



CHILLER REPLACEMENT

AT

**CARSON MIDDLE SCHOOL
13618 MCLEAREN ROAD
HERNDON, VIRGINIA 20171**

INVITATION FOR BID# MMB-001-19

INTENT:

It is the intent of this contract is to remove one (1) water-cooled chiller, associated condensate pumps, chilled water pumps, air separator and expansion tank and replace with one (1) new water-cooled chiller, associated condensate pumps, chilled water pumps, air separator and expansion tank at the specified location. Work shall include all associated demolition rigging, piping, equipment, electrical equipment, controls, ductwork, insulation, patching, painting and related work as shown on the project drawings and as detailed in these specifications to provide a complete and fully operational installation.

**FAIRFAX COUNTY PUBLIC SCHOOLS
OFFICE OF FACILITIES MANAGEMENT
5025 SIDEBURN ROAD
FAIRFAX, VA 22032-2637
(703) 764-2457**

In the event of inclement weather that closes the Fairfax County Public Schools Central or Administrative Offices, bids will be due and opened at the same time, the following business day that offices are open. To confirm closing, visit us online at www.fcps.edu.

**FAIRFAX COUNTY PUBLIC SCHOOLS
Carson Middle School**



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INVITATION FOR BID

INVITATION FOR BID

1. RECEIPT OF BIDS

Bids shall be submitted in duplicate and shall be delivered and time stamped in Room 16, Sideburn Support Center, 5025 Sideburn Road, Fairfax, VA 22032 on or before the hour and date designated, at which time they will be opened and read in public.

2. LUMP SUM

Bids will be considered on a lump sum basis for any one or all bid items requested or any combination thereof for the work described on the drawings and in the specifications.

3. DRAWINGS/SPECIFICATIONS

Drawings and specifications may be examined and one (1) set obtained at the Office of Facilities Management, Room 14, 5025 Sideburn Road, Fairfax, VA 22032-6009.

4. MINORITY/SMALL BUSINESS

Minority contractors and small business enterprises are invited and encouraged to submit bids.

5. COMPLETION TIME

The Contractor shall substantially complete the project within the time specified GENERAL CONDITIONS Item Number 16. Failure to complete this project within these specified dates without written agreement by FCPS Office of Facilities Management will result in the enforcement of liquidated damages or ineligibility to be awarded contracts on future FCPS Office of Facilities Management projects or both.

END OF SECTION

INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

1. QUALIFICATION OF BIDDER:

If a contract is for one hundred twenty thousand dollars (\$120,000.00) or more, or if the total value of all construction removal, repair or improvements undertaken by the bidder within any twelve (12) month period is seven hundred fifty thousand dollars (\$750,000.00) or more, the bidder is required under Title 54, Chapter 11, Code of Virginia (1950) as amended, to show evidence of being licensed as "Class A Contractor." **(Non Virginia licenses are not acceptable.)** If a contract is seventy five hundred dollars (\$7,500.00) or more but less than one hundred twenty thousand dollars (\$120,000.00) the bidder is required to show evidence of being licensed as a "Class B Contractor." The bidder shall place on the outside of the envelope containing the bid and shall place in over his signature whichever of the following notations is appropriate:

The Code of Virginia does not allow an unlicensed contractor to submit a bid where the resultant contract will require a license.

"Licensed Class A Virginia Contractor No. _____"

2. LICENSE REQUIREMENT:

All firms doing business in Fairfax County shall obtain a license as required by Chapter 4, Article 7, of The Code of the County of Fairfax, Virginia, as amended, entitled "Business, Professional and Occupational Licensing (BPOL) Tax." Questions concerning the BPOL tax should be directed to the Office of Assessments, telephone (703) 222-8234

3. REGISTERING OF CORPORATION:

Authorization to Transact Business: By submitting a bid in response to this solicitation, the bidder represents and warrants as follows: (a) it has authorization to transact business in the Commonwealth of Virginia as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia, or as otherwise required by law; and (b) it shall not allow its existence to lapse or its certification of authority or registration to transact business in Virginia, if so required under Title 13.1 or Title 50 of the Code of Virginia, to be revoked or cancelled at any time during the term of this Contract.

Certificate of Authority: Any foreign corporation transacting business in Virginia shall secure a certificate of authority as required by Section 13.1-757 of the Code of Virginia, from the State Corporation Commission, Post Office Box 1197, Richmond, Virginia 23209. The Commission may be reached at (804) 371-9733 or (800) 552-7945. The consequences of failing to secure a certificate of authority are set forth in Virginia Code Section 13.1-758.

4. MANDATORY PRE-BID MEETING:

A mandatory pre-bid meeting will be held August 21, 2018* at 10:00 a.m. at **Carson Middle School**, 13618 McLearen Road, Herndon, Virginia 20171. Contractors shall meet in the Lobby of the buildings front entrance to sign the meeting roster. **NO ONE WILL BE ADMITTED AFTER 10:05 A.M.**

INSTRUCTIONS TO BIDDERS

**In the event of inclement weather on the date of the Mandatory Pre-Bid meeting that delays opening or closes the Fairfax County Public Schools Central or Administrative Offices, the meeting will be rescheduled by Addendum.*

The purpose of the pre-bid meeting is to provide potential Bidder's an opportunity to ask questions and obtain clarification about any aspect of this Invitation for Bid. Any changes or clarifications resulting from this pre-bid meeting will be issued in a written addendum.

It is important that all Bidders have a clear understanding of the specifications, scope of work, and requirements of this solicitation. Attendance at the pre-bid meeting will be a pre-requisite for submitting a Bid; attendance will be evidenced by the Contractor's signature on the meeting roster. Bidder's who do not attend the pre-bid meeting will not be permitted to submit a Bid. If a Bidder submits a Bid and did not attend the mandatory pre-bid meeting, the Bid will not be considered.

5. BIDDER'S QUESTIONS:

All contact between prospective Bidders and the Owner with respect to this solicitation will be formally held at scheduled meetings or will be conducted in writing through the Owner's Office of Facilities Management. Except as expressly authorized herein, communications between prospective bidders, their agents and/or representatives and any representative of the Owner concerning interpretation of all or any portion of this solicitation are prohibited and may not be relied upon for any purpose. No interpretation of the meaning of these documents will be made to any bidder orally.

Any question or request for an interpretation must be in writing and submitted to the Owner by U.S. Mail, commercially recognized overnight delivery service, or hand delivery during business hours addressed as follows:

Angela C. David, CPPB, VCO, Contract Administrator
Fairfax County Public Schools
Department of Facilities and Transportation Services
Office of Facilities Management
5025 Sideburn Road, Room 16
Fairfax, Virginia 22032
Telephone Number: (703) 764-2457
Email:Angela.David@fcps.edu

In order to be eligible for consideration, a question or request for interpretation must be received on or before the date that is three (3) days before the date established for the submission of bids.

6. ADDENDA:

Any and all such responses, interpretations and any supplemental instructions will be returned in writing to the prospective bidder requesting such interpretation, or will be in the form of written addenda which, if issued, will be not later than two (2) days prior to the date fixed for submission of bids.

It shall be the responsibility of each bidder to monitor the Owner's website for Addenda issued at the following URL: <https://www.fcps.edu/facilitiesmanagement/current%20solicitations> Notwithstanding any provision to the contrary, the failure of any bidder to monitor the Owner's website or to otherwise receive any addenda shall neither constitute grounds for withdrawal of a bid nor relieve such bidder from any responsibility for incorporation of the provisions of any addenda into its bid as submitted. All addenda so issued shall become part of the Contract Documents.

INSTRUCTIONS TO BIDDERS

7. BID SECURITY:

Bids \$100,000 or above shall be accompanied by a certified or cashier's check or a bidder's bond in an amount not less than five percent (5%) of the amount of the bid, made payable to the Fairfax County Public Schools, Fairfax, Virginia. No other form of bid security is acceptable. The bidder's bond shall be issued by a surety company licensed to conduct business in Virginia and shall be on the form herein provided. Said check or bond shall be given as a guarantee that the bidder will enter into a contract if awarded the work and, in case of refusal or failure to enter into said contract, the check or bond will be declared forfeited to the Owner.

8. GUARANTY BONDS:

- A. For contracts \$100,000 or above, the successful bidder, simultaneously with execution of the Contract, shall furnish a Performance Bond and a Payment Bond each in an amount equal to one hundred percent (100%) of the Contract price. Bonds shall be on the forms herein provided and shall be issued by a surety company licensed to conduct business in Virginia. The Owner reserves the right to request documentation from the surety company as to its financial capabilities, past experience, etc. In the event that the Contractor's surety company becomes insolvent, bankrupt or in any way is incapable of providing the services and/or security of the Performance and Payment Bonds, the Contractor shall within ten (10) days furnish a new Payment and a new Performance Bond to the Owner from a surety licensed to conduct business in Virginia. Any additional cost in securing new bonding will be the responsibility of the Contractor.
- B. The Contractor shall have the option to require all subcontractors furnishing labor and materials under this Contract in excess of two thousand five hundred dollars (\$2,500.00) to furnish to the successful bidder a payment bond in the amount of fifty percent (50%) of the work sublet to the Contractor.

9. BIDS:

- A. In order to be eligible for consideration, bids shall be made in accordance with the following instructions:
 - 1. Before submitting a bid, each bidder shall become familiar with the requirements of the Contract Documents, and shall include in its bid prices a sum sufficient to cover the cost of all items and services described herein.
 - 2. Bids shall be made upon the Bid Form prepared and furnished by the Owner, a copy of which is bound herein. Bids must contain a bid for each of the items shown on the bid form. Failure to complete all requested prices shall be cause for rejection of the bid. The signatures of all persons shall be in longhand. The completed form shall be without erasures, exceptions, or alterations.
 - 3. Bids shall not contain any recapitulation of the work to be done, and alternate bids will not be considered unless called for. No oral, telegraphic bids or modifications will be considered.
 - 4. Bids shall be time-stamped in Room 16, Sideburn Support Center, 5025 Sideburn Road, Fairfax, VA 22032, on or before the day and hour set for the

INSTRUCTIONS TO BIDDERS

opening of bids, enclosed in an opaque sealed envelope and bearing the title of the work, name of the bidder, and the bidder's Virginia Class A Contractor's License number. Bids may be modified or withdrawn by bidders prior to, but not later than, the time fixed for the opening of same.

5. It is the sole responsibility of each bidder to deliver its bid timely and to the precise location indicated as the place for receipt and opening of bids. Accordingly, bids which are transmitted via US Mail, commercial courier, or overnight delivery service to the Owner are not guaranteed to be brought timely to the attention of the Owner's official who is responsible for opening the bids for this project.

10. OPENING OF BIDS:

Bids will be opened and read at the time and place set forth in the Invitation for Bid. Bidders, or their representative, and other interested persons may be present at the opening of the bids.

11. WITHDRAWAL OF BIDS:

- A. A bidder may withdraw his bid from consideration if the price bid was substantially lower than the other bids due solely to a mistake therein, provided the bid was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or materials made directly in the completion of a bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the bid sought to be withdrawn. The bidder must give notice in writing of his claim of right to withdraw his bid within two (2) business days after the conclusion of the bid opening procedure. Any claim of a bidder for withdrawal shall be governed by Section 2.2-4330(B)(1) of the Code of Virginia, as amended.
- B. No bid may be withdrawn when the result would be the awarding of this Contract to another bidder in which the ownership of the withdrawing bidder is more than five percent (5%).
- C. If a bidder is permitted to withdraw a bid under this section, he may not thereafter, for compensation, supply any material or labor, or perform any subcontract or other work agreement for the person or firm to whom the Contract is ultimately awarded, or otherwise benefit directly or indirectly, from the performance of the project for which the withdrawn bid was submitted.

12. REJECTION OF BIDS:

The Owner reserves the right to accept or reject any or all bids, and/or to waive any informality which does not affect the price, quality, quantity or delivery scheduling for the goods, services or construction being procured in any one or all bids received.

13. AWARD OF CONTRACT:

- A. The Contract will be awarded to the lowest responsive and responsible bidder complying with these instructions and the Invitation for bid. The competency and responsibility of bidders will be considered in making the award. The Owner reserves the right to award the Contract on the basis of any one or all bid items requested or any combination thereof.

INSTRUCTIONS TO BIDDERS

- B. Bids shall be made upon the Bid Form prepared and furnished by the Owner, a copy of which is bound herein. Bids must contain a bid for the base bid and unit prices shown on the bid form. Failure to complete all requested prices shall be cause for rejection of the bid. Bids shall be stated both in writing and in figures. The signatures of all persons shall be in longhand. The complete form shall be without erasures or alternations. Bids will be evaluated on the basis of a firm fixed price and award will be made to the lowest responsive and responsible bidder complying with all provisions of the Invitation for bid.
- C. Unless cancelled or rejected, a responsive bid from the responsible bidder shall be accepted as submitted, except that if a bid from the responsive and responsible bidder exceeds available funds, then the Owner may negotiate with such responsive and responsible bidder to obtain a contract price that is within available funds.

Negotiation may be undertaken when there is insufficient time to re-advertise with a modified specification and/or there are not clearly definable elements of the specifications, which can be removed to permit a re-advertisement or it is otherwise in the best interest of the Owner to negotiate.

If negotiation is undertaken, the Owner may negotiate changes in the solicitation with the lowest responsive and responsible bidder to obtain a satisfactory price within available funds. If a satisfactory price cannot be agreed upon, then the negotiation shall be terminated and the solicitation cancelled.

- D. The Owner reserves the right to require any one or more bidders to submit the items specified in Subsection I below. Bidders are advised that it is the Owner's intention not to award a contract hereunder to any bidder whose past performance shows his firm to be generally late in performance of contracts or services. The ability of the lowest bidder with to provide the required bonds will not in and of itself establish the responsibility of the bidder.
- E. The Owner reserves the right to defer award of Contract for a period of forty-five (45) days after due date of bids. Bid prices shall be binding for forty-five (45) calendar days following bid-opening date, unless extended by mutual consent of all parties.
- F. A "responsive bidder" shall mean a bidder who has submitted a bid, which conforms, in all material respects, to the requirements of the bidding documents.
- G. A "responsible bidder" shall mean a bidder who has the capability, in all respects, to perform fully the Contract requirements and the moral and business integrity and reliability, which will assure good faith performance. In determining responsibility, the following criteria will be considered:
1. The ability, capacity, and skill of the bidder to perform the Contract or provide the service required;
 2. The ability of the bidder to perform the Contract or provide the service promptly, or within the time specified, without delay or interference;
 3. The character, integrity, reputation, judgment, experience and efficiency of the bidder;
 4. The quality of the bidder's performance on previous contracts or services;

INSTRUCTIONS TO BIDDERS

5. The previous and existing compliance by the bidder with laws and ordinances relating to contracts or services;
 6. The sufficiency of the financial resources and ability of the bidder to perform the Contract or provide the service.
 7. The quality, availability and adaptability of the goods or services to the particular use required;
 8. When the bidder is in arrears to the Owner or the County, or has defaulted on a project for the Owner or the County, or is delinquent on taxes and assessments to the County or on amounts due the Owner;
 9. Such other information as may be deemed by the Owner as having a bearing on the decision to award the Contract, including, but not limited to:
 - a. The ability, experience and commitment of the bidder properly to plan, schedule, coordinate, and execute the work under the Contract.
 - b. Whether the bidder has ever been debarred from bidding or found ineligible for bidding on any other projects.
- H. The purpose of subparagraph G, above, is to enable the Owner to select the bid, which is in its best interests
- I. The Owner reserves the right to require from any one or more bidders the following:
1. Upon request of Owner, Bidders agree to submit references within one (1) business day after the opening of the bid;
 2. A list of a minimum of five (5) projects completed by the bidder within the last two (2) years that are similar in size and scope to the services described herein; and
 3. Financial statements indicating current financial status, prepared in accordance with generally accepted accounting principles, by a C.P.A. licensed to do business in Virginia.
- J. Notice of intention to award a contract, as well as the award of the contract, will be posted on the website of the Owner's website at the following URL: <https://www.fcps.edu/school-board/school-board-meetings> While the school division staff may communicate procurement results to bidders or offerors, each bidder or offeror has the responsibility to monitor the website for its own purposes.
14. PROTEST OF AWARD OR DECISION TO AWARD:
- A. Any bidder may protest the award or the decision to award this Contract by submitting a protest in writing to Fairfax County Public Schools (FCPS) Superintendent or Designee, no later than ten (10) days after the award or the announcement of the decision to award, whichever occurs first; however, that no protest shall lie for a claim that the selected bidder is not a responsible bidder.

The written protest must include the basis for the protest and the nature of the relief sought. The Owner's Division Superintendent or Designee shall issue a decision in writing within ten (10) days after receipt of the protest, stating the reasons for the action taken.

INSTRUCTIONS TO BIDDERS

This written decision shall be final unless the bidder appeals within ten (10) days of receipt of the written decision by instituting legal action as provided in the Code of Virginia.

- B. If, prior to the award, it is determined that the decision to award is arbitrary and capricious, then the sole relief shall be as hereinafter provided:
Where the award has been made but performance has not yet begun, the performance may be declared void by the School Board.

Where the award has been made and performance has begun, the Owner may declare the Contract void upon a finding that the action is in the best interest of the School Board. Where a contract is declared void, the performing contractor shall be compensated for the cost of performance at the rate specified in the Contract up to the time of declaration. In no event shall the performing contractor be entitled to lost profits.

- C. Pending final determination of a protest, the validity of the award shall not be affected by the fact that protest has been filed.
- D. An award need not be delayed for the period allowed a bidder to protest, but in the event of a timely protest, no further action to award this Contract will be taken unless the Owner's Division Superintendent or Designee makes a written determination that proceeding without delay is necessary to protect the public interest or that the bid offer will expire.

15. APPEAL OF DETERMINATION OF NON-RESPONSIVENESS OR NON-RESPONSIBILITY:

- A. Any bidder who, despite having the lowest bid, is determined not to be a responsive or responsible bidder for this Contract shall be notified in writing by the Owner. The written notice shall state the basis for the determination, and this determination shall be final unless the bidder appeals within ten (10) days of receipt of the notice by instituting legal action as provided in the Code of Virginia. The bidder may not institute legal action until all statutory requirements have been met.
- B. If it is determined that the Owner's decision was arbitrary and capricious, or otherwise in error, and this Contract has yet to be awarded, the sole relief available to the bidder shall be a finding that the Bidder is a responsive and responsible bidder for this Contract.
- C. If the award has already been made and performance has begun, then the Owner may declare the Contract void upon a finding that this action is in its best interests. Where a contract is declared void, the performing contractor shall be compensated for the cost of performance up to the time of such declaration. In no event shall the performing contractor be entitled to lost profits.

16. SUBSTITUTIONS:

Unless otherwise provided in the bid documents, the name of a certain brand, make, or manufacturer is intended to restrict bidders to the specific brand, make, or manufacturer specified. Substitute materials proposed as equal to materials specified shall be submitted in writing to the Owner by the bidder with full substantiating data for evaluation no later than ten (10) days prior to bid opening; substitute materials shall not be considered for evaluation after this time period. Proposed substitute materials which equal or exceed the performance standard of the specified materials in the sole judgment of the Owner will be included in an "Approved Substitute Materials Bulletin" to be issued prior to the bid opening date.

INSTRUCTIONS TO BIDDERS

For purposes of this solicitation and any resulting contract, the Owner's designation of any one or more manufacturers, subcontractors and/or suppliers as "pre-approved" shall signify only that such manufacturers, subcontractors and suppliers previously have submitted work samples to the Owner that satisfied the Owner's requirements. The Owner's designation of any one or more manufacturers, subcontractors and/or suppliers as "pre-approved" shall in no event be deemed or construed to be a representation or warranty on the part of the Owner of any such manufacturer's, subcontractor's or supplier's capability of or capacity for (in terms of financial wherewithal, personnel and equipment availability, managerial ability, product quality or otherwise) performing or furnishing any portion of the Work in accordance with the requirements of this solicitation. Each bidder shall conduct such independent investigation into the qualifications, experience and abilities of its selected manufacturers, subcontractors and suppliers, as it deems appropriate under the circumstances.

17. FORM OF CONTRACT:

The Contract Documents consist of "The Standard Construction Contract Agreement between Owner and Contractor, the Conditions of the Contract (General Conditions), the Drawings, the Specifications, the Bid Form, the Invitation for bid, the Instructions to Bidder, all Addenda issued prior to execution of the Contract, and all Modifications thereto."

18. VIRGINIA FAIR EMPLOYMENT ACT:

The Contractor shall comply with the Virginia Fair Employment Act.

19. SMALL, MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISES:

- A. The Fairfax County Human Rights Ordinances and relevant Federal and State Laws, orders and regulations require Fairfax County to ensure that its procurement practices are non-discriminatory and promote equality of opportunity for Small, Minority and Women-Owned Business Enterprises.
- B. Small Business/Organization is an independently owned and operated business which, together with affiliates, has 250 or fewer employees or average annual gross receipts of \$10 million or less averaged over the previous three years.
- C. Minority Business is a business concern that is at least 51 percent owned by one or more minority individuals or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in the corporation, partnership or limited liability company or other entity is owned by one or more minority individuals and both the management and daily business operations are controlled by one or more minority individuals. Such individuals shall include Asian American, African American, Hispanic American, Native American, Eskimo or Aleut.
- D. Woman-Owned Business is a business concern that is at least 51 percent owned by one or more women who are U.S. citizens or legal resident aliens, or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest is owned by one or more women who are U.S. citizens or legal resident aliens, and both the management and daily business operations are controlled by one or more women who are U.S. citizens or legal resident aliens.

20. FAILURE TO EXECUTE CONTRACT:

INSTRUCTIONS TO BIDDERS

"The Successful Bidder, upon his failure or refusal to execute the Contract within fifteen (15) days after he has received notice of the acceptance of his Bid, shall forfeit the bid security (which was submitted in form of Certified or Cashier's Check or bidder's bond) with his Bid, as liquidated damages for such failure or refusal".

21. SAFETY RESOLUTION:

Safety: The Contractor shall abide by, and shall be subject to, the Fairfax County Construction Resolution, as adopted by the Fairfax County Board of Supervisors on December 8, 2003, and as excepted and modified below:

- A. It shall be required that each bid submitted for a contractor for construction, alteration, and/or repairs, or any other construction, shall include a list of all the following actions which have become final in the three years prior to the bid submission.
 - 1. Willful violations, violations for failure to abate, or repeated violations, for which the bidder was cited by (a) the United States Occupational Safety and Health Administration; (b) the Virginia Occupational Safety and Health Administration; or (c) the occupational safety and health plan for any other state; or
 - 2. Three (3) or more serious construction safety violations for which the bidder was cited by the (a) United States Occupational Safety and Health Administration; (b) the Virginia Occupational Safety and Health Administration; or (c) the occupational safety and health plan from any other state.
 - 3. Termination of a contract between the Contractor and the County by the purchasing agent of his designee for safety violations.
- B. If the bidder has not received or been the subject of any such violations in the three years prior to the bid submission, then the bidder shall so indicate by certification of Safety Violations. The bidder will also indicate on this form each state in which work was performed in the three (3) years prior to the bid submission.
- C. No construction contract, as discussed above, may be bid on by any bidder or Contractor who has been the subject of any citations for the type and number of violations listed in Paragraph A, above, which have become final within three (3) years prior to bid submission.
 - 1. Notwithstanding the language of Paragraph C, above, any bidder or Contractor who has been the subject of a violation, as described in Paragraph A(1), which has become final within three (3) years prior to bid submission, may bid, after a mandatory waiting period of twelve (12) months from the date the violation became final, if the bidder or Contractor satisfactorily passes eligibility evaluation.
 - 2. Notwithstanding the language of Paragraph C, any bidder or Contractor who has been the subject of the type and number of violations as described in Paragraph A (2), which have become final within three (3) years prior to bid submission, may bid, after a mandatory waiting period of twelve (12) months from the date

INSTRUCTIONS TO BIDDERS

the last such violation became final, if the bidder or Contractor satisfactorily passes an eligibility evaluation.

3. Notwithstanding the language of Paragraph C, above, any bidder or Contractor who has previously been terminated from a County contract, as described in Paragraph A(3), within three (3) years prior to the bid submission, may bid, after a mandatory waiting period of twelve (12) months from the date of termination, if the bidder or Contractor satisfactorily passes an eligibility evaluation.
- D. Prior to bidding on a project under the provisions of Paragraph C above, a Contractor may request that a determination be made regarding its eligibility to submit a bid on a contract under the terms of this resolution. However, this request for determination and any subsequent adjudication process must be completed prior to submitting a bid on any project and the request for determination must be received no later than twenty-one (21) days before bids are due, unless otherwise stated in the Advertisement for Bid.
- E. No Contractor or Subcontractor contracting for any part of the contract work shall require any laborer, mechanic, or other person employed in the performance of the Contract to work in surroundings or under working conditions which are hazardous or dangerous to his safety, as determined under construction safety standards promulgated by the U.S. Department of Labor, or the Virginia Department of Labor and Industry.
- F. No Contractor awarded a County construction contract shall knowingly employ or contract with any person, company, or corporation for services pursuant to that contract if such person, company or corporation could not have been awarded such contract due to the restrictions above.
- G. The Contractor shall also certify in writing that all safety related information provided in accordance with the Safety Resolution and contract requirements are complete, accurate and truthful.
- H. The failure to provide information requested pursuant to this Resolution or the failure to conform to the certification requirements of this Resolution shall be grounds for disqualifying a prospective bidder.

END OF SECTION

BID FORM

Name of Contractor

Address

Date

TO: FAIRFAX COUNTY SCHOOL BOARD
FAIRFAX COUNTY PUBLIC SCHOOLS
DEPARTMENT OF FACILITIES AND TRANSPORTATION SERVICES
OFFICE OF FACILITIES MANAGEMENT
5025 Sideburn Road, Room 16
Fairfax, Virginia 22032

Gentlemen:

The undersigned, having examined the Documents, Drawings, and Specifications entitled:

**Chiller Replacement
at
Carson Middle School**

which compose the Contract Documents, and having visited the site and examined all conditions affecting the work, hereby proposes and agrees to furnish all labor, materials, and equipment to perform all operations necessary to complete the entire work as required by said documents.

1. BASE BID:

A. Carson Middle School:

The undersigned agrees, if awarded the Contract, to execute and totally complete the work in accordance with the Contract Documents for the stipulated sum of

\$ _____

_____ Dollars

*MANUFACTURER: _____

***The undersigned agrees to bid and to use only one Manufacturer from the Owner's approved list and shall furnish and install only the above indicated Manufacturer's product.**

2. Costs due to the Commonwealth of Virginia and County of Fairfax Sales and Use Taxes shall be included in all bids.

BID FORM

3. Contractor is cognizant of Conflict of Interest provisions in the Virginia Code and specified in General Conditions, Paragraph 2.
4. The Undersigned agrees, if awarded the Contract, to perform Substantial and Final Completion of the Work on or before the respective Substantial and Final Completion Dates established in Summary of Work.
5. The Owner reserves the right to accept or reject any or all bids or to waive any informality in any one or all bids received.
6. The undersigned acknowledges receipt of any and all Addenda which may have been issued by the Owner, and acknowledges that the cost, if any, of revisions set forth therein has been included in the bidder's prices.
7. The Owner reserves the right to defer award of Contract for a period of forty-five (45) days after due date of bids and the undersigned agrees that this Bid Form will remain open and binding during such period of time.
8. The undersigned bidder hereby acknowledges that time is of the essence to the Contract and agrees to commence the Work in compliance with the response times established in accordance herewith and to fully complete the Project within the specified time, including normal inclement weather delays. The undersigned hereby covenants and agrees to achieve timely completion of all services described herein and to comply with all emergency and non-emergency response times established pursuant to the Contract.
9. Minority or small business firms information. Please check the following information relevant to your firm: (See Instructions to Bidders, Paragraph 19)

Minority Business Firm	Yes ___	No ___
Small Business Firm	Yes ___	No ___
Women-Owned Firm	Yes ___	No ___

The above information is requested for statistical purposes only. All bidders tendering responses will receive equal consideration for award.

10. The Owner reserves the right to accept or reject any proposed subcontractor or supplier.
11. Safety: The successful bidder shall abide by, and shall be subject to, the Fairfax County Construction Resolution, as adopted by the Fairfax County Board of Supervisors on December 8, 2003, and as excerpted and modified (see Instruction to Bidders, Paragraph 21).

Bidder's disclosure pursuant to Safety Resolution (as stated above):

(additional pages may be attached, as necessary for a complete response by the bidder)

12. Incorporated by Reference: This solicitation is subject to all federal, state and local laws, policies, resolutions, regulations.

List of public jurisdictions (States and District of Columbia) in which Bidder performed work in the 3 years prior to bid submission:

BID FORM

(additional pages may be attached, as necessary for a complete response by the bidder)

13. By signing this Bid, the undersigned bidder hereby confirms and certifies as follows:
- (a) the undersigned has not received or been the subject of safety violations in the three (3) years prior to this Bid Submission, and is in compliance with the requirements of Item 11 above.
 - (b) neither the undersigned Bidder nor any employee of the Bidder who will have direct contact with students has been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child;
 - (c) unless expressly disclosed in an attachment to this Bid on the Bidder's letterhead stationery, neither the undersigned Bidder nor any employee of the Bidder who will have direct contact with students has been convicted of a crime of moral turpitude; and
 - (d) the undersigned does not, and shall not during the performance of the contract for goods and services in the Commonwealth of Virginia; knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

The undersigned Bidder acknowledges and agrees that it will be deemed to have made each of the above certifications at and effective as of Bidder's acceptance of Purchase Order, Task Order or Notice to Proceed issued to Bidder by the Owner hereunder.

Contractor

Address

Email Address

Telephone Number

Facsimile Number

Principal's Name (Signature)

Title

Principal's Name (Printed)

Virginia Contractors License No.

Virginia State Corporation Commission
Identification Number (or attach an explanation
as to why such is not required pursuant to
Virginia Code § 2.2-4311.2)

END OF SECTION

BID BOND

(BIDS \$100,000 OR HIGHER)

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____ of _____ (hereinafter called the "Principal"), and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in _____, and authorized to do business in the Commonwealth of Virginia as a surety (hereinafter called the "Surety"), are held and firmly bound unto FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee") in the full and just sum which is equal to 5% of the total amount of the Principal's Bid (as that term is defined below), as submitted to the Obligee (such total amount referred to herein as the "Total Bid"), in good and lawful money of the United States of America, to be paid upon demand of the Obligee, for the payment of such sum well and truly to be made, the Principal and the Surety bind themselves, their respective successors, and permitted assigns, jointly and severally and firmly by these presents. The Total Bid is the aggregate amount (including amounts set forth with respect to any and all Alternates) set forth on the Principal's Bid Form for performance of the work described below, as submitted to and maintained by the Obligee (such Bid Form referred to herein as the "Bid"). The Surety hereby acknowledges and agrees that the Bid shall be deemed to be incorporated by reference in this Bid Bond to the same extent as if set forth fully herein. WHEREAS, the Principal intends to submit, or has submitted to the Obligee, a Bid for the Principal to perform work for the Obligee, designated as:

(hereinafter called the "Project") and,

WHEREAS, the Principal desires to provide this Bid Bond in lieu of a certified check or cash escrow otherwise required to accompany the Principal's Bid.

NOW THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH THAT, if the Bid be accepted by the Obligee, and if the Principal shall, within ten days after the date of receipt of a written Notice of Award from the Obligee or any agency or department thereof, (i) execute a Contract in accordance with the Bid and upon the terms, conditions and price set forth therein, in the form and manner required by the Obligee, (ii) execute a sufficient and satisfactory Performance Bond in the amount of 100% of the total Contract Sum and a sufficient and satisfactory Payment Bond in the amount of 100% of the total Contract Sum, each payable to the Obligee, on a form prescribed by Obligee and with a surety satisfactory to Obligee, and (iii) provide the Obligee with copies of all required insurance policies, then this obligation is to be void; otherwise this obligation shall be and remain in full force and in the event of the failure of any or all of the foregoing requirements to be satisfied within the time period specified above, the Principal and the Surety immediately shall pay to the Obligee, upon demand, the lesser of: (a) the amount hereof and (b) the difference between the Bid and the next low bid for the Project, in each case in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

Based upon the Surety's present knowledge and information, the Surety knows of no reason why it would not issue payment and performance bonds on behalf of the Principal for the above-referenced Project. The foregoing statement shall not be construed as a commitment on the part of the Surety to issue either or both of such bonds on behalf of the Principal.

The obligations evidenced hereby shall constitute the joint and several obligations of the Principal, the Surety, and their respective successors and permitted assigns.

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

BID BOND

IN WITNESS WHEREOF, we have hereunto set our signatures and seals this ____ day of _____, 20____, all pursuant to due authorization.

(SEAL)

Principal

By: _____

Name: _____

Title: _____

Address: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact (Attach Copy
of Power of Attorney)

Name: _____

Title: _____

Address: _____

Countersigned for the
Commonwealth of Virginia:

By: _____

Resident Agent

Address: _____

END OF SECTION

PERFORMANCE BOND

(BIDS \$100,000 OR HIGHER)

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we,

_____ of (hereinafter called the "Principal"), and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in the Commonwealth of Virginia as a surety (hereinafter called the "Surety"), are held and firmly bound unto the FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee") in the sum of _____ Dollars (\$_____) lawful money of the United States of America for the payment of which well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally and firmly by these presents, to perform all Work in accordance with the requirements of the Contract Documents for the Project.

WHEREAS, the Principal has entered into a certain written agreement with the Obligee, dated as of the ____ day of _____, 20____, (hereinafter called the "Contract"), for _____, which Contract is by reference made a part hereof;

WHEREAS, the Principal is obligated to furnish security with respect to its obligation to perform the work to be performed under the Contract; and

WHEREAS, the Principal desires to furnish this Performance Bond in lieu of a certified check or cash escrow otherwise required to be provided to the Obligee.

NOW THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT, if the Principal and its successors or assigns, or any of them shall:

Well and truly and in good, sufficient, and workmanlike manner perform or cause to be performed the Contract, and each and every of the covenants, promises, agreements, warranties, and provisions to be performed by the Principal set forth therein, in strict conformity with the plans and specifications, and complete the same within the time period specified therein, all as may be amended from time to time by the parties thereto, and fully indemnify and save harmless the Obligee from all costs and damages which it may suffer by reason of the Principal's failure to do so and fully reimburse and repay the Obligee all costs and expenses which it may incur in making good any such default, then these obligations shall be null and void, otherwise they shall remain in full force and effect.

PROVIDED, HOWEVER, that this bond is subject to the following conditions and limitations:

- (a) In no event shall the Surety, or its successors or assigns be liable hereunder for a greater sum than the amount of this bond.
- (b) No action on this bond shall be brought unless within one year after: (i) completion of the Contract, including the expiration of all warranties and guarantees; or (ii) discovery of the defect or breach of warranty, if the action be for such, in all other cases.

The Surety, for value received, on behalf of itself and its successors and assigns, hereby stipulates and agrees that the obligations of the Surety and of its successors and assigns under this bond shall not in

PERFORMANCE BOND

any manner be impaired or affected by: (a) any extension of time, modification, omission, addition or amendment of or to the Contract or the work to be performed thereunder; (b) any payment thereunder before the time required therein; (c) any waiver of any provision thereof; or (d) any assignment, subletting or other transfer of all or of any part thereof or of any work to be performed or of any moneys due or to become due thereunder; and the Surety, for itself and its successors and assigns, does hereby waive any right to receive notice of any and all of such extensions, modifications, omissions, additions, amendments, payments, waivers, assignments, subcontracts and transfers.

The Surety hereby stipulates and agrees that, in the event that the Obligees declares the Principal to be in default, the Surety will promptly, at the Obligees's election: (a) perform and complete the work to be performed under the Contract in accordance with the terms, conditions and covenants set forth therein with a duly licensed and qualified contractor designated by Obligees; (b) obtain bids from qualified contractors for completing the work to be performed under the Contract in accordance with the terms, conditions and covenants set forth therein and, upon determination by the Obligees and the Surety of the lowest responsible and responsible bidder, (i) arrange for a contract between such bidder and the Obligees and (ii) make funds available directly to the Obligees, or to such contractor(s) as the Obligees shall designate, to pay the costs of completion less the balance of the contract price as such may have been adjusted by change order (such amount, including other costs and damages for which the Surety may be liable hereunder, not to exceed the penal sum set forth in the first paragraph hereof); or (c) remedy the default. The Surety further stipulates and agrees that, within 45 days after its receipt of written notice from the Obligees specifying the Obligees's election of (a), (b) or (c) above, the Surety shall have resumed performance of the work or shall have caused the performance of the work to have been resumed, in accordance with the Obligees's election. In the event the Surety fails to resume the Work within such 45 day period, the Obligees may elect to perform or arrange for the performance of the Work at the sole cost and expense of the Surety in addition to any other rights and remedies available to Obligees. As employed herein, the phrases (i) "balance of the contract price" shall mean the total amount payable by the Obligees to the Principal under the Contract after all proper adjustments have been made, less the aggregate of all amounts paid by the Obligees to the Principal thereunder and (ii) "resume the Work" shall mean the commencement and diligent performance of actual work activities at the site, as demonstrated by discernable daily progress at the rate contemplated by the Contract. All payments to be made by the Surety hereunder shall be paid within thirty (30) days after the Surety's receipt of a request or demand therefor.

The Obligees's omission to call upon the Surety in any instance shall in no event release the Surety from any obligation hereunder.

All notices, requests, demands and other communications which are provided hereunder, shall be in writing and shall be deemed to have been duly given upon the hand delivery thereof during business hours, or upon the earlier of receipt or three (3) days after posting by registered mail or certified mail, return receipt requested, or on the next business day following delivery to a reliable overnight delivery service, if to the Principal or the Obligees, to the addresses set forth in the Contract, and if to the Surety, to the address set forth beneath its signature.

The obligations evidenced hereby shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

[SIGNATURES ON FOLLOWING PAGE]

PERFORMANCE BOND

IN WITNESS WHEREOF, the Principal and Surety have caused this Performance Bond to be signed and sealed by their duly authorized representatives as of the ____ day of _____, 20__.

(SEAL)

Principal

By: _____

Name: _____

Title: _____

Address: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact (Attach Copy
of Power of Attorney)

Name: _____

Title: _____

Address: _____

Countersigned for the
Commonwealth of Virginia:

By: _____

Resident Agent

Address: _____

END OF SECTION

PAYMENT BOND

(BIDS \$100,000 OR HIGHER)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____ of (hereinafter called the "Principal"), and _____, a corporation created and existing under the laws of the State of _____, and having its principal office in the City of _____ and authorized to transact business in the Commonwealth of Virginia as Surety (hereinafter called the "Surety") are held and firmly bound unto FAIRFAX COUNTY SCHOOL BOARD (hereinafter called the "Obligee" in the sum of Dollars (\$_____) lawful money of the United States of America, for the payment of which well and truly to be made, the said Principal binds itself and its successors and assigns, and the said Surety binds itself and its successors and assigns, all jointly and severally, firmly by these presents to pay for all labor performed and material furnished in accordance with the Contract Documents for the Project.

WHEREAS, the Principal has entered into a certain written agreement with the Obligee, dated as of the ____ day of _____, 20__ (hereinafter called the "Contract"), for _____, which Contract is by reference made a part hereof.

WHEREAS, the Principal is obligated to furnish security with respect to its obligation to pay for all labor performed and material furnished pursuant to the Contract; and

WHEREAS, the Principal desires to furnish this Payment Bond in lieu of a certified check or cash escrow otherwise required to be provided to the Obligee.

NOW, THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT, if the Principal and its successors or assigns, or any or either of them shall:

Pay or cause to be paid the wages and compensation for labor performed and services rendered of all persons engaged in the prosecution of the work provided for therein, whether such persons be agents, servants or employees of the Principal, and of its successors or assigns, or of any subcontractor or any assignee thereof, including all persons so engaged who perform the work of laborers or of mechanics regardless of any contractual relationship between the Principal, or its assigns, or any subcontractor or any assignee thereof, and such laborers or mechanics, but not including office employees not regularly stationed at the site of the work, and further, shall pay or cause to be paid all lawful claims of subcontractors and of materialmen and other third persons arising out of or in connection with the Contract and the work, labor, services, supplies and materials furnished in and about the performance and completion thereof, then these obligations shall be null and void, otherwise they shall remain in full force and effect.

PROVIDED, however, that this bond is subject to the following conditions and limitations:

- a. All persons who have performed or rendered services, as aforesaid, all subcontractors, and all persons, firms, corporations, including materialmen and third persons, as aforesaid, furnishing work, labor, services, supplies and material under or in connection with the Contract or in or about the performance and completion thereof, shall have a direct right of action (subject to the prior right of the Obligee under any claim which it may assert against the Principal and its successors, and assigns and/or the Surety and its successors and assigns) against the Principal and its successors, and assigns and/or the Surety and its successors and assigns on this bond, which right of action shall be asserted in proceedings instituted in the State in which such work, labor, services,

PAYMENT BOND

supplies or material was performed, rendered or furnished, or where work, labor, services, supplies or material has been performed, rendered or furnished, as aforesaid, in more than one State, then in any such State. Insofar as permitted by the laws of such State, such right of action shall be asserted in a proceeding instituted in the name of the Obligee to the use and benefit of the person, firm or corporation instituting such action and of all other persons, firms and corporations having claims hereunder, and any other person, firm or corporation having a claim hereunder shall have the right to be made a party to such proceedings (but not later than one year after the performance of the Contract including the expiration of any warranty or guarantee) and to have such claim adjudicated in such action and judgment tendered thereof. Prior to the institution of such a proceeding by a person, firm or corporation in the name of the Obligee, as aforesaid, such person, firm or corporation shall furnish the Obligee with a bond of indemnity for costs, which bond shall be in a form and in an amount satisfactory to the Obligee.

- b. Neither the Surety nor its successors or assigns shall be liable hereunder for any damages or compensation recoverable under any worker's compensation or employer's liability statute.
- c. In no event shall the Surety, or its successors or assigns be liable hereunder for a greater sum than the amount of this bond, or subject to any suit, action or proceeding thereon that is instituted by any person, firm or corporation under the provisions of the above section(s), later than one year after such person last performed labor or last furnished or supplied materials.

And the Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligations of the Surety and of its successors and assigns, and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by a waiver of any provision thereof, or by an assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed or of any moneys due or to become due thereunder; and the Surety, for itself and its successors and assigns, does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors, and other transferees, shall have the same effect as to the Surety and its successors and assigns, as though done or omitted to be done by and in relation to the Principal.

The Principal, for itself and its successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objection that might be interposed as to the right of the Obligee to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor services, supplies or material, performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Obligee to require the foregoing provisions to be placed in this bond.

Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Principal shall promptly furnish a copy of this Bond or shall permit a copy to be made on behalf of such potential beneficiary.

The obligations evidenced hereby shall constitute the joint and several obligations of the Contractor, the Surety, and their respective heirs, executors, administrators, successors and assigns.

PAYMENT BOND

Unless the context requires otherwise, capitalized terms not otherwise defined in this Bond shall have the meanings assigned to them in the Contract Documents.

IN WITNESS WHEREOF, we have hereunto set our signatures and seals this ____ day of _____, 20____, all pursuant to due authorization.

(SEAL)

Principal

By: _____

Name: _____

Title: _____

Address: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact (Attach Copy
of Power of Attorney)

Name: _____

Title: _____

Address: _____

Countersigned for the
Commonwealth of Virginia:

By: _____

Resident Agent

Address: _____

END OF SECTION

GENERAL CONDITIONS

1. DEFINITIONS:

- A. Architect. The duly licensed individual or entity who has been engaged by the Owner to observe performance of the Work and to consult with and advise the Owner during the construction process. As employed herein, the term "Architect" may refer to an individual, an organization or to the Architect's authorized representative.
- B. Change Order. A written order to the Contractor signed by the Owner, the Architect, and the Contractor, which authorizes a change in the Work, an adjustment to the Contract Sum, and/or an adjustment to the Contract Period. The latest edition of AIA Standard Form G701 shall be utilized.
- C. Construction Schedule. The schedule for completion of the Work. The Construction Schedule shall be developed utilizing a Critical Path method of scheduling, indicating time periods allotted for the performance of all constituent parts of the Work within the Contract Period.
- D. Contract or Contract Documents. The terms "Contract" and "Contract Documents" shall be used interchangeably herein and shall consist of the following:
 - 1. The signed Agreement
 - 2. The General Conditions of the Contract, which appear herein;
 - 3. The Drawings and Specifications;
 - 4. The Supplementary Conditions;
 - 5. Any Addenda issued prior to execution of the Agreement;
 - 6. The Notice of Award issued by the Owner to the Contractor;
 - 7. The Notice to Proceed issued by the Owner to the Contractor;
 - 8. Any modifications which are issued subsequent to the execution of the Agreement and which may take the form of a Work Order, a Change Order, or written interpretations issued by the Architect;
 - 9. The Contractor's Payment and Performance Bonds;
 - 10. The Bidding Documents, which shall include the Contractor's completed Bid Proposal Form and the Instructions to Bidders; and
 - 11. All provisions required by Law or Regulation to be incorporated herein, regardless of whether any such provision is referred to or set forth expressly in these Contract Documents.

GENERAL CONDITIONS

- E. Contract Period. The period of time allotted in the Contract Documents for completion of the Work, as such period may be adjusted from time to time in the manner prescribed herein.
- F. Contract Sum. The total amount payable to the Contractor for performance of the Work. The Contract Sum is stated in the Contract Documents and shall be subject to adjustments in the manner specified herein.
- G. Contractor. The corporation, limited liability company, partnership or other person or entity that contracts with the Owner to perform the Work. As employed herein, the term "Contractor" may refer to an individual, an organization, or to the Contractor's authorized representative.
- H. Critical Path. The logical and necessary sequence through which all Work items must be completed within their respective timeframes or the completion date for the Project will change. A delay in the completion of any Work item that is on the Critical Path necessarily causes a corresponding delay to the Date of Substantial Completion.
- I. Date of Final Completion. The date certified by the Owner/Architect as the date upon which the Work is completely finished, which event shall be achieved by the Contractor within the time period specified in Schedule of Completion. Work consisting of the completion of punch-list items, submission of O&M Manuals, any and all other Contract requirements being completed by the Contractor.
- J. Date of Substantial Completion. The date certified by the Owner/Architect as the date upon which the Work has been sufficiently completed to allow the Work to be utilized by the Owner for the purpose for which it was intended. Such event shall be achieved by the Contractor within the time period specified in Schedule of Completion.
- K. Day. The term "day" shall mean "calendar day."
- L. Defective. An item described herein as "defective" shall be deemed to be unsatisfactory, faulty, or deficient in that it does not conform to the requirements of the Contract Documents, or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to the Date of Final Completion of the Work (unless responsibility for the protection thereof has been assumed by the Owner as of an earlier date).
- M. Director, Office of Facilities Management. The official in charge of day to day construction matters for the Owner. The Director may designate a representative to act on his or her behalf.
- N. Float. The period of time between the early start date and the late start date, or the early finish date and the late finish date of any of the activities set forth on the Construction Schedule. The Owner shall have and retain exclusive ownership of the Float.
- O. Laws and/or Regulations. Any and all laws, rules, regulations, ordinances, codes, and/or orders of any and all governmental bodies, agencies, authorities, and/or courts, which are applicable to the Work (or any aspect thereof) and are in effect at any time or from time to time during the Contract Period.

GENERAL CONDITIONS

- P. Notice. Notice shall mean written notice. Written notice shall be deemed to have been duly served on the Contractor if delivered by U.S. Mail, hand delivery, or facsimile transmission to the Contractor's office at the Project or to the business address or fax number of the Contractor as stated in its Bid Form Proposal; or if delivered in person to the Contractor, to the Contractor's foreman or superintendent for the Project, or any officer or director of the Contractor. Unless otherwise specified herein, Notice shall be deemed to have been duly served on the Owner if delivered by U.S. Mail, hand delivery, or facsimile transmission (with a duplicate copy transmitted by another means of delivery authorized hereunder) to the Office of Facilities Management, Fairfax County Public Schools, 5025 Sideburn Road, Fairfax, Virginia 22030, fax number (703) 239-0462.
- Q. Notice to Proceed. A written notice from the Owner to the Contractor, which gives consent for commencement of the Work. Unless otherwise provided, Work shall commence on the date specified in the Notice to Proceed.
- R. Overhead. All costs of administration, field office and home office costs (including extended costs), general superintendence, office engineering and estimating costs, other required insurance, materials used in temporary structures (not including form work), additional premiums on the Performance and Payment Bonds of the Contractor, the use of small tools, scheduling costs, cumulative impact costs and all other costs incidental to the performance of a change in the Work or to the cost of doing business. Small tools are defined as any tool with a replacement value less than \$1,000.
- S. Owner. The School Board of Fairfax County, Virginia, its authorized representatives and employees.
- T. Project. The entire improvement of which this Contract and the Work contemplated hereby forms a part. The Project may include construction and/or other activities that are to be performed by the Owner or by one or more Separate Contractors.
- U. Separate Contractor. Any corporation, limited liability company, partnership or other person or entity that contracts with the Owner to perform one or more portions of the Project, other than the Work.
- V. Shop Drawings. All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor and are submitted by the Contractor to illustrate a portion of the Work. Shop Drawings are not Contract Documents.
- W. Site. The area upon or in which the Contractor's operations are performed and such other areas adjacent thereto as may be designated as such by the Architect. The Site may be shared by the Contractor with the Owner and with Separate Contractors and their subcontractors.
- X. Subcontractor. Any corporation, limited liability company, partnership or other person or entity, other than an employee of the Contractor, who contracts with the Contractor to furnish or who actually furnishes labor, materials, services or equipment, or any combination thereof to the Contractor in connection with the Work.
- Y. Submittal Schedule. A schedule for submission to the Architect of all required shop drawings, equipment data, and the like, which reflects lead times of critical submittals and is coordinated with the Construction Schedule for timely progress.

GENERAL CONDITIONS

- Z. Sub-Subcontractor. Any corporation, limited liability company, partnership or other person or entity, other than an employee of a Subcontractor, who contracts with a Subcontractor to furnish, or who actually furnishes labor, materials, service or equipment, or any combination thereof to a Subcontractor in connection with the Work.
- AA. Surety. Any entity that has executed as Surety the Contractor's performance and/or payment bonds securing performance of the Work contemplated by this Contract and/or providing for protection of claimants who have and fulfill contracts to supply labor or materials to the Contractor in connection with the Work.
- BB. Work. Everything explicitly or implicitly required to be furnished or performed under the Contract Documents. The Work may represent the whole, or a necessary and interdependent part of, the Project.

Number and Gender of Words. Whenever the Contract so admits or requires, all references to one number shall be deemed to extend to and include the other number, whether singular of plural, and the use of any gender shall be applicable to all genders.

2. INDEMNIFICATION:

The Contractor hereby assumes all liability for and agrees to indemnify and hold harmless the Owner and its Members, officers, authorized representatives and employees (each of whom shall be referred to herein as an "Indemnified Party") from and against any and all claims, losses, costs, damages, penalties, liabilities and fees (including reasonable attorneys' fees) and expenses resulting from: (i) any material breach of the representations, warranties, covenants and agreements of the Contractor contained in the Contract Documents; (ii) any injuries to persons or property caused by the negligence or other wrongful conduct of the Contractor, any Subcontractor, or any of its or their respective employees or authorized representatives; (iii) any claims filed by the Contractor (or by a Subcontractor, if permitted by law) that are adjudicated in favor of the Owner; or (iv) any other claim arising in any other manner-out of or in connection with the performance of this Contract by or on behalf of the Contractor.

Notwithstanding the foregoing, the Contractor will in no event be obligated hereunder to indemnify or hold harmless any Indemnified Party against liability for damage arising out of bodily injury to persons or damage to property suffered in the course of the Work, caused by or resulting solely from the negligence of such Indemnified Party.

3. CONFLICT OF INTEREST:

The provisions of the State and Local Government Conflict of Interests Act (Va. Code § 2.2-3100, *et seq.*) and Article IV of the Virginia Public Procurement Act entitle "Ethics in Public Contracting" (Va. Code § 2.2-4367 *et seq.*) are incorporated herein by reference. The Contractor shall incorporate the above conflict-of-interest clause in each subcontract entered into hereunder.

4. EXAMINATION OF SITE:

Bidders are required to visit the site, compare the Drawings and Specifications with any work in place, and inform themselves of all conditions, including other work, if any, being performed. Failure to visit the site in no way relieves the successful bidder from the necessity of furnishing any materials or performing any work that may be required to complete work in accordance with Drawings and Specifications without additional cost to the Owner.

GENERAL CONDITIONS

5. INSURANCE:

A. Contractor's Statutory and Legal Liability Insurance

During the Contract Period, the Contractor shall, at its own expense, purchase and maintain insurance to provide coverage for claims resulting from the Contractor's performance of the work. Such coverage shall extend to work performance by Subcontractors, persons or organizations directly or indirectly hired by the Contractor or any subcontractor in connections with the work, or any other persons or organizations who may cause liability to be incurred by the Contractor or any Subcontractor in connection with the work. Such coverage shall include, but not be limited to, the following:

1. Claims arising under workers' compensation, disability benefit, or other related benefits programs.
2. Claims resulting from bodily injury, occupational illness or death or any employees performing the work.
3. Claims resulting from bodily injury, illness disease or deaths of any persons in contact with the work, but who are not engaged as employees.
4. Claims arising under personal injury liability coverage for injury to any employee, which are directly or indirectly attributable to his employment for performance of the work.
5. Claims arising under personal injury liability coverage for injury to any person not an employee which are attributable to performance of the work.
6. Claims arising for damage or destruction of tangible property, including loss of use of the affected property as a result.

B. During the term of the Contract, the Contractor shall, at its own expense, purchase and maintain the following insurance with companies properly licensed to do business in Virginia and satisfactory to Owner in all respects. The Owner shall be designated on each policy as "The County School Board of Fairfax County, Virginia" as an additional named insured except for workers' compensation where the correct certificate of insurance coverage shall be furnished:

1. Workers' Compensation including Occupational Disease and Employer's Liability Insurance.
 - a. Statutory: Amounts and coverage as required by District of Columbia, Maryland and Virginia Workmen's Compensation Law, including provision for voluntary D.C. benefits as required in labor union agreements, and including the "All States" endorsement.
2. Employer's Liability.

Bodily Injury by Accident -- \$100,000 Each Accident
Bodily Injury by Disease -- \$500,000 Policy Limit
Bodily Injury by Disease -- \$100,000 Each Employee

GENERAL CONDITIONS

- C. Commercial General Liability Insurance: Contractor shall provide coverage written on ISO occurrence form CG 00 01 10 01 (or a substitute form providing equivalent coverage) to include the following:
1. Contractual liability as required by the indemnification provision of Paragraph 1.
 2. Personal injury liability, including offenses related to employment.
 3. Coverage of explosion, collapse, or underground hazards.
 4. Broad form property damage liability, including completed operations coverage.
 5. If insurance has been issued on a "claim made" basis, then comply with either of the following conditions.
 - a. Provide insurance of all required coverage for a period of two (2) years after final completion. Such coverage shall be subject to a retroactive date that is not later than the commencement of performance under the Contract, or
 - b. Provide insurance purchase of the extended reporting period endorsement for the policy or policies in force during the term of the Contract.
 - c. Limits of Commercial General Liability Insurance: Limits shall be the greater of requirements of the umbrella excess underwriter, or the following:
 - 1) \$1,000,000 bodily injury and property damage per occurrence;
 - 2) \$1,000,000 personal injury and advertising injury per person;
 - 3) \$1,000,000 aggregate products and completed operations; and
 - 4) \$2,000,000 general aggregate, per project.
 - d. Business Auto Liability Insurance: (includes owned, non-owned and hired vehicles.)
 - 1) Contractual liability coverage shall be included with respect to all auto rentals or lease agreements.
 - 2) Limits of coverage shall be the greater of the umbrella excess underwriter's requirement, or \$1,000,000 combined bodily injury and property damage per accident.
 - e. Umbrella Excess Liability Insurance: The lesser of \$5,000,000 or that amounts which, when added to requirements of B1, B2 and B3, total \$5,000,000. (For example, a \$4,000,000 umbrella in excess of the \$1,000,000 limits under the sections listed above, shall meet the limits requirements of this paragraph).
 6. The limits of liability of the insurance described in B. (lib) may be superseded if the limits prescribed by law are greater.

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7. Owner's Liability Insurance: The Owner may, at his own expense, purchase and maintain its own liability insurance to protect against claims which may arise in connection with the work, or the Owner may self-insure such risks.
 8. Property Insurance: The Contractor shall purchase and maintain property insurance upon the entire work at the site to the full insurance value thereof. This insurance shall include the interests of the Owner, Subcontractors and sub-subcontractors in the Work, and shall insure against all risks of loss, except as excluded. Insurance shall include coverage for the following:
 - a. Loss by explosion of boilers during testing (any exclusion applicable to such loss shall be waived).
 - b. Partial or complete occupancy by the Owner (any exclusion applicable to occupancy shall be removed).
 - c. Loss without coinsurance penalty (coinsurance or similar "insurance to value" requirements shall be eliminated).
 - d. Coverage of property in transit and unscheduled locations sufficient in limits to adequately cover maximum anticipated values at risk.
 - e. Coverage of Contractor's labor, overhead and profit.
 9. Notice of Insurance: Proof of insurance for each type of coverage listed herein shall be provided within ten (10) days after the Contractor's receipt of the Award Letter, and no work shall proceed unless all such insurance is in effect. The Contractor shall not allow any Subcontractor to commence work on its subcontract until all such insurance of the Subcontractor has been so obtained and approved by the Contractor and found to be in accordance with the requirements set forth herein. The Contractor certifies by commencement of the Work that its insurance and that of its Subcontractors is in effect and meets the requirements set forth herein.
 10. Notice of Cancellation: All of the aforesaid insurance policies must be endorsed to provide that the insurance company shall give thirty (30) days prior written notice to the Owner if the policies are to be terminated or if any changes are made during the life of the Contract which will affect in any way the insurance requirements set forth herein.
 11. Copies of Insurance Policies: Before commencing the Work, the Contractor shall provide the Owner with a copy of each policy, which the Contractor and each of its Subcontractors shall carry in accordance herewith, together with receipted bills evidencing proof of premium payment.
 12. No Waiver: Nothing contained herein shall have the effect of waiving or shall be deemed to affect a waiver of the Owner's sovereign immunity under law.
6. COMPLIANCE WITH LAWS; PERMITS, FEES, AND NOTICES:

The successful bidder shall be required to comply with all local, state and federal laws, rules, regulations and ordinances applicable to the Contract and to the services contemplated thereby. The successful bidder shall be required to obtain, at its expense, all permits, licenses and other authorizations necessary for the performance of the services, except that the Owner shall obtain,

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at its expense, all Building Permits that are required for completion of the Project. The successful bidder shall be responsible for giving all required notices and certifications, and for complying with all laws, ordinances, rules, regulations and directives of any public authority bearing on the performance of the work, regardless of whether those notices, certifications, laws, ordinances, rules, regulations and directives are expressly referenced in the Contract.

7. OCCUPIED AREA:

- A. The Contractor hereby certifies that: (i) neither the Contractor nor any employee of the Contractor who will have direct contact with students has been convicted of a felony or any offense involving the sexual molestation or physical or sexual abuse or rape of a child; and (ii) absent prior Notice to the Owner, neither the Contractor nor any employee of the Contractor who will have direct contact with students has been convicted of a crime of moral turpitude. The foregoing certification shall be binding upon the Contractor throughout the Contract Period and the Contractor hereby covenants and agrees to provide the Owner with immediate Notice of any event or circumstance that renders such certification untrue. The Contractor hereby covenants and agrees that it will require this certification to be included in every subcontract of every tier in order that the provisions contained herein will be binding upon each Subcontractor and Sub-subcontractor. The Contractor will ensure that no worker shall perform Work in occupied areas during school hours unless prior written approval has been granted by the Owner and proper safety precautions have been exercised to isolate the area of the Work.
- B. Alcoholic beverages, illegal drugs, and weapons are prohibited on the Site and shall constitute grounds for immediate removal from the Site of the Project. The Contractor shall ensure that neither its employees nor those of any Subcontractor shall fraternize in any manner with any student of Fairfax County Public Schools at the Site of the Work. The Owner shall have the right to remove from the job Site any person whose presence the Owner deems detrimental to the best interests of the Fairfax County Public Schools. Any individual who is removed from the Site pursuant to this paragraph may not return to such Site or to that of any other project of Owner without the prior written permission of the Owner.
- C. Drug-Free Workplace. During the performance of the Contract, the Contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor. As employed herein, the term "drug-free workplace" shall mean each site for the performance of work hereunder.

8. CLEANING:

The Contractor shall be totally responsible for periodic cleaning up of the building and premises daily. In addition to general broom cleaning, the Contractor shall remove all refuse, waste materials and debris of any kind regardless as to who may have left same. All such refuse shall be removed from the property of the Owner and disposed of in a legal manner to the end that at

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all times the building and premises shall present a neat, orderly and workmanlike appearance. The definition of "periodic" shall mean - "as necessary and/or at the direction of the Owner or his representative."

9. SUBCONTRACTORS:

Unless otherwise specified in the Contract Documents, within ten (10) days after the award of the Contract, the Contractor must submit a written statement to the Owner setting forth the name and address, and telephone number of each proposed Subcontractor and Sub-subcontractor and the portion of the Work and materials for which each such Subcontractor or Sub-subcontractor is responsible.

10. ASSIGNMENT AND LEGAL REPRESENTATIVES:

The Contract Documents shall not be assigned, sublet or transferred, in whole or in part, by operation of law or otherwise, by either of the parties hereto except with the prior written consent of the other. Unless specifically stated to the contrary in any written consent to an assignment, no assignment shall operate to release or discharge the assignor from any duty or responsibility under this Agreement.

11. TIME OF START:

The Contractor shall commence work within ten (10) calendar days after the date stated as the date to proceed in the Notice to Proceed. All work shall be performed during regular school business hours (7am – 5pm) only. Work performed outside of regular school business hours must be approved by the FCPS project manager or an FCPS representative prior to the work being performed.

12. EXTENSION OF TIME - NO WAIVER:

The Contractor shall be entitled to an extension of time for delay in completion of the Work only if obstructed or delayed in the commencement, prosecution or completion of any part of the work by any act or delay of the Owner, or by riot, insurrection, war, pestilence, acts of public authorities, fire, earthquakes, or by strikes, or other causes, which causes of delay mentioned in this Paragraph, in the opinion of the Owner, are entirely beyond the expectation and control of the Contractor. In such event, the period specified in any Notice to Proceed or Purchase Order for the completion of the work shall be extended by such time as shall be determined by the Owner. The parties agree that no extension beyond the date of completion fixed by the terms of the Contract shall be effective unless granted in writing, and signed by the Owner.

13. LIQUIDATED DAMAGES:

The Owner and the Contractor hereby acknowledge and agree that time is of the essence with respect to this Contract and in the event the Contractor fails to complete any work within the established timeframe, the Owner will incur actual monetary damage. The amount of **\$500.00** per day is set forth as the liquidated damages for each day that the time consumed in completing the work exceeds the time allowed. This amount shall in no event be considered as a penalty or otherwise than as the liquidated and adjusted damages to the Owner because of the delay.

14. UNTIMELY PERFORMANCE BY CONTRACTOR:

The Owner and the Contractor hereby acknowledge and agree that time is of the essence with respect to the performance of the Work. In the event the Contractor fails to complete the Work

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within the established timeframe, the Owner as well as Community Users will incur actual and direct harm. This includes, but is not limited to, the disruption or loss of scheduled classes, disruption or loss of school activities, loss of revenue from these cancelled activities, disruption or loss of intermural academic and athletic tournaments, loss of revenue from these cancelled events, disruption or loss of scheduled community use of the schools and facilities.

In addition to the Owner's assessment of liquidated damages, unapproved project delays also can result in the Contractor's loss of eligibility for award of future FCPS Office of Facilities Management projects for a period of three years or more as determined by FCPS Office of Facilities Management.

15. PROGRESS SCHEDULE:

Prior to the first request for payment, submit Progress Schedule in such form as to readily indicate status of work as planned, scheduled, and so arranged so that at weekly intervals it may be clearly determined whether actual state of work is in accord with schedule to Owner as indicate actual progress thereon weekly. Contractor shall update schedule to show substantial completion of project and final completion as necessary when delays or change orders are agreed upon and issued.

16. SCHEDULE OF COMPLETION:

- A. All work shall be substantially completed and certified according to the following schedule:
 - 1. Onsite work shall begin on December 22, 2018.
 - 2. Substantial Completion on or before February 1, 2019.
 - 3. Final Completion on or before February 15, 2019.
- B. Phasing of the project within the completion date will be jointly prepared by the Contractor, Office of Facilities Management, and school personnel to afford the least amount of disruption to school operations.
- C. Construction and alteration will be performed while the building is in use and therefore, the Contractor shall give full cooperation to the school authorities in scheduling and performing the work. Contractor shall give forty-eight hours advance written notice to school authorities when work is to be performed.

17. CONSTRUCTION SCHEDULES:

- A. The Contractor, promptly after receipt of the Award Letter, shall prepare and submit to the Owner, for approval, a construction schedule for the Work. The Construction Schedule, as approved, shall not exceed the time limits provided in the Contract Documents, shall be revised at appropriate intervals as required by conditions of the Work and the Project, shall be related to the entire Project to the extent required by the Contract Documents and shall provide for the expeditious execution of the Work within the Contract Period.
- B. The Contractor shall prepare and keep current, for the Owner's review and approval, a schedule of submittals which is coordinated with the Construction Schedule and is maintained both on the job site and available for the Owners review.

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18. SHOP DRAWINGS:

- A. The Contractor shall submit Shop Drawings and similar submittals required by the Contract Documents with reasonable promptness and in accordance with the Submittal Schedule as to cause no delay in the Work or in the activities of the Owner or of separate contractors.
- B. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings or similar submittals until the Owner has approved the respective submittal. Such Work shall be performed in accordance with the approved submittals.
- C. Delays in submission of shop drawings do not qualify for extension(s) in completion of the contract.
- D. Contractor is responsible for reviewing shop drawings from subcontractors and suppliers to verify that they meet the project requirements prior to submitting them to the Owner. The Contractor shall mark on the shop drawings the name of the reviewer and the date reviewed
- E. Shop drawings must have an approval block, the FCPS project number, and the specification section reference or plan sheet number.

19. CHANGE ORDERS:

19.1 PRELIMINARY PROCEDURES:

- A. Owner may initiate changes by submitting Proposed Modification to Contractor. Request will include:
 - 1. Detailed description of the Change, Products, and location of the change in the Project.
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. A specific period of time during which the requested price will be considered valid, which shall be 90 calendar days, unless otherwise stated.
 - 4. The specific action to be initiated by the Contractor.
 - 5. The amounts of the unit prices to be:
 - a. Those stated in the Agreement and the Bid Form.
 - b. Those mutually agreed upon between Owner and Contractor.
- B. Contractor may initiate changes by submitting a written notice to Owner containing:
 - 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.
 - 3. Statement of the effect on the Contract Sum and the Contract Time.
 - 4. Statement of the effect on the work.
 - 5. Documentation supporting any changes in Contract Sum or Contract Time, as appropriate.

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- C. All claims by the Contractor arising out of or relating to the performance of the work or any termination hereunder shall be made in writing and shall be decided by the Director of the Office of Facilities Management or his designated representative. All claims must be filed with the Office of Facilities Management within five (5) calendar days after sustaining the injury underlying the claim. Failure to comply with this provision shall constitute an absolute waiver of such claim. The Director or the Office of Facilities Management or his designated representative shall issue his written decision within thirty (30) days of his receipt of the written claim which decision shall be final.

19.2 DOCUMENTATION OF BIDS AND CLAIMS:

- A. Support each quotation for a lump-sum bid, and for each unit price, which has not previously been established, with sufficient substantiating data to allow Owner to evaluate the quotation.
 - 1. Bid costs attributable to labor shall be based upon labor rates for each category of personnel. A list of labor rates shall be submitted to the Owner for review and concurrence within 30 calendar days of the Notice to Proceed. See paragraph B2 below for allowable inclusions for establishment of labor rates.
- B. Provide data for lump sum bids in accordance with the following criteria:
 - 1. The Contractor's bid shall be itemized and segregated by labor, equipment, and materials for the various components of the Change in the Work (no aggregate labor total will be acceptable) and shall be accompanied by signed bids of any Subcontractors who shall perform any portion of the Change in the Work and of any entities who shall furnish materials or equipment for incorporation therein.
 - 2. The portion of the bid relating to labor, whether by the Contractor's forces or the forces of any of its Subcontractors, shall include anticipated gross wages of Job Site labor, including foremen, who shall be directly involved in the Change in the Work (for such time as they will be so involved), plus payroll costs (including premium costs of overtime labor, if overtime is authorized, Social Security, Federal or State unemployment insurance taxes and fringe benefits required by collective bargaining agreements entered into by the Contractor or any such Subcontractor in connection with such labor).
 - 3. The portion of the bid relating to materials may include the reasonable anticipated direct costs to the Contractor or to any of its Subcontractors of materials shall be purchased for incorporation in the Change in the Work, plus transportation and applicable sales or use taxes.
 - 4. The bid may further include the Contractor's and any of his Subcontractor's reasonable anticipated equipment rental costs, except small hand tools, in connection with the Change in the Work. For rented equipment an hourly rental rate shall be used which shall be determined by using the monthly rental rates taken from the current edition of the Rental Rate Blue Book for construction Equipment and dividing it by 176. An allowance shall be made for operating costs for each and every hour the equipment is actually operating in accordance with the rates listed in the aforesaid Rental Book. The Contractor shall be allowed no more than 65% of the rental rate on Contractor owned equipment.

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5. Base Cost is defined as the total of labor, material, and equipment rentals as described in Subparagraphs 17.2.B3 and 17.2.B4. The actual net cost in money to the Owner for the Change in the Work shall be computed as follows:
 - a. Contractor overhead and profit: If the Contractor performs the Change in the Work, his compensation shall be the Base Costs as described above, plus a mark-up of 20% on Base Costs less than or equal to \$10,000. If the Base Costs exceed \$10,000, his compensation shall be the Base Cost, plus a mark-up of 20% on Base Costs less than or equal to \$10,000, and a mark-up of 15% on Base Costs above \$10,000.
 - b. Subcontractor overhead and profit: If the work is performed by a Subcontractor, his compensation shall be the Base Costs as described above plus a mark-up as described in Paragraph 5.a. above for overhead and profit. The Contractor's compensation shall be a mark-up of ten percent (10%) of the Subcontractors Base Costs.
 - c. Sub-subcontractor overhead and profit: If the work is performed by a Sub-subcontractor, his compensation shall be the Base Costs as herein described plus a mark-up as described in paragraph 5.a. above for overhead and profit. The Subcontractors compensation shall be a mark-up of ten percent (10%) of the Sub-subcontractor's Base Costs for his overhead. The Contractor's compensation will be a mark-up of ten percent (10%) of the Sub-subcontractor Base Costs.
 6. The mark-up on the cost of labor, materials, and equipment described in above Paragraphs 5.a., 5.b., and 5.c. above shall compensate the Contractor, Subcontractor or Sub-subcontractor for all indirect costs associated with or relating to the Change in the Work including, but not limited to, labor and/or equipment inefficiency, changes in sequence, delays, interference, impact on unchanged work, gross receipts tax, superintendent, small tools, reproduction, administration, insurance, unrelated safety requirements, temporary structures and offices, all other general and administrative, home office, and field office expenses.
 - a. The mark-up on the cost of labor, materials, and equipment described in above Paragraphs 5.b. and 5.c. above shall compensate the contractor or Subcontractor for all indirect costs associated with or relating to the change in the Work including but not limited to, gross receipt tax, superintendent, reproduction, administration, and insurance.
- C. Support each claim for additional costs, and for work done on a time-and-material basis, with documentation as required for a lump-sum bid, plus additional information:
1. Name of the Owner's authorized agent who ordered the work, and date of the order. Include copies of written authorization when applicable.
 2. Dates and times that work was performed, and by whom, verified and signed by Owner's Authorized Representative.
 3. Time record, summary of hours worked, and hourly rates paid.
 4. Receipts and invoices for:

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- a. Equipment used, listing dates and times of use.
 - b. Products used, including listing of quantities.
 - c. Subcontracts.
 - D. Document requests for substitutions of Products as specified in Instructions to Bidders Section 16.
- 19.3 PREPARATION OF CHANGE ORDERS:
- A. Owner will prepare each Change Order. Two copies shall be prepared, each with original signature.
 - B. Form: Change Order - AIA Document G701.
 - C. Change Order will describe changes in the work, both additions, deletions and any voided proposed modifications.
 - D. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
 - D. Upon completion of work under a Change Order, enters the pertinent changes in Record Documents.
- 19.4 CHANGE ORDER CONTENTS:
- A. Contents of Change Orders will be based on, either:
 - 1. Owner's proposed Modification and Contractor's responsive Bid as mutually agreed between Owner and Contractor.
 - 2. Contractor's Bid for a change as mutually agreed between Owner and Contractor.
 - B. Owner will sign and date the Change Order as authorization for the Contractor to proceed with the changes.
 - E. Contractor will sign and date the Change Order to indicate agreement with the terms therein.
20. CHANGES IN WORK:
- 20.1 MINOR CHANGES:
- A. Owner's Right to Make Changes. The Owner reserves the right to make such additions, deletions, or changes to the Work as may be necessary in its sole and absolute discretion to complete the Work; provided, however, that no such additions, deletions or changes shall materially affect the substance hereof or materially change the Contract Sum. This Contract shall in no way be invalidated by any such additions, deletions or changes. No claim shall be made by the Contractor for loss of anticipated profits resulting from any such addition, deletion, or change to the Work.
 - B. Construction Conditions. Construction conditions may require minor changes in the location and installation of the Work and equipment to be furnished and other Work to be performed hereunder. The Contractor, when ordered by the Architect,

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shall make such adjustments and changes in the locations and Work as may be necessary without additional cost to the Owner, provided such adjustments and changes do not materially alter the character and quantity of the Work as a whole, or the Contract Sum, and provided further that Drawings and Specifications showing such adjustments and changes are given to the Contractor by the Owner or Architect within a reasonable time before work involving such adjustment and changes is begun. The Owner and the Architect shall be the sole judges of what constitutes a minor change for which no additional compensation shall be allowed.

- C. Time Extension for Minor Changes. The Contractor shall be entitled to an extension of time for such minor changes only for the number of days which the Architect may determine to be necessary to complete such changes and only to the extent that such changes actually delay the completion of the Project, and then only if the Contractor shall have strictly complied with all the requirements of the Contract Documents.

20.2 EXTRA WORK:

- A. The Owner may, in its sole discretion, at any time by a Proposed Modification or Change Order and without notice to the Sureties require the performance of such Extra Work as it deems necessary or desirable.
- B. A Work Order or a Change Order covering Extra Work shall be valid only if issued in writing and signed by the Owner and the Contractor, and the Extra Work so ordered must be performed by the Contractor and reflects the amount of compensation to be paid to the Contractor
- C. The amount of compensation to be paid to the Contractor for any Extra Work so ordered shall be determined as follows:
 - 1. By such applicable unit prices as set forth in the Contract; or
 - 2. If no such unit prices are set forth, then by a lump sum or other prices mutually agreed upon by the Owner and the Contractor.

21. CORRECTION OF WORK:

- A. The Contractor shall promptly correct any work, which fails to conform to the requirements of the Contract Documents (the "Rejected Work"), whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs associated with the correction of any Rejected Work.
- B. The Contractor's obligation to correct defective or non-complying work shall continue for a period of two (2) years after the date of Substantial Completion. The time period of this obligation may be extended by terms of warranties or other circumstances where required by law.

22. RIGHT TO SUPPLEMENT CONTRACTOR'S WORK FORCE:

In the event that the Contractor fails (in the opinion of the Owner) within 3 days following Notice from the Owner: (a) to correct defective Work; or (b) to supply labor, materials, or equipment that is necessary to complete the Work in strict accordance with the requirements of the Contract

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Documents, then the Owner shall have the right to (i) order the Contractor to stop the Work or a designated portion thereof; and/or (ii) supplement the Contractor's forces, in each case to the extent deemed necessary and advisable by the Owner and until such time as, in the opinion of the Owner, the cause of the order or action shall have been corrected. The Owner shall have the right to: (a) correct the deficiencies set forth in the Notice, either with its own forces or with a separate contractor engaged by the Owner to perform such corrections; (b) deduct the cost of correcting such deficiencies (including costs for additional services in connection therewith) from amounts then or thereafter due the Contractor under the Contract Documents; and (c) order the Contractor to re-start at a designated time all or any portion of the Work stopped by the Owner. If the amounts then or thereafter due the Contractor are insufficient to cover the cost of correcting the deficiencies, then the difference shall be payable by the Contractor to the Owner upon written demand. The Architect's determination of cost hereunder shall be final and binding upon the parties. The Owner's exercise of the right to correct deficiencies shall be in addition to, and shall in no way prejudice or limit, any other remedies available to the Owner. In the event that it is determined for any reason that grounds for stopping all or any portion of the Work did not exist, then, at the election of the Owner, the rights and obligations of the parties hereunder shall be the same as if the Notice directing the Contractor to stop the Work had been delivered under the provisions of Paragraph 23 hereof; provided, however, that the Contractor in such event shall be deemed to have received seven days prior written Notice of termination. Any compensation determined to be due the Contractor pursuant to Paragraph 23 shall be offset by the cost of correcting the Work. The Contractor shall in no event be entitled to receive anticipated profits or consequential damages of any kind in connection with any termination or action hereunder.

23. DISPUTED WORK:

If the Contractor is of the opinion that any work required by the Owner violates the terms and provisions of this Contract, then it shall, within four (4) days of commencing such work or action, notify the Owner of the asserted violation in writing. The Owner's Division Superintendent or Designee will make a determination within ten (10) days of the written request. Failure of the Contractor to so notify the Owner shall constitute a waiver and release of the Contractor's right to claim compensation for any work or damages resulting from such compliance.

24. CONTRACTOR CLAIMS:

- A. The Contractor must, within five (5) days after the occurrence of the event giving rise to a claim, deliver to the Owner's Division Superintendent or Designee a written statement specifying that the Contractor has sustained such damage, and detailing the basis of the claim against the Owner with a breakdown of the nature and amounts of such damages, duly verified by the Contractor and notarized. This itemized breakdown shall be made to the fullest extent possible, otherwise the claim shall be deemed to be waived.
- B. The Owner's Division Superintendent or Designee shall make a determination within twenty-five (25) days after receipt of the itemized breakdown, which decision shall be the final determination of the Owner.
- C. No claim by the Contractor shall be made for loss of anticipated profits due to delay or extension of contract completion time. The Contractor shall be entitled to an extension of time for such minor changes only for the number of days which the Owner determines to be necessary to complete such changes and only to the extent the changes actually delay the completion of the project, and then only if the Contractor shall have strictly complied with all the requirements of the Contract Documents.

25. OWNER'S RIGHT TO TERMINATE FOR CONVENIENCE

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The Owner shall have the right to terminate this Contract at its own convenience for any reason by giving seven (7) days prior written notice of termination to the Contractor. The Contractor shall be paid an amount equal to the lesser of: (1) the actual cost of any work, labor or materials actually performed or in place and the actual cost of any labor, equipment or materials ordered in good faith which could not be canceled, less the salvage value thereof, plus ten percent (10%) or (2) the pro rata percentage of completion based upon the Bid Breakdown plus the actual cost of any labor, equipment or materials ordered in good faith which could not be canceled, less the salvage value thereof.

26. CONTRACTOR'S DEFAULT AND TERMINATION:

A. The parties agree that:

1. if the Contractor is not prosecuting the Work with reasonable speed and diligence or is delaying the progress of the Work unreasonably or unnecessarily; or
2. If the Contractor fails to begin the Work when required to do so; or
3. if the force of workers or the quality or quantity of material furnished is not sufficient to insure completion of the Work within the specified time in the Contract Documents; or
4. if the Contractor fails in any manner of substance to observe the provisions of this Contract; or
5. if any of the Work, machinery, or equipment is defective and is not replaced;; or
6. if the Contractor fails to make prompt payments to suppliers or to Subcontractors for Work performed in connection with the Contract; or
7. if the Contractor fails to cooperate in good faith with the Owner;

than the Owner, without prejudice to any other rights or remedies it may have hereunder, shall have the right to declare the Contractor in default, in whole or in part.

- #### B.
- In the event the Owner elects to declare the Contractor in default, the Owner shall notify the Contractor and his Sureties by written notice describing the nature of the default and providing the Contractor a right to cure such default within three (3) calendar days after the date of the notice, or within such longer period as the Owner, in its sole and absolute discretion, may prescribe. In the event the default is not cured within the time period specified by the Owner, the Owner shall have the right to take any actions necessary to contract or complete the Work.
- #### C.
- Any costs incurred in connection with completing or correcting the Work shall be deducted from the amounts then or thereafter due the Contractor. In the event such amounts are not sufficient to cover the costs incurred in connection with completing or correcting the Work, the Contractor and his Surety shall pay to the Owner the amount of any deficiency.
- #### F.
- If, after issuance of a Notice of termination of the Contract under the provisions of this Paragraph, it is determined for any reason that the Contractor was not in default under the provisions of Paragraph 24(A)(1) through 24(A)(7), or that cause for such termination otherwise did not exist under the provisions of Paragraph 24(A)(1) through 24(A)(7), then

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the rights and obligations of the parties shall be the same as if the Notice of termination had been delivered under the provisions of Paragraph 23 hereof; provided, however, that the Contractor in such event shall be deemed to have received seven (7) days prior written Notice of termination. Any compensation thereupon owing to the Contractor under Paragraph 23 shall be offset by the cost of remedying any defective Work performed by or on behalf the Contractor. In no event shall the Contractor be entitled to recover anticipated profits or consequential damages of any kind in connection with any termination of these Contract Documents.

27. SUBSTANTIAL COMPLETION:

- A. When the Contractor considers that the Work is substantially complete, the Contractor shall provide the Owner written notification of such fact. The Owner shall prepare a comprehensive punch list of items to be completed and/or corrected. The Contractor shall proceed promptly to complete and correct the items on the punch list. Failure 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 Documents.
- B. It is the Contractor's responsibility to examine the work of all trades, to correct any deficiencies found, and to verify that all equipment is operating prior to notifying the Owner of Substantial Completion.
- C. "Substantially complete" means that all work described in the specifications or shown on the drawings is done, with only minor items needed to fully complete the work. Typical work that should be done in order to be considered substantially complete include: all equipment installed, piped, electrically connected, and tested with any problems corrected; control systems completed, calibrated and functioning as intended, insulation installed. Equipment should be fully functional and ready for use.

28. FINAL INSPECTION:

Upon written notification by the Contractor that the Work is finally complete, and upon the Contractor's submission of a final application for payment, the Owner will conduct a final inspection of the Work. When the Owner determines that the Work has been satisfactorily completed and the Contract Documents fully performed, including the submission of Operation and Maintenance Data as required in Section 34, he shall promptly prepare and issue a Final Certificate for Payment.

29. PAYMENTS AND COMPLETION:

For the Contractor's complete performance of the Work, the Owner agrees to pay, and the Contractor agrees to accept, subject to the terms and conditions hereof, the Contract Sum, taking into consideration any deductions based on award of a combination of alternates, if applicable, plus the amount required to be paid for Extra Work less credit for any Work omitted.

30. SCHEDULE OF VALUES:

- A. At the start of the Contract the Contractor shall provide a schedule of values for the work for the Owner's approval. The form shall be completed in detail including quantities and unit costs.

GENERAL CONDITIONS

- B. Submit three (3) copies to the project engineer for approval within 5 days of receipt of the Notice to Proceed.
 - C. The schedule of values shall be completed in detail including quantities and unit costs. Identify Schedule with:
 - 1. Complete title of Project and Location
 - 2. Contract number
 - 3. Name and address of Contractor
 - 4. Date of Submission
 - 5. Labor per item to install (lump sum labor will not be acceptable)
 - 6. Total Contract Sum
 - D. Organize the Content of Schedule into columns with headings as follows:
 - 1. Item Number (Column No. 1)
 - 2. Description of Item (Column No. 2)
 - 3. Quantity (Column No. 3)
 - 4. Unit of Measure (Column No. 4)
 - 5. Cost per unit (Column No. 5)
 - 6. Total cost of Item (Column No. 6)
 - E. Each item shall include a directly proportional amount of the Contractors overhead and profit.
31. REQUESTS FOR PAYMENTS AND PARTIAL PAYMENTS:
- A. On or about the first of each month, the Contractor shall make and certify an estimate of the amount and fair value of the Work performed based on the schedule of values and may apply for partial payment. Invoice must have the FCPS contract number clearly indicated on it. The Contractor shall submit the request for payment on AIA Document G702 or equal detailing the schedule of values, work completed, retainage, etc.
 - B. The Owner will retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this Contract, and (10%) of all equipment delivered and properly stored on the site.
 - C. Send all invoices to:
Fairfax County Public Schools
Department of Facilities and Transportation Services
Office of Facilities Management
Sideburn Support Center
5025 Sideburn Road
Fairfax, VA 22032-2637
Attention: Project Manager

GENERAL CONDITIONS

32. CONTRACTUAL DISPUTES:

- A. Any dispute arising hereunder or in connection herewith which is not otherwise resolved by the parties shall be decided by the Owner's Division Superintendent or Designee who shall reduce his decision to writing and mail or otherwise forward a copy thereof to the Contractor within thirty (30) days. The decision of the Owner's Division Superintendent or Designee shall be final and conclusive unless the Contractor appeals within six (6) months of the date of the final written decision by instituting legal action as provided in the Code of Virginia. A Contractor may not institute legal action, prior to receipt of the public body's decision on the claim, unless the public body fails to render such decision within the time specified.
- B. Contractual claims, whether for money or other relief, shall be submitted in writing no later than sixty (60) days after final payment; however, written notice of the Contractor's intention to file such claim shall have been given at the time of the occurrence or beginning of the work upon which the claim is based. Nothing herein shall preclude a contract from requiring submission of an invoice for final payment within a certain time after completion and acceptance of the work or acceptance of the goods. Pendency of claims shall not delay payment of amounts agreed due in the final payment.

33. LEGAL ACTION:

No bidder, offeror, potential bidder or offeror, or Contractor shall institute any legal action until all statutory requirements have been met.

34. OPERATION AND MAINTENANCE DATA:

The Contractor shall compile data and related information appropriate for the Owner's record, maintenance and operation of products, equipment, materials and systems furnished under the Contract. This shall include as-built drawings.

- A. Provide two (2) complete copies of the Record and Information Booklet and one (1) copy of Record and Information in a CD format, and delivered to the Owner. Booklet shall be a commercial quality three-ring binder with durable and cleanable plastic cover.
- B. The Contractor must include the Final Approved Equipment Submittal in the Booklet. The Contractor must provide a Warranty Letter indicating the warranty expiration date and a balancing report (if project is Mechanical/HVAC related) must be included in the Booklet.
- C. Neatly typewritten table of contents for each volume, arranged in a systematic order by specification divisions. Indicate contractor, name of project, contract number and address of project on the face of the binder. On the end of the binder the school name shall be printed with a permanent readable label.
- D. As-built drawings shall be red lined to show location and routing of any items not installed as shown on the original drawings.

35. BUILDING PERMITS:

Necessary building permits will be obtained by the Owner. Trade permits shall be obtained by the Contractor for all work prior to start of the project.

36. RIGHT OF AUDIT:

GENERAL CONDITIONS

The Owner and its authorized representatives shall, until the expiration of three years from the date of final payment under these Contract Documents, have the right to examine and copy those books, records, accounts, documents, papers and other supporting data which involve transactions related to this Contract or which otherwise permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used therein (the "Records"), and the Contractor hereby covenants to maintain the Records in good order for such time and to deliver promptly the Records to the Owner within 5 days after its written request. In the event that the Contractor fails to comply with this Paragraph, then the Owner, in addition to any other available remedies, shall have the right to withhold payment of amounts otherwise due the Contractor until such time as the Contractor shall have complied fully with the obligations set forth herein.

37. NOTICES:

All notices required or permitted hereunder shall be in writing and delivered in the manner prescribed herein. Written notice shall be deemed to have been duly served on the Contractor if delivered by U.S. Mail, hand delivery, or facsimile transmission to the Contractor's office at any Project or to the business address or fax number of the Contractor as stated in its Bid Form; or if delivered in person to the Contractor, to the Contractor's foreman or superintendent for the Project, or any officer or director of the Contractor. Unless otherwise specified herein, Notice shall be deemed to have been duly served on the Owner if delivered by U.S. Mail, hand delivery, or facsimile transmission (with a duplicate copy transmitted by another means of delivery authorized hereunder) to the Office of Facilities Management, Fairfax County Public Schools, 5025 Sideburn Road, Fairfax, Virginia 22032, fax number (703) 239-0462.

END OF SECTION

GENERAL REQUIREMENTS

GENERAL REQUIREMENTS

1. CONFLICT OF PROVISIONS:

Any provision of the Conditions of the Contract or of any other document incorporated herein by reference, which is in conflict or inconsistent with "Instructions to Bidders," except such provisions as are required by applicable codes, laws or regulations, shall be void to the extent of such conflict or inconsistency.

2. SITE CONDITIONS:

The Contractor is expected to have become familiar with, and taken into consideration, site conditions which may affect the work and to have checked all dimensions at the site.

- A. No plea of ignorance of conditions that exist or may hereafter exist on the work site, or difficulties that may be encountered in execution of the work as a result of failure to make necessary investigations and examinations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every detail all the requirements of the Contract documents and to complete the work for the consideration set forth therein, or as a basis for any claim whatsoever.

3. GENERAL:

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

- A. With submission of bid, the Contractor shall give written notice to the Owner of any materials or apparatus believed inadequate or unsuitable, in violation of Federal, State and Local Laws, Codes, Ordinances, and any necessary items of the work omitted. In the absence of such written notice, it is mutually agreed the Contractor has included the cost of all required items in his bid and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensation.
- B. All Contractors and subcontractors shall have current Virginia and Fairfax County licenses to do this kind of work.
- C. A copy of these plans and specifications shall be kept at the job site for the duration of the project. If the Contractor requires additional copies of the plans and specifications it will be the Contractor's responsibility to request up to two (2) additional copies from the Owner at no cost to the Contractor. If additional copies are requested these will be supplied to the Contractor at a cost of \$50 per set by the Owner. Owner will NOT perform any inspections, punch lists, or progress payments unless a copy of plans and specifications are on the job site.
- D. Successful bidder shall meet the Owner's Representative at the site or at the Owner's Representative's Office for a pre-construction meeting. After receipt of the Notice to Proceed the Contractor will contact the Owner's Representative to arrange the date, time and location of the meeting.
- E. It is the intention of the specifications and drawings to call for finished work, tested and ready for operation. Whenever the word "provide" is used, it shall mean "provide and

GENERAL REQUIREMENTS

install complete and ready for use."

- F. Any apparatus, appliance, material or work not indicated in the drawings but mentioned in the specifications, or vice versa or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed by the Contractor without additional expense to the Owner.
 - G. Contractor shall install all equipment, materials in accordance with the Manufacturer's instructions, the drawings and these specifications.
 - H. Contractor shall include in the work, without additional cost to the Owner, any labor, materials, services, apparatus, drawings (in addition to the Contract Documents), required to comply with all applicable laws, ordinances, rules and regulations, whether or not shown or specified.
 - I. For security purposes, all personnel working at this building shall check in and check out at the building's office each day and wear any identification badges required by the building. **Contractor employees/representatives are required to have photo identification and be able to present upon request.** Contractor shall further supply all personnel with a form of identification as to company, name of employee and photographic likeness.
 - J. All work shall comply with current County, City, State and/or Federal codes and standards, whichever may apply.
 - K. The Contractor shall obtain Owner's approval for any revisions items specified prior to incorporation into the work.
 - L. Contractor shall inform all employees that Fairfax County has a NO SMOKING policy on school grounds. Therefore workers shall comply with this policy when students/school personnel are present.
4. SCAFFOLDING, RIGGING AND HOISTING:
- A. Contractor shall furnish all scaffolding, rigging, hoisting, shoring and services necessary for erection and delivery into the premises, for equipment and apparatus furnished and removal of same from premises when no longer required.
 - B. No crane work will be done during regular school hours. The work area around cranes shall be protected with barricades, warning signs, and the Contractor shall provide personnel as necessary to prevent access to the work area by children or adults.
 - C. At no time the units shall be placed on the roof and rolled across the roof. Units shall be lifted directly onto the existing structural support on the roof.
5. ASBESTOS INSULATION:
- A. The Owner will provide upon request copies of asbestos inspections/reports if necessary in the performance of this Contract.
 - B. If the Contractor encounters any suspected asbestos he shall immediately stop work and inform the Owner of the conditions.
 - C. The Owner will be responsible for testing and if necessary removal of any asbestos

GENERAL REQUIREMENTS

containing material encountered in the performance of this Contract.

- D. No materials or equipment containing asbestos shall be utilized in the construction of the project.

6. SITE PROTECTION:

- A. While work is in progress, new materials and work area appurtenances shall be covered or protected from dust, debris or damage.
- B. The Contractor shall maintain the job site in a clean, safe, orderly working condition and shall leave the premises completely clean each day.
- C. The Contractor shall be responsible for the repair or replacement of any roof, grass, asphalt pavement, building, or building contents damaged during the course of this Contract. In addition, any fencing removed by the Contractor shall be re-installed without any damage and to the satisfaction of the Owner.
- D. The Contractor shall provide all necessary manpower, barricades, safety signs and protection needed to safely perform the required work during the Contract.
- E. All openings in building components required for installation of piping or wiring shall be cut, patched and repaired.
- F. All items (lights, pipes, fencing, etc.) that have to be removed during the course of this work shall be reinstalled or relocated as necessary to complete the project.
- G. Contractor shall protect all contents and infrastructure located within the work space and adjacent to the work areas. These shall include but not limited to bleachers, floor plates, lighting, sports padding, walls and ceiling. Gymnasium shall be left clean and free of all dust and debris.
- H. Smoke dust and any construction odors shall not be allowed to enter the occupied building. Contractor shall provide exhaust fans, ducts, seal openings into the school, and if necessary, schedule work during off-hours to prevent problems during the times that students and teachers are in the building.

7. WARRANTY:

Contractor shall warrant the workmanship and materials against defects for a period of two (2) years from the date of final acceptance after all tests and inspections are complete. Manufacturer's warranty individual equipment shall be for two (2) years.

- A. Any portion of the work supplied or performed by the Contractor, which fails within the warranty period shall be repaired or replaced by the Contractor without additional cost to the Owner. Repairs will be initiated within 24 hours of receiving a call from the Owner during the warranty period.
- B. One (1) month prior to the expiration of the warranty, Contractor shall revisit the project with the Owner's representative to determine if any items require correction or if any items previously reported have not been corrected. If necessary, Contractor shall correct noted items even if correction work extends beyond the warranty expiration date.

GENERAL REQUIREMENTS

8. INSTRUCTION OF OWNER'S REPRESENTATIVE:

- A. The Contractor shall furnish, without additional expense to the Owner, full instruction in the care, adjustment, and operation of all parts and controls to the Owner's employees.
- B. The instruction shall be given at a mutually agreed upon time with the Owner during the regular workweek after the equipment has been accepted and turned over to the Owner for regular operation. Where significant changes or modifications in equipment are made under the terms of guarantee, additional information shall be provided as may be necessary to acquaint the operating personnel with the changes or modifications.

9. OWNER'S REPRESENTATIVE:

The Director of the Office of Facilities Management, 5025 Sideburn Road, Fairfax, Virginia 22032, has designated **Zhongyuan (Eddie) Ding** as the point of contact (703) 764-2419. The Director, Office of Facilities Management, may designate such other individual(s) as he deems necessary to assist in the administration of this Contract. These individuals shall have the authority to inspect the Contractor's performance.

10. RELEASE OF BONDS:

The Surety Corporation providing the bonds for this project shall obtain a written release from the Owner prior to the expiration date of the bonds.

11. LOCKOUT AND TAGOUT:

The Contractor shall have an established lockout/tagout procedure, which meets the requirements of VOSH Standard 29 CFR Part 1910, Subpart J, Subsection 147, entitled Control of Hazardous Energy Sources. The Contractor shall coordinate with the Owner's Representative to conform to the Owner's lockout/tagout program requirements.

12. BARRICADES, WARNING SIGNS AND LIGHTS:

Comply with recognized standards and code requirements for the erection of substantial, structurally adequate barricades where needed to prevent accidents and losses. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the public of the hazard being protected against. Provide lighting where appropriate and needed, including flashing yellow lights where appropriate.

13. CONFINED SPACES:

The Contractor shall have an established confined space procedure that meets the requirements of VOSH Standard 29 CFR 1910, Subpart J, §146, titled "Permit-Required Confined Spaces." The Contractor is responsible to provide confined space air monitoring and rescue equipment, as well as any other required devices or equipment on site to all employees. The Contractor must be able to provide safety training records of its employees performing work in a confined space to the Owner upon request. The Contractor shall coordinate with the Owner's representative to ensure the Contractor conforms to all confined space program requirement.

END OF SECTION

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1. SCOPE OF WORK:

It is the intent of this contract is to remove one (1) water-cooled chiller, associated condensate pumps, chilled water pumps, air separator and expansion tank and replace with one (1) new water-cooled chiller, associated condensate pumps, chilled water pumps, air separator and expansion tank at the specified location. Work shall include all associated demolition rigging, piping, equipment, electrical equipment, controls, ductwork, insulation, patching, painting and related work as shown on the project drawings and as detailed in these specifications to provide a complete and fully operational installation.

2. REMOVAL OF EXISTING EQUIPMENT:

- A. The Contractor shall remove and dispose of the designated equipment, one (1) water-cooled chiller, one (1) air separator and one (1) expansion tank and associated components, piping, electrical equipment, and controls, per locations as shown on the drawing.
- B. The refrigerant in the existing chiller will be removed and disposed of by the Contractor.
- C. The Owner has the right of first refusal to any existing parts.

3. DETAILED SPECIFICATIONS FOR CHILLER:

PART 1: GENERAL:

1.01 Summary:

- A. Section includes design, performance criteria, refrigerants, controls, and installation requirements for water-cooled centrifugal chillers.

1.02 References:

- A. Comply with the following codes and standards
 - a. AHRI 550/590
 - b. AHRI 575
 - c. NEC
 - d. ANSI/ASHRAE 15
 - e. OSHA as adopted by the State
 - f. ETL
 - g. ASME Section VIII

TECHNICAL SPECIFICATIONS

1.03 Submittals:

- A. Submittals shall include the following:
 - 1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
 - 2. Summary of all auxiliary utility requirements such as electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
 - 3. Diagram of control system indicating points for field interface and field connection. Diagram shall fully depict field and factory wiring.
 - 4. Manufacturer's certified performance data at full load plus IPLV or NPLV.
 - 5. Installation and Operation manuals.

1.04 Quality Assurance:

- A. Regulatory Requirements: Comply with the codes and standards in above Section 1.02.
- B. Chiller manufacturer must be ISO Certified.
- C. The chiller shall be tested to job conditions at the manufacturer's plant.

1.05 Delivery and Handling:

- A. Chiller shall be delivered to the job site completely assembled and charged with refrigerant R134a and be shipped on skids with a weather resistant cover.
- B. Comply with the manufacturer's instructions for rigging and handling equipment. Leave protective covers in place until installation.

1.06 Warranty:

- A. The chiller manufacturer's warranty shall cover parts and labor costs for the repair or replacement of defects in material or workmanship, and include refrigerant for the entire unit, for a period of one year from equipment startup or 18 months from shipment, whichever occurs first, and also include an additional extended warranty for four years on the entire unit including refrigerant coverage. Warranty support shall be provided by company direct or factory authorized service permanently located near the job site.

1.07 Maintenance:

- A. Maintenance of the chillers in accordance with manufacturer's recommendations as published in the installation and maintenance manuals shall be the responsibility of the Owner.

TECHNICAL SPECIFICATIONS

PART 2: PRODUCTS:

2.01 Acceptable Manufacturers:

- A. Basis of Design: **Daikin Magnitude Model WMC or Trane Agility HDWA**, including the standard product features and all special features as required per the plans and specifications.
- B. The desired units shall be **Daikin** or **Trane**. For product substitutions, the Contractor shall reference "SUBSTITUTIONS" under INSTRUCTIONS TO BIDDERS. Contractor will provide the Owner's Representative with three copies of submittal data prepared by the unit manufacturer for approval. The units shall have the capacities and characteristics as shown on the drawings.

2.02 Unit Description:

- A. Provide and install as shown on the plans a factory assembled, charged, and tested water-cooled packaged centrifugal chiller. Chillers shall have no more than two oil-free, magnetic bearing, semi-hermetic centrifugal compressors (no exceptions). The compressor shall have an integrated variable-frequency drive operating in concert with inlet guide vanes for optimized full and part load efficiency. If two-compressors are used, the evaporator and condenser refrigerant sides and the expansion valve shall be common and the chiller shall be capable of running on one compressor with the other compressor or any of its auxiliaries inoperable or removed.
- B. Each chiller shall be factory run-tested under load conditions for a minimum of one hour on an AHRI certified test stand with evaporator and condenser water flow at job conditions (excluding glycol applications). Operating controls shall be adjusted and checked. The refrigerant charge shall be adjusted for optimum operation and recorded on the unit nameplate. Units operating with 50-Hz power shall be tested with a 50-Hz power supply. Any deviation in performance or operation shall be remedied prior to shipment and the unit retested if necessary to confirm repairs or adjustments. Manufacturer shall supply a certificate of completion of a successful run-test upon request.

2.03 Design Requirements:

- A. General: Provide a complete water-cooled, semi-hermetic, oil-free centrifugal compressor water chiller as specified herein. The unit shall be provided according to standards indicated in Section 1.2. In general, unit shall consist of one or two magnetic bearing, oil-free centrifugal compressors, refrigerant, condenser and evaporator, and control systems including integrated variable frequency drive, operating controls and equipment protection controls. Chiller shall be charged with refrigerant HFC-134A. If manufacturer offers a chiller using any HCFC refrigerant, manufacturer shall provide written documentation signed by an officer of the company, assuring refrigerant availability and price schedule for a 20-year period.
- B. The entire chiller system, including all pressure vessels, shall remain above atmospheric pressure during all operating conditions and during shut down to

TECHNICAL SPECIFICATIONS

ensure that non-condensables and moisture do not contaminate the refrigerant and chiller system. If any portion of the chiller system is below atmospheric pressure during either operation or shut down, the manufacturer shall include, at no charge:

1. A 20-year purge maintenance agreement that provides parts, labor, and all preventative maintenance required by the manufacturer's operating and maintenance instructions.
2. A complete purge system capable of removing non-condensables and moisture during operation and shut-down.
3. The manufacturer shall also include at no charge for a period of 20 years an annual oil and refrigerant analysis report to identify chiller contamination due to vacuum leaks. If the analysis identifies water, acid, or other contaminant levels higher than specified by the manufacturer, the oil and/or refrigerant must be replaced or returned to the manufacturer's original specification at no cost to the Owner.
4. The manufacturer shall include a factory-installed and wired system that will enable service personnel to readily elevate the vessel pressure during shutdown to facilitate leak testing.
5. A factory mounted, wired, and installed shell pressurization system shall be provided to keep air out of the chiller when the unit is not in service. Electric blanket or hot water circulation systems are both acceptable.

C. Performance: Refer to chiller performance rating.

2.04 Chiller Components:

- A. Compressors: The unit shall utilize a magnetic bearing, oil-free, semi-hermetic centrifugal compressor. The levitated shaft position shall be digitally controlled and shall be monitored by X-axis position sensor, Y-axis position sensor, and Z-axis position sensor. The compressor drive train shall be capable of coming to a controlled, safe stop in the event of a power failure by diverting stored power to the magnetic bearing controls system.
1. The motor shall be of the semi-hermetic type, of sufficient size to efficiently fulfill compressor horsepower requirements. It shall be liquid refrigerant cooled with internal thermal sensing devices in the stator windings. The motor shall be compatible with variable frequency drive operation.
 2. If unit contains an atmospheric shaft seal, the manufacturer shall provide the following at no additional charge:
 - a. 20 year warranty and all preventive maintenance required to maintain the shaft seal including appropriate disposal of all oil lost through the shaft seal. Such disposal shall be done in a manner consistent with all Federal, state, and local laws pertaining to disposal and documentation of appropriate disposal shall be provided.

TECHNICAL SPECIFICATIONS

- b. Replacement and re-charging on a semi-annual basis, or more often if required, all oil lost through the shaft seal.
 - c. 20 year refrigerant replacement warranty for any loss of refrigerant that can be directly attributable to the failure of the atmospheric shaft seal.
 3. If the compressor drive motor is an open design the chiller manufacturer shall provide the following at no additional charge:

A self-contained air conditioning system in the mechanical space sized to handle the maximum heat output the open drive motor. The energy required to operate this air conditioning system shall be added to the chiller power at all rating points for energy evaluation purposes.
 4. If the compressor drive motor uses any form of antifriction bearings (roller, ball, etc.) the chiller manufacturer shall provide the following at no additional charge:
 - a. A 20 year motor bearing warranty and all preventative maintenance, including lubrication, required to maintain the bearings as specified in the manufacturer's operating and maintenance instructions.
 - b. At start up a three axis vibration analysis and written report which establishes a baseline of motor bearing condition.
 - c. An annual three axis vibration analysis and written report to indicate the trend of bearing wear.
 5. The chiller shall be equipped with an integrated Variable Frequency Drive (VFD) to automatically regulate compressor speed in response to cooling load and the compressor pressure lift requirement. Movable inlet guide vanes and variable compressor speed acting together, shall provide unloading. The chiller controls shall coordinate compressor speed and guide vane position to optimize chiller efficiency.
 6. The compressor circuit shall be equipped with a 5% line reactor to help protect against incoming power surges and help reduce harmonic distortion.
 7. The compressor shall be vibration tested and not exceed a level of 0.14 IPS.
- B. Evaporator and Condenser:
 1. The evaporator and condenser shall be separate vessels of the shell-and-tube type, designed, constructed, tested and stamped according to the requirements of the ASME Code, Section VIII. Regardless of the operating pressure, the refrigerant side of each vessel will bear the ASME stamp indicating compliance with the code and indicating a test pressure of 1.1 times the working pressure, but not less than 100 psig. The tubes shall be individually replaceable and secured to the

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intermediate supports without rolling or expanding to facilitate replacement if required.

2. Chillers containing oil shall include at no additional charge a 20 year parts and labor warranty on all oil system components including:
 - a. Pumps
 - b. Starter
 - c. Piping
 - d. Tank
 - e. Heater
 - f. Cooler
 - g. Controls
 - h. Valves
3. The evaporator shall be flooded type with 0.025 in. wall copper internally and externally enhanced tubes rolled into carbon steel tubesheets. The water side shall be designed for a minimum of 150 psig. The refrigerant side shall be designed for a minimum of 200 psi. Provide intermediate tube supports at a maximum of 24 inch spacing. The heads shall be carbon steel and the tubes shall be carbon steel. Water connections shall be grooved suitable for Victaulic couplings. The evaporator shall be equipped with marine water boxes with removable covers and vent and drain connections. The evaporator shall have left-hand connections when looking at the unit control panel.
4. The condenser shall have 0.025 in. wall copper internally and externally enhanced tubes rolled into carbon steel. Water connections shall be grooved suitable for Victaulic couplings. The water side shall be designed for a minimum of 150 psig. The refrigerant side shall be designed for a minimum of 200 psi. Provide intermediate tube supports at a maximum of 24 inch spacing. The condenser shall be equipped with marine water boxes with removable covers and vent and drain connections. The condenser shall have right-hand connections when looking at the unit control panel.
5. Provide sufficient isolation valves and condenser volume to hold the full unit refrigerant charge in the condenser during servicing or provide a separate pumpout system and storage tank sufficient to hold the charge of the largest unit being furnished.
6. An electronic expansion valve shall control refrigerant flow to the evaporator. Fixed orifice devices or float controls with hot gas bypass are not acceptable because of inefficient control at low load conditions. The liquid line shall have moisture indicating sight glass.
7. Re-seating type spring loaded pressure relief valves according to ASHRAE-15 safety code shall be furnished. The evaporator shall be provided with single or multiple valves. The condenser shall be provided with dual relief valves equipped with a transfer valve so one relief valve can be removed for testing or replacement without loss of refrigerant or removal of refrigerant from the condenser. Rupture disks are not

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acceptable. If rupture disks are required on negative pressure units to prevent air and moisture ingress, then factory mounted spring loaded pressure relief valves shall be provided in series with the rupture disks to contain the remaining refrigerant in the event of vessel over-pressurization. The space between the rupture disk and the relief valve shall include a suitable telltale indicator integrated into the chiller control system to alert the operator that a potential safety issue exists in the pressure relief system.

8. The evaporator, including water heads, suction line, and any other component or part of a component subject to condensing moisture shall be insulated with UL recognized 3/4 inch closed cell insulation. All joints and seams shall be carefully sealed to form a vapor barrier.
 9. Provide factory-mounted and wired, thermal-dispersion water flow switches on each vessel to prevent unit operation with no or low water flow. Paddle and pressure differential type switches are not acceptable due to high rates of failure and false indications from these types of flow indicators.
- C. Vibration Isolation: Provide neoprene waffle-type vibration isolators for each corner of the unit.
- D. Power Connections: Power connection shall be single point to a factory-mounted disconnect switch.
- E. Chiller Control:
1. The unit shall have a microprocessor-based control system consisting of a 15-inch VGA touch-screen operator interface and a unit controller.
 2. The touch-screen shall display the unit operating parameters, accept set point changes (multi-level password protected) and be capable of resetting faults and alarms. The following parameters shall be displayed on the home screen and also as trend curves on the trend screen:
 - a. Entering and leaving chilled water temperatures.
 - b. Entering and leaving condenser water temperatures.
 - c. Evaporator saturated refrigerant Pressure.
 - d. Condenser saturated refrigerant pressure.
 - e. Percent of 100% speed (per compressor).
 - f. % of rated load amps for entire unit.
 3. In addition to the trended items above, all other important real-time operating parameters shall also be shown on the touch-screen. These items shall be displayed on a chiller graphic showing each component. At a minimum, the following critical areas must be monitored:
 - a. Compressor actual speed, maximum speed, percent speed.
 - b. Evaporator water in and out temperatures, refrigerant pressure and temperature.
 - c. Condenser water in and out temperatures, refrigerant pressure and temperature.

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- d. Liquid line temperature.
 - e. Chilled water set point.
 - f. Compressor and unit state and input and output digital and analog values.
4. A fault history shall be displayed using an easy to decipher, color coded set of messages that are date and time stamped. Time interval scale shall be user selectable as 20 minutes, 2 hours, or 8 hours. The alarm history shall be downloadable from the unit's USB port. An operating and maintenance manual specific for the unit shall be viewable on the screen.
 5. All set-points shall be viewable and changeable (multi-level password protected) on the touch screen and include set-point description and range of set values.
 6. Automatic corrective action to reduce unnecessary cycling shall be accomplished through preemptive control of low evaporator or high discharge pressure conditions to keep the unit operating through abnormal transient conditions.
 7. Chiller shall be capable of starting with entering condenser water temperatures as low as 40°F (4.4°C). For short periods of time during startup, the chiller shall be able to operate with an entering condenser water temperature lower than the leaving chilled water temperature.
 8. Chiller shall be capable of stable operation with varying evaporator flow rate up to 50% per minute.
 9. Chiller plant optimization software for multiple chillers shall be provided including automatic control of: at least eight (8) chillers, evaporator and condenser pumps (primary and standby), up to 3 stages of cooling tower fan cycling control and a tower modulating bypass valve or cooling tower fan variable frequency drives.
 10. The factory mounted controller(s) shall support operation on a BACnet® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.
 - a. BACnet MS/TP master (Clause 9)
 - b. BACnet IP, (Annex J)
 - c. BACnet ISO 8802-3, (Ethernet)
 11. The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the

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unit sequence of operation and the unit points list.

12. The factory supplied VFD and controls shall include the following:
 - a. High short circuit panel rating of 35kA at 460v with a matching circuit breaker.
 - b. Electronic overload
 - c. Phase loss protection
 - d. Under/over voltage protection
 - e. High short circuit panel rating of 35kA at 460v with a matching circuit breaker.
 - f. EMI filters to reduce radio frequency interference.

13. Energy saving software logic shall at a minimum offer the following:
 - a. User programmable compressor soft loading
 - b. Chilled water reset
 - c. Demand limit control
 - d. Staging options lead lag between multiple compressors on a single chiller or on multiple chillers
 - e. Plotting of historic trends for optimizing efficiency

PART 3: EXECUTION:

3.01 Installation - Installing Contractor to:

- A. Install per manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust chiller alignment on foundations, or sub bases as called for on drawings.
- C. Arrange piping to allow for dismantling to permit head removal and tube cleaning.
- D. Coordinate electrical installation with electrical contractor.
- E. Coordinate controls with control contractor.
- F. Provide all material required for a fully operational and functional chiller.

3.02 Start-Up:

- A. Factory Start-Up Services: Provide for as long a time as is necessary to ensure proper operation of the unit, but in no case for less than two full working days. During the period of start-up, the start-up technician shall instruct the Owner's Representative in proper care and operation of the unit.

- B. Service Contract:
 - (1) Service Contract, which shall be provided by the chiller manufacturer's local factory authorized service representative, shall provide a five (5) year full service Parts, Labor and Maintenance Contract for the chiller system, including all controls required to control associated chilled water and chiller winterization. **The service contract shall provide seven (7) inspections with each providing written reports each year and all emergency service on a 24-hour per day basis. The written reports shall be sent to Mr. Edward Bowler, Office of Facilities Management, 5025 Sideburn Road, Fairfax, VA 22032.** With

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documented surety of the manufacturer, this service may be implemented by an authorized service organization. Chiller Manufacturer shall provide the Owner with the manufacturers approved formal contract. The contract shall be presented with an option to the Owner of being renewed for an additional 5 years (years 6-10), which would be executed by Owner subsequent to the expiration of the first 5 year contract. This contract shall be executed prior to start up. The effective start date of the service contract shall be the beginning of the warranty period.

(2) Maximum response time for service technician to be on site for any emergency call out shall be within 4 hours of the receipt of the call from the Owner.

(3) Acceptable Service Contract Providers:

<u>Manufacturer</u>	<u>Service Provider</u>
Daikin	Daikin Service
Trane	Boland Trane

(4) Cost for the service contract(s) shall be included in the base bid price.

C. Startup:

The chiller manufacturer shall provide a factory trained representative, employed by the chiller manufacturer's authorized representative, to perform the startup procedures as outlined in the startup, operation and maintenance manual provided by the chiller manufacturer. After the above services have been performed, the same factory-trained representative will be available for a period of classroom instruction not to exceed **4 hours to instruct the Owner's personnel in the proper operation and maintenance of the chiller.**

D. Pipe Connections: The chiller shall have flanged pipe connections on the chilled water piping connections to the machine.

E. Warranty Tag: The Contractor shall attach an engraved weatherproof Guarantee or Warranty tag to the exterior of each new unit. Identification tag shall be black with engraved 1/4" white letters which reads:

UNIT # <u>(unit number)</u>
INSTALLED BY: <u>(contracting company's name & phone #)</u>
2 YR. WARRANTY EXPIRES: <u>(month / day / year)</u>
5 YR. SERVICE CONTRACT EXPIRES: <u>(month/ day/ year)</u>
SERVICE PROVIDER: <u>(Service providers name)</u>
PHONE: <u>(Service providers telephone number)</u>

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4. ENERGY MANAGEMENT SYSTEM:

- A. Before removing the units, the Control Contractor shall note the function of all existing energy management system controls and tag control wires with their origination.
- B. The existing energy management systems temperature sensors and CT amperage relays shall be reused, by the Control Contractor.
- C. After setting the new units, new controls, and control wires will be routed by the Control Contractor as specified on the drawing control notes/points. The Control Contractor will coordinate new control wiring termination points with the FCPS Energy Management Section.
- D. All wiring shall be neatly routed in electrical EMT conduit, wire tied, color coded, tagged and permanently labeled on the unit wiring diagram. All wiring terminations shall be landed on either factory supplied or field supplied terminal strips.
- E. The Control Contractor shall contact the FCPS Energy Management Section (located at 5025 Sideburn Road) before beginning sequence of operation programming. The Control Contractor must verify all control points and new sequence of operation commands with Energy Management Section by contacting Serghei Malcov at (703) 764-4373.
- F. Control wiring shall be multi-conductor stranded copper, minimum size 18 AWG, # 300 volt rated. Control wires installed in the airstream within the units or within the building shall have 10 mils TPE Teflon insulation fully color coded, rated 300 volts with Teflon outer jacket. Teflon coating shall comply with the NFPA 72D for use in a plenum ceiling

5. POWER ROOF VENTILATOR:

The power roof ventilator shall be the type, capacity and drive (belt drive or direct drive), and be located as shown on the drawings. Power roof ventilator shall be manufactured by GREENHECK. Ventilators fully equal to the specified manufacturer and manufactured by AEROVENT, CARNES, JENCOFAN, PENN VENTILATOR COMPANY, ACME, US FAN or LOREN COOK are acceptable.

- A. Fan - Shall be provided with a backward inclined centrifugal wheel that has been statically and dynamically balanced. The bearings shall be heavy duty, self-aligning, sealed ball bearings. The motor and fan assembly shall be isolated from the base with rubber-in-shear vibration isolators.
- B. Belt drive ventilators shall have variable speed sheave pulley to adjust the speed of the ventilator.
- C. Motor - Shall be installed in a totally enclosed weatherproof housing outside of the air stream. The motor shall have sealed ball bearings and be internally thermally protected.
- D. Disconnect Switch - A factory wired non-fused toggle type disconnect switch shall be located under the housing of the unit.

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- E. Starter - Provide a magnetic across-the-line starter for three phase units. **The starter shall have ON-OFF-AUTO switch and red running light.**
 - F. Pre-fabricated aluminum or galvanized steel curbs 12" high shall be provided to match the power roof ventilator. The curb shall be flashed to match the roofing system. Provide wood nailer. The power roof ventilator and curb shall be provided by the same manufacturer. Backdraft dampers shall be mounted in the curb and shall be full size of the opening.
 - G. Accessories shall be provided as shown on the drawings. Such accessories shall be of the same manufacturer as the ventilators. All ventilators shall have gravity type backdraft dampers.
 - H. Unit shall be controlled by the refrigerant monitor.
6. EXPANSION TANK AND AIR SEPARATOR:
- A. Expansion Tank - Shall be ASME labeled and the size listed on the drawings. Provide the tank with the required tappings and a prime coat of paint. The expansion tank shall be BELL & GOSSETT, TACO, JOHN WOOD, WESSELS, or ARMSTRONG.
 - B. Tank Fitting - Shall match the tank to maintain the proper amount of air. The tank fitting shall be BELL & GOSSETT or TACO.
 - C. Air Separator: Shall be ASME labeled and the same size as connecting pipe. Provide separator with strainer. The air separator shall be BELL & GOSSETT, TACO, THRUSH, AMTROL, JOHN WOOD, or ARMSTRONG.
7. REFRIGERANT LEAKAGE SENSOR AND SIGNAGE:
- A. A sensor mounted within the chiller room shall monitor refrigerant levels in the room. The sensor shall measure and indicate refrigerant levels ranging from 0-1000 parts per million. The sensor shall have an alarm setting of 1000 PPM which will activate audible and visual alarms located in the chiller room, outdoors at the chiller room entrance, and in the building outside of the chiller room. Exceeding the alarm setting of the sensor shall also activate the chiller room emergency exhaust fan (and de-energize the boilers and water heaters if located in the chiller room). Interlock wiring to be provided by the mechanical contractor.
 - B. Provide signage outdoors on the exterior door to the chiller room, and indoors on the outside of the chiller room door, which states "DO NOT ENTER WHEN ALARM IS ACTIVE. CALL THE OFFICE OF SAFETY AND SECURITY @571-423-2000".
 - C. Provide hazard signage outdoors on the exterior door to the chiller room, and indoors on the outside of the chiller room door, to comply with the NFPA 704 requirements for use of refrigerants R-134a R-410a. Signs shall be a minimum of 6" x6" and shall display the hazard ratings.
8. PIPE FITTINGS AND JOINTS:
- A. Chilled water supply and return: Shall be schedule 40 black steel pipe with 125 psi cast iron screwed fittings or 150 psi steel weld fittings.

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- B. Cold water make-up - Shall be type 'L' copper tubing with copper fittings.
- C. Condensate drain piping: Shall be schedule 40 plastic pipe and plastic drainage fittings or type 'L' copper tubing and fittings. Plastic pipe may not be used in plenum spaces.
- D. Runouts to terminal units with copper pipe connections: Type 'L' hard drawn copper tubing shall be used for runouts where required. A brass coupling shall be used between the steel pipe and copper tubing connection.
- E. Condensing water supply and return piping - Shall be schedule 40 black steel pipe with 125 psi cast iron screwed fittings or 150 psi steel weld fittings.
- F. All piping shall be installed parallel or perpendicular to the building construction and shall be installed so as to allow for expansion and drainage.
- G. Piping Joints:
 - (1) Screwed Joints - Screwed joints shall be made with full cut American Standard Pipe Thread. All pipe shall be reamed to full diameter of the pipe. Pipe thread compound shall be applied to the male thread only.
 - (2) Welded Joints:

Welded joints for steel pipe 2 1/2" and larger shall be made in accordance with the procedure standard in the American Standards Association piping code, and before assigning any welder to work covered, the Contractor shall provide for the approval of the name(s) of pipe welders to be employed in the work, together with certification that each of these welders has passed qualification tests as prescribed by the National Certified Pipe Welding Bureau or by other reputable testing laboratory or agency using procedures approved by the ASME or American Welding Society. The Contractor shall use only approved factory manufactured welding type fitting for the intersection welding or branching to mains. Valves and specialties shall have screwed or flanged joints.

Welding tees, ells, reducers and caps shall be of wrought or forged construction similar to those manufactured by TUBE TURNS, INC. In lieu of wrought or forged welding tees for branch outlets, weldolets or welding nipples may be used; provided, first that the nipples are accurately coped in the shop to fit the pipes and leveled for field welding; and provided, second that openings in the walls of pipes are cut to full inside diameter of the nipples; and third, that the outlet diameter shall be less than 3/4 the diameter of the main.
 - (3) Solder Joints:

The solder joint above grade shall be made, unless other noted, with 95% tin - 5% lead solder using approved flux. All underground joints and refrigeration joints shall be made with a 15% silver bearing solder. Cut pipe shall be reamed to full diameter. Copper to steel pipe connections shall be made with brass unions.
 - (4) Flanged Joint - The flanged joint shall be made with the proper number and size of bolts and with the proper gasket between the flanges.

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H. Pipe Testing:

All new piping shall be tested for leaks before any insulation is applied and before the piping system is covered up. The test shall be at least 100 psi of water or air pressure.

I. Pipe Hangers and Supports:

Pipe Hangers and Supports Material - Provide a combination of pipe hangers and supports such as steel and copper clad clevis hangers, round steel rods, concrete inserts, clamps, brackets and other items as applicable. Hangers and supports shall meet the recommendations of the manufacturer. Parallel runs of horizontal piping shall be grouped together on adjustable trapeze hangers. All hangers in contact with copper pipe shall be copper plated. Pipe hangers and support shall be of the size to accommodate the pipe and insulation where applicable. Pipe hangers and supports manufacturer: MASON, GRINNELL, or NIBCO.

(1) Hanger Spacing for Horizontal Pipe shall not exceed:

1/2" to 1" Pipe	6'-0"
1 1/4" to 2" Pipe	8'-0"
2 1/2 to 4" Pipe	10'-0"

(2) Hanger Rods shall be at least:

Pipe to 2/8"	3/8" diameter
2 1/2" to 3"	1/2" diameter

J. Sheet Metal Saddles - Supports for insulated pipes shall not contact the pipe but shall surround the unbroken insulation covering. Provide galvanized steel sheet metal saddles properly form to the jacket between hanger and the lower 1/3 of the circumference. The size of the saddles shall be as follows:

Pipe to 1"	18 gauge X 8" long
1 1/2" to 2"	16 gauge X 12" long
2 1/2" to 4"	14 gauge X 16" long

K. Valves:

- (1) Valves shall be manufactured by STOCKHAM, JENKINS, HAMMOND, MILWAUKEE, FAIRBANKS, CRANE, LUNKENHEIMER, WALWORTH, NIBCO, JAMESBURY or ROCKWELL unless otherwise noted. Stockham catalog numbers are listed to identify quality and style. Valves shall be rated for the medium served.
- (2) Gate Valves 2" and Under: Shall be cast bronze body, screwed ends and solid wedge disc with rising stem. Stockham #B107.
- (3) Gate Valves 2-1/2" and Larger: Shall be iron body flanged ends and solid wedge disc with rising stem (O S & Y type) Stockham #G623.
- (4) Globe Valves 2" and Smaller: Shall be cast bronze body, screwed ends and

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replaceable composition disc. Stockham #B22.

- (5) Check Valves 2" or Smaller: Shall be cast bronze body swing check with screwed ends and with regrinding disc. Stockham #B319.
- (6) Check Valves 2-1/2" and Larger: Shall be flanged iron body with bronze disc and ring. Stockham #6931.
- (7) Butterfly Valves: 2" and larger may be used in lieu of gate or globe valves except on steam and condensate lines. These valves shall be rated at not less than 150 psi WOG Class and be suitable for use with 180 degree F water. Shall be lug type for pipe removal on either side of valve and shall have stainless steel shafts. Stockham #LD611.
- (8) Butterball Valves: 2" and smaller may be used in lieu of gate or globe valves. These valves shall be rated at not less than 150 psi WOG Class, be suitable for use with 180-degree water and provided with extended handles. STOCKHAM #720.
- (9) Balancing Valves: Valves manufactured by B&G, FLOWSET, BARCO, GRISWALD or PRESO with memory stop. Flow set model AS size 1/2" to 2" flow .25 GPM to 100 GPM. For all units with run outs 2" and smaller.
- (10) Balance valve for pump: Eccentric, combination shut-off and balancing with memory stop valve as manufactured by DEZURIK or ROCKWELL.

L. Control Valves:

(1) General:

Provide factory fabricated control valves of type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature in piping system. Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve. Equip control valves with heavy-duty actuators, with proper shutoff rating for each individual application. Required close-off pressure for water valve applications shall be the shutoff head of associated pump. Required close-off rating of steam valve applications shall be design inlet steam pressure. For close-off pressure ratings less than 30 psid the minimum close off shall be 30 psid.

(2) Plug-Type Globe Pattern for Water Service:

- (a) Valve Sizing: Modulating valves shall be sized for maximum full flow pressure drop between 3 and 5 PSIG unless scheduled otherwise.
- (b) Single Seated (Two-way) Valves: Equal percentage characteristics. Cage type trim, providing seating and guiding surfaces for plug on "top and bottom" guided plugs.
- (c) Double Seated (Three-way) Valves: Linear characteristics. Balanced plug type, with cage type trim providing seating and guiding surfaces on "top and bottom" guided plugs.

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- (d) Temperature Rating: 25°F minimum, 250°F maximum.
 - (e) Body: Bronze, screwed, 250 psi maximum working pressure for ½" to 2";
Cast Iron, flanged, 125 psi maximum working pressure for 2-1/2" and larger.
 - (f) Valve Trim: Bronze; Stem: Polished stainless steel.
 - (g) Packing: Spring Loaded Teflon or Synthetic Elastomer U-cups, self-adjusting. O-ring packings are unacceptable.
 - (h) Plug: Brass, bronze or stainless steel, Seat: Brass.
 - (i) Disc: Replaceable Composition or Stainless Steel Filled PTFE.
 - (j) Ambient Operating Temperature Limits: -10 to 150°F.
 - (k) Valves shall be suitable for 200°F water service.
 - (l) Acceptable Manufacturers: Subject to compliance with requirements approved manufacturers are as follows:
 - 1) Johnson Controls
 - 2) Siebe Environmental Controls
 - 3) Warren
 - 4) Delta
 - 5) Belimo
 - 6) TAC
- (3) Butterfly Type:
- (a) Body: Extended neck epoxy coated cast or ductile iron with full lug pattern, shall have minimum 4" stem extension, ANSI Class 125 or 250 bolt pattern to match specified flanges.
 - (b) Seat: EPDM.
 - (c) Disc: Bronze or stainless steel, pinned or mechanically locked to shaft.
 - (d) Bearings: Bronze or stainless steel.
 - (e) Shaft: 300 or 400 series stainless steel.
 - (f) Cold Service Pressure: 175 psi.
 - (g) Valves shall be suitable for 200°F water service.
 - (h) Bubble-tight shutoff to 150 psi.
 - (i) Acceptable Manufacturers: Subject to compliance with requirements approved manufacturers are as follows:
 - 1) Jamesbury WS815
 - 2) Bray Series 31

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- 3) Keystone AR2
- 4) Dezurik BGS
- 5) Belimo F6/F7

(4) Ball Type:

- (a) Body: Brass or Bronze, one, two, or three piece design, threaded ends.
- (b) Seat: Reinforced Teflon.
- (c) Ball: Stainless steel.
- (d) Port: Standard or 'V' style.

- (e) Stem: Stainless steel, blow out proof design, extended to match thickness of insulation. Provide stem protective sleeve that allows operation of valve without breaking the vapor seal on chilled water service valves.

- (f) Cold Service Pressure: 250 psi WOG.

- (g) Acceptable Manufacturers: Subject to compliance with requirements approved manufacturers are as follows:
 - (1) Conbraco
 - (2) Worcester
 - (3) Nibco
 - (4) Jamesbury
 - (5) PBM
 - (6) Delta
 - (7) Belimo
 - (8) TAC

(5) Actuators:

- (a) General Valve actuators/operators not supplied as an integral part of the factory fabricated equipment shall be furnished and installed under this section of the specifications. Size actuators and linkages to operate their appropriate dampers or valves with sufficient reserve torque or force to provide smooth modulating action or 2-position action as specified. All heating valve actuators for valves 1 1/4" and larger and OA damper actuators shall have a manual override with spring return. Required close-off pressure for water valve applications shall be the shutoff head of associated pump. Required close-off rating of air damper applications shall be shutoff pressure of associated fan. Modulating actuators shall have minimum rangeability of 40 to 1. Provide mechanical stops as necessary.

- (b) Globe Valve Gear Train Actuators:
 - (1) Ambient Operating Temperature Limits: -10 to 140° regardless of valve media temperature.

 - (2) Two Position Electric Actuators: Line voltage with spring return.

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- (3) Modulating Electronic Actuators: Provide actuators for 0-5vdc, 0-10vdc, 2-10vdc, 4-20 ma, or 3 position floating input as required. Actuators for heating system valves shall be spring return, normally open, for fail positioning. Actuators shall travel full stroke in less than 60 seconds. Provide stroke indicator. Actuators shall have positive positioning circuit. Actuators shall have current limiting motor protection. Actuators shall have manual override. Modulating actuators shall have minimum rangeability of 40 to 1.
 - (4) Close-off Pressure: Provide the minimum torque required, and spring return for fail positioning (unless otherwise specifically indicated) sized for required close off pressure. Required close-off pressure for water valve applications shall be the shutoff head of associated pump. Required close-off rating of steam valve applications shall be design inlet steam pressure.
 - (5) All 24 VAC/VDC actuators shall operate on Class 2 wiring.
 - (6) Actuators shall be provided with a minimum ½” conduit fitting for wiring connections.
 - (7) Actuators shall be Underwriters Laboratories 873 listed and Canadian Standards Association certified for the application.
 - (8) Actuator shall have a NEMA Type 1 enclosure, and actuators located in plenum ceilings shall meet the UL-465 rating for flame/smoke spread.
 - (9) Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator’s rated torque.
 - (10) Provide position feedback where required.
 - (11) For valves 5 inches and larger a battery back-up system is acceptable for failsafe operations
 - (12) Acceptable Manufacturers: Subject to compliance with requirements approved manufacturers are as follows:
 - a. Johnson Controls
 - b. Belimo
 - c. Delta
 - d. Siebe Environmental Controls
 - e. TAC
- (c) Quarter-turn actuators for ball and butterfly valves:
- (1) Motor: Suitable for 24VAC/VDC, 120 or 240 volt single phase power supply. Insulation shall be NEMA Class F or better. Motor shall be rated for 100 percent duty cycle. Motors shall have inherent overload protection.

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- (2) Gear Train. Motor output shall be directed to a self-locking gear drive mechanism. Gears shall be rated for torque input exceeding motor locked rotor torque. Actuators shall be spring return for fail positioning for heating system valves.
- (3) Enclosure: Actuator Enclosure shall be NEMA 4 rated, and shall have a threaded conduit connection for installation in exposed areas.
- (4) Limit Switches: Travel limit switches shall be UL and CSA approved. Switches shall limit actuator in both open and closed positions.
- (5) Mechanical Travel Stops: The actuator shall include mechanical travel stops of stainless steel construction to limit actuator to specific degrees of rotation.
- (6) Manual override: Actuators shall have manual actuator override to allow operation of the valve when power is off. For valves 4 inches and smaller the override may be a removable wrench or lever or geared handwheel type. For larger valves, the override shall be a fixed geared handwheel type. An automatic power cut-off switch shall be provided to disconnect power from the motor when the handwheel is engaged for manual operation.
- (7) Valve position indicator: A valve position indicator with arrow and open and closed position marks shall be provided to indicate valve position.
- (8) Torque Limit Switches: Provide torque limit switches to interrupt motor power when torque limit is exceeded in either direction of rotation.
- (9) Position Controller: For valves used for modulating control, provide an electronic positioner capable of accepting 4-20 mA, 0-10 VDC, 2-10 VDC, 3 position floating and 135 Ω potentiometer.
- (10) Ambient Conditions: Actuator shall be designed for operation from -140 to 150 °F ambient temperature with 0-100 percent relative humidity.
- (11) For valves 5 inches and larger a battery back-up system is acceptable for failsafe operations.
- (12) Acceptable Manufacturers: Subject to compliance with requirements approved manufacturers are as follows:
 - a. Siebe Environmental Controls.
 - b. Belimo.
 - c. Delta.
 - d. Johnson Controls.

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e. TAC.

M. Piping Specialties:

- (1) Unions: Shall be provided for the assembly, dismantling or service to any portion of the piping system.
 - (a) Unions 2" and Smaller: Shall be malleable iron ground joint unions with brass to iron seals. Stockham Fig. #694.
 - (b) Union 2-1/2" and Larger: Shall be of the companion flange type with ring type gasket painted with graphite before installation. Stockham Fig. #799.
 - (c) Brass Couplings: Shall be used for connecting steel pipe to copper tubing.
- (2) Thermometers: Shall be provided and installed in the supply and return chilled water piping. Thermometers shall be the adjustable angle type and located so they may be read from the floor. The body of the thermometer shall be brass or die-cast aluminum and at least 9" long. The thermometer shall be red mercury type with an appropriate scale for the medium being measured. The thermometer shall be mounted in the pipe in a separate well. Manufacturer - WEISS 9VS3 1/2.
- (3) Pressure Gauges: Shall be installed in the piping system at the chiller inlet and outlet. Connect the gauge to the piping system with 1/4" iron pipe. Provide 1/4" rough brass cock between the gauge and piping system. Pressure gauges on all heating and cooling pipes shall be installed where shown on the drawings. Pressure gauges installed shall be liquid filled bourdon-tube type with dial diameter not less than 4" and operating range 0-100 psig. Install a shutoff cock in line to each gauge. Gauges shall be as manufactured by WEKSLER, TAYLOR, OR TRERICE.
- (4) Flexible Connection: Flexible pipe connection shall be installed on all pipes connecting to equipment where indicated on the drawings. The isolated equipment shall be provided with flexible connections for all piping connections immediately adjacent to the equipment. The hose shall be flexible, metal reinforced rubber. In excessive pressure cases, flexible, braid-reinforced, seamless metal hose shall be used, within the pressure and temperature range applicable. Hose lengths shall be as recommended by the manufacturer; short style will not be acceptable. Flexible connections shall be as manufactured by METRAFLEX, KEFLEX or METRASPHERE.
- (5) Strainers: Shall be B&G, ARMSTRONG or SARCO. Iron or brass body Y pattern sediment strainers shall be installed. These strainers shall be provided with stainless steel or non-ferrous straining elements with heads for removal of the elements.
 - (a) Iron body pattern sediment strainers shall be installed with pipe.

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- (b) Brass body Y pattern sediment strainers shall be installed with copper or brass pipe.
- (c) Area of strainer openings shall not be less than four (4) times the pipe area. All strainers shall have blow-off valves with hose ends.
- (d) Strainer elements shall be No. 10 (ten) mesh screen.
- (e) Each strainer body shall be case with the manufacturer's name, an arrow indicating the direction of flow, strainer size and pressure classification.
- (f) Each strainer shall be of the operating pressure, temperature and service rating of the respective systems.

N. Insulation and Painting:

- (1) The Contractor shall insulate all new indoor condenser water, chilled water and domestic cold water pipes, elbows, tees, fittings, valves. Insulation shall be manufactured by OWENS-CORNING, CERTAIN-TEED, JOHNSONS-MANSVILLE, ARMSTRONG, OR KNAUF. Insulation shall be installed as follows:
- (2) Piping shall be insulated with heavy density rigid molded fiberglass pipe insulation with factory applied all service jacket (ASJ) with a 'K' factor not to exceed 0.25 @ 75 degrees F mean temperature. Insulation laps may have either factory-applied single or double self-seal lap adhesive or have no factory-applied adhesive provided that the laps are sealed. The minimum insulation thickness for the chilled water supply and return piping shall be 1½", the minimum for the domestic cold-water piping shall be 1".
- (3) All valves shall be insulated with two piece molded fiberglass fittings with an insulation value equivalent to the pipe insulation.
 - (a) Finish - All indoor insulation on piping, fittings, valves, air separator, and specialties shall be covered with an 8-oz. canvas jacket.
 - (b) The Contractor shall paint all new insulation with two coats of heavy-duty enamel with a minimum thickness of 1.5 mil for each coat. All painting shall be done over the entire surface except for nameplates or stampings. Paint shall be color coded as follows:
 - Chilled Water Supply - White
 - Chilled Water Return - White with Black Banding
 - Condenser Water Supply – Silver
 - Condenser Water Return – Silver with Black Banding
 - Domestic Water - Blue
 - (c) The Contractor shall paint and label directional arrows on all new pipe insulation and new condenser pipes. Arrows will be at least 12"x 2" spaced every five (5) feet.
 - (d) Damaged insulation shall be repaired as described in new insulation.

O. System Testing, Adjusting and Balancing:

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- (1) The Contractor shall engage an independent balancing agency to provide all labor, materials, equipment and service for testing, adjusting, and balancing of the water systems to obtain the performance of the pumps and chiller as shown on the drawings.
- (2) The testing, adjusting, and balancing shall be performed by an independent balancing agency whose supervisor is certified by the National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC).
- (3) The water system shall be tested, adjusted, and balanced in accordance with the latest edition of the NEBB "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or "AABC National Standard for Total System Balancing". A procedure for testing the systems shall be submitted to the Owner's Representative for review before starting fieldwork.
- (4) The testing agency shall notify the Owner's Representative of any deficiencies found in the distribution system, controls, or equipment.
- (5) The balancing agency work shall include but not be limited to adjusting the following to meet the drawings and specifications: water gpm, suction and discharge pressure, pump motor rpm and amperage, and chiller and cooling tower water flow rates and pressure drops.
- (6) Three (3) copies of balancing data will be submitted to the Owner in bound NEBB or AABC report form before final payment on the contract is made. Reports shall be signed by the supervisor in charge of testing, adjusting, and balancing this project.

9. DUCTWORK:

Ductwork and duct accessories shall meet the requirements and recommendations of Sheet Metal and Air Conditioning Contractors Nation Association (SMACNA) "Low Pressure Duct Construction Standards", UL-181 standard, and ASHRAE recommendations.

All new ductwork shall be no thinner than 22 gauge.

The installation of duct and duct accessories shall comply with NFPA standard 90A as well as state and local codes.

All angles used for reinforcement, support, hanging, and other construction uses shall be galvanized steel and shall be equal to that used for ductwork. Galvanized angle iron shall be used where required by SMACNA standards.

10. ELECTRICAL:

- A. All devices, material, hardware and installation shall be in accordance with the requirements of the local electrical code and the National Electrical Code (NEC).
- B. The electrical Contractor shall have an established lockout/ tag out procedure, which meets the requirements of VOSH Standard 29 CFR Part 1910, Subpart J, Subsection 147, entitled Control of Hazardous Energy Sources. The Contractor shall coordinate with

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the Owner's Representative to conform with the Owner's lockout/ tag out program requirements.

- C. All devices and material shall be as listed by Underwriter's Laboratory and shall bear the UL label.
- D. New disconnect switches shall be installed where shown on the drawings. The switch handle shall be capable of being locked in the closed position. The disconnect shall be selected to hold fuses sized per the HVAC unit manufacturer's recommendation. The disconnect amperage rating shall meet or exceed the rated amperage of the circuit breaker feeding it whether new or existing.
- E. Wire and Cable:

All new conductors except low voltage control wiring shall be new copper THWN or THHN, 600 volt rated. Minimum wire size shall be # 12 unless noted or specified otherwise.

Low voltage control wiring shall be multi-conductor stranded copper, minimum size 18 AWG, with 10 mils TFE Teflon insulation fully color coded, rated 300 volts with Teflon outer jacket. Teflon covering shall comply with the requirements of NFPA 72D for use in a plenum ceiling. It shall be clearly marked for this service. Control wiring installed outdoors shall be run in watertight IMC conduit and all splices shall be in electrical boxes.

All wiring shall be color coded to identify phases, neutral and ground. Color code shall be in accordance with NEC and as follows:

<u>VOLTAGE CONDUCTORS</u>	<u>120/208</u>	<u>277/460</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

- F. Installation of Conductors:

Conductors shall be continuous between junction boxes and no splices shall be made except in boxes or panel board gutters.

All joints, splices and taps Number 8 and larger shall be connected with solder less compression type pressure connectors.

Oil or grease shall not be used when pulling conductors. Approved cable lubricants only.

Train conductors neatly in panels, cabinets and equipment.

Tighten pressure type lugs on panels and equipment and then retighten 24 hours later.

Identification of Conductors: All branch circuits shall be left tagged in the panel boards, in all gutters, and in all junction boxes.

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Conductors in vertical conduit runs shall be supported with split-wedge type fittings, which clamp each conductor and automatically tighten under the weight of the conductors at intervals per NEC.

G. Conduit shall be in accordance with the following:

All conduit shall be new full-length intermediate metal conduit (IMC) or rigid. Any flexible connections to motors or other equipment, shall be made using liquid-tight, galvanized single strip flexible metal conduit minimum length 12"/maximum length 36"

Hangers and Brackets - All new conduit shall be supported from the building structure. Horizontal runs of conduit shall be supported a minimum of 8' on center. Hangers shall be adjustable types especially made for electrical conduit. Parallel runs of conduit may be supported on trapeze hangers made of all thread rods with structural steel channel cross members. Channels shall be 1-inch for 24-inch wide trapeze and 1.5 inch for larger than 24 inches. Perforated steel straphangers are not acceptable. Conduit run along wall surfaces shall be supported with galvanized steel brackets especially designed for conduit and sized for the conduit used.

Pull boxes shall be provided in any conduit run which exceeds 75 feet in length or any run having more than three (3) 90-degree elbows.

H. Disconnect Switches:

Heavy duty disconnect switches shall be provided and installed as shown on the drawings. Disconnect switches shall be NEMA Heavy Duty type HD and shall be UL listed. The heavy duty disconnect switches shall be manufactured by SQUARE 'D', GENERAL ELECTRIC or CUTLER-HAMMER.

Switches shall have quick-make and quick-break operating handle and mechanism, which shall be an integral part of the box. Switches shall be horsepower rated for 250 volt or 600 volt as required. The lugs shall be UL listed for copper conductors and be front removable. Ampere rating shall be provided as indicated on the drawings.

Enclosures for indoor switches, except boiler and mechanical rooms, shall be NEMA 1 for general purpose or as noted on the drawings. Enclosures for outdoor switches or those located in boiler and mechanical rooms shall be NEMA 3R (weatherproof) or as noted on the drawings.

I. Installation:

The disconnect switches shall be securely mounted in accordance with the National Electrical Code, approximately 60 inches above finished floor to top unless otherwise noted. Provide steel channel mounting brackets where required for secure mounting.

The fuses as specified shall be installed in disconnect switches requiring fuses. One complete set of extra fuses shall be turned over to the Owner upon completion for each type and rating of fuses provided new on this project.

J. Electric Motor Starters:

The Contractor shall furnish all motor starters complete with lugs sized to receive conductors specified and with accessories as required such as stop-start push button

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switches, hand-off-auto selector switches, pilot lights, remote switches, auxiliary contacts, transformers, relays, fuses and overload thermal units or heaters.

- (1) The motor starters shall be the type to meet the requirements of the motor and shall be in accordance with NEMA Standards, sizes and horsepower ratings. The starters shall be manufactured by SQUARE 'D', GENERAL ELECTRIC, CUTLER-HAMMER or SIEMENS.
- (2) Three phase motors shall have across-the-line magnetic starter and single-phase motors shall have manual starters. The starters shall have NEMA 1 enclosures unless otherwise noted or required. Outdoor starters shall have weatherproof enclosures.
- (3) The starter shall have an overload thermal unit in each phase conductor. The thermal units shall be sized as recommended by the manufacturer for full protection of the motor.
- (4) All three phase motors and equipment with compressors shall be provided with three phase motor protectors as manufactured by DIVERSIFIED, SLM-ASE series (match voltage to corresponding model number). Unit shall include range plug, output fuse, output switch, line adjustment, status/trouble lights and adjustable/selectable operation with built-in time delays. Unit shall be U/L labeled. Protectors as manufactured by TIMEMARK #265 or MOTECTOR Power Guardian PLUS shall also be acceptable.

K. Nameplate:

Disconnect switches, starters, panel boards, and all other related electrical devices shall have nameplates of 1/16-inch thick laminated plastic with 1/2-inch high white letters on a black background. Nameplates shall identify each piece of equipment and shall be mounted on the front top of the enclosure. Labels shall be securely fastened to equipment. Double-faced tape is not acceptable.

11. SPLIT-COUPLED DUAL-ARM VERTICAL INLINE PUMPS WITH INTEGRATED CONTROLS:

- A. Supply and install as shown on the plans and specifications, Armstrong Series 4302 Dualarm split coupled Vertical In-Line centrifugal pumping unit. The cast casing with equal size suction and discharge flanges, having separate tapped flush line and pressure gauge connections, shall incorporate two radially split, single stage centrifugal pumps. Each pump shall have a cast bronze dynamically balanced impeller, stainless steel shaft, lower seal flush throttle bushing, outside balanced mechanical seal with stainless steel parts and Viton secondary seal and bronze gland plate with stainless steel studs and nuts. Each pump shall be fitted with a factory furnished flush line to the mechanical seal. The flush line is to be fitted with a manual air vent 50 micron cartridge type filter (if the differential pressure exceeds 30 psig, a Cyclone separator may be specified) and a sight flow indicator. The mechanical contractor shall change the filter cartridge after the system has been flushed and on a regular basis thereafter, until the building is turned over to the owner. Each driving motor shall be an industry standard vertical solid shaft, squirrel cage induction type, built to NEMA standards (Premium Efficiency motors may be specified). The motor shall have drip proof enclosure and be suitable for a 460/3/60 supply and shall be connected to the pump by means of a rigid split type spacer coupling that permits removal of the mechanical seal without disturbing the pump or motor connections. The inlet and outlet ports on the casing shall be at least one size larger than the single pump

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size, so that both units may operate in parallel with no loss of single pump efficiency. Each port shall be fitted with a stainless steel isolation valve that allow the units to operate in parallel, or standby, yet may be used to isolate one pumping unit for servicing or removal, with the other pump still operating.

- B. The pumps shall be single stage, single or double suction type, vertical inline design with integrated controls. The seal shall be serviceable without disturbing the motor or the piping connections. The capacities and characteristics shall be as outlined in the plans and specifications. The complete pump unit shall be labeled with ETL listing certification that the product conforms to UL Std 778 and is certified to CSA Std C22.2 No.108.
- C. Pump casing shall be constructed of ASTM A48 class 30 cast iron with ANSI 125 / PN16 flanges for working pressure below 175 psig (12 bar) at 150°F (66°C) and ASTM A536 ductile iron with ANSI 250 / PN25 flanges for working pressures to 375 psig (25 bar) at 150°F (66°C). The casing shall be hydrostatically tested to 150% maximum working pressure. The casing shall be radially split to allow removal of the rotating element without disturbing the pipe connections. The pump casing shall be drilled and tapped for gauge ports on both the suction and discharge connections and for a drain port at the bottom of the casing. The casing shall have an additional tapping on the discharge connection to allow for the installation of a seal flush line.
- D. The pump shall have a factory installed vent/flush line to insure removal of trapped air from the casing and mechanical seal cooling. The vent/flush line shall run from the seal chamber to the pump discharge.
- E. The impeller shall be bronze, fully enclosed type. The impeller shall be dynamically balanced to ANSI Grade G6.3 and shall be fitted to the shaft with a key. Two-plane balancing is required where installed impeller diameter is less than 6 times the impeller width.
- F. The pump shaft shall be stainless steel.
- G. The coupling is to be rigid spacer type constructed of high tensile aluminum alloy. The coupling is to be designed to be easily removed on site to reveal a space between the pump and motor shafts sufficient to remove all mechanical seal components for servicing and to be replaced without disturbing the pump or motor.
- H. The pump shall be fitted with an outside balanced type mechanical seal, with Viton elastomers and antimony carbon (or resinbonded carbon for potable water applications) vs. silicon carbide faces rated up to 250°F (121°C). A 316 stainless steel gland plate shall be provided with a factory installed flush line with manual vent.
- I. The inlet and outlet ports on the casing shall be at least one size larger than the single pump size, so that both units may operate in parallel with no loss of single pump efficiency. Each port shall be fitted with a stainless steel isolation valve that allow the units to operate in parallel, or standby, yet may be used to isolate one pumping unit for servicing or removal, with the other pump still operating.
- J. All split coupled pumps shall be provided with a lower seal chamber throttle bushing to ensure seals maintain positively cooling and lubrication.

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- K. If required to improve seal chamber cleanliness, supply in the flush line to the mechanical seal a 50 micron cartridge filter and sight flow indicator, to suit the working pressure encountered.
- L. Alternately, supply in the flush line to the mechanical seal a maintenance-free sediment separator, with sight flow indicator www.armstrongfluidtechnology.com 10/21/2015, Ref. # 516765.1 rev1 Page 6 of 7 for pump differential pressures exceeding 30 psig (or 200 kPa).
- M. The motor frame shall be NEMA TC type. Motor enclosure is to be ODP or TEFC with NEMA Premium Efficiency 12.12 rating. Acceptable motor insulation for variable speed operation is NEMA MG-1 Part 31.
- N. The variable frequency drive & controls shall be rated UL Type 12 or UL Type 4X and be an integral component of the pumping unit with a 40 hp, ODP, 460/3/60.
- O. The integrated VFD shall be of the VVC-PWM type providing near unity displacement power factor ($\cos \phi$) without the need for external power factor correction capacitors at all loads and speeds. The VFD shall incorporate DC link chokes for the reduction of mains borne harmonic currents and to reduce the DC link ripple current thereby increasing the DC link capacitors lifetime. RFI filters will be fitted as standard to ensure the VFD meets low emission and immunity requirements.
- P. VFD and motor protection shall include: motor phase to phase fault, motor phase to ground fault, loss of supply phase, overvoltage, under-voltage, motor over-temperature, inverter overload, over-current.
- Q. Where selected, VFD shall have Sensorless control software to provide automatic speed control in variable volume systems without the need for pump mounted (internal/external) or remotely mounted differential pressure sensor. The default operating mode under Sensorless control shall be Quadratic Pressure Control (QPC) whereby head reduction with reducing flow will be according to a quadratic control curve, the head at minimum flow being 40% of the design duty head. Control mode setting and minimum/maximum head setpoints shall be user adjustable via a built-in programming interface.
- R. If the quantity of pumps in a system is 2 to 4-maximum, including any standby, a Sensorless controller shall be added to a pumping unit and set up at the factory to operate in parallel Sensorless mode. The pump controls, which will be linked on site by the control contractor, will automatically stage the units, as appropriate, to maintain the best efficiency pumping and minimum operating cost. The standby unit will be brought into the rotation to exercise and equalize wear. The sequence of controls and staging points will be submitted to the engineer for approval at the time of order.
- S. The VFD shall have the following additional features:
1. Sensorless override for BAS/BMS control signal
 2. Manual pump control or closed loop PID control
 3. Programmable skip frequencies and adjustable switching frequency for noise and vibration control
 4. Auto alarm reset
 5. Four programmable digital inputs, two analog inputs, one programmable analog / digital output
 6. One volt-free contact

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7. One RS485 port for serial communications to building management systems
8. Standard serial communication protocols BACnet Native (default), Modbus RTU, Johnson Controls Metasys N2, or Siemens FLN

T. Environmental Ratings:

1. Temperature: 14°F to 113°F up to 3300 ft (-10°C to 45°C up to 1000 m)
2. Max Relative Humidity: 0 to 95%

U. Suction Guides:

1. Furnish and install on the suction of each pump an Armstrong Suction Guide, with Outlet Flow Stabilizing Guide Vanes, removable Stainless Steel Strainer and Fine Mesh Start-up Strainer.
2. Supply fitting with Cast Iron body with ANSI 125 flanged ports.
3. The mechanical contractor shall inspect the strainer prior to activating the pump and, further, shall remove the Fine Mesh Start-up Strainer after a short running period. (24 hours maximum). Space shall be provided for removal of the Strainer and connection of a Blow-down Valve.

12. BASE MOUNTED PUMPS:

A. Quality Assurance:

- (1) Pumps must be selected from published test curves showing actual brake horsepower. The selection point shall be confined to the left of the center of the efficiency curve for the impeller being furnished.
- (2) All pump motors shall meet NEMA Standards.
- (3) All pumps shall be factory tested prior to shipment to the job site.

B. Base Mounted Pump:

The base mounted pump shall be of the centrifugal base mounted type and of the size, capacity and voltage shown on the drawings. The pump shall be series 1510 as manufactured by BELL & GOSSETT. Pumps fully equal to the specified pump and manufactured by PATTERSON, AMTROL, ARMSTRONG, ALLIS-CHALMERS or AURORA are acceptable.

- (1) Pump - Shall be of the vertical split case design for servicing without disturbing piping connections or motor. Motor to pump connections shall be of the flexible spring coupler type, to dampen noise transmission and protect pump and motor from stress and strain of high starting torque. The pump shall use a mechanical rotating type carbon seal and shall face against a remite insert. The pump shall be equipped with re-greasable ball bearings.
- (2) Motor - Shall be drip-proof and shall be especially selected for quiet operation, and shall be SO stamped. The current characteristics of the motor shall be as shown on the drawings. The horsepower of the motor shall be of such a size as to insure non-overloading of the motor throughout the capacity range of the pump.

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- (3) Base - Shall be of the size suitable for the pump, motor and shaft, and shall be constructed of cast iron or welded steel.

C. Suction Diffuser:

- (1) Provide suction diffuser at each pump. Units shall consist of an angle type body with inlet vanes and combination diffuser - strainer - orifice cylinder with 3/16" diameter openings for pump protection. A permanent magnet shall be located within the flow stream and shall be removable for cleaning. The orifice cylinder shall be equipped with a disposable fine mesh strainer, which shall be removed after start-up. Orifice cylinder shall be designed to withstand a pressure differential equal to pump shutoff head and shall have a free area equal to five times the cross section area of the pump to suction opening. Vane length shall be not less than 2 1/2 times the pump connection diameter. Unit shall be provided with adjustable support foot to carry weight of suction piping.

D. Components:

- (1) The pumps shall be long coupled, base mounted, single stage, end suction, vertical split case design, in cast iron stainless steel fitted, specifically designed for quiet operation. Suitable standard operations at 225° F and 175 PSIG working pressure or optional operations at up to 250° F and 250 PSIG working pressures. Working pressures shall not be de-rated at temperatures up to 250F. The pump internals shall be capable of being serviced without disturbing piping connections, electrical motor connections or pump to motor alignment.
- (2) The pumps shall be composed of three separable components a motor, bearing assembly, and pump end (wet end). The motor shaft shall be connected to the pump shaft via a replaceable flexible coupling.
- (3) A bearing assembly shall support the shaft via two heavy-duty regreaseable ball bearings. Bearing assembly shall be replaceable without disturbing the system piping and shall have foot support at the coupling end. Pump bearings shall be regreaseable without removal of the bearings from the bearing assembly. Thermal expansion of the shaft toward the impeller shall be prevented via an inboard thrust bearing.
- (4) The bearing assembly shall have a solid SAE1144 steel shaft. A stainless steel shaft sleeve shall be employed to completely cover the wetted area under the seal.
- (5) A pump condition monitoring system should be provided on the pump power end to continuously measure pump vibration and temperature at the outboard bearing. The system shall record the baseline vibration at start-up and have local alarm indication at the pump when the vibration levels are double the baseline values or when alarm limits are reached for vibration and temperature. Vibration modes shall be based on ANSI/HI 9.6.4-2009 and ISO 101816 recommended levels. The sensors and condition monitors' electronics shall be provided in a stainless steel enclosure potted in epoxy for protection from the environment. A battery powered system is preferred with no external power source required. The

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acceptable ambient temperature range shall be -40°F to 212°F (-40°C to 100°C). CSA certification is required.

- (6) Pump shall be equipped with an internally-flushed mechanical seal assembly installed in an enlarged tapered seal chamber. Application of an internally flushed mechanical seal shall be adequate for seal flushing without requiring external flushing lines. Seal assembly shall have Buna bellows and seat gasket, stainless steel spring, and be of a carbon ceramic design with the carbon face rotating against a stationary ceramic face.
- (7) Bearing assembly shaft shall connect to a stainless steel impeller. Impeller shall be both hydraulically and dynamically balanced to ANSI/HI 9.6.4-2009, balance grade G6.3 and secured by a stainless steel locking capscrew or nut.
- (8) Pump should be designed to allow for true back pull-out allowing access to the pump's working components, without disturbing motor or piping, for ease of maintenance.
- (9) A center drop-out type coupling, capable of absorbing torsional vibration, shall be employed between the pump and motor. Pumps for variable speed application shall be provided with a suitable coupling sleeve. Coupling shall allow for removal of pump's wetted end without disturbing pump volute or movement of the pump's motor and electrical connections. On variable speed applications the coupling sleeve should be constructed of an neoprene material to maximize performance life.
- (10) An ANSI and OSHA rated coupling guard shall shield the coupling during operation. Coupling guard shall be dual rated ANSI B15.1 and OSHA 1910.219 compliant coupling guard and contain viewing windows for inspection of the coupling. No more than .25 inches of either rotating assembly shall be visible beyond the coupling guard.
- (11) Pump volute shall be of a cast iron design for heating systems with integrally cast pedestal volute support, rated for 175 PSIG with integral cast iron flanges drilled for 125# ANSI companion flanges. (Optional 250 PSIG working pressures are available and are 250# flange drilled.) Volute shall include gauge ports at nozzles, and vent and drain ports.
- (12) Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory aligned, and shall be realigned after installation by the manufacturer's representative. Motors shall be non-overloading at any point on the pump curve and shall meet NEMA specifications and conform to standards outlined in EISA 2007.
- (13) Base plate shall be of structural steel or fabricated steel channel configuration fully enclosed at sides and ends, with securely welded cross members and fully open grouting area (for field grouting). The minimum base plate stiffness shall conform to ANSI/HI 1.3.8.2.1-2009 for grouted Horizontal Baseplate Design standards.
- (14) Pump shall be of a maintainable design and, for ease of maintenance, should use machine fit parts and not press fit components.

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- (15) The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 9.6.4-2009 for recommended acceptable unfiltered field vibration limits (as measured per ANSI/HI 9.6.4-2009 Figure 9.6.4.2.3.1) for pumps with rolling contact bearings.
- (16) Pump manufacturer shall be ISO-9001 certified.
- (17) Each pump shall be hydrostatically tested 1.5 times the maximum rated working pressure and name-plated before shipment.
- (18) Pump shall conform to ANSI/HI 9.6.3.1-2012 standard for Preferred Operating Region (POR) unless otherwise approved by the engineer.

E. Accessories:

- (1) Provide one (1) set of mechanical seals for each model type of primary pump.
- (2) Provided internal bronze casing wear rings, galvanized drips pan on the base, or special spacer couplers.
- (3) Pumping equipment may require one or all of the following tests: Certified Lab tests (non-witnessed), to Hydraulic Institute Level B tests, or Witnessed Tests.

F. Installation:

- (1) All components shall be installed in accordance with manufacturer's installation instructions.
- (2) Modify existing concrete base to accommodate new pumps if necessary.
- (3) Pump base shall be mounted on the existing concrete base, modified as necessary.
- (4) Reduction from line size to pump connection size shall be made with eccentric reducers attached to the pump with tops flat to allow continuity of flow.
- (5) Furnish and install triple duty valves on the discharge side of all pumps and furnish and install a line size shut-off valve on the suction side of all pumps. Anywhere that 5 straight pipe diameters of pipe cannot be provided on the inlet side of a pump a suction diffuser shall be used to provide appropriate flow distribution into the eye of the pump's impeller.
- (6) Provide temperature and pressure gauges where and as detailed or directed.
- (7) On systems where pump seals require flushing water or cooling water for a heat exchanger kit, provide cooling water supply piping and connections as well as the return piping, if required. Piping should be of adequate size to pass required flow rate.
- (8) Proper access space around a device should be left for servicing the component. No less than the minimum recommended by the manufacturer.

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- (9) Provide an adequate number of isolation valves for service and maintenance of the system and its components.
- (10) Circulating pump shall have sufficient capacity to circulate the scheduled GPM against the scheduled external head (feet) with the horsepower and speed as scheduled and/or as denoted on the drawings. Motors shall be of electrical characteristics as scheduled, denoted and/or as indicated on the electrical plans and specifications. Pump characteristics shall be such that the head of the pump under varying conditions shall not exceed the rated horsepower of the drive motor.
- (11) On systems where the final balancing procedure requires the triple duty valve to be throttled more than 25% to attain design flow (on a constant speed pumping system), and no future capacity has been built into the pump, the pump impeller must be trimmed to represent actual system head resistance. The pump provider and engineer of record, based on the balancing contractor's reports, shall determine the final impeller trim diameter.
- (12) Install foot mounted and base mounted pumps on vibration isolation pad or housekeeping pad, via anchor bolts. Set and level and grout in place.
- (13) All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any loads or stresses being applied to the connections or piping. All piping shall be fitted to the pumps even though piping adjustments may be required after the pipe is installed.
- (14) On components that require draining, contractor must provide piping to and discharging into appropriate drains.
- (15) Provide drains for bases and seals, piped to and discharging into floor drains.

13. VARIABLE FREQUENCY DRIVES:

- A. The VFD package as specified herein shall be enclosed in a UL Listed Type enclosure, (enclosures with only NEMA ratings are not acceptable).
 - (1) Environmental operating conditions: 0 to 400 C (32 to 1040 F) continuous. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.
 - (2) Enclosure shall be UL rated and shall be UL listed as a plenum rated VFD.
- B. All VFDs shall have the following standard features:
 - (1) All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
 - (2) The keypad shall include Hand-Off-Auto selections and manual speed control. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.

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- (3) The VFD shall have internal 5% impedance reactors to reduce the harmonics to the power line and to add protection from AC line transients.
 - (4) The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120.
 - (5) The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus.
- C. All VFDs to have the following adjustments:
- (1) Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad command, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. A minimum of two separate safety interlock inputs shall be provided. When any safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close.
 - (2) The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates.
- D. Serial Communications:
- (1) The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, and BACnet MS/TP. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority (i.e. BTL Listing for BACnet).
- E. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the entire VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted. No Exceptions.
- F. INSTALLATION:
- (1) Installation shall be the responsibility of the Contractor.
 - (2) Power wiring shall be completed by the Contractor, to NEC code 430.122 wiring requirements based on the VFD input current.
 - (3) The Contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.

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G. START-UP:

- (1) Certified factory start-up shall be provided for each drive by a factory authorized service center.

H. WARRANTY:

- (1) The VFD Product Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment. The warranty shall include all parts, labor, travel time and expenses. A toll free 24/365 technical support line shall be available. **END OF SECTION**