INVITATION FOR BIDS

This *Invitation for Bids* is a written and published solicitation document issued by Horry County Schools (listed as "the District" throughout the bid and Contract Documents) for the purpose of procuring construction work, which shall ordinarily result in a contract award to the lowest responsive and responsible Bidder. The *Bid Conditions* with associated forms and the Contract Documents, which include the *Contract Agreement*, Exhibits A through G, associated forms, the specifications and drawings, and any other referenced documents therein, all describe the bid process and the construction work to be performed and are published as an integral part of this *Invitation for Bids* the same as if incorporated herein. Bid security and performance and payment bonds are required in accordance with the District's Procurement Code, as may be amended. Contractors and subcontractors shall be licensed in accordance with State law and requirements of the Labor, Licensing, and Regulations Board of the State of South Carolina.

In accordance with the authority granted by the Horry County Schools' Procurement Code, any prospective Bidder, Offeror, Contractor, or Subcontractor, who feels aggrieved in connection with this solicitation, any addendum to the solicitation, or the subsequent award of a contract has a right to protest and present an appeal to the District within the time frame allowed from the date of issuance of this *Invitation for Bids*, any addendum issued thereto, or the *Notice of Intent to Award*, whichever is at issue. The protest shall be in accordance with the District's Procurement Code. Contact the District's Procurement Officer for details at 843-488-6893 or email rstrickland@horrycountyschools.net .

INVITATION FOR BIDS / AD DATE:	February 23, 2021
PROJECT OWNER:	Horry County Schools (the District)
BID NUMBER:	2021-46MJ
PROJECT NAME:	St. James High School (SJHS) HVAC Renovations
PROJECT LOCATION(S):	St. James High School 10800 Hwy. 707 Murrells Inlet, SC 29576
PROJECT DESCRIPTION:	The Work involves the replacement of rooftop Make-up Air Units (MAUs) / Water Source Heat Pump Energy Recovery Units and water source heat pumps.
BID SECURITY:	Five Percent (5%) required per *Bid Instructions*
PERFORMANCE & PAYMENT BONDS:	One Hundred Percent (100%) of contracted amount as stated on the *Notice of Intent to Award*
SITE VISIT/PRE-BID DATE/TIME:	***NON-Mandatory Site Visit/Pre-Bid:*** Wednesday, March 3, 2021 at 11:00am
SITE VISIT/PRE-BID LOCATION:	St. James High School 10800 Hwy. 707 Murrells Inlet, SC 29576 All visitors must sign in and out at the front desk.
QUESTIONS:	All questions must be submitted in writing to the District Bid Contact Person by 12:00pm (noon) on Tuesday, March 16, 2021.
SUBMIT BIDS TO:	Submit your offer online through the website at the following URL: https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=2f302e8a-69b0-407b-a21a-3368d004365e (Bidders are cautioned not to be late.)
BID OPENING DATE/TIME:	Tuesday, March 23, 2021 at 2:00pm (Unless date and time are otherwise amended by addendum.)
BID OPENING LOCATION:	Horry County Schools District Office Conference Room **B308** 335 Four Mile Rd. Conway, SC 29526 (Unless the location is otherwise amended by addendum.)
BID CONDITIONS AND CONTRACT DOCUMENTS POSTED AT:	District Website: http://apps.hcs.k12.sc.us/apps/protrac/ Other available web service: https://vrapp.vendorregistry.com/Bids/View/BidsList?buyerId=2f302e8a-69b0-407b-a21a-3368d004365e
ARCHITECTS/ENGINEERS:	McKnight – Smith – Ward – Griffin Engineers, Inc. 4223 South Blvd. Charlotte, NC 28209 J. Craig Champion, P.E., LEED AP (704) 527-2112 x 154 cchampion@mswg.com
DISTRICT BID CONTACT PERSON:	Maurice Jackson, Procurement Specialist Phone: (843) 488-6929 Fax: (843) 488-6945 E-mail: mjackson@horrycountyschools.net

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SUMMARY OF SERVICES REQUIRED

INTRODUCTION – The purpose and intent of this Invitation for Bids is to establish a contract for the provision of services based on the attached specifications and guidelines. The project involves the replacement of seven (7) water cooled roof-mounted Make-up Air Units (MAUs) and three (3) heat pumps at St. James High School with new units.

SCOPE OF WORK – The scope of work requires the Contractor to furnish all labor, materials, tools, equipment, and incidentals necessary to satisfactorily complete the project as detailed in Exhibit A and associated specifications and plans as provided by Horry County School. The overall project involves performing demolition work as required to replace seven (7) water cooled roof-mounted make-up air units (MAUs)/ Water Source Heat Pump Energy Recovery Units and three (3) heat pumps with new equipment. Additionally, connections to existing ductwork and piping will be required.

TERM OF CONTRACT (Estimated) – Contractor has access to the site beginning June 18, 2021 and shall continue through October 10, 2021. Access to the site will be limited to after school hours and weekends from August 16, 2021 through October 10, 2021. Refer to Exhibit D for additional details.

AWARD CRITERIA – Award will be made to the lowest responsive and responsible bidder. Award will be made to only one bidder.

DEFINITIONS

Horry County Schools

Following are definitions of terms used in the *Bid Instructions*. These definitions are not entire, plenary, or exhaustive of all terms used and shall not be used to construe meaning or intent. Terms may be defined where used, in the District's Procurement Code, or may be subject to normal and usual interpretation in the context used.

1. Architect/Engineer: Any individual or entity legally qualified to practice architecture or engineering in South Carolina with whom the District has a contractual agreement to provide services pertaining to construction that members of this profession or those in their employ may justifiably perform. The Architect/Engineer serves as the District's authorized representative to the extent of the contractual agreement between the Architect/Engineer and the District. Any reference to Architect/Engineer also includes any representatives, agents or employees of the Architect/Engineer.

2. Bid: Completed and properly signed offer for the price(s) stipulated on the District's *Official Bid Form* to do the work specified in the Contract Documents and in accordance with the *Bid Instructions*.

3. Bid Addendum: Written or graphic instrument issued by the District prior to the receipt of bids which modifies or interprets the Contract Documents by additions, deletions, clarifications or corrections. The addendum may reference any specification, drawing, or other document as being incorporated therein.

4. Bid Bond: Form of bid security in the amount of five percent (5%) of the sum total of the base bid and all alternate bids and executed on the District's *Bid Bond* form by the Bidder as principal and by a Surety as guarantor that the Bidder, if awarded a contract, shall enter into a contract within the specified time and furnish any required performance and payment bonds, insurance certificate(s) or other documents required by the *Notice of Intent to Award* or risk forfeiture of the bond. (Also see Bid Security.)

5. Bid Opening Date and Time: The date and time established by the District in the *Invitation for Bids*, as amended by any addendum, for receipt and opening of bids. Bids received after the established bid opening date and time are not acceptable and shall not be considered. The bid opening will occur immediately following.

6. Bid Security: A certified cashier's check or a bid bond submitted with a bid and serving to guarantee to the District that the Bidder, if awarded the contract, shall execute such contract in accordance with the Contract Documents requirements. No other forms of security are acceptable. Failure to execute the contract may result in forfeiture of the certified cashier's check or the bid bond to the District. (See District's Procurement Code for additional bid security requirements.)

7. Bidder: An individual or entity who submits a bid to do the work specified in the Contract Documents as a prime contractor and who is licensed to submit a bid and to perform such work in the State of South Carolina. A Bidder does not become a Contractor for purposes of the Contract Documents until a contract is executed.

8. Change Order: Any written alteration in specifications, delivery point, rate of delivery, period of performance, price, quantity, or other provisions of any contract accomplished by mutual agreement of the parties to the contract.

9. Construction Work: Additions, repairs, upgrading or renovating an existing District structure or the erecting of new structures and facilities. It includes the total scope of activities to be performed as provided in the Contract Documents whether performed by one or more contractors, subcontractors, the District, or any combination thereof. The scope of activities includes all labor, materials, and equipment to be provided by the Contractor to fulfill the obligations of the Contract Documents. (Also referred to as the "project.")

10. *Contract Agreement*: The written and executed *Contract Agreement* between the District and the Contractor for purposes of performing the work identified in the Contract Documents at the agreed upon contract price during the agreed upon contract time. The executed *Contract Agreement* supersedes any prior negotiations, representations, or agreements, whether written or oral, unless incorporated in the *Contract Agreement* by reference to supplementary documents, or through execution of a *Change Order*. The contract between the District and the Contractor is not to be construed as an agreement between the District and any subcontractor, material or equipment supplier, or any other individuals or entities enjoined to the Contractor for purposes of contract execution.

11. Contract Documents: Documents including all terms and conditions and forms contained in the Contract Documents as originally published as well as any published bid addenda, any referenced drawings and specifications related to the project and integral to the performance of the work, and any *Change Order* (or directive) executed after contract execution.

12. Contractor's License Number: License number issued by the South Carolina Contractors' Licensing Board and required for all general contractors (as prime contractors) and all mechanical contractors (as prime contractors or subcontractors) performing construction in excess of $5,000. (For information contact the South Carolina Contractors' Licensing Board at 803-896-4686.)

13. Contractor's Group Number: A designation by the South Carolina Contractors Licensing Board from one (1) to five (5) indicating a specific dollar value limitation on construction licenses for prime contractors and mechanical contractors. Such licensure designation limits the Contractor's or subcontractor's ability to bid on or perform the work designated in the Contract Documents.

14. Debarred: The disqualification of an individual or entity from bidding on or being awarded a contract by the State of South Carolina or any other governmental entity for a specified period of time commensurate with the seriousness of the offense or the failure or inadequacy of performance. Any individual or entity debarred by the State of South Carolina or other governmental entity is ineligible to bid on or accept any contracts with the District under the debarred name or any other name.

15. District: Horry County Schools as represented by its Board of Education, Superintendent, management staff, procurement officials, employees, or other authorized representatives or agents. The District's Construction Management Office has the authority to contract for architectural and construction services and administration of the resulting contracts in accordance with the District's Procurement Code and the directives of the Board of Education.

16. District Bid Contact Person: Designee of the District Procurement Officer assigned to officiate the bid process for construction work or other related services.

17. District Procurement Officer: The District's head of Procurement assigned to oversee procurement processes to ensure conformance to the District's Procurement Code and to facilitate protests and claims.

18. Entity: Any business, corporation, partnership, sole proprietorship, joint stock company, joint venture, or any other legally formed organization.

19. Informality or Irregularity: A bidding requirement not fully complied with by the Bidder, waived by the District or allowed to be corrected when it is merely a matter of form or an immaterial variation from the exact requirements of the *Bid Instructions* having no effect or negligible effect on total bid price, quality, quantity or delivery of supplies or performance of the contract and for which the waiver or correction would not be prejudicial to the relative standing of the other bidders.

20. *Invitation for Bids*: A written and published solicitation document issued by the District for the procurement of construction work, which shall ordinarily result in a contract awarded to the lowest responsive and responsible Bidder.

21. May: The word "may" or other such words or phrases used anywhere in the Contract Documents indicates a recommendation that is adhered to by the Bidder, Contractor, Architect/Engineer or District at his/her choice.

22. Minority or Woman Owned Business: Means a small business concern that is at least fifty-one percent (51%) unconditionally owned by one or more individuals who are both socially and economically disadvantaged or are women or a publicly owned business having at least fifty-one percent (51%) of its stock unconditionally owned by one or more socially and economically disadvantaged individuals or by women.

23. *Notice of Intent to Award*: A written notice of the District's acceptance of a Bidder's bid and the intention to award a contract. The *Notice of Intent to Award* is mailed to all bidders and posted at https://vrapp.vendorregistry.com/Bids/View/BidsList?buyerId=2f302e8a-69b0-407b-a21a-3368d004365e . The *Notice of Intent to Award* is not an authorization for commencement of work but only serves as a notice of the District's intention to enter into a contract. Such *Notice of Intent to Award* may be cancelled prior to the execution of a contract.

24. *Official Bid Form*: A form furnished by the District to be completed and signed by an authorized representative of the bidding entity and submitted by the bid opening date and time, which constitutes the Bidder's offer to furnish all materials and labor to accomplish the work at the offered prices in the time frame established by the District.

25. *Payment Bond*: A bond provided by the Contractor on the District's *Payment Bond* form in which a Surety guarantees to the District that the Contractor shall pay subcontractors and suppliers providing work or materials under the contract. (See District's Procurement Code for additional payment bond requirements.)

26. *Performance Bond*: A bond provided by the Contractor on the District's *Performance Bond* form in which a Surety guarantees to the District that the work under the contract shall be performed in accordance with the Contract Documents and in the time established as may be amended by any *Change Order*. (See District's Procurement Code for additional performance bond requirements.)

27. Pre-bid Conference: A meeting, generally conducted at the worksite location if there is an existing structure, approximately fifteen (15) days prior to the bid opening date and time for potential bidders, the Architect/Engineer, and District representatives to view and/or discuss the conditions under which the work is to be performed and to provide clarification of the Contract Documents, which shall be confirmed in a subsequent *Bid Addendum*. Normally the pre-bid conference is voluntary (non-mandatory) unless otherwise stated in the *Invitation for Bids*; however, Bidders are responsible for getting the issued addendum following the conference. If the pre-bid conference is designated as mandatory in the *Invitation for Bids*, only those bids from those bidders represented at the mandatory conference shall be considered.

28. Principal: Officers, directors, owners, partners, and individuals having primary management or supervisory responsibilities within a business entity, including project directors, financial officers or other such key personnel.

29. Product Data: Standard prepared data including such information as project specifications and installation instructions, catalog cuts, product photographs, operating and maintenance instructions, and indicating other general or standard manufacturing or fabrication characteristics.

30. Project: The total scope of work to be performed as provided in the Contract Documents whether performed by one or more contractors, subcontractors or the District itself. (Also referred to as the "work," the "work to be performed" or other such terms.)

31. Project Manager: The Contractor's designated representative to manage the flow of materials to the worksite and the timely sequencing of all sub-contracted work to ensure the continual progress of the work to meet the substantial and final completion dates established as may be amended by any *Change Order*.

32. Representative: An authorized designee of an individual or entity with formal responsibilities as specified by contract or employment agreement.

33. Shall: The word "shall" or "must" or other such words or phrases used anywhere in the Contract Documents indicates a mandate that must be adhered to by the Bidder, Contractor, Architect/Engineer or District.

34. *Special Conditions*: A part of the Contract Documents which supplements, modifies, changes, adds or deletes from the requirements of the *Bid Instructions,* the provisions of the *General Contract Conditions*, or other Contract Documents and specifies terms and conditions specific to the work to be performed.

35. Specifications: A written description of the physical, functional, or performance characteristics, or the nature of the materials, equipment, processes, construction, or work to be performed. It includes, as appropriate, construction standards, technical data, workmanship, inspection and testing requirements.

36. Subcontractor: An individual or entity, who is properly licensed to do business in the State of South Carolina, having a direct contract with the Contractor to perform a portion of the work described in the Contract Documents. Any reference to subcontractor also includes any representatives, agents, or employees of the subcontractor or any other entity enjoined to the subcontractor to perform any work in relation to the project.

37. Surety: An individual or entity who promises, in writing, to make good the debt or default of a Bidder, Contractor or other entity.

38. Suspension: Disqualification of an entity to submit a bid or receive an award of a contract from the State of South Carolina or other governmental entity for a designated period of time pending the completion of an investigation and any legal proceedings that may ensue because the entity is suspected, upon probable cause, of engaging in criminal, fraudulent, seriously improper conduct or the failure or inadequacy of performance.

39. Taxpayer Identification Number (TIN): Means the number required by the Internal Revenue Service to be used by the Bidder or Contractor in reporting income tax and other returns. (A Federal Identification Number or Social Security Number.)

40. Trivial or Negligible Effect: An increase in the amount of the base bid or a decrease in the Contractor's cost not to exceed one percent (1%).

41. Worksite: The actual location(s) where the scope of work as identified in the Contract Documents is to be performed by the Contractor.

42. Worksite Superintendent: Contractor's representative at the worksite who is responsible for continuous field supervision, coordination, and completion of the work and for the enforcement of safety regulations. The worksite superintendent performs no other duties or trade work. A secondary worksite superintendent may be required, who may or may not perform additional duties in addition to worksite superintendent activities.

End of *Definitions*

BID INSTRUCTIONS

1. Bidder Representations: By signing and submitting a bid, the bidding company's (the Bidder's) Principal represents he/she has read and understands these *Bid Instructions* as well as the work to be performed and the conditions under which the Contractor shall perform the work included in the Contract Documents (*Contract Agreement*, Exhibits A through G, specifications and drawings, forms and any other referenced documents therein) and the bid is made in accordance therewith. The Bidder's principal certifies the bid submitted is based upon the materials, equipment and systems specified in the Contract Documents, as amended by any addendum, and incorporates all costs necessary for the successful completion of the work to be performed in the stipulated time. Bidders are expected to examine the solicitation documents thoroughly and should request an explanation of any ambiguities, discrepancies, errors, omissions, or conflicting statements in the solicitation. Failure to do so will be at the Bidder's risk. All ambiguities, discrepancies, errors, omissions, or conflicting statements in the solicitation documents shall be interpreted to require the better quality or greater quantity of work and/or materials, unless otherwise directed by addendum. Bidder assumes responsibility for any patent ambiguity in the solicitation documents that Bidder does not bring to the District's attention.

2. Bidder Licensing: By submitting a bid, the Bidder's principal certifies, to the best of its knowledge and belief, that the Bidder has met the licensing requirements for the State of South Carolina, is not debarred or suspended by any governmental entity or the State of South Carolina, and is eligible to submit a bid to and perform construction work for Horry County Schools ("the District"). The Bidder further represents all subcontractors stated on the *Official Bid Form* or subsequently enlisted to perform a portion of the work outlined in the Contract Documents also meet all licensing requirements of the State of South Carolina as may be required, and are not debarred or suspended from submitting a bid or performing construction services for any governmental entity or the State of South Carolina. Bidders and their subcontractors are advised the District shall report Contractor Licensing Law violations to the S.C. Contractors' Licensing and Regulations Board.

3. Solicitation Information from Sources Other than Official Source: South Carolina Business Opportunities (SCBO) is the official state government publication for State of South Carolina and Horry County School District solicitations. Any information on District solicitations obtained from any other source is unofficial and any reliance placed on such information is at the Bidder's sole risk. Once the initial notice has been published in SCBO, all additional information relating to the solicitations (addenda, award notices, etc.) will be posted on the District's Procurement website at https://www.horrycountyschools.net/Page/15007.

4. Bid Documents: Any potential Bidder is solely responsible for obtaining a complete set of Bid Documents (*Bid Instructions,* bid addenda and forms) as issued by the District and including the Contract Documents, which are an integral part of the bid process, from the posted source(s) as directed in the *Invitation for Bids*. The availability of these documents does not confer a license or grant permission for any other use of any portion of the Bid Documents or Contract Documents.

5. Pre-Existing Site Conditions: Before submitting a bid, the Bidder shall carefully review all documents and examine the worksite in conjunction therewith to ascertain site conditions affecting the performance of the work. If the Bidder receives a contract award but failed to make such examinations, the Bidder shall in no way be relieved of the obligation to comply in every detail with all provisions and requirements of the Contract Documents without additional compensation or time.

6. Interpretations and Clarifications: Requests for additional information or questions regarding error, omission or clarification of any portion of the Bid Documents or the Contract Documents or any addendum, shall be submitted in writing to the District Bid Contact Person stated in the *Invitation for Bids* by e-mail or facsimile no later than five (5) days prior to the bid opening date and time unless an earlier date is stated on the *Invitation for Bids* or as may be amended. Any interpretations, corrections, or changes to the Bid Documents or the Contract Documents made in any other manner than by a written addendum shall not be binding, and Bidders shall not rely upon them. Any information given a prospective Bidder concerning a solicitation will be furnished promptly to all other prospective bidders as an addendum to the solicitation, if that information is necessary for submitting offers of if the lack of it would be prejudicial to other prospective bidders. See clause entitled "Bidder Representations." **We will not identify you in our answer to your question.** The District seeks to permit maximum practicable competition. Bidders are urged to advise the Procurement Specialist – as soon as possible – regarding any aspect of this procurement, including any aspect of the solicitation that unnecessarily or inappropriately limits full and open competition.

7. Pre-Bid Conference: While the District considers any scheduled pre-bid conference critical to understanding the bidding and project requirements and site conditions; attendance is non-mandatory unless otherwise stated in the *Invitation for Bids*; however, Bidders are responsible for ensuring they have received the information from the pre-bid conference site review provided in a subsequent addendum. The date, time and location of any pre-bid conference are stated in the *Invitation for Bids.*

8. Materials Standards and Substitutions: The materials, products, equipment, and processes described in the Contract Documents establish a standard of required function, dimension, appearance, quality and performance to be met. Bidders shall only bid **NEW** materials, products, equipment and processes unless the Contract Documents clearly state otherwise.

9. Addenda: Addenda shall be issued prior to the bid opening date and time for the purposes of modifying or interpreting the Contract Documents through additions, deletions, clarifications or corrections. No addendum shall be issued later than four (4) days prior to the bid opening date except to a) withdraw the *Invitation for Bids*, or b) to postpone the bid opening date and time. When an addendum is issued for the purposes of postponing the bid opening date and time, the addendum shall establish the new bid opening date and time no earlier than five (5) days after the addendum issue date. Addenda shall be posted on the on-line bidding source(s) stated in the *Invitation for Bids*. A Bidder shall acknowledge receipt of all addenda issued by identifying the addendum number and the date of issuance with the Bidder's initials in the spaces provided on the *Official Bid Form* or the bid shall be found non-responsive in accordance with the District's Procurement Code. If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

10. Authorization of Bidder: The legal name of the Bidder and the signature of the Bidder's Principal shall be affixed on the *Official Bid Form* and other documents requiring signature as part of the bid submission along with required notarizations. A bid submitted by an agent shall have a current written power of attorney attached certifying the agent's authority to bind the Bidder. Unsigned bidding forms shall render the bid non-responsive in accordance with the District's Procurement Code.

11. *Official Bid Form*: Bids shall be presented on the District's *Official Bid Form* or an identical copy. Bids submitted in response to this solicitation shall be in the English language and in US Dollars, unless otherwise permitted by the solicitation. To ensure a bid is considered responsive, a) all blanks or information requested shall be completed, b) any blanks not applicable to the bid or the Bidder shall have inserted in the blank the words "N/A" (not applicable) or "none" or other such designation, c) all issued addenda shall be acknowledged, and d) all insertions, alterations and/or erasures shall be initialed by an official representative of the Bidder. The base bid and any other pricing required shall be expressed only in numbers written legibly in ink. Non-legible numbers shall be subject to District interpretation, and the determination is final. Any modification to the requirements of the Contract Documents or any other Bidder conditions may render the bid non-responsive in accordance with the District's Procurement Code.

12. Bid Alternates: Bid alternates listed on the *Official Bid Form* constitute required pricing for additions, reductions, or modifications to the work specified in the base bid. Bidders shall bid all requested alternates listed and indicate whether the pricing is in addition to or a deduction from the base bid pricing or whether there is no change if the bid alternate is accepted by the District. If a Bidder fails to bid any alternate, the bid shall be found non-responsive. Bidders shall include in each bid alternate price all costs necessary to provide a complete, operable, functional, and fully integrated portion of work with the work in the base bid including any bonding, overhead and profit. Pricing shall not be conditioned upon the acceptance of any other bid alternate unless specifically stated by the District. The District reserves the right to reject any or all bid alternates or accept bid alternates in any order or combination.

13. Unit / Incremental Pricing: A Bidder shall stipulate all unit/incremental pricing requested on the *Official Bid Form* for potential additional work in unforeseen circumstances. Unit/incremental pricing shall be the installed price including all costs to the District such as, by way of illustration and not limitation, materials, labor, equipment, fees, taxes, or other such direct costs. Bonding, overhead and profit costs shall not be included in the pricing as these costs will be added when a *Change Order* is processed. The District shall have the right to require the Bidder to amend the unit/incremental pricing prior to contract award if, in the estimation of the District, the pricing provided appears inflated in relation to pricing of other bids submitted.

14. Allowances: Allowances specified by the District in the Contract Documents for a specified product purchase or work to be completed shall be included in the base bid or applicable alternate bid when computing the pricing. An allowance is a reimbursement, dollar for dollar, for actual costs incurred for the product purchase or performance of the work specified. Application of bonding, overhead and profit shall also be included in the pricing when incorporating the allowance.

15. Subcontractor Disclosure: The Bidder shall name on the *Official Bid Form* those subcontractors required by the District to be named. Any subcontractor who will perform a

portion of the work equal to or greater than three percent (3%) of the Contractor's bid shall be disclosed to the District prior to the execution of a contract. When the Bidder intends to perform any trade listed with the Bidder's own forces, the Bidder shall be named in the place of any subcontractor required to be listed. Failure to complete the list or listing a subcontractor that is not properly licensed (if required by LLC) shall render the bid non-responsive and is not subject to cure by substitution. Listing more than one (1) subcontractor or the Bidder and a subcontractor shall only be done when the work will be shared by both. **All** subcontractors, whether or not listed on the *Official Bid Form,* must meet the licensing and experience requirements stated in these *Bid Instructions* as applicable.

16. Subcontractor Conflicts of Interest: A Bidder shall not list as a subcontractor any representative, agent, or employee of the District or the Architect/Engineer without written approval of the District, in advance. No representative, agent or employee of the District or the Architect/Engineer shall have more than a five percent (5%) interest in the Bidder's or any subcontractor's business used in the performance of the work without approval of the District. No representative, agent or employee of the District or the Architect/Engineer having official responsibility in the procurement process shall receive any payment, loan, subscription, advance, deposit of money, services, offer of employment or anything else of greater than a nominal value (in excess of $25.00). The Bidder, nor any subcontractor proposed in the *Official Bid Form*, shall have provided any consultant services related to the designs of the work to be performed or product specifications which would render that entity ineligible to bid in accordance with the District's Procurement Code.

17. Subcontractor Substitution: The District shall have the right to reject any subcontractor that ordinarily appears to meet the requirements but, unknown to the Bidder, is not acceptable to the District at the time of bid submission. Substitution of an unacceptable subcontractor shall be in accordance with the District's Procurement Code. If, at the bid opening, the Contractor lists a subcontractor who, at the time the bid was submitted, was not sufficiently licensed under State law to perform the work for which it was listed as the subcontractor, the bid shall be considered non-responsive unless allowed by the District under Paragraph 30.

18. Use of Minority and Economically Disadvantaged Subcontractors: The District encourages the Bidder's use of minority-owned and women-owned businesses as subcontractors provided they meet all the requirements of the *Bid Instructions*, as applicable.

19. Bid Security: Each bid shall be accompanied by bid security pledging the Bidder shall enter into a contract with the District on the terms stated in the Contract Documents and has the ability to furnish bonds covering the faithful performance of the contract and payment of all obligations arising thereto. Bid security shall be in an amount not less than five percent (5%) of the total bid price including all allowances and bid alternates and shall be made payable to the District. Each Bidder shall maintain such bid security in full force and effect until such time as a) the Contract Agreement has been executed and a *Performance Bond* and *Payment Bond* have been furnished to the District, b) the specified acceptance period has elapsed and the Bidder has refused the District's request to extend the acceptance period at the same bid price, or c) the District has rejected all bids. A Bidder who submits a bid security not meeting the requirements herein or in the District's Procurement Code shall be considered non-responsive except as may otherwise be provided for in the District's Procurement Code.

20. Bid Bond Requirements: Any bid bond submitted with a bid of one hundred thousand dollars ($100,000) or more shall be issued by a surety company licensed to conduct business in the State of South Carolina with an "A" minimum rating of performance as stated in the most current publication of "Best Key Rating Guide, Property Liability" and show a financial strength rating of at least five (5) times the total bid price including all allowances and alternates. For projects less than one hundred thousand dollars ($100,000), the issuing surety company shall have a "B+" minimum rating of performance and a financial strength of at least four (4) times the total bid price. The attorney-in-fact that executes the bid bond on behalf of the surety shall affix to the bid bond a current certified power of attorney.

21. Bid Security Forfeiture: Refusal or failure of the Bidder to a) enter into a contract; b) furnish a *Performance Bond* and *Payment Bond* as required; c) correct any bid deficiency; or d) provide any additional information when requested for determination of responsibility shall cause forfeiture of the amount of the bid security to the District.

22. Bid Submission: Bids delivered orally or via telephone, telegraph, e-mail, facsimile, or other such methods are not sealed bids and are unacceptable. Bids submitted in any other way than as required in these *Bid Instructions* shall be considered non-responsive in accordance with the District's Procurement Code.

23. Receipt of Bids: Bids shall be received at the location stated in the *Invitation for Bids* no later than the date and time published in the *Invitation for Bids*, as they may be amended by any addendum. Timely submission of a fully completed bid is solely the responsibility of the Bidder. It is the Bidder's responsibility to synchronize submission time with the District's official bid clock at the bid opening location to avoid late submissions.

24. Sealed Bid Packaging: *If hard bids are being accepted via hand-delivery or through the mail*, the documents required for bid submission shall be enclosed in a sealed, opaque envelope before delivery, mailing, or insertion into any express carrier envelope or packaging. The exterior of the sealed, opaque envelope shall be clearly marked with a) the project name and project/bid number, b) the Bidder's name and address, c) the Bidder's Contractor license number, and d) the words "SEALED BID" in bold print. The Bidder shall assume full responsibility for the correct packaging and identification of the sealed bid to prevent exposure of bid pricing prior to the official bid opening date and time. Any pre-mature opening of a bid shall be handled in accordance with the District's Procurement Code.

25. Vendor Registration Mandatory: The District has implemented an online, electronic bidding system to receive bids and proposals from prospective offerors. In order to submit offers in response to posted solicitations, prospective offerors must be registered through this electronic system. Registration can be completed through the following link: https://vrapp.vendorregistry.com/Vendor/Register/Index/horry-county-schools-sc-vendor-registration . Once registered, suppliers must keep their information current.

26. On-Line Bidding Instructions: (a) Mandatory Registration: You must register before you can submit an offer online. See clause entitled "Vendor Registration Mandatory". To register or submit and offer, please visit the following site: https://vrapp.vendorregistry.com/Vendor/Register/Index/horry-county-schools-sc-vendor-registration . (b) Once registered and signed into the system, choose the solicitation you wish to respond to. The system will provide the necessary steps to obtain the required information from the Bidder. (c) To confirm your offer has been submitted, you should receive an email notification from cservice@vendorregistry.com with the subject line "Vendor Bid File Submittal". Only offers with an email status of "Vendor Bid File Submittal" have been received by the District.

If you experience any issues, contact Vendor Registry Support Team by email at cservice@vendorregistry.com or toll free at 844-802-9202. **PLEASE NOTE:** Do NOT wait until the last minute to enter your submission. Registration for new contractors can take up to three (3) days.

27. Electronic Files – Required Media and Format: Documents and/or electronic files submitted shall contain the solicitation number and the offeror's name and be compatible with Microsoft Office (version 2003 or later) or Adobe Acrobat or equivalent Portable Document Format (.pdf) viewer. The Procurement Officer must be able to view, search, and print electronic documents without a password. If required by the solicitation, your business and technical proposals must be within separate files.

28. Bid Acceptance Period: Any bid submitted shall be binding on the Bidder and irrevocable by the Bidder for forty-five (45) days following the bid opening date and time. No required Bid Documents, including any bid security, shall be modified, withdrawn or cancelled by the Bidder during this acceptance period. In order to withdraw a bid after the minimum time period specified, the Bidder must notify the Procurement Officer in writing.

29. Withdrawal or Modification of a Bid: Withdrawal or modification of a bid prior to or after the bid opening date and time shall only be done in accordance with the District's Procurement Code. Negligence or error on the part of any Bidder in preparing a bid confers no right of withdrawal or modification after the bid opening date and time. No Bidder who, at the District's discretion, is permitted to withdraw a bid shall in any way benefit from the contract later awarded.

30. Bidder Responsiveness: For a bid to be considered by the District, the Bidder shall first be determined by the District to be responsive to the bid requirements. Any bid which fails to conform in all material respects to the essential requirements of the *Bid Instructions* and the required forms shall be considered non-responsive and rejected as provided for in the District's Procurement Code. A bid may be rejected if the Procurement Officer determines in writing that it is unreasonable as to price. The District may also reject a bid as unresponsive if the prices bid are materially unbalanced between line items or subline items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the District even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment. A bid is also non-responsive if, at the bid opening, the Contractor lists a subcontractor who, at the time the bid was submitted, was not sufficiently and appropriately licensed under State law to perform the work, and such non-responsiveness is not subject to cure by substitution. Any bid which the District is prohibited by law from considering shall be rejected as non-responsive unless allowed by the District under Paragraph 30.

31. Bidder Responsibility: For a *Contract Agreement* to be executed, the Bidder shall also be determined by the District to be responsible. The District may make any and all reasonable investigations deemed necessary and proper to determine the ability of the Bidder to perform the work timely and to the satisfaction of the District. A determination of responsibility focuses on whether the Bidder has the necessary facilities, resources, qualifications, and ability to provide the work specified in the Contract Documents in a satisfactory and timely manner. For a Bidder to be deemed responsible, it must have the capability in all respects to fully perform the contract requirements, and have the integrity and reliability to assure timely good faith performance, which may be substantiated by past performance. Factors used to assess responsibility may include, by way of illustration and

not limitation, a) availability of appropriate finances, material, equipment, facilities, expertise, and personnel resources, or the ability to obtain them, necessary to meet all contractual requirements; b) a satisfactory record of performance and integrity with the District and other governmental entities; c) no outstanding debts owed nor any judgments in the past five (5) years or currently pending with the District or any other entity; d) the capability of legally contracting with the District or the State of South Carolina; e) Bidder and subcontractors being properly qualified and eligible to contract for the work as stated in the next paragraph; f) supplying all necessary, required and requested information within forty-eight (48) hours of the request by the District; and g) submit to a very detailed bid evaluation process administered by the District which includes all subcontractors.

32. Minimum Contractor Qualifications Required: The District reserves the right to reject any Bidder as non-responsible if the evidence submitted by the Bidder or any investigation of the Bidder fails to satisfy the District of the responsibility factors in the previous paragraph and, by way of illustration and not limitation, the following:

A. The Bidder's experience, skill, and ability, to perform the work required as well as the experience, skill, and ability of key personnel. At least one principal of the business shall have a minimum of ten (10) years of documented commercial construction experience or an equivalent of five (5) years of documented school construction experience. The Contractor's project manager and worksite superintendents as well as all subcontractors shall each have a minimum of five (5) years of documented commercial construction experience or as required in the *Contract Agreement*.

   The Project Manager (and Project Superintendents) are to be 100% assignable to this Horry County Schools project. The proposed Manager and Superintendent must have worked a minimum of two (2) years for the General Contractor naming them in their bid. Both must have experience working on construction projects in close proximity to and/or within occupied and operating facilities.

   The District understands the importance of good planning and management. As such, the qualifications for both the Project Manager and the Superintendent will be a significant portion of the Contractor evaluation in determining "responsibility" as it relates to the selection process of the selected General Contractor. Therefore it is the District's anticipation that the Project Manager will be familiar enough with the project and project demands that he/she can organize and oversee the responses during the District's evaluation process for the General Contractor as specified in paragraph 27 of the *Bid Instructions*.

   The District requirements for staffing the project listed in the *Contract Agreement* are to be considered the minimum amount of key supervisory staff assigned to the project. The Contractor, with his in-depth knowledge of building facilities projects must allocate the necessary personnel to deliver the project in a timely, safe, and quality manner.

B. The Bidder and subcontractors having and maintaining a valid Contractor's license with the South Carolina Contractors' Licensing and Regulations Board at an appropriate level for the project being bid or the portion of work to be performed, as may be required. Contractors and subcontractors shall have been licensed by the South Carolina Contractors' Licensing Board (or contractors' licensing agency of another state, in equivalent categories) for a minimum of five (5) consecutive years immediately prior to the bid submission in the construction field or discipline the Contractor or subcontractor will be performing.

C. The Bidders' ability to meet the required insurance and bonding requirements. The Contractor shall have a minimum aggregate available bonding capacity of at least twice the value of the project being bid and shall provide proof of such available bonding capacity as part of the bid submission. The insurance coverage shall be specific to the project as stated in the *Contract Agreement* with the District and Architect/Engineer listed as additionally insured. The Contractor must also have an experience modifier rate (EMR) not greater than 1.00 unless allowed by the District under Paragraph 30.

D. The demonstrated ability of the Bidder and the listed subcontractors to perform construction work promptly within the time specified, without delay or potential default.

E. The character, integrity, reputation, judgment, experience, and efficiency of the Bidder and the listed subcontractors and their key employees, owners, directors, officers or others associated with them.

F. The quality of the Bidder's and listed subcontractors' past and present performance on other contracts entered into and the Bidder's experience with projects similar to the one identified in the Contract Documents.

G. Any current contract between the District and the Bidder or any listed subcontractor in compliance with all terms and conditions of the contract.

H. The Bidder or any listed subcontractor not currently debarred from doing business with the State of South Carolina, the District or any other governmental entity.

I. Any amounts due and payable to the District by the Bidder or any listed subcontractor paid in full prior to the bid submission.

33. Right of Waiver: The District reserves the right to waive any requirements of the previous *paragraph(s)* or any informalities or irregularities in any bid received and award a contract which, in the District's judgment, is in the best interests of the District and in accordance with the District's Procurement Code.

34. Notice of Intent to Award: It is the intent of the District to award a contract to the lowest responsive and responsible Bidder provided the funds are appropriated by the Horry County Board of Education, and the bid does not exceed the funds available. The District expects to post a *Notice of Intent to Award* for this project electronically within thirty (30) calendar days of the bid opening date and time on the District's website page at https://www.horrycountyschools.net/Page/15007 and any other bid posting locations stated in the *Invitation for Bids*. A *Notice of Intent to Award* with bid tabulation shall also be faxed or e-mailed to all Bidders at the time of posting.

35. Contract Award: A *Contract Agreement* shall not be executed between the Contractor and the District until one (1) business day after the completion of the protest period. The *Notice of Intent to Award* is not an authorization for commencement of work but only serves as a public notice of the District's intention to award a contract. A *Notice of Intent to Award* may be rescinded if a) funds for the project become unavailable or the project pricing exceeds the available funding as determined by the Horry County Board of Education; b) further information is brought to the District's attention leading to a determination of Bidder non-responsibility; or c) a protest decision requires rescinding of the *Notice of Intent to Award* or rebidding. The successful Bidder providing services without a fully executed *Contract Agreement* does so at its own risk and expense, and the District shall not be liable for payment of any work performed or the cost of any materials unless the fully executed *Contract Agreement* has been issued to the Bidder.

36. Vendor Registration: Bidders who have not provided products/services to Horry County Schools in the past or have not updated your company's profile with the District via a completed vendor application and W-9 within the past three (3) years, please complete the vendor application along with the W-9 and submit with your offer. The forms are online at: https://www.horrycountyschools.net/Page/10671 .

37. Governing Law: The bidding process and any subsequent contract executed shall be governed by the District's Procurement Code and the laws of the State of South Carolina. A copy of the Procurement Code is available on the District's website at: https://www.horrycountyschools.net/cms/lib/SC02209139/Centricity/Domain/3189/Procurement_Code.pdf. All Bidders are encouraged to read the Procurement Code as it relates to the construction bidding and contracting processes prior to submitting a bid.

38. Ethics Certificate: By submitting a bid, the Bidder certifies that the Bidder has and will comply with, and has not, and will not, induce a person to violate Title 8, Chapter 13 of the South Carolina Code of Laws, as amended (ethics act). The following statutes require special attention: Section 8-13-700, regarding use of official position for official gain; Section 8-17-705, regarding gifts to influence action of public official; Section 8-13-720, regarding offering money for advice or assistance of public official; Sections 8-13-755 and 8-13-760, regarding restrictions on employment by former public official; Section 8-13-790, regarding recovery of kickbacks; Section 8-13-1150, regarding statements to be filed by consultants; and Section 8-13-1342, regarding restrictions on contributions by contractor to candidate who participated in awarding of contract. The District may rescind any contract and recover all amounts expended as a result of any action taken in violation of this provision. If contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders regarding a public contract, contractor shall, if required by law to file such a statement, provide the statement required by Section 8-13-1150 to the procurement officer at the same time the law requires the statement to be filed.

39. Prohibited Communications and Donations (modified): Violation of these restrictions may result in disqualification of your offer, suspension or debarment, and may constitute a violation of law. (a) During the period between publication of the solicitation and final award, **potential and actual Offerors (including any subcontractors or sub-consultants) must not communicate, directly or indirectly, with the District or its employees, agents, or officials (including members of the School Board and/or the District Selection Committee) regarding any aspect of this procurement activity,** unless otherwise approved in writing by the Procurement Specialist. All communications must be solely with the Procurement Specialist. (b) You are advised to familiarize yourself with Regulation 19-445.2165, which restricts donations to a governmental entity with whom you have or seek to have a contract. **You represent that your offer discloses any gifts made, directly or through an intermediary, by you or your named subcontractors to or for the benefit of the District during the period beginning eighteen months prior to the Opening Date.**

40. Non-Collusion Clause: By submitting a signed bid, the Bidder certifies the prices submitted in response to the solicitation have been arrived at independently and without, for the purpose of restricting competition, any consultation, communication, or agreement with any other Bidder or competitor relating to those prices, the intention to submit a bid, or the methods or factors used to calculate the bid prices. The Bidder further certifies the Bidder is not party to any collusive action or any action which may be in violation of any federal or state antitrust act, nor has the Bidder offered or received any kickbacks or inducements

from any other Bidder, supplier, manufacturer, or subcontractor in connection with the bid to be offered to the District. Any and all bids shall be rejected if there is any reason for believing collusion exists among the Bidders which may be a violation of Federal or State antitrust acts. The District may or may not, at its discretion, accept future bids for similar work from Bidders suspected of collusion.

41. Bidding Expenses: All costs associated with a) ordering documents, b) attendance at any pre-bid conference(s) or other bid meetings, c) worksite observations, d) preparation and presentation of a bid, e) supplying any documentation required by the District for purposes of determining Bidder responsibility or in relation to any protest or appeal, or f) any other costs incurred prior to execution of a *Contract Agreement* is solely the responsibility of the Bidder.

42. Protest Procedure: Any Bidder who feels he/she has been aggrieved in connection with this solicitation, an addendum to the solicitation, or the subsequent award of a contract has a right to protest and to present an appeal in accordance with the District's Procurement Code. Any formal protest shall be submitted to the District's Procurement Officer, in writing, within the required number of days from the date of the solicitation, an addendum or the award, whichever is at issue. The aggrieved individual may contact the District Procurement Officer for details or may view the District's Procurement Code at: https://www.horrycountyschools.net/cms/lib/SC02209139/Centricity/Domain/3189/Procurement_Code.pdf. Nothing in these *Bid Instructions* shall preclude the District from requiring a bond in conjunction with any protest or appeal or other activity connected hereto.

End of *Bid Instructions*

LONG FORM CONTRACT AGREEMENT

THE DISTRICT:	CONTRACTOR:	CONTRACT DATE:
Horry County Schools 335 Four Mile Road, P.O. Box 260005 Conway, South Carolina 29528-6005 **Phone:** 843-488-6711	**Phone:**	**PROJECT NAME:** St. James High School HVAC Renovations **PROCUREMENT No.:** 2021-46MJ **CONTRACT VALUE:**

The following terms and conditions are applicable to this *Contract Agreement* between the parties listed above for the Scope of Work (Exhibit A) established:

1. Contract Validity: The *Contract Agreement* shall be executed by a responsible signatory of the District and the Contractor and, along with all the Exhibits and the documents referenced therein forming the Contract Documents, represents the full and complete agreement between the parties. All Contract Documents are intended to be complementary and what is required by one shall be as binding as if required by all. In the case of apparent ambiguity or contradiction, these terms and conditions shall take precedence. Divisions of the Contract Documents into sections and paragraphs shall not interpret or alter the meaning or intent of any provision.

2. Authority for Changes: Neither the Architect's nor the District's representatives, agents or employees have any independent authority, either expressed or implied, to amend the Contract Documents, either orally or in writing. To be official and binding, amendments shall only be made in writing as a *Construction Change Directive (CCD) or a Change Order* based upon the requirements in Exhibit E.

3. Contract Forms: Forms contained in the Contract Documents are the official forms intended for the specified use in preparation and administration of the contract. Any similarly intended forms as distributed by AIA, ACCORD or any other source shall not be substituted except as approved by the District; however, any deficiencies or variances in terms and conditions of those substituted forms from the District's approved forms shall not be applicable or binding upon the District but shall be superseded by the language contained in the District's required forms.

4. Ownership of Documents: Under separate contract with the Architect, the District has ownership of all specifications and drawings in relation to the project. Neither the Contractor nor any other entity shall claim ownership or copyright of any drawings, specifications or other Contract Documents prepared by the District or the Architect nor shall they be used on any other projects without written consent of the District. This requirement survives completion or termination of the *Contract Agreement.*

5. Non-Waiver of Rights: Failure by the District to enforce any provision of the Contract Documents shall not be construed as a waiver of any such provision and shall not affect the validity of the *Contract Agreement* or any part thereof or the right of the District to enforce any provision at any time. No action or failure to act by the District or the Contractor shall constitute a waiver of a right or duty afforded them under the Contract Documents nor shall such action or failure to act constitute approval of or acquiescence to a breach, except as may be specifically agreed to in writing signed by both parties.

6. Maintenance and Auditing of Contractor's Records: The Contractor shall prepare and maintain project records as required by the District, acceptable accounting standards, and applicable laws for a period of three (3) consecutive years following completion of the project as evidenced by the date of final payment to the Contractor. The District, the Office of General Services of the State of South Carolina, and any auditor under contract with the District has the right to audit the Contractor's records related to the *Contract Agreement* at any time. The Contractor shall ensure all records are available for inspection at the location specified by the District within seventy-two (72) hours of notice by the District at no additional cost to the District. This requirement shall survive termination or completion of the contract.

7. Contractor Performance: Performance by the Contractor shall be required only to the extent consistent with the *Contract Agreement*, including all *Change Orders (Exhibit E)* necessary to produce the intended result.

8. Acts, Errors, Omissions, and Inconsistencies: The Contractor shall be responsible to the District for acts, errors and omissions of the Contractor, subcontractors and suppliers who perform any portion of the work or supply any materials, equipment or processes to be incorporated into the work. The Architect and the District shall at no time be legally responsible for any negligence or other acts by the Contractor, any subcontractor, any supplier, or anyone enjoined to them.

9. Independent Contractor Status: The Contractor shall be legally considered an independent contractor and neither the Contractor nor any subcontractor or supplier shall, under any circumstances, be considered employees, representatives, or agents of the District or the Architect.

10. District Representatives' Authority: The District's assigned Project Manager and project representative(s) as identified in the *Scope of Work (Exhibit A)* shall provide administration of the *Contract Agreement* and associated Contract Documents and shall act on behalf of the District only to the extent of a) the terms and conditions of the Contract Documents; b) their respective duties; and c) the authority granted to them in accordance with their respective positions with the District or through a contractual agreement.

11. Required Meetings: A pre-construction conference with the District and the Architect shall be scheduled prior to work commencement. At a minimum, the Contractor, the Contractor's Worksite Superintendent(s), and a representative of each subcontractor listed in the bid shall be in attendance. Construction meetings during the progress of the work shall be held by the District as often as required in the *Scope of Work (Exhibit A)* and, at a minimum, the Contractor's Worksite Superintendent(s) and a representative of any subcontractor currently performing work or scheduled to begin performing work shall be in attendance. At the meetings, the Contractor shall provide a) a progress report as it relates to the established substantial completion date and approved construction schedule, b) any scheduling changes conforming to the established completion date, c) performance issues, problems or delays encountered and resolutions to avoid failure in meeting the completion date, d) the District's scheduled activities or other needs at the worksite, and e) any other aspects of the work deemed to have a potential impact on the date of substantial completion. Other meetings may be required with regulatory authorities or the District's Board of Education. All such meeting requirements shall be adhered to by the Contractor at no additional cost to the District.

12. Reporting of Errors, Omissions or Inconsistencies: Errors, omissions, and inconsistencies discovered in the Contract Documents not previously recognized in the bidding process shall be reported to the District, in writing, within twenty-four (24) hours of discovery for appropriate resolution. If the Contractor performs any construction activity involving a recognizable error, omission, or inconsistency without first notifying the District for a determination, the Contractor shall assume responsibility for such performance and shall bear an appropriate amount of the costs for correction.

13. Building Permit and Other Permits and Fees: No general building permit is required in accordance with § 6-9-110 of the South Carolina Code of Laws; however, the Contractor shall be required to provide mechanical, electrical, plumbing and other such permits which may be required for purposes of inspection at no additional cost to the District. Except for permits and fees which are the responsibility of the Contractor in the Contract Documents, the District shall secure and pay for necessary approvals, easements, assessments, utility impact fees, permits, and such charges required for the successful completion of the work.

14. Verification of Worksite Measurements and Conditions; Surveys: The Contractor shall take worksite measurements and verify worksite conditions and shall carefully compare such measurements, conditions and other information known to the Contractor with all Contract Documents before commencing with the work. The Contractor shall establish all working lines, grades, and bench marks, appropriate to the work being performed, and shall be responsible for accuracy of same. The District shall furnish any necessary land surveys describing physical characteristics, legal limitations and utility locations for the worksite, if necessary to the performance of the work. From the information provided by the District, the Contractor shall develop and make all detailed surveys, as needed, for the performance of the work such as, by way of illustration and not limitation, slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets. The Contractor shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, shall be responsible for any mistakes which may be caused by the unnecessary loss or disturbance.

15. Conformance to Applicable Laws: The Contractor shall comply with and give notices as required by all applicable laws bearing on construction of school facilities including, by way of illustration and not limitation, the following:

A Most current international building, plumbing, mechanical, gases, and fire prevention codes (i.e., International Building Code effective in year 2003, as may be amended).
B National Electrical Code, as may be amended.
C South Carolina Energy Conservation and Efficiency Act of 1992, as may be amended.
D OSHA Standards, as may be amended and applicable to the construction industry.
E SC Department of Transportation Access and Roadside Management Standards, as may be amended.
F Where such requirements are inadequate, the Contractor shall use the most current NFPA Standards, American National Standards Institute or other recognized national standards.

If the Contractor performs work knowing it to be contrary to these or any other applicable laws without first notifying the District, in writing, for a determination, the Contractor shall assume full responsibility for such work and shall bear the costs of correction.

16. Project Time and Work Commencement: By executing the *Contract Agreement*, the Contractor confirms the time limits established in the *Project Schedule (Exhibit D)* are reasonable periods of time for performing all work required. The Contractor shall proceed expeditiously with adequate forces to achieve the established completion date. The Contractor shall not prematurely commence operations on the site or elsewhere prior to the a) commencement date established in Exhibit D, b) effective date of insurance required and evidenced by a valid *Certificate Of Insurance (Exhibit G)* provided to the District, or c) securing of SLED background checks on all Contractor and subcontractor worksite personnel, whichever is later. The date established for completion of the project shall not change should the effective date of any insurance or the acquiring of SLED background checks delay the commencement of the work.

17. Construction Schedule: The Contractor shall, within ten (10) days of the date of the *Notice of Intent to Award*, prepare and submit to the District an itemized construction schedule. The construction schedule shall a) incorporate the entire work to be performed; b) indicate the dates for start and completion of various elements of the work conforming to the time frames in *Project Schedule (Exhibit D)*; c) be affirmed or revised as required by the conditions of the work with District approval; and d) not exceed the time limit established by the District for substantial completion of the project stated in the *Project Schedule (Exhibit D)*. The construction schedule and any revisions thereto must be approved by the District through a *Change Order* or *CCD* and used in monitoring the progress of the work. When the progress of the work, at the District's sole determination, does not conform to the last approved construction schedule, the District shall have the right to withhold payment from the Contractor until the work is compliant with the approved construction schedule and the District is certain there is no further potential for slippage in the construction schedule impacting the substantial completion date..

18. Submittals: The Contractor shall conform to any requirements for submittals stated in the Contract Documents and shall prepare within ten (10) days from the date of the *Contract Agreement* a schedule of submittals, which shall be maintained throughout the term of the *Contract Agreement* and coordinated with the construction schedule to allow adequate time for the Architect and District to review and respond to the submittals. The Contractor shall review and approve and submit to the Architect all shop drawings, product data, samples and similar submittals at least thirty (30) days prior to use to avoid delay in the work. By submission to the Architect, the Contractor warrants the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, and has checked and coordinated the information contained within such submittals with the requirements of the work and the Contract Documents. Submittals shall be marked with the name of the project and bear the signed and dated stamp of approval of the Contractor as evidence the submittals have been reviewed. Any delay in the progress of the work due to the Contractor's delay in submitting such documents in sufficient time for review shall incur no additional costs to the District or extension in contract time but may result in delayed payment to the Contractor. Work performed shall be in conformance with the accepted submittals. The Contractor shall not be relieved of responsibility for errors or omissions in submittals by the acceptance of the Architect or District.

19. Shop Drawings: Shop drawings shall be accurate to a scale sufficiently large enough to show all pertinent aspects of the equipment and its connections. Shop drawings shall be submitted to the Architect for review in the number of copies and on medium required by the Architect at least thirty (30) days prior to intended use. The review of submittals and shop drawings by the Architect and the District shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences or procedures. The acceptance of a single item shall not indicate acceptance of an assembly of which the item is a component. The Contractor is in no manner relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's or District's acceptance of shop drawings, product data, samples or similar submittals unless the District has given specific written approval after written notification by the Contractor of the specific deviation.

20. Maintenance of Record Drawings: The Contractor shall maintain at the worksite one (1) record copy of the Contract Documents including approved changes in good order and marked currently to record changes and selections made during performance of the work. A copy of submittals accepted by the District shall also be maintained at the worksite. These items shall be available to the Architect and District when present at the worksite. When required by the Contract Documents, the Contractor shall provide record drawings on all increments of the work such as, by way of illustration and not limitation, plumbing, electrical, mechanical, and all systems, such as fire and security systems, incorporated into the work. The Contractor shall furnish an electronic and paper copy of record drawings of "as-built" detail to the Architect at final completion of all work, excluding punch list items as required by the Contract Documents.

21. Professional Certifications: When professional certification of performance criteria for materials, systems, or equipment is required by the Contract Documents, the District shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

22. Contractor's Quality Control Program: The Contractor shall institute and maintain throughout the contract term a quality control program, designed to ensure the work performed is in accordance with the Contract Documents, including any changes, at all times and in all respects. The program shall include providing daily supervision and conducting frequent inspections by the Worksite Superintendent(s).

23. Award of Multiple Contracts: The District reserves the right to bid and award separate contracts for portions of the project, perform work with its own forces, or perform construction or operations in conjunction with the work of the Contractor. When the District performs work with its own forces, the District shall be deemed a separate contractor subject to the same obligations and having the same rights. The District shall coordinate the activities of the District's own forces and of each separate contractor with the work of any other contractors. The Contractor shall participate with other contractors, the Architect, and the District in reviewing construction schedules and making any revisions after a joint review, mutual agreement and approval of the revisions by the District. If part of the Contractor's work depends upon construction or operations of the District or a separate contractor, the Contractor shall, prior to proceeding with that portion of the work, promptly report to the District apparent discrepancies or defects in the other construction which would render it unsuitable for the Contractor's work. Failure of the Contractor to report such defects shall constitute an acknowledgment the District's or separate contractors' completed or partially completed construction is fit and proper to receive the Contractor's portion of the work, except as regards latent defects. If any dispute arises between the Contractor and the District's own forces or other contractors, the District shall mediate such disputes and equitably charge any costs to the responsible parties.

24. Assignment and Coordination of Separate Contractors: In order to ensure continuity and quality, the District reserves the right to award separate contracts for certain trades such as low-voltage wiring, HVAC controls, security and fire alarm systems. The District further reserves the right to assign any separately procured contracts to the Contractor for coordination, supervision, and scheduling of work. If the contract is fully assigned, the trade contractor shall become a subcontractor of the Contractor in all respects. The District may also partially assign the trade contractor to the Contractor such that the Contractor schedules and supervises the trade contractor; however, the District administers the contract, holds the performance and payment bonds, processes change orders and payments directly to the trade contractor with approval of the Contractor. Upon execution of the assignment, the Change Order (Exhibit E) shall add the value of the awarded contract price plus a five percent (5%) markup for a fully-assigned contract.

25. Cutting and Patching: The Contractor and separate contractors shall a) be responsible for cutting, fitting or patching required to complete the work or to make its parts fit together properly with other construction or with existing structures; b) not damage or endanger a portion of the work or any portion of present or completed construction of another entity by cutting, patching or otherwise altering such construction or structures or by excavation; and c) not cut or otherwise alter such construction or structures of the another entity without consent, and such consent shall not be unreasonably withheld.

26. Supervision and Labor: The Contractor shall provide and pay for all labor necessary for proper execution and completion of the work identified in the *Scope of Work (Exhibit A)*. The day-to-day supervision and control of the Contractor's employees is the sole responsibility of the Contractor. The Contractor shall not employ or contract with illegal alien workers or otherwise violate the provisions of the federal Immigration Reform and Control Act of 1986, as may be amended or any State of South Carolina immigration and alien work requirements, including any requirements for reporting illegal aliens. A minimum of two (2) employees in addition to the Worksite Superintendent(s) shall be fluent in spoken and written English.

27. Work Scheduling: The Contractor shall maintain a full crew of competent employees and subcontractors on the project full time. At a worksite with an occupied building under repair or renovation or other facilities used on a regular or intermittent basis, normal working hours may vary. The District reserves the right to adjust work hours when such work in progress interferes with the educational process, athletic events, District operations or traffic patterns; therefore, work scheduling shall be flexible to include weekends and evening hours when necessary without additional cost to the District. The Contractor shall ensure this requirement is a part of any subcontract agreements.

28. Davis-Bacon Act: The Contractor shall ascertain whether any federal funds shall be used in payment of the work to be performed and, if so, shall abide by all federal provisions and requirements of the Davis-Bacon Act, as may be amended.

29. Drug-Free Workplace: The Contractor shall be responsible for initiating, maintaining and supervising all drug-free programs conforming to Title 44, Chapter 107, § 44-107-10 through § 44-107-90 of the South Carolina Code of Laws, as may be amended.

30. Conflict of Interest: The Contractor shall not employ any owner, director, representative, agent or employee of the Architect or the District to perform any work, directly or indirectly, full-time or part-time related to the requirements of the Contract Documents without approval of the District.

31. Compliance with Employment Laws: By entering into a *Contract Agreement*, the Contractor agrees to abide by all applicable laws pertaining to employment including, by way of illustration and not limitation, the following:

A. Title VII of the Civil Rights Act of 1964, as may be amended.
B. Age Discrimination in Employment Act of 1964, as may be amended.
C. Title I of the Americans Disabilities Act of 1990, as may be amended.
D. Equal Pay Act of 1963, as may be amended.
E. Fair Labor Standards Act, as may be amended.
F. South Carolina Wages Act, Code 37-10-10 et seq., as may be amended.
G. South Carolina Worker's Compensation Act, Code 42-1-10 et seq., as may be amended.

The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, handicap, or national origin except when such condition is a bona fide occupational qualification reasonably necessary for normal operations of the Contractor. The Contractor, in all solicitations or advertisements for employees, shall state the Contractor is an "Equal Opportunity Employer." The Contractor agrees to post in conspicuous places, visible to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause and shall include the provision of this paragraph in every subcontract or purchase agreement of more than $10,000.

32. Employment Taxes and Benefits: The District shall not withhold from the contract payments any Federal or State income taxes, or any employment-related taxes normally withheld on the District's employees. Further, the District shall not provide any employment related insurances or other benefits such as worker's compensation for the benefit of any Contractor, subcontractor or supplier employees.

33. Project Key Staff – Project Manager: The Contractor shall assign a skilled, experienced, and dedicated Project Manager to the project and identified in Exhibit A. The Project Manager shall secure the materials of proper quality and quantity to meet the Contract Documents and manage the appropriate timing of all materials, sub-contracted work, and Contractor provided labor to ensure the continual progress of the work to meet the substantial completion date. The Contractor shall not change the Project Manager identified in the *Scope of Work (Exhibit A)* or the duties and status of the Project Manager during the course of the project without approval of the District.

34. Project Key Staff -- Worksite Superintendent(s): The Contractor shall employ at least one (1) full-time, competent Worksite Superintendent and, if required by the Contract Documents, an additional part-time or full-time, competent secondary Worksite Superintendent if expedient for the size and scope of the project. Exhibit A identifies the Worksite Superintendent(s). No less than one (1) Worksite Superintendent shall be in attendance at the worksite at all times during performance of any work by the Contractor's own forces or subcontractors and during delivery of any materials. The Worksite Superintendent shall not perform the work of any trade or other duties; however, the secondary Worksite Superintendent may perform part-time work of a trade or the duties of OSHA Compliance Officer or fireguard, if approved by the District. The Contractor shall not change any Worksite Superintendent identified in the *Scope of Work (Exhibit A)* or the duties or status of same during the course of the project without approval of the District. The Worksite Superintendent(s) shall enforce strict discipline and good order among the Contractor's representatives, agents, employees, subcontractors and suppliers.

35. Worksite Communications: The Project Manager and Worksite Superintendent(s) are representatives of the Contractor and communications given to them, either orally or in writing, shall be as binding as if given to the Principal of the Contractor.

36. Subcontractor & Supplier Relationship to the District: Nothing in the Contract Documents shall infer any contractual relationship between the District and any subcontractor, supplier or other entity under agreement to the Contractor except as it relates to warranties or specifically provided for elsewhere.

37. Subcontractor Administration and Contractual Requirements: Within ten (10) days from the date of the *Contract Agreement* the Contractor shall provide to the District and the Architect a list of all subcontractors along with addresses, contact information, trade or portion of work responsible for, and minority status. The Contractor shall not change a subcontractor during the term of the *Contract Agreement* without written approval of the District. Any change in subcontractors shall be in accordance with the District's Procurement Code. The Contractor shall warrant to the District, by execution of the *Contract Agreement,* each subcontract shall a) preserve and protect the rights of the District with nothing prejudicing those rights, b) assume all the obligations and responsibilities the Contractor assumes under the Contract Documents, and c) assume all rights, remedies and redresses against the Contractor which the Contractor has against the District in the Contract Documents. The Contractor shall make available to each subcontractor, prior to execution of a subcontract, a copy of this *Contract Agreement* to which the subcontractor shall be bound.

38. Contractor Legal Requirements Pertaining to Subcontractors: The Contractor shall abide by all applicable laws pertaining to the treatment and payment of subcontractors including, but not limited to, a) South Carolina Code of Laws §29-6-30 regarding timely payment of subcontractors; and b) South Carolina Code of Laws §29-6-230 regarding timely payment of subcontractors when payment to the Contractor may be withheld. If the Contractor is not abiding by applicable laws regarding subcontractor payment, the District shall have the right to a) withhold payment from the Contractor until such breach is corrected, and b) report such failure to the proper authority including the Contractor's Surety. The District shall have the right, upon request, to furnish any subcontractor a copy of the Contractor's payment bond and information regarding percentage of work completed and amounts applied for and paid to the Contractor by the District relative to portions of the work done by the subcontractor. Regardless of the rights expressed herein, the District shall not be obligated to pay any subcontractor except as otherwise required by applicable laws.

39. Provision of Materials and Equipment: The Contractor shall provide and pay for all materials, equipment, tools, construction equipment and machinery, water, heat, utilities, sanitation, transportation, waste disposal and other facilities, sales tax, shipping and handling, and any other goods or services necessary for proper execution and completion of the work, whether temporary or permanent, unless otherwise provided by the District and specifically stated in the Contract Documents.

40. Materials Conformance: By execution of the *Contract Agreement*, the Contractor warrants to the District that the materials and equipment to be incorporated into the work shall a) be of good quality, undamaged, and new (not used or remanufactured unless otherwise required or permitted by the Contract Documents); b) be free from defects (excluding latent defects); and c) conform to the Contract Documents. Materials and equipment not conforming to the Contract Documents, including substitutions not properly pre-approved and authorized by the District, shall be considered defective. Such non-conforming materials or equipment shall be replaced by the Contractor at no additional cost to the District and no extension of contract time. The Contractor warrants the Worksite Superintendent(s) shall inspect and perform random testing of all materials and equipment to ensure quality and conformance with the Contract Documents. The Contractor shall also **not allow use of**: a) asbestos containing products, temporary or permanent, even if they are non-friable, contain only minimal amounts of asbestos, and can be legally installed; and b) lead materials in paints or public water applications. "Lead-free" solder, flux, and pipe containing less than two-tenths of one percent (0.2%) lead and valves, pipes and appurtenances containing less than eight percent (8.0%) lead shall be used in all public drinking water applications as outlined in the 1986 amendments to the Safe Drinking Water Act.

41. Stored Materials: For purposes of this *Contract Agreement,* stored materials and equipment refers only to those purchased for incorporation into, and becoming an integral part of, the completed work. Such materials and equipment shall be suitably stored to ensure the preservation of their quality and fitness for the work. The Architect and the District shall have full access to all stored materials for verification of quality and quantity. The District reserves the right to designate "lay down" locations at the worksite where materials and equipment shall be stored, and such lay down areas shall be completely fenced and secured at all times. **The Contractor shall not store materials in a concentrated area on the roof of any building**. Tarps may be used to prevent damage by weather conditions; however, **polyethylene shall not be used in lieu of tarps**. Materials and equipment maintained off-site shall be suitably stored in a bonded, insured warehouse, at no additional cost to the District, and proof of warehouse bonding, insurance, quality, quantity and value shall be provided with any Payment Request for which the Contractor expects to be reimbursed for off-site materials and equipment. Bonding and insurance shall remain in force for the duration of time the materials, equipment or processes are stored off site.

42. Certification of Authorized Installer: All manufactured or fabricated materials and equipment shall be applied, installed, connected, erected, cleaned, conditioned and handled in strict accordance with the requirements of the manufacturer, fabricator or supplier so as not to nullify any warranties provided. Upon request of the District in the *Scope of Work (Exhibit A)* or otherwise, the Contractor shall supply a letter from the manufacturer, fabricator or supplier stating the Contractor or subcontractor is an approved and authorized installer of the materials or equipment.

43. Title to Materials, Equipment and Processes: Any property acquired or constructed under this *Contract Agreement* is considered public property and is, therefore, not subject to any mechanics liens or other such claims. The Contractor warrants, at the time each *Payment Request (Exhibit F)* is submitted for payment, title to materials and equipment suitably stored off site, on site, and incorporated into the work shall pass to the District. This provision shall not be construed as a waiver of the District's right to require the fulfillment of all terms of the contract or as relieving the Contractor of the sole responsibility for the a) care, protection and proper storage of the materials or equipment upon which payment has been requested or made; b) correction of any deficiencies; and c) restoration or replacement of any damaged or improperly installed materials or equipment.

44. Worksite Access: The Contractor shall confine operations at the worksite to areas permitted by applicable laws, consistent with the Contract Documents, or designated by the District, and shall not unreasonably encumber the worksite with materials or equipment which would hamper ingress to or egress from the worksite or its buildings and facilities. The Contractor shall limit access of the Contractor, subcontractors and suppliers to designated areas where the work is in progress. Access to other occupied areas of buildings and facilities shall only be for the purposes of spotting, clean-up, damage inspection, or

communication with the Principal in the event of an emergency. **No other communication with any occupants of an existing building or facility shall occur. All site communications shall be made with the Architect or District project representatives only.**

45. Worksite Clean-Up: The worksite premises shall be maintained in a neat and orderly condition and kept free of accumulations of refuse materials and debris during the entire performance of the work. The Worksite Superintendent shall ensure all refuse materials and debris are deposited in commercial refuse containers at the end of each working day and removed from the worksite at least weekly or at such intervals necessary to prevent overflow. It is the sole responsibility of the Contractor to arrange for legal removal and disposal of all refuse materials or debris at no additional cost to the District. At completion of the project, portable sanitary or other temporary facilities, construction refuse containers, debris, and all Contractor/subcontractor tools, equipment, machinery, surplus materials, or other such items shall be removed from the worksite. If the Contractor fails to clean up the worksite at least weekly or at such times as the District or Architect feels appropriate for safety or other reasons or at the completion of the work, the District may provide for cleanup and disposal, and deduct such costs from the Contractor's payment.

46. Contractor Supplied Equipment and Facilities: The Contractor shall provide and pay for, by way of illustration and not limitation:

A. A worksite office or construction trailer where the plans, specifications and other construction documents are located, where high-speed internet access and e-mail are available, where site meetings can occur, for temporary shelter from inclement weather, heated/cooled as appropriate for the nature and duration of the project.
B. All tools, scaffolding, fencing, signage, rented or owned construction equipment and machinery or other such equipment necessary for proper execution of the work.
C. Potable (drinking) water as well as temporary water for the project separate from any existing building's water source.
D. Temporary lighting and power including temporary power panels, wiring, lamps, outlets for power equipment, or other such needs for electrical power.
E. Telephones or other communication equipment; office equipment or other utilities and services appropriate to the nature and duration of the project.
F. Sanitation facilities and access to food and drink vending, as appropriate.
G. Transportation and delivery.
H. Any other materials, equipment, facilities and services necessary for the proper execution and completion of the work.

Approval of any use of District facilities shall be identified in the *Scope of Work (Exhibit A)*.

47. Existing Building Safeguards: When renovations or repairs are required to an existing building, the Contractor shall be solely responsible for protecting the existing building and its contents from inclement weather and damage resulting from the work being performed. **The Worksite Superintendent shall inspect the existing premises daily to ensure there is no damage in progress.** Immediate corrective action shall be taken upon observation of any damage in progress, and the Contractor shall notify the District project representative immediately when such damage is identified. The Contractor shall also be responsible for safeguarding any other out buildings, athletic or other facilities at the worksite from damage, either directly or indirectly, as a result of the work being performed, the delivery or storage of materials and equipment, the use of construction equipment, or other Contractor, subcontractor and supplier activities.

48. Damages Remedy: The Contractor shall remedy all damages to the exterior or interior of any buildings or facilities, including building contents, due to the failure of the Contractor, any subcontractor or supplier to take sufficient precautions, either directly or indirectly, to safeguard the buildings and facilities from inclement weather conditions, water infiltration, the work being performed, or other causes of damage. The Contractor shall be responsible for all costs associated with such remedy, including insurance deductibles, which are not recoverable from the Contractor's or subcontractors' insurance carrier or the District's insurance carrier, if applicable. Likewise any building, lawn, landscaping, parking lot, canopies, athletic facilities, fences, signs or other District property damaged by the Contractor, any subcontractor or supplier while in the performance of the work shall be restored to no less than the condition prior to damage and to the satisfaction of the District.

49. Responsibility for Work in Progress: The Contractor shall be solely responsible for coordinating all portions of the work and shall have control over construction means, methods, techniques, sequences and procedures implemented to accomplish the work unless the Contract Documents give specific instructions concerning these matters. The Contractor shall supervise and direct all aspects of the work to be performed using the Contractor's best skill and attention, whether the services are performed by the Contractor or any subcontractor. The Architect, the District or any regulatory authority shall, at any time, have the right to inspect the progress of the work for quality of workmanship and conformance to the Contract Documents and applicable laws.

50. Demolition and Salvage of Materials and Equipment: The Contractor shall notify DHEC of all demolition activities in conjunction with any renovations even if asbestos is not suspected. The District reserves the right, before demolition, to salvage useable materials, equipment and processes from any building, or portion thereof, when such salvaging does not interfere with demolition activities or the progress of the work. After salvage by the District, the Contractor shall have the right to remove or sell any remaining materials, equipment or processes provided it does not delay the demolition or the work. The Contractor shall be responsible for removal from the worksite and disposal of all demolition debris.

51. Underground Utilities and Shutdowns: The Contractor shall abide by the Underground Utilities Damage Prevention Act, South Carolina Statute 58-35-10, as may be amended, and shall include this same requirement in all subcontract agreements. For worksites with an occupied building, prior to any shutdown of any electrical, mechanical, security, fire or other such systems, the Contractor shall notify the District's project representative not less than five (5) days prior to the shutdown. No shutdown shall occur without notification to, coordination with, and approval by the District. **Shutdown of fire alarm and security systems shall not intentionally occur while the building is occupied**. The Contractor shall notify the District's project representative immediately of any accidental termination of electrical, mechanical, security or other such systems. The Contractor shall take immediate remedial action to bring such systems to full functionality. **Fire alarm and security systems shall have priority**.

52. Tests, Inspections and Approvals: Tests, inspections and approvals required by the Contract Documents or any applicable laws shall be made in a timely matter to avoid delay in the construction schedule or progress of the work. Unless otherwise provided in the Contract Documents, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory, the appropriate public authority, or the District's approved provider of IBS inspections. The Contractor shall give the District and Architect timely notice of when and where tests and inspections are to be made so they may observe such procedures. Any required certificate of testing, inspection or approval shall be provided promptly to the District. The Contractor shall also be responsible for tests and inspections of portions of the work already performed to determine such portions are in proper condition to receive subsequent work and conform to the Contract Documents. The Contractor shall not be relieved of the obligation to perform the work in accordance with the Contract Documents by activities or duties of the Architect or District or certifications required by any regulatory authority. The District shall have the right to require additional inspection or testing of the work, whether or not such work is fabricated, installed or completed, if the Architect or the District considers it necessary or advisable for implementation of the intent of the Contract Documents. The Contractor shall cooperate with any additional inspection or testing of the work without any change in contract price or contract time.

53. Costs of Tests, Inspections and Approvals: The Contractor shall bear all related costs for tests, inspections and approvals, except for IBS inspections or those tests, inspections or approvals required of others in the Contract Documents and for which the District is responsible for payment. If tests or inspections reveal failure of the portions of the work to comply with requirements, the Contractor shall bear all costs necessary for correction, including repeated testing and inspection as well as for the additional costs to the Architect, the District, and any regulatory authorities required as a result of the Contractor's failure. Should the Architect or District determine assistance to the Contractor is necessary to obtain timely tests, inspections or approvals to avoid delays in the work or due to Contractor failure in obtaining such tests, inspections or approvals in a timely manner, the Contractor shall reimburse the District one hundred and fifty dollars ($150) per hour per person for the Architect's assistance and seventy-five dollars ($75) per hour per person for District assistance including travel time.

54. Architect, District and Contractor Inspections: The Architect and the District shall have a) access to and the right to observe and inspect the worksite, progress of the work, the materials, equipment, and workmanship for quality and conformance with the Contract Documents; b) access to and the right to inspect off-site stored materials and equipment for quantity and quality; and d) access to the Contractor's records related to the work including, but not limited to, quality control reports, OSHA reports, payrolls, personnel records, SLED criminal background checks, materials and equipment invoices, receiving documents or other project relevant data, documents, or records. The Worksite Superintendent(s) shall perform random testing of work completed to ensure a) the quality and quantity of work completed; b) subcontractor requests for payment do not exceed the actual percentage of work completed; and, c) the appearance of work completed is a true representation of actual work completed. The District shall have authority to require additional inspection or testing of the work, whether or not such work is fabricated, installed or completed, if the Architect or the District considers it necessary or advisable for implementation of the intent of the Contract Documents. No amount of review or inspection by the District or the Architect shall relieve the Contractor of the responsibility for conformance to the Contract Documents or constitutes approval of any defective materials, equipment, process, or work.

55. Sub-Surface Conditions: If conditions are encountered at the worksite which are a) sub-surface or latent physical conditions differing materially from those indicated in the Contract Documents; or b) unknown physical conditions of an unusual nature or differing materially from those ordinarily encountered and generally recognized as inherent in the work to be performed, then the Contractor shall notify the Architect of such conditions before they are disturbed within twenty-four (24) hours of first observation. The Architect shall investigate and, if the condition requires a change in contract price or contract time, a *Change Order* will be processed.

56. Contractor Responsibility for Defective Work: Neither a) final payment, nor b) any decision, approval or acceptance by the Architect or the District, nor c) any other provision

in the Contract Documents shall relieve the Contractor of responsibility for rectifying faulty materials, equipment, workmanship or omission of a portion of the work to be performed. The Contractor shall remedy any defects or supply any omissions and pay for any damage to other work resulting from such remedy. This responsibility shall survive completion or termination of the *Contract Agreement*.

57. Right of Rejection and to Stop Work: The District or the Architect shall have authority to reject work not conforming to the Contract Documents. Rejection of any non-conforming work by the District or Architect shall be corrected by the Contractor within ten (10) days at the expense of the Contractor or subcontractor, whichever is at fault, and without any contract time adjustment. The District shall have the right to stop the work at any time and for any reason. If the work performed by the Contractor or any subcontractor is considered by the District or the Architect not to conform to the Contract Documents or creates a condition that threatens the health, safety, or welfare of the Contractor, subcontractors, suppliers, the District or the Architect, the occupants of any District building or facility or members of the public, the District has the right to stop the work until the Contractor corrects the non-conforming work or condition creating the threat to safety. Any additional costs incurred as a result of the District's stoppage of work shall be the responsibility of the Contractor when the stoppage is precipitated by, but not limited to, action, non-action, omission, error, illegal conduct of the Contractor or any subcontractor or supplier or anyone enjoined to or under agreement to them, or any non-conforming work or unsafe condition. The making of any decision in good faith either to exercise or not to exercise such authority shall not give rise to a duty or responsibility of the District to exercise such authority on behalf of the Contractor, any subcontractor or supplier.

58. Uncovering Work: If a portion of the work is covered (not visible due to the application of additional work) contrary to the requirements or request of the Contract Documents, applicable laws, or the District or Architect to facilitate inspection, that portion of the work shall be uncovered for inspection and be replaced at the Contractor's own expense and time. If applicable laws, the District or the Architect, or the Contract Documents do not request or require observation prior to that portion of the work being covered or for which no testing or inspections are required, it shall be uncovered by the Contractor, and costs of uncovering and replacement shall be paid by the District unless omitted, defective or non-conforming work of the Contractor or any subcontractor is revealed.

59. Contractor Removal and Correction of Work: The Contractor shall, within ten (10) days, supply omitted work or remove from the site portions of work not in conformance with the Contract Documents and correct, remedy, replace or re-execute work rejected by the District or the Architect for failing to conform to the Contract Documents or to pass tests or inspections, whether or not fabricated, installed, completed or performed by the Contractor or any subcontractor. The Contractor shall bear all costs to correct, remedy, replace or re-execute the work, including the costs of rectifying damage to the work of separate contractors, costs of additional tests or inspections, and any additional costs of regulatory authorities, the District or the Architect made necessary as a result.

60. District-Supplied Correction of Omitted or Deficient Work: In the event the Contractor fails, after notice, to supply omitted work or remove and correct deficient work within ten (10) days, the District shall have the right to supply omitted work, remove defective work and store any salvageable materials or equipment at the Contractors expense, order the correction of the defective work by separate contract or with its own resources at the expense of the Contractor, and notify the Surety and any appropriate authorities. If the District supplies, corrects, remedies, replaces or re-executes the omitted or deficient work of the Contractor or any subcontractor, a *Change Order* shall be issued deducting the cost from the Contractor's contract price, including any compensation for the additional services of the District, the Architect or any regulatory authorities, and additional tests and inspections made necessary by such default or failure. If remaining contract funds do not cover the costs, the District shall sell the salvaged materials and equipment and account for the proceeds thereof, and deduct remaining costs and damages including compensation expenses made necessary thereby. Any costs still unpaid shall be the responsibility of the Contractor to reimburse the District and shall survive termination of the *Contract Agreement*.

61. Changes Required in the Work: All difficulties inherent in construction activities cannot be foreseen during design and solicitation of a project; therefore, the District reserves the right to make changes in the work without invalidating the *Contract Agreement*. These changes many include, by way of illustration and not limitation, a) changes in the original design or increasing/decreasing the scope of the project; b) adding an additional alternate originally excluded at the time of *Contract Agreement* execution or the deletion of an accepted alternate from the *Contract Agreement*; c) correction of errors in designs, plans, specifications or drawings not reasonably discernable at the time of bidding; d) implementation of new construction techniques, materials, equipment or processes; e) adapting unanticipated site conditions or other unforeseeable events; and/or f) other necessary changes in requirements. (Requirements for any *Change Order* or *CCD* are provided in Exhibit E.)

62. Excusable Delays: If the Contractor is delayed in the progress of the work by an excusable event such as, by way of illustration and not limitation: a) government acts in a sovereign or contractual capacity; b) fire; c) epidemics or quarantine restrictions; d) freight embargoes; e) acts of a public enemy; or f) other causes which the District determines, then the contract time may be extended by a *Change Order* or *CCD* for such reasonable time as the District may determine, but in no event shall the extension of time be more than one (1) full day for each full day of excusable delay and not to exceed five (5) full days per calendar week. An excusable delay does not automatically entitle the Contractor to an equivalent extension of time unless the District determines the delay directly impacted the worksite location such that no work could reasonably be in progress during the event and was a) unforeseeable, b) beyond the control of the Contractor, and c) not the fault of the Contractor or any subcontractor or supplier, whether directly or indirectly. To warrant an excusable delay, the Contractor shall support the time extension request by a) establishing causation, b) demonstrating the negative impact on the construction schedule, the work in progress, and the established completion date of the project, and c) making every effort to mitigate the potential effect of the delay.

63. Weather Delays: When adverse weather conditions are the basis for a request for additional time, such request shall be documented by data substantiating the weather conditions a) were abnormal for a period of time which could not have been reasonably anticipated; b) had an adverse effect on the work scheduled, and alternate work unaffected by the weather could not have been done; and c) had an adverse effect on the construction schedule such that the loss of work time will adversely impact the established completion date. The Contractor must make every effort to mitigate the potential effect of the weather on the construction schedule including, but not limited to, rescheduling of subcontractors, pumping water from work areas, rescheduling work hours to alternate work days within the work week, or other such actions. Such time extension request shall be in writing and submitted to the District for approval within ten (10) days from the end of the event causing the impact on the construction schedule. An extension of time not requested within the appropriate time period shall not be considered. The approved extension of time shall be incorporated in the next *Change Order*.

64. Anticipated Weather Delays: A total of five (5) days per calendar month (non-cumulative) shall be anticipated by the Contractor as "adverse weather," and such time shall not be considered justification for an extension of time. Such anticipated adverse weather days are established only for normally scheduled work days, excluding Saturdays, Sundays and major holidays, unless such adverse weather conditions on those days are severe enough to impact the scheduled work on the following work day. If adverse weather days beyond the five (5) days anticipated are substantiated and the Contractor could not mitigate the impact of the additional adverse weather days, an extension of time may be allowed only to the extent of the actual impact on the last approved construction schedule and only to the extent of one (1) full day of extended time for each full working day of adverse weather conditions which prevented a forty-hour work week within a seven (7) day calendar week. A request for adverse weather extension shall not be allowed after the date established for substantial completion.

65. Remedy for Delays: Claims for delays shall be remedied only by an extension of contract time, except for delays caused by fraud, misrepresentation or other bad faith on the part of the District or gross negligence by the District or the Architect. Claims for extended or indirect overhead or lost profits as a result of the delay shall not be allowed. No extension of time shall be considered when a delay is caused by a) conditions existing at the time bids were received and of which the Contractor might be reasonably expected to have full knowledge of at the time of bidding; b) failure on the part of the Contractor to anticipate properly the requirements of the work contracted for, as to materials, labor and equipment; c) failure on the part of the Contractor to properly schedule materials and subcontractors; or d) other such failures of the Contractor to properly administer the contract or mitigate conditions resulting in delays.

66. Liquidated Damages: The Contractor acknowledges and agrees the District is a public entity performing an essential public function and failure of the Contractor to comply with the *Contract Agreement* may cause general, special or consequential damages to the District, to those who shall occupy the completed work, and to the public at large. Failure of the Contractor such as, by way of illustration and not limitation, breach, default, delays, or repudiation of the *Contract Agreement* may cause the need to, by way of illustration and not limitation, a) crowd other premises, b) limit educational services and opportunities to students, c) extend occupancy or procure other premises or temporary facilities , d) rectify damages due to a third party, e) pay fines, penalties or other such sums to regulatory or judicial authorities for failure to meet requirements of applicable laws, codes or legal judgments, f) store, delay shipments of, or require suppliers to restock furniture, fixtures and equipment ordered, and/or g) acquire or require services or additional work of the Architect, consultants, other contractors and District staff to mitigate the failure of the Contractor. Should the Contractor fail to complete the project within the contract time, as may be extended by any *Change Order* or *CCD (Exhibit E)*, the District shall have the right to assess liquidated damages as a measure of damages reasonably expected by the District to be incurred and shall not be considered a penalty or retainage. The District shall not be responsible for any additional costs incurred by the Contractor to bring the progress of the work in conformance with the last approved construction schedule such as, by way of illustration and not limitation, a) additional employees or subcontractors, b) overtime payment to employees, c) expediting material or equipment deliveries, d) expediting subcontractor work scheduling, e) substitution of subcontractors or suppliers as addressed elsewhere, or f) other such courses of action. Liquidated damages shall be assessed at the rate specified in the *Scope of Work (Exhibit A)* or actual costs attributable to such failure or delay, whichever is greater. The parties to this *Contract Agreement* hereby acknowledge the difficulty of ascertaining the actual damages to be suffered by District upon Contractor's

default. The parties further agree that any measure of liquidated damages provided for herein is not intended as a penalty but constitutes a good faith estimate of the potential damages arising from Contractor's default. Unless the District specifically elects the remedy of liquidated damages in regard to a default hereunder, it shall not be barred from pursuing any other remedy to which it may be entitled herein.

67. Schedule of Values: The Contractor shall submit to the District a detailed *Schedule of Values* in accordance with Exhibit C within ten (10) days from the date of the *Notice of Intent to Award* allocating the entire contract sum to various portions of the work and subcontracts as well as material costs allocated to either.

68. Payment Requests: The Contractor shall forward two (2) original copies of the *Payment Request (Exhibit F)*, including supporting documentation, to the District for approval and processing no later than the 25th day of the month of the dated *Payment Request*. The itemized *Payment Request (Exhibit F)* submitted shall contain: a) Contractor's original signature with appropriate notarization; b) the updated/highlighted schedule of values; c) the last approved construction schedule with any requested changes highlighted; d) any invoices for which payment is being requested under an allowance, e) proof of insurance and bonding for any off-site warehouse containing stored materials for which payment is being requested, f) each subcontractor's invoice to substantiate the payment requested by the Contractor for those portions of work; and g) any other supporting documentation required by the *Contract Agreement* or the District to substantiate the request, which may include, but is not limited to, invoices or delivery tickets from suppliers, proof of payment to subcontractors and suppliers to date, receipts for rental equipment, labor sheets to support additional labor or additional hours of work, or other documentation.

69. Payment Certification: The presentation of a *Payment Request* constitutes a representation by the Contractor that the Contractor a) is entitled to payment in the amount requested and substantiated, b) is requesting payment for subcontractor work that is not in dispute and funds received will be used to pay subcontractors entitled to payment in accordance with applicable laws, c) is not requesting payment for work that does not conform to the requirements of the Contract Documents, d) is requesting payment for materials, equipment and processes in conformance to the Contract Documents, received and suitably stored, and funds received will be used to pay suppliers, and e) has not included work anticipated to be completed but not completed at the time the *Payment Request (Exhibit F)* is submitted. The approval of a payment shall not, however, represent the District or Architect has a) made exhaustive or continuous on-site inspections to check the quality or quantity of the work, b) reviewed construction means, methods, techniques, sequences or procedures, c) made examinations to ascertain how or for what purpose the Contractor has used the monies previously paid; or d) approved defective or non-conforming work.

70. Approval of Payment: If, upon review of the *Payment Request (Exhibit F)* and based upon the best determination of the District, the Payment Requested does not accurately represent the progress of the completed work and stored materials, the District shall have the right to adjust the payment to more accurately reflect the percentage of completed work. The District shall approve and authorize payment to the Contractor no more often than once monthly. Payment by the District shall be made by the 15th of the following month of the dated *Payment Request* or within thirty (30) days from the date the District receives the *Payment Request (Exhibit F)* except as may be provided for elsewhere in the *Contract Agreement*.

71. Retainage: The District requires a retainage of three and one-half percent (3.5%) of the total contract price, as may be amended by any approved *Change Order (Exhibit E),* to be withheld from the Contractor's payments throughout the term of the *Contract Agreement* and payable at the time of final payment after a) full completion of all work to be performed and all requirements established in the *Contract Agreement* and acceptance by the District, b) submittal of all closeout documents, and c) submittal of an affidavit of payment of debts/claims, if requested by the District, for every subcontractor who performed work on the project evidencing they have received final payment of undisputed work and retainage withheld. As a condition of the contract, no more than three and one-half percent (3.5%) shall be retained from the progress payments of any subcontractor by the Contractor until final completion of that portion of the work. Prompt payment of retainage to all subcontractors at final completion of their acceptable work regardless of timing during the contract is mandatory. **The Contractor shall, at final completion, ensure no amount of the Contractor's retained funds is allocable to the completed and accepted work of any subcontractor nor to materials or equipment purchased from any supplier unless such amounts are in dispute and the Contractor has not requested payment for such disputed amounts to date. Such amounts in dispute shall be identified on the Contractor's affidavit of payment of debts/claims submitted with final documents.**

72. Substantial Completion: A request, shall be submitted to the District for substantial completion ten (10) days prior to the requested inspection to allow the Architect and District to schedule and conduct a review to ensure the project has reached substantial completion and verify all work is complete or make appropriate revisions. Should the Architect or the District determine that all requirements for substantial completion have not been met to allow for regulatory authority inspection or the potential punch list represents more work than can be accomplished within the final completion period and, therefore, does not accurately represent substantial completion, the District shall have the right to a) notify the Contractor's Surety; b) assess liquidated damages, c) withholding payment, and d) any other remedies available to the District.

73. Substantial Completion Inspection: Once the actual substantial completion date has been established, the Architect shall coordinate with representatives of the District and regulatory authorities a mutually acceptable date for project inspection. The Contractor **shall not** notify the Architect and District the project is ready for inspection until, at a minimum, all the following life safety requirements have been completed properly, if included in the work to be performed, and are fully operational according to applicable laws:

A. Fire alarm system with required strobe lights is operational and connected to a supervised monitoring station and any sprinkler system.
B. All fire doors and related hardware, smoke detectors and "hold open" devices are installed and operational.
C. All exit lights, emergency lights and emergency power systems with strobe lights are installed and operational.
D. Fire suppression systems are installed and operational in kitchen hood systems, classrooms and any other facilities with special requirements.
E. Fire extinguishers are installed throughout all buildings, including portable classrooms.
F. All rated walls are properly constructed and identified (stenciled) at proper intervals and sealed to the structure above and it can be demonstrated effectively that proper sealant materials were used.
G. All doors in rated walls are installed with the correct hardware, glazing and labels and are operational.
H. All rated ceilings and floor/ceiling assemblies are properly installed.
I. All penetrations such as, by way of illustration and not limitation, pipes, conduit, and ducts in rated walls and floor/ceiling assemblies are properly installed using appropriate methods and materials.
J. Fire protection of columns, beams, ceilings, roof and floor decking in Type II and Type IV one-hour construction is of adequate depth and properly installed.
K. All required seismic bracing of walls, equipment, hoods, pipes, ducts and ceiling grids is present and properly installed.
L. Smoke testing of all plumbing has been completed in addition to any other testing, and approval to put water and sanitation systems into service has been obtained.
M. Kitchen facilities have been approved for use by DHEC.
N. ADA handicapped accessibility requirements have been met.

74. Additional Substantial Completion Requirements: In addition, the Contractor shall have all mechanical, electrical and plumping installed and operational and all finishes complete, if included in the work to be performed. By way of clarification and not limitation, the following items must be completed before notifying anyone the work is ready for inspection:

A. Installation of all roofing, flashing, drains and downspouts, masonry, sealants.
B. Installation and testing of all windows, doors and hardware and the required sets of tagged keys produced.
C. Installation and testing of boilers, HVAC equipment, ductwork and controls.
D. Completion of all carpentry, including finish work, and painting.
E. Installation and testing of all electrical work, lighting, surge protection, converged network systems and low-voltage wiring.
F. Installation and testing of security system.
G. Installation of all hall lockers, video and audio equipment, stage curtains, auditorium seating, TV brackets, white boards and other wall fixtures.
H. Installation and testing of all gym equipment, lockers and bleachers.
I. Installation and finishing of all flooring, carpeting, and rubber wall base.
J. Completion of retention pond, and installation of landscaping, fencing, covered walkways, and storm water drainage.
K. Installation of all athletic facilities, scoreboards, goal posts, bleachers, concession and storage, baseball backdrops and other such athletic facilities.
L. Completion of all sidewalks, paving and striping.

75. Punch List Completion: At the time of substantial completion inspection by the Architect and District, the punch list shall be reviewed and revised, as appropriate. Punch list items are expected to be relatively inconsequential items that can be completed easily and quickly prior to the final completion date established. Failure of the Architect or District to include an item on the punch list does not alter the responsibility of the Contractor to complete all work in accordance with the *Contract Agreement*. The Contractor shall proceed promptly to complete and correct items on the final punch list within the time frame provided for final completion.

76. Occupancy and Keys: The District may occupy or use any completed or partially completed portion of the work or occupy the worksite location during any substantially completed stage of the work provided the Contractor is aware of such occupancy and any appropriate regulatory authorities have approved such occupancy and use. Partial or full occupancy or use of the work shall not constitute acceptance of any work not complying with the requirements of the Contract Documents. The District may receive deliveries of furniture, equipment and supplies and store them in a designated portion of the worksite prior to the final completion date. Once District staff or a third party has secured the deliveries, the Contractor shall be responsible for maintaining the security of such items and may be held responsible for any theft or misappropriation of such items. The Contractor shall provide to the District at substantial completion, three (3) complete sets of door keys

with tags indicating the number or description of the door or room each key is intended to fit. The Contractor shall also provide to the District with the key sets an itemized key schedule listing door/room number, serial number of the key and number of keys delivered for that door/room.

77. Final Completion: The Contractor has a defined timeframe as indicated in the *Project Schedule (Exhibit D)* from the date of substantial completion to complete all final project requirements shall be the number of days stated in the *Project Schedule (Exhibit D)*. When the Contractor considers all work is completed, including all punch list items, the Contractor shall submit a final *Payment Request (Exhibit F)*, with all final documents to the District for approval. **The Contractor shall cooperate fully with the Architect to facilitate closeout of the project as required. The Contractor is cautioned that occupancy of the premises and delay in completion may cause the distinction between punch list items, normal maintenance of the premises, and any warranty issues to become indecipherable and thus incur possible additional unnecessary costs to the Contractor. The District shall not be responsible for costs incurred by the Contractor related to the Contractor's failure to facilitate completion in the time specified and in the manner required in the Contract Documents.** Should the Contractor fail inspection requiring re-inspection or fail to achieve final completion within the time period established in the *Project Schedule (Exhibit D)*, the final payment of retainage shall be reduced for additional services required of the Architect at the rate of one hundred and fifty dollars ($150) per person per hour and the District at the rate of seventy-five dollars ($75.00) per person per hour including travel time. When the final *Payment Request* (Exhibit F) is received from the Contractor, a final inspection of the work shall be completed by the Architect and District to ensure the project is complete. Certification of the final payment by the District shall indicate that a) final inspection is satisfactory; b) all documents have been adequately prepared and submitted; c) the Contractor is entitled to final payment of all retainage and other funds withheld by the District excluding any amounts remaining in dispute or owed to the District or Architect. The final *Payment Request* shall not be processed for payment until all final documents/items are received, complete and accepted by the District. **Neither completion of the final inspection nor certification of the final payment shall constitute acceptance of any work not complying with the requirements of the Contract Documents**.

78. Final Payment and Release of Claims: Upon receipt and acceptance of all final documents by the District, the final payment shall be authorized less a) any amounts owed to the District including, but not limited to, liquidated damages; b) amounts owed to the District by the Contractor's or any subcontractor's failure to meet the conditions of the *Contract Agreement;* c) additional expenses incurred by the District and/or the Architect from failure of the Contractor to meet required inspections or the need for subsequent inspections; and/or d) amounts owed to third parties reasonably expected to be paid as a result of the Contractor's or any subcontractors' failure to meet the requirements of the *Contract Agreement*. Final payment shall not constitute a waiver of any claim by the District for faulty workmanship identified after the final payment, a release of any obligations of the Contractor, any subcontractor, or any supplier under any warranty agreements, or a waiver of any other requirements of the *Contract Agreement* including those obligations of the Contractor's Surety in the *Contract Agreement*, which may survive termination or completion of the project. Acceptance of the final payment by the Contractor shall be a release to the District of all claims and liability of the Contractor for all materials, equipment and work performed and every act, omission and neglect of the District, the Architect, and others related to or arising out of the work except as may be provided for elsewhere in the *Contract Agreement* or granted by applicable laws.

79. Contractor Warranty: The Contractor shall warrant to the District that any and all work performed, whether by the Contractor or any subcontractor, conforms to the requirements of the Contract Documents or any amendment thereto, and such obligation shall survive termination or completion of the work and acceptance and final payment by the District. If any of the work is found not to be in accordance with any of the Contract Documents or defective during the warranty period, the Contractor shall correct such work within ten (10) days from receipt of written notice from the District unless the District has previously given the Contractor a specific written acceptance of such non-conforming work. If the Contractor fails to correct such non-conforming work within ten (10) days from receipt of the District's written notification or fails during that ten (10) days to propose, in writing, to the District the process by which the work shall commence and be in total compliance with all Contract Documents within thirty (30) days from receipt of written notice of non-conforming or defective work from the District, the District shall have the right to seek other means to correct such non-conforming work at the expense of the Contractor. Any costs to the District shall be reimbursed by the Contractor immediately, or the District has the right to deduct such amount from any other current contract between the District and the Contractor or to find the Contractor non-responsible in any bid submitted until such time as the Contractor has paid in full.

80. Contractor Warranty Terms: The Contractor shall warranty the entire project beginning the day after the date of substantial completion as evidenced by a document prepared by the Contractor and approved by the District, for the period of time stated in the *Scope of Work (Exhibit A)*. In the event of phased work required by the District for early occupancy, the Contractor's warranty shall begin upon substantial completion of each phase of construction. The beginning date of any required phased warranty period shall be documented in a *Change Order* for that phase of work. The warranty shall permit direct enforcement by the District against any subcontractor, or supplier whose guaranty or warranty is called for and the Contractor shall a) be severally liable with such subcontractors or suppliers for purposes of performance under the *Contract Agreement*; b) be furnished by the District with a written notice of any breach of warranty, which shall be sufficient to invoke the terms of the warranty; and c) so bind any subcontractor or supplier to the terms of said warranty. The remedies under warranty are in addition to the remedies otherwise available to the District. The *Contractor's Warranty* shall exclude remedy for damage or defect caused by a) abuse or vandalism; b) modifications to materials, equipment or systems after acceptance of the work by the District; c) proof of improper or insufficient maintenance; d) proof of improper operation of equipment or systems; or e) normal wear and tear under normal usage.

81. Safety Programs and Protection: The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs including all OSHA construction safety standards and requirements. Up to three (3) years of current OSHA (Form 300) reporting logs of accidents shall be provided to the District within forty-eight (48) hours, upon request. The Contractor shall take reasonable precautions for safety of and shall provide reasonable protection to prevent damage, injury or loss to, by way of illustration and not limitation:

A. The Contractor and Contractor's property at the worksite.
B. The District, the Architect, or their property while at the worksite.
C. Other contractors, subcontractors, students, parents, visitors, and other third parties or their property while at the worksite.
D. The work, materials, and equipment under the care, custody, or control of the Contractor or anyone enjoined by or under agreement to the Contractor while located at the worksite either stored or incorporated into the work to be performed.
E. Any other District or neighboring property located at the worksite or adjacent thereto to include, by way of illustration and not limitation, trees, shrubs, lawns, walks, pavements, roadways, parking lots, portable classrooms, sheds, canopies, walkway coverings, structures, utilities or other such items not designated for demolition, removal, relocation or replacement in the course of the work being performed.

82. Safety Precautions: The Contractor shall furnish, install, erect and maintain, as required by existing conditions and performance of the *Contract Agreement*, reasonable safeguards meeting all applicable laws, including by way of illustration and not limitation:

A. Posting directional signs necessary for ingress and egress roads, danger signs and other warnings against hazards, and erecting barricades, fencing, scaffolding, steps, ramps, bridges, platforms, as necessary. Directional and warning signs and protective barricades shall be provided around cranes, hoists, or other such mechanical equipment.
B. Erecting entrance/exit or other overhead protection in accordance with applicable laws to prevent debris or materials falling on employees, students or others. This protection shall be completely removed from the site upon completion of construction, and all holes and damage made as a result of such devices shall be refilled and repaired to the same condition as prior to commencement of the work.
C. Avoiding loading materials on any roof endangering the occupants of any building or facility. Any placement of heavy equipment or materials on the roof of any existing building shall be accomplished prior to or after building occupancy or the Contractor shall make arrangements with the District to vacate classrooms directly affected by such activity.
D. Promulgating safety regulations.
E. Notifying the District and any users of adjacent facilities of safety hazards.

If, at any time during the contract term, the work performed by the Contractor or any subcontractor is considered by the District to create a condition which threatens the health, safety, or welfare of any persons or property, the Contractor shall immediately, correct such condition.

83. Mandatory Safety and Conduct Requirements: The safety and security of District staff, students and the general public are of utmost priority to the District. To that end, the Contractor shall be responsible for ensuring the Contractor, any subcontractor or any supplier comply with the following:

A. **No drugs, alcohol, knives, firearms or other weapons on the worksite,** whether or not there is an existing occupied building.
B. **No fraternizing with, threats to, or use of abusive or profane language in the presence of students, parents, visitors, Architect or District representatives, agents, or employees at the worksite location**.
C. **No improper attire or actions while on any District premises**.
D. **No tobacco products or alternative nicotine products on District premises**.
E. **No direct communication with building occupants at the worksite, including the Principal, unless an emergency occurs.** All communication shall be made directly to and through the Architect or the District's representatives assigned to the project.
F. Take all necessary precautions to separate worksite activities from the occupied portion of any building and secure all work areas and equipment with **safety fencing and appropriate signage**.
G. Take all necessary precautions to ensure **minimal loss of utilities and facilities** required by the occupants of an existing building and **minimal disruption of the educational process** as required by the District.
H. Secure **SLED (State Law Enforcement Division) criminal background checks** on all Contractor and subcontractor employees, agents, and representatives performing

work at the worksite. The Contractor shall ensure no person having committed violent crimes, crimes against children, or crimes of moral turpitude are allowed access to the worksite. Such SLED criminal background checks shall be made available to appropriate District personnel or the District's legal counsel immediately upon request.

I. Take all necessary precautions to protect students, parents, visitors, Architect and District representatives, agents, or employees as well as the property belonging to those individuals at the worksite location during the contract term.

J. Ensure the Contractor's and subcontractor's employees located at the worksite, whether full-time, part-time, or occasionally employed, **wear identification tags** specifically identifying them as part of the Contractor's or subcontractor's workforce.

Failure to meet the requirements of conduct stated in this paragraph may result in arrest and/or removal of the offending individual(s) from the worksite, stoppage of the work until corrective action is taken, or any other action deemed expedient by the District with no increase in contract price or change in contract time.

84. Traffic Control On-Site and Off-Site: The Contractor shall conduct its operations in a manner to not interrupt pedestrian or vehicle traffic except as approved by the District and the South Carolina Department of Transportation. The worksite shall be confined to the smallest area possible allowing maximum use of streets, sidewalks, parking areas or other pedestrian areas and reduce to a minimum any hazard to traffic or pedestrians. The Contractor shall use worker and traffic control signs and devices necessary to comply with Section VI of U.S. Department of Labor, Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways (Washington, DC: GPO) as may be amended, to facilitate traffic control on public roads, streets, or highways when work performed obstructs public traffic. When such traffic areas are obstructed to any extent by work in progress, workers equipped with flags shall direct vehicle and pedestrian traffic. The workers so designated shall not be assigned any other duties while engaged in directing traffic.

85. Safety Designee: The Contractor shall designate a competent individual at the worksite whose duty shall be the prevention of accidents and the implementation and monitoring of all OSHA construction safety standards and requirements. The competent individual shall serve as spotter where there is exposure of pedestrians, students, parents, or visitors to falling debris and, in addition, shall ensure on a daily basis that all fencing or other safety barriers are in an upright position to prevent ingress and egress to "lay down" areas or work areas by unauthorized individuals.

86. Fire Protection: Special precautions shall be taken regarding fire protection and use of open flames from welders or other such equipment. Appropriate fire extinguishers shall be provided around open flames at all times. A fireguard shall be stationed at and beneath the points where open flames are being used. The fireguard shall be equipped with a water hose no smaller than one-half inch (1/2") in diameter with constant availability of water. The fireguard shall continue the fire watch for a minimum of one (1) hour after use of open flames, welders or other such equipment has ceased and shall remove cleaning agents, gasoline, or other such flammable liquids from the work at the end of each working day and store such items in a safe, secure area inaccessible to unauthorized personnel.

87. Hazardous Materials: When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the work, the Contractor shall exercise utmost care and such activities shall be under the supervision of properly qualified personnel. If reasonable precautions are inadequate to prevent foreseeable bodily injury or death to individuals resulting from a material or substance encountered on the worksite, the Contractor shall, upon recognizing the condition, immediately stop work in the affected area and report the condition to the District for resolution. The District is responsible for obtaining the services of a licensed laboratory to verify the presence or absence of the material or substance (including asbestos or polychlorinated biphenyl products) and to verify that it has been rendered harmless or the District shall furnish a qualified entity to perform the task of removal or safe containment of such material or substance, if necessary. The District shall have the right to stop work, evaluate the premises, conduct abatement activities, and take other measures to render the worksite harmless so work can continue, and shall adjust the construction schedule and established completion date through an approved *Change Order (Exhibit E)* for the delay.

88. SDS Sheets: The Contractor shall maintain on the worksite all SDS sheets for any materials with a chemical compound base used during execution of the work required. Safety precautions used in conjunction with any such materials or safety procedures used in the event of an accident shall be in accordance with SDS instructions and OSHA requirements.

89. Emergencies: The Contractor shall provide the Architect and the District with telephone numbers or other direct means of communication with the Contractor and the Worksite Superintendent in the event of an emergency. The Architect or the District shall have the determination as to what constitutes an emergency that must be responded to by the Contractor or the Worksite Superintendent or others. In an emergency affecting the safety of individuals or property, the Contractor shall take immediate action to prevent and mitigate damage, injury or loss. Notice of any emergency shall be given to the District's Project Manager as soon as practicable but in no event more than eight (8) hours after the Contractor is first aware of such emergency conditions.

90. Hold Harmless Agreement: The Contractor shall indemnify and hold harmless the District and the Architect from and against all claims, damages, losses and expenses, including attorney fees, arising out of or resulting from the performance of the work, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease, or death, or the injury to or destruction of tangible property, including the loss of use resulting there from, and is caused in whole or in part by any negligent, omission, or act of the Contractor, any subcontractor or supplier. The obligation of the Contractor shall not extend to the liability of the District or the Architect arising out of the preparation of maps, opinions, reports, surveys, project changes, designs, or specifications except as may be stated elsewhere in the *Contract Agreement*. The Contractor shall indemnify and hold harmless the District and the Architect from and against all claims arising out of lawful demands of subcontractors, laborers, workmen, mechanics, material men, suppliers, fabricators, and furnishers of machinery and laborers, equipment, tools and supplies, incurred in the furtherance of the performance of the work. If the Contractor fails to do so, the District may, after having notified the Contractor, withhold from the Contractor's unpaid contract price a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed, but in no event shall the provisions of this paragraph be construed to impose any obligations upon the District to either the Contractor, the Contractor's Surety, subcontractors, suppliers, or any third party.

91. Remedy of Damages: The Contractor shall promptly remedy damage and loss to property caused in whole or in part, directly or indirectly, by the Contractor or by anyone for whose acts the Contractor may be liable except damage or loss attributable to acts or omissions of the District or the Architect and not attributable to the fault or negligence of the Contractor.

92. Insurances: Adequate insurance coverage is deemed critical to the award of a *Contract Agreement*. The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in South Carolina such insurance to protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the *Contract Agreement* and for which the Contractor may be legally liable:

A. Claims under worker's compensation, disability benefit and other similar employee benefit acts resulting from the work being performed.

B. Claims for damages, bodily injury, sickness, disease, or death of the Contractor's employees or other individuals.

C. Claims for damages insured by usual personal injury liability coverage which are sustained by a) an individual as a result of an offense directly or indirectly related to employment of such individual by the Contractor, or b) another individual.

D. Claims for damages injury to or destruction of tangible property (other than to the work being performed), including loss of use resulting there from.

E. Claims for bodily injury, death or damages to property arising out of ownership, maintenance or use of a motor vehicle including loading and unloading of vehicles.

F. Claims for damages, injury or death applicable to the Contractor's liability for products and completed operations.

G. Claims involving contractual liability insurance applicable to the Contractor's obligations under the hold harmless agreement stated in the *Contract Agreement*.

If a Contractor cannot obtain adequate insurance coverage as required herein, a contract shall not be awarded. Maintenance of insurance coverage, without lapse, is required throughout the term of the *Contract Agreement* and as may be required after the completion of the work and final payment. Should the Contractor or any subcontractor be found by the District to be in non-conformance with the insurance requirements, the District shall have all rights of redress available under the *Contract Agreement* and the laws of the State of South Carolina up to and including cancellation of the contract for default.

93. Minimum Insurance Requirements: The insurance requirements stated herein are minimum requirements and the Contractor's coverage shall be written for not less than the limits stated herein:

A. Commercial General Liability:
   1) $1,000,000 limit for bodily injury and property damage (each occurrence)
   2) Premises Operation and Independent Contractor's Protection of $1,000,000
   3) Products and Completed Operations of $1,000,000 to be maintained for one (1) year following established completion of the project.
   4) Commercial Broad Form Property Damage of $1,000,000 including Owned/Non-owned and Hired Motor Vehicles with combined minimum single limit of $600,000
   5) Personal and Advertising Injury of $1,000,000
   6) Contractual each occurrence of $1,000,000
   7) Fire Damage (any single fire) of $100,000
   8) Medical Expense (any single individual) of $5,000

B. Commercial Umbrella Liability in excess of other coverage with minimum limits of:
   1) $5,000,000 (per occurrence)

C. Automobile Liability with $1,000,000 for bodily injury and property damage (per occurrence) including all owned, hired, and non-owned vehicles

D. Worker's Compensation as required by the State of South Carolina to include:
   1) Employer's Liability (per single accident) of $500,000
   2) Disease (per single individual) of $100,000
   3) Disease (policy limit) of $500,000

Any out-of-state Contractor shall ensure coverage is provided for those employees in South Carolina working on this project, whether residents of South Carolina or of another state, which conforms to the requirements in this *Contract Agreement*.

94. Builder's Risk Insurance: Where necessary, the District shall provide builder's risk coverage on the work in progress and materials and equipment to be incorporated into the work and located at the worksite as well as any other appropriate insurance coverage for the existing facilities at the worksite. The Contractor shall comply with the following regarding District provided insurance coverage:

A. Provide and maintain any additional insurance coverage the Contractor deems necessary to safeguard the work in progress or the Contractor's liability in relation to the work in progress which may be excluded from coverage under the builder's risk or building coverage provided by the District.
B. Provide and maintain insurance coverage against loss, damage or theft of tools, materials, trailers, scaffolding or other equipment owned by the Contractor, which is not intended to be incorporated into the work but located at the worksite.
C. Store any off-site materials or equipment to be incorporated into the work in a bonded, insured warehouse and provide proof of same to the District when requesting payment for such stored materials and equipment.

Provision by the District of builder's risk or other insurance coverage to protect the work in progress or existing facilities at the worksite does not prejudice any rights of the District to remedies by the Contractor for losses or damages incurred due to criminal intent, negligence, action or failure to act of the Contractor, any subcontractor or any supplier.

95. Insurance Carrier Requirements: Each of the insurances required shall be issued by a company licensed in the State of South Carolina for the applicable line of insurance and shall be an insurer with a "Best Policyholder's Rating" of "A-" or better and with a financial size rating of Class V or greater. Any aggregate limits of insurance shall apply, in total, to this *Contract Agreement* only and shall be so indicated on the *Certificate of Insurance*. The District and the Architect shall be named as an additional insured with a cross liability clause on the Comprehensive General Liability and the Automobile Liability policies. An original *Certificate of Insurance (Exhibit G)* shall be provided to the District by the insurance carrier(s) prior to commencement of the work with the provisions stated on the form.

96. Failure to Provide Certificate of Insurance: The Contractor is responsible for any delay resulting from the failure of the insurance carrier to furnish a valid, original *Certificate of Insurance (Exhibit G)* as proof of existing coverage in the prescribed form or for any lapse or cancellation of coverage which results in stoppage of the work by the District until such insurance coverage has been replaced or reinstated. Any delay in the work resulting from the failure of the Contractor to maintain the required insurance coverage or the insurance company's failure to provide a valid, original *Certificate of Insurance (Exhibit G)* shall not result in an increase in contract price or time.

97. Losses: The Contractor shall report all losses related to Contractor-provided insurances within twenty-four (24) hours to the Contractor's insurance agent or carrier as may be appropriate to facilitate adjustment of the claim. The Contractor shall also notify the District's Project Manager within the same period of time the nature and estimated value of the loss or liability exposure incurred. The Contractor shall comply with the following regarding any loss or damage to the work in progress or to the District's buildings or other facilities:

A Report losses promptly to the appropriate authorities (police department, fire department, etc.) and secure a police report.
B Prepare or assist in preparation of any claim forms, affidavits, statements of loss, or other documents required by the District's or the Contractor's adjuster to facilitate claim processing as well as present immediately any estimates, invoices, payrolls or other proofs of loss or damage incurred to facilitate prompt settlement of the claim.
C Immediately, upon knowledge of the loss or damage incurred to the work in progress or the District's existing facilities, safeguard or temporarily repair the work, facilities and premises from further loss or damage until the insurance adjuster has made necessary observations of the damage. The Contractor shall notify the District of action taken to safeguard the work, facilities, and premises or temporary repairs performed until such time as clean-up, permanent repair, replacement or other such activities are authorized. In the event safeguarding the work in progress or temporary repairs would negate or cover up the damage from observance by the insurance adjuster(s), the Contractor shall take photographs of the damage prior to performing temporary repairs and provide them to the District and the adjuster(s).
D Prepare for approval by the District, any necessary *Change Order (Exhibit E)* detailing such costs required to facilitate clean-up, repair, replacement of all damaged or destroyed materials, equipment or processes when the loss is the responsibility of the District's insurer and, upon approval of the *Change Order (Exhibit E)* take immediate action to perform such activities related to correction of the loss.
E Accept any insurance proceeds as full restitution for all work of the Contractor and all subcontractors, and repair or replacement of all materials, equipment and processes damaged or destroyed by the loss to be re-incorporated into the work in progress or to correct damage or loss to the existing facilities.
F Perform any additional work or changes to the work deemed by the District to be appropriate as a direct or in-direct result of the damage or loss incurred. Such changes or additions to the work along with any approved change in contract price or contract time shall be incorporated into a *Change Order (Exhibit E)*.
G Pay all deductibles required by the Contractor's insurance or the District's builder's risk insurance and provide promptly to any subcontractors or suppliers their just shares of any insurance proceeds received by the Contractor upon performance of the work resulting from the loss.

98. Performance and Payment Bonds: The Contractor shall furnish bonds covering faithful performance of the *Contract Agreement* and payment of obligations arising there under. Nothing in the *Contract Agreement* shall preclude the District from requiring any other bonds in conjunction with the work to be performed or any claim or other activity connected thereto. The Contractor shall provide and pay the cost of performance and payment bonds. Each shall be in the full amount of the contract price including any accepted alternates, issued by a Surety licensed in South Carolina, with an "A" minimum rating of performance as stated in the most current publication of "Best's Key Rating Guide, Property Liability" and a financial strength rating of at least five (5) times the contract price. Each bond shall be accompanied by a power of attorney authorizing the attorney-in-fact to bind the Surety and certified to include the date of the bond. Upon request, the Contractor or the District shall promptly furnish a copy of the payment bond to any individual or entity appearing to be a potential beneficiary of the bond without any requirement to establish the legitimacy of such claim.

99. Complaints / Claims Process: Any formal complaint or contract controversy arising out of the interpretation of the *Contract Agreement* between the Contractor and the District shall not be subject to arbitration or mediation but shall be subject to the District's Procurement Code and subsequently, after exhausting the processes therein, the judgments of the Court of Common Pleas of Horry County, South Carolina. The Contractor shall have the right to make an informal request for redress by the District's Project Manager, in writing, regarding interpretation of any condition of the Contract Documents or a decision regarding other condition(s) existing which may impede progress of the work. Such requests shall be made within ten (10) days of the occurrence, the Contractor's first knowledge of the need for an interpretation or decision, or the event precipitating the need for redress. The Project Manager shall, within ten (10) days, provide a written interpretation or decision to the Contractor. The Project Manager's decisions on matters relating to aesthetic effect shall be final if consistent with the intent of the *Contract Agreement*. For all other decisions not resolved by the District's Project Manager, the Contractor shall have the right to submit a formal claim in accordance with the requirements of the District's Procurement Code. The Contractor irrevocably waives any and all rights the Contractor may have to a trial by jury in any action, proceeding or claim of any nature relating to this *Contract Agreement* or any other Contract Document. The Contractor acknowledges that the foregoing waiver is knowing and voluntary. In addition, any costs to the District for litigation in the Court of Common Pleas of Horry County, South Carolina shall be borne by the claimant including all attorney fees, courts costs or other such costs related to the litigation if the judgment of the court is made in favor of the District.

100. Recovery of Sums Owed: Whenever any sum of money shall be recoverable from or payable by the Contractor to the District (whether for the benefit of the District, the Architect, any regulatory authority or another contractor), the same amount may be deducted from any payment due to the Contractor under the *Contract Agreement* or under any other *Contract Agreement* between the Contractor and the District at that time. Should the amount owed by the Contractor be greater than the amounts yet payable to the Contractor under any *Contract Agreement*, the Contractor shall reimburse the District for all remaining amounts. **The District shall have the right to declare any business entity operated by the Contractor as non-responsible from receiving another bid award until all amounts due to the District are paid in full.** These rights of the District are in addition and without prejudice to any other rights the District may have to claim the amount of any loss or damage suffered by the District as a result of acts or omissions of the Contractor from the Contractor's Surety.

101. Contract Governance: This contract shall be governed by the District's Procurement Code and any applicable laws of the State of South Carolina. Duties and obligations imposed by the *Contract Agreement* and rights and remedies available there under shall be in addition to, and not a limitation of, duties, obligations, rights and remedies otherwise imposed or available under the District's Procurement Code or by law. The Office of School Facilities (OSF) shall determine the enforcement and interpretation of all the applicable codes and referenced standards on school buildings. The Contractor specifically affirms by execution of this *Contract Agreement* that the Contractor is charged with the knowledge of the District's Procurement Code and OSF regulations.

102. Written Notices: Written notice is deemed to have been duly served if delivered in person to the officer, director, owner, or other employee of the entity for which it was intended and from whom signature is secured, or if sent by registered or certified mail to the last business address known to the party giving written notice.

103. Taxes: The Contractor shall pay sales, consumer, use and similar taxes, which are legally enacted when bids are received or negotiations concluded, for the work or portions thereof and all materials and equipment provided by the Contractor, whether or not such tax requirements are yet effective or merely scheduled to be effective during the contract term and whether or not the Contractor is aware of the requirements at the time the bid is submitted or negotiations completed.

104. Non-Resident Withholdings: The Contractor's attention is directed to Title 12, Chapter 9, of the South Carolina Code of Laws, "Withholding Agents and Withholdings" dealing with South Carolina Tax Commission withholdings for nonresidents. The Contractor shall ensure the Contractor and any subcontractors performing work under the *Contract Agreement* conform to all requirements pertaining thereto, including by way of illustration and not limitation, securing a non-resident exemption or posting the required non-resident bond for two percent (2%) of the contract price with the South Carolina Tax Commission.

105. Statutory Limitation Periods: As to acts or failures to act occurring prior to the date of substantial completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the established date of substantial completion. As to acts or failures to act occurring subsequent to the date of substantial completion and prior to issuance of the final payment any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of the Contractor's final *Payment Request (Exhibit F)* submitted. As to acts or failures to act occurring after the relevant date of the final *Payment Request (Exhibit F)* any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to the warranty provided, the date of any correction of the work or failure to correct the work by the Contractor, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or District, whichever occurs last.

106. Royalties and Patents: If the Contractor uses any design, device, or materials covered by patent or copyright, it is mutually agreed and understood, without exception, the contract price includes all royalties or costs arising from the use of such design, device, or materials in the work to be performed. The Contractor shall defend suits or claims for infringement of patents or copyright rights or unpatented invention, process, or article manufactured or used in the performance of the contract and shall hold the District, its representatives, agents, employees or others harmless against all claims, loss, damage, injury, fines, penalties and costs, including court costs and attorney's fees, charges, liability, and exposure, however caused on account thereof, including the use by the District. The Contractor shall not be responsible for such defense or loss when a particular design, process or product of a particular supplier is required by the Contract Documents without substitution. However, if the Contractor has reason to believe the required design, process or product or use thereof is an infringement of a patent, the Contractor shall notify the Architect of such information in writing within twenty-four (24) hours of first discovering the potential infringement.

107. Contract Termination By Contractor: The Contractor may terminate the contract if the work is stopped for a period of ninety (90) days or more through no act or fault of the Contractor, any subcontractor or supplier, for a) issuance of an order of a court or other public authority having jurisdiction; b) an act of government, such as a declaration of national emergency, making materials unavailable; or c) if repeated suspensions, delays or interruptions by the District constitute in the aggregate more than one hundred percent (100%) of the total number of days scheduled for completion, or one hundred twenty (120) days in any one (1) year period, whichever is less. If one of the above reasons exists, the Contractor may, upon fifteen (15) days written notice to the District, terminate the *Contract Agreement* and recover from the District payment for work executed in accordance with the *Contract Agreement* to date, and for substantiated direct loss in materials, equipment, and processes to be incorporated into the work, including reasonable overhead and damages less any amounts recoverable from the Contractor as stated in the *Contract Agreement*.

108. District Termination: The District may terminate the contract or pursue any other rights and remedies afforded in the *Contract Agreement* or under applicable laws if the Contractor fails to perform or otherwise materially breaches any requirement of the *Contract Agreement*. The District may, without prejudice to any other rights or remedies of the District and after giving the Contractor and the Contractor's Surety ten (10) days written notice, terminate the contract with the Contractor and may, subject to any prior rights of the Surety, a) take possession of the site and of all materials, equipment, tools, and construction equipment and machinery located thereon owned by the Contractor; b) require and accept assignment of sub-contracts; and/or c) finish the work by whatever reasonable method the District may deem expedient. Further the District may terminate the contract, without cause, should funds become unavailable.

109. Payment at Termination: When termination is predicated upon cause, the Contractor shall not be entitled to further payment until all other obligations related to completion of the work by the Surety or the District are fulfilled and it is determined by the District a balance of the contract price is remaining and the Contractor is entitled to such payment for performance of work in accordance with the *Contract Agreement* prior to termination. If costs to finish the work exceed the unpaid balance, the Contractor or the Surety shall pay the difference to the District. The amount to be paid to or by the Contractor, the District or the Surety, as the case may be, shall survive termination of the *Contract Agreement*. In all other cases of termination, the Contractor shall be entitled to payment of the portion of the contract price for the percentage of work completed to the time of termination and accepted by the District in accordance with the *Contract Agreement*, excluding any anticipatory profits.

110. Cessation of Work: After receipt of a notice of termination, except as otherwise directed, the Contractor shall a) stop work on the date specified in the notice of termination, b) place no further orders or subcontracts for materials, equipment, labor or other services except as necessary for completion of such portion of the work not terminated, c) terminate all supplier orders and assign all existing subcontracts to the District or the Surety in accordance with the *Contract Agreement* unless otherwise directed by the District, and d) settle all outstanding liabilities and claims.

111. Right to Extend Remedy Period: The District shall have the right to extend any period of time given to the Contractor by the *Contract Agreement* to remedy any correction of work, default or other circumstance, if it is deemed in the best interests of the District to do so. The right of the District to extend such time shall not give rise to a duty on the part of the District to exercise this right.

112. Assignment: The District and the Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto in respect to covenants, agreements and obligations contained in the *Contract Agreement*. Neither party to the *Contract Agreement* shall assign the *Contract Agreement* in whole or in part without written consent of the other party. If either party attempts to make such an assignment without consent, that party shall nevertheless remain legally responsible for all obligations under the *Contract Agreement*.

113. Definitions: The following definitions of terms used in the Contract Documents are as follows:

A. Acceptance: The District's acceptance of the completed work from the Contractor when all work appears to be completed in a satisfactory manner and in accordance with the Contract Documents. Acceptance is confirmed by the final payment of all retainage less any amounts owed to the District, the Architect and any regulatory authority. Acceptance does not relieve the Contractor of responsibilities for conditions that survive final completion of the project.

B. Allowance: An amount specified by the District in the Contract Documents for a specified product purchase or work to be completed by the Contractor or a subcontractor. An allowance is a reimbursement, dollar for dollar, of actual costs incurred for the product purchase or performance of the work specified.

C. Applicable Laws: Any local, federal or South Carolina laws, statutes, ordinances, rules, regulations, administrative guidelines, codes, or other lawful orders that may apply to or regulate the work or the performance of the work, whether or not reference is specifically made to such laws, statutes, ordinances, rules, regulations, administrative guidelines, or other lawful orders in the Contract Documents. Also includes applicable construction standards.

D. Architect: Any individual or entity legally qualified to practice architecture in South Carolina with whom the District has a contractual agreement to provide architecture or other services pertaining to construction that members of this profession or those in their employ may justifiably perform. The Architect serves as the District's authorized representative to the extent of the contractual agreement between the Architect and the District. Any reference to Architect also includes any representatives, agents or employees of the Architect.

E. Claim: A demand or assertion by one of the parties to the contract or by a third party seeking, as a matter of right, an adjustment or interpretation of contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract Documents, the work being performed, or actual damages sustained. Any claim shall be in conformance to the requirements of the District's Procurement Code.

F. Construction Change Directive (CCD): A directive issued by the District which shall have the same force and effect as a *Change Order* on the Contractor's performance and in effecting the change to the *Contract Agreement*.

G. Contractor: The individual or entity with whom the District has executed a *Contract Agreement* for the work to be performed and who is licensed to conduct construction activities in the State of South Carolina. Any reference to Contractor also includes any representatives, agents or employees of the Contractor or any other entity enjoined to the Contractor.

H. Complaint: A verbal or written request to the District's Project Manager by the Contractor or a third party seeking a) redress of any condition existing that may impede progress of the work, b) relief from an untenable situation arising during the performance of the work through no fault of the complainant, c) interpretation of any condition of the Contract Documents, d) removal of restrictions or requirements not in accordance with the Contract Documents, or e) additional compensation for changes in work.

I. Day: Shall mean a calendar day unless otherwise specifically designated as business or work day. In computing any period of time, the day of the event from which the designated period of time begins to run is not included. If the final day of the designated period falls on a Saturday, Sunday or a legal holiday for the District, then the period shall run to the end of the next calendar day.

J. Drawings: Graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the work to be performed. Such drawings constitute an integral portion of the Contract Documents.

K. Emergency: A sudden, unexpected occurrence or set of circumstances demanding immediate action to ensure the health and safety of any building occupants or to

prevent further damage to the work or property of the District and others, which may include, but not be limited to, fire, security risk, impending structural collapse, fire alarm or security alarm malfunction, loss of utilities. Action taken by the Contractor during an emergency shall be limited to such action necessary to ensure the safety of the building's occupants and to mitigate, contain and/or prevent further damage to the work in process, the District's property or the property of others.

L. Latent Defect: A latent defect in materials, equipment or processes is not reasonably detected through careful observation or inspection.

M. May: The word "may" or other such words or phrases indicate a recommendation that is adhered to by the Contractor, Architect or District at his/her choice.

N. Minority Status: Means the qualification of a small business concern that is at least fifty-one percent (51%) unconditionally owned by one or more individuals who are both socially and economically disadvantaged or are women or a publicly owned business having at least fifty-one percent (51%) of its stock unconditionally owned by one or more socially and economically disadvantaged individuals or by women, which may or may not be State of South Carolina certification.

O. Project: The total scope of work to be performed whether performed by one or more contractors, subcontractors or the District itself. (Also referred to as the "work," the "work to be performed," the "work in process," or other such terms.)

P. Regulatory Authority: Any agency of the federal government or the State of South Carolina which has jurisdiction over the District, its procurement of design and construction services, or the work being performed under contract.

Q. Shall: The word "shall" or "must" or other such words or phrases indicate a mandate that must be adhered to by the Contractor, Architect or District.

R. Shop Drawings: Drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, which illustrates how specific portions of the work shall be fabricated and/or installed.

S. Specifications: A written description of the physical, functional, or performance characteristics, or the nature of the materials, equipment, processes, construction, or work to be performed. It includes, as appropriate, construction standards, technical data, workmanship, inspection and testing requirements.

T. Subcontractor: An individual or entity, who is properly licensed to do business in the State of South Carolina, having a direct contract with the Contractor to perform a portion of the work described in the Contract Documents. Any reference to subcontractor also includes any representatives, agents, or employees of the subcontractor or any other entity enjoined to the subcontractor to perform any work.

U. Substantial Completion: The date or conclusion of consecutive days established in the Contract Documents for sufficient completion of the work such that the District may occupy and utilize the project for its intended use. The health and safety systems shall be inspected and approved for occupancy by OSF and all other system functionality and work shall be completed as stipulated in the Contract Documents. The determination as to whether the Contractor has reached substantial completion of the work by the date established, as may be amended, is solely the District's.

V. Supplier: Any individual, business, manufacturer, fabricator, vendor or other entity that supplies materials, equipment, or items fabricated to a special design needed for the work to be performed but who does not perform any direct labor. Any reference to supplier also includes any representatives, agents or employees of the supplier or any other entity enjoined to the supplier.

W. Surety: An individual or entity who promises, in writing, to make good the debt or default of a Contractor or other entity.

114. Licenses and Permits: During the term of the contract, the Contractor shall be responsible for obtaining and maintaining in good standing, all licenses (including professional licenses, if any), permits, inspections and related fees for each or any such licenses, permits and/or inspections required by state, county, city, or other government entity or unit to accomplish the work specified in this solicitation and the contract.

115. Ownership of Data & Materials: All data, material and documentation either prepared for HCS pursuant to this contract shall belong exclusively to HCS.

IN WITNESS THEREOF:
This agreement is entered into as of the day and year first written above.

CONTRACTOR	**THE DISTRICT**
Name & Title of Authorized Signatory:	**Name & Title of Authorized Signatory:** John K. Gardner, Chief Financial Officer, Fiscal Services
Date:	Date:
Signature:	Signature:

Attachments:
Exhibit A: Scope of Work
Exhibit B: Contract Documents List
Exhibit C: Schedule of Values
Exhibit D: Project Schedule
Exhibit E: Change Order Procedures
Exhibit F: Payment Procedures
Exhibit G: Certificate of Insurance

SCOPE OF WORK (Exhibit A)

PROJECT NUMBER: 2021-46MJ	PROJECT NAME: St. James High School HVAC Renovations

The following information and terms and conditions are provided specific to the project identified in this contract:

DISTRICT PROJECT MANAGER: Name: Ara Heinz
Telephone: 843-488-6711 Fax: 843-488-6937 E-mail: aheinz@horrycountyschools.net Mobile: 843-465-1588

OTHER PROJECT REPRESENTATIVE(S): Name: Ross Brazier
Telephone: 843-488-6979 Fax: 843-488-6937 E-mail: mbrazier@horrycountyschools.net Mobile: 843-254-9737

DISTRICT PROCUREMENT OFFICER: Robin Strickland, CPPB, at rstrickland@horrycountyschools.net or 843-488-6893

CONTRACTOR'S PRINCIPAL/OWNER: Name:
Telephone: Fax: E-mail: Mobile:

CONTRACTOR'S PROJECT MANAGER: (if required) Name:
Telephone: Fax: E-mail: Mobile:

CONTRACTOR'S WORKSITE SUPERINTENDENT: Name:
Telephone: Fax: E-mail: Mobile:

CONTRACTOR'S SECONDARY WORKSITE SUPERINTENDENT: (if required) Name:
Telephone: Fax: E-mail: Mobile:

APPROVAL OF CONTRACTOR USE OF DISTRICT FACILITIES (as checked): ☒ Water ☒ Electrical Power ☐ Restroom Facilities ☐ Vending Machines ☐ Debris and Recycle Containers ☐ Other: ☐ No use of District facilities allowed.

LIQUIDATED DAMAGES: $ 500.00 per day

RETAINAGE TO BE WITHHELD: ☒ 3.5% from every payment until final completion of the work in accordance with the contract documents ☐ None

CONSTRUCTION WORKSITE MEETINGS HELD: ☐ Weekly ☒ Every Two Weeks ☐ Twice Monthly ☐ Once Monthly

SOURCE OF PROJECT FUNDS: ☐ Federal Source ☒ Other Sources (non-Federal)

CONTRACTOR WARRANTY TERMS: ☐ 60 days ☐ 90 days ☐ 180 days ☒ 365 days (1 year) ☐ 730 days (2 years)

The Contractor shall provide, at the time the *Contract Agreement* is executed by the Contractor and returned to the District, the following checked items:

- ☒ A copy of business licenses valid in the jurisdiction where the construction work will be performed for the Contractor.
- ☒ A copy of contractor licenses issued by the South Carolina Licensing and Regulation Board for the Contractor and each subcontractor.
- ☒ A valid, original Certificate of Insurance.
- ☒ SLED checks maintained in the Contractor's file on all Contractor and subcontractor employees, agents and representatives who will access the worksite during performance of the construction work or other services. (Do not submit to the District until requested.)
- ☐ Certification of Approved Installer (on manufacturer's, fabricator's or supplier's letterhead) for
- ☐ Other:
- ☐ Other:

PERMITS, INSPECTIONS, APPROVALS OF REGULATORY AUTHORITY AND ASSIGNED RESPONSIBILITY:
No building permit will be issued. The Office of School Facilities (OSF) is the authority having jurisdiction. Chapter 1 and Chapter 17 inspections will be performed by an independent testing agency retained by the District. Testing and balancing services will be performed by an independent agency retained by the District.

DETAILED DESCRIPTION OF WORK TO BE PERFORMED: See Attached

The Contractor shall furnish all labor, materials, tools, equipment and incidentals necessary to satisfactorily perform and complete the St. James High School HVAC Renovations in strict accordance with the Contract Documents listed in Exhibit B of this Contract.

Scope includes performing demolition work as required to remove seven (7) water cooled roof-mounted makeup air units (MAUs) / water source heat pump energy recovery units and three (3) heat pumps and replacing with new as shown. Additionally, work includes connecting to existing ductwork and piping. Plans and specifications by MSWG Engineers, Inc.

Allowances: The Contractor shall include a contingency **allowance of $20,000.00** for use upon the Owner's instructions in the bid.

Alternates: The Work will include the following **alternates**:

a. **Alternate #1:** Deduct from the base bid price to use an approved substitution for the water source heat pumps and water source heat pump recovery units.
b. **Alternate #2:** State the amount to ADD to the base bid price to provide 5 year parts and labor warranty for the water source heat pumps and energy recovery units.
c. **Alternate #3:** State the amount to ADD to the base bid price to provide factory training on the makeup air unit components and operations. For the purposes of pricing, training shall consist of a one-day session, 8 hours long, and shall include all necessary training materials.

Note: It is the intent of the District to complete this work starting in June 2021 and complete the work in early October 2021. This schedule shall be coordinated with assigned District Project Manager. District shall supply containers for recyclable equipment and materials on site, all other trash and debris will be removed from the site at contractor's expense. The District shall recover as much refrigerant from the units as possible before they are removed from the site. For any remaining refrigerant, Contractor shall properly remove and recycle refrigerant(s) per current applicable rules and regulations.

The District will have staff in the schools during the summer months and will need to maintain some of the HVAC operational for the summer custodial staff and administration. It is HCS intent NOT to have all A/C off in the school as the work progresses, but to work in one hall or section of the school at a time, completing the replacement work and then to move to another hall once the new equipment is operational. There is the possibility that summer school and/or make-up days are to be scheduled at the school during the summer break.

The District shall contract directly with Control Management Inc. for all controls and building management systems requirements, with Johnson Controls for all fire alarm system modifications, with an independent firm for Chapter 1 and 17 inspections, and with an independent firm for testing and balancing services. Contractor shall coordinate his work with all firms for a complete project.

The Contractor and District agree to the Scope of Work and other terms identified herein as an integral part of the *Contract Agreement*.

The contractor will be responsible and required to meet the following:

1. Proper Identification as a worker/visitor to the school campus must be readily visible by staff and students, in the form of a company supplied ID Badge.

    a. Proper Identification comes in *two forms* and is required by all persons performing work for the general contractor and all sub-contractors: Government-issued; or Photo ID badge with company name; and PPE (Personal Protective Equipment).
    b. ID Badges are required for ALL personnel on-site and must be worn/visible at all times. Any person that does not have the proper ID Badge and is not visible will be asked to leave the property immediately. ID Badges must be laminated or of credit card type material that resists wear and fading. Faded badges are invalid.
    c. PPE (Personal Protective Equipment) is a minimum of international orange/yellow shirt and hard hat. Other forms of personnel visibility and head protection are accepted. Additional PPE measures must be supplied by the contractor for their appropriate trade, such as eye/ear protection, gloves, footwear, etc.

2. The contractor is responsible for rest room facilities for all its employees and any subcontractors to utilize during this project. The facilities inside the school are off-limits during school hours and after school hours.

3. Contractor accepts responsibility for all receiving, unloading, handling, full care and custody of all materials. Site security personnel will not be provided by the District. Access to the school campus for the duration of the Work will be 7:00 am to 7:00 pm; 7-days per week.

4. All areas inside the school are to be off-limits to the construction forces unless coordinated with the District Project Manager. All exterior ingress/egress doors and walkways are to be maintained and door openings are to be sealed to minimize dust infiltration from affecting school equipment, etc.

5. The contractor is responsible for all safety barricades and signage as needed to complete the work during school days when school is in session. Students must be separated from construction activity at all times. Contractor shall provide all protection necessary to ensure the Work shall be completed without damage or deterioration to existing District property. The Contractor must include in the bid the cost to furnish and install protection fencing and etc. to ensure that the district's property is not damaged and student are kept safely at a workable distance. Temporary fencing will be galvanized. Orange construction fence is not allowed.

6. There shall be no construction activity or deliveries in drop-off and pick-up areas during the beginning and ending of the school day.

7. Work areas must be barricaded with galvanized fence to prevent unauthorized access after-hours.

8. The contractor will be responsible for the placement of sod in all disturbed areas. The grass is to be watered and maintained until the root system is established. Mesh backing on sod is NOT allowed.

9. A pre-installation meeting will be required prior to the following activities: demolition, new MAU installation and new MAU start up.

10. The Contractor must adjust construction activities to provide safe access to the schools for essential District activities during the school year and summer breaks as required.

11. The contractor will minimize construction noise at all times to the maximum extent possible. During the time when standardized testing is occurring, limited to zero construction activity will be allowed adjacent to the existing building. Work that does not disturb testing is permitted. The contractor will need to coordinate with the HCS Project Manager and the School administration to determine when and where the testing will be conducted throughout the contract period.

12. The contractor is responsible for identifying the location of all utilities. Any utilities that are interrupted or damaged by the contractor or any subcontractor must be repaired before the contractor leaves the job site that day. Any interruption in service will need to be coordinated and approved in advance with HCS Project Manager.

13. The Contractor will secure all materials and equipment during construction to insure safe means of egress to and from the school building at all times.

14. The Contractor is required to; have a job superintendent present on the property while any and all work is being performed, provide adequate staffed at all times to maintain the construction schedule, have the Job Superintendent attend the bi-weekly progress meeting onsite. The time, day and location will be agreed upon prior to start of construction. These meetings will be scheduled to address questions, issues, schedules, and update the progress of the project, have each Subcontractor's Superintendents in attendance, when their portion of the project is scheduled to begin within 2 weeks and throughout the time that they are working onsite, have each Material Suppliers Representative in attendance, when their portion of the project is scheduled to begin within 2 weeks and throughout the time that they are working onsite.

15. The Contractor shall provide the following documents to Owens and Associates, Inc. and the HCS Project Manager prior to the HCS issuing the final completion:
    a. Punch list with anticipated completion dates
    b. As-Built plans in CAD and PDF formats
    c. Warranties
    d. O & M Manuals
    e. Shop Drawings
    f. HCS Closeout Documents

16. The Contractor shall issue a one-year warranty along with all manufacturers' warranties starting on the date of substantial completion of all the work completed in each phase of the project.

17. A full set of certified As-builts will be required at the end of the job and presented to District in digital and printed format.

The Contractor and District agree to the Scope of Work and other terms identified herein as an integral part of the *Contract Agreement*.

End of Exhibit A

CONTRACT DOCUMENT LIST (Exhibit B)

PROJECT NUMBER: 2021-46MJ	PROJECT NAME: St. James High School HVAC Renovations

The following documents listed below constitute an integral portion of the contract documents for the work to be performed.

DRAWINGS LISTING **DRAWINGS PREPARED BY:** McKnight – Smith – Ward – Griffin Engineers, Inc.

SHEET NO.	TITLE	DATE	IDENTIFICATION
CS100	Cover Sheet	2/17/2021	
M101	Partial Floor Plan – Area A Renovation	2/17/2021	
M102	Partial Floor Plan – Area B Renovation	2/17/2021	
M103	Partial Floor Plan – Area A Renovation	2/17/2021	
M104	Partial Floor Plan – Area C Renovation	2/17/2021	
M105	Partial Floor Plan – Area E (2nd Floor) Renovation	2/17/2021	
M106	Partial Floor Plan – Area F (2nd Floor) Renovation	2/17/2021	
M107	Partial Floor Plan – Areas E + F Renovation	2/17/2021	
M201	Schedules	2/17/2021	
M301	Details	2/17/2021	
E101	Partial Floor Plan – Area A Renovation	2/17/2021	
E102	Partial Floor Plan – Area B Renovation	2/17/2021	
E103	Partial Floor Plan – Area A Renovation	2/17/2021	
E104	Partial Floor Plan – Area C Renovation	2/17/2021	
E105	Partial Floor Plan – Area E (2nd Floor) Renovation	2/17/2021	
E106	Partial Floor Plan – Area F (2nd Floor) Renovation	2/17/2021	
E107	Partial Floor Plan – Areas E + F Renovation	2/17/2021	

SPECIFICATIONS LISTING **SPECIFICATIONS PREPARED BY:** McKnight – Smith – Ward – Griffin Engineers, Inc. and HCS

SECTION NO.	TITLE	DATE	IDENTIFICATION	PAGES
	HCS Front End Specs		**HCS**	
011000	Summary			3
012100	Allowances Procedures			3
012300	Alternates			2
013100	Project Management and Coordination			8
017300	Execution			3
017419	Construction Waste Management and Disposal			3
017700	Closeout Procedures			3
017823	Operation and Maintenance Data			8
017839	Project Records Documents			3
017900	Demonstration and Training			5
024119	Selective Demolition			6
	Mechanical Specs		**MSWG**	
230007	Summary of Work			2
230500	Mechanical General Provisions			16
230540	Vibration and Seismic Control			3
230590	Testing, Adjusting, and Balancing			3
230700	Insulation (HVAC)			3
230900	Building Automation and Control System			25
232000	HVAC Piping			3
232010	Valves and Specialties			4
232500	Water Treatment			1
233000	Air Distribution			3
237410	Makeup Air Units			4
238120	Water Source Heat Pumps			3

ADDENDA LISTING **ADDENDA PREPARED BY:**

ADDENDUM NO.	TITLE	DATE	IDENTIFICATION	PAGES

End of Exhibit B

SCHEDULE OF VALUES (Exhibit C)

PROJECT NUMBER: 2021-46MJ	**PROJECT NAME:** St. James High School HVAC Renovations

The *Schedule of Values* for the Contract Agreement allocating the entire contract sum to various portions of the work is indicated below. The Contractor shall use the schedule of values sheet (page two of the payment request form) to prepare the initial *Schedule of Values* for District approval. Once approved by the District, this schedule shall be used as a basis for reviewing Contractor pay requests and the work in progress. Each subcontract shall be listed on one or more lines of the schedule for the phases of work to be performed or materials required. The "general conditions" portion (fee, overhead, supervision, management, etc) of the schedule shall be listed separately and not distributed within other scheduled values. Allowances shall be listed as separate line items. Bonding premium shall be listed as a separate line item. Each approved Change Order shall be listed separately and itemized by the District. The Schedule of Values shall be in sufficient detail to be acceptable to the District.

End of Exhibit C

PROJECT SCHEDULE (Exhibit D)

PROJECT NUMBER: 2021-46MJ	**PROJECT NAME:** St. James High School HVAC Renovations

The following project schedule is incorporated into the *Contract Agreement*:

ESTIMATED PROJECT COMMENCEMENT DATE: June 18, 2021

The Contractor shall not prematurely commence activities prior to the a) commencement date established above, b) receipt by the District of a valid, original *Certificate Of Insurance* (Exhibit G) issued by the Contractor's insurance provider/agent, or c) securing SLED background checks on all Contractor and subcontractor worksite personnel, whichever is later. The established date for completion of the work shall not change should these conditions not be completed by the project commencement date.

CONSECUTIVE NUMBER OF CALENDAR DAYS FOR SUBSTANTIAL COMPLETION OF THE WORK: **115 Days**

PROJECT SUBSTANTIAL COMPLETION DATE: October 10, 2021

The consecutive number of calendar days for completion of the work and the project completion date established cannot be changed except by an executed *Change Order*.

FINAL COMPLETION PERIOD: ☐ 10 days ☐ 15 days ☐ 20 days ☒ 30 days

The consecutive number of calendar days immediately following the date established for substantial completion, in which the Contractor shall complete any punch list items and submit all final documents required by the District and a final *Payment Request*.

DESCRIPTION OF MILESTONES AND DELIVERABLES WITH DELIVERY DATE:

MILESTONES / DELIVERABLES	**DELIVERY DATE**
Last day of school for teachers	June 17, 2021
Estimated First day of school for students	August 16, 2021
Work to be completed after school hours and on weekends only	August 16, 2021 – October 10, 2021
Final Completion	November 9, 2021

The Contractor and District agree to the project schedule identified herein as an integral part of the *Contract Agreement*.

End of Exhibit D

CHANGE ORDER PROCEDURES (Exhibit E)

PROJECT NUMBER: 2021-46MJ	PROJECT NAME: St. James High School HVAC Renovations

Following are the requirements for *Change Order* procedures:

Changes Required in the Work: All difficulties inherent in construction work cannot be foreseen during design and solicitation of a project; therefore, the District reserves the right to make changes in the work without invalidating the *Contract Agreement*. The *Contract Agreement* shall not be substantially amended or varied nor shall a change in contract price or contract time be effected without execution of a *Change Order*. In the absence of total agreement between the Contractor and the District on the terms of any *Change Order*, the District has the right to issue a *Construction Change Directive (CCD)* as a directive which shall have the same force and effect as a *Change Order* on the Contractor's performance and in effecting the change to the *Contract Agreement.* Any changes authorized shall be performed under applicable provisions of the *Contract Agreement,* and the Contractor shall proceed promptly to execute the work as described. If the Contractor defaults or neglects to execute a change in the work, the District shall have all remedies stated in the contract documents and afforded by the District's Procurement Code and the law, including notification to the Surety.

***Change Order* Cost Adjustments:** When the District determines a change to the work is necessary, a request for pricing will be submitted to the Contractor. The Contractor shall reply promptly with an itemized cost to complete such work using the *Contract Change Pricing* form herein. The District shall have the right to make any changes to the pricing deemed appropriate and in accordance with prevailing industry rates and other requirements of the contract documents. Any adjustment to the contract price shall approximate the actual, un-inflated costs to the Contractor or subcontractor with all costs justifiable with prevailing standards including reasonable overhead and profit and shall be based on:

A. A total sum properly itemized and supported by sufficient substantiating data to permit evaluation, adjustment, and approval by the District.
B. Unit or incremental pricing stated in the original quote as negotiated and agreed upon between the District and the Contractor.
C. Any allowances for Contractor's purchase of materials, equipment or processes or for other specified work as established in the contract documents or otherwise required by the District through a properly executed *Change Order* for which the Contractor shall supply invoices of actual costs for reimbursement by the District.

If the Contractor does not respond promptly with an itemized estimate of the change in contract price or contract time when notified by the District of the change in work, the method and amount of the adjustment shall be determined by the District on the basis of reasonable costs or savings attributable to the change in work. If the Contractor does not agree with the change in contract price or contract time stated in the issued directive and cannot resolve the disagreement through the informal complaints process with the District's Construction Manager, the Contractor may pursue the steps for a contract controversy as outlined in the District's Procurement Code. **Disagreement with any change in contract price or the initiation by the Contractor of the complaint or contract controversy claims process shall not give rise to a right on the part of the Contractor or any subcontractor to delay or postpone the work described in the *Change Order (or directive)*.**

Change Order Allowable Pricing: For any change in contract price, the Contractor shall provide, itemize, and justify with appropriate supporting data, direct costs attributable to the change. Direct costs attributable to the change in work shall be limited to the following:

A. Costs of materials, equipment and processes to be incorporated into the work including costs of shipping, handling, fabricating, sales tax (8% required in Horry County and 9% within certain incorporated parts of the City of Myrtle Beach as of August 1, 2009), or other such costs inherent in the provision and delivery of such materials, equipment and processes by the supplier or manufacturer.
B. Costs of direct labor based on actual hourly labor rates multiplied by the actual work hours required to accomplish the change in work when such change in work results in additional contract time or labor. No Contractor or subcontractor shall ask for direct labor costs, when work required can be accomplished with the existing work force, in conjunction with other concurrent work, and during the current approved contract time. The hourly labor rate for any additional contract time or laborers shall be actual hourly rates not to exceed thirty dollars ($30) per hour unless documented proof of payment of a higher hourly rate for a specific skilled laborer is approved by the District prior to *Change Order* execution.
C. Costs of fringe benefits for additional direct labor, including social security, unemployment or other taxes, health and workers' compensation insurances, or other benefits required by agreement, custom or applicable laws. Such fringe benefit rate shall not exceed twenty-eight percent (28%) and the District has the right to request itemized documentation proving the fringe benefit rate used.
D. Costs of machinery or equipment rented or leased in the short term specifically for completion of the additional work to be performed. Such equipment rented/leased shall not customarily be owned by the Contractor or any subcontractor affected by the change but shall be necessary to the accomplishment of the work required. Copies of invoices for such rental shall be provided to document the cost of rental or lease of machinery or equipment. The District shall not pay for use of Contractor- or subcontractor-owned equipment or machinery, which costs are included in the overhead computation.
E. Costs of permits or inspection fees directly attributable to the change in work and not included as part of the Contractor's requirements nor attributable to the Contractor's non-performance or non-conformance to the *Contract Agreement*.
F. Other such direct costs directly attributable to the work and approved by the District.
G. Any additional cost resulting from an amendment to performance and payment bonds but in no event more than one percent (1%) after application of overhead and profit provided for elsewhere. The Contractor shall be responsible for notifying the Surety of any changes in the contract price, if required by the Surety.

Costs itemized shall not exceed the unit costs as listed in the most current issue of Means Construction Cost Data or actual costs justified to the satisfaction of the District.

Unallowable Costs: Any costs which may be perceived by the Contractor to be indirectly attributable to a change in work shall not be included in direct costs but shall be considered part of the overhead and profit rate applied to direct costs. Such costs not to be included in direct costs shall be, by way of illustration and not limitation:

A. Labor hours and fringe benefit costs of the worksite superintendent(s) when such costs were included, or should have been included, in the original bid submitted or result from the Contractor's inability to meet the approved schedule or required completion date. The Contractor must prove, to the satisfaction of the District, such additional costs are directly attributable to any extension of time beyond the last approved completion date. An increase in contract price for additional site supervision shall be at the District's sole discretion.
B. Perceived additional costs attributable to the Project Manager or supervision and coordination of subcontractors, suppliers or Contractor employees.
C. Costs related to use, rental, purchase or replacement of equipment generally or customarily necessary to accomplish the work but not to be incorporated into the work such as, by way of illustration and not limitation, hand tools, generators, cleaning equipment, scaffolding, signage, fencing, vehicles, fuel, and so forth.
D. Transportation or travel costs related to the transporting of hired or contracted supervisors, workers or subcontractors to and from the worksite or between worksites or to pick-up and deliver materials, equipment and processes to the worksite by the Contractor's or subcontractor's own forces including parking, tolls, fines, meals, per diem, hotel, living expenses, or other such costs.
E. Costs attributable to expediting delivery of materials, equipment or processes including telephone calls, facsimile transmissions, copying, employee labor and benefits, and so forth.
F. Costs attributable to maintaining a local office, home office or corporate office as well as office staffing, equipment and consumables, and so forth.
G. Costs for maintaining on-site facilities, including work trailers, telephones, computers, licenses, temporary utilities, and so forth.
H. Contracted services such as accountants, payroll service providers, attorneys, catering and so forth.
I. Catering or vending services, portable toilets, dumpsters, and so forth.
J. Other such indirect costs of doing business or costs normally considered inclusive in overhead.

Allowable Overhead and Profit Charges: Additional overhead and profit attributable to the change in contract pricing shall not exceed the following:

A. For work performed by the Contractor's own forces, a maximum of ten percent (10%) of the allowable direct costs or the unit pricing negotiated at the time of award.
B. For work performed by a subcontractor's own forces, a maximum of ten percent (10%) of the allowable direct costs.
C. For work performed by a subcontractor, overhead and profit of a maximum of five percent (5%) is allowable by the Contractor for administration of the sub-contract.

End of Exhibit E (Except for Forms Provided)

CONTRACT CHANGE PRICING

NAME OF CONTRACTOR OR SUBCONTRACTOR: _____

NAME OF PROJECT: St. James High School HVAC Renovations **CHANGE NUMBER:** _____

BRIEF DESCRIPTION OF WORK: _____

Materials – Name of Items	Quantity	Unit Price	Extended Price
		SUB-TOTAL MATERIALS:	
		Shipping/Delivery:	
		Miscellaneous Materials (Not to exceed $100):	
		South Carolina Sales Tax (7%):	
		Credit on Returned Items (Including Sales Tax):	
		(A.) TOTAL ALL MATERIALS:	

Equipment Leased / Rented	No. Hours	Cost Per Hour	Extended Price
		SUB-TOTAL EQUIPMENT:	
		South Carolina Sales Tax (7%):	
		Credit on Returned Items (Including Sales Tax):	
		(B.) TOTAL ALL EQUIPMENT:	

Other Costs (Specify)	Cost
(C.) TOTAL ALL OTHER COSTS:	

Contractor Initials: _____ District Initials: _____

Classification of Laborer	No. Hours	Rate of Pay	Extended Cost
		SUBTOTAL LABOR COSTS:	
		Labor Burden (FICA, insurances, Workers Comp., etc.) (Maximum 28%):	
		(D.) TOTAL ALL LABOR COSTS:	

(A. + B. + C. + D. = E.) TOTAL ALL DIRECT COSTS (Sub-contractor or Contractor)**:**

(FOR SUBCONTRACTORS ONLY)	
(F.) SUBCONTRACTOR OVERHEAD & PROFIT ON TOTAL DIRECT COSTS (Maximum 10%):	
(E. + F. = G.) TOTAL SUBCONTRACTOR DIRECT COSTS, OVERHEAD & PROFIT:	
(H.) APPLICATION OF SUBCONTRACTOR BOND PREMIUM (If bond required by Contractor.) (Maximum 1%)**:**	
(G. + H. = I.) GRAND TOTAL SUBCONTRACTOR COSTS:	

(FOR GENERAL CONTRACTOR ONLY)	
List all Subcontractors performing a portion of the change for which itemized costs are provided:	**Cost (Total I. for Each)**
1.	
2.	
3.	
(J.) TOTAL PROJECT COSTS FOR ALL SUBCONTRACTORS:	
(K.) OVERHEAD & PROFIT ON SUBCONTRACTED WORK (Maximum 5% of J.)**:**	
(L.) OVERHEAD & PROFIT ON DIRECT COSTS OF CONTRACTOR PERFORMED WORK (Maximum 10% of E.)**:**	
(E. for Contractor work only +J. + K. + L. = M.) TOTAL CONTRACTOR DIRECT COSTS, OVERHEAD & PROFIT:	
(N.) APPLICATION OF CONTRACTOR BOND PREMIUM (Maximum 1% of M.)**:**	
(M.+N.) GRAND TOTAL ALL PROJECT COSTS:	

CHANGE ORDER

PROJECT NUMBER (if any): 2021-46MJ	**EFFECTIVE DATE:**	
PROJECT NAME: St. James High School HVAC Renovations		
CONTRACTOR NAME:	**CHANGE ORDER NO:**	

DETAILED DESCRIPTION OF CHANGE TO THE PROJECT OR TO THE TERMS, CONDITIONS, SPECIFICATIONS OR DRAWINGS:

CHANGE IN CONTRACT PRICE:

Total original contract price:	$
Cumulative change in contract price, excluding this change order: [increase / (decrease)]	$
Revised total contract price, prior to this change order:	$
Total change in contract price for this change order: [increase / (decrease)]	$
Total revised contract price including this change order:	**$**
Total current number of days for substantial completion:	
Total change in number of days for substantial completion for this change order: [increase / (decrease)]	
Total revised number of days for substantial completion including this change order:	

The above changes as defined and agreed to by the Contractor and the District shall become, upon execution, an integral part of the *Contract Agreement* for the project identified herein and the Contractor shall proceed promptly with the change in work/services identified herein. In the absence of total agreement, this Change Order shall constitute a directive, upon signature and transmission to the Contractor, and the Contractor shall proceed promptly with the change in work/services.

Contractor Initials: _____ District Initials: _____

PAYMENT PROCEDURES (Exhibit F)

PROJECT NUMBER: 2021-46MJ	**PROJECT NAME:** St. James High School HVAC Renovations

Payment Requests:

An itemized payment request shall be submitted to the District by the 25th day of each month that payment is being requested and at completion of the project, using the form provided by the District. The payment request shall not include a) any work anticipated to be completed but not completed by the end of each month being requested; b) any materials not incorporated into the work to be performed except those properly stored as stated in the *Contract Agreement*; c) any damaged, used, inferior or substituted materials not meeting the requirements and standards of the contract; nor d) any amounts the Contractor does not intend to pay to any subcontractor or supplier, where performance or material quality is in question or any other dispute is pending.

If, upon review of the payment request and based upon the best determination of the District, the amount requested does not accurately represent, in the District's opinion, the progress of the completed work to be performed in the Scope of Work (Exhibit A), the District shall have the right to adjust the payment request to more accurately reflect the percentage of completed work/services. The District shall approve and authorize payment to the Contractor no more often than once monthly. For projects less than forty-five (45) days in duration, payment shall be made once upon completion of the work and clean-up of the worksite.

Payment by the District of undisputed amounts shall be made by the 15th day of the following month if request is received by Contractor by the 25th of the month. If payment request is not received by the 25th, the payment will be made within thirty (30) days from the date the District receives the payment request.

Payment Withholding:

The District may decide not to approve or process the Contractor's payment request or, because of subsequently discovered evidence or observations, may nullify the payment request, in whole or in part, to such extent as may be necessary to protect the District from loss. The District shall notify the Contractor the reason for non-payment. The payment request in dispute or amount withheld shall remain unpaid, without interest accrual, until such time as the Contractor and the District resolve the dispute or the conditions resulting in non-payment.

Payment at Project Completion:

When the Contractor considers all work in the Scope of Work (Exhibit A) completed, the Contractor shall submit a final payment request along with all final documents required by the District. The District shall inspect the work and, if the District agrees that all work is complete and appears to be in conformance with the contract documents, the District shall process the final payment, less any amounts the Contractor may owe to the District, the Engineer or regulatory authority.

Payment at Termination:

When termination is predicated upon cause, the Contractor shall not be entitled to further payment until all other obligations related to completion of the work by the District are fulfilled and it is determined by the District a balance of the contract price is remaining and the Contractor is entitled to such payment for performance of work in accordance with the contract documents prior to termination. If costs to finish the work exceed the unpaid balance, the Contractor shall pay the difference to the District. The amount to be paid the District, shall survive termination of the *Contract Agreement* as addressed below.

Recovery of Sums Owed:

Whenever any sum of money is recoverable from or payable by the Contractor to the District, the Engineer or any regulatory authority, the amount may be deducted from any payment to the Contractor under this contract or any other contract between the Contractor and the District at the time. Should the amount owed/recoverable be greater than the amounts yet payable to the Contractor, the Contractor shall reimburse the District for all remaining amounts. **The District shall have the right to declare any business entity operated by the Contractor as non-responsible from any future contract awards until all amounts due to the District are paid in full.**

The Contractor and District agree to the payment request procedures identified herein as an integral part of the *Contract Agreement*.

End of Exhibit F (Except for Form Provided)

APPLICATION FOR PAYMENT

TO: HORRY COUNTY SCHOOLS
1160 E HWY 501
CONWAY, SC 29526

PROJECT: SJHS HVAC Renovations

APPLICATION DATE:

PERIOD TO:

FROM:

PROJECT NO: 2021-46MJ

APPLICATION FOR PAYMENT-SUMMARY

Application is made for payment, as shown below, in connection with the contract.

1. ORIGINAL CONTRACT AMOUNT:	
2. NET CHANGES TO CONTRACT:	
3. TOTAL CONTRACT AMOUNT (Line 1 +2):	$ -
4. TOTAL COMPLETED AND STORED TO DATE: ..... (Column G on Schedule)	
5. RETAINAGE:	
a. % of Completed Work (Columns D + E on Schedule)	
b. % of Stored Material (Column F on Schedule)	
Total Retainage: (Line I on Schedule)	$ -
6. TOTAL COMPLETED AND LESS RETAINAGE: ..... (Line 4 less Line 5 total)	$ -
7. LESS PREVIOUS APPLICATIONS:	
8. CURRENT PAYMENT DUE:	$ -
9. BALANCE TO FINISH INCLUDING RETAINAGE: ..... (Line 3 less Line 6)	$ -

EXTRA WORK SUMMARY	ADDITIONS	DEDUCTIONS
Changes From Previous Applications:		
Changes From This Application:		
Total:	0	0
Net Changes:		

I, the undersigned, certify that to the best of my knowledge, informationand belief ALL WORK covered by this request for payment has been completed in accordance with any applicable contract documents or District standards and that the payment requested herein is now due and payable. I further certify that I am authorized by the Company stated below to make sure certifications and request the payment herein on behalf of said Company in lieu of the authorized person so indicated.

ARCHITECT/GC:

By: Date:

State of: County of:

Subscribed and sworn to me this day of

The above personally appeared before me, the undersigned notary public and provided satisfactory evidence of identification.

Notary Public: My Commission expires:

ACCEPTED/APPROVED BY: HORRY COUNTY SCHOOLS

ACCEPTED BY: DATE:

APPROVED BY: DATE:

This approved application is not negotiable. The amount approved for payment is payable only to the Architect/GC named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the District or the Architect/GC under any applicable contract agreement.

Contractor Initials _____ District Initials _____

CONTINUATION SHEET

SCHEDULE OF VALUES

INVOICE NO: 1

PERIOD NO:

(Thru end of the month)

PROJECT NO: 2021-46MJ

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO:	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATIONS (D+E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G/C)	BALANCE TO FINISH (C-G)	RETAINAGE (IF VARIABLE RATE)
1						$ -		$ -	
2						$ -			
3						$ -		$ -	
4						$ -		$ -	
5						$ -		$ -	
6						$ -		$ -	
7						$ -		$ -	
8						$ -		$ -	
9						$ -		$ -	
10						$ -		$ -	
11						$ -		$ -	
12						$ -		$ -	
13						$ -		$ -	
14						$ -		$ -	
15						$ -		$ -	
16						$ -		$ -	
17						$ -		$ -	
18								$ -	
TOTALS		$ -	$ -	$ -	$ -	$ -		$ -	$ -

A-Line Item number

B-Brief Item Description

C-Total Value of Item

D-Total of D and E fromPrevious Application(s) (if any)

E-Total Work Completed for this Application

F-Materials Purchased and Stored for Project

G-Total of All Work Completed and Materials Stored for Project

H-Remaining Balance of Amount to Finish

I-Amount Withheld form G

Contractor Initials _____ District Initials _____

CERTIFICATE OF INSURANCE (Exhibit G)

PRODUCING AGENT: (Name and Business Address) **Contact Person:** **Phone:** **Best Policy Holder Rating:** ☐ A+ ☐ A ☐ A- ☐ B+ ☐ B **Financial Strength Rating:** ☐ Class III ☐ Class IV ☐ Class V	**CONTRACTOR (INSURED):** (Name and Business Address) **Contact Person:** **Phone:**
ADDITIONAL INSURED (CERTIFICATE HOLDER): Horry County Schools 335 Four Mile Road, P.O. Box 260005 Conway, SC 29528-6005 **Contact Person:** Maurice Jackson **Phone:** (843) 488-6929	**PROJECT / BID NUMBER:** 2021-46MJ **PROJECT NAME:** St. James High School HVAC Renovations

Type of Insurance	Policy No.	Policy Inception & Expiration Dates (MM/DD/YY)	Deductible Amt.	Insurance Company Providing Coverage
Commercial General Liab.				
Limits: Single Limit (per occurrence)		$	Products & Completed Operations	$
General Aggregate		$	Personal & Advertising Injury	$
Premises Operations		$	Contractual	$
Independent Contractor's Protection		$	Owned /Non-owned Vehicles	$
Broad Form Property Damage		$	Medical Expense	$
Commercial Auto Liability				
Limits: Bodily Injury (per occurrence)		$	Property Damage (per occurrence)	$
Worker's Compensation & Employer's Liability				
Limits: Worker's Compensation		Statutory Limit	Disease (each employee)	$
Each Accident		$	Disease (aggregate)	$
Other: (specify)				
Limits: (specify)		$		$
		$		$

Such insurance as is herein certified (a) applies to all insurance issues in connection with the work/services required by Horry County Schools forming the *Contract Agreement*, (b) is written in accordance with the company's regular policies and endorsements, subject to the company's applicable manuals or rules and rates in effect, (c) has been issued on behalf of the insured Contractor named above, and (d) shall apply in total to the above named project. The District and its contracted Engineer (if any) shall be included as additional insured as its interests may appear. Each policy shall be endorsed to provide that the policy shall not be cancelled, changed, allowed to lapse, or allowed to expire until thirty (30) calendar days after the District has received written notice thereof as evidenced by proof of mailing notice to: Procurement Coordinator, Horry County Schools, P.O. Box 260005, Conway, SC 29528-6005.

By signature below, I, the agent, certify that I have been fully informed of the insurance requirements of the Contractor's contract with the District and such insurance as named herein is in force as of the date of this certificate.

Name & Title of Authorized Representative:

Signature of Authorized Representative: _____

Date Certificate Prepared & Signed:

OFFICIAL BID FORM

BID NUMBER: 2021-46MJ

PROJECT NAME: St. James High School HVAC Renovations

FULL COMPLETION OF THIS FORM IS MANDATORY FOR A BID TO BE CONSIDERED. (This *Official Bid Form* and all requested documentation shall be submitted through the website at the following URL https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=2f302e8a-69b0-407b-a21a-3368d004365e , mailed, expressed or hand delivered to the location(s) specified in the *Invitation for Bids* **no later than** the bid opening date and time, as may be amended by addendum.)

BASIC SUBMITTER INFORMATION:

Name of Submitting Company: _____

Mailing Address of Company: _____

Taxpayer Identification Number: _____

Qualifier's Name: _____ **Phone Number:** _____

Contractor's License Number: _____ **Fax Number:** _____

Contractor's Group Number: _____ **Dollar Limitation of License:** **$**

Email Address: _____

Company's Minority Status: ☐ Minority Owned Business ☐ Woman Owned Business ☐ Not Applicable
(Must be certified by the State of South Carolina and will be used for statistical purposes only. Check if State certified: ☐)

ADDENDA ACKNOWLEDGEMENT: *(Acknowledgement of all addenda issued is required.)*

ADDENDA NO.	ADDENDA DATE	BIDDER'S INITIALS	ADDENDA NO.	ADDENDA DATE	BIDDER'S INITIALS

BID PRICING: Having carefully examined the Contract Documents with all corresponding terms, conditions, requirements, specifications, drawings, forms or other such descriptions of the work to be performed as well as the worksite and conditions affecting the work, the undersigned proposes to furnish all materials, labor, equipment and processes necessary for the **base bid** and **bid alternates** listed below. *(Failure of the Bidder to bid any alternate listed shall render the bid non-responsive. Check box to indicate addition, reduction, or no change from base bid.)* ***Round all bids to the nearest dollar.***

BASE BID (Lump Sum): The base bid shall include all work illustrated on the drawings and described within the specifications unless otherwise noted. **(Include any allowances)** **Dollars:** **$** _____

BID ALTERNATES:

1. State the amount to deduct from the base bid price to use an approved substitution for the water source heat pumps and water source heat pump recovery units. ☐ No Change ☐ Add ☐ Deduct **Dollars:** **$** _____
2. State the amount to add to the base bid price to provide a 5 year parts and labor warranty for the water source heat pumps and energy recovery units. ☐ No Change ☐ Add ☐ Deduct **Dollars:** **$** _____
3. State the amount to add to the base bid price to provide factory training on the makeup air unit components and operations. For the purposes of pricing, training shall consist of a one-day session, 8 hours long and shall include all necessary training materials. ☐ No Change ☐ Add ☐ Deduct **Dollars:** **$** _____

(CAUTION: Bidders are required to include ALL costs in the above Base Bid and each Bid Alternate, if any. If the bid is accepted, the District will not contract for more than the amounts shown. The District reserves the right to accept bid alternates in any order or combination that serves its best interests and is within budget. If any numbers are illegible, the District's interpretation of the number is final.)

UNIT / INCREMENTAL PRICING: Unit pricing must be provided in the event a *Change Order* is necessary for the following types of work due to unforeseen circumstances. These unit prices shall be the installed price including all costs to the District. Unit costs shall not include bonding, overhead and profit, which shall be added at time of *Change Order*. The District reserves the right to negotiate any of the unit prices listed and, at the District's discretion, to use the same rates for deduct work under a *Change Order*.

SUBCONTRACTOR DISCLOSURE: As stipulated in the *Bid Instructions*, subcontractors who shall perform the trades listed below must be identified. When the Bidder intends to perform any trade listed with the Bidder's own forces, the Bidder shall be named in the place of any subcontractor required to be listed. **Listing any subcontractor that does not meet the qualifications stated in the *Bid Instructions* or does not meet the licensing requirements of the State of South Carolina shall render the bid non-responsive.**

Base Bid:

TRADE	SUBCONTRACTING COMPANY NAME	LICENSE NUMBER
Electrical		
Air Conditioning		

Alternate 1:

TRADE	SUBCONTRACTING COMPANY NAME	LICENSE NUMBER
Electrical		
Air Conditioning		

CONFLICTS OF INTEREST IDENTIFICATION: Identify any employee, agent or representative of the Architect/Engineer or District (including members of the Horry County Board of Education) with more than a five percent (5%) interest in the Contractor's business. ☐ Not applicable

Names: _____

Identify any employee, agent or representative of the Architect/Engineer or District (including members of the Horry County Board of Education) that will be subcontracting any work for the project. ☐ Not applicable

Names: _____

ACKNOWLEDGEMENT:

1. Have you clearly listed any deviations from the requested specifications and fully explained such deviations? ☐ Yes ☐ No ☐ N/A – No Deviations

BID CERTIFICATION: I, the undersigned, certify that I am an authorized signatory for the bidding company identified in this bid form with authority to submit bids and obligate the company to a contract for the work identified in the Contract Documents provided by Horry County Schools. I have read and fully understand the Contract Documents such that I have full knowledge of all of the work to be performed and the terms, conditions, and requirements the company I represent must comply with if a contract is awarded. I further understand that the bidding company I represent must comply with all applicable local, state and federal laws related to the work to be performed and to the payment of subcontractors. I certify that the information included on this form or as attached supplementary information is true and accurate to the best of my knowledge, understanding, and belief. I understand that misrepresentation of any information on this form shall result in the bid being considered non-responsive.

BIDDER:	**NOTARY:**	**CORPORATE SEAL:**
Name & Title of Authorized Signatory:	State of: County of: Subscribed and sworn to before me on this date:	
Signature:	Signature: _____ My Commission Expires:	

REMINDER: The following documents must be submitted with this *Official Bid Form*:

1. A fully executed *Bid Bond*, including power of attorney, or other approved security.
2. Other documents as checked and identified below:
   - ☐
   - ☐

BID BOND

PRINCIPAL (BIDDER): *(Name and Business Address)* Contact Name: Phone:	**TYPE OF ORGANIZATION:** ☐ Individual ☐ Partnership ☐ Joint Venture ☐ Corporation Principal organized under the laws of the State of:
OWNER (THE DISTRICT): (Name and Business Address) Horry County Schools 335 Four Mile Road, P.O. Box 260005 Conway, South Carolina 29528-6005 Contact Name: Maurice Jackson Phone: 843-488-6929	**BID IDENTIFICATION:** Project / Bid Number: 2021-46 Project Name: St. James High School HVAC Renovations
SURETY: [Name and Business Address) Contact Name: Phone:	Surety's Best Key Rating: Surety's Financial Strength Rating: Surety organized under the laws of the State of:

PENAL SUM OF BOND IS FIVE PERCENT (5%) OF TOTAL BASE BID PLUS ALL ALTERNATES NOT TO EXCEED: $

OBLIGATION:
We, the Principal and Surety are firmly bound to Horry County Schools (hereinafter called the District) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally.

CONDITIONS:
The Principal has submitted the bid referenced and identified above.

THEREFORE:
The above obligation is void if the Principal, upon acceptance by the District of the bid identified above within forty-five (45) days from the bid opening date and time as amended by any addendum to the bid, is found by the District to be a responsive and responsible Bidder, and who a) executes the *Contract Agreement*, b) provides to the District a fully executed *Performance Bond* and *Payment Bond*, c) has its insurance provider submit a bona-fide *Certificate of Insurance* and, d) provides all other documents required by the terms of the bid and by the date stated in the *Notice of Intent to Award* or, in the event of failure to execute one or more of the contractual documents or in the event of refusal of the Principal to comply with other such requirements of the *Bid Instructions*, pays the District for any cost of procuring the work which exceeds the amount of the Principal's bid not to exceed the penal sum so stated.

Such Surety executing this instrument agrees that its obligation is not impaired by any extension of the time for acceptance of the bid that the Principal may grant to the District. Notice to the Surety of any extension of time is waived; however, waiver of the notice applies only to extensions aggregating not more than sixty (60) calendar days in addition to the forty-five (45) calendar days originally allowed for acceptance of the bid.

WITNESS:
The Principal and Surety executed this bid bond and affixed their seals on this date of:

PRINCIPAL'S SIGNATORY

NAME & TITLE:

Corporate Seal

SIGNATURE: _____

SURETY SIGNATORY

NAME & TITLE:

Corporate Seal

SIGNATURE: _____

A fully executed Power of Attorney must accompany this bond when submitted with the *Official Bid Form*.

SECTION 011000 - SUMMARY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Contract description.
2. Work by Owner or other Work at the Site.
3. Owner-furnished products.
4. Contractor's use of Site and premises.
5. Future work.
6. Work sequence.
7. Owner occupancy.
8. Permits.
9. Specification conventions.

1.2 CONTRACT DESCRIPTION

A. Work of the Project includes construction or alteration per the project drawings.
1. Work is the replacement of existing water cooled roof mounted makeup air units and heat pumps and associated connections to existing ductwork and piping.
2. Work associated with coordination of Building Automation Controls and unit start up with HCS provided BAS Contractor (CMI Controls).

B. Contract with Owner according to Conditions of Contract.

1.3 WORK BY OWNER OR OTHERS

A. Work associated with the Building Automation System is to be contracted with HCS Contractor and to be paid directly by HCS. Owner will coordinate the sequence of work under all contracts according to "Work Sequence" and "Contractor's Use of Site and Premises" Articles in this Section.

B. Contractor to coordinate BAS work with Owner, Owner contractor and contractor’s forces.

C. Work under this Contract includes:
1. Work as indicated on Drawings and as specified in the Project Manual.

D. Items noted NIC (Not in Contract) will be furnished and installed by Owner.

1.4 OWNER-FURNISHED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples to Contractor.
2. Arrange and pay for delivery to Site.

3. Upon delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload products at Site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install, and finish products.
4. Repair or replace items damaged after receipt.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limit use of Site and premises to allow:
1. Owner occupancy.
2. Work by Owner.

B. Construction Operations: Limited to areas indicated on Drawings.
1. Noisy and Disruptive Operations (such as Use of Jack Hammers and Other Noisy Equipment): Not allowed in close proximity to existing building during regular hours of operation. Coordinate and schedule such operations with Owner to minimize disruptions.

C. Utility Outages and Shutdown:
1. Coordinate and schedule electrical and other utility outages with Owner.
2. Outages: Allowed only at previously agreed upon times. In general, schedule outages at times when facility is not being used.

D. Construction Plan: Before start of construction, submit three copies of construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.6 PERMITS

A. Obtain all permits and licenses required to perform the work required by the Contract Documents (Drawings, Specifications and Contract).

1.7 SPECIFICATION LANGUAGE

A. These Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 012100

ALLOWANCES PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Contract General Conditions and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Allowances indicated in the Bid Proposal Form to be included in Contract Amount.

1. Selected materials and equipment, and in some cases, their installation, are shown and specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by change order.
2. Allowances may be used in lieu of metering for temporary construction site utility services or to reimburse project related work performed by District forces, for example, keying.

1.3 RELATED SECTIONS

A. Refer to product Specifications Sections identified in Allowance description.

1.4 GENERAL REQUIREMENTS FOR ALLOWANCES

A. Contractor shall submit cost data and other descriptive data to establish basis used by Contractor for determining costs in Contract Amount attributable to each Allowance.

B. Any amount not fully consumed shall be adjusted by change order.

1. The Contractor will be credited for his actual cost of labor, materials, and other actual costs WITHOUT mark-up.
2. Any unused allowances shall be returned to the Owner using a credit change order for the full amount of the value unused.
3. Should the Contractor's actual costs exceed the specified allowance, the Contractor's Contract Amount will be adjusted by change order in accordance with Contract.

PART 2 - PRODUCTS

2.1 LUMP SUM ALLOWANCES

Owners Contingency:

a. The Contractor shall include a contract allowance of $20,000.00 in their proposal to provide all material, labor, and equipment necessary to design, permit, and installation of unknown conditions.
b. Owner to determine the conditions and use of this allowance.

PART 3 - EXECUTION

3.1 SELECTION OF PRODUCTS

A. Owner's Representative and Architect will:
   1. Consult with Contractor for considerations to be given in selection of products, suppliers and qualified installers.
   2. Make selection in consultation with HCS Facility staff. Obtain written direction by HCS's Representative designating:
      a. Product, color, design and finish.
      b. Accessories and attachments.
      c. Suppliers and qualified installers, as applicable.
      d. Allowance amount to be included in Contract Amount.
      e. Construction Contract warranty and manufacturer's guarantee provisions.

B. Contractor shall:
   1. Assist HCS Facility staff's Representative and Architect in determining qualified suppliers or installers.
   2. Obtain proposals from suppliers and installers.
   3. Make cost and constructability recommendations to Owner's Representative and Architect for consideration in product, supplier and qualified installer selections.
   4. Notify Owner's Representative and Architect promptly of:
      a. Reasonable objections Contractor may have against any supplier or party under consideration for installation.
      b. Effects on Construction Schedule anticipated by selections under consideration.

3.2 CONTRACTOR'S RESPONSIBILITIES

A. Upon notification of selection, Contractor shall execute purchase agreement with designated supplier(s) and enter into contract with designated qualified installer(s), as applicable.

B. Contractor shall make all arrangements for and submit shop drawings, product data and samples as required.

C. Contractor shall make all arrangements for pick-up, delivery, handling and storage of products.

D. Upon delivery, Contractor shall promptly inspect products for damage or defects. Should damage or defects be found, Contractor shall effect return, replacement or

repair of products, as appropriate, and process claims for transportation damage.

E. Contractor shall apply, install and finish products in compliance with requirements of applicable Sections of Specifications.

3.3 ADJUSTMENT COSTS

A. Should the net cost of the Allowance be more or less than the amount included in the Contract Amount, the Contract Amount shall be adjusted in accordance with provisions of the Contract General Conditions and a Change Order shall be executed.

END OF SECTION

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

2. Include, as part of the Base Bid and as part of the Alternative Bid the Owners Contingency allowance of $20,000.00

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. **Base Bid:** Shall include all work illustrated on the drawings and as described within the specifications unless otherwise noted.

B. **Alternate Number 1**: State the amount to deduct from the base bid price to use an approved substitution for the water source heat pumps and water source heat pump energy recovery units.

C. **Alternate Number 2:** State the amount toad to the base bid price to provide a 5 year parts and labor warranty for the water source heat pumps and energy recovery units.

D. **Alternate Number 3:** State the amount to add to the base bid price to provide factory training on the makeup air unit components and operations. For the purposes of pricing, training shall consist of a one-day session, 8 hours long, and shall include all necessary training materials.

END OF SECTION 012300

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 CONTRACT DOCUMENT

A. The **Contract Agreement** with referenced attachments, technical specifications and drawings including all project addenda constitute the Scope of the Work.

B. Specific project requirements are included in the Contract Agreement and contain, but may include more than the following:

1. Pre-Construction Meeting
2. Construction Management
3. Conformance to applicable Codes and Laws
4. Project Schedule
5. SLED Background checks
6. Submittals
7. Record Drawings
8. Quality Control
9. Cut and Patching
10. Jobsite Supervision
11. Work site control and clean-up.
12. Material testing and Inspections
13. Warranties and Guarantees
14. Traffic Control and Safety

C. Important safety and specific Horry County School requirements are contained in the Contract Agreement and specifically Section 83 “Mandatory Safety and Conduct Requirements.”

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Those work restrictions and limitations listed on the **Scope of Work (Exhibit A)** and the **Contract Agreement**.

1.3 UTILITY USE AND CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless specifically noted otherwise within the Scope of Work (Exhibit A) to the Contract Agreement. Allow other entities to use temporary

services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Requirement for temporary utilities to be paid for by the Owner:

1. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations at no cost to the Owner.

2. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations at no cost to the Owner.
   a. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
   b. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1.6 DEFINITIONS

A. Included within the **Contract agreement** and within each specific specification section.

PART 2 - PRODUCTS

2.1 TEMPORARY FENCING

A. Chain-Link Fencing: Minimum 2-inch , 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-

inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch , 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect**,** and construction personnel office activities and to accommodate Project meetings specified in **Contract agreement**. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

2. Install lighting for Project identification sign.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel

1. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations and / or as indicated on Drawings.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

J. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.

1. Construct covered walkways using scaffold or shoring framing.
2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Paint and maintain appearance of walkway for duration of the Work.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent

construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 013100

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Installation of the Work.
   2. Cutting and patching.
   3. Coordination of Owner-installed products.
   4. Progress cleaning.
   5. Starting and adjusting.
   6. Protection of installed construction.

1.2 QUALITY ASSURANCE

A. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety

B. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, **mechanical and electrical systems,** and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to **local utility and to Owner** that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Owner.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer **and Owner** promptly.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect **or Owner**. Report lost or destroyed permanent benchmarks or control points promptly.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

END OF SECTION 017300

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Construction waste management plan.
   2. Construction waste recycling.
   3. Construction waste adaptive reuse.

1.2 PLAN REQUIREMENTS

A. Develop and implement construction waste management plan as approved by Architect/Engineer.

B. Intent:
   1. Divert construction, demolition, and land-clearing debris from landfill disposal.
   2. Redirect recyclable material back to manufacturing process.
   3. Generate cost savings or increase minimal additional cost to Project for waste disposal.

1.3 SUBMITTALS

A. Construction Waste Management Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:
   1. Transportation company hauling construction waste to waste processing facilities.
   2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
   3. Construction waste materials anticipated for recycling and adaptive reuse.
   4. On-Site sorting and Site storage methods.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

A. Construction Waste Landfill Diversion: Minimum 50 percent by weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.

B. Implement construction waste management plan at start of construction.

C. Review construction waste management plan at preconstruction meeting and progress meetings.

D. Distribute approved construction waste management plan to Subcontractors and others affected by plan requirements.

E. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.

F. Purchase products to prevent waste by:
   1. Ensuring correct quantity of each material is delivered to Site.
   2. Choosing products with minimal or no packaging.
   3. Requiring suppliers to use returnable pallets or containers.
   4. Requiring suppliers to take or buy back rejected or unused items.

1.5 CONSTRUCTION WASTE RECYCLING

A. Use source separation method or comingling method suitable to sorting and processing method of selected recycling center. Dispose nonrecyclable trash separately into landfill.

B. Source Separation Method: Recyclable materials separated from trash and sorted into separate bins or containers, identified by waste type, prior to transportation to recycling center.

C. Comingling Method: Recyclable materials separated from trash and placed in unsorted bins or container for sorting at recycling center.

D. Materials suggested for recycling include:
   1. Packing materials including paper, cardboard, foam plastic, and sheeting.
   2. Recyclable plastics.
   3. Organic plant debris.
   4. Earth materials.
   5. Native stone and granular fill.
   6. Asphalt and concrete paving.
   7. Wood with and without embedded nails and staples.
   8. Glass, clear and colored types.
   9. Metals.
   10. Gypsum products.
   11. Acoustical ceiling tile.
   12. Carpet.
   13. Equipment oil.

1.6 CONSTRUCTION WASTE ADAPTIVE REUSE

A. Arrange with processing facility for salvage of construction material and processing for reuse. Do not reuse construction materials on-Site except as allowed by Architect/Engineer.

B. Materials suggested for adaptive reuse include:
   1. Concrete and crushed concrete.
   2. Masonry units.
   3. Lumber suitable for re-sawing or refinishing.
   4. Casework and millwork.
   5. Doors and door frames.
   6. Windows.
   7. Window glass and insulating glass units.
   8. Hardware.
   9. Acoustical ceiling tile.

10. Equipment and appliances.
11. Fluorescent light fixtures and lamps.
12. Incandescent light fixtures and lamps.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION WASTE COLLECTION

A. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.

B. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials separated to eliminate co-mingling of materials required to be delivered separately to waste processing facility.

C. Store construction waste materials to prevent environmental pollution, fire hazards, hazards to persons and property, and contamination of stored materials.

D. Cover construction waste materials subject to disintegration, evaporation, settling, or runoff to prevent polluting air, water, and soil.

3.2 CONSTRUCTION WASTE DISPOSAL

A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.

B. Dispose of construction waste not capable of being recycled or adaptively reused by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.2 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From all authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of **5** days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
2. Complete final cleaning requirements, including touchup painting.
3. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 5 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect, Engineer and Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect and Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by the Architect and Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. Contractor shall compensate Architect and Engineer at the firm’s standard billing rates for additional reinspections beyond the first.
2. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items:
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 5 days prior to date the work will be completed and ready for final inspection and tests. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected. Contractor shall

compensate Architect and Engineer at the firm’s standard billing rates for additional reinspections beyond the first.

1.6 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Owner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

C. Construction Waste Disposal: Comply with waste disposal requirements specified.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least **30** days before commencing demonstration and training. Engineer will determine whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least **15** days before commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.

7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, **loose-leaf** binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, **and** subject matter

of contents**, and indicate Specification Section number on bottom of spine**. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available. Provide recording in commonly used digital format.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings:

1. Number of Copies: Submit **one** set(s) of marked-up record prints.

a. Final Submittal:
1) Submit PDF electronic files of scanned record prints and one set of prints.
2) Print each drawing, whether changes and additional information were recorded.

B. Record Specifications: Submit **one paper copy and annotated PDF electronic file** of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit **one paper copy and annotated PDF electronic files and directories** of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit **one paper copy and annotated PDF electronic files** of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Mark important additional information that was either shown schematically or omitted from original Drawings.
5. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders**, record Product Data,** and record Drawings where applicable.

B. Format: Submit record Specifications as **scanned PDF electronic file(s) of marked-up paper copy of Specifications**.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's **and Owner's** reference at all times work is being performed.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:
    a. Operations manuals.
    b. Maintenance manuals.
    c. Project record documents.
    d. Identification systems.
    e. Warranties and bonds.
    f. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to **format file type acceptable to Owner**, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
3. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

a. Name of Contractor/Installer.
b. Business address.
c. Business phone number.
d. Point of contact.
e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of all items off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain all existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of

measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 013100 "Project management and Coordination."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

INDEX

SECTION 230007 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 PROJECT/WORK IDENTIFICATION

A. General: The project name is St. James High School HVAC Renovations as shown on Contract Documents prepared by McKnight Smith Ward Griffin Engineers, Inc.

B. Summary, Prime Contract Work: Briefly, the work, as defined in greater detail by other provisions of the Contract Documents, can be summarized as follows:

1. Remove existing water cooled roof mounted makeup air units and heat pumps and install new.
2. Connect to existing ductwork and piping.
3. Update existing CMI controls for noted mechanical system renovations.

1.3 PROJECT COORDINATION

A. General: The Contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules and control of site utilization from the beginning of construction activity through project close-out and warranty periods. The HVAC Contractor shall act as the Prime Contractor for coordination of the project schedule. The intent of the paragraph is to Require that the contract be administered as a single prime contract, preferably (logically) with the HVAC Contractor as the Prime. It is not the intent of this paragraph to eliminate the opportunity for other contractors to serve as Prime. Note that the submission of a Bid as Prime Contractor will attest that that subcontractors with proper licensing necessary to secure all required permits are included as a part of the proposal.

1.4 ALTERNATE BID DESCRIPTION:

A. Base Bid: The base bid shall include all work illustrated on the drawings and described within the specifications unless otherwise noted.

B. Alternate 1: State the amount to deduct from the base bid price to use an approved substitution for the water source heat pumps and water source heat pump energy recovery units.

C. Alternate 2: State the amount to add to the base bid price to provide 5 year parts and labor warranty for the water source heat pumps and energy recovery units.

D. Alternate 3: State the amount to add to the base bid price to provide factory training on the makeup air unit components and operations. For the purposes of pricing training shall consist of a one day session, 8 hours long and shall include all necessary training materials.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION 230007

SECTION 230500 – MECHANICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.1 SCOPE

A. Applicable requirements of the General Conditions, Supplementary General Conditions, and Special Conditions bound at the front of these specifications shall govern work under this heading.

B. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere in order to assure a complete and satisfactory installation. Work such as flashing, wiring, etc., which is required by the work of this section shall be performed in accordance with the requirements of the applicable section of the specifications.

C. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the word "provide" is used, it shall mean "furnish and install complete and ready for use".

D. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

E. This Contractor is referred to the General and Special Conditions of the Contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.

F. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

1.2 DEFINITION

A. The word "Contractor" as used in this section of the specification refers to the HVAC Contractor unless specifically noted otherwise. The word "provide" means furnish, fabricated, complete, install, erect, including labor and incidental materials necessary to complete in place and ready for operation or use the item referred to or described herein and/or shown or referred to on the Contract Drawings.

1.3 CONTRACTOR'S QUALIFICATIONS

A. It is assumed that the Contractor has had sufficient general knowledge and experience to anticipate the needs of a construction of this nature. The Contractor shall furnish all items required to complete the construction in accordance with reasonable interpretation of the intent of the Drawings and Specifications. Any minor items required by code, law or regulations shall be provided whether or not specified or specifically shown where it is a part of a major item of equipment, or of the control system specified or shown on the plans.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces.

Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.

B. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers and labor required to unload, transfer, erect, connect-up, adjust, start, operate and test each system.

C. Unless otherwise specifically indicated on the plans or specifications, all equipment and material shall be installed with the approval of the Architect in accordance with the recommendations of the manufacturer. This shall include the performance of such tests as the manufacturer recommends.

D. All work must be done by first-class and experienced mechanics properly supervised and it is understood that the Architect has the right to stop any work that is not being properly done and has the right to demand that any workman deemed incompetent by the Architect be removed from the job and a competent workman substituted therefore.

2.2 EQUIPMENT APPLICATION AND PERFORMANCE

A. The Contractor and/or Equipment Supplier shall be responsible to see that equipment supplied is correct for the intended application and will perform within the limits of capacity, noise, life expectancy, pressure drop and space limitations intended for that equipment as shown on the plans or described in the specifications. The shop drawings shall show the capacity and operating characteristics of the equipment.

B. All equipment shall automatically restart after power outages. Motors shall restart after one minute delay unless specified otherwise.

2.3 EQUIPMENT DEVIATIONS

A. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Subcontractor at his own expense and submitted for approval by the Architect.

B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

2.4 MOTORS

A. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C40 and conform thereto for installation resistance and dielectric strength. Each motor shall be provided with conduit terminal box, adequate starting and protective equipment as specified or required. The capacity shall be sufficient to operate associate driven devices under all conditions of operation and load and without overload, and at least shall be the horsepower indicated or specified. Each motor shall be selected for quiet operation. Motors shall be premium efficient with a minimum efficiency as specified by NEMA MG1-2006, Table 12-12. Motors shall be TEFC or TEAO construction as appropriate. ODP motors are not allowed. Motors shall be 1800 RPM whenever possible.

B. Motors 15 HP or less shall incorporate maintenance free sealed bearings.

2.5 DRIVES

A. Machinery drives shall be provided for all power driven equipment specified in this section.

B. Drives shall be cog V-belt type and shall be selected to overcome the starting inertia of the equipment without slippage, but in no case shall be less than 150% of the full motor load. Drives 1/2 HP and smaller may be provided with single belts. Drives 3/4 HP and larger shall be provided with the number of belts necessary to transmit the required power with 95% minimum efficiency.

C. Where adjustable type sheaves are indicated they shall be selected such that the schedule speed of the driven equipment is at the midpoint in the adjustment range of the sheave. Adjustable sheaves shall be replaced with fixed after final balancing and adjustment.

D. Where fixed type sheaves are indicated the Contractor shall include in his price changing sheave sizes once during the balancing period to achieve proper air quantities.

E. Sheaves shall be machined cast iron of the same manufacturer as the belt provided. Shop drawings shall be submitted of each drive which shall include actual transmission capacity of each drive.

2.6 SUPPORTS AND ATTACHMENTS

A. All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect, not strong enough shall be replaced as directed.

2.7 DIELECTRIC CONNECTIONS

A. At any points within the piping systems where dissimilar metals are connected, use full port ball valves. Careful attention shall be given to support brackets and hangers to select proper materials to avoid dissimilar metal contact at these points.

2.8 DRAINS AND VENTS

A. In addition to the drains and vents indicated on the plans and piping details, the Contractor shall install additional drains and vents as required to remove all water and air from the piping systems.

2.9 MOTOR STARTERS AND DISCONNECTS

A. Individual motor controllers complete with auxiliary contacts, control transformers, push buttons, selector switches and remote push button stations not specifically specified to be furnished with the equipment shall be provided under this section. Motor controllers shall comply with NEMA Standards and be complete with proper size heaters and auxiliary contacts and shall be in NEMA enclosures as required. Unless otherwise noted, push button stations shall be oil-tight heavy duty type. Controllers shall be manual, magnetic, or combination type with disconnect switch or circuit breaker as indicated on the drawings or where required by the NEC. Controllers shall include motor over current protection in each phase conductor. Each motor controller shall be provided with phenolic nameplate, black with 1/4" high letters and white border, indicating equipment served, attached using counter sunk screws.

B. Where disconnecting switches are indicated to be furnished under this Section, they shall be General Electric, heavy duty NEMA 1 or NEMA 3R enclosures as applicable, with voltage and amperage rating appropriate to the application. Unless otherwise noted, fuses shall be Buss "Fusetrons", or approved equal. Unfused motor disconnecting switches shall be heavy duty in

NEMA 1 or 3R applicable enclosures. Similar and equivalent equipment as manufactured by I.T.E., Square D, or Westinghouse is equally acceptable. Switches used as service switches shall bear such U.L. Label and nameplate on switch shall so indicate.

2.10 PAINTING

A. Paint material shall be selected from the products listed below and, insofar as practical, products of only one manufacturer shall be used. Contractor shall submit to the Architect the listed manufacturer he proposes to use in the work. Should the Contractor desire to use products of a manufacturer not listed below, or products made by a listed manufacturer but not scheduled herein, Contractor shall submit complete technical information on the proposed products to the Architect for approval. Only products approved by the Architect shall be used.

1. Rust Inhibitive Primer:

a. Devoe: Bar-Ox Quick Dry Metal Primer, Red.
b. Duron: Deluxe Red Primer.
c. Glidden: Rustmaster Tank and Structure Primer.
d. Pittsburgh: Inhibitive Red Primer.

2. Galvanized Metal Primer:

a. Devoe: Mirrolac Galvanized Metal Primer.
b. Duron: Duron Deluxe Galvanized Metal Primer
c. Glidden: Rustmaster Galvanized Iron Metal Primer.
d. Pittsburgh: Speedhigh Galvanized Steel Primer.

PART 3 - EXECUTION

3.1 DUTIES OF CONTRACTOR

A. Contractor shall furnish and install all materials called for in these Specifications and accompanying drawings, and must furnish the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications must be furnished by the Contractor.

B. Contractor is responsible for familiarizing himself with the details of the construction of the building. Work under these specifications installed improperly or which requires changing due to improper reading or interpretation of building plans shall be corrected and changed as directed by the Architect without additional cost to the Owner.

C. The Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, Architect shall be notified before proceeding with installation.

D. The plans are diagrammatic and are not intended to show each and every fitting, valve, pipe, pipe hanger, or a complete detail of all the work to be done; but are for the purpose of illustrating the type of system, showing pipe sizes, etc., and special conditions considered necessary for the experienced mechanic to take off his materials and lay out his work. This Contractor shall be responsible for taking such measurements as may be necessary at the job and adapting his work to local conditions.

E. Conditions sometimes occur which require certain changes in drawings and specifications. In the event that such changes in drawings and specifications are necessary, the same are to be made by the Contractor without expense to the Owner, providing such changes do not require furnishing more materials, or performing more labor than the true intent of the drawings and specifications demands. It is understood that while the drawings are to be followed as closely as circumstances will permit, the Contractor is held responsible for the installation of the system according to the true intent and meaning of the drawings. Anything not entirely clear in the drawings and specification will be fully explained if application is made to the Architect. Should, however, conditions arise where in the judgment of the Contractor certain changes will be advisable, the Contractor will communicate with the Architect and secure his approval of these changes before going ahead with the work.

F. The right to make any responsible change in location of apparatus, equipment, routing of piping up to the time of roughing in, is reserved by the Architect without involving any additional expense to the Owner.

G. It shall be the duty of prospective Contractors to visit the job site and familiarize themselves with job conditions. No extras will be allowed because of additional work necessitated by, or changes in plans required because of evident job conditions, that are not indicated on the drawings.

H. Contractor shall determine the schedule of work as lay down by the General Contractor and must schedule his work to maintain the building construction schedule so as not to interfere with or hold up any other Contractors.

I. Contractor shall leave the premises in a clean and orderly manner upon completion of the work, and shall remove from the premises all debris that has accumulated during the progress of the work.

3.2 CODES, RULES, PERMITS AND FEES

A. The Contractor shall give all necessary notices, obtain all permits and pay all sales taxes, fees and other costs, including utility connections or extensions, in connection with his work; file all necessary plans prepare all documents and obtain all necessary approvals of all authorities having jurisdiction. Obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment of the work.

B. The Contractor shall include in his work, without extra cost to the Owner, any labor, materials, service, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on drawings and/or specified.

C. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, and with the requirements of all governmental departments having jurisdiction.

D. All materials and equipment for the electrical portion of the mechanical system shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc.

E. All work shall be done in accordance with the International Building Code, and requirements of governmental agencies having jurisdiction.

3.3 COOPERATION WITH OTHER TRADES

A. This Contractor shall give full cooperation to other trades and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. Where the work of the Contractor will be installed in close proximity to, or may interfere with the work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Architect, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 3/8" = 1'-0", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.4 RECORD DRAWINGS

A. The Contractor shall furnish drawings showing dimensioned location and depths of all exterior piping and structures, and shall indicate any and all changes in location of piping, ductwork, equipment or valves from that shown on the Contract Drawings. Additional equipment added, such as vents and drains, shall also be indicated on the record drawings. The drawings shall consist of clean, legible sepia prints of the Contract Drawings, available from the Architect on which the Contractor shall mark all notes, dimensions, sizes and information required. The sepias shall be kept for this purpose only. Before final inspection the Contractor shall submit to the Architect eight (8) sets of black line prints of the sepias.

3.5 SURVEYS AND MEASUREMENTS

A. This Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

B. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Architect through the General Contractor, and shall not proceed with his work until he has received instructions from the Architect.

3.6 SAFETY REQUIREMENTS

A. All systems shall be installed so as to be safe operating and all moving parts shall be covered where subject to human contact. All rough edges of equipment and materials shall be made smooth.

B. All safety controls shall be checked under the supervision of the Architect's representative and eight (8) copies of test date showing setting and performance of safety controls shall be submitted to the Architect.

3.7 SHOP DRAWINGS

A. Contractor shall submit within ten (10) days after award of contract eight (8) copies of a complete list of all manufacturers to be used on the job. No substitutions will be allowed after this date except in extenuating circumstances as determined by the Architect.

B. Submission of a manufacturer's name or equipment number on this list shall not be considered as equipment approved by the Architect.

C. The Contractor shall submit for approval eight (8) sets of detailed shop drawings of all equipment and all material required to complete the project, and no materials or equipment may be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than eight (8) copies.

D. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Architect ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance, characteristics and capacity. Each item of equipment proposed shall be standard catalog product of an established manufacturer and of equal quality, finish, performance, and durability to that specified.

E. Samples, drawings, specifications, catalogs, submitted for approval, shall be properly labeled indicating specific service for which material or equipment is to be used, Section and Article number of specification governing, Contractor's Name and Name of Job.

F. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly marked. Data of a general nature will not be accepted. Data shall include eight (8) copies of computation sheets indicating how unit capacity was determined where ratings are at other than standard conditions. No payment for any equipment or labor will be allowed until all major pieces of equipment specified have been submitted to the Architect for approval.

G. The Contractor, as part of the shop drawing submitted, shall submit shop drawing of all ductwork in the mechanical rooms, the risers including takeoffs to the floors with their associated dampers, and ells with unequal legs showing turning vanes.

H. Static pressure drops across fittings shall not exceed minimum ASHRAE Standards (2009 Fundamentals – Chapter 21 Duct Design).

I. The submittal of shop drawings shall be with the Contractor stamp affixed; this shall assure the Engineer that they are being submitted in accordance with Sub-Paragraph 4.13.4 in AIA Document A201 and/or Paragraph 6.26, in NSPE Document 1910-8. This stamp indicates that the Contractor, by approving and submitting shop drawings, represents that he has determined and verified all field measurements and quantities, field construction criteria, material, catalog material, and similar data that he has reviewed and coordinated information in the shop drawings with the requirements of the work and the Contract Documents. It, also, indicates that any deviation from the Contract Documents has been shown on the submittal and clearly defines the deviations from the specifications.

J. Approval rendered on shop drawings shall not be considered as a guarantee of quantities, measurements, or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail: said approval does not in any way relieve the Contractor from his responsibilities or necessity of furnishing material or performing work as required by the contract drawings and specifications.

K. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of default will be allowed.

L. All shop drawings and submittals are to be in the office of the Architect within 30 days after the Contracts have been awarded. Contractor shall be financially responsible for any price increase of shop drawing items from the time these drawings are issued until they are returned to the Contractor for purchase of items.

M. Contractor shall keep on the job at all times copies of all approved shop drawings.

N. All mechanical submittals shall be contained in one binder. Incomplete submittals will cause the binder to be rejected. (Controls may be submitted individually.)

3.8 OBSERVATION

A. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect at least 72 hours in advance when any work to be covered up is ready for inspection. No work will be covered up until after observation has been completed on such items as piping and insulation, etc.

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3.9 ACCESSIBILITY

A. Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with the General Contractor and all other Contractors whose work is in the same space, and shall advise the General Contractor of his requirements. Such spaces and clearances shall; however, be kept to the minimum size required.

B. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to valves, traps, cleanouts, motors, controllers, switch-gear, and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility and any change shall be submitted for approval.

C. The Contractor shall provide the General Contractor with exact locations of access panels for each concealed valve, control damper or other device requiring service. Access panels shall be provided and installed by the General Contractor and as specified in the Architectural sections of the specifications. Locations of these panels shall be submitted in sufficient time to be installed in the normal course of work.

3.10 CONCEALED PIPE

A. In general, all pipes in finished spaces shall be run concealed in floors, walls, partitions and above ceilings.

B. Concealment of pipe and covering of same shall not be done until authorized by the Architect, after proper tests have been made. Piping installation, including insulation, coatings, etc. shall be complete prior to requesting inspection. This applies to all interior work and exterior work.

3.11 CUTTING AND PATCHING

A. This Contractor shall provide all cutting and patching necessary to install the work specified in this section.

B. No structural members shall be cut without the approval of the Architect and all such cutting shall be done in a manner directed by him.

C. This Contractor shall arrange for proper openings in building to admit his equipment. If it becomes necessary to cut any portion of building to admit his equipment, portions cut must be restored to their former condition by this Contractor through agreeable arrangement with the General Contractor.

D. The Contractor will provide all openings or chases in masonry or concrete. It is the Contractor's responsibility to advise exact dimensions, shape and locations of openings required. The Contractor shall be responsible for correct size and location of each opening for his equipment.

3.12 SLEEVES AND PLATES

A. This Contractor shall provide and locate all sleeves and inserts required before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where sleeves and inserts were not installed, or where incorrectly located. This Contractor shall do all drilling required for the installation of his hangers.

B. Sleeves shall be provided for all mechanical piping passing through concrete floor slabs and concrete, masonry, tile and gypsum wall construction. Sleeves shall not be provided for piping running imbedded in concrete or in insulating concrete slabs on grade.

C. Where sleeves are placed in exterior walls below grade, the space between the pipe or conduit and the sleeves shall be sealed with expanding elastomeric device and made completely watertight.

D. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the pipe and insulation. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:

1. Terminate sleeves flush with walls, partitions and ceiling.
2. In areas where pipes are concealed, as in chases, terminate sleeves flush with floor or as shown on the plans.
3. In all areas where pipes are exposed, extend sleeves 1/4 inch above finished floor, except in rooms having floor drains, where sleeves shall be extended 3/4 inches above floor.

E. Sleeves shall be constructed of schedule 40 black steel pipe unless otherwise indicated on the drawings. Sleeves through concrete beams shall be constructed as indicated on the drawings.

F. Fasten sleeves securely in floor, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.

G. Where piping penetrates fire rated floors or walls, penetrations shall be sealed with a U.L. approved fire stopping system. System shall be as manufactured and detailed by 3M Company or approved equal.

H. Escutcheon plates shall be provided for all exposed pipes and all exposed conduit passing through walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

3.13 UTILITIES

A. This Contractor shall bear the cost of utilities required to perform the work under this Contract. Where services such as electricity, hoist, etc. are provided by the General Contractor, he shall be responsible directly to the General Contractor for his portion of the utilities as may be agreed upon.

3.14 SCAFFOLDING, RIGGING, HOISTING

A. This Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.15 ELECTRICAL CONNECTIONS

A. The Electrical Contractor shall furnish and install all wiring except: (1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Electrical Contractor shall receive from the Mechanical Contractor and mount all individually mounted motor starters and provide all power wiring to the motor terminals unless otherwise indicated. The Electrical Contractor will provide branch circuit protection and disconnects unless otherwise indicated or specified. The Mechanical Contractor shall provide all other control and protective devices, and perform all control and interlock wiring required for the operation of the equipment. Power wiring, from nearest panel, for control components (dampers, panels, etc.) shall be provided by the Mechanical Contractor unless specifically called for by Division 26.

B. After all circuits are energized and complete, the Electrical Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of this Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.

C. It shall be the responsibility of this Contractor to check with the Electrical Contractor on service outlets provided for this Contractor, to determine that the switches and wiring provided are of adequate size to meet Code requirements for this Contractor's equipment. Any discrepancy shall be brought to the attention of the Architect before work is installed. Otherwise, any cost for changes shall be at the expense of this Contractor, and in any case electrical cost increase due to equipment substitution of different electrical characteristics shall be this Contractor's expense.

3.16 PIPE WORK

A. All pipe work shown on the drawings and/or specifications or implied herein and required for a complete and operating system shall be done by experienced mechanics in a neat and workmanlike manner and subject to the approval of the Architect.

B. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required and it shall be the responsibility of the Contractor to furnish and install all materials and equipment required for the operating systems.

C. The piping shall be installed as shown on the plans with strict conformity to the sizes listed and due provisions for expansion and contraction.

D. Unless otherwise noted on the plans, all piping shall be installed inside the insulated envelope of the building.

3.17 LUBRICATION

A. All bearing, except those specifically requiring oil lubrication, shall be pressure lubricated. All lubrication points shall be readily accessible, away from locations dangerous to workmen. In areas where lubrication points are not readily accessible Contractor shall provide extended lubrication tubes to positions where lubrication can be easily accomplished. Pressure grease lubrication fittings shall be "Zerk-Hydraulic" type as made by the Stewart-Warner Corporation, or approved equal, for each type of grease required.

B. The Contractor shall furnish lubrication charts or schedules for each piece of equipment or machinery. The charts or schedules shall designate each point of lubrication. Eight (8) copies of

charts and schedules shall be submitted to the Architect prior to final inspection and approved copies of each schedule and chart shall be framed by the Contractor in metal frames with glass front and installed in the Equipment Room.

3.18 PROTECTION

A. The Contractor shall protect all work and material from damage, and shall be liable for all damage during construction.

B. The Contractor shall be responsible for work and equipment until all construction is finally inspected, tested and accepted. He shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site which is not immediately installed. He shall close open ends of work including pipe, duct, or equipment with temporary covers or plugs during storage and construction to prevent entry of obstructing materials or dust and debris.

C. Provide a protective covering of not less than 0.004" thick vinyl sheeting (or a similar approved material) to be used in covering all items of equipment, immediately after the equipment has been set in place, (or if in a place of storage within the building under construction) to prevent the accumulation of dirt, sand, cement, plaster, paint or other foreign materials from collecting on the equipment and/or fouling working parts.

3.10 CLEANING

A. Clean from all exposed insulation and metal surfaces grease, debris or other foreign material.

B. Chrome plated fittings, fixtures, piping and trim shall be polished upon completion.

3.20 LABELS, TAGS, COLOR CODING AND INSTRUCTIONS

A. Post in the Equipment Room framed under glass the following:

1. Lubrication instructions listing all equipment which requires lubrication, the type of lubricant to be used and the frequency of lubrication.
2. Photostatic copy of wiring diagram of temperature controls.
3. Step-by-step operating instruction for each piece of equipment with control sequence description.

B. A tabulation shall be made of each panel number and circuit number serving each air conditioning unit, fan or other device with electrical service. This list shall be prepared and be ready to turn over to inspectors prior to calling for final inspection.

C. Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications shall be used. Stencils shall not be less than 1-1/4" high letters for ductwork and not less than 3/4" high letters for access door signs and similar operational instructions. Stencil paint shall be standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

E. Engraved Plastic-Laminate Signs

1. Provide engraving stock melamine plastic laminate, in the sizes and thickness indicated, engraved with engraver's standard letter style of the sizes and wording indicated,

punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2. Thickness: 1/16" for units up to 20 square inches or 8" length; 1/8" for larger units.
3. Fasteners: Self-tapping stainless steel screws.

F. Valve and Damper Tags

1. Brass Tags: Provide 19-gauge polished brass tags with stamp-engraved piping or duct system abbreviation in 1/4" high letters and sequenced numbers 1/2" high and with 5/32" hole for fastener. Provide 1-1/2" diameter tags except as otherwise indicated.
2. Plastic Laminate Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate tags, with piping or duct system abbreviation in 1/4" high letters and sequenced numbers 1/2" high, and with 5/32" hole for fastener. Provide 1-1/2" square black tags with white lettering, except as otherwise indicated.
3. Ceiling ID Tags: Provide manufacturer's standard 3/4" diameter ceiling tack, with color coding per owners standards.

G. Wrap-Around Plastic Identification

1. All plumbing/mechanical piping identification shall adhere to ANSI A13.1 – 1981. Piping shall utilize pipe markers. All pipe markers shall be snap around whenever possible. Markers shall be located at each wall, floor or ceiling penetration, whether exterior or interior, and every 10 ft. thereafter. Markers shall be fully legible from floor level showing medium contained in pipe, and directional arrows.
2. Piping shall be identified as follows: CONDENSER WATER SUPPLY, CONDENSER WATER RETURN, & others by approval by submittals.

H. Piping in exposed areas, with canvas cloth jackets, to be painted with two coats of latex based paint suitable as per jacketing manufacturer’s instructions, prior to piping identifications.

I. Installation Requirements

1. Coordinate new labeling with existing labeling through Project Manager. Where identification is to be applied to surfaces that require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, identification shall be installed after completion of covering and painting. Identification is to be installed prior to installation of acoustical ceilings and similar removable concealment.

J. Piping System Identification

1. General: Provide for wrap around pipe marker plastic identification with application system as indicated in paragraph f. Include arrows to show normal direction of flow. For hot non-insulated pipes, install a segment of pipe insulation with appropriate piping identification.
2. Locate identification as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.

    a. Near each valve and control device.
    b. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
    c. At locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
    d. At access doors, manholes and similar access points which permit view of concealed piping.
    e. At major equipment items and other points of origination and termination.

f. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
h. Identify non potable piping and outlets.

3. The following piping shall be color-coded (not banded or striped) in exposed locations by completely painting the piping with the indicated color. Use standard identification methods in concealed areas.

a. Condenser Water Supply: Light blue / white arrows & letters (Blue Flame 90 BG 57 / 180)
b. Condenser Water Return: Light blue / black arrows & letters (Blue Flame 90 BG 57 / 180)

K. Valve Identification: Provide for valve tags on every valve cock and control device in each piping system. Exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in a valve schedule for each piping system.

L. Mechanical Equipment Identification: Provide for engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device. Provide signs for the following general categories of equipment and operational devices:

1. Main control and operating valves, including safety devices.
2. Meters, gauges, thermometers and similar units.
3. Pumps, compressors, and similar motor-driven units.
4. Heat exchangers, coils, heat recovery units and similar equipment.
5. Label ceiling grids for all valve and damper locations above ceilings.
6. Other items as specified by Project Manager.

3.21 VALVE, MOTOR & DAMPER TAGS AND SCHEDULE

A. Each valve, motor and damper shall be provided with an engraved black finish, phenolic tag indicating service and number. Tag lettering shall be at least 1/4" high etched white letters and beveled white trim. Tags to be attached using brass chains.

B. The Contractor shall submit eight (8) copies of charts indicating valve number, location, service, "normal" position, manufacturer, size and model number to the Architect for approval.

C. Prior to final inspection an approved copy of each chart shall be framed by the Contractor in a metal frame with glass front and installed in the Equipment Room.

D. Provide ½” Color Tape labels on Ceilings to identify Components as follows.

Hot Water System	Orange Label with Lettering
Pipe Drain	DRAIN
Pipe Vent	VENT
Control Valve	CV
Balancing Valve	BV
Shutoff Valve	SHTV

Condenser Water System	Dark Blue Label with Lettering
Pipe Drain	DR
Pipe Vent	V

Control Valve	CV
Balancing Valve	BV
Shutoff Valve	SHTV

Other Systems	Color with Lettering
Balancing Dampers	Dark Blue / BD
Fire Dampers	Red / FD

3.22 EQUIPMENT SERVICEABILITY

A. All equipment shall be serviceable. All equipment shall be installed so that it can be removed. All equipment in or connected to piping systems shall have valves to isolate this equipment from the piping system. This includes, but not necessarily limited to control valves, water heaters, sensors, switches, pumps, traps and strainers. Unions (screwed or flanged) shall be provided so that all equipment is removable.

B. Equipment installed in walls, ceilings or floors shall be accessible for service or removal without cutting walls, etc.

C. Equipment requiring periodic service shall be installed to allow clearance for service and have removable panels, access doors, etc. through which the service is to be performed.

D. Elevated equipment shall have service platforms.

3.23 ACCEPTANCE OF EQUIPMENT

A. In the event that the Architect considers it impractical, because of unsuitable test conditions, or some other factors, to execute simultaneous final acceptance of all equipment portions of the installation may be certified by the Architect for final acceptance when that portion of the system is complete and ready for operation.

B. Contractor shall make all necessary tests, trial operation balancing and balance tests, etc., as may be required as directed by the engineer to prove that all work under these plans and specification is in complete serviceable condition and will function as intended.

C. Upon completion of all work the system shall be tested to determine if any excess noise or vibration is apparent during operation of the system. If any such objections are detected in the system or noisy equipment found, the Contractor shall be responsible for correcting same. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces. Equipment shall be wiped clean with all traces of oil, dust, dirt and paint spots removed. Temporary filters shall be provided for all fans that are operated during construction and after all construction dirt has been removed from the building, new filters shall be installed. Bearings shall be lubricated as recommended by the equipment manufacturer. All control valves and equipments shall be adjusted to setting indicated. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.24 GUARANTEE

A. The Contractor shall guarantee the complete mechanical system against defect due to faulty materials, faulty workmanship or failure due to negligence of the Contractor. This guarantee will exclude normal wear and tear, maintenance lubrication, replacement of expendable components, or abuse. The guarantee period shall begin on the date of the final acceptance and shall continue for a period of 12 months during which time the Contractor shall make good such defective workmanship and materials and any damage resulting there from, within a reasonable time of notice given by the Owner.

B. The period of Guarantee for equipment driven by electrical motors, etc., shall be 12 months from the date of acceptance. Refrigeration compressors shall have a five (5) year warranty.

3.25 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Submit 3 sets of complete operating and maintenance instructions.

B. Bind each set in plain black vinyl-covered, hard back, 3-ring binder. Individual paper shall be Boorum and Pease Reinforced Ring Book Sheet, No. S-212-101 or equivalent.

C. Organize material in the following format:

1. Section I:

a. Name of Project
b. Address
c. Owner's Name
d. Mechanical Contractor's Name and Address
e. Control Subcontractor's Name and Address
f. Warranty Dates

2 Section II:

a. Major Equipment List (name, manufacturer, serial no., H.P. and voltage) (include all equipment with motors)
b. Control Sequence Description
c. Routine Maintenance Instructions in Step-by-Step form
d. Lubrication Charts and Schedules
e. Valve Schedules
f. Test and Balance Reports
g. Sound Power Level Readings (Where Required)

3. Section III:

a. Operating and Maintenance Instructions by Manufacturer
b. Shop Drawings (Major Requirement)
c. Wiring Diagrams
d. Control Drawings

3.26 PAINTING

A. All surfaces to receive paint shall be dry and clean.

B. Before priming, all surfaces shall be thoroughly cleaned of all dirt, oil, grease, rust, scale and other foreign matter. Cleaning shall be done with sandpaper, steel scraper, or wire brush where appropriate and necessary. Metallic surfaces which have been soldered shall be cleaned with benzol and all other metal surfaces washed with benzine.

C. Mixing shall be in galvanized iron pans. Paint shall be mixed in full compliance with manufacturer's directions. Thinning shall be done only in full compliance with manufacturer's directions.

D. Workmanship shall be highest quality, free from brush marks, laps, streaks, sags, unfinished patches, or other blemishes. Edges where paint joins other material or colors shall be sharp and clean without overlapping. Paint shall be brushed or sprayed on in strict compliance with manu-

facturer's directions and shall work evenly and be allowed to dry at least 48 hours before subsequent coating. Paint shall not be applied in damp or rainy weather or until surface has thoroughly dried. Contractor shall furnish and lay drop-cloths in all areas where painting is done as necessary to protect work of other trades. Varnish and enamel shall not be applied when temperature in the area is less than 60 degrees Fahrenheit nor paint when under 50 degrees Fahrenheit. Prior to final acceptance, Contractor shall touch up or restore any damaged finish. All insulation materials shall be provided with a paint suitable jacket.

E. The following materials and equipment require painting as noted:

1. All concealed piping, sheet metal, hangers and accessories except galvanized sheet metal or piping:

    a. One coat rust-inhibitive primer except where exterior insulation is provided.

2. All exposed, exterior and interior, piping, sheet metal, hangers and accessories, air handling units, chillers, pumps, etc. except galvanized sheet metal or piping:

    a. One coat rust-inhibitive primer except where exterior insulation is provided.

3. All concealed galvanized sheet metal, piping and accessories.

    a. One coat galvanized metal primer on threaded portions of piping and any damaged galvanized surfaces.

4. All exposed, exterior and interior galvanized sheet metal, piping and accessories.

    a. One coat galvanized metal primer except where exterior insulation is provided.

5. All exposed, exterior and interior, insulation equipment.

    a. Two coats exterior glass enamel over paint suitable insulation jacket.

END OF SECTION 230500

SECTION 230540 – VIBRATION AND SEISMIC CONTROL

PART 1 - GENERAL

1.1 GENERAL

A. All vibration isolation and seismic control materials specified herein shall be provided by a single manufacturer to assure single responsibility for their proper performance. Installation of all vibration and seismic control materials specified herein shall be accomplished following the manufacturer's written instructions.

B. The Contractor shall furnish a complete set of shop drawings and other necessary information, of all mechanical equipment to receive vibration isolation and seismic devices, to the vibration isolation and seismic control materials manufacturer. The information to be furnished shall include operating weight of the equipment to be isolated, distribution of weight to support points and dynamic characteristics along with any internal isolation systems to be analyzed. The Contractor shall also furnish a complete layout of piping and ductwork to be isolated, including vertical risers, showing size or weight and support points of the piping and ductwork system, to the vibration isolation and seismic control materials manufacturer, for selection and layout of mountings.

C. The vibration and seismic control materials manufacturer shall use the above listed information to design a complete system of vibration and seismic mounts in accordance with the contract documents along with the 2000 International Building Code Section 1607, SMACNA "Seismic Restraint Manual", and ASHRAE 1995, Chapters 43 and 50. The vibration and seismic control materials Contractor shall analyze all "multiple degree of freedom" systems, and provide properly designed isolation systems avoiding all resonance frequencies. To accomplish this, the vibration and seismic control materials supplier shall employ an Engineer registered in the State of South Carolina to design all isolation and restraint systems and prepare a complete set of calculations and shop drawing submittals with his professional Engineer's seal certifying that the design meets all requirements of these contract documents. A seismic design "errors and omissions" insurance certificate must accompany submittals from the vibration and seismic Engineer. Manufacturer's product liability insurance certificates are not acceptable.

D. The vibration and seismic control Engineer or his designated representative shall inspect the project upon completion of the applicable work and provide written certification that the installation is in compliance with the approved shop drawing submittals. This certification shall also bear the professional Engineer's seal and shall become part of the contract closeout documents. All seals shall be signed and dated appropriately.

E. Vibration and seismic control systems shall be provided by Vibration Mounting and Controls, Mason Industries, Consolidated Kinetics, or prior approved equal.

PART 2 - PRODUCTS AND EXECUTION

2.1 VIBRATION ISOLATION

A. All mechanical equipment shall receive external vibration isolation. Internal component isolation of equipment shall not be considered equivalent, but shall be considered when analyzing systems with multiple degrees of freedom.

B. Vibration isolators shall be selected based upon known operating weight distributions and dynamic characteristics of the isolated equipment, with the quantity and location as required by the component drawing. Isolator type shall be tabulated for each isolated piece of equipment. Complete calculations of vibration analysis shall be included with submittals, including but not limited to fundamental and harmonic frequencies.

C. Isolators shall have either known non-deflected heights of spring element or calibration markings so that, after adjustment, when carrying their load, the deflection under load can be verified to determine if the load is within the proper range of tile isolator and if the correct degree of vibration isolation is being provided.

D. Isolators shall function in the linear portion of the load versus deflection curve. Theoretical vertical natural frequency shall not differ from the design objectives by more than ± 10%.

E. Spring mounts shall have seismic housings as required by Paragraph 2.02.

F. Isolation of equipment shall be as follows:

1. Suspended equipment shall be isolated from the building structure by means of noise and vibration isolators. Units shall be supported with spring and neoprene type isolators, springs to be as described above. Isolators shall be VMC Series RSH.
2. Roof mounted equipment shall be isolated from the building structure by means of a structural aluminum or hot dipped galvanized structural steel isolation curb. The structural spring isolation curbs shall bear directly on the roof support structure and be flashed and waterproofed into the roofs membrane waterproofing system. Roof curbs shall be designed to match pitch of roof. Equipment manufacturers or field fabricated curbs shall not be used. The curb shall consist of a rigid lower section containing properly spaced pockets with fully adjustable spring isolators. All springs shall be color coded for proper identification and spring pocket shall allow for easy removal or replacement of any spring without disturbance of the supported equipment. Pockets shall have removable waterproof covers to allow for spring adjustment. Spring pockets shall contain combination vertical and horizontal restraint in conjunction with a 1/4 inch thick neoprene rubber bushing which will resist wind and seismic forces. All springs shall be installed in series with a 1/4 inch thick neoprene acoustical cup or pad. Curbs supplied shall be factory acoustically lined with 1 inch 3 PCF duct liner. An air tight neoprene seal shall be incorporated into the curb design to prevent air leakage or infiltration. Air seal must not be exposed so that it could be damaged or that in the event of the air seal failure, water could leak into the curb's interior. Wood nailer and flashing shall be provided and curbs shall be manufactured to NRCA standards. Curbs shall include a means of incorporating a sound banier package, consisting of two layers of waterproof gypsum board furnished and installed by the Mechanical Contractor. Individual pier supported curbs are not acceptable. Roof equipment supports to be VMC type P or R.
3. Mechanical equipment as noted shall be mounted on a rigid structural steel base. The equipment including the base shall be mounted on or suspended from vibration isolators as applicable. Base shall be VMC Type WFB.
4. Floor mounted equipment as noted shall be provided with a noise and vibration isolated structural steel concrete slab inertia base mounted on isolators. Spring mounts shall be recessed at comers. Inertia base shall be VMC Type MPF or WPF as applicable.

2.2 SEISMIC CONTROL

A. All mechanical equipment, piping, ductwork, etc. shall be provided with seismic restraints in accordance with the 2000 International Building Code, 2000 International Mechanical Code, and SMACNA Seismic Restraint Manual, Latest Edition requirements, as a minimum.

1. All equipment isolated or not, shall be bolted to the structure to allow for seismic acceleration with no failure or displacement. All connections shall be positive bolted type; no friction clamps of any kind are allowed.
2. Provide cable and connection sets for suspended equipment at each of four comers secured to the building structure.
3. Provide seismic roof curb systems fastened to roof structure for roof top equipment.
4. Floor mounted equipment shall be provided with seismically housed springs or springs with seismic snubbers as determined by the equipment to be isolated.

END OF SECTION 230540

SECTION 230590 – TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 SCOPE

A. The provisions of Section 230500 apply to all the work in this Section.

B. Work shall be performed by an independent balancing company certified by AABC or NEBB. Technicians shall be competent in the trade of testing and balancing environmental systems and shall be done in an organized manner utilizing appropriate test and balance forms.

C. The test and balance contractor shall be selected and retained (under separate contract) by Horry County Schools.

D. Contractor shall cooperate fully and coordinate with the Owner's TAB agent. Equipment changes parts and labor shall be by the contractor.

E. The test and balance report shall be submitted prior to the final inspection. The TAB sub-contractor shall attend the final to spot check air and water flows.

F. Out-of-tolerance data: This phase means a measurement taken during TAB field testing which does not fall within the range of plus 10 to minus 5 percent of the original measurement reported on the TAB Report for a specific parameter.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 230500:

1. Manufacturer's cut sheets and calibration information for all equipment to be used.
2. Sample balancing charts and forms. Include all components that to be Tested and Balanced complete with balance values and tolerances.
3. Preliminary report for review and comment.
4. Completed final balancing data.

PART 2 - PRODUCTS

2.1 INSTRUMENTATION

A. Instruments for use in the test and balancing procedures shall be of first quality and be accurately calibrated at the time of use. The following list is provided to indicate the instruments expected, however, other instruments as necessary to properly perform the work will be provided and subject to approval of the Architect.

1. Inclined manometer calibrated in no less that .006-inch divisions.
2. Combination inclined and vertical manometer (0 to 10 inch is generally the most useful).
3. Pitot Tubes. (Usually and 18 and 48 inch tube covers most balance requirements.
4. Tachometer. This instrument should be of the high quality self-timing type.
5. Clamp-on ampere meter with voltage scales.
6. Deflecting vane anemometer.
7. Rotating vane anemometer.
8. Thermal type (hot wire) anemometer.
9. Hook gage.

10. Dial and glass stem thermometers.
11. Sling psychrometer.

B. The accuracy of calibration of the field instruments used is of the utmost importance. All field instruments used in the balance should have been calibrated at least within the previous three months. Calibration standards shall be traceable to NIST. Naturally, any suspect instruments should be checked more frequently.

PART 3 - EXECUTION

3.1 SYSTEM START-UP

A. Starting date for mechanical system shall be scheduled well in advance of expected completion date and shall be established a minimum of two weeks prior to acceptance date. The system shall be in full operation with all equipment functional prior to acceptance date.

B. Performance readings shall be taken and recorded on all air and water distribution devices and the system shall be balanced out prior to acceptance. Balancing of the system shall be accomplished with duct dampers. Grille dampers may not be used for balancing. Record and submit results in table form along side of scheduled quantities.

C. All controls shall be calibrated by qualified personnel prior to acceptance date. Thermostats shall be in close calibration with one another and shall operate their respective units without interference from adjacent units.

D. All units shall be checked out thoroughly and the following information recorded on each machine which shall include, but not be limited to information listed below. Check sheets shall be included in Operating and Maintenance instructional Manual.

1. Water Source Heat Pump Condenser

    a. Unit Number and Location
    b. Manufacturer and Model No.
    c. Water, Pressure Drop, and EWT, LWT
    d. Water Flow

2. Fans

    a. Unit No. and Use
    b. Manufacturer and Model
    c. Motor Nameplate Data
    d. Motor Amps and Volts
    e. Entering and Leaving Static Pressure
    f. Fan RPM
    g. Damper Operation

E. Contractor shall have in his possession a copy of a letter from the responsible Control Representative stating that the controls have been installed according to the plans; that the control sequence has been checked and that all controls have been calibrated.

G. Replace fan sheaves as necessary to produce design air volume.

3.2 SPECIAL REQUIREMENTS

A. Provide TAB result to controls contractor for use in control logic.

END OF SECTION 230590

SECTION 230700 – INSULATION (HVAC)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section of specifications and related drawings describe requirements pertaining to insulation.

B. Provide all insulation in conjunction with ductwork furnished under this division.

C. The provisions of Section 230500 apply to all the work in this section.

1.2 QUALITY ASSURANCE

A. Products of the manufacturers listed under MATERIALS will be acceptable for use for the specific functions noted. Adhesives, sealers, vapor barriers, and coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.

B. Materials shall be applied subject to their temperature limits. Any methods of application of insulating materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.

C. Insulation shall be applied by experienced workers regularly employed for this type of work.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 230500:

1. Catalog cuts.
2. Materials ratings.
3. Insulation instructions.

1.4 RATING

A. Insulation and accessories such as adhesives, mastics, cements, tape and jackets, unless noted otherwise, shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50. Materials that are factory applied shall be tested individually. No fugitive or corrosive treatments shall be employed to impart flame resistance.

B. Flame spread and smoke developed ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 255, ASTM E-84, UL 723.

C. Products of their shipping cartons shall bear a label indicating that flame and smoke ratings do not exceed above requirements.

D. Treatment of jackets or facings to impart flame and smoke safety shall be permanent. The use or water-soluble treatment is prohibited.

E. Certify in writing, prior to installation, that products to be used will meet RATING criteria.

PART 2 – PRODUCT

2.1 DUCT INSULATION

A. Materials. Insulation shall be Owens-Corning as specified hereinafter or products of Certain-Teed/St. Gobain, Armstrong or Manville. Adhesives shall be as manufactured by 3-M Foster or insulation manufacturer. Insulation shall have composite (insulation, jacket and adhesive) fire and smoke hazard rating as tested by ASTM E-84, not exceeding Flame Spread -25 and Smoke Developed -50.

B. All ductwork wall penetrations shall be continuously insulated through the penetration to ensure proper vapor barrier containment.

PART 3 - EXECUTION

3.1 PIPE INSULATION.

A. Application:

1. Insulation and surfaces to be insulated shall be clean and dry when insulation is installed and during the application of any finish.

B. Fiberglass Insulation:

1. All fiberglass pipe covering shall be furnished with self-seal lap and 3" wide butt joint strips. The release paper is pulled from adhesive edge, pipe covering closed tightly around pipe and self-seal lap rubbed hard in place with the blunt edge of an insulation knife. This procedure applies to longitudinal as well as circumferential joints. Under no circumstances will staples be allowed. Care shall be taken to keep jacket clean, as it is the finish on all exposed work. All adjoining insulation sections shall be firmly butted together before butt joint strip is applied, and all chilled water and cold water service lines shall have vapor seal mastic thoroughly coated to pipe at butt joints every 21' and at all fittings. All insulation outside shall be protected with aluminum weather-proof jacketing with lap-seal, and factory attached moisture barrier. The aluminum shall be .016 gauge (3303-H14 alloy) of embossed pattern. It shall be applied with a 2" circumferential and 1-1/2" longitudinal lap and be secured with aluminum bands 3/8" wide 8" o.c.. All elbows shall be covered with the same .016 aluminum with factory applied moisture barrier. All fittings, valve bodies, unions, and flanges shall be finished as follows:

a. Apply molded or segmental insulation to fittings equal in thickness to the insulation on adjoining pipe and wire in place with 2#14 copper wires.
b. Apply a skim coat of insulating cement to the insulated fitting, if needed, to produce a smooth surface. After cement is dry, apply Fiberglass Fitting Mastic, UL labeled.
c. Wrap the fitting with fiberglass reinforcing cloth overlapping the preceding layer by 1 to 2". Also, overlap mastic and cloth by 2" on adjoining sections of pipe insulation.
d. Apply a second coat of mastic over cloth, working it well into mesh of cloth and smooth the surface. Mastic to be applied at the rate of 40 square feet per gallon. All flanges and fittings on hot and cold lines in utility tunnels shall be insulated according to above. Omit insulation on flanges and unions over 60 degrees F. If painting is required, no sizing is necessary. To maintain the non-combustibility of the system only acrylic latex paint is to be used.
e. All piping exposed to view (equipment rooms, etc.) shall be covered with an 8 oz. canvas jacket.

3.2 DUCT INSULATION

A. All vapor barriers and joints shall be sealed to prevent condensation. Clean and dry all ductwork before installing insulation. All weld joints shall be wire brushed and give one (1) coat of red lead before insulating.

1. Where staples are used, they shall be coated with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape. All seams, except those on factory self-seal systems shall be coated with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

B. Lined Duct:

1. None

C. Wrapped Duct:

1. All ducts shall be insulated by wrapping with fiberglass with vapor barrier jacket with joints overlapped a minimum of two inches. Insulation shall be adhered to duct with non-combustible insulation bonding adhesive applied in 4" strips, 8" on center. All joints shall be secured with flare door staples on 3" centers through all laps over duct tape.

a. All – 2”, 3/4# density (minimum installed R value of 6).

END OF SECTION 230700

SECTION 230900 - BUILDING AUTOMATION AND CONTROL SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. The provisions of Section 230500 apply to the work of this section. The system is an existing system that will be modified/upgraded for the installation of the new equipment shown on the drawings.

B. This specification section is included for information purposes only. The owner shall perform the Building Automation System (BAS) and temperature controls portion of this project under a separate contract. For coordination contact Control Management, Inc. (803) 765-9070.

C. This specification defines the minimum equipment and performance requirements for a direct digital control building control system.

D. Acceptable manufacturers are as follows:

1. Siemens – Landis Division

E. This Section includes control equipment and installation for HVAC systems and components.

F. See Sheet M301 for sequenced of operation requirements that relate to this Section.

1.2 DEFINITIONS

A. DDC: Direct digital controls

B. P2 : Siemens Protocol 2 network communications

C. IP: Internet Protocol

D. I/O: Input/Output

E. LAN: Local area network.

1.3 SYSTEM DESCRIPTION

A. The Building Automation System (BAS) contractor shall furnish and install a networked system of HVAC controls. The contractor shall incorporating direct digital control (DDC) for building ventilation equipment, supplemental heating and cooling equipment, and terminal units.

B. Provide networking to new DDC equipment using communication standards. System shall be capable of communication with Siemens P2 communications.

C. Provide standalone controls where called for on the drawings or sequences.

1.4 WORK INCLUDED

A. The installation of the control system shall be performed under the direct supervision of the controls manufacturer with the shop drawings, flow diagrams, bill of materials, component

designation, or identification number and sequence of operation all bearing the name of the manufacturer.

B. Furnish a complete distributed direct digital control system in accordance with this specification section. This includes all system controllers, logic controllers, and all input/output devices. Items of work included are as follows:

1. Provide a submittal that meets the requirements below for approval.
2. Coordinate installation schedule with the mechanical contractor and general contractor.
3. Provide installation of all panels and devices unless otherwise stated.
4. Provide power for panels and control devices.
5. Provide all low voltage control wiring for the DDC system.
6. Provide miscellaneous control wiring for HVAC and related systems regardless of voltage.
7. Provide engineering and technician labor to program and commission software for each system and operator interface. Submit commissioning reports for approval.
8. Participate in commissioning for all equipment that is integrated into the BAS (Refer to Commissioning sections of the equipment or systems in other parts of this specification.)
9. Provide testing, demonstration and training as specified below.

1.5 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 5 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 5 seconds.
3. Object Command: Reaction time of less than 5 seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within 5 seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 2 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Programmable controllers shall execute DDC PI control loops, and scan and update process values and outputs at least once per second.
7. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

    a. Water Temperature: Plus or minus 1 deg F.
    b. Water Flow: Plus or minus 5 percent of full scale.
    c. Water Pressure: Plus or minus 2 percent of full scale.
    d. Space Temperature: Plus or minus 1 deg F.
    e. Ducted Air Temperature: Plus or minus 1 deg F.
    f. Outside Air Temperature: Plus or minus 2 deg F.
    g. Dew Point Temperature: Plus or minus 3 deg F.
    h. Temperature Differential: Plus or minus 0.25 deg F.
    i. Relative Humidity: Plus or minus 2 percent.
    j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
    k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
    l. Airflow (Terminal): Plus or minus 10 percent of full scale.
    m. Air Pressure (Space): Plus or minus 0.01-inch wg.
    n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.

o. Carbon Monoxide: Plus or minus 5 percent of reading.
p. Carbon Dioxide: Plus or minus 50 ppm.
q. Electrical: Plus or minus 5 percent of reading.

1.6 SUBMITTALS

A. Provide submittals for fast track items that need to be approved and released to meet the schedule of the project. Provide submissions for the following items separately:

1. Valve schedule and cut sheets
2. Factory mounting and wiring diagrams and cut sheets
3. Thermostat locations

B. Provide a complete submittal with all controls system information for approval before construction starts. Include the following:

1. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
2. Wiring Diagrams: Power, signal, and control wiring.
3. Details of control panel faces, including sizes, controls, instruments, and labeling.
4. Dampers are furnished by other, submit a damper actuator schedule coordinating actuator sizes with the damper schedule.
5. Schedule of valves including leakage and flow characteristics.
6. Written description of the Sequence of Operations.
7. Network riser diagram showing wiring types, network protocols, locations of floor penetrations and number of control panels.
8. Point list for each system controller including both inputs and outputs (I/O), point numbers, controlled device associated with each I/O point, and location of I/O device.
9. Starter and variable frequency drive wiring details of all automatically controlled motors.
10. Reduced size floor plan drawings showing locations of control panels, thermostats and any devices mounted in occupied space.

C. Product Data: Include manufacturer's technical literature for each control device indicated, labeled with setting or adjustable range of control. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated. Submit a write-up of the application software that will be used on the operator workstation including revision level, functionality and software applications required to meet the specifications.

D. Submit a description of the application software that will be used on the operator workstation including revision level, functionality and software applications required to meet the specifications.

E. Wiring Diagrams: Detail the wiring of the control devices and the panels. Show point-to-point wiring from field devices to the control panel. Show point-to-point wiring of hardwired interlocks. Show a ladder diagram or schematic of wiring internal to the panels, including numbered terminals. Clearly designate wiring that is done at a factory, at a panel shop or in the field.

F. Submit blank field check-out and commissioning test reports, customized for each panel or system, which will be filled out by the technician during start-up.

G. Submit sample graphics for approval before starting system commissioning.

H. Variance letter: Submit a letter detailing each item in the submission that varies from the contract specification or sequence of operation in any way.

I. After the BAS system is approved for construction, submit sample operator workstation graphics for typical systems for approval. Print and submit the graphics that the operator will use to view the systems, change setpoints, modify parameters and issue manual commands. Programming shall not commence until typical graphics are approved.

1.7 QUALITY ASSURANCE

A. Codes

1. Perform all wiring in accordance with Division 26, NEC, local codes and Owner's requirements.
2. Uniform Building Code (UBC)
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
4. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."
5. All equipment shall be UL listed and approved and shall meet with all applicable NFPA standards, including UL 916 - PAZX Energy Management Systems,
6. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.
7. The manufacturer of the building automation system shall provide documentation supporting compliance with ISO-9002 (Model for Quality Assurance in Production, Installation, and Servicing) and ISO-140001 (The application of well-accepted business management principles to the environment). The intent of this specification requirement is to ensure that the products from the manufacturer are delivered through a Quality System and Framework that will assure consistency in the products delivered for this project.

B. Qualifications

1. Installing contractor shall be in the business of installing and servicing DDC controls for mechanical systems, temperature and ventilation control, environmental control, lighting control, access and security controls, and energy automation as their primary business. Installer Qualifications: An experienced installer who is the authorized representative of the automatic control system manufacturer for both installation and maintenance of controls required for this Project.
2. Engineering, drafting, programming, and graphics generation shall be performed by the local branch engineers and technicians directly employed by the Building Automation System Contractor.
3. Supervision, checkout and commissioning of the system shall be by the local branch engineers and technicians directly employed by the Building Automation System Contractor. They shall perform commissioning and complete testing of the BAS system.

C. The BMS contractor shall maintain a service organization consisting of factory trained service personnel and provide a list of ten (10) projects, similar in size and scope to this project, completed within the last five years.

D. Final determination of compliance with these specifications shall rest solely with the Engineers and Owner who will require proof of prior satisfactory performance.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.9 COORDINATION

A. Coordinate location of thermostats, humidistats, panels, and other exposed control components with plans and room details before installation.

B. Coordinate power for control units and operator workstation with electrical contractor.

C. Coordinate equipment with provider of starters and drives to achieve compatibility with motor starter control coils and VFD control wiring.

D. Coordinate scheduling with the mechanical contractor and general contractor. Submit a schedule for approval based upon the installation schedule of the mechanical equipment.

1.10 WARRANTY

A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system demonstration.

B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours.

C. During normal building occupied hours, failure of items that are critical for system operation shall be provided within 4 hours of notification from the Owner's Representative.

D. This warranty shall apply equally to both hardware and software.

PART 2 - PRODUCTS

2.1 ACCEPTABLE SYSTEMS

A. Provide a Building Automation System based upon the following:

1. Siemens APOGEE System as installed by Control Management Inc. (803-765-9070)

2.2 BAS NETWORK

A. All networked control products provided for this project shall be comprised of Siemens P2 standard protocol internetwork. Access to system data shall not be restricted by the hardware configuration of the building management system. The hardware configuration of the BMS network shall be totally transparent to the user when accessing data or developing control programs.

1. Software applications, features, and functionality, including administrative configurations, shall not be separated into several network control engines working together.

B. The network architecture shall consist of three levels of networks:

1. Owner furnished network Ethernet IP connection the Main DDC panel. All operator interfaces shall be on the Owners network.
2. The Automation level network shall be IP over Ethernet or RS-485 wired. It shall network the BC level controllers.

3. The Floor level network shall be RS-485 wired communications. It shall network to all of the DDC controlled equipment on a floor or in a system.

C. The primary backbone network between the building level controllers shall be based upon Ethernet IP. Ethernet Network switches shall be strategically placed through the building to cover several floors or several mechanical rooms that are within 300 ft wiring-feet of each other.

D. The Building Level Controllers shall be able to support subnetwork protocols that may be needed depending on the type of equipment or application. Subnetworks shall be limited to:

1. Apogee FLN

E. Application specific controllers for smaller single zone, supplemental or special systems can reside on the RS-485 network.

F. Floor level controllers, terminal units, package AC units, auxiliary equipment, VFDs, meters shall reside on one of the Floor Level Network.

G. The system shall meet peer-to-peer communication services such that the values in any one BC or AC level controller can be read or changed from all other controllers without the need for intermediary devices. The software shall provide transparent transfer of all data, control programs, schedules, trends, and alarms from any one controller through the internetwork to any other controller, regardless of subnetwork routers.

H. Remote Communications: Provide a TCP/IP compatible communication port for connection to the Owner's network for remote communications. Provide coordination with the Owner for addressing and router configuration on both ends of the remote network.

2.3 DISTRIBUTED CONTROL REQUIREMENTS

A. The loss of any one DDC controller shall not affect the operation of other HVAC systems, only for the points connected to the DDC controller.

B. The system shall be scalable in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC Controllers, and operator devices.

C. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O, and data collection. The failure of any single component or network connection shall not interrupt the execution of any control strategy, reporting, alarming and trending function, or any function at any operator interface device.

D. DDC Controllers shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC Controller on the network without dependence upon a central processing device. DDC Controllers shall also be able to send alarms to multiple operator workstations without dependence upon a central or intermediate processing device.

E. The DDC control panel shall be mounted in the same mechanical room as the equipment being controlled, or an adjacent utility room.

F. Multiple systems can be programmed on the same controller as long as they are in the same room. Systems on separate floors shall have separate controllers.

G. VAV boxes subnetworks shall be connected to the AHU controller that feeds those boxes. If multiple subnetworks are needed, then the VAV shall be grouped into subnetworks in an orderly method, such as per floor, per wing, etc.

H. Remote sensors shall be wired to the control panel of the equipment it is controlling, not across the network.

I. Signals to remote motor control centers shall be hard wired to the control panel, not across the network.

J. Terminal units shall each have their own controller.

2.4 OPERATOR INTERFACE SOFTWARE

A. The existing Siemens Apogee Insight Revision 3.14 graphical software shall be used for all Horry County School projects. This software resides on the Server located at the Horry County Schools Maintenance Offices in Conway.

B. The Insight server shall allow monitor and control of data in any field panels networked together on the same automation level TCP/IP Ethernet network.

1. The server must provide a common alarm display that shows alarms in all field panels on the network.
2. The Web must be able to provide common graphics that simultaneously display the current value and status for points residing in multiple field panels.
3. The server must be able to display daily mode schedules for points from multiple field panels simultaneously.

C. Access to the server interface shall be username and password protected. A user's rights and privileges to database objects within the BAS shall be configurable on a per-user basis.

1. A graphic selector list shall allow or limit the graphic displays that a user account has access to.

D. The server shall provide the following functionality to users based on their access and privilege rights:

1. Point Navigation – Provide a screen that allows users to see all of the points that are active in the system. The points shall include hardwired, software, schedules, trends, alarms and network setup.

    a. The point navigation shall display the point name, descriptor, command priority, alarm status, and current value.
    b. The user shall be able to run and print a pre-configured point log report through a web interface client that shows the point name, descriptor, command priority, alarm status, and current value.
    c. The interface and report shall allow selection filter such that the operator can select or deselect the types of point that are visible.

2. Alarm Display –displays current BAS alarms to which the user has access will be displayed. Users will be able to acknowledge active alarms, erase resolved alarms, and directly link to the Point Commanding feature.

a. The alarm display must provide a filter that displays all alarms whether acknowledged or not.
b. The alarm display must provide a filter that displays only alarms that have not yet been acknowledged.
c. The alarm display must provide a persistent indication whenever there is one or more unacknowledged alarm in any connected field panel.

3. Point details – users will have access to point detail information including operational status, operational priority, physical address, and alarm limits, for point objects to which they have access rights.
4. Point Commanding – users will be able to override and command points they have access to.
5. Scheduling – allows operators, depending on their current user privileges, to override schedules selected by date, and to modify the properties of a selected schedule.

    a. The scheduler display must be able to represent facility mode schedules in a graphical format.

6. Trend Data Report – allows users to run and print a pre-configured trend data report for historical data reporting, including a representation of the alarm status of the each point for each Trend sample. The report shall allow selection of individual points or wildcard selection of points.

    a. Trend data shall be exportable to a data file, such as .csv or other comparable.

7. Network navigation - Provide a screen that allows users to navigate to the panels and terminal units via the network architecture.

E. Graphic Displays – The BAS contractor shall provide a graphical display for each system that is controlled.

1. Display of system graphics shall be available for viewing. Graphic displays will automatically refresh with the latest change of values. Users shall have the ability to command and override points directly from the graphic display as determined by their user accounts rights. The Graphic Display shall accommodate a minimum of 10 customized graphics.
2. The Graphic Display shall accommodate the terminal unit graphics related to the Application Specific Controllers tied in to the Field Panels within the system.

F. The server shall be able to send SMTP text messages to notify users of alarm status. The owners shall provide a mail server and a connection port.

G. The operator shall be able to add modify and delete controller database program, including points, schedules, alarms, and trends.

1. The operator shall be able to edit the custom program in the field panel that executes the sequences of operations, control loops and logic for the systems controlled.
2. The operator shall be able to add terminal unit controllers that reside on field panel subnetworks.

2.5 CONTROLLER SOFTWARE

A. Provide a full capability user license to the owner for the operator to be able to see, modify, create, upload, download and save control programs to the DDC controllers.

B. The software program shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher level computer or another controller for execution.

C. The software application shall be accessible from a PC using the Windows environment, but shall use all of its own services and data files so as to not be susceptible to Microsoft Windows operating systems based viruses.

D. The software shall be provided with an interactive HELP function to assist operators with syntax, abbreviations, commands and saving programs.

E. Point naming and communication format:

1. All points, panels, and programs shall be identified by a 30-character name. All points shall also be identified by a 16-character point descriptor. The same names shall be displayed at both Building Controller and the Operator Interface.
2. All digital points shall have a consistent, user-defined, two-state status indication with 8 characters minimum (e.g., Summer, Enabled, Disabled, Abnormal).

F. System Security

1. User access shall be secured using individual security passwords and user names.
2. Passwords shall restrict the user to the objects, applications, and system functions as assigned by the system manager.
3. Building Controllers shall be able to assign a minimum of 50 passwords access and control priorities to each point individually. The logon password (at any Operator Interface or portable operator terminal) shall enable the operator to monitor, adjust and control only the points that the operator is authorized for. All other points shall not be displayed at the Operator Interface or portable terminal. Passwords and priorities for every point shall be fully programmable and adjustable.
4. User Log On/Log Off attempts shall be recorded.
5. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user-definable.
6. Use of workstation resident security as the only means of access control is not an acceptable alternative to resident system security in the DDC controller software.

G. User Defined Control Applications: The applications software shall program DDC routines to meet the sequences of operations.

1. Building Controllers shall have the ability to perform energy management routines including but not limited to time of day scheduling, calendar-based scheduling, holiday scheduling, temporary schedule overrides, start stop time optimization, automatic daylight savings time switch over, night setback control, enthalpy switch over, peak demand limiting, temperature-compensated duty cycling, heating/cooling interlock, supply temperature reset, priority load shedding, and power failure restart.
2. The Building Controllers shall have the ability to perform the following pre tested control algorithms:

    a. Two position with differential control and time delays
    b. Floating control
    c. Proportional control
    d. Proportional plus integral control
    e. Proportional, integral, plus derivative control
    f. Automatic tuning of control loops

g. Model-free adaptive control

3. Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
4. Each controller shall support plain language text comment lines in the operating program to allow for quick troubleshooting, documentation, and historical summaries of program development.

H. Peer-to-peer access to other DDC controllers

1. It shall be possible to use any actual or virtual point data or status, any system calculated data, a result from any process, or any user-defined constant in any controller in the system.
2. Any process shall be able to issue commands to points in any and all other controllers in the system.
3. Processes shall be able to generate operator messages and advisories to other operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of an advanced annunciation feature, such as:

a. Generate a report
b. Annunciate an alarm
c. Issue a text message or email

I. Alarm Management

1. Alarm management shall be provided within the controller software to monitor and direct alarm information to operator devices.
2. Each Building Controller shall perform distributed, independent alarm analysis, minimize network traffic and prevent alarms from being lost. At no time shall the Building Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.
3. Conditional alarming shall allow generation of alarms based upon user defined multiple criteria.
4. An Alarm “shelving” feature shall be provided to disable alarms during testing. (Pull the Plug, etc.).
5. Binary Alarms. Each binary alarm object shall be set to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.
6. Analog Alarms. Each analog alarm object shall have both high and low alarm limits. Alarming must be able to be automatically and manually disabled.
7. All alarm shall include the point's user-defined language description and the time and date of occurrence.
8. Alarm reports and messages shall be routed to user-defined list of operator workstations, or other devices based on time and other conditions. An alarm shall be able to start programs, print reports, be logged in the event log, generate custom messages, and display graphics.
9. The user shall be able to add a 200-character alarm message to each alarm point to more fully describe the alarm condition or direct operator response. Each Building Controller shall be capable of storing a library of at least 50 alarm messages. Each message may be assigned to any number of points in the Controller.
10. Operator-selected alarms shall be capable of initiating a trigger to an advanced annunciation, such as text, email, etc.
11. An alarm history log shall report the start of the alarm condition, acknowledgement by a user and return of the alarm to normal condition.

J. Scheduling:

1. Provide a comprehensive menu driven program to automatically start and stop designated multiple objects or events in the system according to a stored time.
2. Schedules shall reside in the building controller and shall not rely on external processing or network.
3. It shall be possible to define a group of objects as a custom event (i.e., meeting, athletic activity, etc.). Events can then be scheduled to operate all necessary equipment automatically.
4. For points assigned to one common load group, it shall be possible to assign variable time delays between each successive start and/or stop within that group.
5. The operator shall be able to define the following information:

    a. Time, day
    b. Commands such as on, off, auto, etc.
    c. Time delays between successive commands.
    d. There shall be provisions for manual overriding of each schedule by an authorized operator.

6. It shall be possible to schedule calendar-based events up to one year in advance based on the following:

    a. Weekly Schedule. Provide separate schedules for each day of the week. Each of these schedules should include the capability for start, stop, optimal start, optimal stop, and night economizer. When a group of objects are scheduled together as an Event, provide the capability to adjust the start and stop times for each member.
    b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by the standard schedule for that day of the week.

K. Peak Demand Limiting (PDL):

1. The Peak Demand Limiting (PDL) program shall limit the consumption of electricity to prevent electrical peak demand charges.
2. PDL shall continuously track the amount of electricity being consumed, by monitoring one or more electrical kilowatt-hour/demand meters. These meters may measure the electrical consumption (kWh), electrical demand (kW), or both.
3. PDL shall sample the meter data to continuously forecast the demand likely to be used during successive time intervals.
4. If the PDL forecasted demand indicates that electricity usage is likely to exceed a user preset maximum allowable level, then PDL shall automatically shed electrical loads.
5. Once the demand peak has passed, loads that have been shed shall be restored and returned to normal control.

L. Temperature-compensated duty cycling

1. User defined conditions shall be able to initiate a Duty Cycle Control Program.
2. The Duty Cycle Control Program (DCCP) shall be configured to periodically stop and start loads according to various patterns.
3. The loads shall be cycled such that there is a net reduction in both the electrical demands and the energy consumed.

M. Automatic Daylight Savings Time Switchover. The system shall provide automatic time adjustment for switching to/from Daylight Savings Time.

N. Night setback control. The system shall provide the ability to automatically adjust setpoints for night control.

O. Enthalpy switchover (economizer). The Building Controller Software (BCS) shall control the position of the air handler relief, return, and outside air dampers. If the outside air dry bulb temperature falls below changeover setpoint the BCS will modulate the dampers to provide 100 percent outside air. The user will be able to quickly change over to an economizer system based on dry bulb temperature and will be able to override the economizer cycle and return to minimum outside air operation at any time.

P. Control Loop Algorithm

1. Provide a PID (proportional-integral-derivative) closed-loop control algorithm with direct or reverse action and anti-windup. The algorithm shall calculate a time-varying analog value that is used to position an output or stage a series of outputs. The controlled variable, setpoint, and weighting parameters shall be accessible from the operator workstation.

Q. Adaptive Loop Tuning

1. Building Controllers shall also provide high resolution sampling capability for verification of DDC control loop performance. Documented evidence of tuned control loop performance shall be provided on a monthly, seasonal, quarterly, annual period.
2. For Model-Free Adaptive Control loops, evidence of tuned control loop performance shall be provided via graphical plots or trended data logs. Graphical plots shall minimally include depictions of setpoint, process variable (output), and control variable (e.g., temperature). Other parameters that may influence loop control shall also be included in the plot (e.g., fan on/off, mixed-air temp).
3. For PID control loops, operator-initiated automatic and manual loop tuning algorithms shall be provided for all operator-selected PID control loops. Evidence of tuned control loop performance shall be provided via graphical plots or trended data logs for all loops.

    a. In automatic mode, the controller shall perform a step response test with a minimum one-second resolution, evaluate the trend data, calculate the new PID gains and input these values into the selected LOOP statement.
    b. Loop tuning shall be capable of being initiated either locally at the Building Controller, from a network workstation or remotely using dial-in modems. For all loop tuning functions, access shall be limited to authorized personnel through password protection.

R. Logic programming: Provide a software routine that can build ladder logic to control using many conditional statements.

1. The logic programming syntax shall be able to combine ladder logic with other software features, such as combining status, scheduling, PDL and alarm conditions into one conditional decision.
2. Logic programming shall be able to reference conditions in any other controller in the system.

S. Staggered Start:

1. This application shall prevent all controlled equipment from simultaneously restarting after a power outage. The order in which equipment (or groups of equipment) is started, along with the time delay between starts, shall be user definable in an application and shall not require written scripts or ladder logic.
2. Upon the resumption of power, each Building Controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operations.

T. Totalization Features:

1. Run-Time Totalization. Building Controllers shall automatically accumulate and store run-time hours for all digital input and output points. A high runtime alarm shall be assigned, if required, by the operator.
2. Consumption totalization. Building Controllers shall automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis for all analog and digital pulse input type points.
3. Event totalization. Building Controllers shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly or monthly basis for all points. The event totalization feature shall be able to store the records associated with events before reset.

U. Data Collection:

1. A variety of historical data collection utilities shall be provided to manually or automatically sample, store, and display system data for all points.
2. Building Controllers shall store point history data for selected analog and digital inputs and outputs:
3. Any point, physical or calculated may be designated for trending. Any point, regardless of physical location in the network, may be collected and stored in each Building Controllers point group.
4. Two methods of collection shall be allowed: either by up to four pre-defined time intervals or upon a pre-defined change of value. Sample intervals of l minute to 7 days shall be provided.
5. Each Building Controller shall have a dedicated RAM-based buffer for trend data and shall be capable of storing a minimum of 10,000 data samples.
6. Trend data shall be stored at the Building Controllers and uploaded to the workstation when retrieval is desired. Uploads shall occur based upon either user-defined interval, manual command or when the trend buffers are full. All trend data shall be available for use in third-party personal computer applications.

2.6 BUILDING CONTROLLERS (BC)

A. Provide all necessary hardware for a complete operating system as required. The Building Controller shall be able to operate as a standalone panel and shall not be dependent upon any higher level computer or another controller for operation.

B. Basis of design is Siemens PX Modular and Compact Controllers (PXC).

C. This level of controller shall be used for the following types of systems:

1. Air handlers over 15,000 cfm
2. Systems with over 24 input/output points

D. Computing power and memory minimum:

1. A 32 bit, stand alone, multi tasking, multi user, real-time 100MHz digital control microprocessor module.
2. Inputs shall be 16-bit minimum analog-to-digital resolution
3. Outputs shall be 10-bit minimum digital-to-analog resolution
4. Memory module (24 Megabyte, minimum) to accommodate all Primary Control Panel software requirements, including but not limited to, its own operating system and databases (see Controllers Software section), including control processes, energy management applications, alarm management applications, historical/trend data for points specified, maintenance support applications, custom processes, operator I/O, dial up communications.
5. Real time clock and battery
6. Data collection/ Data Trend module sized for 10,000 data samples.
7. Flash Memory Firmware: Each Building Level Control Panel shall support firmware upgrades without the need to replace hardware.

E. Onboard or Modular hardware and connections:

1. Primary Network communication module, if needed for primary network communications.
2. Secondary Network communication module, if needed for secondary network communications.
3. RJ45 port 10/100Mbaud
4. RS485 ports for subnetworks and point expansion
5. Man to Machine Interface port (MMI)
6. USB Port

F. Input and Output Points Hardware

1. Input/output point modules as required including spare capacity.
2. Monitoring of the status of all hand off auto switches.
3. Monitoring of all industry standard types of analog and digital inputs and outputs, without the addition of equipment to the primary control panel.
4. Local status indication for each digital input and output for constant, up to date verification of all point conditions without the need for an operator I/O device. Each primary control panel shall perform diagnostics on all inputs and outputs and a failure of any input or output shall be indicated both locally and at the operator workstation.
5. Graduated intensity LEDs or analog indication of value for each analog output.

G. Code compliance

1. Approvals and standards: UL916; CE; FCC
2. Provide UL864-UUKL where called for in the sequences of operations.

H. Accessories:

1. Appropriate NEMA rated metal enclosure.
2. Power supplies as required for all associated modules, sensors, actuators, etc.

I. The operator shall have the ability to manually override automatic or centrally executed commands at the primary control panels via local, point discrete, on board hand/off/auto operator override switches.

J. Each Building Level Control Panel shall continuously perform self-diagnostics on all hardware modules and network communications. The System Level Control Panel shall provide both local

and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication with any system.

K. Panel setup, point definitions and sequencing diagrams shall be backed up on EEPROM memory.

L. Power loss. In the event of the loss of power, there shall be an orderly shutdown of all Building Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 30 days.

M. Building Level control panels shall provide at least two serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. Primary control panels shall allow temporary use of portable devices without interrupting the normal communications, operation of permanently connected modems, printers or terminals.

N. Isolation shall be provided at all primary control panel terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587 1980.

O. Environment.

1. Controller hardware shall be suitable for the anticipated ambient conditions.
2. Controllers used outdoors and/or in wet ambient conditions shall be mounted within waterproof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).
3. Controllers used in conditioned space shall be mounted in dust-proof enclosures and shall be rated for operation at 0°C to 49°C (32°F to 120°F).

2.7 APPLICATION SPECIFIC CONTROLLERS

A. Each Application Level Control Panel shall operate as a stand-alone controller capable of performing its user selectable control routines independently of any other controller in the system. Each application specific controller shall be a microprocessor based, multi-tasking, real-time digital control processor.

B. Basis of design is Siemens TEC controller.

C. Provide an Application Specific Control Panel for each of the following types of equipment (if applicable):

1. Water Source or DX Heat Pumps
2. Supplemental AC units
3. Other terminal equipment

D. Each Application Specific Controller shall, at a minimum, be provided with:

1. Appropriate NEMA rated enclosure
2. Floor Level network communications ability
3. Power supplies as required for all associated modules, sensors, actuators, etc.
4. Software as required for all sequences of operation, logic sequences and energy management routines.
5. A portable operator terminal connection port
6. Auxiliary enclosure for analog output transducers, isolation relays, etc. Auxiliary enclosure shall be part of primary enclosure or mounted adjacent primary enclosure

7. Each controller measuring air volume shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time
8. Each controller measuring air volume shall include a differential pressure transducer
9. Approvals and standards: UL916; CE; FCC

E. Each Application Specific Controller shall continuously perform self-diagnostics on all hardware and secondary network communications. The Application Specific Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failure to establish communication to the system.

F. Provide each Application Specific Controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration. Provide uninterruptible power supplies (UPSs) of sufficient capacities for all terminal controllers that do not meet this protection requirement. Operating programs shall be field selectable for specific applications. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of all applications are not acceptable.

G. The Application Specific Controller shall be powered from a 24 VAC source provided by this contractor and shall function normally under an operating range of 18 to 28 VAC (25% to +17%), allowing for power source fluctuations and voltage drops. Install plenum data line and sensor cable in accordance with local code and NEC. The controllers shall also function normally under ambient conditions of 32 to 122 F (0 to 50 C) and 10% to 95%RH (non condensing). Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly

H. Digital Energy Monitors: Provide three phase digital Watt-meters with pre-wired current transmitters. (CT) All Watt-meter electronics shall be housed within the CTs. CTs shall include sizes capable of mounting directly on a power bus. Diagnostics visible to the installing electrician (without an operator tool) shall indicate: proper operation, defective wiring or low power-factor, device malfunction, and over-load condition. The meters shall include the following:

1. The device shall be UL Listed, and shall comply with ANSI C12.1 accuracy specification. The minimum CT/meter combined accuracy shall be no greater than 1% of reading over the range of 5% to 100% of rated load. The meter shall not require calibration.
2. The Watt-meter shall directly connect to power from 208 through 480 with no potential transformer. In-line fuses for each voltage tap phase shall be included.
3. The Watt-meter CTs shall be split-core and at minimum be sized to accommodate loads ranging from 100 to 2400 Amps. The CTs shall be volt-signal type, and shall not require shorting blocks.
4. The Watt-meter shall reside directly on the Secondary Network along with other Secondary Network devices. Data transferred shall include:

    a. kW & kWh
    b. Consumption
    c. Demand
    d. Power Factor
    e. Current
    f. Voltage
    g. Apparent Power

2.8 CONTROL PANELS

A. Controllers in mechanical rooms shall be mounted in NEMA 1 enclosures.

B. Mount on walls at an approved location or provide a free standing rack.

C. Panels shall be constructed of 16 gauge, furniture-quality steel, or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with ANSI 61 gray polyester-powder painted finish, UL listed. Provide common keying for all panels.

D. Provide power supplies for control voltage power.

E. Dedicate 1 power supply to the DDC controller. Other devices shall be on a separate power supply, unless the power for the control device is derived from the controller terminations.

F. Power supplies for controllers shall be a transformer with a fuse or circuit breaker. Power supplies for other devices can be plain transformers.

G. All power supplies for 24V low voltage wiring shall be class 2 rated and less than 100VA. If low voltage devices require more amps, then provide multiple power supplies. If a single device requires more amps, then provide a dedicated power supply in a separate enclosure and run a separate, non-class 2 conduit to the device.

H. Surge transient protection shall be incorporated in design of system to protect electrical components in all DDC Controllers and operator's workstations.

I. All devices in a panel shall be permanently mounted, including network switches, modems, media converters, etc.

J. Provide a pocket to hold documentation.

2.9 SENSORS

A. Existing sensors may be used if they are in acceptable condition. New sensors shall comply with the following paragraphs if required.

B. Each controller performing space temperature control shall be provided with a matching room temperature sensor.

C. Digital Display temperature sensor specifications – Wired:

1. As called for in the sequences of operations or on the drawings, provide temperature sensors with digital displays.
2. The sensing element for the space temperature sensor must be IC-based and provide the following.

    a. Digitally communicating with the Application Specific Controller.
    b. Mountable to and fully covering a 2 x 4 electrical junction box without the need for an adapter wall plate.
    c. IC Element Accuracy: +/- 0.9°F
    d. Operating Range:55 to 95°F
    e. Setpoint Adjustment Range: User limiting, selectable range between 55 and 95°F
    f. Display of temperature setpoint with numerical temperature values
    g. Display of temperature setpoint graphically, with a visual Hotter/Colder setpoint indication

h. Calibration: Single point, field adjustable at the space sensor to +/- 5°F
i. Installation: Up to 100 ft. from controller
j. Auxiliary Communications Port: Included
k. Local OLED Temperature Display: Included
l. Display of Temperature to one decimal place
m. Temperature Setpoint Adjustment included
n. Occupancy Override Function included

3. Auxiliary Communication Port. Each room temperature sensor shall include a terminal jack integral to the sensor assembly. The terminal jack shall be used to connect a portable operator's terminal to control and monitor all hardware and software points associated with the controller. RS-232 communications port shall allow the operator to query and modify operating parameters of the local room terminal unit from the portable operator's terminal.

D. Provide the following options as they are called for in the sequences or on the drawings:

1. Setpoint Adjustment. The setpoint adjustment function shall allow for modification of the temperature by the building operators. Setpoint adjustment may be locked out, overridden, or limited as to time or temperature through software by an authorized operator at any central workstation, Building Controller, room sensor two-line display, or via the portable operator's terminal.
2. Override Switch. An override button shall initiate override of the night setback mode to normal (day) operation when activated by the occupant and enabled by building operators. The override shall be limited to two (2) hours (adjustable.) The override function may be locked out, overridden, or limited through software by an authorized operator at the operator interface, Building Controller, room sensor two-line display or via the portable operator's terminal.

E. Temperature Sensors

1. All temperature sensors shall meet the following specifications:

a. Accuracy: Plus or minus 0.2 percent at calibration point.
b. Wire: Twisted, shielded-pair cable.
c. Vibration and corrosion resistant

2. Space temperature sensors shall meet the following specifications:

a. 10k ohm type 2 thermisters

3. Insertion Elements in Ducts shall meet the following specifications:

a. Single point 10k ohm thermister
b. Use where not affected by temperature stratification
c. The sensor shall reach more than 1/3 the distance from the duct wall
d. Junction box for wire splices

4. Averaging Elements in Ducts shall meet the following specifications:

a. 72 inches (183 cm) long
b. Flexible
c. Use where prone to temperature stratification, in front of coils, or where ducts are larger than 9 sq. ft.
d. Junction box for wire splices

5. Outside-Air Sensors Platinum RTD with 4-20mA transmitter:

    a. Watertight enclosure, shielded from direct sunlight
    b. Circulation fan
    c. Watertight conduit fitting

F. Humidity Sensors shall meet the following specifications:

1. Bulk polymer sensor element
2. Accuracy: 2 percent full range with linear output
3. Room Sensors: With locking cover matching room thermostats, span of 0 to 100 percent relative humidity
4. Duct and Outside-Air Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity

G. Air Static Pressure Transmitter shall meet the following specifications:

1. Non-directional sensor with suitable range for expected input, and temperature compensated.
2. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
3. Output: 4 to 20 mA.
4. Building Static-Pressure Range: 0 to 0.25 inches wg.
5. Duct Static-Pressure Range: 0 to 5 inches wg.

H. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; proportional output 4 to 20 mA.

I. Water Flow Meters:

1. Flow Meters shall be ONICON Insertion Type
2. Output: 0-10Vdc
3. Provide Service Valve to allow for visual inspections

J. Equipment operation sensors as follows:

1. Status Inputs for Fans: Differential-pressure switch with adjustable range of 0 to 5 inches wg.
2. Status Inputs for Pumps: Differential-pressure switch piped across pump with adjustable pressure-differential range of 8 to 60 psig.
3. Status Inputs for direct drive electric motors: Current-sensing relay with current transformers, adjustable and sized for 175 percent of rated motor current.
4. Status inputs for belt drive electric motors: Current sensing transmitter with linear 4-20mA output

K. Electronic Valve/Damper Position indication: Visual scale indicating percent of travel and 0 to 10 V dc, feedback signal.

L. Air Differential Pressure Switches: Diaphragm type air differential pressure switches with die cast aluminum housing, adjustable setpoint, minimum 5 amp switch rating at 120VAC, SPDT switches, and the switch pressure range shall be suited for the application. Provide Dwyer or equal. These switches shall be utilized for filter status.

M. Leak detectors: Provide spot leak detectors that can be secured to the floor or secured to a drain pan. The detection shall use a microchip controlled energized probes. The detector shall operate on 24Vor less. Provide a way to adjust the height of the leak probes. The SPDT contacts shall be inside a watertight enclosure.

2.10 ELECTRONIC DAMPER ACTUATORS

A. Actuator shall be direct coupled (over the shaft), enabling it to be mounted directly to the damper shaft without the need for connecting linkage. The actuator-to-shaft clamp shall use a "V" bolt and "V" shaped, toothed cradle to attach to the damper shaft for maximum holding strength. Single bolt or set screw type fasteners are not acceptable.

B. Actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator. End switches to deactivate the actuator at the end of rotation or magnetic clutch are not acceptable.

C. For power-failure/safety applications, a mechanical, spring return mechanism shall be used.

D. Actuators with spring return mechanisms shall be capable of either clockwise or counterclockwise spring return operation by simply changing the mounting orientation.

E. Proportional actuators shall accept a 2-10VDC, 4-20mA signal, or be of the 2 point floating type and provide a 2-10VDC actuator position feedback signal.

F. All actuators shall have an external manual gear release (clutch) or manual crank to aid in installation and for allowing manual positioning when the actuator is not powered.

G. All actuators shall have an external direction of rotation switch to aid in installation and to allow proper control response.

H. Actuators shall be provided with a factory-mounted 3-foot electrical cable and conduit fitting to provide easy hook-up to an electrical junction box.

I. Actuators shall be listed under Underwriters Laboratories Standard 873 and Canadian Standards Association. They must be manufactured under ISO 9001.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the architect/engineer for resolution before rough-in work is started.

3.2. INSTALLATION

A. Provide all relays, switches, sources of emergency and electricity and all other auxiliaries, accessories and connections necessary to make a complete operable system in accordance with the sequences specified. All field wiring shall be by this contractor.

B. Install controls so that adjustments and calibrations can be readily made. Controls are to be installed by the control equipment manufacturer.

C. Mount surface-mounted control devices on brackets to clear the final finished surface on insulation.

D. Install equipment level and plumb.

E. Unless otherwise noted, install wall mounted thermostats and humidistat 60” above the floor measured to the center line of the instrument, or as otherwise directed by the Architect.

F. Install averaging elements in ducts and plenums in horizontal crossing or zigzag pattern.

G. Install outdoor sensors in perforated tube and sunshield.

H. Install damper motors on outside of duct in protected areas, not in locations exposed to outdoor temperatures.

I. Install labels and nameplates on each control panel listing the name of the panel referenced in the graphics and a list of equipment numbers served by that panel.

3.3 ELECTRICAL WIRING SCOPE

A. This contractor shall be responsible for power that is not shown on the electrical drawings, to controls furnished by this contractor. If power circuits are shown on the electrical drawings, this contractor shall continue the power run to the control device. If power circuits are not shown, this contractor shall coordinate with the electrical contractor to provide breakers at distribution panels for power to controls. This contractor is then responsible for power from the distribution panel.

1. Coordinate panel locations. If enclosures for panels are shown on the electrical drawings, furnish the enclosures according to the electrician’s installation schedule.

B. This contractor shall not be responsible for power to control panels and control devices that are furnished by others, unless it is part of the control interlock wiring.

C. Refer to Coordination section for what devices this contractor is responsible to mount and which are turned over to others to mount.

D. This contractor shall be responsible for wiring of any control device that is furnished as part of this section of specification.

E. Wiring for controls furnished by others:

1. Provide control wiring for HVAC controls furnished by others. Wiring may include, but not limited to, interlocks, standalone thermostats, safeties and remote control devices such as valves, sensors, etc.

F. Class1 wiring shall be run in separate conduits from BAS associated wiring.

3.4 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. All low voltage control wiring shall be class 2. Control wiring that is not class 2 shall be run in separate conduits from class 2 wiring.

B. Floor level network wiring between terminal units can be combined with thermostat and other low voltage wiring in the same conduit. All other network wiring shall be in dedicated conduits.

C. Install raceways, boxes, and cabinets according to Division 26 Section "Raceways and Boxes."

D. Install building wire and cable according to Division 26 Section "Conductors and Cables."

E. Installation shall meet the following requirements:

1. Conceal cable and conduit, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in conduit raceway.
3. Install concealed cable in rigid conduit or EMT.
4. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
5. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
6. All wiring in lab areas shall be in conduit.
7. All unsupported risers shall be rigid steel conduit. Supported risers shall be EMT.

F. Rigid conduit shall be steel, hot dip galvanized, threaded with couplings, ¾ inch minimum size, manufactured in accordance with ANSI C-80-1. Electrical metallic tubing (EMT) with compression fittings or intermediate metallic conduit (IMC) may be used as conduit or raceway where permitted by the NEC.

G. Concealed control conduit and wiring shall be provided in all spaces except in the Mechanical Equipment Rooms and in unfinished spaces. Install in parallel banks with all changes in directions made at 90 degree angles.

H. Install conduit adjacent to machine to allow service and maintenance.

I. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

J. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

K. Ground equipment.

3.5 SYSTEM CHECKOUT AND STARTUP

A. Inspect each termination in the MER control panels and devices to make sure all wires are connected according to the wiring diagrams and all termination are tight.

B. After the controls devices and panels are installed and power is available to the controls, perform a static checkout of all the points, including the following:

1. Inspect the setup and reading on each temperature sensor against a thermometer to verify its accuracy.
2. Inspect the setup and reading on each humidity sensor against a hygrometer to verify its accuracy.
3. Inspect the reading on each CO2 sensor using a calibration kit to verify the sensor range accuracy matches the DDC setup.
4. Inspect the reading of each status switch to verify the DDC reads the open and close correctly.
5. Command each relay to open and close to verify its operation.
6. Command each 2-position damper actuator to open and close to verify operation.
7. Command each 2-position valve to open and close to verify operation.

8. Ramp each modulating actuator to 0%, 25%, 50%, 75% and 100% to verify its operation.
9. Ramp each modulating output signal, such as a VFD speed, to verify its operation.
10. Test each safety device with a real life simulation, for instance check freezestats with ice water, water detectors with water, etc.

C. Document that each point was verified and operating correctly. Correct each failed point before proceeding to the dynamic startup.

D. Verify that each DDC controller communicates on its respective network correctly.

E. After all of the points are verified, and power is available to the mechanical system, coordinate a startup of each system with the mechanical contractor. Include the following tests:

1. Start systems from DDC.
2. Verify that each setpoint can be met by the system.
3. Change setpoints and verify system response.
4. Change sensor readings to verify system response.
5. Test safety shutdowns.
6. Verify time delays.
7. Verify mode changes.
8. Adjust filter switches and current switches for proper reactions.
9. Adjust proportional bands and integration times to stabilize control loops.

F. Perform all program changes and debugging of the system for a fully operational system.

G. Verify that all graphics at the operator workstations correspond to the systems as installed. Verify that the points on the screens appear and react properly. Verify that all adjustable setpoints and manual commands operate from the operator workstations.

H. After the sequence of operation is verified, setup the trends that are listed in the sequence of operations for logging and archiving for the commissioning procedure.

3.6 SYSTEM COMMISSIONING, DEMONSTRATION AND TURNOVER

A. The BAS Contractor shall prepare and submit for approval a complete acceptance test procedure including submittal data relevant to point index, functions, sequence, inter-locks, and associated parameters, and other pertinent information for the operating system. Prior to acceptance of the BAS by the Owner and Engineer, the BAS contractor shall completely test the BAS using the approved test procedure.

B. After the BAS contractor has completed the tests and certified the BAS is 100% complete, the Engineer shall be requested, in writing, to approve the satisfactory operation of the system, sub-systems and accessories. The BAS contractor shall submit Maintenance and Operating manuals at this time for approval. An acceptance test in the presence of the Engineer and Owner's representative shall be performed. The Owner will then shake down the system for a fixed period of time (30 days).

C. The BAS contractor shall fix punch list items within 30 days of acceptance.

D. When the system performance is deemed satisfactory in whole or in part by these observers, the system parts will be accepted for beneficial use and placed under warranty.

3.7 PROJECT RECORD DOCUMENTS

A. Project Record Documents: Submit three (3) copies of record (as-built) documents upon completion of installation. Submittal shall consist of:

1. Project Record Drawings. As-built versions of the submittal shop drawings provided as AutoCAD compatible files in electronic format and as 11 x 17 inch prints.
2. Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements in the Control System Demonstration and Acceptance section of this specification.
3. Operation and Maintenance (O & M) Manual.

    a. As-built versions of the submittal product data.
    b. Names, addresses, and 24-hour telephone numbers of installing contractors and service representatives for equipment and control systems.
    c. Operator's Manual with procedures for operating control systems, logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.
    d. Programming manual or set of manuals with description of programming language and of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
    e. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
    f. Documentation of all programs created using custom programming language, including setpoints, tuning parameters, and object database.
    g. Graphic files, programs, and database on electronic media.
    h. List of recommended spare parts with part numbers and suppliers.
    i. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware, including computer equipment and sensors.
    j. Complete original original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
    k. Licenses, guarantees, and warranty documents for equipment and systems.

B. Operating manual to serve as training and reference manual for all aspects of day-to-day operation of the system. As a minimum include the following:

1. Sequence of operation for automatic and manual operating modes for all building systems. The sequences shall cross-reference the system point names.
2. Description of manual override operation of all control points in system.
3. BMS system manufacturers complete operating manuals.

C. Provide maintenance manual to serve as training and reference manual for all aspects of day-to-day maintenance and major system repairs. As a minimum include the following:

1. Complete as-built installation drawings for each building system.
2. Overall system electrical power supply schematic indicating source of electrical power for each system component. Indicate all battery backup provisions.
3. Photographs and/or drawings showing installation details and locations of equipment.
4. Routine preventive maintenance procedures, corrective diagnostics troubleshooting procedures, and calibration procedures.
5. Parts list with manufacturer's catalog numbers and ordering information.
6. Lists of ordinary and special tools, operating materials supplies and test equipment recommended for operation and servicing.

7. Manufacturer's operation, set-up, maintenance and catalog literature for each piece of equipment.
8. Maintenance and repair instructions.
9. Recommended spare parts.

3.8 TRAINING

A. During System commissioning and at such time as acceptable performance of the Building Automation System hardware and software has been established, the BAS contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction during normal working hours shall be performed by a competent building automation contractor representative familiar with the Building Automation System's software, hardware and accessories.

B. At a time mutually agreed upon, during System commissioning as stated above, the BAS contractor shall give 16-hours of onsite training on the operation of all BAS equipment. Describe its intended use with respect to the programmed functions specified. Operator orientation of the automation system shall include, but not be limited to:

1. Explanation of drawings and operator’s maintenance manuals.
2. Walk through of the job to locate all control components.
3. Operator workstation and peripherals.
4. DDC Controller and ASC operation/sequence.
5. Operator control functions including scheduling, alarming, and trending.
6. Explanation of adjustment, calibration and replacement procedures.

C. Additional 8-hours of training shall be given after the 30 day shakedown period.

END OF SECTION 230900

SECTION 232000 – HVAC PIPING

PART 1 GENERAL

1.1 SCOPE

A. The provisions of Section 230500 apply to all work in this Section.

B. Furnish and install all condenser water and condensate drain piping as shall be required in order to provide a complete and satisfactory system.

1.2 SUBMITTAL

A. Submit the following in accordance with Section 230500:

1. Manufacturer's cuts.
2. Installation instructions.
3. Operating and Maintenance Instructions.

PART 2 - PRODUCTS

2.1 CONDENSER WATER PIPING

A. All new pipe used in entire system except where otherwise shown or specified, shall be standard weight Schedule 40 black steel pipe with weights and dimensions in accordance with American Standard Association B36-10 as manufactured by National Tube Company, Birmingham Tank Company, Bethlehem Steel Company or approved equal.

B. Piping 2” and smaller shall be hard drawn copper tubing ASTM B 88 Type "L". Fittings for copper tubing shall be ANSI B16.18 or B16.22 solder joint fittings. Ends of pipe shall be reamed, pipe and fittings cleaned. Use only 95-5 (95% tin and 5% antimony) solder with non-corrosive flux on 1-1/4" and smaller and on 1-1/2" and larger use silver solder (Minimum 12% Silver), with a melting point greater than 1000^{o}F. Submit solder for approval.

2.2 DRAIN PIPING

A. All drain lines shall be Type “L” hard drawn copper. Drains shall be run in a neat manner to the floor drain and turned down at the floor drain, unless otherwise indicated. Minimum of 1-1/4" unless otherwise shown. Secure drain piping to floor every 24” and/or at each end of the pipe.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall install valves and specialties according to the best practice and manufacturer's recommendations.

3.2 PIPE AND PIPE FITTINGS

A. Provide all piping and connections to all items of equipment as shown and/or required to fully complete the system indicated, including drains and other connections. The drawings show the arrangement desired and the Contractor shall follow the drawings as accurately as possible. If conflict should arise, the Contractor shall verify all measurements on the job and cut pipe unless

specifically noted for expansion loops. All piping shall be reamed or filed and cleaned to remove burrs and other obstructions.

B. The Contractor shall be responsible for installing all piping work in a neat workmanlike manner. This shall be interpreted to mean that all piping shall be neatly aligned, installed and supported in equally spaced parallel runs using trapeze hangers where applicable, install square, true and plumb with walls, equipment or other related surfaces using standard fittings. Any pipe work installed in a disorderly or unworkmanlike manner as adjudged by the Architect shall be corrected by the Contractor at the Contractor's expense.

C. Branch connections to mains shall be made from the center-line of mains on horizontal runs. No branch connections are to be made from the bottom of piping.

3.3 CONDENSER WATER PIPING

A. Piping and Pipe Work: Grade all piping properly to insure noiseless circulation of water without formation of pockets. Unless otherwise called for in the plans and specifications, horizonal pipe runs shall be graded to permit complete drainage of the system.

B. All piping 2" diameter or smaller shall be threaded. Piping 2-1/2 inches and larger shall be welded. Joints at valves and equipment in piping 2-1/2 inches and larger shall be flanged. All threads shall be cut with clean and true dies.

C. Install eccentric reducers to change size of mains installed with eccentricity up to keep the top of mains level in the piping.

D. Welding: All welding of joints in piping connections done in the field shall be in accordance with the requirements of the American Standard Code for Pressure Piping.

E. Welding may be either by Metal Arc-Welding Process of the Oxyacetylene Welding Process and in general conformance with procedures established in the latest edition of Appendix B to Section 6 of the ASA Code for Pressure Piping B31.1.

F. Welding fittings shall be used with welded piping. These shall be welding pattern in accordance with ASTM Specifications A-234 and ASA Standard B16.9. Such fittings shall be provided at all changes in direction or changes in pipe size except as hereinafter provided.

G. Weldolet or Threadolet fittings may be used in lieu of welded fittings for branch connection to size 2-1/2" and larger mains, provided branch is two or more pipe sizes smaller than the main.

H. Fittings: Fittings in welded piping shall be standard weight welding fittings, with radii of 1-1/2" the diameter and equal to Tube Turns, Ladish, Taylor Forge or approved equal. See "welding" section for lateral connections and welding fittings standards.

I. Fittings in threaded piping shall be standard weight, malleable iron, screw pattern. Except where otherwise noted, fittings shall be rated for 125 pounds per square inch gauge working pressure and shall be manufactured by Crane, Flagg, Stockham or approved equal.

J. During erection, care shall be taken to remove all dirt, scale and other foreign matter from inside the piping before tying in long sections or installing valves.

K. Copper piping:

1. Piping shall be installed so as to be free floating. 125 pound copper sweat pattern unions shall be provided in the piping as indicated on the drawings.
2. Unions shall be installed at each piece of equipment.

3.5 BLOWING-OUT SYSTEM

A. All piping and equipment shall be thoroughly blown-out under pressure and clean of all foreign matter wasting condensate through temporary connections so long as necessary to thoroughly clean before system is placed in operation. Use every precaution to prevent pipe compound, scale, dirt, welding and other objectionable matter getting into piping system and equipment.

3.6 HANGERS

A. All piping shall be supported on not less than 10' centers and within 30" of each change of direction except that piping 1-1/4" size and smaller shall be supported on 8'-0" centers.

B. All piping shall be hung by means of split type wrought iron hanger rings similar to Grinnell Figure 104 except as otherwise noted. Copper piping not insulated shall be hung from copper plated hangers similar to Figure CT-97. All insulated piping shall be hung by means of clevis type hangers sized to fit outside of insulation, Grinnell Figure 260.

C. Pipe hangers shall be supported by means of iron hanger rods from the building construction or from structural steel members, and in an approved manner. Where required, piping shall be hung from angle iron slips or suitable brackets attached to sides of masonry construction.

D. All insulated piping shall be provided with insulating protection sheet metal saddles. These shall be 20 gauge galvanized iron. Saddles shall be of a length equal to two times the outside diameter of the insulation and shall extend to above the center line of the pipe.

E. Spring type isolators and wood blocking under insulation jacket shall be provided at large piping subject to vibrations as indicated in the plans and details. Contractor shall provide spring isolator submittal indicating construction, spacing, loading and efficiency.

F. Where piping passes through masonry construction, steel pipe sleeves shall be provided, sized to allow at least 1/2" clearance around pipe or insulation where pipe is insulated. Sleeves shall be flush with finished walls and extend 1/2" above finish floors. A watertight seal shall be provided between floor and sleeve and space between pipe and sleeve shall be caulked with lead wool.

3.7 TEST

A. Pressure test all condenser water piping at a pressure of 150 psig for 24 hours. Architect/Engineer shall be notified 72 hours before test is to be performed.

END OF SECTION 232000

SECTION 232010 - VALVES AND SPECIALTIES

PART 1 - GENERAL

1.1 SCOPE

A. The Mechanical Contractor shall furnish and install all necessary valves and specialties to make the installation complete and as specified below. All specialty items unless otherwise noted shall be for operation on at least 125 pound psig working pressure as rated in accordance with the standards of the ASA.

B. The provisions of Section 230500 apply to all the work of this Section.

1.2 SUBMITTAL Submit the following in accordance with Section 230500

A. Manufacturer's cuts.

B. Installation instructions.

C. Operating and Maintenance Instructions.

PART 2 - PRODUCT

2.1 VALVES

A. All new valves shall be as specified below by figure number and shall be one manufacturer throughout.

B. SCREWED ENDS, UNION BONNETS (Gates with Solid Wedge, Globes with Composition or Teflon Disc as Specified) - BRONZE VALVE LIST

Manufacturer	Gate 125#	Globes 150#	Checks 125#
NIBCO	None	T235-Y	T413-B
CRANE	None	7	37
STOCKHAM	None	B-22	B319

C. SOLDER ENDS, SCREWED BONNET GATES, UNION BONNET GLOBES, (Globes with Teflon Disc)

Manufacturer	Gates 125#	Globes 150#	Checks 125#
NIBCO	None	S235-Y	S413-B
CRANE	None	-	1342
STOCKHAM	None	B-24	B-309

D. IRON VALVE LIST

Manufacturer	Gates 125#	Globes 125#	Checks 125#
NIBCO	None	F718-B	F918-B
CRANE	None	351	373
STOCKHAM	None	G-512	G-931

Manufacturer	Gates 250#	Globes 250#	Checks 250#

NIBCO	None	F768-B	F968-B
CRANE	None	21E	39E
STOCKHAM	None	F-532	F-947

E. Spring check valves shall be installed on water lines 2-1/2 inches and above. Valves shall be non-slam type of such design that closing is controlled by spring action so designed to return disc or leaves to seat at zero velocity or before reversal of flow. Disc or leaves shall be free-flowing with no greasing or counterweights required. Body shall be semi-steel, 125 psi rated. Disc or leaves and seat shall be bronze with stainless steel spring.

Manufacturer	Wafer 125#	Flanged 125#
NIBCO	W910-B	F910-B
MUELLER	91-AP	105M-AP
MISSION		

F. Butterfly valves shall be lug type and suitable for water service. Valves shall have EPDM seats suitable for temperature up to 275 degrees Fahrenheit and pressure up to 150 psig. Body shall be cast iron, disc shall be aluminum bronze, and shafts shall be stainless steel. Valves 2" to 6" shall be interim positive lock, lever operators. Valves 8" and larger shall have encased gear operators with hand whl. Bodies shall be lug type. All working parts shall be field replaceable. All valves shall be equipped with extended neck for insulation up to 2" thick. Manufacturer must certify valves (2" through 16") to be capable of providing bubble tight seal at 200 psi when used for end of line service without the need of a flange on the downstream side. Valves 18" and larger must be capable of 150 psi end of line service.

Manufacturer	Lug 150#
NIBCO	LD2000
CRANE	14-TL
STOCKHAM	LD-711-BS3-E

G. Hose end gate valves shall be screwed connection, bronze as specified above. Hose connection shall be as specified above. Hose connection shall be suitable for 1/2" hose.

Manufacturer	Hose End 125#
NIBCO	T113-HC
CRANE	451
STOCKHAM	-

H. Ball valves shall be bronze, two piece construction rated for 125 SWP/400 WOG. Valves shall have conventional port with Teflon seats. Stem shall be of silicon bronze. When installed in insulated piping furnish extended tee handle. All isolation valves above ceiling shall be ball valves.

MANUFACTURER	THREADED 125#	SOLDER 125#
NIBCO	T580	S580
APOLLO	70-100	70-200
STOCKHAM	S214-BR-T-T	S214-BR-T-S

2.2 VALVE TAGS AND CHARTS

A. Furnish for each valve and gas cock in the H.V. and A.C. system a brass tag fitted to each valve so that it may not be removed. Each tag shall be numbered consecutively with the Numbers V-1, V-2, V-3, etc.

B. Furnish two (2) copies of a master valve chart denoting valve number, location and purpose. One (1) chart shall be in a suitable black wood frame with glass cover and mounted where directed.

2.3 SPECIALTIES

A. Gaskets: This Contractor shall furnish and install at each flange connection, Johns-Manville Service Gasket N. 60, or approved equal.

B. Flow Balance Valves: Flow balance valves, where shown, shall be auto flow valves as outlined in paragraph G.

C. Automatic Control Valves: All automatic control valves shall be of the modulating or proportioning type. See temperature controls.

D. Strainers for water service with end suction pumps shall be bolted top basket type with 40-mesh monel screen. For other water service where space is insufficient for basket strainers, and for steam service strainers shall be Y-type with 40-mesh monel screen. Strainers shall have blow-down tappings, removable baskets and be iron bodied with flanged ends. All startup strainers shall be removed from equipment and tied to equipment for Owner inspection after startup is complete.

E. Pressure gauges shall be designed for the service. Gauge size shall be 4-1/2" diameter black lettering on a white field. Provide ¼ turn ball valve at each gauge. Gauge scale shall be twice the normal pressure of the line in which it is installed. Gauge shall be Bourdon tube type with bushed movement and cast aluminum case. Accuracy shall be ½%.

F. SOLAR Pipe thermometers shall be adjustable angle type and shall be provided with extensions for all thermometers mounted through insulation. Thermometers shall have ranges suitable for the service. Minimum operating light level = 10 lux.

G. Auto Flow Control Valves:

1. The GPM for the automatic flow control valves shall be factory set and shall automatically limit the rate of flow to within 5% of the specified GPM over at least 95 percent of the control range.
2. For ½" - 2“, the flow cartridge shall be removable from the Y- body housing without the use of special tools to provide access for regulator change-out, inspection and cleaning without breaking the main piping. (Access shall be similar to that provided for removal of a Y-strainer screen).
3. Each valve shall have two P/T ports.
4. All automatic flow control devices shall be supplied by a single source and certified flow tests, witnessed by a professional engineer, shall be available.
5. Five-year product warranty and free first-year cartridge exchange, up to 10 percent of the total units ordered.
6. The internal wear surfaces of the valve cartridge shall be stainless steel.
7. The internal flow cartridge body shall have machined threads so the spring free height may be compensated for without the use of fixe shims. A crimped sheet metal design is not acceptable.
8. The internal flow cartridge shall be permanently marked with the GPM and spring range.
9. For ½" through 2" pipe sizes: An assembly shall consist of a brass Y-type body, integral brass-body ball valve and ‘O’ ring type union.
10. For 2 ½" and larger flanged connections:

a. Ductile-iron body suitable for mounting wafer style between standard 150# or 300# flanges. The long flange bolts and nuts shall be provided with each control valve. Flow Design Model WS or equal.

11. All valves shall be factory leak tested at 100 psi air:

    a. ½" through 2" pipe size: 400 PSIG at 250°F
    b. 2 ½" through 14" pipe size: 600 PSIG at 250°F
    c. 16" through 30" pipe size: 250 PSIG at 250°F

12. The flow shall be verified by measuring the differential pressure across the coil served or the wide-open temperature control valve and calculating the flow using the coil or valve Cv.
13. An electronic pressure and temperature test kit shall be provided with the ability to read differential pressure from 0 to 75 PSI, and temperature from -10 to 230 F..
14. Install automatic flow control valves on the return lines of coils as indicated on the plans. A balancing valve on supply side is not acceptable.
15. The standard ports and handles shall clear 1" thick insulation. Handle and port extensions are required for over 1" thick insulation. Do not insulate flow control valves used on heating coils.
16. Install, on the supply side of coils, a Y-strainer with brass blow down valve with ¾" hose-end connection with cap. Inline (basket) strainer is not acceptable.

H. Automatic air vents shall be brass with MNPT connections and a manual shut-off valve. Valve shall be rated for a maximum operating temperature of 240°F at pressures of 150 PSI.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall install valves and specialties according to the best practice and manufacturer's recommendations.

END OF SECTION 232010

SECTION 232500 – WATER TREATMENT

PART 1 - GENERAL

1.1 SCOPE

A. The provisions of Section 230500 apply to all the work in this Section.

B. Furnish and install water treatment including equipment required to provide a complete and satisfactory job.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 230500:

1. Manufacturer's cuts.
2. Certified capacity ratings.
3. Installation instructions.
4. Operating and Maintenance Instructions.

PART 2 - PRODUCTS

2.1 GENERAL

A. The Contractor will furnish, install and provide all equipment, chemicals and the necessary service for a Water Treatment Program. Water treatment supplier for Horry County Schools is Nalco Company, LLC. All systems shall comply with their requirements.

2.2 PRE-OPERATIONAL SYSTEM CLEAN-OUT

A. All lines and related equipment shall be thoroughly flushed out with pre-cleaning chemicals designed to remove deposition such as pipe dope, oils, loose rust and mill scale and other extraneous materials. Add recommended dosages of pre-cleaner chemical products and circulate throughout the water system. Drain, fill and flush water system until no foreign matter is observed and total alkalinity of the rinse water is equal to that of the makeup water.

2.3 CHEMICAL FEEDING AND CONTROL EQUIPMENT - CLOSED WATER SYSTEMS

A. For each existing closed water system, the contractor shall reuse the existing shot feeder.

PART 3 – EXECUTION

3.1 QUALIFICATIONS

A. All services will be provided by a qualified, full-time representative of the chemical supplier.

END OF SECTION 232500

SECTION 233000 – AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE

A. Furnish and install all sheet metal work shown or called for including ductwork and connections to fans and equipment.

B. Ductwork shall be provided and installed as shown on the drawings. All details of ductwork are not indicated, and necessary bends, offsets and transformation must be furnished whether shown or not.

C. The provisions of Section 230500 apply to all the work in this Section.

1.2 SUBMITTALS

A. Submit the following in accordance with Section 230500.

1. Manufacturer's cuts.
2. Certified capacity ratings.
3. Installation instructions.

1.3 RELATED DOCUMENTS

A. Section 230700 - Insulation.

PART 2 - PRODUCTS

2.1 GENERAL

A. All ductwork, plenums and casings shall be constructed of sheet metal, as herein specified. All sheet metal construction shall conform to the pressure classification shown on the contract drawings, or herein specified and shall be in accordance with the construction and installation details in Chapter 16 of the 1992 ASHRAE Systems and Equipment Handbook or the appropriate SMACNA Standards.

B. Duct sizes on drawings represent gross sheet metal dimensions. Allowance has been made, where applicable, for duct liner.

2.2 LOW PRESSURE DUCTWORK

A. Low pressure ductwork shall be constructed of zinc coated sheet steel and shall conform to the 1st Edition of SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1985, as follows:

1. Rectangular Duct

a. 1" w.g. pressure class - Table 1-4.

2. Round Duct

a. 2" w.g. pressure class - Table 3-2.

2.3 FIRE DAMPERS

A. Furnish and install, at locations shown on plans, or where required by code, fire dampers constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have 1-1/2 hour fire protection rating. In addition each fire damper shall include a 212^{o}F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Damper manufacturer's literature submitted for approval prior to installation shall include comprehensive performance data developed from testing in accordance with AMCA Standard 500 and shall illustrate pressure drops for all sizes of dampers required at all anticipated airflow rates. Fire dampers shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing steel sleeves, angles, other materials and practices required to provide an installation equivalent to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. Fire dampers shall be style "A", "B" or "C" as required.

2.4 ACCESS DOORS

A. Ventifabrics, Krueger or Duro-Dyne, (Min. 12" x 10" - use 16" x 12" where size permits) insulated doors shall be provided for fire dampers, control dampers, smoke detectors, and other locations where shown. Door shall be minimum 24 gauge galvanized, double construction with 1" insulation complete collar mounting frame, steel butt hinges, felt gaskets, fasteners and handles. Doors shall be labeled as to function, (fire damper, smoke detector, etc.).

2.5 TURNING VANES

A. Turning vanes and Deflector Controls, Barber-Colman, Carnes Corporation, Kruger or Titus in length up to 18"; Aero-Dyne Duro-Dyne, or Airsan double thickness about 24" in length, installed in rails.

2.6 FLEXIBLE CONNECTIONS

A. Flexible duct connections shall be provided where ductwork connects to equipment; ventifabrics or Duro-Dyne 28 ounce minimum waterproof and fire retardant woven glass fabric double coated with neoprene, approved by UL. Maximum length of flexible connections shall be 10 inches.

2.7 MANUAL AND MOTOR OPERATED DAMPERS

A. American Warming and Ventilating Company Type DAA-P-50, opposed blade, constructed with 15 gauge steel blades. Manual dampers shall be provided with Ventlock No. 637 hand operated locking quadrants located outside of ducts. Locking quadrants shall be elevated 1-1/2" for insulation. Manual dampers 18" x 10" or smaller may be single blade type construction of 16 gauge galvanized sheet metal. Dampers of Ruskin, Krueger, Louvers and Dampers, or Advanced Air, Inc. will be acceptable.

2.8 SPLITTER DAMPERS

A. Install where shown and at duct splits; provide with Ventlock No. 690 self-locking device; constructed of 16 gauge galvanized steel with hemmed leading edge and reinforced at hinged side.

PART 3 - EXECUTION

3.1 DUCTWORK

A. All ductwork shall be provided in a neat workmanlike manner. The ducts shall be properly braced and reinforced. All slip joints shall be made in the direction of flow. All ducts shall be true to the dimension indicated and shall be straight and smooth on the inside with neatly finished airtight joints. The ducts shall be securely anchored into the building construction in an approved manner and shall be completely free from vibration under all conditions of operation. All supply, return fresh-air and exhaust systems shall be completely balanced.

B. No duct transformation shall be of a ratio less than four to one and where possible, shall be of a ratio of six to one. No less than three vertical splitters shall be provided where these ratios cannot be met. No elbow shall have a throat center line radius of less that one and one-half times the duct width at the turn. All turns of less than this amount in rectangular duct shall be provided with duct turning vanes of standard design. Splitters or multi-blade volume dampers, where indicated, shall be provided in all branch.

C. Turning vanes shall be provided at all tees and square elbows. Turning vanes shall be factory fabricated and designed in accordance with the SMACNA or ASHRAE Guide for formed vanes.

D. Handholes of not less than 6" x 6" shall be provided at all points where access is required. Manholes of not less than 18" x 24" shall be provided at all points where it is necessary to clean or remove parts of equipment. All access doors and handholes shall be rubber gasketed insulated type with frame and latches.

E. Install access doors at each fire damper and smoke detector. Label all access doors.

F. All ductwork must be sealed in accordance with Seal Class C as defined in SMACNA HVAC Duct Construction Standards - Metal and Flexible, 1985.

3.2 DUCT HANGERS AND SUPPORTS

A. Duct hangers and supports shall conform to those shown in Tables 4-1 and 4-2 of SMACNA HVAC Ductwork 1985, 1st Edition.

3.3 WALL PENETRATIONS

A. Where ducts pass through non-rated walls and is exposed to view the duct shall be finished with suitable metal collar.

B. Where ducts pass through one hour fire walls, provide not less than 1/2" (13 mm) clearance between the duct and combustible material. Seal the clearance space with non-combustible material retained, and the duct secured in place by steel collars of a gauge equivalent to that of the duct and fastened to both the duct and the enclosure.

C. Where fire dampers are shown or required, dampers shall be installed per manufacturer's UL listing.

3.4 CLEANING DUCT SYSTEMS

A. Before fan systems are put in operation, vacuum clean inside of air units, plenums and apparatus housing. Filters are to be installed before moving air through duct systems.

END OF SECTION 233000

SECTION 237410 - MAKEUP AIR UNITS

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.

C. Submit drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

E. Drawings submitted for approval shall be accompanied by a copy of the purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.

1.2 DELIVERY, STORAGE and HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units from physical damage. Leave factory shipping covers in place until installation.

C. Units to be secured via base rail tie-down locations.

1.3 WARRANTY

A. Provide one year parts and labor warranty for entire unit. In addition, provide 5 year compressor parts warranty.

PART 2 - PRODUCTS

2.1 SUMMARY

A. The contractor shall furnish and install packaged outdoor air unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

B. Acceptable Manufacturers

1. Manufacturers: This specification is based on an Energy Recovery Unit as manufactured by Trane. Cost associated with dimensional, performance, warranty, or other deviations from the specified equipment, including engineering costs to evaluate such deviations, shall be paid for by the contractor. Subject to compliance with requirements, acceptable manufacturers are: Trane, Munters, Valent

2.2 GENERAL UNIT DESCRIPTION

A. The units shall be down discharge airflow. Cooling performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be ETL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M40 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.

B. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 1000 hours in a salt spray test in compliance with ASTM B117. Unit shall have a 2 inch thick Antimicrobial Insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.

C. The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top

D. A factory installed combination outdoor air sensor located in the outdoor air hood is designed to sense both outdoor air temperature and relative humidity for use by the microprocessor controller to make required ventilation, cooling, dehumidification and heating decisions. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes. A factory installed sensing tube is designed to sense the supply air temperature downstream of the indoor fan section.

E. Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT).

F. Evaporator Coil: DX 4 Row Interlaced, Internally finned, 5/16 inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil shall be leak tested to 500 psig and pressure tested to 500 psig. A Stainless Steel double-sloped condensate drain pan with provision for through the unit wall condensate drain is standard. Evaporator coil will have 4 interlaced rows for superior sensible and latent cooling.

G. Provide modulating hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited with a low pressure switch. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes.

H. All units shall have direct-drive, hermetic, digital scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included. Compressor shall be able to fully modulate from 20%-100%.

I. Condenser water coils shall utilize a coaxial "tube in tube" design. Water flows through the inner tube while refrigerant flows in the annulus between the inner and outer tubes. The coils have a convoluted multi-lead inner tube. The resulting convoluted tube has increased heat transfer surface area per unit length yet still permits full flow of both water and refrigerant around its entire periphery for improved performance. Turbulence imparted by the convolutions to both the water and refrigerant flows further enhances the thermal performance, while inhibiting the accumulation of deposits on the surfaces.

J. Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive (unless no controls option is selected, VFD can be provided by others). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT). All Fans shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

K. Coastal Corrosion Package: S/S Interior w/ Aux, Eco Coated Coils

1. Evaporator, Hot Gas Reheat and Condenser Coil will have a flexible epoxy polymer e-coat uniformly applied to all coil surface areas with no material bridging between fins. The coating process will ensure complete coil encapsulation and a uniform dry film thickness from 0.6 – 1.2 mills on all surface areas including fin edges and meet 5b rating cross hatched adhesion per ASTM B3359- 93.Corrosion durability will be confirmed through testing with no less than 5,000 hours salt spray resistance per ASTM B117-90 using scribed aluminum test school coupons. The coil coating will meet the following test standards:

    a. MIL-C-46168 Chemical Agent Resistance – DS2, HCL Gas
    b. CIDA-A-52474-A (GSA)
    c. MIL-STD810F, Method 509.4 (Sand and Dust)
    d. MIL-P-53084 (ME)-TACOM Approval
    e. MIL-DTL-12468 Decontamination Agent (STB)
    f. DPG (Dugway Proving Grounds) Soil & Water Exposure Tests
    g. GM9540P-97 Accelerated Corrosion Test (120 cycles)
    h. ASTMB117-G85 Modified Salt Spray (Fog) Testing-2,000 hours (tested by ARL for Lockheed Martin)

2. Cabinet shall include optional interior liner constructed of Type 304 stainless steel with sealed seams. Interior walls, floor and roof to be included.

L. Unit is completely factory wired with necessary controls and contactor pressure lugs for power wiring. Units will provide an external location for mounting fused disconnect device. Micro-processor controls are provided for all 24 volt control functions. The resident control algorithms will make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring outdoor temperature and humidity as well as indoor temperature. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized micro-processor (OACM) will provide anti-short cycle timing for a higher level of machine protection. Terminals are provided for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.

M. Powered Exhaust Fan motor shall be direct drive type with factory installed Variable Frequency Drive to allow variable air volume operation. All motors shall be thermally protected. All fan motors shall meet the U.S. Energy Policy Act of 2005 (EPACT). All Fan(s) shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

N. Energy recovery wheel performance shall be AHRI 1060 certified and bear the AHRI certified label. The rotor media shall be light weight and must be made of aluminum. Paper or fibrous media are not acceptable. All surfaces must be coated with a nonmigrating adsorbent layer of desiccant prior to being formed into the media structure to insure that all surfaces are coated and that adequate latent capacity is provided. The desiccant must be a 3A molecular sieve designed for the adsorption of water vapor. The media shall be cleanable by vacuuming the media surface, without degrading the latent recovery. Dry particles up to 800 microns shall pass freely through the media.

O. Aluminum Mesh Filters (D, K and N Cabinets) and Galvanized Mesh Bird Screen (B and G Cabinets) shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-8

rated filters (30 percent) shall be installed prior to the evaporator coil. Unit shall be equipped with a 6” filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the attached selection.

P. 3-pole, molded case, HACR circuit breaker with provisions for through the base electrical connections shall be installed. The circuit breaker will be installed in the unit in a water tight enclosure. Wiring will be provided from the switch to the unit high voltage terminal block. The circuit breaker will be UL/CSA agency recognized. The circuit breaker will be sized per NEC and UL guidelines. A powered 120 volt, 10 amp, 2 plug convenience outlet shall be factory installed. A service receptacle disconnect shall be installed. The convenience outlet is powered from the line side of the circuit breaker, and therefore will not be affected by the position of circuit breaker.

PART 3 - EXECUTION

3.1 MANUFACTURER'S FIELD SERVICES

A. Unit start-up shall be completed by an Employee of the Factory and must be a factory-certified technician.

1. Manufacturer must have twenty factory-authorized and factory-trained technicians within a 50 mile radius of job site.

B. The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

END OF SECTION 237410

SECTION 238120 – WATER SOURCE HEAT PUMPS

PART 1 - GENERAL

1.1 SCOPE

A. The provisions of Section 230500 apply to all the work in this Section.

B. Furnish and install roof mounted water source heat pumps as required to provide a complete and satisfactory job. Units shall be capable of two speed operation (fan and compressor) to meet low load conditions.

1.2 SUBMITTALS Submit the following in accordance with Section 230500

A. Manufacturer's cuts.

B. Certified capacity ratings.

C. Installation instructions.

D. Operating and Maintenance Instructions.

PART 2 - PRODUCTS

2.1 WATER SOURCE HEAT PUMPS

A. General

1. Equipment shall be completely assembled, piped, internally wired, fully charged with R-410A refrigerant and test operated at the factory. Filters, thermostat field interface terminal strip, and all safety controls are furnished and factory installed.
2. The system water inlet and outlet connections shall be female NPT composed of copper.

B. Air-to-Refrigerant Coil

1. Provide internally finned, 3/8-inch copper tubes mechanically bonded to a configured aluminum plate fin. Coils shall be leak tested at the factory to ensure the pressure integrity. The coil shall be leak tested to 450 psig and pressure tested to 650 psig. The tubes are to be completely evacuated of air and correctly charged with proper volume of refrigerant prior to shipment. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor tubes. The tubes shall be sized consistently with the capacity of the coil. Suction header shall be fabricated from rounded copper pipe.
2. A thermostatic expansion valve shall be factory selected and installed for a wide range of control.

C. Piping

1. Provide an automatic flow kit shall contain an automatic flow control valve, two ball valves, two flexible hoses, a high flowY-strainer, and strainer blow-down.
2. The automatic flow control valve shall be factory set to a rated flow, and shall automatically control the flow to within 10% of the rated value over a 40 to 1 differential pressure, operating range (2 to 80 PSID). Operational temperature shall be rated from

fluid freezing, to 225°F.The valve body shall be constructed from hot forged brass UNS C37700 per ASTM B-283 latest revision.

3. Ball valves shall be field installed between the unit and the supply and return lines of the loop to stop water flow to the unit in a maintenance or service situation. See section 232010 for ball valve requirements.
4. Hoses shall consist of a stainless steel outer braid with an inner core of tube made of a nontoxic synthetic polymer material. The hoses shall be suitable for water temperatures ranging between 33°F and 211°F.

D. Blower Motor

1. The motor shall be an ECM variable speed motor with thermal overload protection. The ECM motor shall be programmed to provide soft starting and a constant CFM over a range of static pressure. A means to adjust the air flow shall be provided on the control board. Fan speed shall reduce down to provide lower airflow setting when the zone set point temperature is satisfied or when the unit runs in fan only mode. The motor shall contain a quick disconnect plug and permanently lubricated bearing. The fans shall be placed in a draw-through configuration and constructed of corrosion resistant galvanized material. Removal of the motor and fan wheel shall be made with the assistance of a factory provided orifice ring device. This device shall attach the wheel and motor to the fan housing in a single assembly eliminating the need for access to the set screw on the backside of the fan hub.
2. Unless otherwise noted, the blower shall have multiple blower motor/sheave combinations available. Options of the blower motor/fan packages shall be selected and wired from the factory to match performance criteria suggested in the performance section. The fan(s) shall be placed in a draw-through configuration. They shall be constructed of corrosion resistant galvanized material.

E. Cabinet

1. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shallbe cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit.
2. All exposed vertical panels and top covers in the indoor air section shall be insulated with a 1/2", 1.0 lb pound density foil-faced, fire-resistant, permanent, odorless, glass fiber material. The base of the downflow unit shall be insulated with 1/2", 1.0 lb pound density foil-faced, closed-cell material. The downflow unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8" high supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting.

F. Compressors

1. The unit shall contain a high efficiency rotary or scroll compressor. External vibration isolation shall be provided by rubber mounting devices located underneath the mounting base of the compressor. A second isolation of the refrigeration assembly shall be supported under the compressor mounting base.
2. Thermal overload protection shall be provided. Protection against excessive discharge pressure shall be provided by means of a high pressure switch. A loss of charge shall be provided by a low pressure safety.

G. Drain Pan

1. The condensate pan shall be constructed of corrosion resistant material and insulated to prevent sweating. The bottom of the drain pan shall be sloped on two planes which pitches the condensate to the drain connection. The drain pan shall be flame rated per UL945V-B. A UL 508 condensate overflow device shall be provided.

H. Electrical

1. The unit control box shall contain all necessary devices to allow heating and cooling operation to occur from a remote unitary controller.

I. Refrigerant Circuits

1. The refrigerant circuit shall contained a thermal expansion device. Service pressure ports shall be factory supplied on the high and low pressure sides for easy refrigerant pressure or temperature testing.

J. Refrigerant Tubing

1. The refrigerant tubing shall be of 99% pure copper. This system shall be free from contaminants and conditions such as drilling fragments, dirt and oil. All refrigerant and water lines shall be insulated with an elastomeric insulation that has a 3/8-inch thick wall in the air-side section of the unit.

K. Sound Attenuation

1. Sound attenuation shall be applied as a standard feature in the product design. The sound reduction package shall include, vibration isolation to the compressor and water-to-refrigerant coil, unit base stiffeners, insulated metal compressor enclosure, and a second stage of vibration isolation to the compressor and water-to-refrigerant base pan.

L. Water-to-Refrigerant Heat Exchanger

1. The water-to-refrigerant heat exchanger shall be of a high quality co-axial coil for maximum heat transfer. The copper or optional cupro-nickel coil shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coil shall have a refrigerant working pressure of 650 PSIG and a water side pressure of 400 PSIG. The factory shall provide rubber isolation to the heat exchanging device to enhance sound attenuation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unit shall be installed in accordance with the manufacturer’s recommendations.

1. Unit shall be installed in fully accessible locations.
2. Remove existing unit and ductwork as shown on the plans and install new. Disconnect and reconnect condenser water and drain piping. Remove existing service valves and install new valves and flexible hoses.

END OF SECTION 238120