchase Order.
 - 3. Contract item number, quantity and description of item billed.
 - 4. Unit price and extended price of each item.
 - 5. Total amount of invoice.
 - 6. Any prompt payment discount offered.

1.39 INDEMNIFICATION

- A. By submitting a bid, all bidders agree that in the event they are awarded a contract, they will indemnify and otherwise hold harmless the District, its agents and employees from any and all liability, suits, actions or claims, together with all costs, expenses or attorneys'

fees, arising out of their performance of work or supplying materials and services in connection with the contract. This agreement to indemnify and hold harmless shall cover all suits, actions, claims or liabilities asserted against the District, its agents and employees, regardless of whether such suits, actions, claims or liabilities are based upon acts or failures to act attributable to the District or its employees or agents, to the extent that it shall be also determined that the acts, or failure to act are attributable, in whole or in part, to such bidders or its employees or agents.

1.40 ASSIGNMENT OF ANTITRUST CLAIMS

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

1.41 HAZARDOUS MATERIALS

A. As required in the Hazardous Chemical Information Act of June, 1984, all vendors supplying any materials that may be defined as hazardous must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation.

B. Material Safety Data Sheets must be provided directly to each School along with the shipping slips that includes those products.

1.42 CONTRACT DOCUMENTS

A. These General Instructions and any Special Instructions, Bid Specifications, Requests for Bid, Bid Proposal Form, Purchase Order, and Contract shall be a part of and constitute the contract entered into by the District and any successful bidder. In the event there is any discrepancy between any of the foregoing contract documents, the following order of documents governs so that the former prevails over the latter: Contract, Purchase Order, Bid Specifications, Special Instructions, General Instructions, Requests for Bid and Bid Proposal Form.

1.43 THE CONTRACT

A. This Contract shall be governed by Delaware law, and any dispute concerning the interpretation or application of this Contract, and any documents incorporated by reference into this Contract, or any materials supplied or work performed under this Contract must be heard in Delaware.

1.44 TRANSFER OF BIDS

A. The District named in this bid and the successful bidder may reach an agreement to make available to any agency or school district in the State the bid prices submitted for this contract. Where such an agreement exists, the District named shall have access to purchase under the contract.

1.45 CONTRACT REQUIREMENTS:

A. This contract will be issued to cover the General requirements for multiple locations of the District, as noted in this project manual _____.

1.46 CONTRACT PERIOD:

- A. Each vendor's contract shall be valid for a period from Authorization to Proceed through completion.

1.47 PRICES

- A. Prices will remain firm for the term of the contract.

1.48 MANDATORY INSURANCE REQUIREMENTS

- A. Before any work is done hereunder, the Certificate of Insurance and/or copies of the insurance policies, referencing the contract number stated herein, shall be filed with the State. The certificate holder is as follows:

As required in Section 009000

1.49 BASIS OF AWARD:

- A. The Owner shall award this contract to the lowest responsible and responsive bidder(s) who best meets the terms and conditions of the bid. .
- B. The Owner reserves the right to reject any or all bids in whole or in part, to make multiple awards, partial awards, award by types, item by item, or lump sum total, whichever may be most advantageous to the District.

1.50 HOLD HARMLESS:

- A. The successful bidder agrees that it shall indemnify and hold the District and all its agencies harmless from and against any and all claims for injury, loss of life, or damage to or loss of use of property caused or alleged to be caused by acts or omissions of the successful bidder, its employees, and invitees on or about the premises and which arise out of the successful bidder's performance, or failure to perform as specified in the Agreement.

1.51 NON-PERFORMANCE:

- A. In the event the vendor does not fulfill its obligations under the terms and conditions of this contract, the ordering agency may purchase equivalent product on the open market any difference in cost between the contract prices herein and the price of open market product shall be the responsibility of the vendor. Under no circumstances shall monies be due the vendor in the event open market products can be obtained below contract cost. Any monies charged to the vendor may be deducted from an open invoice.

1.52 PAYMENT:

- A. The agencies or school districts involved will authorize and process for payment each invoice within thirty (30) days after the date of receipt.

1.53 ALTERNATE BIDS AND SUBSTITUTIONS:

- A. All alternate bids/substitutions must be accompanied with the following information for each item in order to be considered for award.
 1. Completed bid forms
 2. Written list, stating deviations from specified product.
 3. Product literature and manufacturers specifications.
 4. Warranty Information.

- B. All vendors should also be prepared to provide a sample of the exact item bid for evaluation purposes within 48 hours of a request to provide this information. Failure of a

vendor to meet any of these terms will result in an automatic rejection of the vendor's bid for items that do not comply with these requirements.

- C. The District and the Architect reserve sole discretion on the final selections based on any and all criteria and any or all General Conditions, Special Instructions or Supplementary Conditions.

1.54 QUANTITIES:

- A. Quantities listed in this Specification are the anticipated needs for this contract. Except where budget constraints would prohibit ordering those quantities, the quantities stated are, to the best of the District's knowledge, the minimum amounts. The right to increase or decrease quantities is reserved and the unit price quoted on the bid form shall remain as quoted for the contract period.

1.55 PUNCH LIST:

- A. Vendor(s) shall complete punch list items in a timely manner. Final payment will not be issued until punch list items are complete to Owner's satisfaction

END OF SECTION

SECTION 011000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. The Project consists of the construction of full depth asphalt paving replacment, cross walks, sidewalks replacment, new curbing, new striping, stormwater drainage improvements and erosion and sediment controls..

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings and details..
- B. Contractor shall remove and deliver the following to Owner prior to start of work:
 - 1. _____.
 - 2. _____.
- C. Contractor shall remove and store the following prior to start of work, for later reinstallation by Contractor:
 - 1. _____.
 - 2. _____.

1.04 OWNER OCCUPANCY

- A. Owner intends tocontinue to occupyadjacent portions of the existing building during the entier period of construction for teh oconduct of normal operations. .
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Construct work to accommodate the Owner's use of the premises during the construction period. Coordinate with the Owner's Representative to minimize inconvenience to faculty, students and parents/guardians.

1.05 TIME OF START AND COMPLETION

- A. Site is available for start of work on June 20 2016
- B. The Work shall be Substantially Complete within 56 calendar days after issuance of Notice to Proceed (if any) or Date of Contract, whichever is earlier.
 - 1. Provide double shifts and/or overtime if required to meet Substantial Completion date.
 - 2. Work must be completed by August 12 2016
 - 3. Minor work may be permitted after occupancy.

1.06 LIQUIDATED DAMAGES

- A. There are no Liquidated Damages applying to this Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section 005000 - Contracting Forms and Supplements: Forms to be used.
- B. Document 007300 - Supplementary Conditions: Percentage allowances for Contractor's overhead and profit.
- C. Section 012100 - Allowances: Payment procedures relating to allowances.
- D. Section 012200 - Unit Prices: Monetary values of unit prices, payment and modification procedures relating to unit prices.

1.03 SCHEDULE OF VALUES

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Engineer for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- D. Include in each line item, the amount of Allowances specified in Section 01210. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Engineer for approval.
- C. Forms filled out by hand will not be accepted.
- D. Execute certification by signature of authorized officer.
- E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- F. List each executed Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- G. Submit three copies of each Application for Payment.
- H. Include the following with the application:
 - 1. Insurance certificates for off-site stored products.

1.05 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Engineer will issue instructions directly to Contractor.
- C. For other required changes, Engineer will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Engineer will issue a Contract Modification Request (CMR) that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change, with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation, including changes in Contract Time, if necessary, .
 - 1. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress.
 - 2. Format for Contract Modification Requests shall be as issued by the Architect at the Pre-Construction meeting.
- E. Contractor may propose a change by submitting a change order request for change to Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
- G. Substantiation of Costs: Provide full information required for evaluation.
 - 1. Provide following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 - 2. Support each claim for additional costs, including time and material work, with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 - 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

- H. When the information in the Contract Modification Request and Change Order Request is complete, it will be submitted to the Architect for review and forwarded to the Owner. If the change is agreed to by the Owner, the Architect will prepare a Change Order and forward it to the Contractor for signature.
- I. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- J. After execution of Change Order by all parties, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- K. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- L. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in Section 017000.
 - 2. All Closeout submittals as specified in Section 017800.
 - 3. Submit Affidavit of Payment of Indebtedness: See General Conditions.
 - 4. Submit Consent of Surety to Final Payment: See General Conditions.
 - 5. Submit Releases of Liens: See General Conditions. Release forms shall conform to State law governing mechanics Liens and shall be transmitted with AIA Document G706A. Note that Document G706A is not a release of liens and must be accompanied by actual releases.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012200

UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

1.02 COSTS INCLUDED

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 MEASUREMENT OF QUANTITIES

- A. Assist by providing necessary equipment, workers, and survey personnel as required.

1.04 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Engineer, multiplied by the unit price.
- B. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected Products.

1.05 SCHEDULE OF UNIT PRICES

- A. The description of Unit Prices contained in this Section is in summary form. Detailed requirements for materials and execution are shown on the drawings and specified in the Section indicated.
- B. Refer to Bid Form for complete list of Unit Prices required.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Special meetings
- B. Submittals for review, information, and project closeout.
- C. Submittal procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.02 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. MSDS sheets.
 - 8. Other types indicated.
- B. Submit for Engineer's knowledge as contract administrator or for Owner. No action will be taken.

3.03 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Warranties.
 - 3. Bonds.
 - 4. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Construction Aids
- E. Security requirements.
- F. Vehicular access and parking.
- G. Traffic Regulation
- H. Tree and Plan Protection
- I. Waste removal facilities and services.
- J. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 015100 - Temporary Utilities.

1.03 TEMPORARY UTILITIES - SEE SECTION 015100

1.04 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 - 2. Telephone Land Lines: One line, minimum; one handset per line.
 - 3. Internet Connections: Minimum of one; DSL modem or faster.
 - 4. Facsimile Service: Minimum of one dedicated fax machine/printer.

1.05 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. New permanent facilities may not be used during construction operations.
- D. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 FENCING

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.
- C. Location:
 - 1. Enclose and secure all construction areas.
 - 2. Locate vehicular entrance gates in suitable relation to construction facilities; and to avoid interference with traffic on public thoroughfares.
 - 3. Locate pedestrian entrance gates as required to provide controlled personnel entry, in suitable relation to construction parking facilities.

1.08 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of 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. Provide access doors with self-closing hardware and locks.

1.09 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - 1. Maximum flame spread rating of 75 in accordance with ASTM E84.

1.10 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required to facilitate execution of the Work. Examples are scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.
- B. Mutual use may be arranged by the Contractor where applicable.
- C. Stairs in existing building shall not be used by construction personnel.
- D. Elevators in the existing building and new elevators shall not be used by construction personnel.

1.11 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Security of persons and property in areas under control of the Contractor shall be the Contractor's exclusive responsibility.
- C. The Contractor, at his own expense, shall initiate whatever programs necessary to execute his responsibility.
- D. Control of access to the areas under control of the Contractor shall be maintained. Visitors shall be required to report immediately to the Field Office and to produce full

identification to be recorded in the Contractor's Daily Log, along with the purpose of the visit.

E. Coordinate with Owner's security program.

1.12 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Maintain traffic areas free as possible of excavated materials, construction equipment, products, snow, ice and debris.

F. Designated existing on-site roads may be used for construction traffic.

1. Provide additional temporary roads as needed for required construction access.

2. Maintain existing road construction, and restore to original, or specified, condition at completion of Work.

G. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.13 TRAFFIC REGULATION

A. Obtain all temporary permits for access to and use of public roads and streets for construction and hauling purposes. Comply with traffic control regulations applying to permit issuance.

B. Provide all markers, signs, lights and barriers on and near the site to safely control construction traffic and public access.

1.14 TREE AND PLANT PROTECTION

A. Preserve and protect existing trees and plants at site which are designated to remain, and those adjacent to site.

B. Consult with Engineer, and remove agreed-on roots and branches which interfere with construction. Employ qualified tree surgeon to perform removal and treat cuts.

C. Provide temporary barriers to a height of six feet, around each, or around each group, of trees and plants.

D. Protect plants from deleterious liquid and solid droppings from construction operations.

E. Protect root zones of trees and plants:

1. Do not allow vehicular traffic or parking.

2. Do not store materials or products.

3. Prevent dumping of refuse or chemically injurious materials or liquids.

4. Prevent puddling or continuous running water.

F. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.

G. Replace, or suitably repair, trees and plants designated to remain which are damaged or destroyed due to construction operations.

1.15 WASTE REMOVAL

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.16 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices and storage sheds as as directed in the field.
- D. Office may be moved inside new structure or located inside existing structures if approved by Engineer and Owner.

1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
 - 1. Remove stone from temporary access roads, unless it is to be incorporated into new work.
 - 2. Grade damaged areas of site to required elevations, spread topsoil, and re-seed.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 017800
CLOSEOUT SUBMITTALS**PART 1 GENERAL**

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 007200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Engineer with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned, with Engineer comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Addenda.
 - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings : Legibly mark each item to record actual construction including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 3. Field changes of dimension and detail.
 - 4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 3 inch (____ mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrange content by products and systems under section numbers and sequence of Table of Contents of this Project Manual.
 - 1. Operating instructions.
 - 2. Maintenance instructions for equipment and systems.
 - 3. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- M. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 230200

GENERAL PROVISIONS – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to work of this Section.
- B. This specification or drawing and the design features or resulting construction disclosed, are the property of Furlow Associates, Inc., and shall not be reproduced without written permission.
- C. All Mechanical Systems shall be part of and included in all of the following: 230200 thru 230950.

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and supervision necessary to install complete operating HVAC Systems, including all work at the site and within the proposed construction areas to accomplish the required work.
- B. Wherever the term "provide" is used, it shall be understood to mean both "furnish" and "install".

1.3 REGULATIONS, CODES AND STANDARDS

- A. Work shall be performed in accordance with latest adopted codes, regulations and ordinances by authorities having jurisdiction. Observe all safety regulations.
- B. Obtain all permits and inspection certificates and pay all charges.
- C. Latest editions of any referenced standards shall govern.

1.4 RELATED WORK

- A. Refer to equipment shown or specified in sections of Division 1 thru 14 and 26 that will require Mechanical services and provide such service.
- B. Refer to work related to HVAC as shown on the following contract drawings:
 - Architectural & Structural
 - Plumbing
 - Electrical
- C. This Contractor shall coordinate with the work of Division 16 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 16, Electrical.

1.5 COORDINATION

- A. The Mechanical, Plumbing and Electrical Contractors are responsible to coordinate all manufacturer's recommended circuit breakers, starters, disconnects and fuse sizes for all equipment. Submission of a shop drawing will certify that this has been completed. Any necessary changes required will be included as part of this contract.

- B. Mechanical Contractor shall coordinate scheduling, submittals and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of independent work elements, with provisions to accommodate items that may be installed at a later time.
- C. Mechanical Contractor shall verify utility requirements and all characteristics of operating equipment are compatible with the building utilities. Coordinate the work of all sections related and required for installing, connection and placing in service of all equipment.
- D. Mechanical Contractor shall coordinate all space requirements, supports and installation of all mechanical, electrical, plumbing and fire protection work, which are indicated diagrammatically on the Drawings. Verify routing of all pipes, ducts, conduits and equipment connections. Maximize accessibility for other work, and service requirements for maintenance and repairs.
- E. Obtain written confirmation from all related trade Contractors and the Owner or his representative that requirements, conflicts and coordination issues have been discussed and resolved.
- F. Submit coordination drawings to verify access and clearances.

1.6 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations..
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installation within unheated shelters.

1.7 SUBMITTALS

- A. Shop Drawings:
 - 1. Shop drawings shall be submitted in accordance with Division 1 of these specifications except where herein modified.
 - 2. Shop drawings comprising complete catalog cuts, performance test data for HVAC equipment as required by other sections of Division 23, shall be submitted for review checking. The Contractor shall review these shop drawings for conformance to contract documents prior to submission and affix contractor's signature to each submittal certifying that this review has been done. By approving and submitting shop drawings, product data, samples and similar materials, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction data that relates to the work, and has checked and coordinated this information with all of the requirements contained in the contract documents for the work of all trades.
 - a. The Contractor and equipment manufacturer shall clearly identify in all submittals and shop drawings any and all applications standards which require additional work to accommodate this equipment and provide a complete and operational system as described in the contract documents.

- b. The Contractor shall be completely responsible for any and all additional costs associated with the changes required by this and all other trades.
 3. Submit a 1/4" scale layout of all mechanical equipment rooms. All equipment and pads shall be to scale of equipment being furnished. Obtain size information of any and all equipment from other trades and indicate on drawings. The drawings shall be fully coordinated with all trades prior to submission. Indicate coil pull areas, filter pull areas, maintenance clearances, and access as applicable.
 4. All shop drawing submittals shall have the following identification data, as applicable, contained therein or permanently adhered thereto.
 - a. Project name.
 - b. Project number.
 - c. Sub-contractor's, vendor's and/or manufacturer's name and address.
 - d. Product identification.
 - e. Identification of deviation from contract documents.
 - f. Applicable contract drawings and specification section number.
 - g. Shop drawing title, drawing number, revision number, and date of drawing and revision.
 5. Resubmit revised or additional shop drawings as requested.
 6. Wherever shop drawings or vendor's standard data sheets indicate work to be done "by others", it shall be the responsibility of the contractor making the submission to identify by name, the contractor who is to do this work. If the contractor named is other than the contractor making the submission, the shop drawing submission must be reviewed by the named contractor and bear his mark of approval, prior to submission to the Architect/Engineer.
 7. Where equipment proposed differs from that shown on the drawings or specified, he shall submit for approval drawings showing the manner in which the layout is affected by the substitution.
 8. The Contractor shall keep one copy of approved shop drawings at the job site, filed in a suitable metal container. The shop drawings shall be cataloged and kept in good repair, and shall be available for use by the Owner, Architect and Engineer.
 9. No equipment shall be ordered, fabricated, etc., before approval of shop drawings.
- B. Contractor is responsible for the shop drawing coordination and interface with the work of other contracts and adjacent work. The relationship of Contractor's work shall be verified as it relates to adjacent and critical features of the work of this and all contracts and materials.
- C. The Contractor shall submit a complete schedule of all shop drawings required for the scope of work covering all materials and equipment listed in all sections of Division 23, Mechanical, including all documents required for contract closeout, Owner instructions and training, and all turnover items at the completion of the work. This schedule shall be submitted for review and approval within thirty days of contract award and before any subsequent materials are provided for review.
- D. The shop drawings provided by the Contractor will be reviewed only once and resubmittals will be reviewed only once. Any other submittals will be billed to the Contractor at the Engineer's standard rates.

1.8 SITE INSPECTION

- A. The Contractor shall visit site, inspect, and become aware of all conditions which may effect the work during the estimation phase of his work prior to bid openings. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.
- B. Submission of a bid will be deemed evidence of having complied with this requirement.

1.9 SUBSTITUTIONS

- A. Whenever a material, article, piece of equipment or system is identified in the following specification or indicated on the drawings by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing the basis of the Bid.
- B. Substitution approval must be obtained and included as an addendum item prior to the submission of the bid. An approved substitution shall not be considered as an approval for the Contractor or an equipment vendor to deviate from the written portion of the specifications unless so stated in the addendum.
- C. The drawings illustrate the space allocated for equipment and the Contractor shall install the equipment accordingly. If changes are required in the building or arrangement due to substitution of equipment, the Contractor making the substitution must pay for the necessary modifications.
- D. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but not be limited to all: space requirements, code clearances, type-horsepower-capacities-number and size of services required from other trades including all auxiliary items provided by this Contractor and all other trades, and all manufacturer's specific equipment applications standards and requirements, for approved equipment including that which is basis of design or a substitution. The bidding related contractor and equipment manufacturers shall clearly identify in all submittals and shop drawings any and all applications standards which require additional work to accommodate this equipment and provide a complete and operational system as described in the contract documents. If the bidding contractor or manufacturer does not comply with these requirements then they shall be completely responsible for any and all additional costs associated with the changes required by this and all other trades.
- E. Substitutions:
 - 1. Until a date no later than seven (7) days before the date Bids are due, Architect will consider written requests from bidders for substitution of Products. Architect will review requests and will notify Bidders in an Addendum if the requested substitution is acceptable.
 - 2. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the Product specified.
 - e. Any required license fees or royalties.
 - f. Availability of maintenance service, and source of replacement materials.
 - 3. Architect shall be the judge of the acceptability of the proposed substitution.

4. A request for a substitution constitutes a representation that Bidder:
 - a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the Product specified.
 - c. Will coordinate the installation of an accepted substitution into the work, and make such other changes as may be required to make the work complete in all respects.
 - d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

1.10 LUBRICATION

- A. Provide and maintain all required lubrication of any equipment operated prior to acceptance by the Owner. Lubrication shall be as recommended by the equipment manufacturer.
- B. Provide one year's supply of lubricants to Owner at date of acceptance.
- C. Verify that required lubrication has taken place prior to any equipment start-up.

1.11 EQUIPMENT START-UP

- A. Verify proper installation by manufacturer or his representative.
- B. Advise Owner's Representative 2 days prior to actual start-up.
- C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to Owner's Representative.
- D. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
- E. The Mechanical Contractor shall own as part of his work, the following:

Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

1.12 OPERATION & MAINTENANCE INSTRUCTIONS

- A. Properly and fully instruct Owner's personnel in the operation and maintenance of all systems and equipment.
- B. Insure that the Owner's personnel are familiar with all operations to carry on required activities.
- C. Such instruction shall be for each item of equipment and each system as a whole.
- D. Provide report that instruction has taken place. Include in the report the equipment and/or systems instructed, date, contractor, Owner's personnel, vendor, and that a complete operating and maintenance manual has been reviewed.
- E. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalogue cuts, complete schedule of air filters for each unit type in Excel spreadsheet format, wiring diagrams, piping diagrams, control sequences, service requirements, names and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided.
- F. Submit manuals for review prior to operating instruction period. Manuals shall be 8-1/2 x 11" with hard cover, suitably bound.

- G. Provide to the Owner any special tools necessary for operation and routine maintenance of any of the equipment.
 - H. Upon completion of the project, the Mechanical Contractor shall provide a complete set of legible as-built drawings for the Owner.
- 1.13 TOOLS
- A. All equipment furnished by the Mechanical Contractor which requires special tools or devices other than those normally available to the maintenance or operating staff shall be furnished in duplicate to the Owner, sufficiently marked, packed or boxed for staff usage. The tools provided shall be listed by the Mechanical Contractor identified as to their use or the equipment applicable in a written transmittal to the Owner.
- 1.14 CLEANING AND FINISHING
- A. After equipment start-up and all operating tests have been made and the system pronounced satisfactory, each respective Contractor shall go over the entire project, clean all equipment, etc., installed by him and leave in a clean and working condition. Any surfaces found marred after this final cleaning shall be refinished or replaced by each Contractor at no cost to the Owner.
 - B. Provide for the safety and good condition of all materials and equipment until final acceptance by the Owner. Protect all materials and equipment from damage. Provide adequate and proper storage facilities during the progress of the work. Special care shall be taken to provide protection for bearings, open connections, pipe coils, pumps, compressors and similar equipment.
 - C. All fixtures, piping, finished surfaces and equipment shall have all grease, adhesive labels and foreign materials removed.
 - D. All piping shall be drained and flushed to remove grease and foreign matter. Pressure regulating assemblies, traps, and similar items shall be thoroughly cleaned. Remove and thoroughly clean and reinstall all liquid strainer screens after the system has been in operation ten (10) days.
 - E. When connections are made to existing systems, the Mechanical Contractor shall do all cleaning and purging of the existing systems required to restore them to the condition existing prior to the start of work.
 - F. Clean-up: Remove from the premises, all unused material and debris resulting from the performance of work under this section.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All material and equipment shall be new and of present day manufacture, and shall conform to accepted standards of the trade where such a standard has been established for the particular type of equipment or material.
- B. Whenever equipment or material is referred to in the singular, such as "the fan", it shall be deemed to apply to as many such items as necessary to complete the work.

2.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. During loading, transporting and unloading exercise care to prevent damage to material.
- B. Store all materials in dry enclosures or under protective coverings out of way of work progress.
- C. Material shall not be allowed to be stored directly on ground.
- D. Deliver in manufacturer's original cartons or on skids.

- E. Handle and protect so as to prevent damage to product or any surrounding material.

2.3 WARRANTY

- A. Wherever in the specification sections of this division, reference is made to a specific warranty period, this warranty shall be in addition to and not a limitation of other rights the Owner may have against the Mechanical Contractor under the contract documents.

PART 3 – EXECUTION

3.1 PROTECTION

- A. Plug or cap open ends of piping systems, conduit and ductwork.
- B. Stored materials shall be covered to prevent damage by inclement weather, sun, dust or moisture.
- C. Protect all installed work until accepted in place by the Owner.
- D. Plates, polished metal escutcheons, thermostats and other finished devices shall not be installed until masonry, tile, and painting operations are complete unless otherwise protected.
- E. Protect all work from operations which may cause damage such as hauling, welding, soldering, painting, insulating and covering.

3.2 WORKMANSHIP

- A. Install all work neat, trim and plumb with building lines.
- B. Install work in spaces allocated.
- C. Cutting and patching shall be performed by skilled tradesmen normally employed for the work involved.
- D. This Contractor shall provide a complete weathertight seal to all new systems in the building including the necessary caulking, weather-stripping and insulation.

3.3 FASTENERS, HANGERS AND SUPPORTS

- A. Provide all hangers and supports required to suspend, mount, or hang the work.
- B. Provide all miscellaneous steel angles, channels, beams, clips, brackets and anchors necessary to hang or support the work. Provide submissions for review.
- C. Power-driven fasteners shall not be allowed for piping larger than 2 inch, or equipment. When used they shall not be loaded more than 1/8 rated capacity or 200 pounds.
- D. All hangers, miscellaneous steel, braces and supports shall be galvanized, cadmium plated, or primed steel. Copper tubing shall be supported with copper hangers.
- E. Piping shall be supported from adjustable clevis type hangers with insulation pipe saddles or pipe shields in accordance with piping support spacing table on the drawings. Where hangers are 18" or longer provide lateral bracing at every fourth hanger.
- F. Support vertical piping at floor levels. Piping shall have split rings.
- G. Any lintels required for openings for this work if not indicated on Architectural or Structural drawings shall be provided under this Section.

3.4 SLEEVES

- A. Provide each pipe, duct or conduit passing through a masonry or concrete wall, floor or partition with a sleeve made from standard weight steel pipe for pipe or conduit and No. 12 gauge galvanized steel for ducts, with smooth edges, securely and neatly cemented in place. Provide each pipe, duct or

conduit passing through a frame or metal partition with a sleeve made from No. 22 gauge galvanized sheet metal, securely fastened in place.

- B. Be responsible for the proper location and alignment of all sleeves.
- C. Provide hydrostatic seals for sleeves passing through outside walls, either above or below grade, or through hydrostatically sealed slabs or floors on grade. Provide fire-rated seals for all sleeves which penetrate fire-rated walls.
- D. Install both piping and sleeve seals so as to maintain integrity of seals with expansion and contraction of piping.
- E. Set floor sleeves flush with floor surface in finished areas, 1" above the finished floor in kitchens, cafeterias, and similar service areas unless such areas are slab-on-grade; 1" above the floor in mechanical rooms, pipe chases, pipe spaces and other unfinished areas, unless otherwise indicated, and flush with the underside of slabs. Extend wall and partition sleeves through and cut flush with each surface unless otherwise indicated or specified.
- F. Select sleeves two pipe sizes larger than any pipe or conduit that is to remain uncovered, unless otherwise required by the sealing method specified. Where pipes are to be covered, provide sleeves large enough to allow the covering to pass through the sleeves with sufficient clearance for sealing as specified hereinafter. Size sleeves for branch piping from vertical risers large enough to permit vertical expansion at the riser.

3.5 PLATES

- A. Provide chrome plated plates wherever piping passes into finished area.
- B. Plates shall be securely fastened to piping or building construction.
- C. Floor plates shall cover 1 inch sleeve extension.

3.6 OFFSETS, TRANSITIONS, MODIFICATIONS

- A. Provide all offsets necessary to install the work and to provide clearance for other trades.
- B. Maintain adequate headroom and clearance.
- C. Incidental modifications necessary to the installation of the systems shall be made as necessary and as approved by the Architect.

3.7 LABELING

- A. All HVAC equipment such as pumps, fans, air handling units, and devices requiring identification for operating procedures shall be provided with permanent black laminated micarta white core labels with 3/8 inch letters.
- B. This shall also apply to all controllers, remote start/stop pushbuttons and equipment cabinets.
- C. This shall not apply to individual room thermostats.

3.8 ACCESS

- A. Locate all equipment, valves, devices and controllers which may need service in accessible places.
- B. Where access is not available, access panels shall be provided. Furnish access panels to the Owner's Representative for installation.
- C. Access panels shall be Nailor-Hart Industries, Karp Co., or Controlled Air Manufacturing Limited, with 16 gauge frames and 14 gauge steel door, prime painted.

- D. Maintain access clearances for tube or fan removal, coil pulls, and filter removal.

3.9 WIRING AND MOTOR CONTROLS

- A. Packaged equipment shall be furnished with disconnect switches, starters, overloads, factory furnished and wired by the unit manufacturer.
- B. Roof-mounted exhaust fans, except utility sets, rated less than 1/2 HP at 115 volts, single phase, shall be furnished with disconnect switches, factory furnished and wired by unit manufacturer.
- C. Rooftop equipment shall be furnished with starters, disconnect switches, overloads, factory furnished and wired by unit manufacturer.
- D. This Contractor shall furnish all information and assistance required for the Electrical Contractor to purchase all motor starters that are not specified to be part of the mechanical equipment.
- E. Control wiring shall be provided under this Division of the work.
- F. All wiring shall be in accordance with the National Electrical Code and as recommended by the equipment manufacturer.

3.10 UTILITIES

- A. Do not interrupt any utility or service to the Owner without adequate previous notice and schedule.

3.11 OPENINGS – CUTTING, REPAIRING

- A. This Contractor shall cooperate with the work to be done under other sections in providing information as to openings required in walls, slabs and footings for all piping, ductwork and equipment, including sleeves where required.
- B. Any drilling or cutting required for the performance of work under this Section, shall be the responsibility of this Contractor and the cost thereof shall be borne by him.
- C. Holes in Concrete: Sleeves shall be furnished, accurately located and installed in forms before pouring of concrete. This Contractor shall pay all additional costs for cutting of holes as the result of the incorrect location of sleeves. All holes through existing concrete shall be either core drilled or saw cut. All holes required shall have the approval of the Structural Engineer prior to cutting or drilling.
- D. It shall be the responsibility of this Contractor to ascertain that all chases and openings are properly located.

3.12 PAINTING

- A. This Contractor shall be responsible for painting required in conjunction with cutting and patching of existing building construction, in areas which are not scheduled for painting under the General Contract. This Contractor shall also be responsible for painting existing equipment, and/or piping, where finish is damaged by new work, in these same areas.
- B. Refer to Division 1 for types of paint, color and finish.
- C. Surfaces subjected to temperatures below 180 degrees F, shall be painted with one coat of rust-resisting paint and one coat of high gloss enamel or sufficient finish coats for complete and uniform cover and high glossy finish.
- D. Surfaces subjected to temperatures above 180 deg. F, shall be painted with one coat of heat-resistant paint and one coat of heat resistant enamel, or sufficient finish coats for complete and uniform cover and high glossy finish.
- E. All painting shall be done in a careful, neat and workmanlike manner, with particular care being exercised to protect adjacent building and equipment finishes. All surfaces shall be thoroughly

cleaned of dirt, rust, scale, dust, grease, oil, debris and sanded, sand blasted or power brushed to properly prepare to provide bond for the paint. Contractor shall be entirely responsible for cleaning and preparing all surfaces. Should evidence appear that the surface was not properly prepared, the Contractor shall remove paint, prepare surface and repaint, as required, at no additional cost.

- F. All name plates, data plates that indicate manufacturer, model, size, capacity codes or identifying data on equipment painted, shall not be painted, but shall be carefully cut in.
- G. All exposed canvas, insulation jackets and other porous surfaces shall be cleaned and sized with at least two coats of sizing primer before finish coats are applied. Sizing shall completely cover canvas so that canvas will not be noticeable through the final finish coat.
- H. Equipment factory painted and not damaged shall not be painted, except equipment herein specified to be painted a particular color. Damaged surfaces on factory painted equipment will necessitate the painting by this Contractor.
- I. Grilles, access panels, fan screen, convector, and unit heater enclosures and other prime-coated equipment in finished areas, will be painted by the General Contractor.
- J. Piping, fans, floor-mounted pipe supports, containers, hangers, pump and other equipment surfaces that are insulated or uninsulated shall be finished in accordance with the Owner's color code.
- K. The Mechanical Contractor shall furnish and lay drop clothes in all areas where painters finish work is being done, to protect floors and roofs and all other work from defacement. All temporary protections or coverings removed too early from any part of the work shall be promptly replaced, and any damage from neglect to do so shall be made good at the Mechanical Contractor's expense.
- L. At the end of each day, the Mechanical Contractor shall place in covered metal containers, or destroy, all cloths, waste and refuse, which have been used in the application of inflammable paint materials. At the completion of work, all staging, scaffolding, containers and debris shall be removed from premises, leaving all painting in perfect and clean condition. Upon completion, leave the work clean and free from blemishes. Hardware, tile, marble, and similar material shall be thoroughly cleaned of all paint.

3.13 GUARANTEE

- A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the Owner.
- B. Guarantee shall be extended on an equal time basis for all non-operational periods due to failure within the guarantee period.
- C. All materials and equipment provided and/or installed under this section of the specifications shall be guaranteed for a period of one year from date of acceptance of the work by the Owner unless otherwise specified in Division 1. Should any trouble develop during this period due to defective materials or faulty workmanship, the Mechanical Contractor shall furnish necessary labor and materials to correct the trouble without any cost to the Owner. Any defective materials or inferior workmanship noticed at time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner.
- D. In the event of occupancy by the Owner prior to final acceptance of the project, the guarantee date for equipment placed in operation shall be mutually agreed to by the Mechanical Contractor and the Owner's representative.

3.14 DRAWINGS

- A. The Mechanical Systems are indicated on the Contract Drawings. Certain pertinent information and details required by the Mechanical Work appear on the Architectural, Structural and Electrical Drawings; become familiar with all drawings, and incorporate all pertinent requirements.
- B. Drawings are diagrammatic and indicate the general arrangement of systems and requirements of the work. Do not scale drawings. Exact locations of fixtures and equipment, not specifically shown, shall be obtained before starting work.

3.15 TESTING AND BALANCING OF MECHANICAL EQUIPMENT

- A. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
- B. The Mechanical Contractor shall own as part of his work, the following:
Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

END OF SECTION 230200

SECTION 230210

BASIC MATERIALS AND METHODS – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
- B. Refer to Section 230200 for HVAC General Provisions.
- C. Refer to other sections in Division 23 for materials and methods not specified herein.

1.2 DESCRIPTION OF WORK

- A. Included in this Section are the following:
 - 1. Chlorinated Polyvinyl Chloride (CPVC) Pipe & Fittings
 - 2. Copper Tubing & Fittings
 - 3. Unions
 - 4. Motors

1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. Install work to meet the requirements of the following:
 - 1. New Castle County Dept. of License and Inspections
 - 2. International Mechanical Code
 - 3. Gas Utility Company
 - 4. NFPA
 - 5. OSHA
 - 6. ASHRAE
 - 7. Manufacturer's Standardization Society (MSS) of the valve and Fittings Industry, Inc.:
 - SP-58 Pipe Hangers and Supports Materials, Design and Manufacture.
 - SP-69 Pipe Hangers and Supports Selection and Application
- C. Appliances and materials governed by UL requirements shall meet such requirements and bear the label.

1.4 QUALITY ASSURANCE

- A. Provide adequate supervision of labor force to assure that all aspects of the specifications are being fulfilled.
- B. Verify that all work and equipment is installed in accordance with manufacturer's warranty requirements.

PART 2 – PRODUCTS**2.1 CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPE AND FITTINGS
(Pool Heating Supply & Return)**

- A. Pipe: ASTM D-2846 schedule 40, Type 1, Grade 1.
- B. Fittings: ASTM D-2466 Schedule 40.
- C. Solvent Cement: ASTM D-2564 Schedule 40 and DWV.
- D. Uniformity: To ensure installation uniformity, all piping components shall be of one manufacturer.
- E. Flux shall be non-toxic type and non-corrosive.

2.2 COPPER TUBING & FITTINGS

- A. Condensate Drain Piping:
 - 1. Pipe: Copper tubing Type DWV.
 - 2. Fittings: Wrought copper solder type drainage fittings, ASME B16.23 or B16.29.

2.3 UNIONS

- A. Up to and including 2 inch pipe size: Screwed pattern, bronze-to-bronze seat.
- B. Above 2 inch pipe size: Flanged pattern, A.S.A. forged steel, with gaskets, bolts and nuts.
- C. Copper tubing unions shall have sweated type ends. Flanged unions on copper tubing may be soldered connections.
- D. Materials and pressure ratings shall be the same as specified for the respective pipe and fitting system unless otherwise specified.

2.4 MOTORS

- A. All single phase and polyphase motors shall be manufactured to incorporate the latest NEMA standards.
- B. All single phase and polyphase motors shall have steel frames with ball bearings and copper windings. All motors to have a Class "F" insulation system with a service factor of 1.15.
- C. All motors shall be 1725 RPM, 4 pole design, unless otherwise noted on the drawings, or in the equipment specifications.
- D. Motors installed indoors and not exposed to moisture shall be open, dripproof, Class B temperature rise based on 40 deg. C maximum ambient temperature.
- E. Motors installed outdoors and exposed to moisture shall be totally enclosed, fan cooled, Class B temperature rise based on 40 deg. C maximum ambient temperature.
- F. Based on NEMA Standards, motors shall comply with the following minimum nominal efficiencies at full load.

Nominal Efficiencies for “NEMA Premium™” Induction Motors						
Rated 600 Volts or Less (Random Wound)						
	Open Drip-Proof			Totally Enclosed Fan-Cooled		
HP	3500 RPM	1800 RPM	1200 RPM	3500 RPM	1800 RPM	1200 RPM
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	93.6
125	95.4	95.4	94.1	95.0	95.4	94.1
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	94.1	95.8	96.2	95.0

- G. Motor Characteristics: Refer to Equipment Schedules for specific data.
120/208 Volt System: Motors 1/2HP & Larger - 208V, 3 Phase, 3 Wire
- H. All motors rated 1/2HP and larger shall have thermal protection provided by an external device.
- I. Whenever a variable frequency PWM drive is installed to control an AC motor, a maintenance-free, circumferential, conductive micro fiber shaft grounding ring shall be installed on the AC motor drive end to discharge shaft currents to ground. Recommended part: AEGIS SGR™ Bearing Protection Ring, as made by Electro Static Technology. Install in accordance with the manufacturer’s written instructions.

PART 3 – EXECUTION

3.1 PIPING SYSTEMS

- A. All piping to drain to low points. Low points shall be provided with drain valves with hose thread.

- B. All piping shall be arranged to have air vents at high points.
 - 1. Air vents shall be automatic in operation when located in Boiler Rooms, Chiller Rooms and Mechanical Equipment Rooms. All air vents shall be provided with a PVC drain line which shall be routed to the nearest floor drain. Several air vents may be tied together.
 - 2. Air vents shall be manual in operation in all other locations.
- C. Do not install trapped lines where water cannot be drained or air can accumulate without being vented.
- D. Piping shall run square with building lines.
- E. Piping shall not be insulated or covered until tested.
- F. Necessary drains, off-sets, vents and drips shall be provided for coordination of the work as part of the contract.
- G. Running or close nipples are not permitted.
- H. Piping shall not be installed over electrical transformers, panels, switchgear, substations, and control panels. No piping shall be installed in elevator machine rooms.
- I. Exposed insulated piping risers in unfinished spaces shall be covered with 22 gauge galvanized steel sleeves from floor to ceiling. Refer to Section: Insulation & Covering – HVAC for additional requirements.
- J. Allow clearance for expansion and contraction.
- K. Install eccentric piping fittings where change in sizes occurs in piping systems. Tops of pipes shall remain level for hydronic systems. Bottom of pipe shall remain level for steam systems.
- L. Install isolating fittings between sections of ferrous and non-ferrous pipe or connected equipment.
- M. Do not support piping from other piping, conduits or equipment.
- N. Strainers shall be installed on suction of all pumps, inlets of control valves, and where indicated on drawings.
- O. Thermometers and gauges shall be installed where indicated on the drawings, required by equipment specifications and where indicated elsewhere in the specifications.
- P. Flexible connectors shall be provided on suction and discharge piping of all base mounted pumps.
- Q. Unions shall be provided adjacent to all valves, at equipment connections, and where necessary to facilitate dismantling of the piping system.
- R. Install expansion joints, expansion compensators, anchors and guides in piping systems as shown on the drawings and in accordance with manufacturer's written instructions.
 - 1. Provide anchors and guides on both sides of the expansion compensator or expansion joint in accordance with EJMA Standards.
 - 2. Provide anchors and moment guides in each pipe, with the first moment guide located the equivalent of four-pipe diameters from the compensator, and the second guide fourteen pipe diameters beyond the first guide.
 - 3. Remove all shipping blocks, stays, setscrews, etc., from all compensators and moment guides. Pipe centerlines shall be aligned.
 - 4. During initial system pressurization, all pipe guides and anchors must be secure and functioning.

- S. Material Requirements for Systems:
 - 1. AC Condensate Drain (including pumped condensate):
 - a. Type DWV copper.
 - 2. Pool Water Supply & Return Piping:
 - a. Schedule 40 CPVC.
- 3.2 SOLDERING/BRAZING
- A. Connections between copper tubing and copper fittings shall be made with the appropriate filler metal. Flux shall be non-corrosive type as recommended by the manufacturer of the filler metal, and conforming to AWS A5.8.
 - B. Tubing shall be cut square and then reamed and deburred. End of tubing and inside of fitting cup shall be cleaned with steel wool and the flux shall be applied to the clean surface before joining. After joining, the excess filler metal shall be wiped off while still plastic.
 - C. Silver brazing alloy shall be equal to Easy-Flo by Handy and Harmon or Sta-Brite silver solder and shall be used for joints in:
 - 1. Air conditioning condensate drain piping
 - D. Where the silver brazing is performed in a confined non-ventilated space, a non-toxic, cadmium-free brazing alloy such as braze 560 by Handy & Harman shall be used.
 - E. Bring joint to solder temperature or brazing temperature in as short a time as possible.
 - F. Form continuous solder bead or brazing filler bead around entire circumference of joint.
 - G. Wipe excess solder from joint area while solder is still plastic.

END OF SECTION 230210

SECTION 230950**TESTING & BALANCING OF MECHANICAL SYSTEMS****PART 1 – GENERAL****1.1 JOB CONDITIONS**

- A. Systems shall be completely installed and in continuous operation as required to accomplish the tests.
- B. Heating, ventilating and air conditioning equipment shall be completely installed and in continuous operation as required to accomplish the balance work specified.
- C. Adjust and balance shall be performed when outside conditions approximate design conditions indicated for heating and cooling functions.
- D. Make at least two inspections of the mechanical systems during construction to verify that balancing procedures may be accomplished. Report findings to the Architect/Engineer/Construction Manager.
- E. Balancing firm shall balance Mechanical System two (2) times. The first time shall be considered a rough balance. Any discrepancy in air flow shall be addressed to the Architect/Engineer/Construction Manager. The final balancing will be accomplished after review of rough balance reports.
- F. The final balancing reports shall be submitted and approved prior to project's being considered complete; i.e., commencement of warranties.

1.2 ENGINEER QUALIFICATIONS

- A. The firm shall be an independent organization having no affiliation with construction contractors, equipment sales or design engineering.
- B. The firm shall specialize in balancing heating, ventilating and air conditioning systems.
- C. The firm shall show proof of having balanced and tested at least five projects of similar size and scope.
- D. All field work shall be under the direct supervision of a registered Professional Engineer who is a full-time employee of the balancing firm.
- E. The firm shall be certified by and a member of the AABC (Associated Air Balance Council), or NEBB (National Environmental Balancing Bureau).

1.3 REPORT

- A. Data Sheets:
 - 1. Submit data sheets on each item of testing equipment required.
 - 2. Include name of device, manufacturer's name, model number, latest date of calibration and correction factors.
- B. Report Forms:
 - 1. Submit specimen copies of report forms.
 - 2. Forms shall be 8-1/2 x 11 inch paper for loose-leaf binding, with blanks for listing of the required test ratings and for certification of report.
 - 3. Reports shall be on standard forms published by AABC or NEBB.

PART 2 – PRODUCTS

2.1 AIR BALANCE INSTRUMENTS

- A. Alnor Velometer with probes and alnor pitot tube.
- B. Rotating Vane Anemometer: 4 inch size.
- C. ASHRAE Standard Pitot Tubes, stainless steel 5/16 inch outside diameter, lengths 18 inches and 36 inches.
- D. Magnehelic Differential Air Pressure Gauges, 0 to 0.5 inches, 0 to 1.0 inch and 0 to 5.0 inches water pressure ranges, each arranged as a portable unit for use with a standard Pitot tube.
- E. Combination Inclined-Vertical Portable Manometer, range 0 to 5.0 inches water.

2.2 WATER BALANCING INSTRUMENTS

- A. 30 Inch Mercury U-Tube Manometer, 200 psig, with 3 valve bypass assembly and return wells or mercury check valves.
- B. Inspector's gauge testing set.
- C. Water Differential Pressure Gauge, 4-1/2 inch dial, 0 to 100 psi range.
- D. Pressure gauge measurement points, quick connect couplings, 1/4 inch psi.

2.3 SYSTEM PERFORMANCE MEASURING INSTRUMENTS

- A. Insertion Thermometers, with graduation at 0.5 degrees F for air and 0.1 degrees F for water.
- B. Sling Psychrometer.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Arrange and pay for all tests.
- B. Notify Architect/Engineer/Construction Manager at least three working days in advance of test and conduct in presence of Architect/Engineer/Construction Manager.
- C. Tests to be performed prior to insulation, covering or concealment.
- D. Provide signed report of completion of test with signature of witnesses. Report shall indicate:
 - 1. System Tested
 - 2. Date
 - 3. Specified test requirements and actual testing results
- E. The balancing firm shall report to and review the work required with the Architect/Engineer before beginning field balance work. The balancing firm shall make at least two inspections of the air systems during construction and shall report his findings in writing to the Architect/Engineer.
- F. The balancing firm shall cooperate with the Architect/Engineer/Construction Manager and the Mechanical Contractor to effect smooth coordination of the balancing work with the job schedule.
- G. The balancing firm shall be responsible for getting the various systems into proper operation. They shall enlist the aid of the equipment suppliers and Mechanical Contractor as may be required to effect proper operation consistent with the contract plans and specifications.

- H. When the balancing firm cannot balance a belt-driven piece of equipment with the supplied belts and sheaves, inform the Mechanical Contractor that the Mechanical Contractor shall provide additional sheaves as spelled out in other Division 23 Sections.

3.2 CIRCULATING WATER SYSTEM TEST

- A. All piping tests shall be applied not only to piping, but also to all devices and equipment connected thereto with the exception of control valves, boilers or any other equipment which may be damaged by the test pressure. All valves shall be full open.
- B. Test at 100 psi hydrostatic pressure for 6 hours:
 - 1. Record pressures each hour
 - 2. Repair all leaks
 - 3. Retest until 6 hours can be completed with no leaks or loss of pressure.
- C. After completion of successful test, strainers shall be cleaned, then system shall be backflushed and strainers cleaned again.

3.3 DUCTWORK TESTING

- A. Witness testing conducted by the Mechanical Contractor per Section 230600, PART 3: EXECUTION.

3.4 BALANCING PROCEDURE

- A. Air System Balance:
 - 1. With the fan supply system set to handle normal minimum outdoor air, the balancing firm shall perform the following tests and compile the following information:
 - Air Handling Equipment
 - a. Design Conditions:
 - (1) CFM Supply Air
 - (2) Static Pressure
 - (3) CFM Fresh Air
 - (4) Fan RPM
 - b. Installed Equipment:
 - (1) Manufacturer
 - (2) Size/Model Number
 - (3) Motor HP, Voltage, Phase, Full Load Amperes
 - c. Field Test:
 - (1) Fan Speed
 - (2) No Load Operating Amperes
 - (3) Fan Motor Operating Amperes
 - (4) Calculated BHP
 - d. Test for Total Air:
 - (1) Size of discharge, return air and outside air ducts.
 - (2) Number and locations of Velocity Readings taken.

- (3) Duct Average Velocity
 - (4) Total CFM
 - (5) Outside Air CFM
 - (6) Return Air CFM
 - e. Individual Outlets (Diffusers, Registers and/or Grilles):
 - (1) Identify each outlet or inlet as to location and area and fan system
 - (2) Outlet, manufacture and type
 - (3) Outlet size
 - (4) Outlet free area, core area, or neck area
 - (5) Required FPM and test velocity found for each outlet.
 - (6) Required CFM and test results for each outlet
 2. After completion of tests, adjustment and balancing under minimum fresh air conditions, set the system for 100% fresh air. Repeat the total CFM tests to check field versus design conditions. The results under 100% fresh air cycle shall agree with conditions found under "minimum fresh air operation" before the system is considered to be in balance. Adjustments of the proper dampers shall be made to achieve balance.
 3. 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 main supply air and return air dampers to be adjusted and set for design CFM indicated. Any required changes in air patterns, settings, etc., necessary for achieving correct air balance, shall be provided by this Contractor. 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 fan(s).
- B. Water Balance:
1. Water balance shall include heating water, chilled water and condenser water systems. The balancing agency shall perform the following tests, compile data and submit reports.
 2. Heating and/or Cooling Elements Including Loop Water to all terminal Units:
 - a. Design Data:
 - (1) MBH Specified, GPM Specified
 - (2) Entering Water Temperature (EWT)
 - (3) Entering Air Temperature (EAT)
 - (4) Water Temperature Drop (DTW)
 - (5) Element Type Specified
 - b. Field Test:
 - (1) Identify each element as to location
 - (2) Required water temperature drop corrected for item (3) above
 - (3) Actual entering air and water conditions (temperature and GPM)
 - (4) Adjust element until required temperature drop is obtained

- D. In addition to the above work, the Balancing Firm shall check the operation of all automatic temperature control equipment; verify all thermostat, aquastat, etc., set-points and operations; and enlist the aid of the Mechanical Contractor and the Control Subcontractor to make necessary adjustments where required.

END OF SECTION 230950

SECTION 230212
GAS PIPING SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

- A. This Section includes:
 - 1. Natural gas piping system as indicated on drawings and schedules, and by requirements of this section.

1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this Section.

1.4 QUALITY ASSURANCE

- A. Refer to Section 230210 for a general description of requirements applying to this section.

1.5 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 230200.
- B. Submit the following:
 - 1. Product data on gas valves.

1.6 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, GENERAL REQUIREMENTS.

PART 2 – PRODUCTS

2.1 NATURAL GAS PIPING MATERIALS AND PRODUCTS

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match piping materials used in natural gas piping systems. Where more than 1 type of material or product is indicated, selection is Installer's option.

2.2 BASIC PIPE, TUBE AND FITTINGS

- A. Provide pipe, tube and fittings complying with Section 230210 Basic Materials and Methods and in accordance with the following listing:
 - 1. Exterior Exposed or Roof Top Piping: Schedule 40 black steel with weather coating.
Fittings: Malleable black iron, threaded.

2.3 BASIC PIPING SPECIALTIES

- A. Provide piping specialties complying with applicable Division 23 Sections and in accordance with the following listing:

Pipe escutcheons

Pipe sleeves

Sleeve seals

2.4 SPECIAL VALVES

- A. Valves required for gas piping systems on this project shall be the following types:

Gas Valves: (Up to 3")

1. Apollo 80-100 Series bronze gas ball valve. Threaded, 600 PSIG WOG, cold non-shock. 250 PSIG LP-Gas. 150 PSIG saturated steam. Vacuum service to 29 inches Hg. Federal Specification: WW-V-35C, Type: II, Composition: BZ, Style: 3.
2. Features:
 - UL Listed for LP-Gas and natural gas.
 - Large ports to reduce pressure drop
 - Reinforced TFE seats and seals
 - Blow-out-proof stem design
 - Optional tee handle available
 - Quarter turn on-off
 - Adjustable packing gland
 - One piece bronze body
 - Chromium plated ball
3. UL Listings:
 - Guide YSDT: LP-Gas shut-off valve.
 - Guide YRPV: Gas shut-off valve for use with natural and manufactured gases.
4. This valve shall be used for all pipe sizes up to 3" in the system.

2.5 GAS PRESSURE REGULATORS

- A. ANSI Z21.18, single-stage, steel-jacketed, corrosion-resistant pressure regulators. Include atmospheric vent, elevation compensator, with threaded ends conforming to ASME B1.20.1 for 2 inch NPS and smaller and flanged ends for 2-1/2" NPS and larger. Regulator pressure ratings, inlet and outlet pressures, and flow volume in cubic feet per hour of natural gas at specific gravity are as indicated.
1. Service Pressure Regulators: Inlet pressure rating not less than natural gas distribution system service pressure.
 2. Line Gas Pressure Regulators: Inlet pressure rating not less than system pressure.
 3. Appliance Gas Pressure Regulators: Inlet pressure rating not less than system pressure.
 4. Gas Pressure Regulator Vents: Factory or field installed corrosion-resistant screen in opening when not connected to vent piping.

5. Regulators shall be as manufactured by Fisher (no equal substitute permitted).
6. Test connections shall be installed before and after regulator per the IFGC latest accepted edition. See Section 3.4.C.
7. Contractor shall submit cut sheets on the regulator indicating the CFH and pressure range. Provide flow curve or manufacturer's flow chart showing that the valve selected has potential for additional capacity between 15 to 20% greater than the system demand load.

PART 3 – EXECUTION

3.1 INSTALLATION OF BASIC IDENTIFICATION

- A. Install mechanical identification in accordance with applicable Division 23 Sections.

3.2 INSTALLATION OF VALVES

- A. Gas valves: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.
- B. Locate gas valves where easily accessible, and where protected from possible damage.

3.3 EQUIPMENT CONNECTIONS

- A. Connect gas piping to each gas-fired equipment item, with drip leg, union and shutoff gas valve. Comply with equipment manufacturer's instructions. Drip legs shall not be installed on any exterior gas piping.
- B. Equipment furnished by the Owner, or Contractors other than this Contractor: After equipment has been set in place, this Contractor shall furnish all labor and material required to make final connections between roughing-in and the equipment. Install valves, fittings, trim and appurtenances furnished with the equipment. Piping shall be of the same material as the system to which it connects.
- C. All rooftop, gas-fired equipment shall be provided with gas pressure regulating valve to reduce gas pressure from 5 psi to 10" WC. All regulators shall be provided with relief vent discharge piping of lengths as required for minimum distance of equipment air intake grilles.

3.4 INSTALLATION OF GAS PRESSURE REGULATORS

- A. This Contractor shall furnish and install gas pressure regulating valves for all shown on the drawings. Installation shall be in strict accordance with the requirements of the Utility Company and the Canadian Gas Association.
- B. All regulators installed shall be tagged with data noting the inlet and outlet pressure for each individual regulator installed.
- C. Medium or High Pressure (MP) (HP) Regulators shall comply with the following:
 1. The MP regulator shall be approved and shall be suitable for the inlet and outlet gas pressures for the application.
 2. The MP regulator shall maintain a reduced outlet pressure under lockup (no flow) conditions.
 3. The capacity of the MP regulator, determined by published ratings of its manufacturer, shall be adequate to supply the appliances served.
 4. The MP pressure regulator shall be provided with access. Where located indoors, the regulator shall be vented to the outdoors or shall be equipped with a leak-limiting device, in either case complying with Section 410 of the IFGC.

5. A tee fitting with one opening capped or plugged shall be installed between the MP regulator and its upstream shutoff valve. Such tee fitting shall be positioned to allow connection of a pressure-measuring instrument and to serve as a sediment trap.
6. A tee fitting with one opening capped or plugged shall be installed not less than 10 pipe diameters downstream of the MP regulator outlet. Such tee fitting shall be positioned to allow connection of a pressure-measuring instrument.

3.5 EXTERIOR GAS PIPING

- A. All existing exterior gas piping shall be weatherproof with an epoxy resin approved by the Gas Company.

END OF SECTION 230212

SECTION 230230
INSULATION & COVERING – HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
- B. Refer to Section 230200 for HVAC General Provisions
- C. Refer to Section 230210 for HVAC Basic Materials & Methods.

1.2 DESCRIPTION OF WORK

- A. This Section includes insulation and covering provided on the following piping and equipment:
 - 1. Condensate Drain Lines
 - 2. Exterior Piping
- B. Insulation shall be installed on the following duct systems:
 - 1. All supply ductwork.
 - 2. All return ductwork.
 - 3. All ductwork connected to energy recovery units.

1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.

1.4 QUALITY ASSURANCE

- A. Refer to Section 230210 for a general description of requirements applying to this section.
- B. Install insulation in accordance with manufacturer's recommendations.
- C. Provide adequate supervision of labor force to assure that all aspects of the specifications are being fulfilled.

1.5 SUBMITTALS

- A. Submit shop drawings, installation instructions, and manufacturer's literature of all materials specified in accordance with Section 230200.
- B. Submit fabrication instructions for pipe fitting and valve insulation.
- C. Submit manufacturer's joining recommendations for butt joints and longitudinal seams.

1.6 WARRANTY/GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

PART 2 – PRODUCTS

2.1 PIPE INSULATION MATERIAL

- A. Fiberglass:
 - 1. Material: Preformed fiberglass bonded with resin to form circular pipe sleeves with factory

applied, white all service jacket bonded to reinforced foil vapor barrier jacketing. The jacket shall have factory applied double pressure-sensitive, self-sealing, adhesive closure and vapor sealing of longitudinal joints. Thermal conductivity: 0.24 Btu/Hr./SF/inch at 100 degrees F. Flame spread of 25 and developed smoke of 50 or less.

2. All Valves and Fittings:

- a. Glass fiber insert and pre-molded PVC cover, Johns Manville Corp. "Zeston" and "Hi-Lo Temp Inserts" for fittings. Glass fiber or prefabricated elastomeric foam fittings must fill the entire space within the cover completely.
- b. Factory molded fibrous glass fitting covering for fittings. Coat ends with Fosters 30-36 lagfast adhesive
- c. Mitered sections of pipe covering for valves.

3. Manufacturers: Johns Manville Corp., Certain-Teed, Owens- Corning, Knauf, Armacell.

B. Closed Cell:

1. Material: Black flexible elastomeric foamed closed cell structure insulation 25/50 rated with a flame spread rating of 25 or less and a smoke developed rating of 50 or less with both a moisture seal and a reinforced elastic foam lap seal closure system.
2. Flexible pipe insulation shall be a foamed elastomeric closed cell structure material, with a thermal conductivity of not more than 0.27 Btu/Hr./Sq. Ft./Inch at a mean temperature of 75 degrees F. The insulation shall have an average density of at least 2 pounds per cubic foot, shall be self-extinguishing, and shall have a water vapor transmission rating of not more than 0.1 perms. Between temperature limits of -40 degrees F and plus 220 degrees F, the insulation shall not indicate any deviation from its original state.
3. Specification Compliance:

ASTM-E-84

ASTM-C-534 Type I – Tubular, Type II – Sheet.

ASTM-D-1056, 2B1 – Tubular, Sheet.

MIL-C-3133B (MIL STD 670B) Grade SBE-3

MIL-P-15S280J, Form T, Form S.

4. Manufacturers: Armacell, Nomaco, K-Flex.

C. Covering of Pipe Insulation Outdoors:

1. Wrapping: Wrap insulation with embossed 0.016" aluminum jacket.
2. Fastenings: Cover shall be held in place with soft aluminum bands on 12" centers.
3. Valves and Fittings: Weatherproof all valves and fittings.

D. Manufacturers: Johns Manville Corp., Certain-Teed, Owens- Corning, Knauf.

2.2 DUCT INSULATION

A. Outdoor Installation:

1. Pre-manufactured panel system consisting of four (4) piece interlocking panels.
2. The interlocking panels shall be constructed of Dow Thermax Polyisocyanurate insulation, ASTM D-1622, nominal 2 pcf; water vapor transmission as permeance less than 0.03, per ASTM E-96; water absorption less than 0.3% (24 hours), per ASTM C-209; flexure strength more than 40 psi,

- per ASTM C-203.
3. Operating temperature range of -100°F to +250°F.
 4. Insulation shall be laminated in two (2) layers to provide R-14 at 2" thickness, per ASTM C-236/C-518.
 5. The insulation shall be jacketed with 0.032" thick embossed aluminum and sealed with vapor barrier compound. All joints shall interlock to ensure a thermal seal.
 6. Panels shall be secured with #10 self-tapping stainless screws with weather seal washers.
 7. Manufacturers: Techna-Duc Insulation System as made by P.T.M. Manufacturing, L.L.C., Newark, Delaware.

OR

A. Outdoor Installation:

1. On all outdoor square and rectangular ductwork, provide a minimum 0.032 inch thick plain stucco embossed aluminum jacket over 2 inch thick rigid fiberglass board insulation as described in part B of this article.
 - a. 32-mil aluminum roll jacketing, ASTM B2089, with 2.5 mil poly/surlyn backing, plain or white acrylic coated, as made by Childers, RPR, or Pabco.
2. Provide duct roof pitch-supports at all flanges, stiffeners, insulation joints along the top of the horizontal ducts with 24 inch maximum spacing, with 12 degree pitch and anti-sweat coating.
3. Provide rolled metal jacketing with all seams overlapping 2 inches in a watershed fashion.
4. Apply the roll metal jacketing from 48 inch wide roll stock lengthwise with the duct to minimize the number of seams for ducts that measure 44 inches and less on any side including insulation.
5. Machine break the metal jacketing for sharp corners; on large ducts, cross break the jacket to eliminate wrinkles.
6. Secure seams with stainless steel sheet metal screws 4 inches on center. On horizontal ducts, seal seams on duct horizontal surfaces and on vertical ducts seal the vertical seams with continuous bead of caulking sealant.
 - a. sealer made by Fosters Foamseal 30-45, Childers CP-70, Epolux Cadaseal 745.
7. Flash metal jacket with same material applied to the duct where insulation terminates at bolted flanges. Allow for bolt removal where access or disassembly is required.
8. Manufacturer: Fabrite as made by County Insulation Company, New Castle, Delaware.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL

- A. Do not install until systems have been tested and meet requirements.
- B. Heavy work which may damage insulation shall have been completed in the vicinity of the insulation work.
- C. Provide non-compressible insulation saddles at all piping hanger locations, and at all piping hanger locations where piping is insulated with flexible closed cell insulation.
Option: Provide insulation coupling system as made by Klo-Shure Co.
- D. All installations shall be made by skilled craftsmen regularly engaged in this type of work.

- E. Insulation shall be continuous thru-wall, ceiling and floors.
- F. Metal shields, 16 gauge galvanized, shall be installed between hangers and pipe insulation.
- G. Pipe, ductwork and equipment shall be clean and dry prior to insulating.
- H. Install all insulation per manufacturer's instructions.
- I. To avoid undue compression of insulation, provide solid core inserts at all supports as recommended by the insulation manufacturer. Provide insulation shields between the insulation jacket and the hanger.

3.2 PIPE INSULATION - TYPES & THICKNESSES

- A. Provide fiberglass insulation of thickness specified on:
 - 1. Freeze protection of outdoor piping (over heat tracing tape): 3" thick insulation, with metal jacket.
 - a. HVAC: Chilled water and condenser water piping designated on the drawings.
 - b. Plumbing: Cold water make-up to cooling tower.
 - c. Equipment drain piping.
 - 2. Heat Recovery:
 - 1-1/2" for piping 1-1/2" and below.
 - 2" for piping 2" and larger.

3.3 PIPE COVERING (FOAMED PLASTIC TYPE)

- A. All joints and seams shall be sealed with a compatible adhesive. Approved adhesives are as follows:
Armstrong World Industries No. 520
Benjamin Foster Company No. 85-75 up to 200 degrees F.
Contractor may use Armstrong Self-Seal Armaflex 2000 insulation in lieu of the above wherever 1/2" is specified.
- B. Fitting covers shall be fabricated from the foamed plastic pipe insulation or from sheet insulation of the identical material. The fabrication shall be in accordance with manufacturer's instructions, and all seams mitered joints shall be joined using the adhesives described hereinbefore.
- C. Pipe insulation in concealed spaces shall require no finish coatings.
- D. Pipe insulation in all other areas shall receive two coats of finish of color selected by Architect. Approved finishes are as follows:
Armstrong World Industries WB Armaflex Finish

3.4 EXTERIOR PIPE COVERING

- A. Wrapping: Wrap insulation with embossed 0.016" aluminum jacket, orient seam down.
- B. Fastenings: Cover shall be held in place with soft aluminum bands on 12" centers.
- C. Valves and Fittings:
 - 1. Weatherproof all valves and fittings.
 - 2. Finish: Apply two coats of vapor resistant mastic reinforced with glass fabric over wrapping.

END OF SECTION 230230

SECTION 230600**AIR DISTRIBUTION & ACCESSORIES – HVAC****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
- B. Refer to Section 230200 for HVAC General Provisions
- C. Refer to Section 230210 for HVAC Basic Materials & Methods.
- D. This Contractor shall coordinate with the work of Division 26 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 26, Electrical. Mount smoke detectors in the supply and return air stream at each unit in accordance with NFPA 72.

1.2 DESCRIPTION OF WORK

- A. This Section includes labor, material, equipment and supervision to provide a complete air distribution system as specified herein and as shown on drawings.
 - 1. Ductwork – Single Wall, Square and Rectangular
 - 2. Ductwork - Spiral Round Aluminum (Pools)
 - 3. Flexible Connections
 - 4. Dampers
 - 5. Air Diffusers, Registers and Grilles
 - 6. Sound Attenuation

1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. Requirements established within the portions of the Project Manual titled Division 1, General Requirements, are collectively applicable to the work of this section.
- C. IMC (International Mechanical Code).
- D. SMACNA (Sheet Metal and Air Conditioning Contractors National Association, Inc.)
- E. American Society of Heating, Refrigerating and Air Conditioning Engineers' recommendations in ASHRAE Guide shall apply to this work.
- F. ARI Standard 885 - Standard for Estimating Occupied Sound Levels in the Applications of Air Terminals and Air Outlets.
- G. UL (Underwriter's Laboratories, Inc.)
- H. NFPA 90A shall apply to this work.
- I. State Fire Prevention Regulations.

1.4 QUALITY ASSURANCE

- A. Refer to Section 230210 for a general description of requirements applying to this Section.

1.5 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 230200.
- B. Submit the following:
 - 1. Shop drawings of all sheet metal. Indicate all steel, piping, conduit, and Architectural/Structural features to demonstrate complete coordination. Scale shall not be less than 1/4".
 - a. Shop drawings shall indicate the sizes and lengths of each section of ductwork as well as all system components such as coils, VAV boxes, access doors, dampers, diffusers and register locations. Also indicate the type of joints used and where internal acoustic lining or insulation, if required, will be utilized.
 - b. The location of the duct runs and the air outlets shall be closely coordinated with all other trades by the sheet metal contractor to avoid interference. The shop drawings shall show the contact surfaces adjacent to the ducts or air outlets and the space assigned for concealment. The drawings shall indicate principal items of equipment, adjacent piping and conduit, etc., the location of which shall be secured from the contractors of other trades.
 - c. Sheet Metal Contractor to include resubmissions of the shop drawings to the Engineer. The resubmissions are to include all corrections to previous submissions.
 - 2. Manufacturer's literature and performance data of all equipment and devices.
 - 3. Samples: Furnish color samples, etc., at request of the Architect.

1.6 SUBSTITUTIONS

- A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but shall not be limited to space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items furnished and installed by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, they shall be responsible for any and all additional costs associated with the changes required by other trades.

1.7 WARRANTY GUARANTEE

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements.

PART 2 – PRODUCTS

2.1 DUCTWORK (SINGLE WALL, SQUARE AND RECTANGULAR)

- A. All ductwork shall be fabricated in accordance with SMACNA "HVAC Duct Construction Standards - Metal and Flexible" latest Edition except as described below. The minimum thickness of metal ductwork is 26 gauge. Fabrication requirements shall be based on ductwork subjected to positive or negative pressures of 2" W.G. Ductwork systems shall be sealed to SMACNA "Seal Class "C" Standards. Alternatively, "Ductmate" System 45 can be used in accordance with manufacturer's specifications. Drive slip joints are not permitted.

Exception: For ductwork smaller than 12" x 8", Contractor may provide slip and drive joints with all joints sealed with Hardcast tape and mastic system.

- B. Rectangular ducts for 2" W.G. or less, positive or negative pressure shall be per SMACNA Table 1-5. Longitudinal seams shall be Pittsburgh Lock Type L-1 per SMACNA Figure 1-5. Transverse joints shall be standing seam type T -15 per Figure 1-4.
1. In the event that material size is not compatible with duct size and segmenting must be utilized to fabricate duct, use SMACNA Figure 1-5, seam L-4 (Standing Seam).
- C. Joints:
1. Per SMACNA Transverse Joint Reinforcement Table 1-12, only joints T -22, T -25a, T -25b and Proprietary slip on flanges will be acceptable.
 2. Joints T -25a and T -25b that have stress fractures from bending will not be accepted.
 3. All joints will have butyl gasket 3/16" thick by 5/8" wide installed per manufacturers installation instructions.
- D. Ductwork systems for this standard shall be galvanized sheet steel, commercial quality of lock - forming grade, conforming to ASTM coating standards A-525 or A-527 with coating of designation G-60. For corrosive or moist conditions, use coating designation G-90.
1. Where the outer surface of the duct is exposed in finished spaces and is not scheduled for insulation, duct material shall be galvanized, suitable for field painting by the Mechanical Contractor.
- E. The size and configuration of each duct shall be indicated on design drawings. Where thicker sheets or different types of materials are required, they shall be specified on the design drawings or in the project specifications.
- F. Aluminum Rectangular Ductwork:
1. Aluminum ductwork shall be two B.& S. gauges heavier than specified for the equivalent width steel ductwork. Bracing, supports and joints shall be as specified for steel ductwork.
 2. Aluminum ducts shall be used where the ducts are concealed when exhausting saturated air.
 3. Dishwashing exhaust ducts shall be made watertight by means of silicone or 3M duct sealant properly installed and compressed at each joint and seam.
- 2.2 DUCTWORK – SPIRAL ROUND ALUMINUM (POOLS)
- A. Submittals:
1. Submit manufacturer's technical product data for spiral round ductwork materials and products.
 2. Shop Drawings detailing metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and approximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.
- B. Quality Assurance:
1. Manufacturer's Qualifications Manufacturers are limited to members of Spiral Duct Manufacturers Association (SPIDA) who are dedicated to producing quality uniform products in accordance with Sheetmetal & Air Conditioning Contractors National Association (SMACNA) Standards.
 2. Installer's Qualifications: Contractor with at least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

C. Ductwork Materials:

1. Exposed Ductwork Materials: Provide materials which are free from visual imperfections including pitting, dents and other imperfections, including those which would impair painting. Where painting is indicated on drawings, material shall be mill phosphatized (ASTM A591) sheetmetal suitable for immediate painting without further treating other than normal cleaning.
2. Aluminum Ductwork: Where indicated, provide aluminum sheet complying with ASTM B209; Alloy 3003, Temper H14.

D. Miscellaneous Ductwork Materials:

1. Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.
2. Fittings: Provide radius type elbow fittings fabricated of multiple sections with maximum 22-½ deg. change of directions per section. Die stamped elbows are acceptable through 10 inch diameter. Unless specifically detailed otherwise, use 45° laterals and 45° elbows, 90° conical type fittings for branch connections.
3. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
4. Duct Cement: Non-hardening, non-migrating mastic or liquid neoprene based cement, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for cementing fitting components or longitudinal seams in ductwork.
5. Ductwork Support Materials: Except as otherwise indicated, provide rust resistant, aluminum fasteners, anchors, rods, straps, trim and angles for support of ductwork. Space hangers to be 10 ft. on center.
6. Fittings shall be of wall thickness not less than that specified above for longitudinal seam straight ducts. See Field Quality Control for sealing requirements.

E. Fabrication:

1. Fabricate Round Ductwork in 10 or 12 feet lengths, unless otherwise indicated or required to complete runs as shown on approved shop drawings. Match-mark sections for assembly and coordinated installation.

Shop Fabricate Ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards" as follows:

Maximum 2" w.g. Static Pressure			Maximum 2" w.g. Static Negative	
Duct Diameter In Inches	Spiral Seam Gauge	Longitudinal Seam Gauge	Spiral Seam Gauge	Longitudinal Seam Gauge
3 thru 8	.025"	.03"	.025"	.040"
9 thru 14	.025"	.03"	.032"	.040"
15 thru 26	.032"	.04"	.040"	.050"

27 thru 36	.040"	.05"	.050"	.063"
37 thru 50	.050"	.06"	.063"	.070"
51 thru 60	.063"	.07"	N.A.	.090"
61 thru 84	N.A.	.09"	N.A.	N.A.

F. Inspection:

1. Examine areas and conditions under which metal ductwork is to be installed. do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
2. SMACNA Standards comply with SMACNA's "HVAC Duct Construction Standards", Metal and Flexible" for fabrication and installation of metal ductwork.
3. Comply with NFP A 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" and NFPA 90B "Standard for Installation of Warm Air Heating and Air Conditioning Systems".
4. Fabricate and install in accordance with SMACNA "HV AC Duct Construction Standards, Metal and Flexible".

G. Installation of Metal Ductwork:

1. Assemble and install ductwork in accordance with recognized industry practices which will achieve virtually air-tight and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.
2. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.
3. Routing:
 - a. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any.
 - b. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
4. Penetrations:
 - a. Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheetmetal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1- 1/2". Fasten to duct and substrate.

- b. Where ducts pass through fire-rated floors, walls or partitions, provide firestopping between duct and substrate in accordance with requirements of Division 7 Section "Firestopping".
- 5. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- 6. Installation: Install metal ductwork in accordance with SMACNA "HVAC Ductwork - Construction Standards."

H. Field Quality Control: Duct Sealing Requirements:

- 1. All ductwork shall be sealed in accordance with pressure classification listed herein:

Seal Class	Sealing Required	Static Pressure Construction Class
A	All transverse joints, longitudinal seams and duct wall penetrations.	4" w.g. and up
B	All transverse joints and longitudinal seams	3" w.g.
C	Transverse joints	2" w.g. or less

- 2. Where sealing is required in Table above and otherwise herein, it shall mean the following:
 - a. The use of adhesives, gaskets, tape systems or combinations thereof to close openings in the surface of the ductwork and field-erected plenums and casings through which air leakage would occur.
 - b. The use of continuous welds.
 - c. The prudent selection and application of sealing methods by fabricators and installers, giving due consideration to the designated pressure class, pressure mode (positive or negative), chemical compatibility of the closure system, potential movement of mating parts, workmanship, amount and type of handling; cleanliness of surfaces, product shelf life, curing time and manufacturer-identified exposure limitations.
 - d. That these provisions are applicable to duct connections to equipment and to apparatus but are not for equipment and apparatus.
 - e. That where distinctions between seams and joints are made herein, a seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. Helical (spiral) lock seams are exempt from sealant requirements. All other duct surface connections made on the perimeter are deemed to be joints. Joints are inclusive of but not limited to girth joints; branch and sub-branch intersections; so-called duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum and casing abutments to building structures.
 - f. That sealing requirements herein do not contain provisions to:
 - (1) Resist chemical attack.
 - (2) Be dielectrically isolated.

- (3) Be waterproof, weatherproof or ultraviolet ray resistant.
- (4) Withstand temperatures higher than 120°F or lower than 40°F.
- (5) Contain atomic radiation or serve in other safety-related construction.
- (6) Be electrically grounded.
- (7) Maintain leakage integrity at pressures in excess of the duct classification herein.
- (8) Be underground below the water table.
- (9) Be submerged in liquid.
- (10) Withstand continuous vibration visible to the naked eye.
- (11) Be totally leak-free within an encapsulating vapor barrier.
- (12) Create closure in portions of the building structure used as ducts; e.g., ceiling plenums, shafts, pressurized compartments.

The exclusions in this section (t) shall mean "not defined or prescribed herein" and that the prescription of the design is required independently of this standard if obligatory.

- g. The requirements to seal apply to both positive pressure and negative pressure modes of operation.
 - h. Externally insulated ducts located outside of buildings shall be sealed prior to being insulated as though they were inside. If metal surfaces of ducts located on the exterior of buildings are exposed to weather, they shall receive exterior duct sealant. An exterior duct sealant is defined as a sealant that is marketed specifically as forming a positive air and watertight seal, bonding well to the metal involved, remaining flexible with metal movement and having a service temperature range of -30oP to 175°P. If exposed to direct sunlight, it shall also be ultraviolet ray and ozone resistant or shall, after curing, be painted with a compatible coating that provides such resistance. The term sealant herein is not limited to materials of adhesive or mastic nature but is inclusive of tapes and combinations of open weave fabric strips and mastics.
- I. Adjusting and Cleaning:
1. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

2.3 FLEXIBLE CONNECTIONS

- A. Required between ductwork and suction and discharge connection of all fans and air handlers.
- B. Material: Woven fiberglass with mounting hardware tested in accordance with UL Standard 181, listed and labeled as Class 0 or 1.
- C. Manufacturer: Ventfabrics, Inc., Durodyne, Dynair, Ductmate Pro Flex.

2.4 DAMPERS

- A. Provide where indicated and required to control flow of air and balance system.
- B. Round dampers shall be single blade, molded synthetic bearings at each end, 20 gauge galvanized steel, adjusting quadrant and locking device. Round dampers shall be Ruskin Model MDRS25.
- C. Rectangular and square dampers shall be opposed blade within 16 gauge galvanized steel channel frame with corner brace, 16 gauge galvanized steel blades; molded synthetic bearings and hex

steel shafts, exposed or concealed linkage, adjustable quadrant and locking device. Dampers shall be Ruskin Model MD35.

- D. Approved Manufacturers: Ruskin, Arrow, Nailor-Hart, Pottorff, Lloyd Industries, Inc., Cesco Products, Louvers & Dampers, United Enertech.

2.5 AIR DIFFUSERS, REGISTERS AND GRILLES

- A. Air diffusing terminals shall be provided in duct runs on drawings. The diffusers shall properly and uniformly distribute the design air quantity with no objectionable drafts, while maintaining not more than 50 F. P. M. velocity in the occupied portion of the space.

B. Registers & Grilles:

1. Registers and grilles shall be steel construction, fixed single deflection type, with clips and/or flange holes and screws (as required by Architectural finishes) to secure registers to ceiling construction. Face bars shall be inclined 30 degrees. Registers and grilles shall be factory primed and painted with a baked-on white enamel finish.

2. Supply, Return, Exhaust and Transfer Grilles (SG, RG, EG & TG):

- a. Grilles shall be available parallel to the long dimension of the grille. Construction shall be of steel with a 1 1/4-inch wide border on all sides. Screw holes shall be countersunk for a neat appearance. Corners shall be welded with full penetration resistance welds.
- b. Deflection blades shall be firmly held in place by mullions from behind the grille and fixed to the grille by welding in place. Blade deflection angle shall be available at 35°.
- c. The finish shall be #26 white. The finish shall be a baked on anodic acrylic paint, with a pencil hardness of HB to H.
- d. Price Model 630 (RG)

C. Manufacturers: Provide diffusers, registers and grilles of one of the following:

Anemostat	Price
Carnes Co.	Titus
Krueger	Tuttle & Bailey
Metalaire	Nailor Industries

2.6 SOUND ATTENUATION

- A. Provide silencers of the types and sizes shown on plans.

B. Materials and Construction:

1. Outer casings of rectangular silencers shall be made of 20 gauge galvanized aluminum in accordance with ASHRAE Guide recommended construction for high pressure rectangular duct work. Seams shall be lock formed and mastic filled.
2. Outer casings of tubular silencers shall be made of galvanized aluminum.
3. Interior partitions for rectangular silencers shall be made of not less than 20 gauge galvanized perforated aluminum.
4. Interior construction of tubular silencers shall be compatible with the outside casings.
5. Filler material shall be of inorganic mineral or glass fiber of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5 % compression to eliminate voids due to vibration and settling. Material shall be inert, vermin and moisture-proof.

6. Combustion rating for the silencer acoustic fill shall be not less than the following when tested in accordance with ASTM-E-84, NFPA Standard 255 or UL No. 723:
- | | |
|----------------------------|----|
| Flamespread Classification | 25 |
| Smoke Development Rating | 15 |
| Fuel Contribution | 20 |
7. Airtight construction shall be provided by use of a duct sealing compound on the job site. Material and labor furnished by contractor. Silencers shall not fail structurally when subjected to a differential air pressure of 8 in. w .g. inside to outside of casing.
- C. Acoustic Performance: Silencer ratings shall be determined in a duct- to-reverberant room test facility which provides for airflow in both directions through the test silencer in accordance with ASTM Specification E-477. The test set-up and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves and test chamber sound absorption are eliminated. Acoustic ratings shall include Dynamic Insertion Loss (DIL) and Self- Noise (SN) Power Levels both for Forward Flow (air and noise in same direction) and Reverse Flow (air and noise in opposite directions) with airflow of at least 2000 fpm entering face velocity.
- D. Aerodynamic Performance: Silencer shall be of the low static pressure loss type. Airflow measurements shall be made in accordance with ASTM specification E-477 and applicable portions of ASME, AMCA and ADC airflow test codes. Tests shall be reported on the identical units for which acoustic data is presented.
- E. Certification: With submittals, the manufacturer shall supply certified test data on Dynamic Insertion Loss, Self-Noise Power Levels, and Aerodynamic Performance for Reverse and Forward Flow test conditions. Test data shall be for a standard product. All rating tests shall be conducted in the same facility, shall utilize the same silencer, and shall be open to inspection upon request from the Architect/Engineer.
- F. Manufacturers: Industrial Acoustics Co., Rink, Commercial Acoustics, Dynasonics, BRD, Vibro-Acoustics.

PART 3 – EXECUTION

3.1 DUCTWORK

- A. Dimensions on drawings are inside dimensions. Sheet metal dimensions shall be increased to suit thickness of acoustic duct lining, if applicable.
- B. Ducts shall be concealed unless otherwise indicated.
- C. Changes in direction shall be made with radius bends or turning vanes.
- D. Supports shall be galvanized steel for steel ductwork and aluminum for aluminum ductwork.
- E. Locate ceiling air diffusers, registers, and grilles on "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.
- F. Do not install ductwork directly above any electrical equipment.
- G. Ductwork shall be supported per SMACNA Standards except as follows:
1. Rivet or screw to side of duct when using flat strap hangers. Rivet or screw to bottom of duct when using trapeze hangers.
 2. Extend hangers down the side of the duct at least 9"; pass hangers under ducts less than 9" deep.

3. Space hangers not more than 8' on centers for ducts up to 18" wide and 4' on centers for ducts over 18" wide.
 4. Wire hangers are not acceptable.
 5. Support ductwork from building structure with expansion bolts, rods, steel angles or channels installed to meet existing or new building conditions.
 6. Drilling into the roof deck is not permitted.
 7. Driving nails into anchors is not permitted.
- H. Air Flow Control:
1. Major take-offs: Install volume control dampers.
 2. Branches: Install volume control dampers in all branches and at tap in branch take-off connections.
 3. Elbows: Use unvaned elbows with throat radius equal to width of duct and full heel radius; provide turning vanes where full throat and heel radius are not possible.
 4. Transitions: Make transitions in ducts as required by structural or architectural interferences.
 - a. Proportion airways to compensate for any obstructions within duct.
 - b. Avoid dead ends and abrupt angles.
 - c. Do not exceed 15 degrees slope on sides of transitions.
- I. For all exterior single wall, square or rectangular ductwork, ensure that the top of all horizontal ductwork is crowned to minimize accumulation of weather on top of the finished insulation system jacket specified in Section 230230.
- J. Ductwork on the roof shall be supported by an engineered, prefabricated hanger system specifically designed for installation on the roof without roof penetrations, flashing or damage to the roofing material. The system shall consist of bases made of high density polypropylene plastic with additives for UV protection, hot dipped galvanized structural steel frames, hangers, fasteners, rods, etc. The system shall be completed and designed to fit the ductwork installed under actual conditions of service. The system shall be furnished as manufactured by PHP Systems & Design or Anvil International Haydon H-Block.
- 3.2 DUCT SYSTEM LEAK SEALING
- A. Joints in duct systems at duct heaters, air monitors, fire dampers, sound traps, supply air terminals including air handling light fixtures, shall be sealed to prevent air leakage.
 - B. All duct joints and seams in medium pressure and high pressure duct systems shall be sealed to SMACNA Seal Class" A" Standards to prevent air leakage.
 - C. In the event there is in excess of 5% air leakage indicated in low pressure duct systems, it shall be the Contractors responsibility to seal the duct system. The amount of sealing necessary shall be that required to obtain the design air quantity at each terminal.
 - D. Duct sealing shall be by means of high velocity duct sealants such as Hardcast and/or Neoprene gaskets. Type of sealant and method of application shall conform to recommendations in SMACNA high velocity duct construction standards.
- 3.3 DUCTWORK TESTING
- A. The following ductwork shall be pressure leak tested:
 1. Supply ductwork

2. Return ductwork

- B. All tests shall be conducted in accordance with AABC National Standards.
- C. Ducts to be tested at 100% maximum of static pressure before any duct is insulated externally and concealed in accordance with SMACNA Standards.
- D. Calculate the allowable leakage using leakage factor of 5% of Design Air Flow.
- E. Select a limited section of duct for which the estimated leakage will not exceed capacity of the test apparatus.
- F. Connect the blower and flow meter to the duct section and provide temporary seals at all openings of the ductwork.
- G. Start the blower motor with the inlet damper closed. Increase pressure until the required level is reached.
- H. Read the flow meter and compare the leakage in cfm. Reading should be 5% or less of design flow for the duct segment being tested.
- I. If reading is more than 5% of design flow, depressurize duct, repair all leaks and retest until 5% or less of design flow is obtained.
- J. Complete test reports and obtain Owner's witness signature.
- K. Remove all temporary blanks and seals.
- L. Warning: Do not overpressure duct.

3.4 EQUIPMENT

- A. Test apparatus shall consist of an airflow measuring device, flow producing unit, pressure indicating devices and accessories necessary to connect the metering system to the test specimen.
- B. The Contractor conducting tests shall arrange for or provide all temporary services, all test apparatus, all temporary seals and all qualified personnel necessary to conduct the specified testing.
- C. Test apparatus shall be accurate within plus or minus 7.5% at the indicated flow rate and test pressure and shall have calibration data or a certificate signifying manufacture of the meter in conformance with the ASME Requirements for Fluid Meters. Verification of above, to be supplied to Owner upon request.
- D. Pressure differential sensing instruments shall be readable to 0.05" scale division for flow rates below 10 cfm or below 0.5" w.g. differential. For flows greater than 10 cfm scale divisions of 0.1" are appropriate. U-tube manometers should not be used for reading less than 1" of water.
- E. Liquid for manometers shall have a specific gravity of 1 (as water) unless the scale is calibrated to read in inches of water contingent on use of a liquid of another specific gravity, in which case the associated gauge fluid must be used.
- F. Instruments must be adjusted to zero reading before pressure is applied.

3.5 TEST REPORT

- A. Log the project and system identification data.
- B. Enter the fan CFM, the test pressure, and the leakage class specified by the designer.
- C. Enter an identification for each duct segment to be tested.
- D. Calculate the allowable leakage factor. Enter this number on the report for each test segment.

- E. Conduct and record the field tests. If the sum of the CFM measured is less than or equal to the sum of the allowable leakage, the test is passed. Record the date(s), presence of witnesses and flow meter characteristics.
- F. Maintain a mechanical duct plan of all tested duct segments. Plan to include duct segment identification and dates tested.
- G. Test reports shall be submitted as required by the project documents.

END OF SECTION 230600

SECTION 230734**HEAT RECOVERY ROOFTOP UNIT (POOLPAK UNIT)****PART 1 – GENERAL**

1.1 RELATED DOCUMENTS

- A. The general provisions of the contract, including the conditions of the contract (General, Supplementary and other Conditions, if any) and Division 1 as appropriate, apply to the work specified in this section.
- B. Refer to Section 230200 for HVAC General Provisions
- C. Refer to Section 230210 for HVAC Basic Materials & Methods.

1.2 DESCRIPTION OF WORK

- A. This Section includes all work necessary and/or required and all materials and equipment for construction of a complete system. Such work includes, but is not limited to the following:
 - 1. Heat Recovery Rooftop Unit (PoolPak Unit)

1.3 REFERENCE STANDARDS

- A. Refer to Section 230200 for a general description of requirements applying to this section.
- B. Media type air filters shall comply with U.L. Standard 900.

1.4 QUALITY ASSURANCE

- A. Refer to Section 230210 for a general description of requirements applying to this section.

1.5 SUBMITTALS

- A. Submit shop drawings in accordance with Section 230200.
- B. Submit shop drawings and descriptive data for all equipment specified in this section.

1.6 SUBSTITUTIONS

- A. The listed equivalent or substituted manufacturers along with the bidding related contractor shall be completely responsible to comply with all requirements on all contract documents. This shall include, but not limited to, space requirements, code clearances, the type, horsepower, capacities, number and size of services required from other trades, including all required ancillary items provided by other trades. If the manufacturer or related bidding contractor does not comply with these requirements, this Contractor shall be responsible for any and all additional costs associated with the changes required by other trades.

1.7 WARRANTY/GUARANTEES

- A. All work and materials are subject to the general warranty as described in the General Conditions of the Contract and in Division 1, General Requirements. In addition, the following special guarantee applies:
 - 1. Each compressor unit shall be provided with manufacturer's five (5) year warranty.

PART 2 – PRODUCTS

2.1 HEAT RECOVERY ROOFTOP UNIT (POOLPAK UNIT)

- A. GENERAL

1. Provide where indicated, factory assembled, enclosed swimming pool environmental control / energy recovery system. System shall include mechanical heat recovery, supply and return / exhaust fans, outdoor, exhaust and recirculated air dampers, pool water heater, moisture disposal and complete solid state logic control system; factory installed and wired in a single unit enclosure.
2. The complete unit shall be listed by Underwriter Laboratories under the title of "Special Purpose Air Conditioners" and carry the appropriate label. Underwriter Laboratories listing shall not be required for units equipped with electric, gas or steam auxiliary heat; but these units shall be built in accordance with Underwriter Laboratories requirements.
3. The unit shall be specifically designed, manufactured and tested for enclosed swimming pool duty. Field assembled or modified standard commercial grade equipment is not acceptable. Complete unit shall be weatherproofed for outdoor installation and also suitable for indoor mounting.
4. Manufacturer shall have ten years prior experience making similar equipment as described in this specification.

B. Principle of Operation:

1. The unit shall control space temperature and relative humidity, pool water temperature and shall provide controlled ventilation. Warm moist air from the natatorium is drawn over an evaporator coil by the return fan; and the latent and sensible heat is removed from the air. The heat captured by this process and the heat generated from the compressor power consumption are absorbed by a mechanical refrigeration system. The resulting dryer, cooler air is blown into a mixing box. The unit shall include an automatic economizer control function in which the system logic determines what portion, if any, of the "leaving evaporator" air to exhaust from the mixing box and replace with an equal amount of outside air. The selected exhaust air quantity is that which will result in the least electrical power consumption by the unit, based upon a comparison of outside air temperature and humidity, return air temperature and humidity and "leaving evaporator" air temperature and humidity. The air from the mixing box is drawn over a condenser coil and optional auxiliary heating coil by a supply fan.
2. The refrigeration system is activated if either the space temperature deviates from or the relative humidity rises above its setpoint.
3. The unit shall monitor space and outdoor temperature and relative humidity, pool water temperature and building wall temperature.
4. The thermal energy absorbed by the refrigeration system is distributed as follows:
 - a. First priority is given to maintaining the natatorium space temperature. No supplementary space heating system external to the unit is required.
 - b. Second priority is given to maintaining pool water temperature.
 - c. All heat is then transferred to a Remote Air-Cooled Condenser (Future).

C. Unit Casing:

1. All panel work and structural steel members shall be of galvanized steel, treated and painted after fabrication but prior to assembly to provide a chlorine and pool chemical resistant finish. The paint shall be plastic epoxy based powder coating, applied .003 inch (2-3 mils) thick, and baked and bonded at 420°F until it forms a hard vinyl textured surface.
2. Structural steel frame shall be 3/16 inch steel channel base with 3/16 inch steel cross bracing. Vertical support posts for removable panels shall be formed from 16 gauge galvanized steel and

painted. All nuts, bolts and lock washers shall be Cadmium plated. All sheet metal screws shall be Empigard coated galvanized steel.

3. Top panels and removable side panels shall be formed from 18 gauge galvanized steel. Access panels shall be secured by two or more key operated latches. All side panels shall be insulated with minimum one inch duct liner insulation secured to panels by adhesive and panel flanges. The insulation shall be approved for 350°F operating temperature. The fire resistance rating shall conform to NFPA Standard 90A and 90B. The thermal conductivity shall not exceed 0.29 BTU/hr/F/sq. ft/in at 75°F. All seams shall be bolted and sealed to prevent leaks. The roof shall be gasketed and secured to frame with Empigard coated zinc treated screws. All nuts, bolts and lock washers exposed to the natatorium air shall be Cadmium plated. All sheet metal screws exposed to the natatorium air shall be Empigard coated galvanized steel.
4. Compressors, pool water heat recovery unit, and controls, including solenoid and expansion valves and refrigerant sight glasses shall be located in compartments isolated from unit air stream.
5. The unit shall be equipped with two factory mounted terminal blocks, for dual power supply connections, one for the fan and control transformer circuit and one for compressor circuit. The terminal blocks shall be suitable for copper conductors only.
6. Heavy duty wire guards on condenser coil and fan discharge.

D. Compressor:

1. The dehumidifier shall utilize a heavy duty industrial semi-hermetic compressor(s) with a total of 3 stages serviceable type with suction gas cooled motor equipped with internal solid state sensor thermal protection, service valves, easily removable external crankcase heater for liquid migration protection, pumpdown cycle protection and oil failure protection.
2. Capacity control shall be electro-hydraulic, allowing reduced load starting and variable load operation. Capacity control through hot gas by-pass is absolutely not permissible. Forced feed lubrication system shall include self-priming, positive displacement, replaceable oil pump, oil strainer, sight glass and crankcase oil heater. The compressor shall use ring plate suction valves and "discus puck" type discharge valves, large diameter, high strength modular cast iron crank shaft.

E. Pool Water Heater:

1. Water heater shall be capable of rejecting all the heat recovered from the compressor and the heat recovered in the evaporator.
2. Pool water heater shall be counter flow, tube-in-tube type. Water side shall be Type L, cupro-nickel. Pool water heater shall be insulated with minimum 1/2 inch closed cell foam. If dehumidifier is located outdoors, pool water condenser shall be equipped with self-regulating electric heat tape for freeze protection.
3. Pool water condenser shall be a vented double wall with removable heads for inspection and cleaning.
4. Pool water heating is controlled by a refrigerant solenoid valve which directs hot refrigerant gas into the pool water heater on a call from the control system. Water circuit shall be applied with CPVC pipe stub-outs. Copper tubing and/or fittings in the pool water circuit shall be unacceptable.

F. Evaporator Coil:

1. Coil shall be constructed of copper tubes, .006 inch thick, copper fins with copper end sheets, frame and intermediate supports. All nuts, bolts and lock washers shall be cadmium plated. All

sheet metal screws shall be Empigard coated galvanized steel. Coil construction of dissimilar metals such as copper/aluminum/galvanized steel/stainless steel or plastic/vinyl coated coils shall not be acceptable.

2. All tubes shall be expanded into fin collars. All joints shall be brazed. The coil shall be tested to 500 PSIG while submerged in water. All brazing shall be done with nitrogen gas inside tubes to give clean internal surfaces. The coil shall be dried and sealed. Its inside shall be commercially free of oxides and foreign matter. Coil assembly shall be 1600 PSIG ultimate strength.
3. The coil shall be sectioned to provide proportional air-to-refrigerant latent and sensible heat removal capacity. This capacity modulation shall be accomplished by utilizing multiple thermal expansion valves (TXV) for the evaporator. Each TXV shall be equipped with a refrigerant flow control solenoid valve and refrigerant sight glass.

G. Condenser Coil:

1. Condenser coil shall be capable of rejecting all the heat recovered from the compressor and the heat recovered in the evaporator.
2. The condenser coil shall be constructed of copper tubes, .006 inch thick, copper fins with copperend sheets, frame and intermediate supports. Coil construction of dissimilar metals such as copper / aluminum / galvanized steel / stainless steel or plastic / vinyl coated coils shall not be acceptable.
3. All nuts, bolts and lock washers shall be Cadmium plated. All sheet metal screws shall be Empigard coated galvanized steel.
4. All tubes shall be expanded into fin collars. All joints shall be brazed. The coil shall be tested to 600 PSIG while submerged in water. All brazing shall be done with nitrogen gas inside tubes to give clean internal surfaces. The coil shall be dried and sealed. Its inside shall be commercially free of oxides and foreign matter. Coil assembly shall be 2000 PSIG ultimate strength.

H. Auxiliary Air Heating: The auxiliary air heating shall be provided by two factory mounted, and wired indirect gas fired furnaces. Field installed duct furnaces shall not be acceptable. Unit mounted gas furnaces shall be constructed with 409 stainless steel primary and secondary heat exchangers, spark-ignited intermittent safety pilot with electronic flame supervision, two stage controls, fan control, high limit safety cutout.

I. Air Filters: The evaporator and condenser coil shall each be protected with a separate upstream air filter system. The filters shall be 2 inch thick, multigraduated, laminated polyester construction, throwaway type. The filters shall have a non-migrating tackifier encapsulated between the second and third laminates. They shall be totally non-toxic, non-allergenic and not support the growth of bacteria and fungus.

J. Mixing Box: The mixing box shall be integral to the unit and physically located between the evaporator and condenser coils. The mixing box shall be equipped with three dampers to control the amount of exhaust, outside and recirculated air. The exhaust damper shall be downstream of the evaporator coil to allow full heat reclaim prior to exhaust of the air. The air condenser coil shall be located downstream of the outside air intake to allow utilization of outside air when available or necessary.

K. Louvers:

1. If the dehumidifier is located outdoors, the dehumidifier shall be equipped with a louver and bird screen for both the outside air and exhaust air dampers.
2. The louvers shall be constructed so as not to reduce the face area of the dampers. The louver and bird screen construction and paint shall be the same as for the dehumidifier casing. The louver and

bird screen shall be factory installed.

- L. Dampers: Air mixing compartment shall be provided with opposed blade, less than 1% leakage, neoprene tipped, anodized aluminum air foil cross section dampers. Each damper section shall be operated by a separate motor factory mounted and wired into unit control panel; and be capable of modulating the dampers from 0% to 100%.
- M. Supply Fan and Return Fan: The units shall be factory equipped with a supply fan and a return fan. These fans shall be multi V-belt driven, double inlet centrifugal type with multiblade forward curved wheels. Construction shall be galvanized steel, painted and baked with an epoxy coating providing a chlorine and pool chemistry resistant finish. The fans shall be dynamically and statically balanced and tested on the shafts. Fan bearings shall be grease lubricated, self-aligning ball bearings selected for 200,000 hours average life.
- N. Fan Motors: Fan motors shall be induction type, totally enclosed fan cooled with Class F insulation, prelubricated ball bearings and shall be mounted on an adjustable base. Motor to be U.L. listed. Supply and return fan motors shall each be provided with individual factory mounted and wired motor starters.
- O. Drain Pan:
 - 1. The floor of each air side section shall be fabricated to be a drain pan. Each drain pan shall be constructed of galvanized steel and powder coat painted after fabrication with a protective coating providing a chlorine and pool chemistry resistant finish. Drain pans shall be fully insulated and piped to a common drain accessible from either side of the unit.
 - 2. If the unit is located outdoors all drain lines within the unit shall be insulated with minimum 3/4 inch closed cell foam with self-regulating electric heat tape for freeze protection.
- P. Refrigeration Circuit: The refrigeration system shall include a replaceable core liquid line filter dryer, liquid receiver, thermostatic expansion valves, pumpdown solenoid valves, two manual valves to isolate filter drier for fast drier core replacement and manual valves to isolate the liquid receiver. Suction lines shall be fully insulated with closed cell foam insulation. High and low pressure controls and refrigeration service access valves shall be located outside of the air stream. All refrigerant piping shall be copper Type L and is in accordance with "BOCA STANDARDS" ASTM B 88 for Copper Tubing, and M-702.0 for Joints and Connections.
- Q. Control Panel:
 - 1. The controller shall be micro computer based, The following functions / setpoints shall be programmable at the panel:
 - a. Air Temperature
 - b. Relative Humidity
 - c. Pool Water Temperature
 - d. Occupied / Unoccupied Schedule
 - e. Damper Positions
 - 2. The following LCD readouts and / or annunciation lights shall be provided:
 - a. Power On
 - b. Space Temperature
 - c. Space Relative Humidity
 - d. Pool Water Temperature

- e. Pool Water Flow
 - f. Wall Condensation Prevention Temperature
 - g. Outside Air Temperature
 - h. Outside Air Relative Humidity
 - i. Supply Air Temperature
 - j. Damper Position
 - k. Compressor(s) Circuit Fault
 - l. Compressor(s) in Pumpdown
 - m. First Stage of Compressor(s) On
 - n. Second Stage of Compressor(s) On
 - o. Third Stage of Compressor(s) On
 - p. Unit in Air Heating Mode
 - q. Unit in Dehumidifying Mode
 - r. Auxiliary Air Heating Coil On
 - s. Pool Water Heating On
 - t. Time of Day / Day of Week
3. Control panel shall be integral to the unit and located in a separate compartment isolated from air flow. Compressors shall be equipped with contactors. Blower motors shall be equipped with motor starters and protected with adjustable magnetic trip overloads. Dry contacts shall be provided for alarm and fan interlock. Power block terminals shall be provided for different wire size connections. Wire shall be numbered and color coded for ease of trouble-shooting. Compressor shall have an anti-recycle timer to prevent short cycling.
 4. The memory of the micro-computer control panel shall have a fault code history log. This fault code history log shall record the last 50 fault codes in the order of their occurrence. Each fault code shall be recorded along with the date and time it occurred. This fault code history log shall be accessible at the control panel, and, for so equipped units, at the remote panel and/or via modem and phone lines.
 5. The dehumidifier control panel shall be capable of being remotely accessed via modem.
 6. All wiring and electrical controls shall be done and installed in accordance with BOCA STANDARD M407.1.
 7. The controls shall continuously monitor the 3-phase power lines for abnormal conditions and detect phase loss even when regenerated voltage is present. The device consists of a solid-state voltage and phase-angle sensing circuit driving an electromechanical relay. When correct voltage and phase rotation are applied, the internal relay will energize. A fault condition shall de-energize the relay; when the fault is corrected the device shall automatically reset.
 8. Remote Control Panel: The dehumidifier shall be remotely monitored and controlled. All setpoints and monitoring functions listed in **CONTROL PANEL section** shall be capable of being remotely controlled and monitored from the remote terminal and simultaneously at the dehumidifier control panel. Remote monitoring and controlling shall be accomplished by a remote CRT with keyboard (provided by the dehumidifier manufacturer) and via an auto-answer, 1200 BAUD modem (by dehumidifier manufacturer) and an electronic data transmission quality

telephone line located at the remote terminal location (by owner). The remote terminal will be linked to the dehumidifier control system by a shielded 2 wire cable (18 gauge) standard copper up to 2000 feet (by dehumidifier manufacturer).

R. Control Sensors:

1. The unit shall be provided with the following factory mounted and wired control sensors:
 - a. Space Dry Bulb Temperature
 - b. Space Relative Humidity
 - c. Air-Leaving-Evaporator Dry Bulb Temperature
 - d. Air-Leaving-Evaporator Relative Humidity
 - e. Pool Water Temperature
 - f. Supply Air Dry Bulb Temperature
2. The unit shall be delivered with the following factory supplied sensors to be installed in the field by the unit manufacturer:
 - a. Outside Air Dry Bulb Temperature
 - b. Outside Air Relative Humidity
 - c. Natatorium Wall Condensation Prevention Temperature Sensor

S. Environmental Logic Controls:

1. All operating and logic controls shall be factory mounted and wired in the unit. Control sequences shall be designed specifically to control swimming pool environmental conditions by the unit manufacturers.
2. At a minimum, control system shall provide full modulation of heat recovery / heating system by proportional control of dry bulb temperature, relative humidity, cold-wall surface condensation prevention humidity reset and ventilation air volume.
3. Controls shall automatically operate heating, dehumidification and heat recovery system in response to greatest requirement and adjust unit outputs to maintain building conditions. Unit and controls shall be capable of providing full heating capacity to either air or water. Controls shall be capable of proportional control of heating and dehumidification by loading stages of compressor capacity as necessary. As building requirements are satisfied, unit shall unload and shut off. At a minimum, unit shall provide the following functions:
 - a. Economizer/Ventilation: Providing outdoor air ventilation as a function of indoor and outdoor conditions. The economizer shall operate in either the space heating, space cooling, space heating and dehumidification or space cooling and dehumidification mode.
 - b. Occupied / Unoccupied Control Mode: Time clock for 7-day, 24-hour operation controlling the unoccupied mode operation during heating season. During unoccupied times the outside air and exhaust dampers stay in closed position to minimize the air heating load.
 - c. Space Heating: Full proportional control of space dry bulb temperature by staging compressor loading of unit capacity, with humidity override. Automatic mechanical heat recovery from pool room return air as required by building and / or water temperature. Return / exhaust air must pass through mechanical heat recovery system and shall be exhausted at its lowest heat content. Automatic switching and three (3) stage outputs for control of auxiliary air heating coil shall be performed.

Condition	Action
At Setpoint	Ventilation
At a drop from setpoint	Economizer if outdoor temperature is higher than return air.
At further drop from setpoint	Valve directing hot gas to air condenser energized. First and successive stages of compressor energized. Smart Economizer

Auxiliary air heating shall be controlled in two (2) stages as follows:

1st stage: energize gas furnace(s) on low fire

2nd stage: energize gas furnace(s) on high fire

- d. Smart Economizer: The Smart Economizer is the simultaneous operation of the Heat Recovery Heating and Economizer modes.

Condition	Action
Natatorium requires dehumidification and/or heating and the outside air dry bulb and dew point are warmer and dryer, respectively, than the air off the evaporator coil	100% of the air from the evaporator is exhausted. 100% warm dry air is drawn into the PoolPak with its supply fan. The warm dry outside air is heated further as it passes over the condenser coil and supplied to the natatorium.

- e. Pool Water Heating: If the space temperature is at or above setpoint and the pool water temperature is below the setpoint, hot gas is directed to the pool water condenser when the compressor is running. At other times the pool water requires heat, the PoolPak activates the main pool water heater.
- f. Humidity Control The economizer is activated if dehumidification is required and:
 - a. the air and water temperatures are satisfied, and
 - b. the absolute humidity of the outside air is lower than the absolute humidity of the pool room air, and
 - c. the outside air temperature will not adversely effect the pool room air temperature.

If outside air cannot be used for dehumidification, then full proportional control of relative humidity is done by staging unit capacity. Humidity controller energizes the compressor and directs hot gas to the air condenser if space needs heating or water condenser if pool water temperature is below setpoint.

If dehumidification is required and the air and water temperatures are satisfied and the outside air cannot be used to dehumidify the pool room and Flywheel Air Conditioning is not enabled, then the hot gas is directed to the external air cooled condenser, chilled water or cooling tower condenser or the auxiliary chilled water coil is activated, if so equipped.

Condition	Action
At Setpoint	Ventilation
At a rise from setpoint	Economizer if outdoor dew point is lower than return air dew point.
At further rise from setpoint	Valve directing hot gas to air condenser, pool condenser or ext. air-cooled condenser energized. First and successive stages of compressor energized. Smart Economizer

- g. Condensate On Walls: When the temperature of the interior surface at the wall sensor drops to within 5°F of the dew point temperature of the space air, the relative humidity setpoint is offset downward. This condition causes the dehumidifier system to activate humidity control lowering the space dew point and hinders the formation of condensation on the cold wall surfaces.
- h. Air Conditioning: Flywheel Air Conditioning
 - (1) This air conditioning control strategy uses the thermal storage capacity of the swimming pool. During occupied times the PoolPak cools the Natatorium air by removing the sensible and latent heat from the air in the evaporator. This heat is put into the pool water. The pool water's temperature is allowed to rise a maximum of 2°F above its normal setpoint. Automatic staging of cooling capacity is in response to air conditioning load.
 - (2) During the unoccupied time, if the pool water is above its setpoint, full ventilation is used to evaporatively cool the pool. This mode of operation continues until either the pool water goes 1° F below its setpoint or an occupied period starts.
 - (3) The changeover from heating to air conditioning as a function of dry bulb cooling demand in the Natatorium is automatic. A normal changeover deadband of 1.5°F between heating and cooling is used.
 - (4) This cycle is repeated as long as the requirement to provide air conditioning during the occupied periods exists.

T. Operating and Safety Controls:

- 1. Each unit shall be provided with a complete operating and safety logic control system. The control system shall shut down the compressor in case of high refrigerant pressure, low refrigerant pressure, oil failure, and / or high motor temperature conditions. The complete unit (fans & compressor) shall be shut down to protect the motors if power line abnormalities occur.
- 2. Operating and safety control system shall include all relays, contactors, sensors and switches necessary to operate complete unit.

U. Manufacturer:

1. Unit shall be base bid with specified PoolPak, Inc. - PoolPak SWHP 100SR. Moisture removal rate shall be a minimum of 102 pound/hr.
2. Accepted Alternatives: Desert Aire, Seresco.

V. Installation:

1. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.
2. Install unit where shown on drawings. Provide three feet clearance around sides and four feet around compressor compartment of unit for air flow and service.
3. Provide and install all water piping, drains and controls for proper operation of unit.

W. Start-Up:

1. Start-up service shall be provided by the equipment manufacturer's authorized representative and shall include complete testing of all controls and unit operation. The agency responsible for start-up shall record the refrigeration pressures and electrical operating data. Copies of this data are to be supplied to the owner.
2. All units shall be thoroughly cleaned by the installing contractor in accordance with the manufacturer's instructions prior to being placed into service.
3. A complete operating and maintenance manual, including wiring diagrams, start-up and operating sequence and material list shall be provided to the owner.
4. The owner shall be provided with complete instruction of operating and maintenance procedures.

X. Warranty:

1. One year parts and material and labor warranty on the entire unit.
2. Drive Line Warranty - A four year extended parts warranty shall be provided on the:
 - a. Compressors
 - b. Compressor Motor Contactors
 - c. Return Fan Motor
 - d. Return Fan Motor Starters
 - e. Supply Fan Motor
 - f. Supply Fan Motor Starters
 - g. Pool Water Condenser
 - h. Pool Water Condenser Solenoid Valves & Coils
 - i. Liquid Expansion Solenoid Valves & Coils
 - j. Air Condenser Solenoid Valves & Coils
 - k. Blowers, Wheels & Housings
3. A nine year extended parts warranty shall be provided on the all-copper evaporator, condenser and auxiliary hot water heating coils.
4. These warranties are contingent on proper maintenance of pool water chemistry including a pH of between 7.2 to 7.6, Free Chlorine not exceeding 2.0 ppm and Combined Chlorine not to exceed

- 0.5 ppm. These parameters are to be measured and recorded daily and be available for review upon request.
5. AutoGuard Service - For units equipped with a modem and phone line, the manufacturer shall call the unit once a week for the first two years and download the fault code history log as well as review the performance and status of the unit. If a problem is detected, the manufacturer's service department shall call the owner's representative to further diagnose and solve the problem.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- B. Install in accordance with manufacturer's recommendations. Unit and all component sections shall be properly supported and vibration isolated.

3.2 INSTALLATION

- A. Verify that coils, filters, motors, drives and other components are matched with the proper unit.
- B. Assemble unit components following manufacturer's instructions for handling, testing and operating. Repair damaged galvanized areas, and paint in accordance with manufacturer's written recommendations.
- C. Vacuum clean interior of units prior to operation.
- D. Repair air leaks from or into casing that can be heard or felt during normal operation.
- E. Perform field mechanical balancing in accordance with Section 230950: TESTING AND BALANCING OF MECHANICAL SYSTEMS.
- F. The Mechanical Contractor shall own as a part of his work, the following:
Provide one (1) additional drive set, if necessary, to obtain final design balancing requirements. The Mechanical Contractor shall coordinate with Balancing Firm and equipment manufacturer for drive selection, including belts and pulleys.

END OF SECTION 230734

SECTION 230900**AUTOMATIC TEMPERATURE CONTROL****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. Section 230200 and drawings are hereby made a part of this section as fully as if repeated herein.
- B. The Mechanical Contractor shall coordinate with the work of Division 26 and the Fire Alarm System vendor for locations and mounting of all duct smoke detectors. These devices are shown on the Mechanical Drawings for reference only to show the intent of the work. All locations shall be determined based on approved shop drawings from the Fire Alarm System vendor and the Contractor for the work of Division 26, Electrical.

1.2 DESCRIPTION OF WORK

- A. Provide labor, material and supervision necessary to install a complete direct digital control system of temperature controls to control all HVAC Systems, associated components and accessories as described herein.

1.3 SUBMITTALS

- A. Submit shop drawings and manufacturer's data sheets of all equipment.
- B. Submit manufacturer's certificates of conformance with applicable codes.
- C. Furnish point-to-point diagram of automatic temperature control system approval, including heating, ventilating and air conditioning equipment wiring diagrams where temperature control connections are required.
- D. Provide ten (10) copies of submittal data within thirty (30) days of contract award.
- E. Submittal shall consist of:
 - 1. System Architecture showing all digital and pneumatically actuated devices.
 - 2. Equipment lists of all proposed devices and equipment including data sheets of all products.
 - 3. Valve, damper and well and tap schedules showing size, configuration, capacity and location of all equipment.
 - 4. Data entry forms for initial parameters. Contractor shall provide English listing of all analog points with columnar blanks for high and low warning limits and high and low alarm limits, and a listing of all fan systems with columnar blanks for beginning and end of occupancy periods; and samples of proposed text for points and messages (for at least two systems of at least 15 points total) including sample 480 character alarm message. All text shall be approved prior to data entry.
 - 5. Wiring and piping interconnection diagrams including panel and device power and sources.
 - 6. Sketches of all graphics.

1.4 QUALITY ASSURANCE

- A. Insure that all work and equipment is installed in accordance with manufacturer's warranty requirements.
- B. Provide adequate supervision of labor force to assure that all aspects of specifications are being fulfilled.

- C. The system shall be engineered, programmed and installed by personnel trained and regularly employed by the control's manufacturer.
- D. Supplier shall have technical support to promptly respond within 24 hours or less to service calls to the site with technical staff, spare parts inventory and test and diagnostic equipment.
- E. Codes and Approvals:
 - 1. The complete system installation shall be in strict accordance with national and local electrical codes. All devices designed for or used in line voltage applications shall be UL listed.
 - a. All microprocessor based devices shall be UL916 listed.
 - b. All electrical environmental control and monitoring devices shall be UL429 and/or UL873 listed.
 - 2. All electronic equipment shall conform to the requirements of FCC regulation Class B, Part 15, Section 15 governing radio frequency electromagnetic interference and be so labeled.
 - 3. The complete system shall conform to ANSI/ASHRAE Standard 135-2012, BACNET.
- F. All system components shall be designed and built to be fault tolerant.
 - 1. Provide satisfactory operation without damage at 100% above and 85% below rated voltage and at +3 Hertz variation in line frequency.
 - 2. Provide static, transient, and short circuit protection on all inputs and outputs. Communication lines shall be protected against incorrect wiring, static transients and induced magnetic interference. Bus connected devices shall be A.C. coupled or equivalent so that any single device failure will not disrupt or halt bus communication.

1.5 ELECTRICAL WIRING

- A. All electrical wiring, components and accessories in connection with the Automatic Temperature Control System shall be furnished and installed by the control manufacturer.
 - 1. Electrical Contractor shall provide all wiring to duct smoke detectors.
 - 2. Unless stated otherwise in the design documents, the ATC Contractor is responsible for providing control power to all valves, actuators, devices and components within the DDC System regardless of the selected voltage of those devices. This also includes all 120 volt power circuits required for devices, panels and control equipment.
 - 3. The ATC Contractor shall be responsible for providing the control interface between terminal unit condensate pumps and their respective units at the required voltage of these devices in order to shut down the terminal unit in the event of high water level in the condensate pump receiver.
- B. Control wiring shall include all wiring necessary to interface with new controls, such as relays and transducers, and shall also include electric and electronic devices such as freezestats, electronic sensors, relays, flow switches and controlled devices such as valve and damper operators, both electric/electronic actuated devices. Pilot devices such as ON/OFF switches and thermostats installed in series with line voltage circuits shall be considered to be control wiring.

1.6 AUTOMATIC TEMPERATURE CONTROL

- A. Provide a DDC System of automatic temperature control. The system shall be complete in all respects including labor, materials, equipment and services necessary.
- B. All electrical wiring in connection with the installation of the automatic temperature control system shall be furnished and installed under the direct supervision of the control manufacturer.

PART 2 – PRODUCTS**2.1 SMOKE DETECTORS**

- A. Duct type ionization smoke detectors shall be furnished by the Electrical Contractor and installed by the Mechanical Contractor in the supply and return air stream. The Electrical Contractor shall provide wiring from each detector to the Fire Alarm System panel.
- B. The Electrical Contractor shall provide an alarm output signal from the FAS panel to the BAS for unit shutdown.

2.2 ACTUATORS

- A. Electronic actuators shall be sized to operate their appropriate dampers and valves with sufficient reserve power to provide smooth modulating action or two-position action as specified.
- B. Provide integral, auxiliary switches for direct coupled actuators to indicate when a desired position is reached or to interface additional controls for a specific sequence.
- C. Align actuator with drive shaft, provide permanent mark to identify closed position of end device.

2.3 SENSOR TRANSMITTERS

- A. Duct and immersion sensors shall have minimum spans as required to meet the temperature requirements. Duct sensors shall have sensing elements of sufficient length and accuracy to measure average duct temperature in each location.
- B. Sensors shall be of corrosion resistant construction, tamperproof, suitable for mounting on a vibrating surface. Exposed capillaries shall be temperature compensated, and armored or installed in protective tubing.
- C. All sensing elements for water pipe mounting shall be of the rod and tube type with linear output and shall be furnished complete with separable protecting wells filled with heat conductive compound. Sensors shall be factory calibrated and tamperproof. If easily adjustable sensors are provided, they shall be located inside metal enclosures with cylinder lock and key to prevent unauthorized setting.

2.4 CONTROL VALVES

- A. Valves shall be rated for a minimum of 150 percent (150%) of system operating pressure at the valve location but not less than 125 psig.
- B. 2" and Smaller: Valves shall be bronze body with screwed or flared connections.
- C. 2-1/2" and Larger: Valves shall be bronze or iron body, flanged.
- D. Flow characteristics:
 - 1. Three-way valves shall have a linear relation of flow vs. valve position.
 - 2. Two-way valve position vs. flow relation shall be equal percentage for water flow control.
- E. Maximum pressure drop through valve:
 - 1. Modulating water flow control: 1/2 the pressure drop through the apparatus with maximum of 10 feet of water. Two position water valves shall be line size.
 - 2. Two-position steam control: 20 percent (20%) of inlet gauge pressure.
 - 3. Modulating steam control: 67 percent (67%) of inlet gauge pressure but not to exceed 45 percent (45%) of inlet absolute pressure (acoustic velocity limitation).

2.5 CONTROL DAMPERS

- A. The ATC Sub-contractor shall furnish all the controlled dampers of the type and sizes indicated on the drawings for installation by the sheet metal Sub-contractor.
- B. All 2-position control dampers shall be parallel blade and sized for minimum pressure drop, at the specified duct size.
- C. All modulating dampers shall be opposed blade and sized for an effective linear air flow control characteristics within the angle of rotation and maximum pressure drops specified. Information shall be provided to the sheet metal Subcontractor for determining the proper duct reductions or baffles used.
- D. Damper frames shall not be less than 16 gauge galvanized steel, formed with corner braces for extra strength, with mounting holes for enclosed duct mounting.
- E. All damper blades shall be of not less than 16-gauge galvanized steel formed for strength and high velocity performance. Blades on all dampers must not be over 8" in width. Blades shall be secured to 1/2" diameter zinc plated axles by zinc plated bolts and nuts. All blade bearings shall be nylon or oilite. Blade side edges shall be sealed off against spring stainless steel seals. Teflon coated thrust bearings shall be provided at each end of every blade to minimize torque requirements and insure smooth operation. All blade leakage hardware shall be constructed of corrosion resistant, zinc plated steel and brass.
- F. Dampers shall be suitable for operation between -40 and 200 degrees. The control manufacturer shall submit leakage and flow characteristics plus a size schedule for all controlled dampers.
- G. All blade edges shall have inflatable seal edging that shall be rated for leakage less than 10 cubic feet per minute per square foot of damper area at a differential pressure of 4" of water when the damper is being held by a torque not to exceed 50 inert lbs. Leakage shall not exceed 1/2 of 1% of total flow.
- H. Provide permanent mark or scribe end of drive shaft to align damper with actuator in closed position.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install system and materials in accordance with manufacturer's instructions and roughing-in drawings, and details and drawings. Install electrical work and use electrical products complying with requirements of these specifications. Mount controllers at convenient locations and heights.
- B. All wiring shall be properly supported and run in a neat and workmanlike manner. All wiring exposed and in equipment rooms shall run parallel to or at right angles to the building structure. All wiring within enclosures shall be neatly bundled and anchored to prevent obstruction to devices and terminals. All wiring shall be in accordance with all local and national codes. Low voltage wiring for space temperature sensors, communication bus between terminal units, etc., above accessible ceilings in finished spaces on the floors may be plenum rated cable. Wiring in all locations shall be installed in EMT conduit. All electronic wiring shall be #18 AWG minimum THHN and shielded if required, except standard network (Ethernet, LonWorks, etc.) cabling shall be as tested and recommended in lieu of #18 gauge twisted, #22 or #24 gauge is acceptable if used as a part of an engineered structured cabling system. The control manufacturer must submit technical and application documentation demonstrating that this cabling system has been tested and approved for use by the manufacturer of both the control system and the engineered structured cabling system.
- C. Provide all sensing, control, and interlock wiring for the following:
 - System inputs and outputs
 - System communications

System power

System interlocks

Unit controls

- D. The Control Manufacturer shall enter all computer data into the Host computer including all graphics, control programs, initial approved parameters and settings, and English descriptors. The Control Manufacturer shall maintain diskette copies of all data file and application software for reload use in the event of a system crash or memory failure. One copy shall be delivered to the owner during training sessions, and one copy shall be archived in the Control Manufacturer's local software vault.

3.2 DATA CONTROL (D/C) AND GRAPHICS SUMMARY

- A. All hardware, custom software, application software, graphics, etc., necessary to accomplish the control sequences and display the graphics specified shall be provided as part of this contract. Provide all controllers, inputs, outputs, valves, dampers, actuators and flow meters required to provide the control and graphic data described. Provide software setpoints required for display in logical groups and graphics.
- B. Each digital output shall have a software-associated monitored input. Any time the monitored input does not track its associated command output within a programmable time interval, a "command failed" alarm shall be reported.
- C. Where calculated points (such as CFM) are shown, they shall appear in their respective logical groups.
- D. Unless otherwise specified or approved prior to bidding, the primary analog input and the analog output of each DDC loop shall be resident in a single remote panel containing the DDC algorithm, and shall function independent of any primary or UC communication links. Secondary (reset type) analog inputs may be received from the primary network, but approved default values and/or procedures shall be substituted in the DDC algorithm for this secondary input if network communications fail or if the secondary input becomes erroneous or invalid.

3.3 ACCEPTANCE

- A. The Control Manufacturer shall completely check out, calibrate and test all connected hardware and software to insure that the system performs in accordance with the approved specifications and sequences of operations approved.
- B. Witnessed acceptance demonstration shall display and demonstrate each type of data entry to show site specific customizing capability; demonstrate parameter changes; execute digital and analog commands; and demonstrate DDC loop stability via trend of inputs and outputs.

3.4 MANUALS

- A. The following manuals will be provided:
 - 1. An Operators Manual shall be provided with graphic explanations of keyboard use for all operator functions specified under Operator Training.
- B. Computerized printouts of all GPC data file including all point processing assignments, physical terminal relationships, scales and offsets, command and alarm limits, etc.
- C. A manual shall be provided including revised as-built documents of all materials required under the paragraph "SUBMITTALS" on this specification.
- D. Two Operators Manuals, and two As-Built Manuals shall be provided to the owner.

3.5 TRAINING

- A. All training shall be by the BMCS contractor and shall utilize operator's manuals and as-built documentation.
- B. Operator training shall include one (1) four-hour session encompassing modifying text and graphics, sequence of operation review, selection of all displays and reports, use of all specified OWS functions, troubleshooting of sensors (determining bad sensors), and password assignment and modification. One training session shall be conducted at system completion, one shall be conducted forty five days after system completion, and one at ninety (90) days, or as requested by the Owner..

3.6 SERVICE GUARANTEE

- A. The control system herein specified shall be free from defects in workmanship and material under normal use and service. After completion of the installation, the control manufacturer shall regulate and adjust all thermostats, control valves, motors and other equipment provided under this contract. If within twelve (12) months from date of acceptance either for beneficial use or final acceptance, whichever is earlier, any of the equipment herein described is proven to be defective in workmanship or materials, it will be replaced or repaired free of charge. The control manufacturer shall, after acceptance, provide any service incidental to the proper performance of the control system under guarantee outlined above for the period of one year. Normal maintenance of the system or adjustments of components is not to be considered part of the guarantee. The control manufacturer will upon completion of the installation, during the warranty period, make available to the Owner, an annual service agreement covering all labor and material required to efficiently maintain the control system.

3.7 FINAL ADJUSTMENT

- A. After completion of installation, adjust thermostats, control valves, motors and similar equipment provided as work of this section.
- B. Final adjustment shall be performed by specially trained personnel in direct employ of installer of primary temperature control system.

END OF SECTION 230900