

BIDDING DOCUMENTS

**HVAC PIPING IMPROVEMENTS
PISGAH FOREST ELEMENTARY**

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA



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PISGAH FOREST ELEMENTARY SCHOOL**

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA



55 Broad Street
Asheville, North Carolina, 28801
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Firm License No.: C-0459



FEBRUARY 2023

DANIEL GRIFFEE, PE

PROJECT NO. 22.00607

TRANSYLVANIA COUNTY SCHOOLS
PISGAH FOREST ELEMENTARY SCHOOL
HVAC PIPING IMPROVEMENTS

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ADVERTISEMENT TO BID
HVAC PIPING IMPROVEMENTS
PISGAH FOREST ELEMENTARY SCHOOL
TRANSYLVANIA COUNTY SCHOOLS

Sealed Bids for the project entitled HVAC Piping Improvements, Pisgah Forest Elementary School, Transylvania County Schools will be received by **Alan Justice** at **2:00 P.M.** local time **March 2, 2023**, located at **225 Rosenwald Lane, Brevard, North Carolina.**

The project generally consists of replacing existing 2 pipe hydronic distribution system with a 4 pipe system. Existing 2 pipe system will remain in service during installation of the 4 pipe system.

A pre-bid conference will be held for the project at 10 am, February 15, 2023, at the site, 1160 Ecusta Road, Pisgah Forest, NC 28712. Report directly to the office and do not tour the building or grounds on your own.

Digital copies of the Bid Documents are available for download at www.mcgillassociates.com. These documents may be downloaded by entering **Quest Project Number 8389480** in the search bar. **For assistance and free membership, contact Quest CDN at (952) 233-1632 or info@questcdn.com.**

The successful bidder must be required to furnish a Performance Bond and Labor and Materials Payment Bond, each in an amount equal to 100% of the contract sum, pursuant to North Carolina General Statutes Section 143-129 and Article 3 of Chapter 44A. The Performance Bond must be in full force and effect for one (1) year after the date of final acceptance of the project by the Owner.

Each bid must be accompanied with a cash deposit or certified check drawn on a bank or trust company insured by the FDIC or a Bid Bond prepared on the form of Bid Bond contained in the Bidding Documents or a Surety Company's standard form and properly executed by a corporate surety licensed under the laws of North Carolina to execute such bonds. The amount of the bid bond must be equal to **five (5) percent** of the total of the bid. The bid deposit will be retained by the Owner if the successful bidder fails to execute the contract or fails to provide the required bonds, as stated above, within ten (10) days after the proper notice of award of the contract.

Bidders must comply with the requirements of the State of North Carolina and be appropriately licensed as a Contractor as provided in General Statutes Chapter 87.

Attention is called to the fact that the Contractor must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, sex or national origin.

Neither the Owner nor the Engineer will be responsible for full or partial sets of Bidding Documents, including any Addenda, obtained from any source other than the Owner's representative, McGill Associates, P.A. Each Bidder shall be responsible for the review of all addenda for the project and shall acknowledge the addenda on the Bid form.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

Each Bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Bidding Documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to his Bid.

The Owner reserves the right to reject any and all Bids, to waive informalities, or to reject non-conforming, non-responsive, or conditional Bids. The Owner reserves the right to award a contract to the lowest, responsive, responsible Bidder or Bidders, taking into consideration quality, performance and time. The owner reserves the right to evaluate bid totals based upon the base bids, alternates, additional unit prices, or any combination thereof. A conditional or qualified Bid will not be accepted.

The Owner may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein.

Questions regarding the intent or Scope of Work must be delivered in writing to Daniel Griffiee via email (Daniel.griffiee@mcgillassociates.com). To be given consideration, questions must be received at least ten (10) days prior to the date fixed for the opening of bids. Responses will be issued via addendum through the Quest CDN site for use by prospective bidders.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

MODIFIED INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACTS

Prepared by

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ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Modified Instructions to Bidders have the meanings indicated in the Modified General Conditions. Additional terms used in these Modified Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Contract Documents are to be issued and where the bidding procedures are to be administered.
 - B. *Disadvantaged Business Enterprise (DBE)* – A business meeting at least one of the following criteria:
 - 1. *Minority Business Enterprise (MBE)* – A qualified socially and economically disadvantaged minority-owned business certified by any state and/or Federal agency.
 - 2. *Women’s Business Enterprise (WBE)* – A qualified independent business at least 51% owned by a woman or women and certified by any state and/or Federal agency.
 - C. *Unbalanced Bid* - An unbalanced bid is one that is either:
 - 1. A mathematically unbalanced Bid is one that contains lump sum or unit bid items that do not appear to reflect reasonable actual costs. Reasonable actual costs include a reasonable proportionate share of the Bidder’s anticipated profit, overhead costs, and other indirect costs the Bidder anticipates for the required performance; or
 - 2. A materially unbalanced Bid is one that produces a reasonable doubt that Award to the low Bidder, who submitted the mathematically unbalanced Bid, would result in the lowest ultimate cost to the Owner.
 - D. *Responsible Bidder* - A bidder who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity, and experience to satisfactorily perform the work described in the Contract Documents.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office upon payment of the fee stated in the advertisement or invitation to bid. The fee is non-refundable.
- 2.02 Complete sets of Bidding Documents must be used in preparing Bids. Neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 The Owner may make investigations to determine the qualifications of the Bidder to perform the work and the Bidder must furnish to the Owner all information and data requested. The Owner reserves the right to reject any Bid if the evidence submitted by, or investigation of, the Bidder fails to satisfy the Owner the Bidder is properly qualified to carry out the obligations of the contract, and to complete the work. Conditional bids will not be accepted.
- 3.02 Bidders must comply with all applicable laws regulating the practice of General Contracting as provided in Chapter 87 of the General Statutes of the State of North Carolina and be properly licensed as a contractor with the State of North Carolina.
- 3.03 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.
- 3.04 Bidder must hold a current North Carolina contractor's license appropriate for the type and magnitude of the work.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE CONDITIONS

4.01 *Site and Other Areas*

The Site is identified in the Bidding Documents. By definition, the Site may include rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Bidding Documents identify:
 - a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
 - b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
 - c. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the Modified General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion

Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in the reports or shown or indicated in the drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the Modified General Conditions will apply.
4. Geotechnical Report: The Bidding Documents may contain a Geotechnical Report. If included, the Geotechnical Report describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations. The Geotechnical Report is a Contract Document.
 - a. The conditions described in the Geotechnical Report are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the conditions described. Bids should be based on a comprehensive approach that includes an independent review and analysis of the Geotechnical Report, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are described in the Geotechnical Report.
 - b. Nothing in the Geotechnical Report is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.
- B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.
- C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the Modified General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.03 of the Modified General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder must conduct Site visits during normal working hours, and must not disturb any ongoing operations at the Site. The Owner requires site visits by the Bidder to be scheduled with the Owner in advance. Contact Alan Justice, Facilities, Athletic, Transportation Director CDPT at (828)-884-6173 or ajustice@tcsnc.org for scheduling.

- B. The Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions. However, on request, and to the extent the Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- C. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs and regulations.
- D. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of any explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner's Safety Program. As the General Conditions indicate, Bidders are responsible for complying with Owner's Safety Program, if any.

4.05 *Other Work at the Site*

- A. Reference is made to the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid, a Bidder is required to:

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site including Underground Facilities that may be made available

by the Owner and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Contract Documents.

- E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of any work that may be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

5.02 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

5.03 No verbal agreement or conversation with any officer, agent or employee of the Owner, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations therein.

ARTICLE 6 – PRE-BID CONFERENCE

6.01 A pre-bid conference will be held for this project. See Instructions to Bidders.

ARTICLE 7 – SITE AND OTHER AREAS

7.01 The Site is identified in the Contract Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands, and access thereto, required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 8 – INTERPRETATIONS AND ADDENDA

8.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Engineer in writing. Interpretations or clarifications considered necessary by the Engineer in response to questions will be issued by Addenda delivered by either mail or electronic means to all parties recorded by the Engineer as having received the Bidding Documents. Questions received less than ten (10) days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Contractor waives the right to rely on information provided by the Engineer which is not provided in writing and in the form of a formal Addendum.

8.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

8.03 Failure of any Bidder to receive any Addenda shall not relieve the Bidder from any obligation under the Bid as submitted.

8.04 All Addenda are incorporated into and a part of the Contract Documents.

8.05 Prospective Bidders are prohibited from using a Post Office Box address as Addenda cannot be sent via overnight carrier to Post Office Boxes.

ARTICLE 9 – BID SECURITY

9.01 A Bid must be accompanied by Bid security made payable to the Owner in an amount of **five percent (5%)** of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid bond (on the form included or the standard form of the surety company) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the Modified General Conditions.

9.02 The Bid security of the apparent Successful Bidder will be retained until the Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within ten (10) days after the Notice of Award, Owner may consider Bidder to be in default, annul the

Notice of Award, and the Bid security of the Bidder will be forfeited to Owner. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of all other Bidders may be retained by Owner until the earlier of ten (10) days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by Bidders will be returned.

ARTICLE 10 – CONTRACT TIMES

10.01 The number of calendar days within which Milestones are to be achieved and the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 11 – LIQUIDATED DAMAGES

11.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 12 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 12.01 The Contract for the Work, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.
- 12.02 All prices that Bidder sets forth in its Bid must be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 13 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 13.01 The Contract Documents may require the identification of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five (5) days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which identification is required. The list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute. If this occurs Successful Bidder must submit an acceptable substitute, and Bidder’s Bid price will be increased (or decreased) by the difference in cost related to the substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 13.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in the Modified General Conditions.
- 13.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 14 – PREPARATION OF BID

- 14.01 Only the Bid Form included with the Bidding Documents may be used and cannot not be altered, contain any unauthorized additions, deletions, or conditional bids.

- 14.02 The Bidder must not add any provision reserving the right to accept or reject an award, or to enter into a Contract pursuant to an award.
- 14.03 The Bid must not contain irregularities of any kind which make the Bid incomplete, indefinite, or ambiguous as to its meaning.
- 14.04 All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, and unit price item listed therein. Alternative Bids will not be considered unless specifically shown on the Bid Form. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered.
- 14.05 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown.
- 14.06 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 14.07 A Bid by a limited liability company must be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 14.08 A Bid by an individual must show the Bidder’s name and official address and be signed by the individual.
- 14.09 A Bid by a joint venture must be executed by each of the joint venturers in the manner indicated on the Bid Form. The official address of the joint venture must be shown.
- 14.10 All names must be printed in ink below the signatures.
- 14.11 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 14.12 Street, postal and e-mail addresses and telephone numbers for communications regarding the Bid must be shown.
- 14.13 The Bid must contain evidence of Bidder’s authority and qualification to do business in the State of North Carolina, or Bidder must agree in writing to obtain such authority and qualification prior to award of the Contract and attach to the Bid.
- 14.14 Bidder’s NC state contractor license number must be shown on the Bid Form.

14.15 All attachments, certifications or acknowledgements attached to the Bid must be executed in the same manner as the Bid.

ARTICLE 15 – BASIS OF BID; COMPARISON OF BIDS

15.01 *Lump Sum*

Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.

15.02 *Base Bid with Alternates*

Bidders must submit a Bid for the base Bid as shown on the Bid Form and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Schedule. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.

15.03 *Unit Price*

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the Bid Schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with the Modified General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

15.04 *Allowances*

For cash allowances the Bid price must include amounts the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with the Modified General Conditions.

15.05 Bids will be compared on the basis of the totals of the lump sum and/or unit prices bid. The resulting Total Contract Bid Price will be compared which must include and cover the furnishing of all materials, and the performance of all labor requisite for proper completion of all the work called for under the accompanying Contract, and in the manner set forth and described in the Contract Documents.

15.06 The lowest Bidder will be the Bidder whose Bid totals the lowest number of dollars as determined above.

ARTICLE 16 – SUBMITTAL OF BID

16.01 The Bid Form in the Bidding Documents must be completed and submitted with the Bid security.

- 16.02 A sealed Bid must be received no later than the time and date prescribed and at the place indicated in the advertisement or invitation for bids. The bid must be submitted in a single (one (1)) envelope system. The envelope must be plainly marked with the Project title, Owners name and address in the middle of the envelope and the name, address, license number, limitation and classification of Bidder in the upper left hand corner of the envelope. The envelope must contain the Bid security, the Bid and any other required information as defined in the advertisement or invitation for bid or bid documents.
- 16.03 If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED for HVAC Piping Improvements, Pisgah Forest Elementary School, Transylvania County Schools. A mailed Bid must be addressed to:

Alan Justice
Facilities, Athletic, Transportation Director CDPT
225 Rosenwald Lane
Brevard, North Carolina 28712

- 16.04 If received prior to the designated time of opening, bids will be securely kept and remain sealed. Mailed bids will be treated in every respect as though filed in person and will be subject to the same requirements. Bids received subsequent to the designated time of opening will be returned to the Bidder unopened.

ARTICLE 17 – MODIFICATION AND WITHDRAWAL OF BID

- 17.01 A Bid may be withdrawn prior to the Bid opening by the Bidder by providing an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 17.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 17.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 17.03 No Bid may be withdrawn for a period of 90 days after Bids have been opened pending the execution of a Contract with the successful bidder except as provided for in Section 143-129.1 of the North Carolina General Statutes. A Bidder must file a duly signed written notice within the time frame allowed under applicable statutes with the Owner and Engineer promptly after the time set for the opening of bids that demonstrates, to the reasonable satisfaction of Owner, there was a material and substantial mistake in the preparation of its Bid, and the Bidder desires to withdraw its Bid. The Owner and Engineer will review the request and, if approved, the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 18 – OPENING OF BIDS

18.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 19 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

19.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 20 – EVALUATION OF BIDS AND AWARD OF CONTRACT

20.01 Owner reserves the right to select any or none of the Add Alternates included in the Bid Schedule.

20.02 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids if there is a reasonable doubt the bid will result in the lowest overall cost to the Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advanced payment.

20.03 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, the Owner will reject the Bid as nonresponsive; However Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.

20.04 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

20.05 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

20.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

20.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.

20.08 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid including any selected Add Alternatives.

ARTICLE 21 – CONTRACT SECURITY AND INSURANCE

21.01 The Modified General Conditions, and as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by the bonds and insurance documentation.

ARTICLE 22 – SIGNING OF AGREEMENT

22.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 10 days thereafter, Successful Bidder must sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. The Owner will set a time and place for a Preconstruction conference. One fully signed counterpart of the Contract Documents will be provided to the Contractor following review from the Owner’s legal counsel.

ARTICLE 23 – RETAINAGE

23.01 Provisions concerning Contractor’s rights to deposit securities in-lieu of retainage are set forth in the Agreement.

ARTICLE 24 – COMMENCEMENT OF WORK

24.01 Upon execution and delivery of the Contract and the delivery of the required Performance and Payment Bonds and insurance certificates and policies by the Contractor to the Owner, the Contractor will be notified to proceed with the work of the Contract. The work of the Contract must be commenced within ten (10) days following such notification or as otherwise specified in the Notice to Proceed.

24.02 The Contractor must notify the Engineer, in writing, of its intention to enter upon the site of the work at least three (3) days in advance of such entrance.

ARTICLE 25 – PREQUALIFICATION OF EQUIPMENT SUPPLIERS

25.01 Certain equipment on this project may require the prequalification of manufacturers prior to the receipt of bids. When required by the Contract Documents, manufacturers wishing to supply equipment for this project must submit a prequalification submittal to the Engineer for approval. The prequalification submittal must be submitted by the equipment manufacturer and received by the Engineer by the specified time listed in the Contract Documents to receive consideration. The submittal must demonstrate the proposed equipment meets the requirements of the Contract Specifications and Drawings. The Engineer will issue an addendum prior to the bid date listing the approved manufacturers.

25.02 The submittal of prequalification information does not omit the requirement for the Contractor and manufacturers to submit complete shop drawing submittals to the Engineer in accordance with the Contract Documents.

- 25.03 The prequalification submittal must be made in accordance with Paragraph 2.1 of Specification Section 013300 “Submittal Procedures” a minimum of 14 days prior to the bid date.
- 25.04 The naming of manufacturers in the technical specifications is given as a basis for comparison and does not omit the requirement for the Contractor and manufacturers to provide a prequalification submittal.
- 25.05 The manufacturer is responsible for visiting the site prior to the bid. Failure to visit the site to understand all existing facility, operation, and site conditions does not relieve the manufacturer from complying with all of the requirements of the Contract Documents and specifications.
- 25.06 Refer to the individual equipment specifications for prequalification requirements.

BID FORM

*HVAC PIPING IMPROVEMENTS, PISGAH FOREST ELEMENTARY SCHOOL
TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA*

MCGILL PROJECT NO. 22.00607

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ARTICLE 1 – BID RECIPIENT

This Bid is submitted to:

**Alan Justice
Facilities, Athletic, Transportation Director CDPT
225 Rosenwald Lane, Brevard, NC 28712**

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for **60** days after the date of the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Project Site and has become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures, including Underground Facilities, at or contiguous to the Site which have been included as a part of the Contract Documents.

E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

- F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder or, if no written response was made by Engineer, that Bidder has resolved the issue to its satisfaction prior to the submittal of its Bid.
- J. The Bidding Documents are sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.
- L. Bidder has not relied upon any information provided by the Engineer except information which is part of the Bidding Documents and is in writing and in the form of a formal addendum.
- M. The submission of a Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of the Bid Documents and the Instructions to Bidders, and that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents.

ARTICLE 4 – FURTHER REPRESENTATIONS

4.01 Bidder further represents that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

ARTICLE 5 - BASIS OF BID

Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

LUMP SUM BASE BID

Lump Sum Base Bid Price: _____

_____ dollars

(words)

(\$ _____)

(numbers)

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete within 240 calendar days after the date when the Contract Times commence to run as provided in the Modified General Conditions, and will be completed and ready for final payment in accordance with the Modified General Conditions within 270 calendar days after the date when the Contract Times commence to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Time.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are attached to, incorporated herein by reference, and made a condition of this Bid:

- A. Required Bid security in the form of a certified check, money order, or Bid Bond
- B. Non-Collusive Affidavit
- C. Affidavit of Compliance – North Carolina – E-Verify Statutes

ARTICLE 8 – BID SUBMITTAL

8.01 This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (CORPORATE SEAL)

Attest _____

Date of Authorization to do business in *State Where Project is Located* is ____/____/____.

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address _____

Phone No. _____ Fax No. _____

SUBMITTED on _____, 20____.

State Contractor License No. _____.

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*): Transylvania County Schools
225 Rosenwald Lane, Brevard, NC 28712

BID

Bid Due Date: XXXXXXXX

Description (*Project Name— Include Location*): HVAC PIPING IMPROVEMENTS, PISGAH FOREST
ELEMENTARY SCHOOL

1160 Ecusta Rd, Brevard, NC 28712

BOND

Bond Number:

Date:

Penal sum _____ \$ _____

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Transylvania County Schools
HVAC PIPING IMPROVEMENTS, PISGAH FOREST ELEMENTARY SCHOOL

Non-Collusive Affidavit
(Submit with Bid Documents)

State of North Carolina

County of Transylvania

_____ being first duly sworn, deposes and says that:

- (1) He/She is the _____,) Owner, Partner, Officer, Representative or Agent) of _____ the Bidder that has submitted the attached Bid;
- (2) He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham Bid; employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Work for which the attached Bid has been submitted; or to refrain from bidding in connection with such Work; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against(Recipient), or any person interested in the proposed Work;
- (4.) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit/.

BY _____

ITS _____

(Title)

Subscribed and sworn to before me

This _____ day of _____

My Commission Expires _____

**Transylvania County Schools
E-VERIFY AFFIDAVIT**

STATE OF NORTH CAROLINA
COUNTY OF TRANSYLVANIA

I, _____ (the individual attesting below), being duly authorized by and on behalf of
_____ (the entity doing business with Transylvania County Schools hereinafter

"Employer") after first being duly sworn hereby swears or affirms as follows:

1. Employer understands that E-Verify is the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law in accordance with NCGS §64-25(5).
2. Employer understands that Employer as defined herein, must use E-Verify. Each Employer, after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS§64-26(a).
3. Employer is a person, business entity, or other organization that transacts business in North Carolina and that employs 25 or more employees in this State. (mark Yes or No)
 - a. YES _____, or
 - b. NO _____
4. Employer's subcontractors comply with E-Verify, and if Employer is contracted with Watauga County, Employer will ensure compliance with E-Verify by any subcontractors subsequently hired by Employer.

This ____ day of _____, 20____.

Signature of Affiant

Title: _____

State of _____

County of _____

Signed and sworn to (or affirmed) before me, this the ____

day of _____, 20____.

Notary Public
Print Name: _____

My Commission Expires: _____

||
||
(Affix Official/Notarial Seal)

Notice of Award

Date: _____

Project: HVAC Piping Improvements, Pisgah Forest Elementary School	
Owner: Transylvania County Schools	Owner's Contract No.:
Contract: Single Prime	Engineer's Project No.: 22.00607
Bidder:	
Bidder's Address:	

You are notified that your Bid dated **XXXXXX**, for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for HVAC Piping Improvements, Pisgah Forest Elementary School .

The Contract Price of your Contract is (\$) _____ based on the scope of work and revised bid included in the Contract Documents.

Three (3) copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

You must comply with the following conditions precedent within ten (10) days of the date you receive this Notice of Award.

1. Deliver to the Owner [Three (3)] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] and other documents as specified.

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

 Transylvania County Schools
 Owner
 By: _____
 Authorized Signature

 Title

ACCEPTED

 Contractor
 By: _____
 Authorized Signature
 _____ Title

MODIFIED AGREEMENT **BETWEEN OWNER AND CONTRACTOR**

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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**MODIFIED AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (LUMP SUM)**

THIS AGREEMENT is by and between _____ Transylvania County Schools _____ (“Owner”) and

_____ (“Contractor”).

Effective Date of Agreement: _____

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents.
The Work is generally described as follows:

The project generally consists of replacing existing 2 pipe hydronic distribution system with a 4 pipe system. Existing 2 pipe system will remain in service during installation of the 4 pipe system.

ARTICLE 2 – ENGINEER

2.01 The Project has been designed by McGill Associates, P.A. (Engineer), which is to act as Owner’s representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 3 – CONTRACT TIMES

3.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.02 *Dates for Substantial Completion and Final Payment*

A. The Work must be substantially completed within 240 calendar days from date of Notice to Proceed, and completed and ready for final payment in accordance with the Modified General Conditions within 270 calendar days from date of Notice to Proceed.

3.03 *Liquidated Damages*

- A. Contractor and Owner recognize time is of the essence and Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 3.02 above, plus any extensions allowed in accordance with Article 12 of the Modified General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner **\$500 (five hundred dollars)** for each calendar day that expires after the time specified in Paragraph 3.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner **\$500 (five hundred dollars)** for each calendar day that expires after the time specified in Paragraph 3.02 above for completion and readiness for final payment until the Work is completed and ready for final payment. Liquidated damages as described in this Paragraph will also apply to delays in completion of each Phase of the Work as described in Paragraph 3.02 above.

ARTICLE 4 – CONTRACT PRICE

- 4.01 Owner will pay Contractor for completion of the Work in accordance with the Contract Documents an amount equal to the sum of the amounts determined pursuant to Paragraph 4.01.A.
- A. For lump sum work an amount equal to the percentage completed of specific items of work provided by the Contractor as a schedule of values for the Lump Sum work.

ARTICLE 5 – PAYMENT PROCEDURES

5.01 *Submittal and Processing of Payments*

- A. Contractor must submit Applications for Payment in accordance with Article 14 of the Modified General Conditions. Applications for Payment will be processed by Engineer as provided in the Modified General Conditions.

5.02 *Progress Payments; Retainage*

- A. Owner will make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th day of each month during performance of the Work as provided in Paragraph 5.02.A.1 below. All payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the Modified General Conditions (and in the case of Unit Price Work based on the number of units completed).
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or

Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the Modified General Conditions.

95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work has been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage.

- B. Upon Substantial Completion, Owner will pay an amount sufficient to increase total payments to Contractor to 97.5 percent of the Work completed, less such amounts as Engineer determines in accordance with Paragraph 14.02.B.5 of the Modified General Conditions and less 250 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

5.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the Modified General Conditions, Owner will pay the remainder of the Contract Price as recommended by Engineer as provided in Paragraph 14.07.

ARTICLE 6 – CONTRACTOR'S REPRESENTATIONS

6.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
- B. Contractor has visited the Site and become familiar and satisfied with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar and satisfied with all federal, state, and local Laws and Regulations which may affect cost, progress, and performance of the Work.
- D. Contractor has reviewed all General and Supplementary Conditions applicable to the Work.
- E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in Paragraph 6.01.E above, Contractor does not consider further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site which relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies if any, which Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 7 – MISCELLANEOUS

7.01 Terms

- A. Terms used in this Agreement have the meanings stated in the Modified General Conditions and the Supplementary Conditions.

7.02 Assignment of Contract

- A. No assignment by a party of any rights under or interests in the Contract will be binding on another party without the written consent of the party sought to be bound; and, specifically but without limitation, moneys may become due and moneys that are due may not be assigned without such consent (except to the extent the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

7.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

7.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

7.05 *Contractor's Certifications*

- A. Contractor certifies it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 7.05:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution.
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels.
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 8 – CONTRACT DOCUMENTS

8.01 Contents

- A. The Contract Documents consist of the following:
1. This Agreement
 2. Performance bond
 3. Payment bond
 4. Other bonds
 5. Notice of Award
 6. Modified General Conditions
 7. Specifications as identified in the table of contents of the bound Project Manual.
 8. Drawings consisting of each sheet bearing the following general title: HVAC Piping Improvements, Pisgah Forest Elementary School
 9. Addenda (numbers __ through __, inclusive).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages __ through __, inclusive).
 11. The following may be delivered or issued on or after the Effective Date of the Agreement but are not attached hereto:
 - a. Notice to Proceed (pages __ through __, inclusive).
 - b. Work Change Directives.
 - c. Change Orders.
- B. The documents listed in Paragraph 8.01.A are attached, and incorporated here by reference, to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 8.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the Modified General Conditions.

ARTICLE 9. SAFETY

The Contractor is solely and exclusively responsible for initiating, maintaining, monitoring and supervising all safety programs, safety precautions and procedures, safety equipment and

required safety reporting procedures in connection with the work and in accordance with County requirements and State and Federal statutes. The Contractor must take all necessary or required measures to prevent damage, injury and loss to all employees present at the site, the employees of subcontractors and all other parties having access to the project site including visitors and the general public. Before beginning work, the Contractor must provide a written copy of its Safety Program to the Owner for informational purposes and for verification a safety program is available.

The project is considered a " Hard Hat", " Protective Eyewear" and ` Appropriate Clothing" construction project. All workmen, delivery truck drivers and visitors to the project are required to procure and wear approved safety headgear and eye protection regardless of whether ` overhead hazard" or ` flying debris" work is being performed and regardless of whether the workman is operating a piece of equipment from an enclosed station. All workmen and visitors are required to wear appropriate clothing including trousers, long/ short sleeved shirts and leather footwear. No sleeveless shirts or canvas or" athletic- style" shoes will be permitted. The Contractor must furnish, install, maintain and remove signs at the project entrance stating that appropriate clothing, hard hats and protective eyewear must be worn at all times.

Notwithstanding anything contained within these General Conditions to the contrary and to the fullest extent permitted by law, the Contractor shall indemnify, protect and hold harmless the Owner, and Engineer from and against all losses, claims, liens, causes of action at law or at equity and expenses, including without limit, attorney' s fees arising or allegedly arising from such operations, activities, mistakes, negligence or omission of the Contractor, its employees, agents, representatives, subcontractors, materialmen, or suppliers incidental to, or related to the Contract Agreement. Contractor understands and agrees the Owner and Engineer will not, in any way, be responsible for any losses or damages incurred, or allegedly incurred, by the Contractor, its employees, agents, representatives, subcontractors, materialmen or suppliers.

ARTICLE 11. CONTRACT GOVERNED BY NORTH CAROLINA LAWS

This Agreement and the rights and obligations to the parties hereunder shall be construed and governed by the laws of the State of North Carolina and venue for any proceedings shall be in the Superior Court of Transylvania County.

ARTICLE 12. USE OF ILLEGAL IMMIGRANTS/ HOLD HARMLESS

Transylvania County Schools assumes no responsibility for, and Contractor shall hold Transylvania County Schools harmless from, all fines or fees arising from Contractor' s failure to satisfy Department of Labor or Immigration and Naturalization Service employment regulations.

As a condition of payment for services rendered under this Agreement, Contractor must comply with the requirements of Article 2 of Chapter 64 of the General Statutes. Further, if Contractor provides services to the County utilizing a subcontractor, Contractor must require the subcontractor to comply with the requirements of Article 2 of Chapter 64 if the General Statutes.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

OWNER:

Transylvania County Schools

By: _____

Title: _____

Attest: _____

Title: _____

Address for giving notices:

Pre-Audit Statement: This instrument has been preaudited in the manner required by the Local Budget and Fiscal Control Act as amended.

By: _____

Title: _____

Date: _____

Approved as to Form:

By: _____

Title: _____

Date: _____

CONTRACTOR

By: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Title: _____

Address for giving notices:

License No.: _____

Agent for service of process:

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER: Transylvania County Schools
225 Rosenwald Lane, Brevard, NC 28712

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description: HVAC Piping Improvements, Pisgah Forest Elementary School

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint ventures. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence,

to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims

for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*: Transylvania County Schools
225 Rosenwald Lane, Brevard, NC 28712

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*: HVAC PIPING IMPROVEMENTS, PISGAH FOREST ELEMENTARY SCHOOL

1160 Ecusta Rd, Brevard, NC 28712

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

_____ *(seal)*

Contractor's Name and Corporate Seal

_____ *(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in

the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

ATTACH INSURANCE CERTIFICATES AND W-9 FORMS HERE

Notice to Proceed

Date: _____

Project: HVAC Piping Improvements, Pisgah Forest Elementary School	
Owner: Transylvania County Schools	Owner's Contract No.:
Contract:	Engineer's Project No.: 22.00607
Contractor:	
Contractor's Address:	

You are notified that the Contract Times under the above Contract will commence to run on_____. On or before the 10th day following this date, you are to commence work and start performing your obligations under the Contract Documents. In accordance with the Agreement, the date of Substantial Completion is _____, and the date of Final Completion is _____.

Contractor

Authorized Signature

Title

Date

Owner

Given by:

Authorized Signature

Title

Date

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

**MODIFIED STANDARD
GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT**

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC

AMERICAN COUNCIL OF ENGINEERING COMPANIES



ASCE *American Society
of Civil Engineers*

P/E *National Society of
Professional Engineers*
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These Modified General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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**MODIFIED STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT**

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below have the meanings indicated which are applicable to both the singular and plural. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form provided in the Contract Documents is to be used by Contractor during the course of the Work in requesting progress or final payments and is to be accompanied by supporting documentation as required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer, signed by Contractor and Owner, which authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Construction Field Representative (CFR)*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
 12. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

13. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
14. *Contract Price*—The Monies payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
15. *Contract Times*—The number of calendar days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
16. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
17. *Cost of the Work*—See Paragraph 11.01 for definition.
18. *Drawings*—The part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
19. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but only if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not involve a change in the Contract Price or the Contract Times.
22. *General Requirements*—Sections of Division 1 of the Specifications.
23. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances which present a substantial danger to persons or property.
24. *Hazardous Waste*—The same as the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) and as amended from time to time.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
27. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder, with the conditions precedent listed therein, Owner will sign and deliver the Agreement. The Notice of Award shall not be construed as an agreement or contract. Contractor has no rights or remedies against Owner until the Notice to Proceed has been issued.
29. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor must start to perform the Work under the Contract Documents.
30. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
31. *PCBs*—Polychlorinated biphenyls.
32. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, or oil mixed with other non-Hazardous Waste and crude oils.
33. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
34. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents. The Project Manual contains any and all addenda issued, documents executed by the Owner and Contractor or Engineer after bidding, and all attachments and exhibits thereto, up to and including the executed copy of the Notice to Proceed.
36. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) and as amended from time to time.
37. *Samples*—Physical examples of materials, equipment, or workmanship which are representative of some portion of the Work and establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—The part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be fully utilized for the purposes for which it is intended. As a precedent condition to Substantial Completion the Owner shall have received all certificates of occupancy and any other necessary permits for beneficial occupancy. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—The part of the Contract Documents which amends or supplements these Modified General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
49. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those which convey electricity, gases,

steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*—Work to be paid for on the basis of unit prices.
51. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
52. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence the parties expect the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. The exercise of professional judgment, action, or determination is to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient because it:

- a. does not conform to the Contract Documents or general standards of workmanlike construction or published authorities which govern the proper use and application of a particular material or component including, but not limited, to literature published by manufacturers and trade organizations; or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
- c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position services, materials, or equipment complete and ready for intended use.
3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install services, materials, or equipment complete and ready for intended use.
4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor must also deliver to Owner the bonds as Contractor is required to furnish. The Owner has sole authority to review and reject any bonds as nonconforming.
- B. Within fifteen (15) calendar days after the Effective Date of the Agreement, but before any Work at the Site is started, Contractor must deliver to Owner, with a copy to Engineer, certificates and other evidence of insurance requested by Owner which Contractor is required to purchase and

maintain in accordance with Article 5 of these Modified General Conditions. The Owner has sole authority to review and reject any insurance as nonconforming.

2.02 *Copies of Document*

Engineer will furnish to the successful Contractor up to three (3) sets of the Project Manual. Additional sets will be made available by the Engineer to the Contractor at the cost set forth in the Advertisement for Bids for this project or the actual cost for reproduction whichever is greater.

2.03 *Commencement of Contract Times; Notice to Proceed*

The Contractor must complete all of the work contracted herein, in an acceptable manner and within the established Contract Time. The Contract Time shall commence on the start date given in the Notice to Proceed, and run continuously each and every calendar day following, except as provided, and in accordance with Paragraph 17.02. Times shall be of the essence of this Contract.

2.04 *Starting the Work*

The Contractor must commence work on or before the tenth (10th) calendar day after the date of the Notice to Proceed or as may be differently stated in the Notice to Proceed. Contractor shall not start work prior to the date set in the Notice to Proceed.

2.05 (Intentionally Deleted)

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a Preconstruction Conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the Contractor's schedule for completion of the work, policies and procedures for submittal of Shop Drawings and other submittals, presentation and processing of Applications for Payment, and maintaining records required by the Contract Documents. If agreed between Owner and Contractor, the Preconstruction Conference may be held prior to the commencement of the Contract Times.
- B. At this conference Owner and Contractor each must designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals must have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of, and legally bind each respective party.

2.07 *Submission and Acceptance of Schedules*

Prior to presentation of the first Application for Payment, the Contractor must submit the below schedules. No progress payment will be made to Contractor until acceptable Schedules are submitted to Engineer. All schedules must be coordinated and logically related in time and value for the various stages of work.

1. The Progress Schedule. The Progress Schedule will be computer generated, utilizing the critical path method (CPM), indicating the dates and duration for completing the various stages of the Work, including any milestones. The level of detail a number of tasks shown in the Progress Schedule will be commensurate with the complexity of the work. The Progress Schedule must be acceptable to Engineer if at a minimum it clearly and accurately demonstrates an orderly progression and completion of the work within the contract times. Contractor is solely responsible for scheduling and completing the work within the contract time. Any approval or acceptance of the schedule shall not impose on Engineer responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility for completion within the contract time.
2. The Schedule of Submittals. The Schedule of Submittals must provide a workable arrangement for the Engineer to timely review and process the required submittals. The Schedule of Submittals must also include a list of manufacturers and suppliers. Approval of any schedule by Engineer shall not relieve the Contractor from any obligations under the Contract.
3. The Schedule of Values. The Contractor's Schedule of Values must provide a reasonable allocation of the Contract Price to component parts of the Work. Contractor's Schedule of Values for all of the Work must include quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail, commensurate with the complexity of the Work, to serve as the basis for progress payments during performance of the Work. The Schedule of Values must have line items for project closeout including, demobilization, record drawings, completion of the punch list and project restoration and final cleanup. Approval of any Schedule by Engineer shall not relieve the Contractor from any obligations under the Contract.
4. Cash Flow Schedule. Contractor's Cash Flow Schedule must be a scheduled and forecasted value of the anticipated payment requests for the Work. The amounts shown will be considered an estimate which may differ from the actual amounts requested.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. The intent of the Contract Documents is to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result must be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents will be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether the reference is specific or implied, shall mean the standard, specification, manual, code, or Laws or Regulations in effect as of the date Engineer sealed, signed, and dated the Contract Documents, except as may be otherwise specifically stated in the Contract Documents.
2. The Contract Documents shall be deemed to include applicable building codes, laws and regulations, relevant published industry and trade organization standards, as well as the published requirements of any product manufacturer. However, no such provision or instruction shall have the effect of assigning to Owner, Engineer, or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Review of Contract Documents before Starting Work:* Before undertaking each part of the Work, Contractor must carefully study and compare the Contract Documents and check and verify pertinent figures and all applicable field measurements. Contractor must promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby. Contractor's failure to notify Engineer of any discrepancy prior to commencement of Work shall constitute a waiver of Contractor's right to seek additional compensation or damages for any alleged discrepancy later discovered by Contractor.
 - a. Contractor (and any Subcontractor responsible for the performance of all or any part of such Work) must field verify the accuracy of all grades, elevations, dimensions, locations, orientation and measurements including locations of any underground utilities or other features which may be shown generally on the drawings for informational purposes only. The Contractor must promptly, in writing, notify the Engineer of any discrepancies. Contractor's failure to notify Engineer of any discrepancy prior to commencement of Work shall constitute a waiver of Contractor's right to seek additional compensation or damages for any alleged discrepancy later discovered by Contractor.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, Contractor must promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract

Documents has been issued by one of the methods indicated in Paragraph 3.04. Contractor's failure to notify Engineer of any discrepancy prior to commencement of Work shall constitute a waiver of Contractor's right to seek additional compensation or damages for any alleged discrepancy later discovered by Contractor.

- a. In the event Contractor determines that some aspect of the Contract Documents require clarification or interpretation by Engineer, Contractor must submit a Request for Information (RFI) in writing to Engineer in a format provided by Engineer. RFIs may only be submitted by the Contractor and must be in the form required by Engineer. Verbal RFI or a RFI presented on an unapproved form must be rejected. Any delay caused by Engineer's refusal to accept a verbal RFI or a RFI presented on an unapproved form will be attributed solely to Contractor. Each RFI must be limited to a single issue. Information that is discernible from the Contract Documents as well as issues concerning construction means, methods, techniques, sequences or safety will not be addressed by Engineer.
- b. Contractor must clearly and concisely state the issue for which clarification or interpretation is sought and why a clarification or interpretation is needed. The RFI process shall not be used by Contractor to seek approval for proposed "or-equal" or substitute materials or equipment.
- c. Engineer's review of or responses to RFIs will not constitute an approval, direction, or procedure related to the construction means, methods, techniques, sequences, or safety.
- d. Responses to Contractor RFIs will not change any requirement of the Contract Documents. In the event Contractor believes that a response to an RFI will cause a change in the Contract Price or Contract Time, Contractor must promptly give written notice of the Claim to Engineer.
- e. If Contractor wishes to make Claim for an adjustment of the Contract Price or an extension of the Contract Times, or both, written notice as provided in Paragraph 10.05 must be given and approved by Engineer before proceeding to execute the Work. Failure to give such written notice shall waive Contractor's right to seek an adjustment of the Contract Price or an extension of the Contract Times.

B. *Resolving Discrepancies:*

Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
- b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of a Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation of such documents by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for ordinary record keeping purposes.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless Engineer, and the Owner and their employees, principals, agents, successors, insurers, sureties and assigns, from and against any and all liabilities, claims, causes of actions, suits of any nature, fines, penalties, expenses, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of, resulting from, or relating to the unauthorized use, reuse, or modification of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions, by Contractor, its employees, agents, or any other person or entity for whom Contractor is legally liable.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, which may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, surveys, graphics, or other types are furnished, if at all, only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. To the extent that any discrepancy exists between the electronic files and the hard copies, the hard copies shall govern.

The Engineer may, but is not obligated to, make copies of requested Drawings in electronic format for the Contractor's convenience and to facilitate the Contractor's administration of the Project. Because information presented on electronic files can be modified, unintentionally or otherwise, the Engineer reserves the right to remove all indications of ownership from each electronic display. Notwithstanding the removal of indicia of ownership, the Engineer's copyright interest in such files and the information contained therein shall not be abridged or abated by such action. The use of electronic files prepared by the Engineer shall not in any way relieve the contractor of its duty to fully comply with the Contract Documents nor negate the Contractor's responsibility for coordination of other trades, and taking field measurements.

- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data. To the extent any errors are detected, the receiving party must provide written notice to the transferring party, who must correct the errors identified within the 60 day acceptance period.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner will furnish the Site. Owner will notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain, in a timely manner and pay for, easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim as provided in Paragraph 10.05.

- B. In the event the Project involves private land, upon reasonable written request, Owner will furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor must provide for all additional lands and access required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Contract Documents identify:

1. If during the preparation of these Contract Documents, subsurface or geotechnical explorations were conducted which are relevant in the discretion of the Engineer to the scope of the work, the findings will be included in the Appendix of the Specifications. The Contractor is responsible for obtaining reports and explorations it deems necessary and advisable for the performing of the Work in accordance with the Contract Documents.
2. Information and data reflected in the Contract Documents, with respect to existing structures and facilities at or contiguous to the Site, are based upon information obtained from varying sources which may include reports, drawings or other data of those facilities presently on file with the Owner. The Owner and Engineer do not guarantee the accuracy of any such information. The Contractor is responsible for field verifying all conditions and measurements and for determining the suitability of the site for the proposed Work.

B. *Limited Reliance by Contractor on Technical Data Authorized*: any reports and drawings which have been identified in Article 4.02 A 1 are not Contract Documents. However, in the event the Engineer specifically calls out and designates certain information in reports and drawings as "Technical Data" then Contractor has a limited right to rely upon the accuracy of the designated Technical Data. Other than the designated Technical Data, any information provided and depicted on the Drawings is merely intended to be a general representation of the physical conditions likely to be encountered during the Work and will not constitute a guarantee or warranty by the Engineer or Owner that actual conditions will not vary from what is depicted. Except for the Contractor's right to rely on the designated technical data, which is limited as more specifically shown below. Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in reports or shown or indicated in drawings; or

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any other data, interpretations, opinions, or information.
4. the information provided and depicted on the project drawings is not guaranteed by the Owner or Engineer to be more than a general representation of the physical conditions likely to be encountered during the Work.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor discovers or should reasonably have discovered, or otherwise reasonably believes any subsurface or physical condition is uncovered or revealed:

1. is of such a nature as to establish any “Technical Data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate;
2. is of such a nature as to require a change in the Contract Documents;
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents, and is not in the area of the project bid as Unclassified Excavation,

then Contractor must, promptly, after becoming aware and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor may not further disturb the condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work, subject, however, to the following:
 - a. such circumstance must meet the conditions of Paragraph 4.03. A; and
 - b. with respect to Work paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor is not entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any consequential damages, including but not limited to claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project, and Contractor expressly and specifically releases any and all damages related thereto. Any damages for suspension or idle time shall be limited to the Contractor's actual cost of labor or equipment costs, including a reasonable markup for overhead but shall not include a markup for profit.

4.04 *Underground Facilities*

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Contract Documents:
1. Owner and Engineer are not responsible for the accuracy or completeness of any information or data provided; and
 2. the cost of all of the following must be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all Underground Facilities and repairing any damage resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor must, promptly after becoming aware and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment will be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim as provided in Paragraph 10.05.
3. Generally, service connections are not indicated on the project drawings. Contractor is responsible for locating all existing underground utility installations in advance of excavation.

C. *Underground Utility Damage Prevention Act:*

1. Contractor is required to and agrees to comply with all the provisions of any applicable underground utility damage prevention act (however titled) and hereby agrees, to the fullest extent permitted by Laws and Regulations, to indemnify, defend, and hold harmless Owner, Engineer, and their employees, elected officials, principals, agents, successors, sureties, insurers and assigns, including any of their Related Entities, if any, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to Contractor's failure, or the failure of anyone for whom Contractor is responsible, to so comply with the requirements of said act, except the Contractor is not required to indemnify any person or entity for acts attributable to the sole negligence of such person or entity.

4.05 *Reference Points*

- A. Owner will provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor is responsible for laying out the Work, protecting and preserving the established reference points and property monuments. Contractor cannot make any changes or relocations without the prior written approval of Owner. Contractor must report to Engineer whenever any reference point or

property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and is responsible for the accurate replacement or relocation of reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Contract Documents for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, which have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on designated Technical Data Authorized:* Contractor may rely upon the accuracy of any designated "Technical Data" contained in reports and drawings, but reports and drawings are not Contract Documents, and Contractor's reliance on the designated Technical Data is limited to the extent specifically described in set forth in Article 4.02 B. Except for reliance on "Technical Data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in reports or shown or indicated in drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any other data, interpretations, opinions or information.
- C. Contractor is not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor is responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor must immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner will promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor is not required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits and delivered written notice to

Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim as provided in Paragraph 10.05.

- F. If after receipt of written notice Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim as provided in Paragraph 10.05. Owner may have the deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor must furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor must also furnish such other bonds as are required by the Contract Documents. The Owner is solely responsible for determining the adequacy and sufficiency of the bonds for the Project.
- B. All bonds must be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and be executed by a surety named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of the individual's authority to bind the

surety. The evidence of authority must show the bond is effective on the date the agent or attorney-in-fact signed each bond.

- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor must promptly notify Owner and Engineer and must, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor must be obtained from surety or insurance companies who are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits. Surety and insurance companies must also meet such additional requirements and qualifications provided in the Supplementary Conditions. The Owner is responsible for determining the sufficiency and adequacy of such bonds and insurance.

5.03 *Certificates of Insurance*

- A. Contractor must deliver to Owner, with copies to each additional insured and loss payee identified in the Contract Documents, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain. The Owner is solely responsible for determining the adequacy and sufficiency of the insurance requested under the Contract Documents and any certificates of insurance which are required.
- B. Owner will deliver to Contractor, with copies to each additional insured and loss payee identified in the Contract Documents, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with the insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain insurance.
- D. Neither Owner nor Engineer represents insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required shall not be deemed as a limitation on Contractor's liability under the cap contract documents, including under the indemnities granted in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor must purchase and maintain insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from

Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting there from;
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle; and
7. claims for damages arising out of Contractor's performance or providing of professional architectural or engineering services in accordance with Paragraph 6.21.B.

B. The policies of insurance required by this Paragraph 5.04 must:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insured's (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Contract Documents, all of whom must be listed as additional insured's, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insured's, and the insurance afforded to these additional insured's shall provide primary coverage for all claims covered thereby;
2. include the specific coverages herein required or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 60 days prior written notice has been

given to Owner and Contractor and to each other additional insured identified in the Contract Documents to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Insurance must remain in effect for two years after final payment.
 - b. Contractor must furnish Owner and each other additional insured identified in the Contract Documents to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any additional insured of continuation of insurance at final payment and one year thereafter.

C. Satisfactory certificates of insurance must be submitted and attached to the executed Agreement for Construction between the Owner and Contractor. In connection with the provisions set forth in the Modified General Conditions, the Notice to Proceed will not be issued until certificates of insurance, satisfactory to Owner, are filed.

D. Specified Limits of Insurance Required to be Carried by Contractor

1. Worker's Compensation and Employer's Liability

The insurance must protect the Contractor and Owner and the Engineer against all claims under worker's compensation laws. The Contractor and Owner must also be protected against claims for injury, disease, or death of employees that, for any reason, may not fall within the provisions of a worker's compensation law. This policy must include an "all states" endorsement.

The liability limits must not be less than:

Worker's Compensation Statutory
Employer's Liability \$500,000 each occurrence

2. Comprehensive Automobile Liability

The insurance must be written in comprehensive form and protect the Contractor and Owner and engineer against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, and cover operation on or off the site of all motor vehicles licensed for highway use, whether they are owned, non-owned, or hired.

The liability limits must not be less than:

Bodily Injury \$1,000,000 each person
 \$1,000,000 each occurrence
Property Damage \$1,000,000 each occurrence
 \$1,000,000 aggregate

3. Comprehensive General Liability

The insurance must be written in comprehensive form and protect the Contractor and Owner against all claims arising from injuries to persons other than its employees or damage to property of the Owner or others arising out of any act or omission of Contractor or its agents, employees, or Subcontractors. The policy must also include protection against claims insured by usual personal injury liability coverage and include a “protective liability” endorsement to insure the contractual liability assumed by the Contractor under the indemnification provisions in the Modified General Conditions, and “Completed Operations and Products Liability” coverage (to remain in force during the correction or warranty period required under this Agreement).

To the extent the Contractor's work, or work under its direction, may require blasting, explosive conditions, or underground operations, the comprehensive general liability coverage must contain no exclusion relative to blasting, explosion, collapse of building, or damage to underground property.

Bodily Injury	\$1,000,000 each person \$1,000,000 each occurrence
Property Damage	\$1,000,000 each occurrence \$2,000,000 aggregate

4. Umbrella Liability Policy

The insurance must protect the Contractor against all claims in excess of the limits provided under the worker’s compensation and employer's liability, comprehensive automobile liability, and general liability policies. The liability limits of the umbrella liability policy must not be less than \$5,000,000.

- E. Contractor covenants and agrees the insurance coverage and limits required by the Contract Documents shall in no way be considered or used in any manner as a limit or cap of any kind on any liability or obligation Contractor may otherwise have, including, without limitation, liability under the indemnification provisions contained herein.
1. by requiring insurance and insurance limits, neither Owner nor Engineer represents the coverage and limits will necessarily be adequate to protect Contractor.
 2. Contractor is responsible for any deductible or self-insured retention.

5.05 *Owner’s Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner’s option, may purchase and maintain at Owner’s expense Owner’s own liability insurance to protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Contractor must purchase and maintain Builder's Risk insurance for the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Contract Documents or required by law). Contractor is responsible for all associated costs of insurance. The insurance must:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Contract Documents, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form which must at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and other perils or causes of loss as may be specifically required by the Contract Documents.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued. The Owner is solely responsible for determining the adequacy and sufficiency of Builders Risk insurance.
- B. Unless otherwise provided in the Contract Documents, Contractor must purchase and maintain boiler and machinery insurance or any other additional property insurance required by the Contract Documents or Laws and Regulations, which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Contract Documents, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest in the project and be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 must contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 60 days prior written notice has been given to Owner and Contractor and to

each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

- D. Owner is not responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts identified in the Contract Documents. The risk of loss within identified deductible amount must be borne by Contractor, Subcontractors, or others suffering any loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, elected officials, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All policies must contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees there under. Owner and Contractor waive all rights against each other and their respective officers, elected officials, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by policies and any other property insurance applicable to the Work; and, in addition, waive all rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, elected officials, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under policies for losses and damages so caused. None of the above waivers extend to the rights that any party making the waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy issued. This Waiver of Subrogation must survive the completion or termination of this Agreement.
- B. Owner, and Contractor waive all rights against each other, Subcontractors, and Engineer, and the officers, elected officials, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner, or any other loss of profits or other consequential damages; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B must contain provisions to the effect that in the event of payment

of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them. This provision must survive the completion and/or termination of the Agreement.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner will deposit in a separate account any money so received and distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work must be repaired or replaced, the Monies received applied on account thereof, and the Work and the cost covered by an appropriate Change Order.
- B. Owner as fiduciary has the power to adjust and settle any loss with the insurers unless one of the parties in interest objects in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If objection be made, Owner as fiduciary will make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no agreement among the parties in interest is reached, Owner as fiduciary will adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary will give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party must notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor must each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party fails to purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party must notify the other party in writing of the failure to purchase prior to the start of Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order will be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy may commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any necessary changes in coverage. The insurers providing the property insurance must consent by endorsement on the policy or policies, but the property insurance must not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor must supervise, inspect, and direct the Work competently and efficiently, devoting attention and applying skills and expertise necessary to perform the Work in accordance with the Contract Documents. The Contractor is solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor must supervise, inspect, and direct the Work competently and efficiently, devoting attention and applying skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

Contractor must provide competent, qualified, on-site, supervision at all times during construction activities including supervision of the activities of the sub-contractor(s), vendors and suppliers through a Resident Superintendent. The Resident Superintendent must be on-site at any time work is ongoing at the project. Sub-contractors shall not work independently on the project without on-site supervision provided Resident Superintendent. A resume for the Resident Superintendent must be submitted to the Engineer for approval prior to commencing work. Resumes must include projects they were in responsible charge of, are of similar work in scope and value with owner’s references. Contractor must not change the Resident Superintendent without written approval from the Engineer. However, the approval of any supervisor by the Engineer does not relieve the Contractor of its obligation to properly supervise and perform the Work.

- B. If at any point during the progress of the Work the Owner determines, in its sole discretion, the Resident Superintendent is inadequately performing its services, the Owner may direct in writing the Contractor to replace the Resident Superintendent within thirty (30) days of notification. The resumes of any proposed new Resident Superintendent must be submitted to the Engineer for approval prior to their commencement of work on the project.
1. The Resident Superintendent must provide Owner and Engineer with a written daily field report containing, as a minimum, the following information:
 - a. the number of personnel on site, identified by craft or trade, employer and work activity, and the number of hours worked during the workday;
 - b. the types and numbers of equipment on site and the time each piece of equipment was used or stood idle during the workday;
 - c. any materials or equipment received on site during the workday; and
 - d. the identification and quantity of any unit price work, if any, installed during the day.

The daily field reports must be submitted to Owner and Engineer at least weekly.

- C. For purposes of giving or receiving notices, directives, Change Orders, or any other information from Owner or Engineer to Contractor, Contractor must designate a specific individual as Project Manager to receive notices, directives, Change Orders, or other information. If the person designated by Contractor is not available, Contractor must (in writing addressed to Owner and Engineer) identify the individual who is acting as his authorized representative.

- D. Contractor acknowledges its obligation to complete the Work in accordance with the Contract Documents shall not be affected or amended as a result of any act by Engineer or any other Owner's consultant, or as a consequence of any field inspections or observations or approval of any Application for Payment, or in regard to any other duty performed by Engineer or other Owner's consultant for the benefit of Owner, unless Owner and Engineer expressly approve Contractor's action in advance in writing specifically identifying the action approved. Furthermore, Contractor shall not be relieved of any responsibility to complete the Work in conformity with the contract Documents as a consequence of any knowledge of non-conformity obtained by an Owner's representative, including Engineer, whether or not such representative acts or fails to act on such knowledge. Contractor acknowledges and agrees that any representative retained by Owner to act for Owner's benefit, including Engineer, shall have no duty or responsibility to Contractor, except where specifically stated herein, and no act or failure to act by such Owner's representative shall relieve Contractor of its obligations to perform all requirements under this Contract, except as specifically approved in writing otherwise.

6.02 *Labor; Working Hours*

- A. Contractor must provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor must, at all times, maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site must be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.
- C. No Work may be done between 6 p.m. and 7 a.m. without permission of Owner. However, emergency work may be accomplished without prior permission. No Night Work may be undertaken without permission of Owner.
- D. Each occasion Contractor works in excess of 45 hours per week, or outside of the hours of 7:00 am and 6:00 pm, or on weekends or holidays, the Contractor must reimburse Owner for any and all costs and expenses (including, but not limited to, Engineer's fees and expenses associated with additional Observation and Contract Administration) incurred by Owner as a result of such schedule. Contractor covenants and agrees Owner may retain, deduct, and/or offset monies due to Owner pursuant to this Paragraph from monies due to Contractor under the Agreement. Contractor further covenants and agrees Owner retains the right to make such deduction or offset at any time prior to and including final payment and the imposition and the deduction and/or offset of such monies shall not be subject to any notice or claim provisions of the Contract Documents.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

- B. All materials and equipment incorporated into the Work must be as specified or, if not specified, be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications must expressly run to the benefit of Owner. If required by Engineer, Contractor must furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
1. To the extent possible, all warranties must run to and be enforceable by Owner. Contractor agrees to assign to Owner at the time of final completion of the Work, or as otherwise required by the Contract Documents, any and all Subcontractor and Supplier warranties relating to materials and labor used in the Work and Contractor further agrees to perform the Work in such a manner to preserve any and all Subcontractors' and Suppliers' warranties. Contractor must provide Owner assistance, throughout the duration of such warranties, in enforcing the obligations of Subcontractors and Suppliers. If necessary as a matter of law, Contractor may retain the right to enforce directly any such Subcontractors' and Suppliers' warranties during the one-year period following the date of Substantial Completion established by Paragraph 14.04. Contractor includes in this warranty materials and equipment specified by Engineer by brand name. The warranty provided in this Paragraph 6.03 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law and be in addition to all other rights and remedies available to Owner. All warranty obligations are cumulative to and in addition to all remedies available to Owner pursuant to the Contract Documents and applicable law.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.
- D. Materials and equipment stored off site must be stored in a bonded, secure warehouse. Any materials and equipment stored off site must be available for review by Engineer's representative. Material and equipment must be stored and maintained while in storage in a manner consistent with the manufacturer's recommendations. Maintenance during storage, or prior to startup must be documented and presented to the Engineer. Risk of loss of stored materials and equipment must be on Contractor, whether titled in the name of the Contractor or whether title previously passed to the Owner as a result of payment for the stored materials and equipment.
- E. The Contractor has responsibility for the care of all equipment and materials, including those furnished by the Owner, if any, and bears the risk of injury, loss, or damage to any part thereof by action of the elements or from any other cause, until final completion. Contractor must rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the Work or the equipment or materials occasioned by any cause before completion and acceptance of the Work and bears the expense therefore. Contractor, at no additional cost to Owner, provide temporary measures and suitable structures as might be necessary to protect the Work or any portion thereof from damage.
- F. Suspension of the Work or the granting of an extension of time for any reason does not relieve Contractor of responsibilities for the Work as specified herein including the continuing care and maintenance of stored materials and equipment as well as work accomplished to date.

G. If the equipment furnished by the Contractor differs in dimension, orientation, horsepower requirements, pipe connection sizes, or is otherwise non-conforming to the Contract Documents, the Contractor is responsible for the furnishing of all properly-sized connecting piping, motor starters, motor controls, and electrical wiring and connections, and all other work required to properly install the equipment in complete operating condition. Further, such non— conforming equipment or materials must be submitted as a "Substitute" in accordance with Section 6.05 of the Modified General Conditions, including and subject to Paragraph 6.05. E. *Engineer's Cost Reimbursement*. No additional compensation by the Owner to the Contractor will be made with respect to such "Substitutes".

6.04 *Progress Schedule*

A. Contractor must adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor must submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Adjustments must comply with any provisions of the General Requirements applicable thereto.
2. Proposed adjustments in the Progress Schedule which change the Contract Times must be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.
3. Contractor must submit to the Engineer an adjusted Progress Schedule whenever the progress of the Work is behind the current, approved Progress Schedule as defined in paragraph 2.07 1 of the Modified General Conditions, or upon the Engineer's request and whenever the Engineer determines in its discretion the Work cannot be substantially complete in the time remaining. The adjusted Progress Schedule must be submitted within ten (10) days of Engineer's written request and prior to the Contractor's next application for payment.
4. Owner has the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of Owner's premises or any tenants or invitees thereof. Contractor must, upon Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling, or performance of the Work under this Paragraph 6.04.3 may be grounds for an extension of the Contract Times, if permitted under Article 12, and an equitable adjustment in the Contract Price, if permitted under Article 12 and (i) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents and (ii) such rescheduling or postponement is required for the convenience of the Owner.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the Contract Documents contain a description followed by words reading "or an approved

equivalent” or “or approved equal” item or “substitution is permitted,” other items of material or equipment or material or equipment of other suppliers may not be submitted to Engineer for review. If the description contains or is followed by words reading “or an approved equivalent” or “or approved equal” item or “substitution is permitted,” other items of material or equipment or material or equipment of other suppliers may be substituted to Engineer for review under the circumstances described below.

1. *“Or-Equal” Items* If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines:

- 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics; and
- 2) it will reliably perform at least equally well the function and achieve the results intended by the design concept of the completed Project as a functioning whole; and
- 3) it has a proven record of performance and availability of responsive service; and
- 4) it is equal or better in form, features, operation and maintenance cost and general configuration; and
- 5) it conforms to the requirements of the Contract Documents in all respects, except for make and manufacturer or supplier and minor details of specified equipment; and

b. Contractor certifies in writing, if approved and incorporated into the Work:

- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
- 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor must submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. Requests for review of proposed substitute

items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances. Applications for approval of substitute items of material or equipment will not be accepted by the Engineer if made as part of a Shop drawing submittal. The application for use of substitute material or equipment must be made prior to the submission of a shop drawing by a written communication clearly labeled "Request for Substitution". Substitute items proposed by Shop Drawings for materials or equipment will be rejected by the Engineer unless previously approved in a separate application.
- d. Contractor must make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design;
 - b) be similar in substance to that specified;
 - c) be suited to the same use as that specified; and
 - d) Contractor accepts the installation instructions, warranty and correction obligations contained in the product manufacturer's literature in connection with the proposed substitution as if such, information pertaining to the new product was originally specified in the Contract Documents; and
 - 2) must state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty; and
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and

- 4) contain an itemized estimate of all costs or credits which will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
 - e. If a proposed substitution affects a correlated function, adjacent construction, or the work of other contractors, then the necessary changes and modifications to the affected work are considered an essential part of the proposed substitution, to be accomplished by Contractor as a part of the Work, if and when approved.
- B. *Substitute Construction Methods or Procedures* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor must submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine the substitute proposed is equivalent to what is expressly called for by the Contract Documents. The requirements for review by Engineer must be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
1. Proposed substitutions may be rejected without explanation and will not be considered unless one or more of the following conditions exists:
 - a. Required for compliance with interpretation of code requirements or insurance regulations then existing.
 - b. Unavailability of specified products, through no fault of Contractor.
 - c. Subsequent information discloses inability of specified products to perform properly or to fit in designated space.
 - d. Manufacturer/fabricator refuses to certify or guarantee performance or specified product as required.
 - e. When in the judgment of Owner or Engineer, a substitution would be substantially to Owner's best interests, in terms of cost, time, or other considerations.
- D. *Special Guarantee* Owner may require Contractor to furnish, at Contractor's expense, a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement* Contractor shall be liable to Owner for any and all costs and expenses (including, but not limited to, Engineer's fees and expenses) incurred by Owner as a result of evaluating a substitute proposed or submitted by the Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B, and reflecting changes in the Contract Documents, whether or not Engineer

approves a substitute so proposed or submitted by Contractor. Contractor covenants and agrees that Owner may retain, deduct, and/or offset monies due to Owner pursuant to Paragraph 6.17.D.4 from monies due to Contractor under the Agreement. Contractor further covenants and agrees that Owner retains the right to make such deduction or offset at any time prior to and including final payment and that the imposition and the deduction and/or offset of such monies shall not be subject to any notice or claim provisions of the Contract Documents. Such payment is an obligation separate and apart from the Contractor's obligation to pay liquidated damages for delay, if any.

- F. *Contractor's Expense* Contractor must provide all data in support of any proposed substitute or "or equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor will not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor will not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any Subcontractor, Supplier, or other individual or entity may be revoked on the basis of reasonable objection after investigation. Contractor must submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order issued. No acceptance by Owner of any Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, constitute a waiver of any right of Owner or Engineer to reject defective Work.
- B. As part of the Bid or the Proposal, the Owner may require the identity of the Contractor's proposed Subcontractors and Suppliers of Equipment or Materials in order to better evaluate the Proposal or Bid. In the instance where identification of Suppliers is required, supply only one name per equipment or material item.
- C. Contractor is solely responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Owner or Engineer may furnish to any such Subcontractor, Supplier, or other individual, entity, or organization, to the extent practicable, information about amounts paid to Contractor for Work performed. Nothing in the Contract Documents:
1. creates for the benefit of any Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any Subcontractor, Supplier or other individual or entity; nor

2. creates any obligation on the part of Owner or Engineer to pay or to see to the payment of any Monies due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor is solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor must require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings does not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade. Owner and Engineer assume no responsibility for the overlapping or omission of parts of the Work by various Subcontractors or Suppliers in their subcontracts with the Contractor, as this is solely the Contractor's responsibility.
- G. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured's or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same. This Waiver of Subrogation provision shall survive the completion and/or termination of this Agreement.
- H. As soon as possible, but in no case more than 30 days after receipt of the Notice of Award, and prior to the first application for payment, the Contractor must provide the Engineer with a list of sub-contractors along with the division of their work.

6.07 *Patent Fees and Royalties*

- A. Contractor must pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.
- B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the

Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor must obtain and pay for all construction permits and licenses. Owner will assist Contractor, when necessary, in obtaining such permits and licenses. Contractor must pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner will pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor must give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer is responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor bears all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work are the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor must pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.
- B. A certified sales tax statement must be provided with each and every pay application, even if there were no sales tax during the period.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor must confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and not unreasonably encumber the Site and other areas with construction

equipment or other materials or equipment. Contractor assumes full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor must promptly settle with such other party by negotiation or otherwise resolve the claim or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, elected officials, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
4. Only materials and equipment that are to be used directly in the Work can be brought to and stored on the Project site by Contractor. After equipment is no longer required for the Work, it must be promptly removed from the Project site. If Contractor uses any portion of the new Work prior to the date of Substantial Completion of the entire Work, items must be restored to their new condition.

B. *Removal of Debris during Performance of the Work* During the progress of the Work Contractor must keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of waste materials, rubbish, and other debris must conform to applicable Laws and Regulations.

C. *Cleaning* Prior to Substantial Completion of the Work Contractor must clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor must remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures* Contractor must not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor will Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor must maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction including, but not necessarily limited to, (i) deviations from the Drawings and Specifications made during construction; (ii) details in the Work not previously shown; (iii) changes to existing conditions or existing conditions found to differ from those shown on the Drawings; (iv) the actual installed position of all mechanical, electrical equipment, piping, ductwork, access panels, valves, drains, stub outs, etc.; and (v) such other information as Owner

or Engineer may reasonably request. These record documents together with all approved samples and a counterpart of all approved Shop Drawings will be available to Engineer and Owner for reference. Contractor's Record Documents must be available for review by Engineer as part of the pay application process. A pay application will not be considered until the Record Documents are shown complete through that application period. Upon completion of the Work, these Record Documents, Samples, and Shop Drawings will be delivered to Engineer for Owner. Final payment and any retainage is not due and owing to Contractor until the Record Documents, marked by Contractor, as required above are delivered as required above.

6.13 *Safety and Protection*

- A. Contractor is solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of its responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor must take all necessary precautions for the safety of, and provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor must comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and erect and maintain all necessary safeguards for such safety and protection. Contractor must notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor must comply with the applicable requirements of Owner's safety programs, if any.
- D. Contractor must inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and for protection of the Work must continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Nothing contained in the Contract Documents shall be construed to require or authorize Engineer or Owner to supervise or be in any way responsible for Contractor's compliance with any applicable safety regulations, codes, or procedures. Engineer and Owner has no duty to inform the Contractor of any safety violations, and should Engineer or Owner voluntarily point out safety violations, such actions shall not be construed to mean that Engineer or Owner has assumed any responsibility for Contractor's compliance with any applicable safety regulations, codes, or procedures. Contractor is solely responsible for Project safety.
- H. Contractor must promptly report in writing to Owner and Engineer all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage, giving full details and statements of any witnesses.

6.14 *Safety Representative*

- A. Contractor must designate a qualified and experienced safety representative at the Site whose duties and responsibilities be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor is responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor must give Engineer prompt written notice if Contractor believes any significant changes in the Work or variations from the Contract Documents have been caused or are required as a result thereof. If Engineer determines a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor must submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07) and the submittal procedures described elsewhere in these Contract Documents. In the event of any conflict between the submittal procedures noted above and this Paragraph 6.17, the more stringent requirements control. Each submittal will be identified as Engineer may require. Contractor represents and warrants all Shop Drawings will be prepared by persons and entities possessing expertise and experience in the trade for which the Shop Drawing is prepared and, if

required by the Contract Documents or applicable Laws or Regulations, be a licensed architect or engineer, as appropriate.

1. *Shop Drawings*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal is at the sole expense and responsibility of Contractor.

C. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, Contractor must have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and related information;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs.
2. Each submittal must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of the submittal.
3. With each submittal, Contractor must give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the

Contract Documents. This notice must be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. Engineer's review is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance responsibility of Contractor as required by the Contract Documents. The review and approval of a separate item does not indicate approval of the assembly in which the item functions.
3. Except as otherwise expressly provided herein, Engineer's approval of any submittal shall not in any way be deemed to release Contractor from full responsibility for complete and accurate performance of the Work in accordance with the Contract Documents; neither shall such approval release Contractor from any liability imposed upon Contractor by any provision of the Contract Documents. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.
4. Contractor acknowledges the processing of Shop Drawings and other submittals often requires extensive and time-consuming reviews by many individuals and the time required for such reviews are directly related to the clarity, completeness, and accuracy of such submittals. Contractor covenants and agrees Contractor's responsibilities include, but are not limited to, reviewing and coordinating each submittal with all other related or affected work and approving each submittal before submitting same to Engineer for approval. As a part of its Basic services to Owner, Engineer will review up to two submissions of all Contractor submittals required by the Contract Documents. However, if Engineer is required to:
 - a. review a third or subsequent submission of any submittal, or
 - b. review more than the number of copies of each submittal specified in the Contract Documents, or

- c. review submittals in addition to those required by the Contract Documents, or
- d. review submittals for proposed substitutions for previously approved items, then

Contractor is liable to Owner for any and all costs and expenses (including, but not limited to, Engineer's fees and expenses) incurred by Owner as a result thereof. Contractor covenants and agrees Owner may retain, deduct, and/or offset Monies due to Owner pursuant to this Paragraph 6.17.D.4 from monies due to Contractor under the Agreement. Contractor further covenants and agrees that Owner retains the right to make such deduction or offset at any time prior to and including final payment and the imposition and the deduction and/or offset of such monies shall not be subject to any notice or claim provisions of the Contract Documents. Contractor acknowledges this obligation is separate and apart from the obligation to pay liquidated damages for delay, if any.

E. *Resubmittal Procedures:*

- 1. Contractor must make corrections required by Engineer and return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor must direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

F. *Professional Certification:*

- 1. When professional certification of performance criteria of materials, systems, or equipment is required by the Contract Documents, Contractor must provide the person or party providing the certification with full information on the relevant performance requirements and on the materials, systems, or equipment which are expected to operate at the Project site. The certification must be based on performance under the operating conditions generally prevailing or expected at the Project site. Engineer is entitled to rely upon the accuracy and completeness of such certification.

6.18 *Continuing the Work*

- A. Contractor must carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work may be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing. Contractor's refusal or failure to continue with the Work in a timely manner as a result of any dispute that arises will constitute a material breach of the Agreement. Owner is entitled to specific performance of provisions requiring delivery of warranties and other required documentation.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors are entitled to rely on representation of Contractor's warranty and guarantee. Unless otherwise stipulated elsewhere within the Contract Documents, the Contractor's warranty period will begin at Owner's acceptance and remain in effect for a period of 12 months. If an equipment or material failure occurs during the

Contractor's warranty period, the Contractor's warranty period shall be extended by a period of time, equal to the down time of the equipment, or time until the material failure was corrected to the Owner's satisfaction.

B. Contractor's warranty and guarantee excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work which is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;
2. recommendation by Engineer or payment by Owner of any progress or final payment;
3. the issuance of a certificate of Substantial Completion by Engineer or any payment by Owner;
4. use or occupancy of the Work or any part by Owner;
5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor and Subcontractor(s) (the "Indemnitors") shall indemnify and hold harmless Owner and Engineer, and the officers, elected officials, directors, members, partners, employees, insurers, agents, consultants and subcontractors of each and any of them (the "Indemnitees") from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of, resulting from, or relating to the Contractor's or its employees', agents' or Subcontractors' (or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable) actions, activities or omissions, negligent or otherwise, or breach or failure to perform this Agreement on or near Owner's property or easement, or arising in any way out of, resulting from, or relating to any of the Work to be performed under this Contract, including, without limitation, claim for bodily injuries, sickness, disease, or death, or to injury to or destruction of tangible property, or other economic damages such as fines, penalties, or other losses, including the loss of use resulting therefrom, except such obligation shall not require

indemnity in favor of any party whose negligence solely caused such loss. To the extent any portion of this provision is deemed contrary to law or to otherwise be unenforceable, the parties agree such offending portion or portions be severed from this provision and the remaining provisions shall be enforceable to the maximum extent permitted at law. In the event of any conflict in the construction of this provision, the parties agree the interpretation requiring the fullest obligation and indemnity shall prevail.

- B. In any and all claims against Owner or Engineer or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, and Contractor expressly waives any right to any such limitation. Contractor must include in any and all subcontracts a provision requiring each Subcontractor to likewise waive any limitation on amount or type of damages, compensation, or benefits payable for or to the Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. Contractor's indemnity obligations under this Paragraph 6.20 shall also specifically include, without limitation, all fines, penalties, damages, liability, costs, expenses (including, but not limited to, reasonable fees and charges of engineers, architects, attorneys, and other professionals, and all court or mediation or other dispute resolution costs), and punitive damages (if any) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by Contractor, a Subcontractor, or any person or entity for whom either is responsible, specifically including, but not limited to, any violations of the federal Occupational Safety and Health Act (as applied in the state in which the Project is located or any of the Work is performed) or the safety requirements under Article 6 of these Modified General Conditions; (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work; and (iii) failure to secure and pay for permits, fees, approvals, licenses, and inspections as required under the Contract Documents, or any violation of any permit or other approval of a public authority applicable to the Work, by Contractor, Subcontractor, or any person or entity for whom either is responsible.
- D. Contractor shall indemnify and hold harmless all of the Indemnities from and against any and all costs and expenses (including, but not limited to, reasonable fees and charges of attorneys) incurred by any of the Indemnities in enforcing any of Contractor's defense, indemnity, and hold-harmless obligations under this Contract.
- E. No contention by Contractor that a certain claim is beyond its indemnity obligations herein required shall relieve Contractor of the obligation to provide indemnity until final judgment by a court of competent jurisdiction holding that there exists no duty on the part of Contractor to undertake any indemnity obligation under the circumstances of any particular claim.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures or safety precautions and programs in connection with the Work.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer must specify all performance and design criteria of which the Owner and Engineer have knowledge that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional, whom comply with reasonable requirements of the Owner regarding qualifications and insurance. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, must bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer are entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria of which the Owner and Engineer have knowledge that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. (Intentionally deleted)

6.22 *Owner-Purchased Material and Equipment*

- A. Contractor accepts assignment of, and liability for, all purchase orders and other agreements for procurement of Owner-purchased materials and equipment identified as part of the Contract Documents, if any. Contractor is responsible for any such pre-purchased items as if Contractor were the original purchaser. The Contract Price must include, without limitation, all costs and expenses in connection with delivery, handling, storage, insurance, installation, and testing of items covered in any assigned purchase orders or agreements. All warranty and correction of the Work obligations under the contract documents must also apply to any pre-purchased items, unless the Contract Documents specifically provide otherwise.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts, or have other work performed by utility owners that does not unreasonably interfere with Contractor's Work.
- B. Contractor must afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor must do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with other work. Contractor must not endanger any work of others by cutting, excavating, or otherwise altering work; provided, however, Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor must inspect other work and promptly report to Engineer in writing any delays, defects, or deficiencies that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to report will constitute an acceptance of the work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following must be set forth in Contract Documents:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. the specific matters to be covered by such authority and responsibility must be itemized; and
 - 3. the extent of authority and responsibilities must be provided.

- B. Unless otherwise provided in the Contract Documents, Owner has sole authority and responsibility for coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. (Intentionally deleted)
- C. Contractor is liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

7.04 *Claims between Contractors*

- A. Should Contractor cause damage to the Work or property of any other contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any other contractor against Contractor, Owner, Engineer, or the construction coordinator, Contractor must promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law.
- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify, defend, and hold harmless Owner and its officers, elected officials, directors, partners, employees, agents, consultants, and subcontractors from and against all liabilities, claims, causes of action, suits of any nature, fines, penalties, expenses, costs, losses, and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court costs) arising directly, or, indirectly, out of any controversy arising between Contractor any other contractor oversight, including, without limitation, any action, legal or equitable, brought by any other contractor against Owner to the extent said claim is based on or arises out of Contractor's performance of the Work. Should the presence of another contractor at the Site give rise to any other Claim, Contractor agrees its sole remedy with respect to such claim shall be against the of the contractor and Contractor agrees it shall not institute any action, legal or equitable, against owner or its officers, elected officials, directors, partners, employees, agents, consultants, and subcontracts, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter, which seeks to impose liability on or to recover damages from Owner or its officers, elected officials, directors, partners, employees, agents, consultants, and subcontractors on account of any such damage or Claim.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

Except as otherwise provided in these Modified General Conditions, Owner will issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

In case of termination of the employment of Engineer, Owner will appoint an engineer, whose status under the Contract Documents will be that of the former Engineer.

8.03 *Furnish Data*

Owner will promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

Owner will make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *(Intentionally deleted)*

8.07 *Change Orders*

Owner will execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

The Owner will not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner is not responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *(Intentionally deleted)*

8.12 *(Intentionally deleted)*

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer. Except for those responsibilities of the Engineer to decide matters in dispute between the Owner and contractor, the Engineer’s services are being performed solely for Owner’s benefit, and no other party or entity shall have any claim against Engineer because of the performance or non-performance of such services.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work. No act, omission, or observation of the Engineer will relieve the Contractor of its primary obligation to perform Work in strict accordance with the Contract Documents. No deviation from the Contract Documents will be deemed conforming Work unless documented in a written Change Order signed by all Parties, except for minor deviations which may be addressed by Field Orders as set forth below.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Construction Field Representative (CFR)*

- A. Engineer may furnish a CFR to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any CFR and assistants will be as provided in the Contract Documents, and limitations on the responsibilities will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is

not Engineer's consultant, agent or employee, the responsibilities and authority and limitations of any other individual or entity will be as provided in the Contract Documents.

- B. Limitations of Authority: Contractor cannot rely on the CFR in performing any of the following unless Contractor first receives written instructions of the Engineer. In addition, CFR may not:
1. undertake any of the responsibilities of the Contractor, the Subcontractors, or the Contractor's superintendent;
 2. authorize any deviation from the Contract Documents;
 3. stop Work;
 4. expedite the work for the Contractor;
 5. advise on, or issue directions relative to, any aspect of the means, methods, techniques, safety, sequences, or procedures of construction;
 6. authorize the Owner to occupy the Project in whole or in part;
 7. participate in the performance of specialized field or laboratory tests.

9.04 *Authorized Variations in Work*

Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who must perform the Work involved promptly. If Owner or Contractor believes a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

Engineer has authority to reject Work which Engineer believes to be defective, or believes will not produce a completed Project which conforms to the Contract Documents or will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer also has authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority and limitations as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority and limitations as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on matters before rendering a written decision (by recommendation of an Application for Payment or otherwise). Engineer's written decision is final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work. All matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, must be referred initially to Engineer in writing within 21 days of the event giving rise to the question in accordance with the provisions of Paragraph 10.5 with a request for formal decision.

1. In connection with Contractor's responsibilities with respect to requests for information (RFIs), see Paragraph 3.03.A.2.a and 3.03.A.2.b.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision will be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision with respect to any Claim will be a condition precedent to any exercise of rights or remedies a party may have under law.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision unless either party proves, by the preponderance of the evidence, that Engineer's decision was made arbitrarily and capriciously, with no evidence whatsoever to support Engineer's decision.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them. As a condition of the Contractor accepting the right to perform the Work required under this Agreement, the

Contractor on behalf of itself, its subcontractors, employees, sureties, and assigns does prospectively release any such claim as to Engineer and Contractor agrees its sole remedy shall be under the Contract to request additional time and compensation from the Owner in strict accordance with the provisions of this Agreement.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer is not responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer is not responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work. Neither the professional activities of Engineer, nor the presence of Engineer or its employees or consultants at the Project site, relieves Contractor of its obligations, duties, and responsibilities under the Contract Documents.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally the content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 also apply to the Construction Field Representative, and assistants, if any.

9.10 *(Intentionally deleted)*

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 Authorized Changes in the Work

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor must promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided). A change in the Contract Price or the Contract Times must be by a written Amendment, a written Change Order, or a written Work Change Directive. Contractor waives the right to additional compensation or time unless it first obtains such documents, properly executed by the appropriate parties, prior to performing any additional Work. No course of conduct or dealings between the parties, no expressed or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alterations or additions to the Work can be the basis of any claim for an increase in any amount due under the Contract Documents or a change in any time period provided for in the Contract Documents unless written documentation is obtained, as written documentation is a condition precedent to the Contractor's recovery of additional money or time.

- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

Contractor is not entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed unless required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor must execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A, or otherwise nonconforming work or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any Change Order, an appeal may be taken from any decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any appeal, Contractor must carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

B. Agreement on any Change Order constitutes a full and final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect (including without limitation delay, disruption, impact, loss of efficiency, and extended overhead) costs associated with such change, or the cumulative effect of changes through the date of the subject Change Order, and any and all adjustments to the Contract Price and the Contract Times. Implied in every Change Order, unless expressly reserved by Owner or Contractor, is a waiver of all known and unknown claims arising out of or otherwise associated with the Change Order, including a waiver of an applicable federal or state anti-claim waiver statute or common law principal of similar effect. In the event a Change Order increases the Contract Price, Contractor must include the Work covered by the change Order in Applications for Payments as if the Work were originally part of the contract Documents.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's

responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change. Owner has the responsibility of enforcing this provision.

- B. Contractor must keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to, or waiver of, (i) notice of changes in the Work; (ii) request for reduction or release of retention; (iii) request for final payment; and/or (iv) any other item required by the surety. Owner must be notified by Contractor and be copied, in writing, with all communications between the Contractor and the surety. Owner may, in Owner's sole discretion, inform the surety of the quality and progress of the Work and obtain consents as necessary to protect Owner rights, interest, privileges, and benefits under and pursuant to any bond issued in connection with the Work.

10.05 *Claims*

- A. *Engineer's Decision Required* All Claims, except those waived pursuant to Paragraph 14.09, must be referred to the Engineer for decision. A decision by Engineer is required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect to Claims.
- B. *Notice* Written notice stating the general nature of each Claim must be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 21 days) after the start of the event giving rise thereto; provided, however, that the claimant must use its best efforts to furnish Engineer and the other party, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such Claim is recognized, and cooperate with Engineer and the party against whom the Claim is made in any effort to mitigate the alleged or potential damages, delay, or other adverse consequences arising out of the condition that is the cause of such a Claim. The responsibility to substantiate a Claim rests with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data must be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event in writing (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price must be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times must be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim must be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of the event. The opposing party must submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal in writing (unless Engineer allows additional time).
- C. *Engineer's Action* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or

3. notify the parties the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event Engineer does not take action on a Claim within 30 days, the Claim shall be deemed denied.
 - E. Engineer's written action under Paragraph 10.05. C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D is final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
 - F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.
 1. The notice required by Paragraph 10.05.B is a condition precedent to the assertion of any claim by Contractor. The right of Owner to receive written notice of claims under Paragraph 10.05.B may not be waived or modified by Owner or Engineer except in writing signed by Owner, and Contractor waives the right to rely on any purported waiver of this written notice by verbal instructions or other conduct of Owner or Engineer.
 2. Contractor's written notice of a Claim must be made by written request seeking a Change Order and specifying the grounds and the relief sought. Contractor must attach to each Application for Payment a schedule of outstanding and unresolved Contractor Claims. By attaching and submitting the schedule with its Application for Payment, Contractor is deemed to have certified the only outstanding and unresolved Claims of which it has notice at the time of the Application for Payment are those identified in the schedule attached to its Application for Payment. A schedule of outstanding and unresolved requests for change orders and claims is required of each Subcontractor submitting an application for payment to Contractor that is to be included in Contractor's Application for Payment to Owner. Owner and Engineer must each rely upon Contractor's schedule of outstanding and unresolved Claims as inclusive of any and all Claims Contractor is then on notice of, and Contractor's acceptance of payment in response to an Application for Payment constitutes a waiver and release of any and all Claims not identified in Contractor's schedule of outstanding and unresolved Claims not identified in Contractor's schedule accompanying Application for Payment. Contractor must require each Subcontractor waive and release any and all requests for change orders and claims the Subcontractor is on notice of at the time it submits its application for payment to Contractor and which is not identified in its application for payment by acceptance of payment from Contractor.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as agreed to in

writing by Owner, costs shall be in amounts no higher than those prevailing in the locality of the Project, can not include any of the costs itemized in Paragraph 11.01.B, and are limited to the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Employees include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work must be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which includes social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, must be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage, and Suppliers' field services. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment accrue to Owner, and Contractor must make provisions so they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor must obtain competitive bids from subcontractors acceptable to Owner and Contractor and deliver bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides Subcontractor be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work, but only to the extent authorized and approved by Owner in writing before such charges and expenses are incurred.
5. Supplemental costs include the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with

the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal. All costs must be in accordance with the terms of the rental agreements. The rental of any equipment, machinery, or parts must cease no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses must include settlements made with the written approval of Owner. No losses, damages, or expenses may be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required to purchase and maintain pursuant to the Contract Documents.

B. *Costs Excluded* The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee* When all the Work is performed on the basis of cost-plus, Contractor's fee is determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee is determined as set forth in Paragraph 12.01.C.
- D. *Documentation* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor must establish and maintain records in accordance with generally accepted accounting practices and submit, in a form acceptable to Engineer, an itemized cost breakdown together with supporting data.

11.02 *Allowances*

- A. Contractor will include in the Contract Price all allowances named in the Contract Documents and cause the Work covered to be performed for the sums and by the persons or entities acceptable to Owner and Engineer.
- B. *Cash Allowances*
1. Contractor agrees:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
- Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued, as recommended by Engineer, to reflect actual amounts due Contractor on account of Work covered by allowances and the Contract Price will be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum

of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as stated in the Agreement.

- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Unless otherwise stipulated in the Contract Documents, for Unit Price Work, Contractor shall be paid an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the actual quantity of each item as determined by the Engineer pursuant to paragraph 9.07. Variations between the actual quantity and the estimated quantity for items of Unit Price Work, including increases and decreases in quantities, as a result of any Change Orders, shall not serve as a basis for an adjustment in the unit price of the item.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price must be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

If Owner is entitled to reimbursement or payment from Contractor under or pursuant to the Contract Documents, payment must be made promptly to Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if Contractor fails to promptly make any payment due Owner, or Owner incurs any costs and expenses to cure any default of Contractor or to correct defective Work, Owner has the absolute right to offset the amount against the Contract Price and may, in Owner's sole discretion, elect either to (1) deduct an amount equal to what Owner is entitled from any payment due Contractor from Owner, including payment of retainage, or (2) issue a written notice to Contractor reducing the Contract Price by an amount equal to what Owner is entitled.

- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to new unit prices or a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee* The Contractor's fee for overhead and profit is determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee is 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee is 5 percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is the Subcontractor who actually performed the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by the Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of 5 percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee will be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. where Work is deleted from the Contract prior to commencement of the Work without substitution of other similar Work, one hundred percent (100%) of the Contract cost attributable to the Work, plus a Contractor's markup of ten percent (10%) on the amount of deleted cost, will be deducted from the Contract Price. However, in the event material submittals have been approved and orders placed for the materials, a lesser amount equal to the greater of (i) one hundred percent (100%) of the Contract cost attributable to the deleted Work, minus reasonable order cancellation, material restocking, and similar fees, plus a Contractor's fee of five percent (5%) on the amount of deleted cost, or (ii) eighty percent (80%) of the Contract Price will be deducted from the Contract Price. The credit to the Owner as a result of deletions in the work which results in a for reduced premiums on labor and material bonds, payment and performance bonds shall in all cases be one hundred percent (100%) of the reduction in premium. When both additions and credits are involved in any one change, the adjustment in Contractor's fee will be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.
 - f. To the extent the Owner performs work as a result of any omission or breach of the Contractor, the Owner is entitled to an overhead mark-up consistent with the provisions in this section.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times must be based on written notice submitted by the party making the Claim to the Engineer, and the other party to the Contract, in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times may be extended in an amount equal to the time lost due to the delay if a Claim is made as provided in Paragraph 12.02.A and if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension of the Contract Times under the Contract Documents. Delays beyond the control of Contractor include, but are not limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God. Contractor acknowledges and agrees that adjustments in the Contract Times will be permitted for a delay only to the extent such delay (i) is not caused, or could not have been anticipated, by Contractor; (ii) could not be limited or avoided by the Contractor's timely notice to Owner of the delay or reasonable likelihood that a delay will occur; and (iii) is of a duration not less than one day. In no event will claims for delay be allowed where alleged delays do not impact the critical path of the Contractor as demonstrated on the relevant schedule provided by the Contractor for the period of time in which the delay allegedly occurred.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor is entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor is entitled to an equitable adjustment in Contract Times, if the adjustment is essential to Contractor's ability to complete the Work within the Contract Times. An adjustment is Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
 - 1. If a claim is made, as provided in Paragraph 12.03.A, and this Paragraph 12.03.C for delay due to abnormal weather conditions, the time extension to be awarded to Contractor, if any, will be calculated using the following standard baseline ("standard Baseline") of monthly anticipated adverse weather delay days for the project location, and extensions will only be granted for days lost in any given month in excess of the number of days shown in the Standard Baseline for the same given month. The Standard baseline will be regarded as the

established normal and anticipatable number of calendar days for each month during which construction activity is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline must be included in the Contractor' scheduling of weather-dependent activities and will not be eligible for extension of Contract Time.

Monthly Contract Allowance (MCA) in days												
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Days	8	6	6	7	5	8	7	5	6	3	5	7

2. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:
 - a. Precipitation (rain, snow, and/or ice) in excess of two-tenths inch (0.20") liquid measure.
 - b. Standing Snow in excess of one inch (1.00")
3. Adverse Weather may include, as deemed by Engineer, "dry-out" or "mud" days:
 - a. For rain days above the standard baseline,
 - b. Only if there is a hindrance to site access or site work such as earthwork; and,
 - c. At a rate no greater than one (1) make-up day for each day or consecutive days of rain beyond the standard baseline totaling one inch (1.00") or more, liquid measure, unless specifically recommended otherwise by Engineer.
4. Actual adverse weather delay days must prevent work on critical exterior activities for fifty percent (50%) or more of Contractor's scheduled workday. The number of actual adverse weather delay days will be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather days exceeds the number of days anticipated by the Standard Baseline in Paragraph 12.03.C.1, and providing all other contractually-required conditions are met, qualifying delays will be converted to calendar days and additional calendar days will be added to the Contract times for each qualifying delay in excess of the Standard Baseline.
5. Upon commencement of on-site activities and continuing throughout construction, Contractor is responsible for accurately measuring and recording the daily the occurrence of adverse weather on-site.
6. Within 30 days of the last day of any month (hereinafter referred to as the "Reporting Month"), Contractor must submit a written Adverse Weather Report, including copies of Contractor's daily weather reports and applicable climatological data from the National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location, unless Engineer allows an additional period of time for submission of the report. Notwithstanding any other provisions, failure to submit the required written report within the

time specified above will be deemed to be and constitute a waiver by Contractor of any and all claims for delay due to adverse weather conditions occurring during Reporting Month.

- D. Owner, Engineer, and their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project. Time extensions due to weather delay shall not entitle Contractor to any claim, compensation, or recovery for extended overhead.
- E. Contractor is not entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier will be deemed to be delays within the control of Contractor.
- F. Contractor is liable to Owner and must pay Owner for a percentage of all costs incurred by Owner and Engineer in investigating, analyzing, negotiating, arbitrating, and litigating any claim against Owner or Engineer for costs or damages due to any alleged delaying of Contractor in the performance of the Work, which percentage will be equal to the percentage of Contractor's total delay claim which is determined to be false or to have no basis in law or in fact.
- G. To the fullest extent permitted by law, and notwithstanding anything to the contrary in the Contract Documents, an extension of the Contract Time, to the extent permitted under Paragraph 12.02, shall be the sole remedy of Contractor for any (i) delay in the commencement, prosecution, or completion of the Work, (ii) hindrance or obstruction in the performance of the Work, (iii) loss of productivity, or (iv) other similar claims (collectively referred to in this Paragraph 12.03.G as "Delays" whether or not such Delays are foreseeable, unless a Delay is caused by acts of Owner constituting active interference with Contractor's performance of the Work, and only to the extent such acts continue after Contractor furnishes Owner with notice of such interference. In no event shall Contractor be entitled to any compensation with any Delay, including, without limitation, consequential damages, lost opportunity costs, impact damages, or other similar remuneration. Owner's exercise of any of its rights under the Contract Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling, or correction of the Work), regardless of the extent or frequency of Owner's exercise of such rights or remedies, shall not be construed as active interference with Contractor's performance of the Work.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the

Site and the Work at reasonable times for observation, inspection, and testing. Contractor must provide proper and safe conditions for access and advise them of Contractor's safety procedures and programs so they may comply as applicable.

13.03 *Tests and Inspections*

- A. Contractor must give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner will employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B and paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of the public body, Contractor must assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor is responsible for arranging and obtaining and paying all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase for incorporation in the Work. Inspections, tests, or approvals must be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) is to be inspected, tested, or approved and is covered by Contractor without written concurrence of Engineer, Contractor must, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E is at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover and Engineer has not acted with reasonable promptness in response to notice.
- G. Contractor is responsible for inspection of portions of the work already performed to determine which portions are in proper condition to receive subsequent Work. Contractor must maintain an adequate inspection system and perform inspections to ensure the Work conforms strictly to the Contract requirements. Contractor must keep full and detailed inspection records and Owner and Owner's authorized representatives must be afforded access to, and be permitted to audit and copy, Contractor's inspection records relating to the Project. Contractor must preserve these records for a period of five years after final payment or for such longer period of time as may be required by law.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, must uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, the portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor must pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others). Owner will be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefore as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, or if the Work interferes with the operation of the existing facility, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for the order has been eliminated. However, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor must correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor must pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others). Retesting which is necessary as a result of failed testing or defective work will be at the Contractor's expense.
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor cannot take action that would void or otherwise impair Owner's special warranty and guarantee, if any, on the Work.

- C. At any time during the progress of the Work and up to the date of final acceptance, the Engineer has the right to reject any Work which does not conform to the requirements of the Contract Documents, even though the Work has been previously inspected and paid for. Any omissions or failure on the part of the Engineer to disapprove or reject any Work or materials at the time of inspection shall not be construed as an acceptance of any defective Work or materials.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
1. repair such defective land or areas; or
 2. correct such defective Work; or
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) must be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for the item may start to run from an earlier date if provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period with respect to such Work will be extended for an additional period of one year after the correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor must pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner is entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work accepted. If the parties are unable to agree as to the amount, Owner may make a Claim therefore as provided in Paragraph 10.05. If the acceptance occurs after a recommendation, an appropriate amount must be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails, within a reasonable time after written notice from Engineer, to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner will proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor must allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order issued incorporating the necessary revisions in the Contract Documents with respect to the Work. Owner will be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim as provided in Paragraph 10.05. Claims, costs, losses and damages include but are not limited to, all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work and the Owner's expenses and compensation for the Engineer's additional services made necessary by Contractor's default, neglect, or failure. Contractor covenants and agrees Owner may retain, deduct, or offset Monies due to Owner pursuant to this Paragraph 13.09.C from Monies due to Contractor under the Contract Documents. Contractor further covenants and

agrees Owner retains the right to make such reduction or offset at any time prior to and including final payment and the imposition and the deduction and/or offset of Monies is not subject to any notice or Claim provisions of the Contract Documents.

- D. Contractor will not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established in Paragraph 2.07 serves as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.
- B. Detail Breakdown of Contract Amount except in cases where unit prices form the basis for payment under the Contract, the Contractor must, in accordance with Paragraph 2.07.3, submit a complete itemization of the Contract Amount showing the value assigned to each part of the work, including an allowance for profit and overhead. Upon approval of the itemization of the Contract Amount by the Engineer, it will be used as the basis for all Applications for Payment.

14.02 Progress Payments

A. Applications for Payment

1. At the date established for each progress payment (but not more often than once a month), Contractor must submit to the Engineer an Application for Payment for Work done and materials delivered and stored on the Site. Each Application for Payment must be computed on the basis of Work completed on all items listed in the Detail Breakdown of Contract Amount (or on unit prices), less retainage. The Contractor must furnish the Engineer and Owner all reasonable information required for obtaining the necessary data relative to the progress and execution of the Work. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or another location agreed to in writing, the Application for Payment must be accompanied by evidence the materials and equipment are covered by appropriate property insurance, all of which must be satisfactory to the Owner.
2. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments is governed by N.C. General Statute 143-134.1.
4. Payment for Stored Materials and Equipment The following conditions apply to payment for stored materials and equipment allowed by Article 14.02.A.1.:

- a. Except in the instance of a material or equipment item that involves little or no installation cost, payment for stored materials or equipment must not exceed fifty percent (50%) of the value of the item on the Schedule of Values (for lump sum contracts) or fifty percent (50%) of the value the pay item (for unit price contracts) which covers the materials or equipment being claimed. For material or equipment items that involve little or no installation cost, the percentage of the value of the item that will be paid for stored materials will be as agreed upon by the Engineer, Owner, and Contractor.
 - b. Contractor must submit paid invoices or releases of Lien from the stored materials and equipment suppliers with each Application for Payment containing a request for payment for that particular item of stored materials or equipment.
 - c. Payment for stored materials and equipment is generally intended to apply only to major materials and equipment items, as determined by the Engineer.
5. Each Application for Payment must be accompanied by the following, all in form and substance in accordance with the Contract Documents and satisfactory to Owner:
- a. In accordance with Paragraph 10.05.F.2, a current schedule of outstanding and unresolved Contractor Claims;
 - b. A current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors and Suppliers with whom contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for an Subcontractor and Supplier in the requested progress payment, and the amount to be paid to Contractor from such progress payment, together with similar sworn statements from all Subcontractors and Suppliers;
 - c. Duly executed waivers of mechanic's and material man's liens from all Subcontractors and, when appropriate, from Suppliers and lower tier subcontractors establishing payment or satisfaction of payment of all amounts requested by Contractor on behalf of such entities or persons in any previous Application for Payment;
 - d. All information and materials required to comply with the requirements of the Contract Documents or reasonably requested by Owner or Engineer;
 - e. Contractor's social security number (if an independent contractor) or federal employer identification number (if a corporation, partnership, or proprietorship), as appropriate;
 - f. Contractor must annotate the record copy of the Drawings to show all changes made each period as a condition for Engineer's recommendation of payment; and
 - g. Contractor must provide a certified sales tax statement with its pay application.
6. Contractor must also comply with the following specific requirements:
- a. Title to all materials and equipment purchased by the Contractor for the Work shall pass to the Owner at the time Owner makes payment for such materials and equipment. The

Contractor must comply with any procedures established by the Owner to secure, evidence, or establish the Owner's title to such materials and equipment.

- b. With each application for payment, Contractor must submit to Owner a written list identifying each location where materials are stored off the Project site and the value of materials at each location. Contractor must procure insurance satisfactory to Owner for materials stored off the Project site in an amount not less than the total value.
- c. The consent of any surety must be obtained to the extent required prior to payment for any materials stored off the Project site.
- d. Representatives of Owner and Owner's lender, if any, has the right to make inspections of the storage areas at any time.
- e. Materials must be: (1) protected from diversion, destruction, theft, and damage to the satisfaction of Owner and Owner's lender, if any; (2) specifically marked for use on the Project; and (3) segregated from other materials at the storage facility.

B. Review of Applications

1. Engineer will, within 10 days after receipt of each complete Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any payment Engineer will not be deemed to have represented:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

- b. Engineer is legally liable or responsible for any defects in the Work performed by the Contractor; or
 - c. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the Monies paid on account of the Contract Price; or
 - e. to determine title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09;
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A; or
 - e. there are other items warranting a set-off against the amount requested by Contractor, including, but not by way of limitation, errors or overpayments on prior payments to Contractor.

C. Payment Becomes Due:

- 1. Within thirty (30) days after receipt of a Contractor's Request for Payment with Engineer's recommendation, the Owner will:

- a. Pay the Application for Payment as recommended by the Engineer.
- b. Pay other amounts as Owner decides is due the Contractor, informing the Contractor and Engineer in writing stating the reasons for paying the amended amount.
- c. Withhold payment informing the Contractor and the Engineer of his reasons for withholding payment.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended;
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A;
 - e. failure of the Contractor to make payments due to Subcontractors, material suppliers, or employees;
 - f. damage to another Contractor or any allegations of damage caused to another Contractor;
or
 - g. Owner reasonably believes Contractor cannot complete the Work within the Contract Price.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount withheld. Owner will promptly pay Contractor the amount withheld, or any adjustment agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 14.02.C.1.

E. Other Payment to Contractor Provisions

1. Credit for Uncorrected Work Should the Owner direct the Contractor to leave uncorrected Work that has been damaged or was not performed in accordance with the Contract

Documents, an equitable deduction from the Contract Amount will be made to compensate the Owner for the Uncorrected Work.

2. Payment for Removal of Rejected Work and Materials The removal of Work and materials rejected in accordance with paragraph 13.06.A of the Modified General Conditions and the re-execution of acceptable work by the Contractor will be at the expense of the Contractor, and it shall pay the cost of replacing the Work of other contractors destroyed or damaged by the removal of the rejected Work or materials and the subsequent replacement of acceptable Work.

Removal by Owner Removal of rejected Work or materials and storage of materials by the Owner, in accordance with paragraph 13.09.A of the Modified General Conditions, will be paid by the Contractor within thirty (30) days after written notice to pay is given by the Owner. If the Contractor does not pay the expenses of removal, and after ten (10) days written notice being given by the Owner of his intent to sell the materials, the Owner may sell the materials at auction or at private sale and will pay the Contractor the net proceeds after deducting all the costs and expenses that should have been borne by the Contractor.

14.03 *Contractor's Warranty of Title*

Contractor warrants and guarantees title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor must notify Owner and Engineer in writing the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer will review the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons.

If after the performance of such Substantial Completion Review, Engineer determines the Work is not substantially complete, Contractor shall be liable to Owner for any and all costs and expenses (including, but not limited to, Engineers fees and expenses) incurred by the Owner as a result of each failed review. Contractor covenants and agrees that Owner may retain, deduct, and/or offset monies due the Owner pursuant to this Paragraph 14.04.B.1 from Monies due to Contractor under the Agreement. Contractor further covenants and agrees Owner retains the right to make such deduction or offset at any time prior to and including final payment and that the imposition and the deduction and/or offset of such monies shall not be subject to any notice or claim provisions of the Contract Documents.

- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a proposed certificate of Substantial Completion which fixes the date of Substantial Completion. There must be attached to the certificate a proposed list of items to be completed or corrected before final payment. Owner has seven days after receipt of the proposed certificate during

which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes the Work is not substantially complete, Engineer will, within 14 days after submission of the proposed certificate to Owner, notify Contractor in writing, stating the reasons. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised list of items to be completed or corrected) reflecting the changes from the proposed certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the proposed certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and inform Engineer in writing prior to Engineer's issuing the final certificate of Substantial Completion, Engineer's recommendation will be binding on Owner and Contractor until final payment.
- E. Owner has the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work which can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner, at any time, may request Contractor in writing to permit Owner to use or occupy any part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
2. Contractor, at any time, may notify Owner and Engineer in writing that Contractor considers any part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer must make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons. If Engineer considers part of the Work to be substantially complete, the provisions of Paragraph 14.04 apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

Upon written notice from Contractor the entire Work, or an agreed portion, is fully complete, inclusive of all requirements of the Contract, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which the inspection reveals the Work is incomplete or defective. Contractor must immediately take necessary measures to complete the Work or remedy the deficiencies.

If after the performance of the final completion inspection, Engineer determines punch list items, site or project cleanup activities remain or the Work is otherwise not fully complete in accordance with all of the requirements of the Contract Documents, Contractor shall be liable to Owner for any and all costs and expenses (including, but not limited to, Engineer's fees and expenses) incurred by the Owner as a result thereof. Contractor covenants and agrees Owner may retain, deduct, and/or offset Monies due to the Owner pursuant to this Paragraph 14.06.A.1 from Monies due to Contractor under the Agreement. Contractor further covenants and agrees Owner retains the right to make such deduction or offset at any time prior to and including final payment and the imposition and the deduction and/or offset of Monies shall not be subject to any notice or claim provisions of the Contract Documents.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation required in the Contract Documents, including, but not limited to, the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner which Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and

equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

4. Contractor must submit to the Engineer within thirty (30) days of the Final Completion date, all Maintenance and Operating Manuals, schedules, guarantees, equipment test reports, and record drawings noting all changes during construction. Failure to submit all items listed will result in Engineer's recommendation to Owner not to make final payment.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor must make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after presentation to Owner of Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer confirms, Owner will, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for the portion of the Work fully completed and accepted must be submitted by Contractor to Engineer with the Application for payment. Payment will be made under the terms and conditions governing final payment, but it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

The making and acceptance of final payment constitutes:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

At any time and without cause, Owner may suspend the Work, or any portion thereof, for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor must resume the Work on the date fixed. Contractor will be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any suspension if Contractor makes a Claim as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events justifies termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
3. Contractor's repeated disregard of the authority of Engineer; or
4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient, including hiring contractors on any contractual basis including payment under a cost plus contract
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner is not required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 10 days of receipt of the notice.
- E. Where Contractor's services have been terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor existing or which may accrue. Any retention or payment of Monies due Contractor by Owner will not release Contractor from liability.
- F. If Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of the bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Owner may, at any time, terminate the contract in whole or in part for Owner's convenience and without cause. Termination by Owner under this Paragraph 15.03 will be by a notice of termination prepared by the Owner and delivered to Contractor indicating intent to terminate for convenience and the effective date.
- B. Contractor will not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from termination.
- C. Upon receipt of a notice of termination for convenience, Contractor shall immediately, in accordance with instruction from Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph 15.03.C:
1. Cease operations as specified in the notice;
 2. Place no further order and enter into no further subcontracts for materials, labor, services, or facilities except as necessary to complete continued portions of the Contract;

3. Terminate all subcontracts and orders to the extent they relate to the Work terminated;
 4. Proceed to complete the performance of Work not terminated; and
 5. Take actions that may be necessary, or Owner may direct, for the protection and preservation of the Work.
- D. Upon termination, Contractor shall recover as its sole remedy payment of the percentage of the Contract Price equal to the percentage of the Work performed satisfactorily and not previously paid for as determined by the Engineer. Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits or revenue or other economic loss arising out of or resulting from such termination.
- E. Owner shall be credited for:
1. Payments previously made to Contractor for the terminated portion of the Work;
 2. Claims which Owner has against Contractor under the contract; and
 3. The value of the materials, supplies, equipment, or other items that are to be disposed of by contractor that are part of the Contract Price.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner does not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

Dispute Resolution for this project is governed by RULES IMPLEMENTING MEDIATED SETTLEMENT CONFERENCES IN NORTH CAROLINA PUBLIC CONSTRUCTION PROJECTS adopted February 26, 2002.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

B. For the purposed of this contract, notices shall be given to:

Daniel Griffee, P.E.

Project Manager

McGill Associates, P.A.

55 Broad Street, Asheville, NC 28801

17.02 *Computation of Times*

When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

The duties and obligations imposed by these Modified General Conditions and the rights and remedies available to the parties are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph are as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, shall survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

This Contract is governed by the law of the State of North Carolina, venue in Transylvania County.

17.06 *Headings*

Article and paragraph headings are inserted for convenience only and do not constitute parts of these Modified General Conditions.

MEET NORTH CAROLINA ONE-CALL CENTER

North Carolina One-Call is a Corporation formed and funded by participating utility companies and municipalities in the interest of community and job safety and improved service through damage reduction to the utilities.

A one call toll free number, **1-800-632-4949**, provides an avenue to all of the participating members from any point within the State of North Carolina.

Anyone proposing to excavate, dig, bore, tunnel, blast or disturb the earth in any manner in which buried utilities may be damaged is requested to call the toll-free number between the hours of 7:00 a.m. and 5:00 p.m., Monday through Friday, forty-eight hours before starting the proposed work.

Within minutes of your telephone call, the participating members will be made aware of your plans and will be given pertinent information that has been provided by you about your planned work. You will be told the names of the participating members from whom you can expect a response. If there are buried facilities in the path of your activity, the route of the utilities will be staked and/or marked at no expense to you. If there are no facilities in the area of the planned work, you will be called or notified by a representative of the participating company accordingly.

Should a non-participating utility operator be serving your area, we recommend that you call them on an individual basis. All utility operators, whether company or municipality, will be provided an opportunity to become a member of North Carolina One-Call.

Naturally, knowing the route of the utilities, the excavator is expected to exercise caution and to avoid damage as the project progresses.

Damage prevention doesn't just happen - it is a planned and orderly process through which each of us can participate - **Yes, we can and will dramatically reduce damages to the utilities in the State of North Carolina! Thanks for your help.**

BEFORE YOU DIG

IN THE INTEREST OF COMMUNITY AND JOB SAFETY

AND IMPROVED SERVICE

CALL NORTH CAROLINA ONE-CALL

1-800-632-4949

Contractor's Application for Payment No.

Application Period:		Application Date:	
To (Owner): Transylvania County Schools	From (Contractor):	Via (Engineer):	
Project: HVAC Piping Replacement, Pisgah Forest Elementary	Contract: HVAC Piping Replacement, Pisgah Forest Elementary		
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:	22.00607

**Application For Payment
Change Order Summary**

Approved Change Orders	Number	Additions	Deductions	
				1. ORIGINAL CONTRACT PRICE..... \$ _____
				2. Net change by Change Orders..... \$ _____
				3. Current Contract Price (Line 1 ± 2)..... \$ _____
				4. TOTAL COMPLETED AND STORED TO DATE (Column F total on Progress Estimates)..... \$ _____
				5. RETAINAGE:
				a. X _____ Work Completed..... \$ _____
				b. X _____ Stored Material..... \$ _____
				c. Total Retainage (Line 5.a + Line 5.b)..... \$ _____
				6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)..... \$ _____
				7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
				8. AMOUNT DUE THIS APPLICATION..... \$ _____
				9. BALANCE TO FINISH, PLUS RETAINAGE (Column G total on Progress Estimates + Line 5.c above)..... \$ _____
TOTALS				
NET CHANGE BY CHANGE ORDERS				

Contractor's Certification	
The undersigned Contractor certifies, to the best of its knowledge, the following: (1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment; (2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and (3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.	
Contractor Signature	
By: _____	Date: _____

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ (Date)
Funding or Financing Entity (if applicable)

SALES TAX REIMBURSEMENT STATEMENT

CONTRACTOR _____

PROJECT	Transfer Station Improvements
OWNER	_____
FOR PERIOD	_____

VENDOR	ADDRESS	INVOICE	DATE	AMOUNT	N.C. TAX	COUNTY TAX	COUNTY NAME

I, _____, being duly sworn, certify that the foregoing statement of sales tax paid in connection with the referenced contract does not contain sales or use taxes paid on purchases of tangible personal property purchased by such contractors for use in performing the contract which does not annex to, affix to or in some manner become a part of the building or structure being erected, altered or repaired for the governmental entities as defined by G.S. 105-164.14(c) and is to the best of his/her belief, true and correct.

Sworn to before me this _____ day of _____, 201 _____

My commission _____

Signature
Title
Notary Public



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(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project: Ductwork Replacement, Davidson River Schools	Owner: Transylvania County Schools	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.: 21.00606

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change

\$ _____

CHANGE IN CONTRACT TIMES:

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Certificate of Substantial Completion

Project: Ductwork Replacement, Davidson River Schools	
Owner: Transylvania County Schools	Owner's Contract No.:
Contract:	Engineer's Project No.: 22.00606

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

PART 1 GENERAL**1.1 DESCRIPTION OF WORK:**

- A. General: This section specifies several categories of provisions of mechanical work, including: 1) Certain adaptive expansions of requirements specified in Division 1, as uniquely applicable to mechanical work, 2) General performance requirements within the mechanical work as a whole and 3) General work to be performed as mechanical work, because of its close association with mechanical work. This section applies to all subsequent Division 23 sections.
- B. Heating, Ventilating, Air Conditioning and Refrigeration work shall include all material and labor to furnish and install all the HVAC systems as indicated on the M-series drawings and the mechanical specifications.
- C. Contractor - The person or organization awarded the contract for construction services. In the case of a construction project administered as a multiple-prime contract, the term shall be further defined as the Contractor holding a prime contract for Mechanical construction work. Any reference to "contractor" or "subcontractor" shall be superseded by the actual contractual arrangement used on the project.
- D. The term "Mechanical Contractor is used interchangeably with the term "Contractor".
- E. All start-up and testing and balancing shall be complete. Coordination between the TAB and mechanical contractors will be mandatory and the responsibility of each.
- F. All bidders shall visit the site prior to submitting a bid. Any existing condition which should be obvious to an experienced bidder shall be deemed to be included in the bid. Failure of any bidder to visit the site shall not relieve them of this responsibility.

1.2 QUALITY ASSURANCE

- A. Workers shall be thoroughly experienced and fully capable of installing assigned work. Work shall be in accordance with the best standard practice of the trade. Work that is not of good quality will require removal and reinstallation at no additional expense to Owner.
- B. Provide complete operational mechanical systems with facilities and

services to requirements described, in accordance with applicable codes and statutes.

- C. Drawings are diagrammatic and approximately to scale. The contract documents establish scope, material and quality, and are not detailed installation instructions. The Contractor shall be responsible to prepare all necessary coordination and shop drawings to completely and correctly install systems and/or make field modifications necessary resulting from a failure to do so, at no additional cost to the contract
- D. Provide labor and materials required to install, test and place into operation the mechanical systems. Provide additional labor and materials for modifications required to correct job conflicts resulting from a failure to coordinate between trades, at no additional cost to contract.
- E. Certain terms such as "shall, provide, install, complete, start-up" are occasionally not used in some parts of these specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- F. Protect all materials and equipment from damage during storage at the Site and throughout the construction period. In the event of damage prior to final inspections, the Contractor shall repair or replace damaged items as determined by the Architect or Engineer, at no cost to the Owner.
- G. Install all equipment and appurtenances in strict accordance with the manufacturer's requirements and recommendations.
- H. Working pressure of piping, fittings, valves, equipment and accessories in piping systems shall be of a pressure rating equal to or greater than the maximum working pressure of the system and/or the test pressure to which it will be subjected.
- I. All welders shall be certified by the Welding Bureau of the Mechanical Contractors Association of America for the appropriate service, and shall perform all welding in accordance with Welding Bureau's procedures and the ASA Code for pipe welding.

1.3 DEFINITIONS:

- A. By other Trades: Shall mean by persons or parties who are not anticipated to be the contractor for this trade working together with the Prime Contractor. In this context the words "by other trades" shall not be interpreted to mean not included in the overall contract, unless specifically noted as not in contract (NIC).

- B. Concealed: Embedded in masonry or other construction, installed behind wall furring, above ceilings, in crawl spaces, in shafts or otherwise not visible.
- C. Contractor: As used in this Division of the specification refers to the Mechanical Contractor unless specifically noted otherwise.
- D. Ductwork: All air distribution, recirculation and exhaust ducts, whether of sheet metal or other material, and includes all connections, hanger, supports, damper controls, insulation, accessories, fire and smoke control devices, and appurtenances necessary for and incidental to a complete system.
- E. Exposed: Not concealed.
- F. Furnish: Purchase and deliver to the project site complete with every necessary appurtenance and for installation.
- G. Install: Unload at the delivery point and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project.
- H. Piping: Pipe, fittings, flanges, valves, controls, hangers, supports, traps, drains, gauges, insulation, vents and items customarily required in connection with the transfer of fluids.
- I. Provide: Furnish and install complete ready for use.

1.4 INTERPRETATION OF CONTRACT DOCUMENTS

- A. This section of the specifications and related drawings describe general provisions applicable to every section of Division 23.
- B. Attention is directed to Instructions to Bidders and General Conditions, which are binding in their entirety on this portion of the work and in particular to paragraphs concerning materials, workmanship and substitutions.
- C. Provide all materials called for in these specifications and accompanying drawings and provide the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings, or shown on the drawings and not called for in the specifications must be provided.
- D. Mention in these specifications, indications and reasonable implications on drawings, whereby articles, materials, operation or methods related to execution of the mechanical work are noted, specified, drawn or

described, thereby requires execution of each such item of work and provision of all labor, materials, equipment and appurtenances required for execution thereof.

- E. Particular attention is directed to the drawings and other contract documents for information pertaining to required items or work which are related to and usually associated with the work of this Division of the specifications, but which are to be provided as part of the work of other Divisions of the specifications.
- F. Drawings show arrangements of system desired and shall be followed as closely as practical. Because of the small scale of the drawings not all offsets and bends can be shown and these shall be provided as required, to fully complete the intent of plans. Verify and check all measurements in the field. Should conditions and substitutions of equipment necessitate a rearrangement, prepare and submit for review, scaled drawings of such rearrangement before beginning work.
- G. No exclusions from, or limitations in, the language used in the drawings or specifications shall be interpreted as meaning that the appurtenance or accessories necessary to complete any required system or item of equipment are to be omitted.
- H. The drawings of necessity utilize symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed, in accordance with the intent diagrammatically expressed on the drawings, and in conformity with the dimensions indicated on final architectural and structural working drawings and on equipment shop drawings. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded. When abbreviations appear on the drawings or specification in lower case letter with or without periods, their meanings shall be the same as stated above.
- I. Certain details appear on the drawings that are specific with regard to the dimensioning and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not make unnecessary the field coordination for the indicated work.
- J. Information as to the general construction shall be derived from structural and architectural drawings and specifications only.
- K. The use of words in the singular shall be considered as limited where other indications denote that more than one item is referred to.

- L. Submission of a proposal and ultimate acceptance of an agreement or contract for execution of this section of work will be construed as evidence that the Prime Contractor, Subcontractor and Vendor has carefully read and accepts all conditions set forth in each Division under specification Divisions titled "Instruction to Bidders" and Division 1, "General Condition", insofar as such conditions may affect both the bidding for and execution of this section or work.

1.5 DELINEATION OF WORK:

- A. The "Division of Work:" as shown on the drawings, is a recommended division of work as an aid to Contractors and Subcontractors for bidding and performance of the overall prime contract. This or any other reference to the Mechanical Contractor or any Subcontractor shall in no way be intended to interfere with or relieve the Prime Contractor as to his overall responsibility.
- B. Division 23 contractors are required to supply all necessary supervision and coordination of information to any others who are performing work to accommodate Division 23 installations. Where the Division 23 contractors are required to install items which they do not purchase, they shall include for such items:
 - 1. The coordination of their delivery.
 - 2. Their unloading from delivery trucks driven in to any designated point on the property line at grade level.
 - 3. Their safe handling and field storage up to the time of permanent placement in the project.
 - 4. The correction of any damage, defacement or corrosion to which they may have been subjected.
 - 5. Their field assembly and internal connection as may be necessary for their proper operation.
 - 6. Their mounting in place including the purchase and installation of all dunnage, supporting members, fastenings necessary to adapt them to architectural and structural conditions.
 - 7. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.
- C. Items that are to be installed but not purchased as part of the work of Division 23 shall be carefully examined upon delivery to the project. Claims that any of these items have been received in such condition that their installation will require procedures beyond the reasonable scope of the work will be considered only if presented in writing within one week of the date of delivery of the project of the items in question. The work under Division 23 shall include all procedures, regardless of how extensive,

necessary to put into satisfactory operation, all items for which no claims have been submitted as outlined above.

1.6 MECHANICAL CODES, STANDARDS & REGULATIONS

- A. General: All work shall comply with the current governing codes, ordinances and regulations of all National, State and Local authorities having jurisdiction. The requirements of the following governing bodies, codes and standards are included by reference and shall have the same force and affect as if printed here in full (in addition to specific applications specified by individual work sections of these specifications):
1. ADA: Air Diffusion Council.
 2. AMCA: Air Moving and Conditioning Association, Inc.
 3. ANSI: American National Standards Institute
 4. ANSI Pressure Piping Standards (B31-Series).
 5. ARI: American Refrigeration Institute
 6. ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers
 7. ASHRAE 15, Safety Code for Mech. Refrig. (ANSI B9.1).
 8. ASME: American Society of Mechanical Engineers
 9. ASME Boiler and Pressure Vessel Code
 10. ASTM: American Society of Testing and Materials
 11. AWS Standards for Welding.
 12. IBR: Institute of Boiler and Radiator Manufacturers
 13. MSS: Manufacturers Standardization Society
 14. North Carolina Department of Labor
 - a. The Uniform Boiler and Pressure Vessel Act – current edition
 15. North Carolina State Building Code.
 - a. General Construction
 - b. Plumbing
 - c. Mechanical
 - d. Energy
 - e. Fire Code
 16. NEMA: National Electrical Manufacturer's Association
 17. NFPA 45: Standard on Fire Protection for Laboratorial Using Chemicals
 18. NFPA 70 National Electrical Code.
 19. OSHA: Occupational Safety and Health Administration
 20. SMACNA: Sheet Metal and Air Conditioning Contractors National Association, Inc.
- B. Include all items of labor and materials required to comply with such standards and codes. Where quantity, sizes or other requirements indicated on the drawings or herein specified are in excess of the standard

or code requirements, the specifications or drawings, respectively, shall govern.

- C. Should contractor become aware of any change in plans or specifications required to comply with governing regulations, the Contractor is to notify the Professional at least 10 days prior to the bid date.

1.7 PERMITS AND FEES

- A. The contractor shall arrange for, obtain and pay for all permits, certificates, tests, inspections, agency approvals, etc. and pay all fees levied by the authorities and having jurisdiction over the work performed under this contract. Provide copies of all required permits, certificates, inspections and agency approvals to the owner. Contractor shall submit to the appropriate Regulatory Agencies all items necessary to obtain all required permits and to perform all tests and inspections.
- B. Contractor shall pay royalties or fees required in connection with the use of any patented devices and systems.

1.8 VERIFICATION OF DIMENSIONS AND LOCATIONS:

- A. The Contractor shall visit the premises and thoroughly familiarize themselves with all details of the work, working conditions, verify all dimensions in the field, advise the Architect/Engineer of any discrepancy, and submit shop drawings of any significant changes affecting other work he proposes to make, in quadruplicate for approval, before starting the work.
- B. The location of duct, pipe, fixture, equipment and appurtenances for existing facilities are shown on plans to indicate the extent of work required. Exact condition shall be field verified.

1.9 PRODUCT SUBMITTALS:

- A. General: Refer to the Division 1 sections for general requirements concerning work-related submittals. In addition to those general requirements, the following are required for Division 23 submittals. Failure to comply with these requirements may result in rejection without further review.
 - 1. Manufacturer or Vendor terms and conditions of sale are strictly between Vendor and Contractor. Approval of submittal data shall not be construed as approval of terms and conditions.

By providing submittals to the contractor to be forwarded to the

engineer for review, the equipment vendor is acknowledging review of the contract documents and installation details, and that the submitted product is suitable for application in the manner indicated in the contract documents. Upon request, and at no additional charge, the equipment vendor will provide to the engineer a letter from the manufacturer stating the product has been applied in accordance with manufacturer's recommendations.

- B. Product Data, Shop Drawings and Samples: After checking and verifying all field measurements, the Contractor shall submit to the Engineer for review, in accordance with the accepted schedule of shop drawings submissions, copies of all product data, shop drawings and samples, which shall have been checked by and stamped with the approval of the Contractor and identified as the Engineer may require. The data shown on the shop drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the Engineer to review the information as required.
1. The Contractor shall review each submittal in detail. The work described in shop drawing submission shall be carefully checked for clearances (including those required or recommended for maintenance and servicing), field conditions, maintenance of architectural conditions and proper coordination with other trades on the job. If it is determined to be correct, the Contractor shall place an approval stamp on each copy; approval stamp shall be filed in with the date on which the items is checked and the checker's name. The Contractor's approval stamp certifies that submittals and related job conditions have been checked and that conflicts do not exist. Any job conflicts arising from the contractor's failure to fully complete these responsibilities shall be corrected as directed by the Professional at no additional cost to the contract. Drawings which the Contractor finds are incomplete or incorrect shall be returned to the source without being forwarded to the Professional. Drawings which do not contain the signed Contractor's stamp may be returned unchecked to the Contractor. Return of unchecked submittals and any delays in construction it may cause, will not be considered cause for any extensions or delays in construction by the Contractor.
 2. Shop drawings shall be submitted well in advance of field requirements to allow ample time for checking. Submittals shall be complete and contain required detailed information. Shop drawings with multiple parts shall be submitted as a package.
 3. Include with each submittal a permanent cover sheet for identification. Provide the following information on the cover sheet

for proper processing and recording of action taken. A sample cover sheet can be made available by the Engineer for reproduction and use for each submittal.

- a. Project name;
 - b. name and address of Professional;
 - c. name and address of Contractor;
 - d. name and address of supplier;
 - e. Sequential submittal number (e.g. FP-1, M-1, P-1, P-2, P-3, etc.); resubmittals shall be designated with the same submittal number but noted as a resubmittal (e.g. FP-1R, M-1R, P-1R, P-2R, P-3R, etc.);
 - f. name of manufacturer;
 - g. number and title of appropriate specification section, drawing number identifying symbol, and detail references, as appropriate.
 - h. similar definitive information as necessary.
 - i. space for the Contractor's review and approval markings
 - j. space for the Professional "Action" marking
4. Submit materials and equipment by manufacturer, trade name and model number. Include copies of applicable brochure or catalogue material. Do not assume applicable catalogues are available in the Professional's office. Maintenance and operating manuals are not suitable substitutes for shop drawings.
 5. Identify each sheet of printed submittal pages (using arrows, underlining or circling) to show applicable sizes, types, model numbers, ratings, capacities and options actually being proposed. Cross out non-applicable information. Note specified features such as special tank linings, pump seals, materials or painting.
 6. Include dimensional data for roughing in and installation, technical data sufficient to verify that equipment meets requirements of drawings and specifications. Include wiring, piping and service connection data, motor sizes complete with voltage ratings and schedules.
 7. Installed materials and equipment shall meet specified requirements regardless of whether or not shop drawings are reviewed by the Professional.
 8. Furnish all submittals for the items used in this project as listed in their related sections.

9. The Contractor shall also submit to the Engineer for review, with such promptness as to cause no delay in work, all samples required by the Contract Documents. All samples shall have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.
10. At the time of each submission, the Contractor shall in writing call the Engineer's attention to any deviations that the shop drawings or sample may have from the requirements of the Contract Documents. Make specific mention of such difference in a letter of transmittal, with request for substitution, together with reasons for same.
11. The Engineer shall review with reasonable promptness shop drawings and samples, but their review shall be only for conformance with the design concept of the project and for compliance with the information given in the Contract documents.
12. No work requiring a shop drawing or sample submission shall be commenced until the submission has been reviewed by the Engineer. A copy of each shop drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer and other authorities having jurisdiction.
13. The Engineer's review and acceptance of submitted data or shop drawings for material equipment apparatus, devices, arrangement and layout shall not relieve Contractor from responsibility of furnishing the proper dimensions and weight, capacities, sizes, quantity, quality and installation details to efficiently perform the requirements and intent of the Contract. Approval shall not relieve the Contractor from responsibility for errors, omissions or inadequacies of submitted data or shop drawings.
14. Upon final approval of shop drawings, the Contractor shall submit manufacturer's installation instructions to the Local Building Authority for all equipment and appliances at their request.
15. Upon final approval of shop drawings, the Contractor shall submit a record copy of all applicable items to the Balancing Agency.
16. If any components for which shop drawings have been approved is later found to not comply with those shop drawings contractor shall be responsible for all costs to address this, including but not limited to charges from the owner, engineer and other contractors.

1.10 SUBSTITUTIONS

- A. Follow requirements listed in the general provisions of the contract.
- B. Submittals are not opportunities for gaining acceptance of substitutions. Where three or more manufacturers are specified by name or by catalog reference, Contractor shall select for use any of those so specified.
 - 1. Should Contractor desire to substitute another manufacturer's equipment for one specified by name, the Contractor shall apply to the Engineer in writing no later than 10 days prior to bid opening for such permission. They shall provide supporting data and samples for Engineers consideration. No substitution shall be made for any material, article or process required under the contract unless approved by the Engineer.
- C. Contract documents are based on materials and equipment specified. Approval by Professional of equipment submitted by the mechanical trade as equal to that specified does not relieve the mechanical trade of any responsibility.
- D. Revisions required to adapt alternative shall be included in such proposals. No increase in the contract price will be considered to accommodate the use of the equipment other than that specified.
- E. Wherever operating results such as quantity delivered, pressure obtained, or similar results are specified, or a definite manufacturer and size of apparatus is specified, for which such quantities are readily determinable, the manufacturer and size of apparatus that the Contractor has proposed using must conform substantially (in regard to the operating results) to the quantities specified or implied. This requirement shall also apply to important dimensions relating to operation of apparatus in coordination with the rest of the system, and to properly locating the apparatus in available space conditions.
- F. Acceptance of substitutions for equipment specified shall be given only after receipt of complete and satisfactory performance data covering the complete range of operating conditions in tabular and graphical form. Furnish complete and satisfactory information relative to equipment dimensions, weight, etc. Acceptance of equipment specified or shown on the Drawings, or substitutions submitted for that specified or shown on the drawings, will be granted if such equipment, in the opinion of the Professional, conforms to the performance requirements, space conditions, weight requirements and quality requirements. Acceptance by the Professional as "equivalent" does not relieve the contractor(s) of any

responsibility. Any additional construction and design costs incurred as a result of any accepted substitution shall be borne by the Contractor.

1.11 REQUESTS FOR INFORMATION

- A. During the course of construction, the Contractors may find it necessary to request additional information. The Professional encourages written requests for information (RFI's) to clearly document the request. The response issued by the design Professional is an attempt to assist in the progress of construction. With a response, the design Professional is not conceding any deficiency of the design and is not assuming responsibility for means and methods. RFI's may not be used and asserted as an excuse for late submittal of shop drawings. The Contractor bears the responsibility to prioritize RFI's in the order in which it desires the professional to respond.

1.12 ALTERNATES

- A. Refer to Division 1 for Schedule of Alternates, if any.
- B. Alternate amounts quoted on bid forms shall include any and all costs to coordinate related work among all disciplines and modify surrounding work as required to obtain complete and operational systems.

1.13 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. If conflicts arise, prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Professional before proceeding.

1.14 FUTURE PROVISIONS

- A. Where indicated on the Contract Documents there may be provisions for future work. Contractor shall carefully coordinate any associated work that could affect that future work. Future equipment space and working clearances shall be maintained by avoiding routing current mechanical systems through those areas. Where indications of "Capped For Future" are indicated, provide capped isolation valves in piping and for duct work provide dampers with capped ends, sealed with removable sealant.

1.15 OWNER FURNISHED PRODUCTS

- A. Certain products may be furnished to the site and paid for by Owner:

Rough-ins and final connections shall be provided by the HVAC subcontract as required. Contractor shall fully coordinate requirements with Owner and/or Owner's vendor.

1.16 INTERRUPTION OF SERVICES

- A. Occupancy: The work is to be performed in and around existing facilities that are occupied by the public as a place of business. The work shall be coordinated and scheduled with the Owner and/or Owner's representatives to minimize any disruption to normal functions and occupancy of the facility.
- B. The Contractor shall schedule their work to avoid any major interruption of any utility services.
- C. Existing utilities serving facilities occupied and used by the Owner or others shall not be interrupted except when such interruptions have been authorized in writing by the Owner or the Professional. Interruptions shall occur only after an acceptable temporary utility services have been provided. The Contractor shall provide a minimum of ten (10) working days notice to the owner and receive notice to proceed before interrupting any utility.

PART 2 PRODUCTS

2.1 MECHANICAL PRODUCT REQUIREMENTS:

- A. Under the Base Bid, the specified equipment shall be used as the basis of the proposal.
- B. Standard Products: Provide not less quality than manufacturer's standard products, as specified by their published product data. Notwithstanding the indication that a particular product/model number is acceptable, comply with the specified requirements. Do not assume that the available off-the-shelf conditions of a product comply with the requirements; as an example, a specific finish or color may be required. Where the specifications do list a specific model number for a manufacturer, the construction of a product shall be equal to those models specifically listed.
- C. Unencumbered Purchases: Wherever possible, avoid the purchase and use of products which are encumbered with questionable title transfers, patent rights, trade union restrictions, code compliance, non-listing as "approved products" for compliance with governing regulations, duties due, embargoes and similar possible encumbrances, claims, or seller's interest.
- D. Purchasing: Do not purchase specific mechanical materials and equipment for

the project until completion of submittals that might affect the purchase.

- E. Conditions of Products: Unless noted otherwise, all equipment and materials required for installation under these specifications shall be new and without blemish or defect. Applicable equipment and materials to be listed by Underwriter's Laboratories and manufactured in accordance with ASME, AWWA, or ANSI standards, and as approved by local authorities having jurisdiction. All equipment shall bear labels attesting to Underwriters Laboratories approval where subject to Underwriters Laboratories label service. Where no specific indication as to the type or quality of material or equipment is indicated, a first-class standard article shall be furnished. All manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacturers of said equipment a minimum of three (3) years and, if so directed by the Engineer, be able to furnish proof of their ability to delivery this equipment by submitting affidavits supporting their claim. Comply with Division 1 requirements for exposure or visual display limitations against trademarks and manufacturer's names. Provide each product complete with trim, accessories, finish, guards, safety devices and similar components specified or recognized as integral parts of the product, or required by governing regulations.
- F. Uniformity: Where multiple units of a generic product are required for the mechanical work (as specified in Division 23), provide identical products by the same manufacturer, without variations except for sizes and similar variations as indicated.
- G. Limitations: Product/manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanges and grooved type), insulation, sheet metal, wire, steel bar stock, welding rods, solder, paint, fasteners, motors for unlike equipment units, and similar items used in the work, and except as otherwise indicated.
- H. Product Compatibility Options: Where more than one product selection is specified, either generically, or proprietarily, selection is Purchaser's or Installer's option, except do not provide products which are not compatible with previously purchased or installed products which must interface with the adjacent selections. Provide mechanical adaptations as needed for the interfacing of selected products in the work.
- I. Equipment Nameplates: Provide a permanent operational data nameplate on each item of power operated mechanical equipment, indicating the manufacturer's name and address, product name, model number, serial number, speed, capacity, power characteristics, labels of tested compliance, and similar essential operating data. Locate nameplates in easily-read locations; except where product is visually exposed in occupied areas of the building, locate nameplate in a concealed position (where possible) which is accessible for reading by service personnel. UL or other label, or other data that

is die-stamped into the surface of the equipment shall be stamped in a location easily visible. The generic nameplate of a distributing agent will not be acceptable.

- J. Except where more stringent requirements are indicated, comply with the product manufacturer's installation instructions and recommendations, including handling, anchorage, assembly, connections, clearances, cleaning, testing, charging, lubrication, adjustment, start-up test operation, and shut-down of operating equipment. Provide a copy of such instructions at the equipment during work on the equipment. Consult with manufacturer's technical representatives, who are recognized as the technical experts, for specific instructions on unique project conditions and unforeseen problems.
- K. Statically and dynamically balance rotating equipment for minimum vibration and low operating noise level after installation is complete.
- L. Pressure vessels and relief valves shall be selected, built and labeled in accordance with ASME. Obtain a certificate from the Inspector having jurisdiction showing such acceptance, and mount this certificate in a black frame under glass or laminated plastic adjacent to each pressure vessel and relief valves.
- M. Where factory testing of equipment is required to ascertain performance and attendance by the Owner's representative is required to witness such test, associated travel costs and subsistence shall be borne by the Contractor.
- N. No product containing any amount of any form of asbestos shall be installed on this project. Asbestos includes but is not limited to asbestiform varieties of chrysotile, crocidolite, anthophyllite, tremolite or actinolite. The contractor shall furnish a letter to the Owner certifying that this requirement has been complied with prior to final payment.

PART 3 EXECUTION

3.1 COORDINATION OF MECHANICAL WORK:

- A. The HVAC contractor shall coordinate the HVAC work with the work of other trades to avoid installation conflicts. Conflicts arising from failure to coordinate shall be rectified by the contractors at no additional cost to the contract.
- B. The mechanical drawings show the general arrangement of equipment, ductwork, piping and appurtenances. Follow these drawings as closely as the actual construction and the work of other trades will permit. Provide offsets, fittings, and accessories that may be required but not shown on

the drawings. Investigate the site, structural and finish ground conditions affecting the work, and arrange the work accordingly. Provide such work and accessories as may be required to meet such conditions.

- C. Examine and compare the contract drawings and specifications with the drawings and specifications of other trades and work furnished by others not in contract (NIC), and report any discrepancies between them to the Professional and obtain from Professional written instructions for changes necessary in the mechanical work. Install and coordinate the mechanical work in cooperation with other related trades and work furnished by others (NIC). Before installation, make proper provisions to avoid interference.
- D. Wherever the work is of sufficient complexity, prepare additional detail drawings to scale similar to that of the design drawings, prepared on medium of the same size as contract drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work shall be clearly identified on the drawings as to the area to which it applies. Submit these drawings to the Professional for approval. At completion include a set of such drawings with each set of as-built drawings.
- E. Certain materials will be provided by other trades. Coordinate the affected work with other trades. Examine the Contract Documents to ascertain these requirements. Consult with other trades regarding equipment so that, wherever possible, motors, motor controls, pumps and valves are of the same manufacturer.
- F. Wherever work interconnects with work of other trades, coordinate with other trades to insure that they have the information necessary so that they may properly install the necessary connections and equipment. Identify items (valves, dampers, coils, etc.) requiring access in order that the ceiling trade will know where to install access doors and panels.
- G. Coordination of Options and Substitutions: Where the contract documents permit the selection from several product options, and where it becomes necessary to authorize a substitution, do not proceed with purchasing until coordination of interface requirements has been checked and satisfactorily established.
- H. Chases and Holes: Unless otherwise indicated, all piping and ductwork shall be run in concealed spaces between floor and ceilings or in chases. Ductwork and piping areas without ceilings shall be installed exposed and as high as practical. This Contractor shall be responsible for the location and size of holes required for pipe, ducts and other equipment and shall advise of chase spaces and holes required as building progresses. Failure to do so shall require this Contractor to provide or cut same.

- I. Carefully check space requirements with other trades prior to installation to insure that material can be installed in the spaces allotted including finished suspended ceilings.
- J. Structural Limitations: Do not cut structural framing, walls, floors, decks and other members, except with the Architect's or Engineer's written authorization. Authorization will be granted only where there is not another reasonable method of completing the mechanical work, and where the proposed cutting clearly does not materially weaken the structure. Provide required supports and hangers for ductwork, piping and equipment, designed so as not to exceed allowable loading of structures.
- K. Slots, chases, openings and recesses through floors, walls, ceilings, and roofs shall be provided by the various trades in their respective materials. Contractor shall properly locate such openings and be responsible for cutting and patching caused by the failure to do so.
- L. All cutting and patching required for installation of Division 23 work shall be the responsibility of the associated Contractor(s), performed in accordance with all requirements indicated in Division 1.
 - 1. Cutting Concrete: Where authorized, cut openings through concrete (for pipe penetrations and similar services) by core drilling or sawing. Do not cut by hammer driven chisel or drill, unless receiving special permission for specific cases.
 - 2. Other Work: Do not endanger or damage other work through the procedures and processes of cutting to accommodate mechanical work. Review the proposed cutting with the Installer of the work to be cut, and comply with their recommendations to minimize damage. Where necessary, engage the original Installer or other specialists to execute the cutting in the recommended manner.
 - 3. Patching: Where patching is required to restore other work, because of either cutting or damage inflicted during the installation of mechanical work, execute the patching in the manner recommended by the original Installer. Restore the other work in every respect, including the elimination of visual defects in exposed finishes, as judged by the Architect/Engineer and Owner.
- M. Furnish and set sleeves for passage of pipes, ducts and conduits through structural masonry and concrete walls and floors and elsewhere as required for the proper protection of each pipe and duct passing through building surfaces. Coordinate locations of sleeves with General Contractor for proper scheduling and installation.
- N. Install mechanical work to permit removal (without damage to other parts)

of coils, heat exchanger plates and tube bundles, fan shafts and wheels, filters, belt guards, sheaves and drives, and other parts requiring periodic replacement or maintenance. Arrange pipes, ducts, and equipment to permit access to valves, gauges, starters, motors, and control components, and to clear the opening of swinging doors and access panels.

- O. Sequence, coordinate and integrate the various elements of mechanical work so that the mechanical plant will perform as indicated and be in harmony with other work of the building. The Architect/Engineer will not supervise the coordination, which is the exclusive responsibility of the Contractor. Comply with the following requirements:
1. Install piping, ductwork and similar services straight and true, aligned with other work, close to walls and overhead structure (allowing for insulation), concealed where possible in occupied spaces, and out-of-the-way with maximum passageway and headroom remaining in each space.
 2. Arrange work to facilitate maintenance and repair or replacement of equipment without removal of relatively fixed building elements or other equipment. Locate services requiring maintenance on valves and similar units in front of services requiring less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
 3. Locate operating and control equipment and devices for easy access. Install access panels where units are concealed by finishes and similar work.
 4. Integrate mechanical work with light fixtures and other work, so that required performances of each will be achieved.
 5. Adjust location of pipes, ducts, panels, equipment, etc., to accommodate the work to prevent interference, both anticipated and encountered. Determine the exact route and location of each pipe and duct prior to fabrication
 6. Right-of-Way: Piping systems that pitch have the right-of-way over those which do not pitch (e.g. drainage systems normally have right-of-way). Service lines whose elevations cannot be changed have right-of-way over lines whose elevations can be changed.
 7. Make offsets, transitions and changes in direction in pipes and ducts as required to maintain proper head room and pitch on

sloping lines. Furnish and install air vents, drains, etc., as required to affect these offsets, transitions and changes in direction.

8. Obtain from Others furnishing products, materials or services not in contract, all necessary catalog cut sheets, rough-in requirements or any other such information as required to fully coordinate the services to support all such work by others. Costs that arise from not performing this coordination shall be borne by the Contractor.
- P. Protective Drip Pans: Where indicated, and where mechanical work piping carrying liquids pass over electrical or electronic equipment which might be damaged by dripping liquids (leakage or condensation), install drip pans 2" deep, 16 gauge galvanized steel with rolled edges of adequate width and length to protect the electrical equipment. Pipe drainage from pan to nearest floor drain or similar suitable point of discharge, and terminate pipe as an open-sight drainage connection. Provide permanent support and anchorage to prevent displacement of drip pans. Drains shall be 3/4" copper unless noted otherwise. Locate drip pans as close to underside of piping as possible. Extend edges not less than 6" each side of piping and extend ends not less than 18": beyond equipment being protected.
- Q. Electrical Work: Coordinate the mechanical work with electrical work, and interface properly with electrical service to mechanical equipment. In general, and except as otherwise indicated, install mechanical equipment ready for electrical connection.
1. Refer to Division 26 sections for electrical power connection of mechanical equipment, including disconnect switches.
 2. Power Characteristics: Refer to the appropriate sections of Division 26 and the electrical drawings for the power characteristics available for the operation of each power driven item of mechanical equipment. Coordinate purchases to ensure uniform interface with electrical work.
- R. Utility Coordination: Coordinate the connection of mechanical systems with exterior underground and overhead utilities and services. Comply with the requirements of governing regulations, franchised service companies and controlling agencies. It is the construction contractor's responsibility to mark and trace the lines using appropriate/suitable devices; i.e., metal detectors, pipe locators, etc.; or by having the appropriate utility company stake the lines. The contractor shall repair all utility systems he damages at no charge to the Owner. All repairs shall be performed to Owner's or the affected utilities' satisfaction. The contractor is responsible for all utility hook ups, disconnects and coordination with the

appropriate agencies.

- S. Seasonal Requirements: Adjust and coordinate the timing of mechanical system start-ups with seasonal variations, so that demonstration and testing of specified performance can be observed and recorded. Exercise proper care in off-season start-ups, to ensure that systems and equipment will not be damaged by the operation.
- T. The HVAC Contractor shall be responsible to coordinate their work with the TAB and notify the Agencies when each phase of the project is at 30, 60 and 90 percent complete, in order for the Agencies to provide the required field inspections.
- U. The HVAC Contractor shall be responsible for ensuring that the HVAC systems, wiring, and controls are complete and operational and for providing written documentation as such to the Professional and the TAB prior to TAB being performed. The HVAC Contractor shall be responsible for any costs associated with additional services required to reschedule and/or redo TAB and punch list inspections resulting from the failure to perform said completed services.

3.2 CUTTING & PATCHING:

- A. See Division 1 for Cutting and Patching requirements.
- B. This Contractor must have an experienced Mechanic on the job before concrete floors, concrete or masonry walls are set in place, whose duty it shall be to locate the exact position of any and all sleeves and holes for the future installation of his pipe or duct work. This Contractor shall locate and size all openings required for his equipment in time to not delay the building construction.
- C. If it becomes necessary to cut holes in concrete floors or concrete or other masonry walls, each subcontractor shall contact the Prime Contractor or their superintendent of Construction, and inform them of the position and size of the hole or other opening to be provided and the Prime Contractor shall determine how this will be done. Under no condition shall this Contractor make any cuts without permission from the Prime Contractor, nor shall he cut any green floors or walls.
- D. This Contractor shall arrange proper openings in the building to admit their equipment. If it becomes necessary to cut any portion of the building to admit any equipment or install mechanical systems, this Contractor shall be responsible for cutting and patching. The portions cut must be restored to their former condition by this Contractor.

- E. All cutting of structure shall be done using best method to minimize noise and cracking of structure. The method of cutting shall be approved by the Prime Contractor before work if started.
- F. All drilled holes required for equipment or supports shall be done by this Contractor. Holes for piping shall be core drilled only.

3.3 ACCESS PANELS

- A. The Contractor shall furnish access doors to the General Contractor for installation in ceilings, walls, partitions and floors for access to valves, dampers, equipment, etc. and all appurtenances.
- B. Access panels shall be of sufficient size to permit removal or access to equipment, except that the minimum size shall be 12-inches by 16-inches.
- C. Access door locations shall be as determined by field conditions for optimum access to equipment, and shall be reviewed by the Professional before final installation, and shall be subject to the following:
 - 1. Bottom of access doors shall not be lower than the top of the partition base, or a minimum of 6 inches above floor.
 - 2. Tops and/or sides of access panels shall be a minimum of 6-inches from the ceiling or opening or from the edge of a wall return.
 - 3. Access doors shall be suitable for installation in the finish material of the ceilings, walls, partitions and floors.
 - 4. Frame and panel access doors in restrooms, kitchens and as indicated shall be stainless steel.
 - 5. Access doors with UL Listing shall be provided in rated construction assemblies. Access doors shall be "B-Label" and shall have a UL one and one-half (1-1/2) hour rating at 250 degrees F rating for both door and frame. Maximum size shall be 20" x 20" or 400 square inches in area. Frame shall be sixteen (16) gauge minimum steel, panel shall be twenty (20) gauge minimum steel. Access doors shall be provided with a baked-on enamel finish (prime coat), continuous type hinge on one side, flush-face type lock with key operation and self-latching cylinder locks.
 - 6. Access doors without UL label shall be provided in all non-rated construction assemblies: Frame shall be sixteen (16) gauge minimum steel, panel shall be fourteen (14) gauge minimum steel. Access doors shall be provided with a baked-on enamel finish

(prime coat), concealed spring type hinges and flush-face type lock with key operation and self-latching cylinder locks. Door shall open 175 degrees (minimum).

7. All access doors shall be keyed alike.

3.4 STORAGE AND INSTALLATION OF EQUIPMENT AND MATERIALS:

- A. Move and store products and materials in a manner that will protect them from damage, weather and entry of debris. The Contractor shall fully protect finished parts of the materials and equipment against damage from whatever cause during the progress of the work until final acceptance. Materials and equipment in storage and during construction shall be stored on elevated supports and covered on all sides with securely fastened protective rigid or flexible waterproof coverings in such a manner that nothing will be damaged or marred, and kept clean and dry. If items are damaged, do not install, but take immediate steps to obtain replacement or repair at no cost to Owner.
- B. Piping shall be protected by storing it on elevated supports and capping the ends with suitable closure material to prevent dirt accumulation in the piping.
- C. During construction cap all ductwork openings that could be exposed to dust, dirt and debris. Cap all piping installed vertically.
- D. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris. All adjacent occupied areas shall be cleaned daily to remove dirt and debris resulting from this work.
- E. If products and materials are specified or indicated on the drawings for a specific item or system, the Contractor shall use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of shop drawings.
- F. Install materials and equipment with qualified trades people. Install all equipment and appurtenances in strict accordance with the manufacturer's instructions and recommendations.
- G. Replace materials less than specified quality or as designated by Professional and relocate work incorrectly installed as determined by Professional.
- H. All parts of the HVAC system shall be protected from entry of dust and

other contaminants until all activities producing these contaminants are complete and all dust and debris has been removed. HVAC Contractor shall bear the responsibility to thoroughly clean all air handling equipment, interior surfaces of ductwork, terminal devices, air distribution devices and any other related mechanical equipment if any of these systems are contaminated due to inadequate protection during construction.

- I. Do not use the HVAC system for temporary heat or cooling until all dust and other contaminant producing activities are complete and all dust and debris have been removed. Once all dust and other contaminant producing activities are complete and all dust and debris has been removed HVAC system may be used for temporary heating or cooling. Do not operate air systems until ductwork is complete, temporary filters are in place. At a minimum provide one-inch thick fiberglass filter media across the face of each return air opening prior to start of each air system during temporary system operation. HVAC Contractor shall bear the responsibility to thoroughly clean all air handling equipment, interior surfaces of ductwork, terminal devices, air distribution devices and any other related mechanical equipment if any of these systems are contaminated due to use as for temporary heat.
- J. Do not operate water systems until piping has been cleaned and startup strainers are in place.
- K. Secure equipment with bolts, washers and locknuts of ample size to support equipment. Embedded anchor bolts shall have bottom plate and pipe sleeves. Grout all machinery set in concrete under the entire bearing surface. After grout has set, remove all wedges, shims and jack bolts and fill space with grout.
- L. Valves, dampers operators, and access doors, shall be easily accessible, either in mechanical spaces or through access panels specified.
- M. All equipment shall be thoroughly cleaned. All excess materials and all debris shall be removed from the site.

3.5 REVIEW OF WORK PROGRESS:

- A. Prior to performing work, the Contractor shall carefully review and assess the installed Work of all other Trades and verify that all such Work is complete to the point where their installation may properly commence.
- B. Verify that all equipment may be installed in accordance with all pertinent codes and regulations, the original design and the referenced standards. Schedule and obtain inspections of the AHJ, and contact Professional for site observations at appropriate times.

- C. In the event of discrepancy, immediately notify the Architect/Engineer.
- D. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.6 WELDING:

- A. All welded piping shall be installed by Contractor using NCPWB or ASME Certified Welding Procedures. Welding shall comply with ANSI/ASME B31.1 and Section IX of the ASME Boiler and Pressure Code.
- B. All welded piping shall be hydrostatically tested for pressure of 1-1/2 times the working pressure of the line, but not less than 150 psig. This hydrostatic test shall be witnessed by the Engineer.
- C. Ten days before any welded work is to start, the Contractor shall furnish the Engineer copies of the welding procedures approved for the Contractor.
- D. Before any welder is put to work in welding any piping for this job, the Engineer shall be furnished with duplicate copies of the certification of each welder. If, in the opinion of the Engineer, the welding is not done properly, a coupon shall be cut from field welds for inspection and/or the welder may be required to pass a recertification test. Costs of cutting the coupon shall be the responsibility of the Contractor. Also all welds shall be subject to non-destructive x-ray examination by Owner. In the event that defective work is found the Contractor will be responsible for all costs of non-destructive x-ray examination, including all remedial repair work and retesting of welding that is determined to be unsatisfactory.
- E. No welding is to be covered with insulation or concealed until the welding has been approved by the Engineer as outlined above.
- F. All welding operations shall be approved by the Engineer prior to beginning work. Extreme care shall be exercised to prevent damage to the existing buildings or building or surrounding contents during welding operations.
- G. During welding of all piping, contractor shall use fire resistant or equal pad protection to prevent scorching or burning of existing floor and wall finishes, etc. Also, care shall be taken to eliminate sparks from dropping on existing furniture, equipment and flooring material. All damages created by welding flame or sparks shall be repaired to owner's satisfaction at contractor's expense.

3.7 PAINING REQUIREMENTS:

- A. Work buried in soil or encased in concrete or insulation need not be painted (except for protective coatings specified with the piping system).
- B. Painting of work in finished areas will be done by others. However, this Contractor shall leave their work in proper condition and ready for painting by removing all dirt, grease, pipe dope and scale or other foreign material by wire-brushing or as required.
- C. Except as indicated specifically otherwise herein, paint material shall be selected from materials for work under the Architectural Specifications.
- D. Painting on all pipe and pipe insulation in equipment rooms shall be done by the Mechanical Contractor. Colors shall be selected from the Industry Standard for colors or those approved by the owner.
- E. All equipment having factory applied finish shall have its surface restored to its original condition if the finish is marred during installation.

3.8 MANUALS, REPORTS AND FORMS SUBMITTAL:

- A. Submit specified number of operating and maintenance manuals, reports and forms to the A/E for review. Submittals shall be in strict compliance with specifications.
- B. Submittals not approved or not submitted in proper format may be rejected and returned to Contractor. Contractor shall make necessary changes and resubmit until approved.
- C. Submittals shall include all reports, forms and manuals referenced in these specifications.

3.9 GENERAL COMPLETION AND DEMONSTRATION:

- A. All aspects of the work shall be completed and demonstrated to be operating correctly before project will be considered complete. The following results are expected:
 - 1. All systems and controls shall be complete, tested and operational.
 - 2. All start-up and testing and balancing shall be complete.
 - 3. All equipment shall be thoroughly cleaned. All excess materials and all debris shall be removed from the site.
 - 4. All walls, floors, ceilings and other surfaces marred or otherwise damaged as a result of execution of this contract shall be cleaned

and repaired to the satisfaction of the Architect/Engineer and Owner.

3.10 MAINTENANCE OF LOCAL SERVICE ORGANIZATION:

- A. The Contractor shall maintain sufficient forces to respond promptly to any system problems that occur during construction and during the warranty period. The Contractor shall provide the Owner and the Engineer with reliable and prompt means of contacting the Contractor. In the event that after an attempt to contact the Contractor, the Contractor does not respond appropriately to any problem, the Owner and/or Engineer will without further notice address the problem. All costs associated with addressing the problem will be borne by the Contractor including all costs of the engineer and owner and including all risk of damage to equipment except that caused by gross negligence of others.

END OF SECTION 23 00 00

PART 1 GENERAL REQUIREMENTS**1.1 SCOPE OF WORK:**

- A. Refer to Division 1 Specifications for documentation and close-out requirements. When conflicts exist; the more stringent shall apply.

PART 2 PRODUCTS**2.1 RECORD DOCUMENT SUBMITTALS:**

- A. General: Specific requirements for record documents are indicated in the individual sections of these specifications. Other requirements are indicated in the General Conditions.
 - 1. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Professional's reference during normal working hours.
- B. Record Drawings: Maintain a record set of blue or black line white-prints of contract drawings and shop drawings in a clean, undamaged condition for concurrent mark-up of actual installations which vary substantially from the work as shown. Mark whichever drawing is most capable of showing the actual "field" condition fully and accurately; however, where shop drawings are used for mark-up, record cross-reference at the corresponding location on the working drawings.
 - 1. Mark with red ink, and where feasible use multiple colors to aid in the distinction between work of separate mechanical systems. Give particular attention to concealed work that would be difficult to measure and record at a later date. In general, record every installation of mechanical work which previously is either not shown or shown inaccurately, but in any case record the following:
 - a. Mark-up new information which is known to be important to the Owner, but for some reason was not shown on either contract drawings or shop drawings. Record drawings shall identify location of fire dampers, major control lines, access doors, tagged valves, systems concealed in walls or ceilings.
 - b. Work concealed behind or within other work, in a non-accessible arrangement. All such work shall be identified with field measured dimensions to locate in the future and shall be inspected by Owner's representative prior to completing enclosure.

- c. Mains and branches of piping systems, with valves and control devices located and numbered, with concealed unions located, and with items requiring maintenance located (traps, strainers, expansion compensators, tanks, etc.).
 - d. Note related change-order and numbers where applicable. When construction clarification or change order sketches are issued by the Professional and approved to be used for construction, a copy of each sketch shall be securely taped to the back of the preceding sheet and properly referenced on the original drawing.
 - e. Ductwork layouts, including locations of coils, dampers, filters, boxes, and similar units.
 - f. Concealed control system devices and sensors.
 - g. Cross out work that has been moved or changed.
 - h. Qualified drafters shall perform this task.
 2. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set. Upon completion of the work, submit record drawings to the Professional for review.
 3. Once drawings are approved by the Professional, the Contractor shall obtain a minimum of 3 full size reproduced sets (2) for Owner's use and (1) is the Architect's/Engineer's records.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including specifications and addenda, and one copy of other written construction documents such as change orders and similar modifications issued in printed form during construction. Mark these documents to show substantial variations in the actual work performed in comparison with the text of the specifications and modifications as issued. Give particular attention to substitutions, selection of options and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data, where applicable.
 1. Upon completion of the Work, submit record specifications to the Professional for the Owner's records.
- D. Record Product Data: Maintain one copy of each product data submittal. Mark these documents to show significant variations in the actual Work performed in comparison with the submitted information. Include both variations in the products as delivered to the site, and variations from the manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and mark-up of record drawings and specifications.

1. Upon completion of mark-up, submit complete set of record product data as part of the Operation and Maintenance Manuals.
- E. Miscellaneous Record Submittals: Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with the actual performance of the Work. Immediately prior to the date or dates of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Professional for the Owner's records.

2.2 OPERATING AND MAINTENANCE MANUALS:

- A. General: The Contractor shall develop or acquire the necessary documents describing the operation and maintenance of equipment, assembled in the form of an instructional manual for use by Owner's personnel. In addition to the general requirements listed in Division 1, comply with the following requirements. Failure to comply with this organizational format and/or content will result in rejection of manual until conditions are met.
- B. Number and Format: Submit one hard copy and one electronic copy (PDF Format, not copy protected)
- C. Binders: Organize and bind operating and maintenance data into fully identified and indexed binder sets of manageable size. Binders shall be heavy-duty 3-inch maximum, 3-ring vinyl type sized to handle 8.5"x11" paper. Each binder shall include clear plastic sleeves on front and spine to insert labels.
1. Identify each binder on the front and spine, with the typed or printed title "OPERATING AND MAINTENANCE MANUAL", project title or name, and subject matter covered. Indicate the volume number for multiple volumes.
 2. Dividers: The binders shall be divided according to the format described under "Manual Content".
 - a. Tabbed Dividers: 3-hole, reinforced, punched, heavy paper dividers with plastic tabs and typewritten inserts. Provide a typed description of the product(s) included in the subdivision on each divider. Clear plastic tabs shall be minimum 2-inches and inserts shall be assembled to prevent them from falling out.
 3. Text Material: Where written material is required as part of the manual, use the manufacturer's standard printed material. If it is not available, specially prepared data, neatly typewritten, on 8.5"x11", 20 pound white bond paper.

4. Drawings: Where drawings or diagrams are required as part of the manual, insert them in top-loading plastic sheet protectors and bind in with the text.
 - a. Where oversized drawings are necessary, fold the drawings to the same size as the text pages and insert into large capacity sheet protectors. Insert a cover sheet to describe the contents of the drawing(s).
- D. Manual Content: Organize each manual according to the outline listed below. Manuals that are submitted incomplete or not in accordance with the following format will not be acceptable.
 1. Title Page: Provide a title page in a transparent plastic sheet protector as the first sheet of each manual. Provide the following information:
 - a. Construction Specification Division covered by the manual.
 - b. Name and address of the Project.
 - c. Date of submittal.
 - d. Name, address, and telephone number of the Contractor.
 - e. Name and address of the Professional.
 2. Table of Contents: Provide a typewritten table of contents for each volume in a transparent plastic sheet protector.
 - a. Where more than one volume is required, provide a comprehensive table of contents in each volume of the set.
 3. List of Products and Suppliers: Provide a list of products and suppliers in transparent plastic sheet protectors. List each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the Subcontractor or installer, and the local vendor. Clearly delineate the extent of responsibility of each of these entities.
 4. Product and System Information: Provide all pertinent information to properly locate, identify, operate and maintain each product or system. Assemble the submittal information required by the individual specification section and the requirements listed below. Organize information in the same sequence as the specification sections listed in the Project Manual Table of Contents. Identify each divider tab with the specification number and name.
 - a. General Description: Provide a complete description of each product or system and related equipment parts including the specification section listed in the Project Manual Table of Contents. Identify each divider tab with specification section number and name:

- (1) Name, identification tag (where applicable), location and function of product or system.
 - (2) Final record copies of Shop Drawings and Product Data, including Professional's comments and approval stamp.
 - (3) All engineering data including Performance Curves: For fans, pumps, balance valves and similar equipment at the operating conditions, certifications, and test reports for all products or systems required by the specifications, professional or the authorities having jurisdiction.
- b. Manufacturer's Information: Provide manufacturer's standard printed data for equipment. May be standard instruction booklets but shall be clearly marked to indicate applicable equipment and characteristics. Mark each sheet to identify each part or product included in the installation. Where more than one item in a tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information that is not applicable. In general, the manufacturer's information shall include:
- (1) Printed operating and maintenance instructions.
 - (2) Inspection and test procedures.
 - (3) Alignment, adjusting, lubrication and checking procedures.
 - (4) Assembly drawings and diagrams including complete nomenclature and number of replacement parts, and instruction for disassembly, repair and reassembly.
 - (5) Trouble-shooting guide.
 - (6) Safety precautions.
 - (7) Copies of warranties, bonds and service contracts.
- c. Supplemental Information: Where manufacturer's standard printed data is not available, and information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement data included in the manual, prepare written text to provide necessary information. Organize the text in a consistent format under separate headings for different procedure. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Also, provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems, or to provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation. Do not use

original Project Record Documents as part of the Operating and Maintenance Manuals.

- d. System Operating Instructions: Provide typewritten instructions to assist the owner in proper building systems operation. These instructions shall include the following.
 - (1) Start-up procedure.
 - (2) Equipment or system break-in.
 - (3) Routine operating instructions or systems, special valves, dampers or controls.
 - (4) Lubrication Schedule: Indicating type and frequency of lubrication required.
 - (5) Shut-down and emergency instructions.
 - (6) Summer and winter operating and change over instructions.
 - (7) Any other special operating or maintenance instructions.
 - (8) List of items recommended to stocked as spare parts.
- e. Servicing Schedule: Provide a summary schedule of routine servicing and lubrication requirements.
- f. Filter schedule: Identifying filter type, size efficiency, manufacturer and equipment number
- g. Valve Charts: Provide copies of charts of valve tag numbers, with the location and function of each valve. Coordinate valve tags and charts with existing numbers and provide updated valve charts including all new and existing to remain valves.
- h. Ceiling marker schedule.
- i. Material Safety Data Sheets: Where applicable, include standard safety data sheets for hazardous or toxic materials such as refrigerants and water treatment chemicals. These sheets shall clearly indicate the level of hazard or toxicity, the proper use, storage and disposal of such material and what to do in case of an emergency as well as any other information listed by the material manufacturer.
- j. Wiring Diagrams: Generalized diagrams are not acceptable, submittal shall be specifically prepared for this Project.
- k. Automatic Controls: Diagrams and functional descriptions. The following diagrams, schematics and lists shall be framed under glass and hung adjacent to equipment, in mechanical room.
 - (1) Automatic control diagram and points list.
 - (2) Sequence of operation.

- l. Test and Balance Reports.
 - m. Certifications of welders and brazers.
 - n. Certificate of Completion: Provide standardized form sheets for each sub contractors own final review, punchlist and sign-off that work is complete,
- 5. Submit a draft copy of operating and maintenance manual for review and approval prior to final issuance and at least one month prior to turnover seminar.
 - 6. Once draft copy is approved by the Professional, submit paper copies in binders and one electronic copy on a CD, PDF format, not copy protected, divided into tabs and sections.

PART 3 EXECUTION

3.1 SUBSTANTIAL COMPLETION AND FINAL INSPECTIONS

- A. Prior to substantial completion inspection, confirm in writing, that the following work is completed. The Professional will not perform substantial completion inspection without this confirmation.
 - 1. Heating, ventilation and air conditioning systems are capable of operation with alarm conditions functional and automatic controls in operation generally, but not finally calibrated.
 - 2. Tests performed on equipment including those required by authorities and approval certificates obtained.
 - 3. Rough balance of air and water systems are complete and draft copy of report issued to Engineer.
 - 4. Valve tagging is complete, equipment is identified and escutcheons installed. Equipment and piping is painted.
 - 5. Equipment is lubricated per manufacturer's instructions.
 - 6. Systems are chemically cleaned, flushed, strainers are cleaned and water treatment initiated. Obtain report from manufacturer's representative to confirm acceptability of treatment
 - 7. Sample of Operating/Maintenance Manuals submitted. Arrange Operating and Maintenance Instruction Seminar and submit schedule for approval provided.
 - 8. Ensure access doors are suitably located and equipment accessible.
 - 9. Noise and vibration control devices including flexible connections inspected by manufacturer's representative and written report submitted.
 - 10. Equipment aligned by qualified millwright is complete.
 - 11. Ensure electrical connections to mechanical equipment are complete.

12. Air handling units and fan plenums cleaned, permanent filters installed.
- B. Prior to substantial completion inspection, the contractor shall provide complete punch list of items which are not finished or deficient at the time of the scheduled inspection.
- C. Prior to final inspection, provide declaration in writing that previously identified deficiencies and the following items have been completed.
 1. Equipment cleaned inside, outside and lubricated.
 2. Final balancing completed and balance reports submitted.
 3. Final calibration of controls completed and control system report submitted.

3.2 CLOSEOUT PROCEDURES:

- A. General Coordination: Refer to Division 1 sections and the 23-Series sections for coordination of mechanical closeout work with seasonal heating and cooling loads on mechanical system. Sequence closeout procedures properly, so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated.
- B. Basic Requirements: Contractor shall be sure to perform all basic functions to ensure proper system functions, including but not necessarily limited to:
 1. Fill and vent water systems.
 2. Check rotation on each motor.
 3. Have representatives of each manufacturer present when hereinafter specified, so that equipment will be started up by manufacturer.
- C. Cleaning and Lubrication: After final performance test run of each mechanical system, clean system both externally and internally. Clean dirt and debris from air handling systems and clean or replace dirty filters. Flush piping systems by operating drains and similar means, and clean strainers and traps. Remove any start up screens in strainers and suction diffusers at pumps. Lubricate both power and hand operated equipment and remove excess lubrication. Touch-up minor damage to factory painted finishes and other painting specified as mechanical work; refinish work where damage is noticeable.
- D. System Performance: Test Run: Following Testing, Adjusting and Balancing Work, at the time of mechanical work closeout, check each item in each system to determine that it is set for proper operation. With Owner's Representative, Equipment Manufacturers' Representatives, and Architect/Engineer present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During or following test runs, make final corrections or adjustments of systems to

refine and improve performances wherever possible, including noise and vibration reduction, elimination of hazards, best response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices as may be requested for Architect's/Engineer's observation of actual system performances. Demonstrate that controls and items requiring service or maintenance are accessible.

- E. Construction Equipment Removal: After completion of performance testing and Owner's operating instructions and demonstrations, remove installers' tools, test facilities, construction equipment and similar devices and materials used in execution of the work but not incorporated in the work.

3.3 GENERAL OPERATIONAL AND MAINTENANCE INSTRUCTION:

- A. General Operating Instructions: In addition to specific training of Owner operating personnel specified in individual Division 23 work sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified in 23-Series sections and elsewhere in these specifications, provide general operating instructions for total mechanical plant. Conduct a walk-through explanation and demonstration for orientation and education to Owner's personnel to be involved in continued operation of building and its mechanical plant. Make arrangements to record this seminar on videotape and turnover the completed tapes to the owner at the conclusion of the project.
 - 1. After all final tests and adjustments have been complete, a competent employee of the Contractor, and equipment vendor if necessary, shall be provided to instruct the Owner's Representative in all details of operation and maintenance for equipment installed. Supply qualified personnel to operate equipment for sufficient length of time after instructions to assure that Owner's Representative is qualified to take over operation and maintenance procedures. Instruction periods shall be as designated by the Owner and shall not necessarily be consecutive.
 - 2. Instruction period shall be performed during the 12 months following substantial completion at time periods as requested by Owner. Fifty percent of instruction shall be in a formal classroom setting. Use the Product and System Information division of the final operation and maintenance manual as the basis of instruction.
 - 3. Describe each basic mechanical system and how its control system functions, including flow diagrams, signals, alarms, intercom system (if any), and similar audiovisual provisions of the work.
 - 4. Describe basic sequencing requirements and interlock provisions for system start-up, phasing, coast-down, shut-down, seasonal operations, and emergency procedures.

5. Emphasize emergency procedures and safety provisions for protection of plant and safety of occupants during equipment malfunction, disasters, power failures and similar unusual circumstances, and describe system limitations and precautions including weather adjustments.
 6. Outline basic maintenance procedures and major equipment turnaround requirements.
 7. Point out operational security provisions, safety, unavoidable hazards and similar operator limitations.
 8. Display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, spare parts inventory, storage of extra materials and similar service items.
- B. Submit agenda schedule and list of representatives to the Professional for approval thirty (20) days prior to seminar. Confirm attendance of seminar by written notification to participants.
- C. Submit a written record of the seminar, complete with an attendance list to the Professional.

3.4 CONTROLS OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Upon completion of Operation and Maintenance instructions, competent employees of the Control Contractor shall be provided to instruct the Owner's representative in all details of operation and maintenance for the controls installed. Supply qualified personnel to operate system for sufficient length of time after instructions to assure the Owner's Representative is qualified to take over operation and maintenance procedures.
- B. Controls Operation and Maintenance Instruction shall include the entire control system including control sequences that are inherent to equipment provided by the Equipment Manufacturer including economizer cycles, low ambient operation, freezestats and similar sequences. Contractor shall provide sufficient personnel equipment walkie-talkies, gauges, and other accessories for this work.

END OF SECTION 230001

PART 1 GENERAL**1.1 SECTION INCLUDES**

- A. Extent of variable drives (VFD's) is indicated on the Drawings and is defined by the requirements of this section as part the HVAC contract.
- B. This specification describes an AC variable speed/torque drive used to control the speed/torque of a NEMA design B induction motor. The drive must also provide an optional operational mode for scalar or V/Hz operation.

1.2 QUALITY ASSURANCE

- A. VFD's shall be constructed, tested and rated in accordance with the following standards and references.
 - 1. NEMA ICS 3.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.
 - 2. NEMA 250
 - 3. NEC
 - 4. IEEE 519
 - 5. FCC Part 15, Class A
 - 6. UL or ETL
- B. Manufacturer's Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience and with service facilities with 100 miles of project site.
- C. Product Factory Testing
 - 1. To ensure quality and minimize startup failures at the jobsite, the complete VFD shall be tested by the manufacturer. The VFD shall operate a dynamometer at full load and the load and speed shall be cycled during the test.
 - 2. All optional features shall be functionally tested at the factory for proper operation.
- D. The Drive Manufacturing facility shall be ISO 9011 and 14001 certified.
- E. The Drive shall be UL listed.

- F. All printed circuit boards shall be completely tested and burned-in before being assembled into the completed Drive. The Drive shall then be subjected to a preliminary functional test, minimum one (1) hour burn-in and computerized final test. The burn-in shall be at 104F (40C), at full rated load, or cycled load. Drive input power shall be continuously cycled for maximum stress and thermal variation.
- G. The Drive shall utilize efficient IGBT technology throughout the entire Drive manufacturer's Power and Voltage range.
- H. The Drive shall utilize the same communications architecture, utilizing plug-in communications cards, for high-speed noise immune connectivity throughout the entire Drive manufacturer's Power range.
- I. The Drive manufacturer shall have an analysis laboratory to evaluate the failure of any component. The failure analysis lab shall allow the manufacturer to perform complete electrical testing, x-ray components, and decap or delaminate components and analyze failures within the component.
- J. The Drive shall utilize surface mount technology in the manufacturing of internal printed circuit boards and electronics, for maximum performance and reliability.

1.3 SUBMITTALS

- A. Submit the following under provisions of General Conditions.
 - 1. The specification lists the minimum VFD performance requirements for this project.
 - 2. Shop Drawings: Include front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.
 - 3. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
 - 4. Manufacturer's Field and Test Reports: Indicate field test and inspection procedures and test results.
 - 5. Operation and Maintenance Data: Submit instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions. Submit routine preventive maintenance schedule.
 - 6. Submittals shall include the following information:

- a. Outline dimensions, conduit entry locations and weight.
- b. Customer connection and power wiring diagrams.
- c. Complete technical product description include a complete list of options provided. Any portions of the specifications not complied with must be clearly indicated or the supplier and contractor shall be liable to provide all components required to meet the specification.
- d. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).
- e. The VFD manufacturer shall provide calculations; specific to the installation, showing total harmonic voltage distortion is less than 5%. Input filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with the IEEE electrical system standard 519. All VFDs shall include a minimum of 5% equivalent impedance reactors, no exceptions.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site with factory-installed protective skids and containers.
- B. Accept controllers on site in original packing. Inspect for damage.
- C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.5 MAINTENANCE SERVICE

- A. Furnish service and maintenance of controller free of charge for one year from Date of Project Acceptance.

1.6 WARRANTY

- A. With a certified start-up, warranty shall be 24 months from the date of start-up and not less than 1 year from Date of Project Acceptance. The warranty shall include all parts, labor, travel time, and expenses.

1.7 EXTRA MATERIALS

- A. Provide three of each fuse size and type.

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (HVAC GRADE, 0.55 – 2800 KW, 230-690V)

- A. The Acceptable Manufacturer's: Subject to compliance with requirements, manufacturers offering VFD's which may be incorporated in work include, but are not limited to, the following:
 - 1. ABB Drives ACH550 Series
 - 2. Bell & Gossett
 - 3. General Electric
 - 4. Danfoss
 - 5. Mitsubishi Electric
 - 6. Square D
 - 7. Schneider
- B. General: Furnish complete variable frequency drives as specified herein for the fans and pumps designated on the drawing schedules to be variable speed. All standard and optional features shall be included within the VFD enclosure, unless otherwise specified. VFD enclosure shall be NEMA 1 with inlet air filters. Provide integral inlet fusing.
- C. The Drive shall be solid state, with a Pulse Width Modulated (PWM) output. The drive must also provide an optional operational mode for scalar or V/Hz operation.
- D. Ratings:
 - 1. The Drive shall be rated to operate from 3-phase power at 230VAC to 500VAC +10/-10%, 48Hz to 63Hz. The Drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.97 at all speeds and loads. The Drive efficiency shall be 98% or better at full speed and load. An internally mounted AC line reactor (5% impedance for 60 HP & less, 3% impedance for greater than 60 HP) and DC choke shall be provided to reduce input current harmonic content, provide protection from power line transients

such as utility power factor correction capacitor switching transients and reduce RFI emissions.

2. The overvoltage trip level shall be a minimum of 30% over nominal, and the undervoltage trip level shall be a minimum 35% under the nominal voltage.
3. Output voltage and current ratings shall match the adjustable frequency operating requirements of standard NEMA design A or NEMA design B motors. The overload current capacity shall be 110% of rated current for one (1) minute out of five (5). Output frequency shall be adjustable between 0Hz and 300Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation. The drive's switching pattern shall be continually adjusted to provide optimum motor flux and avoid the high-pitched audible noise produced by motors energized by conventional PWM drives. The drive shall be furnished in a UL Type 1 listed enclosure rated for operation at ambient temperatures between 0 and 40C at an altitude not exceeding 3300 feet, with relative humidity less than 95% and no condensation allowed. The drive shall be protected from atmospheric contamination by chemical gasses and solid particles per IEC 721-3-3, classes 3C2 and 3S2. The drive shall be protected from vibration per IEC 68-2-6 (max. sinusoidal displacement 1 mm, 5Hz to 13.2Hz and max. acceleration 7m/s², 13.2Hz to 100Hz).
4. Unit shall operate at full capacity at 3300 ft elevation from 5F to 104F non condensing and shall operate up to 122F with 10% derated capacity. Permissible storage and transportation conditions shall be -40 to 158F.

E. Control Functions and Adjustments

1. An intelligent start-up assistant shall be provided as standard. The Start-up assistant will guide the user through all necessary adjustments to optimize operation and will include "plug and produce" operation, which recognizes the addition of options/fieldbus adapters and provides the necessary adjustment assistance.
2. Start-up data entries shall include motor nameplate power, speed, voltage, frequency and current.
3. A motor parameter ID function shall automatically define the motor equivalent circuit used by the sensorless vector torque controller.
4. A PID speed/torque loop regulator shall be provided with an autotune function as well as manual adjustments.
5. A selection of six (6) preprogrammed application macro parameter sets shall be provided to minimize the number of different parameters to be set during start-up. Macros included as standard are as follows: Factory Default, Hand/Auto, PID Control, Sequential Control, and Torque Control. A selection of two (2) user defined macros shall also be available.
6. Start/Stop control functions shall include two (2) or three-(3) wire start/stop, coast/ramp stop selections, optional dynamic braking and flux braking.

7. The VFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to reference without safety tripping or component stop a reverse spinning motor prior to ramp.
8. The VFD shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
9. Accel/Decel control functions shall include two (2) sets of ramp time adjustments with linear and three (3) S-curve ramp selections.
10. Speed/Torque control functions shall include:
 - a. Adjustable min./max. speed and/or torque limits
 - b. Selection of up to 15 preset speed settings or external speed control
 - c. Three (3) sets of critical speed lockout adjustments.
 - d. A built-in PID controller to control a process variable such as pressure, flow or fluid level.
 - e. Reference signal processing shall include increase/decrease floating point control and control of both speed/torque and direction using a "joystick" reference signal. Two (2) analog inputs shall be programmable to form a reference by addition, subtraction, multiplication, minimum selection or maximum selection.
11. Output control functions shall include:
 - a. Flux optimization to limit the audible noise produced by the motor and to maximize efficiency by providing the optimum magnetic flux for any given speed/torque operating point.
 - b. Current and torque limit adjustments to limit the maximum Drive output current and the maximum torque produced by the motor. These limits shall govern the inner loop torque regulator to provide tight conformance with the limits with minimum overshoot.
 - c. A torque regulated operating mode with adjustable torque ramp up/down and speed/torque limits.
12. The Drive shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
13. The Drive shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.
14. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.

F. Static and Dynamic Performance

1. Open loop static speed regulation shall be 0.1% to 0.3% (10% of motor slip). When motor speed feedback is provided from a suitable encoder, closed loop speed regulation shall be 0.01% or better. Dynamic speed accuracy shall be 0.3-0.4 %-sec or better open loop and 0.1-0.2 %-sec or better-closed loop.

G. Operator Control Panel (Keypad)

1. Each Drive shall be equipped with a front mounted operator control panel (keypad) consisting of a four- (4-) line by 20-character back-lit alphanumeric display and a keypad with keys for Run/Stop, Local/Remote, Increase/Decrease, reset, menu navigation and parameter select/save.
2. All parameter names, fault messages, warnings and other information shall be displayed in complete English words or standard English abbreviations to allow the user to understand what is being displayed without the use of a manual or cross-reference table.
3. Other languages selectable in addition to American English (Am) shall be as follows: English (European), French, Spanish, Portuguese, German, Italian, Dutch, Danish, Swedish, Finnish, Czech and Polish.
4. The Display shall have contrast adjustment provisions to optimize viewing at any angle.
5. The control panel shall include a feature for uploading to the control panel memory and downloading from the control panel to the same drive or to another drive.
6. All Drives throughout the entire power range shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.
7. The keypad is to be used for local HAND control, for setting all parameters, and for stepping through the displays and menus.
8. The keypad shall be removable and insertable under drive power, capable of remote mounting, and shall have it's own non-volatile memory.
9. During normal operation, one (1) line of the control panel shall display the speed reference, and run/stop forward/reverse and local/remote status. The remaining three (3) lines of the display shall be programmable to display the values of any three (3) operating parameters. At least 26 selections shall be available including the following:
 - a. Speed/torque in percent (%), RPM or user-scaled units
 - b. Output frequency, voltage, current and torque
 - c. Input voltage, power and kilowatt hours
 - d. Heat sink temperature and DC bus voltage
 - e. Status of discrete inputs and outputs
 - f. Values of analog input and output signals
 - g. Values of PID controller reference, feedback and error signals
 - h. Control interface inputs and outputs shall include:

H. I/O Capabilities

1. Six (6) discrete inputs, all independently programmable with at least 25 input function selections. Inputs shall be designed for “dry contact” inputs used with either an internal or external 24 VDC source.
2. Three (3) form C relay contact outputs, all independently programmable with at least 30 output function selections. Relay contacts shall be rated to switch 2 Amps at 24VDC or 115/230VAC. Function selections shall include indications that the drive is ready, running, reversed and at set speed/torque. General and specific warning and fault indications shall be available. Adjustable supervision limit indications shall be available to indicate programmed values of operating speed, speed reference, current, torque and PID feedback.
3. Three (3) analog inputs, either 4-20 mADC or 0-10 v dc one (1) +/- 0VAC - 10VAC and two (2) 4mA - 20mA, all independently programmable with at least ten (10) input function selections. A differential input isolation amplifier shall be provided for each input. Analog input signal processing functions shall including scaling adjustments, adjustable filtering and signal inversion. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of the following: (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.
4. Two (2) analog outputs providing 4mA to 20mA signals. Outputs shall be independently programmable to provide signals proportional to at least 12 output function selections including output speed, frequency, voltage, current and power.

I. Serial communications

1. Provide Serial communication interface modules for Bacnet communication protocol. I/O shall be accessible through the serial communications adapter. Coordinate requirements with ATC vendor per Section 23 09 23.
2. Serial communication capabilities shall include, but not be limited to, run-stop control; speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, and accel/decel time adjustments. The drive shall have the capability of allowing the Distributed Drive Controller (DDC) to monitor feedback such as process variable feedback, output speed/frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), relay outputs, and diagnostic warning and fault information. Additionally, remote Local Area Network (LAN) VFD fault reset shall be possible. A minimum of 15 field parameters shall be capable of being monitored. The DDC system shall

be able to monitor if the motor is running in the VFD mode or bypass mode (if bypass is specified) over serial communications.

- J. The drive shall have an RS485 port to interface to a Microsoft Windows-based software which shall be available for drive setup, diagnostic analysis, monitoring and control. The software shall provide real time graphical displays of drive performance.
- K. Protective Functions
 - 1. For each programmed warning and fault protection function, the drive shall display a message in complete English words or Standard English abbreviations. The five (5) most recent fault messages and times shall be stored in the drive's fault history.
 - 2. The drive shall include internal MOV's for phase to phase and phase to ground line voltage transient protection.
 - 3. Output short circuit and ground fault protection rated for 65,000 amps shall be provided per UL508C without relying on line fuses. Motor phase loss protection shall be provided.
 - 4. The drive shall provide electronic motor overload protection qualified per UL508C.
 - 5. Protection shall be provided for AC line or DC bus overvoltage at 130% of maximum rated voltage or undervoltage at 65% of min. rated voltage and input phase loss.
 - 6. A power loss ride through feature will allow the drive to remain fully operational after losing power as long as kinetic energy can be recovered from the rotating mass of the motor and load.
 - 7. Stall protection shall be programmable to provide a warning or stop the drive after the motor has operated above a programmed torque level for a programmed time limit.
 - 8. Underload protection shall be programmable to provide a warning or stop the drive after the motor has operated below a selected underload curve for a programmed time limit.
 - 9. Over-temperature protection shall provide a warning if the power module temperature is less than 5C below the over-temperature trip level.
 - 10. Input terminals shall be provided for connecting a motor thermistor (PTC type) to the drive's protective monitoring circuitry. An input shall also be programmable to monitor an external relay or switch contact (klixon).
- L. Disconnects shall be lockable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Contractor to verify that jobsite conditions for installation meet factory recommended and code required conditions for VFD installation prior to start-up. These shall include as a minimum:
 - 1. Clearance spacing.
 - 2. Temperature, contamination, dust, and moisture of the environment.
 - 3. Separate conduit installation of the motor wiring, power wiring, and control wiring.
- B. The VFD is to be covered and protected from installation dust and contamination until the environment is cleaned and ready for operation. The VFD shall not be operated while the unit is covered.
- C. Do not install controller until building environment can be maintained with the service conditions required by the manufacturer.

3.2 INSTALLATION

- A. The Drive manufacturer shall provide adequate drawings and instruction material to facilitate installation of the Drive by electrical and mechanical trades people employed by others.
- B. Install controller where indicated, in accordance with manufacturer's written instructions and NEMA ICS 3.1. In no case shall the length of wiring from drive to motor exceed 100 ft.
- C. Tighten accessible connections and mechanical fasteners after placing controller.
- D. Install fuses in fusible switches.
- E. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- F. Provide engraved plastic nameplates under the provisions of Section 23 05 53.
- G. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 1.
- B. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.

3.4 MANUFACTURER’S FIELD SERVICES

- A. The manufacturer shall provide start-up commissioning of the variable frequency drive and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. Sales personnel and other agents who are not factory certified technicians for drive field repair shall not be acceptable as commissioning agents.
 - 1. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system. Included in this services shall be (as a minimum):
 - a. Verification of contractor wire terminations to the VFD and its optional circuitry.
 - b. Installation verification for proper operation and reliability of the VFD, the motor being driven, and the building automation system.
 - c. Up to one hour of customer operator training on operation and service diagnostics at the time of the equipment commissioning.
 - d. Measurements for verification of proper operations on each of the following items:
 - 1) Motor voltage and frequency. Verification of proper motor operation.
 - 2) Control input for proper building automation system interface and control calibration.
 - 3) Calibration check for the following set points (and adjustment as necessary) (1) minimum speed, (2) maximum speed, (3) acceleration and deceleration rates.
 - 2. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.

3.5 ADJUSTING

- A. Make final adjustments to installed drive to assure proper operation of fan system. Obtain performance requirements from installer of driven loads.

3.6 CLEANING

- A. Touch up scratched or marred surfaces to match original finish.

3.7 DEMONSTRATION

- A. Provide systems demonstration.
- B. Demonstrate operation of controllers in automatic and manual modes.
- C. The factory shall extend the normal warranty for the Drive with a certified factory start-up.

3.8 PRODUCT SUPPORT

- A. Factory trained application engineering and service personnel that are thoroughly familiar with the Drive products offered shall be locally available at both the specifying and installation locations.

END OF SECTION 230504

PART 1 - GENERAL**1.1 DESCRIPTION OF WORK:**

- A. Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-23 sections. The contractor is to coordinate the locations and color of all markers with the engineer and the owner prior to beginning the work.
- B. Types of identification devices specified in this section include the following.
 - 1. Plastic Pipe Markers
 - 2. Pipe Stencils
 - 3. Plastic Tape
 - 4. Valve Tags
 - 5. Valve Schedule Frames
 - 6. Engraved Plastic-Laminate Signs
 - 7. Plastic Equipment Markers
 - 8. Plasticized Tags
 - 9. Ceiling Stickers
- C. Mechanical identification furnished as part of factory-fabricated equipment, is specified as part of equipment assembly in other Division-23 sections.

1.2 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards: ANSI Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- C. Owner Coordination: Coordinate and comply with owner's existing identification nomenclature.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.
- B. Schedules: Submit valve schedule for each piping system, typewritten and reproduced on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on tag), location of valve (room or space), and variations for identification (if any). Mark valves which are intended for emergency

shut-off and similar special uses, by special "flags", in margin of schedule. In addition to mounted copies, furnish extra copies for Maintenance Manuals as specified in Division 1.

- C. Maintenance Data: Include product data and schedules in maintenance manuals; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering mechanical identification materials which may be incorporated in the work include; but are not limited to, the following:

1. Allen Systems, Inc.
2. Brady (W.H.) Co.; Signmark Div.
3. Industrial Safety Supply Co., Inc.
4. Seton Name Plate Corp.

2.2 MECHANICAL IDENTIFICATION MATERIALS:

- A. General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.3 PIPING SYSTEM IDENTIFICATION:

- A. All piping shall be identified with stenciling or self-adhesive pipe markers complying with ASME A13.1. Identification shall specify piping system and direction of flow. Piping shall be identified at a minimum of 10' intervals and at every transition, each side of wall and floor penetrations and branch connections. Identification and lettering shall be oriented to be easily observable from normal viewing locations. Piping systems shall utilize the following for system identification:

Piping System	Stencil Identification
Chilled Water Return	CHWR
Chilled Water Supply	CHWS
Hot Water Return	HWR

Piping System	Stencil Identification
Hot Water Supply	HWS

- B. Provide ½" color tape labels on grid ceiling to identify Hot Water System components as indicated.

Hot Water System	Orange label with Lettering
Pipe Drain	DR
Pipe Vent	V
Control Valve	CV
Balancing Valve	BV
VAV Box	VAV
Unit Heater	UH
Shutoff Valve	SHTV

- C. Provide ½" color tape labels on grid ceiling to identify Chilled Water System components as indicated.

Chilled Water System	Dark Blue Dot with Lettering
Pipe Drain	DR
Pipe Vent	V
Control Valve	CV
Balancing Valve	BV
Shutoff Valve	SHTV

2.4 **ENGRAVED PLASTIC-LAMINATE SIGNS:**

- A. General: Provide engraving stock, melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated. Engrave with engraver's standard letter style of the sizes and wording indicated with black letters on light contrasting background except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5 **PLASTIC EQUIPMENT MARKERS:**

- A. General: Provide manufacturer's standard laminated plastic, color coded equipment markers. Conform to the following color code or that approved by the owner.
 - 1. Green: Supply system equipment and components.
 - 2. Yellow: Outside air equipment and components.
 - 3. Blue: Relief air equipment and components.
 - 4. Red: Exhaust equipment and components.
 - 5. Black: Equipment and components that do not meet any of the above criteria.
- B. For hazardous equipment, use colors and designs recommended by ANSI A13.1.
- C. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - 1. Name and plan number.
 - 2. Equipment service.
- D. Size: Provide approximate 2-1/2" x 4" markers for control devices, dampers, and valves; and 4-1/2" x 6" for equipment.

2.6 **PLASTICIZED TAGS:**

- A. General: Manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matt finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording (as examples; DANGER, CAUTION, DO NOT OPERATE).

2.7 **LETTERING AND GRAPHICS:**

- A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.
- B. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples; Boiler No. 3, Air Supply No. 1H, Standpipe F12).

PART 3 - EXECUTION

3.1 **GENERAL INSTALLATION REQUIREMENTS:**

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished

mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 MECHANICAL EQUIPMENTS IDENTIFICATION:

- A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
 - 1. Pumps: provide plastic nameplates.
 - 2. Thermostats-relate to associated terminal units with plastic nameplates.
- B. Optional Sign Types: Where lettering larger than 1" height is needed for proper identification, because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved plastic, at Installer's option.
- C. Lettering Size: Minimum 1/4" high lettering for name of unit where viewing distance is less than 2'-0", 1/2" high for distances up to 6'-0", and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.
- D. Text of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicated safety and emergency precautions, and warn of hazards and improper operations.
- E. Optional Use of Plasticized Tags: At Installer's option, where equipment to be identified is concealed above acoustical ceiling or similar concealment, plasticized tags may be installed within concealed space to reduce amount of text in exposed sign (outside concealment).
- F. Operational valves and similar minor equipment items locate in non-occupied spaces may, at Installer's option, be identified by installation of plasticized tags in lieu of engraved plastic signs.

3.3 ADJUSTING AND CLEANING:

- A. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.
- B. Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION 230553

PART 1 GENERAL**1.1 SECTION INCLUDES**

- A. This section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and recording and reporting the results.
- B. Test, adjust, and balance the following mechanical systems:
 - 1. Hydronic systems.
- C. Verify and measure final operating conditions of HVAC systems.
- D. This section does not include:
 - 1. Testing boilers and pressure vessels for compliance with safety codes.
 - 2. Specifications for materials for patching mechanical systems.
 - 3. Specifications for materials and installation of adjusting and balancing devices. If devices must be added to achieve proper adjusting and balancing, refer to the respective system sections for materials and installation requirements.

1.2 DEFINITIONS

- A. System testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
 - 1. The balance of air and water distribution.
 - 2. Adjustment of total system to provide design quantities.
 - 3. Electrical measurement.
 - 4. Verification of performance of all equipment.
- B. Test: To determine quantitative performance of equipment.
- C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

- D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.
- E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.
- F. Report Forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.
- G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.
- H. Main: Duct or pipe containing the system's major or entire fluid flow.
- I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.
- J. Branch Main: Duct or pipe serving two or more terminals.
- K. Branch: Duct or pipe serving a single terminal.

1.3 **QUALITY ASSURANCE**

- A. Agency Qualifications:
 - 1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and recording and reporting the results.
 - 2. The independent testing, adjusting and balancing agency shall be certified by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project and shall have at least one individual on staff certified by AABC or NEBB as a Test and Balance Engineer (TBE).
- B. Codes and Standards: Comply with the following:

1. AABC - National Standards for Total System Balance.
2. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.
3. NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.

C. Supplemental Requirements:

1. The T&B contractor shall maintain logs, in a form acceptable to the engineer, to demonstrate that at least 50% of the measurements used in the Test and Balance procedures were made while an individual certified by AABC or NEBB as a Test and Balance Engineer was on the job site.
2. All T&B shall be performed to AABC and NEBB least energy guidelines. Critical branch shall be not less than 90% open. Critical path shall be hilited on T&B reports.

1.4 **SCHEDULE**

- A. Final Test and Balance reports for both air and water systems are considered life safety items. Final T & B Reports shall be completed, reviewed and approved by the Engineer prior to scheduling a Final Inspection. Any pre-final draft is not acceptable.

1.5 **SUBMITTALS**

- A. Agency Data: Submit name of and proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified.
- B. Engineer and Technicians Data: Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified.
- C. Procedures and Agenda: Prior to commencing work, submit a synopsis of the testing, adjusting, and balancing procedures equipment and agenda proposed to be used for this project.
- D. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- E. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

- F. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Mechanical General Requirements.
- G. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.
- H. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the system are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:
1. Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be handwritten, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
 2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit [2] complete sets of final reports to be included in the project O & M manuals. Coordinate with requirements of Mechanical General Requirements.
 3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
 - a. Index
 - b. General Information and Summary
 - c. Air Systems
 - d. Temperature Control Systems
 - e. Special Systems
 - f. Sound and Vibration Systems
 4. Report Contents: Provide the following minimum information, forms and data:

- a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Professional, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
- b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets. Indicate final thermostat locations.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Mechanical General Requirements.
- B. Record actual locations of flow measuring stations, balancing valves, and rough setting.
- C. Pre-Balancing Conference.
- D. Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Professional and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.7 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.
- B. Test, adjust, and balance the air systems before hydronic systems.

PART 2 PRODUCTS – This application not used.

PART 3 EXECUTION

3.1 CONTRACTOR COOPERATION

- A. Mechanical contractor shall cooperate with the balancing firm to:
1. Provide sufficient time before completion date so that balancing can be accomplished.
 2. Provide immediate labor and tools to make corrections without delay.
 3. Place heating, ventilating and air conditioning systems and equipment into full operation and continue the operation for each working day of testing and balancing.
 4. Provide approved shop drawings to testing and balancing firm and advise them of changes made to the system during construction.
 5. Install required test holes complete with removable and replaceable plugs.
 6. Make necessary revisions to controls, dampers, fan and pump drives and consult with equipment manufacturers as required to achieve the specified system's performance.
 7. Provide ladders, scaffolds, tools and labor to assist the work of the balancing firm, including removing ceiling tiles, guards, adjusting pulleys, belts; replace when finished.
 8. Control manufacturer shall work with the balancing firm when setting damper linkages and minimum outside air dampers. The control manufacturer shall be available for readjusting of dampers or controls that are not properly calibrated.
 9. Set pressure regulating, automatic fill and reducing valves to operating and code conditions.
 10. Check and set relief and safety valves to code requirements.
 11. Clean strainers. Check air filters immediately prior to air balancing.
 12. Open fire dampers.
 13. Variable pitch pulleys supplied on 20 HP motors and larger shall be changed to fixed pulleys after the air balance is completed. Provide such pulleys.
 14. Lubricate all motors and bearings.

3.2 EXAMINATION

- A. The TAB agency shall review contract documents in detail within 30 days of notice to proceed and advise the professional where additional balancing devices or other modifications are required.
- B. Contractor shall cooperate with the balancing firm to:
1. Systems are started and operating in a safe and normal condition.

2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Hydronic systems are flushed, filled, treated and vented.
 13. Pumps are rotating correctly.
 14. Proper strainer baskets are clean and in place.
 15. Service and balance valves are open.
- C. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
- D. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations.
1. Make instruments available to Professional to facilitate spot checks during testing.

3.4 PRELIMINARY PRODECURES FOR HYDRONIC SYSTEM BALANCING

- A. Before operating the system perform these steps:
1. Open valves to full open position. Close coil bypass valves.
 2. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
 3. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
 4. Set temperature controls so all coils are calling for full flow.
 5. Check operation of automatic bypass valves.
 6. Check to set operating temperatures of chillers to design requirements.

3.5 INSTALLTION TOLERANCES

- A. Hydronic Systems: Adjust to within plus or minus 10% of design.

3.6 MEASUREMENTS

- A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
- B. Provide instruments meeting the specifications of the referenced standards.
- C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.
- D. Apply instrument as recommended by the manufacturer.
- E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.
- F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5%. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.
- G. Take all reading with the eye at the level of the indicated value to prevent parallax.
- H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.
- I. Take measurements in the system where best suited to the task.

3.7 PERFORMING TESTING, ADJUSTING AND BALANCING

- A. General: Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
 - 1. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
 - 2. Patch insulation, ductwork, and housings, using materials identical to those removed.

3. Seal holes in ducts and piping, relating to TAB procedures, and test for and repair leaks.
4. Seal insulation to re-establish integrity of the vapor barrier.
5. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
6. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

B. Adjusting:

1. Ensure recorded data represents actual measured or observed conditions.
2. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
3. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
4. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
5. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
6. Check and adjust systems approximately six months after final acceptance and submit report.

C. Water System Procedure:

1. Adjust water systems to provide required or design quantities.
2. Use calibrated balancing valves, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
3. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
4. Effect system balance with automatic control valves fully open to heat transfer elements.
5. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

6. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

D. Hydronic Coil Procedure

1. Follow air and water balancing procedures.
2. Perform an energy balance for each coil, with total air energy + or - 10% of total water energy.

3.8 RECORD AND REPORT DATA

- A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.
- B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.9 ACCEPTANCE

- A. At the completion of balancing procedures, allow for a minimum of two days for the Professional to witness test procedures and conduct operational tests.
- B. Mechanical systems shall not be considered ready for final inspection until balancing results acceptable to the Professional are obtained.
- C. If it is found that the specified air flows cannot be achieved on portions of the system, the actual conditions shall be reported to the Professional for consideration of corrective action before continuing the balancing procedure.
- D. If measured flow at final inspection shows deviation of 10% or more from the certified report listings for more than 10% of selected areas, the report shall be rejected.
- E. If report is rejected, systems shall be rebalanced, and a new certified report submitted.

3.10 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 1. HVAC Pumps
 2. Air Coils

3. Terminal Heat Transfer Units
4. Existing Boilers
5. Existing Chiller

B. Report Forms

1. Title Page:
 - a. Name of Testing, Adjusting and Balancing Agency
 - b. Address of Testing, Adjusting and Balancing Agency
 - c. Telephone number of Testing, Adjusting and Balancing Agency
 - d. Project Name
 - e. Project Location
 - f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Report Date
2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flow to indicate amount of building pressurization
 - e. Nomenclature used throughout report
 - f. Test conditions
3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model Number
 - d. Serial Number
 - e. Range
 - f. Calibration Date
4. Electric Motors:
 - a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP
 - d. Phase, voltage, amperage, nameplate, actual, no load
 - e. RMP
 - f. Service Factor
 - g. Starter size, rating, heater elements
 - h. Sheave make/size/bore
5. V-Belt Drive:
 - a. Identification/Location
 - b. Required drive RPM
 - c. Driven sheave, diameter and RPM
 - d. Belt, size and quality

- e. Motor sheave diameter and RPM
- f. Center to distance, maximum, minimum and actual
- 6. Cooling Coil Data:
- 7. Heating Coil Data:
- 8. Air Moving Equipment:
 - a. Location
 - b. Manufacturer
 - c. Model Number
 - d. Serial Number
 - e. Arrangement/Class/Discharge
 - f. Air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Sheave Make/Size/Bore
 - m. Number of Belts/Make/Size
 - n. Fan RPM
- 9. Return Air/Outside Air Data:
 - a. Identification/Location
 - b. Design air flow
 - c. Actual air flow
 - d. Design return air flow
 - e. Actual return air flow
 - f. Design outside air flow
 - g. Actual outside air flow
 - h. Return air temperature
 - i. Outside air temperature
 - j. Required mixed air temperature
 - k. Actual mixed air temperature
 - l. Design outside/return air ratio
 - m. Actual outside/return air ratio
- 10. Exhaust Fan Data:
 - a. Location
 - b. Manufacturer
 - c. Model Number
 - d. Serial Number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make Size
 - k. Fan RPM
- 11. Duct Traverse:

- a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor
12. Hydronic Flow Measuring Station:
- a. Identification/Number
 - b. Location
 - c. Size
 - d. Manufacturer
 - e. Model Number
 - f. Serial Number
 - g. Design flow rate
 - h. Design pressure drop
 - i. Actual/final pressure drop
 - j. Actual/final flow rate
 - k. Station calibrated setting
13. Terminal Unit Data:
- a. Manufacturer
 - b. Type, constant, variable, single, dual duct
 - c. Identification/Number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Inlet static pressure
14. Air Distribution Test Sheet:
- a. Air terminal number
 - b. Room number/Location
 - c. Terminal Type
 - d. Terminal Size
 - e. Area factor
 - f. Design velocity
 - g. Design air flow
 - h. Test (final) velocity
 - i. Test (final) air flow
 - j. Percent of design air flow

3.11 DEMONSTRATION

- A. At the request of the design Professional, the TAB Contractor shall repeat the balancing procedure for any system or portion of a system in the presence of the Professional and Owner's representative.

END OF SECTION 230593

PART 1 GENERAL**1.1 DESCRIPTION OF WORK**

- A. Contractor shall examine the existing buildings, the drawings and these specifications with their provisions regarding the removal of existing items and work. It is not the intent herein to fully describe all the items and work to be removed, demolished, cut, patched, or altered under this section. The Contractor shall assure themselves that all of the work required to be removed, demolished, cut, patched or altered for the full completion of the project shall be included at no additional cost to the Owner.
- B. Scope: Without limiting the volume of work and strictly for the Contractor's convenience demolition includes but is not necessarily limited to the removal and subsequent offsite disposal of the following:
 - 1. General Construction: Portions of walls, floors and roofing indicated on drawings and as required to accommodate new HVAC construction.
 - 2. HVAC Construction: Removal of indicated existing equipment, ductwork, piping and controls.

PART 2 PRODUCTS (NOT APPLICABLE)**PART 3 EXECUTION****3.1 INSPECTION**

- A. Prior to commencement of demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure, surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from demolition work; file with Owner's Representative prior to starting work.

3.2 PREPARATION

- A. Locate, identify, stub off and disconnect utility services that no longer in service and are not indicated to remain.
- B. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shut-down of service is necessary during change-over.

3.3 DEMOLITION

- A. Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations. Refer to the drawings for any defined construction phasing plan. The contractors are required to perform their demolition and/or temporary service tie-in installations in accordance with the progress of the project with minimum disruption to areas outside the construction boundary.
- B. In areas where existing surfaces and structures are to remain, all mechanical equipment and materials designated for removal shall be disassembled where possible and neatly cut where necessary to avoid damaging surfaces and structures. Where damage to existing surfaces and structures occur, the contractor shall be responsible for repairs using proper materials as specified in other sections of this specification and as directed by the Professional.
- C. All demolished materials and equipment not designated to be turned over to the Owner or retained for reuse shall become the property of the Contractor. The contractor shall legally dispose of these materials and equipment off site in accordance with the applicable requirements of local, state and federal authorities having jurisdiction. All equipment to be reused is to be cleaned and repaired to like new condition prior to re-installation.
- D. Removals shall be complete and shall include all attachments, brackets, hangers, clamps, hardware, bolts, and screws. Cast in place and expanded anchors do not need to be removed where they are flush with the surface, but protruding studs shall be cut off flush.
- E. Where equipment to be removed is on pads and pads are not specifically noted to be reused, pads are to be removed.
- F. Where removals disrupt service to existing piping, ductwork and equipment which is to remain, the Contractor shall restore service to the remaining equipment and outlets using the construction methods and materials permitted or required by the appropriate sections of this specification.

3.4 ITEMS TO REMAIN PROPERTY OF OWNER

- A. All items as noted on drawings shall be carefully removed, protected, and turned over to the Owner in the condition which existed prior to their removal.
- B. The Owner may mark items on site for field salvage which are not designated on drawings. Cooperate with Owner to salvage these items.

3.5 COORDINATION WITH ASBESTOS ABATEMENT

- A. There are no known Asbestos Containing Materials (ACM) to be disturbed by this project.
- B. Notwithstanding lack of known ACM, if any material is encountered which the contractor believes may be hazardous immediately stop work, secure the area and notify Engineer and Owner's Representative.

3.6 ITEMS TO BE REUSED

- A. All items noted to be reused are to be repaired and cleaned to like new condition prior to re-installation. The items are to be carefully stored by the contractor until they are needed.

END OF SECTION 230599

PART 1 - GENERAL**1.1 SECTION INCLUDES**

- A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct fabrication and installation of thermal insulation applied to the piping, equipment, and duct systems indicated on the Drawings and specified herein.
- B. Types of mechanical insulation specified in this section include the following for piping and ductwork:
 - 1. Fiberglass
 - 2. Flexible Unicellular
 - 3. Rigid Polyisocyanurate
- C. Certain equipment and/or systems to be factory insulated by manufacturer. Factory insulation materials are to be as specified in applicable sections of the specifications.

1.2 QUALITY ASSURANCE

- A. Insulation materials, including all weather and vapor barrier materials, closures, hangers, supports, fitting covers, and other accessories, shall be furnished and installed in strict accordance with project drawings and specifications by skilled workers who have at least five years of successful experience in commercial insulation work.
- B. All insulation work shall comply with the following codes and standards:
 - 1. Certify that all insulation meets the minimum requirements of the current State Energy Code for New Building Construction.
 - 2. NAIMA Insulation Standards
 - 3. ASTM E-84
 - 4. NFPA 255
 - 5. UL 723
 - 6. NFPA 90A
 - 7. NFPA96
- C. Thermal insulation materials shall meet the property requirements of the following specifications as applicable to the specific product or use:

1. American Society for Testing of Materials Specifications:
 - a. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - b. ASTM C585 - Recommended Practice for Inner and Outer Diameters of Rigid Pipe Insulation for Nominal Sizes of Pipe and Tubing (NPS System)".
 - c. ASTM C591 – “Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation”.
 - d. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
 - e. ASTM C1136 – “Standard Specification for Barrier Material, Vapor”, Type 1 or 2 (jacket only)”.
 - f. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
 - g. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

D. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 method.

1. Exception: Mechanical insulation where specifically called out in this specification may have flame spread index of 75 and smoke developed index of 450.
2. Insulation jacket for duct, pipe, and equipment exposed to weather to be certified as self-extinguishing in less than 53 seconds when tested in accordance with ASTM D1692.

E. Insulation exposed to view shall have a well-tailored appearance.

1.3 REFERENCE STANDARDS

A. The following industry standards form a part of these specifications by mention herein.

1. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]).
3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.

4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
5. ASTM C240 - Standard Test Methods of Testing Cellular Glass Insulation Block.
6. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
7. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
8. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
11. NAIMA National Insulation Standards.
12. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
13. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 DEFINITIONS

- A. Thermal resistance of “R” values are expressed in units of “Hours-Degrees F-sq. ft/Btu per inch of Thickness” on a flat surface at a mean temperature of 75 degrees F unless noted otherwise.
- B. Thermal conductivity (K), the reciprocal of “R”, $\text{btu/hr/ft}^2/\text{degree}$.
- C. Insulation to consist of insulating material, jacket, mastic, and adhesive, either as a “system” or as an individual component when used separately.

1.5 SUBMITTALS

- A. Product data: Submit manufacturer’s technical product data for each type of mechanical insulation. Submit schedule showing manufacturer’s product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.

1.6 DELIVERY AND STORAGE OF MATERIALS

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The contractor shall use whatever means are necessary to protect the insulation

materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials installed by other trades.

- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation when fully dried out (either before installation, or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.

PART 2 - PRODUCTS

2.1 PIPING INSULATION MATERIALS

- A. General: Molded pipe insulation shall be manufactured to meet ASTM C 585 for sizes required in the particular system. It shall be of a type suitable for installation on piping systems, including fittings and valves. Fitting insulation to be of same thickness and material as adjoining pipe insulation.
- B. TYPE A – FIBERGLASS:
 - 1. Insulation: ASTM C547 and ASTM C795; rigid molded or semi flexible, noncombustible with the following characteristics:
 - a. 'K' value: ASTM C177, 0.24 Btu-in/hr-ft²-F at 75 degrees F.
 - b. Maximum service temperature: 850degrees F.
 - c. Maximum moisture absorption: 0.2 percent by volume.
 - d. White All service jacket with Self-sealing lap.
 - e. Manufacturer's data regarding thickness constraints in relation to operating temperature shall be followed.
 - f. When multiple layers are required, all inner layer(s) shall beunjacketed.
 - g. Subject to compliance with requirements, acceptable manufacturers include:
 - (i) CertainTeed
 - (ii) Knauf
 - (iii) Owens Corning
 - (iv) Schuller
- C. TYPE D – RIGID POLYISOCYANURATE FOAM:
 - 1. Rigid closed-cell polyisocyanurate thermal insulation bunstock, fabricated into shapes required to insulate pipe, valves, fittings, vessels, and /or special shapes. Installation of insulation shall be in strict accordance with

- manufacturer's published guidelines.
2. Polyiso material shall not be produced with, or contain, any of the United States EPA regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program. Insulation shall meet the requirements of ASTM C-591, type I Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 3. Product shall meet 75/450 flame-smoke spread rating.
 4. 'K' value: 0.19 BTU-in/hr-ft² - °F at 75°F and 180 days aging.
 5. Minimum service temperature: -320 degrees F.
 6. Maximum service temperature: 300degrees F.
 7. Density: not less than 2.0 pounds per cubic foot.
 8. Water absorption based on 96 hr immersion test shall be no more than 2% by volume.
 9. Water vapor permeability shall be no more than 4 perm-inch.
 10. Connection: Waterproof vapor barrier adhesive.
 11. Subject to compliance with requirements, acceptable manufacturers include:
 - a. Dow "TRYMER 2000" with Saran" vapor retarder film jacketing and tape.
 - b. Dyplast Products, dP-ISO.
 - c. EXTOL, "HiTherm HT-300".
 12. Cover pipe, valves and fitting insulation with the following finishes: Straight pipe – All service jacket with self-seal lap; valves and fittings – preformed PVC (polyvinylchloride) jacketing, 0.020 inch thick. The following PVC meets 25/50 rating to ASTM E-84:
 - a. Proto, LoSmoke 20-mil Proto-Jac
 - b. Manville, Zeston 2000 20-mil
 - c. CEEL-Co, CEEL-Tite 320

D. TYPE E – FLEXIBLE UNICELLULAR FOAM PIPING INSULATION:

1. Insulation: ASTM C534; flexible, unicellular elastomeric, molded slit tubing, or sheet.
2. 25 flame spread and 50 smoke development ratings.
3. 'K' value: ASTM C177; 0.27 at 75 degrees F.
4. Minimum service temperature: -40 degrees F.
5. Maximum service temperature: 220 degrees F.
6. Maximum moisture absorption: ASTM D1056; 3.0 percent by volume (Pipe), 6.0 (sheet).
7. Moisture vapor transmission: ASTM E96; 0.17 perm-inches.
8. Butt joints: Neoprene contact adhesive.
9. Provide all insulation exposed to weather with two coats of water based latex enamel as recommended by insulation manufacturer.
10. Subject to compliance with requirements, acceptable manufacturers include:
 - a. Armstrong Armaflex
 - b. Rubatex

E. Jackets for Piping Insulation:

1. Provide Manufacturer's standard white craft jacket unless indicated elsewhere in this specification. Provide canvas jacket in mechanical rooms and all other locations where exposed to view. Provide PVC plastic fitting covers wherever white kraft or canvas jackets are specified.
 - a. Shall comply with requirements of ASTM C 921.
 - b. Use vapor barrier type for piping with temperatures below ambient, vapor permeable type allowable for piping with temperatures above ambient or where closed-cell, non-permeable insulation is used. Vapor barrier type may be used for all piping at Installers option.
 - c. Provide aluminum jackets in addition to white kraft or canvas jacket for all exterior applications and to 10 feet above finished floor in mechanical equipment rooms.
 - d. Jackets are not required for insulation type "E".
2. PVC Plastic. Provide PVC jackets where specifically noted on the drawings, or where indicated elsewhere in this specification.
 - a. Jacket: ASTM D1784, one-piece molded type fitting covers and sheet material, white color.
 - b. Minimum service temperature: 0 degrees F.
 - c. Maximum service temperature: 150degrees F.
 - d. Moisture vapor transmission: ASTM E96; 0.002 perm-inches.
 - e. Thickness: 15 mil.
 - f. Connections: Brush on welding adhesive or pressure sensitive color matching vinyl tape.
 - g. Subject to compliance with requirements, acceptable manufacturers include:
 - (i) Ceel-Co
 - (ii) Proto Corp.
 - (iii) Exact-Fit
 - (iv) Speedline
3. Canvas Jacket: UL listed. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.
4. Aluminum Jacket: ASTM B209 or ASTM B209M.
 - a. Thickness: 0.016 inch.
 - b. Finish: Embossed.
 - c. Joining: Longitudinal slip joints and 2 inch.
 - d. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - e. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum or 0.010 thick stainless steel.
 - f. Subject to compliance with requirements, acceptable manufacturers include:
 - (i) Proto
 - (ii) Ceel-Co
 - (iii) Pabco
 - (iv) RPR Products
 - (v) Childers

- F. Staples, Bands, Wires: As recommended by insulation manufacturer for applications indicated.
- G. Adhesives, Sealers, Cement and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
 - 1. Subject to compliance with requirements, acceptable manufacturers include: Foster, Childers, 3M, Marathon, Pittsburgh Corning, Vimasco.

2.2 MATERIALS FOR FITTINGS AND VALVES

- A. Provide factory pre-molded one-piece PVC insulated fitting covers, precut insulation inserts and installation materials for the following services:
 - 1. All pipe fittings and valves.
 - 2. All grooved coupling installations.
 - 3. Hot surfaces; apply with stainless steel tacks or staples or draw bands.
 - 4. Cold surface; use 2" wide, 10 mil vapor barrier tape furnished by manufacturer of jacket or vapor barrier mastic and drawbands. Do not puncture vapor barrier with tacks or staples.
- B. Materials to be equal to be Foster Seaglass PVC fitting cover, UNI-Fit inserts and accessories, or equivalent by Molded Acoustical Products, Inc., Hamfab, Zeston division of Mansfield; or Armstrong Products.

2.3 EQUIPMENT INSULATION MATERIALS

- A. General: Vessels, tanks, and equipment operating at temperatures up to 450°F shall be insulated with glass fiber or closed cell foam insulation selected to conform readily to the surface to which it will be applied.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- B. Verify that all materials and accessories can be installed in accordance with project drawings and specifications and material manufacturer's recommendations.
- C. Verify by inspecting product labeling, submittal, data, and/or certifications which may accompany the shipments that all materials and accessories to be installed on the project comply with applicable specifications and standards and meet specified thermal and physical properties

3.2 PREPARATION

- A. All pipe, ductwork and equipment surfaces over which insulation is to be installed shall be clean and dry when insulation is applied.
- B. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation.
- C. Ensure that pressure testing of piping or duct systems has been completed prior to installing insulation. Ensure that all seams and joints in ductwork have been sealed by the contractor responsible for the ductwork.
- D. All adhesives, cements and mastics to be compatible with materials applied without attacking materials in either wet or dry state.

3.3 INSTALLATION OF PIPE INSULATION

- A. General: Install insulation products in accordance with manufacturer's written instructions and NAIMA National Insulation Standards to ensure that insulation serves its intended purpose.
- B. Install insulation on systems subsequent to installation of heat tracing, painting, testing and acceptance of tests.
- C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. In exposed areas, orient and cover seams in least visible locations.
- D. Clean and dry surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
- E. For insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
 - 3. For hot piping conveying fluids 160 degrees F or less, do not insulate flanges and unions at equipment, and bevel and seal ends of insulation.
 - 4. For hot piping conveying fluids over 160, insulate flanges and unions at equipment.
- F. For insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive

- adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe and cover with PVC fitting covers.
 3. Maintain integrity of vapor-barrier jackets on insulation, and protect to prevent puncture, tears, or other damage.
 4. All valve stems must be sealed with caulking that allows free movement of the stem but provides a seal against moisture incursion.
- G. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
1. Exception: Do not insulate valves in systems operating above 60 degrees F and where installed in valve boxes outdoors. Paint valves with a rust-resistant product equivalent to Rustoleum.
- H. Fittings and valves shall be insulated with pre-formed fittings, fabricated sections of pipe insulation of same material as pipe insulation, fiberglass pipe and tank insulation, fiberglass blanket insulation, or insulating cement. Thickness shall be equal to adjacent pipe insulation. Finish shall be with pre-formed PVC fitting covers or as otherwise specified on contract drawings. Miter cutting of pipe insulation is acceptable for fittings provided that it is neatly and accurately done with no less than 4 miter sections per 90 degree elbow.
1. Flanges, couplings and valve bonnets shall be covered with an oversized pipe insulation section sized to provide the same insulation thickness as on the main pipe section. An oversized insulation section shall be used to form a collar between the two insulation sections with low density blanket insulation being used to fill gaps. Jacketing shall match that used on straight pipe sections. Rough cut ends shall be coated with a suitable weather or vapor resistant mastic as dictated by the system location and service.
 2. On hot systems where fittings are to be left exposed, insulation ends should be beveled away from bolts for easy access.
 3. On cold systems (below ambient temperature), particular care must be given to vapor sealing the fitting cover or finish to the pipe insulation vapor barrier
- I. Extend insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
- J. All final pipe insulation ends shall be tapered and sealed regardless of service.
- K. All piping shall be supported in such a manner that neither the insulation or the vapor/weather barrier is compromised by the hanger or the effects of the hanger. In all cases, hanger spacing must be such that the circumferential joint may be made outside the hanger. On cold systems, vapor barrier must be continuous, including material covered by the hanger saddle.
1. For hot or cold piping systems, operating at temperatures less than +200°F and insulated with low density insulation, shields as above and high density

inserts such as cellular glass foam with sufficient compressive strength shall be used to support the weight of the piping system. At temperatures exceeding +200°F, Calcium Silicate pipe insulation shall be used for high density inserts.

- a. Insert location: Between support shield and piping and under the finish jacket.
 - b. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - c. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.
2. Where pipe shoes and roller supports are required, insulation shall be inserted in the pipe shoe to minimize pipe heat loss. Where possible, the pipe shoe shall be sized to be flush with the outer pipe insulation diameter.
 3. Thermal expansion and contraction of the piping and insulation system can generally be taken care of by utilizing double layers of insulation and staggering both longitudinal and circumferential joints. Where long runs are encountered, expansion joints may be required where single layers of insulation are being used and should be so noted on the contract drawings.
 4. On vertical runs, insulation support rings shall be used.
- L. Pipe exposed in Mechanical Equipment and Boiler Rooms or Finished Spaces: Finish with 8 oz. canvas jacket sized for finish painting.
- M. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with 0.016" aluminum jacket equivalent to Childers and cover fittings with factory formed covers equivalent to Elljacs.
- N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like materials, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Coordinate with heat trace installer for access points and to match insulation joint lengths with maximum length of heat trace allowable (to limit future insulation removal for heat tape repair/replacement).

3.4 INSTALLATION OF EQUIPMENT INSULATION

- A. Factory Insulated Equipment: Do not insulate.
- B. Finish insulation at supports, protrusions, and interruptions.
- C. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands as appropriate. Coat insulated surfaces on equipment with layer of insulating cement, troweled in workmanlike manner, leaving smooth

continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities. On cold equipment, use vapor barrier cement.

1. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gaping joints and excessive voids resulting from poor workmanship
- D. Do not apply insulation to equipment, breechings, or stacks while hot.
 - E. Apply insulation using staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.
 - F. Areas left uninsulated: Items such as boiler manholes, handholes, clean-outs, ASME stamp, and manufacturer's nameplates, may be left uninsulated unless omitting insulation would cause a condensation problem. When such is the case, appropriate tagging shall be provided to identify the presence of these items. Provide neatly beveled edges at interruptions of insulation.
 - G. Provide removable insulation sections to cover parts of equipment that must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.
 - H. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.

3.5 INSTALLATION OF ONE-PIECE PVC INSULATION FITTING COVERS

- A. Pre-molded fitting covers to be precisely cut or mitered to fit or be tucked snugly into the throat of fitting and edges adjacent to pipe covering and taped to form a fully insulated pipe covering.
- B. Use adhesive and/or tape specified for type of insulation to insure a thorough vapor barrier.
- C. Tape ends securely to adjacent pipe covering. Tape to extend over adjacent pipe insulation with an overlap of at least 2-inch on both sides.

3.6 PENETRATION OF RATED WALLS, PARTITIONS & FLOORS

- A. Refer to other Sections on Firestopping. Do not pass pipe insulation through fire rated partitions or floors unless firestopping system is listed for insulated pipe. Stop and properly terminate insulation at each side of partition.
- B. On systems operating below ambient temperature provide insulation compatible with UL listing of firestopping at penetration.
- C. Stop all duct coverings, including jacket and insulation, at fire damper penetrations of walls, floors above grade and roofs.

- D. Stop all duct coverings including jacket and insulation at all penetrations of rated walls and smoke partitions. Flare-out or extend insulation jacket at least 2-inches beyond angle frames of fire dampers and seal to structure.
- E. Maintain vapor barrier.
- F. Install covering over damper and smoke detector access doors readily removable and identifiable.

3.7 PROTECTION AND REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

3.8 SAFETY PRECAUTIONS

- A. Insulation Contractor's employees shall be properly protected during installation of all insulation. Protection shall include proper attire when handling and applying insulation materials, and shall include (but not be limited to) disposable dust respirators, gloves, hard hats, and eye protection.
- B. The insulation contractor shall conduct all job site operations in compliance with applicable provisions of the Occupational Safety and Health Act, as well as with all state and/or local safety and health codes and regulations that may apply to the work.

3.9 FIELD QUALITY ASSURANCE

- A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be done while work is in progress, to assure compliance with requirements herein to cover and protect insulation materials during installation.

3.10 INSULATION REPAIR

- A. Repair damaged sections of mechanical insulation damaged during this construction period, including that damaged during installation of new devices or controls. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

3.11 PIPING SYSTEM INSULATION SCHEDULE

- A. Insulate the following piping systems with material and thickness as scheduled below: (Based on $K=0.27$ BTU-in/hr. ft² F, adjust for other K values)

PIPING SYSTEM TYPES	FLUID TEMP RANGE, °F	INSULATION SPEC. TYPE	PIPE SIZES ^a					
			Runouts up to 1.5" ^b	<1"	1" to 1¼"	1½" to 3"	4" to 6"	8" and up
Heating Water Supply/Return	105-180	A (E) ^a	1.5	1.5	1.5	2	2	2
Chilled Water	40-55	D, E ^a	1.5	1.5	1.5	2	2	2

Notes:

- a. Type E substituted for A & D on Runouts up to 1.5" only.
- b. Runouts not exceeding 12' in length to individual terminal units.

3.12 EQUIPMENT INSULATION SCHEDULE

A. Insulate the following equipment application with material and thickness as scheduled below:

<u>Equipment</u>	<u>Material</u>	<u>Thickness</u>
Air Separator or Surge Tank for HW, CHW Systems	Flexible Unicellular Sheet	2"
Expansion Tank for HW, CHW Systems	Flexible Unicellular Sheet	1"
Pumps for HW, CHW Systems	Flexible Unicellular Sheet	1"

END OF SECTION 230700

PART 1 - GENERAL**1.1 SECTION INCLUDES:**

- A. Pipe and pipe fittings for following services.
 - 1. Heating hot water piping.
 - 2. Chilled water piping.
- B. Valves.
- C. Pipe expansion compensation.

1.2 REFERENCES:

- A. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B31.9 - Building Services Piping.
- D. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc coated Welded and Seamless.
- E. ASTM A234 - Piping Fitting of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- F. ASTM B32 - Solder Metal.
- G. ASTM B88 - Seamless Copper Water Tube.

1.3 GENERAL REQUIREMENTS:

- A. Where more than one piping system material is utilized, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use approved dielectric fittings whenever jointing dissimilar metals in open or closed systems.
- C. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded connections to valve bodies, equipment or other apparatus.

- D. Except where shown otherwise, use ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Use lug type butterfly valves to isolate equipment.
- F. Furnish: Purchase and deliver to the project site complete with every necessary appurtenance and for installation.
- G. Use 3/4 inch ball valve with cap for drains at low points of piping, bases of vertical risers, and at equipment.

1.4 QUALITY CONTROL:

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three year documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum three years documented experience.
- C. Welders: Certify in accordance with ASTM 31.1 and ASME SEC 9. Submit copy of certificate prior to beginning work.

1.5 REGULATORY REQUIREMENTS:

- A. Conform to ASME B31.9 Code for Installation of Piping Systems.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Delivery, store, protect and handle products to site.
- B. Accept valves on site in shipping containers. Protect machined surfaces.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.1 HOT WATER AND CHILLED WATER PIPING ABOVE GROUND:

- A. Copper Tubing (for 2" and smaller): ASTM B88, type L hard drawn. Fittings: ANSI/ASTM B16.22. Joints: ANSI / ASTM B32, solder 95% tin, 50% antimony.
- B. Steel Pipe (2" and smaller): ASTM A53, Schedule 40
 - 1. Fittings: ASTM A234 Forged Steel Screwed type fittings
 - 2. Joints: Screwed
- C. Steel Pipe (2-1/2" and larger): ASTM A53, Schedule 40.

1. Fittings: ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings
2. Joints: welded

2.2 **EQUIPMENT DRAINS AND OVERFLOWS:**

- A. Cold drains.
 1. Copper tubing, ASTM B-88, Type L, hard drawn
 - a. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 - b. Joints: Solder, lead free 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.3 **UNIONS, FLANGES, AND COUPLINGS:**

- A. Union for Pipe 2 inches and Under:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe Over 2 inches:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze
 3. Gaskets: 1/16 inch thick performed neoprene.

2.4 **VALVES GENERAL:**

- A. Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Valves and valve construction shall be suitable for the pressure, temperature and fluid of the service. Provide proper selection as determined by Installer to comply with installation requirements. Provide end connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- B. Unless otherwise indicated, provide valves of same size as upstream pipe size.
- C. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves, 6" and smaller. Provide gear operators for quarter-turn valves 8" and larger. Provide chain-operated sheaves and chains for routinely operated overhead valves more than 8 feet above the floor in Mechanical Equipment rooms.
- D. For valves in insulated piping provide extended stem as required to accommodate insulation specified elsewhere.
- E. Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the following:

1. Crane
2. Fairbanks
3. Hammond
4. ITT Grinnell
5. Jenkins
6. Lunkenheimer
7. Milwaukee
8. Nibco
9. Powell
10. Stockham
11. Walworth

2.5 **MANUAL FLOW BALANCING VALVES:**

- A. Calibrated ball type balancing valves with differential pressure readout ports across fixed geometry venturi orifice. Each port shall have positive schrader type connections for connection to portable pressure meter. Provide reduced port type where flow rate is less than 2 GPM.
- B. Valves shall have memory feature to allow valve to be closed for service and then reopened without affecting balanced position.
- C. Where installed to insulated piping systems each valve shall be provided with insulation molded by manufacturer to permit easy access for balance and readout.
- D. For sizes larger than 4", provide venturi or wafer type orifice plate with butterfly valve with memory stop.
- E. Acceptable Manufacturers: Subject to compliance with requirements, provide balancing valves of one of the following:
 1. B&G Circuit Setters
 2. Flow Design Inc., Accusetter series
 3. Preso Industries, B-Plus series
 4. Hydronic Components, Inc., Terminator System
 5. Taco, Accu-Flo
 6. Nexus Valve

2.6 **BALL VALVES:**

- A. Ball valves shall be used for shutoff service for heating water, chilled water and condenser water for pipe sizes up to 2 inches.
- B. 1" and Smaller (except where used for connection of dissimilar metals): 125 psi steam, 400 psi WOG, bronze body, full port, bronze trim, 2 piece construction, Teflon seats.

- C. 1¼" to 2" (and any size where used for connection of dissimilar metals): 150 psi steam, 600 psi WOG, bronze body, standard port, 3 piece body, Teflon seats with bronze trim.
- D. Provide extended stem as required to accommodate piping insulation as specified elsewhere.
- E. On ball valves used at terminal equipment, provide drain plugs positioned for easy access and proper drainage on terminal side of valves.

2.7 **BUTTERFLY VALVES:**

- A. "Bubble Tight" at 150 psi and 200° construction shall be:
 - 1. Body - Ductile Iron
 - 2. Seat - E.P.D.M.
 - 3. Disc - Ductile iron or aluminum-bronze
 - 4. Stem - 304, 316 or 17-4PH S.S
- B. Watts, Hammond, Powell
- C. Provide 9" lever handle with infinitely adjustable throttling plate with lock nut and memory stop. Valves in insulated piping shall have extended neck. VALVES 8" and larger; screw or gear operator. All butterfly valves shall be "lug" type for bolting to a standard flange

2.8 **CHECK VALVES – SWING TYPE:**

- A. 2 inches and smaller with screwed bonnet; 2½ inches and larger with bolted bonnet. Valves to have renewable bronze seat and disc.

2.9 **CHECK VALVES, NON-SLAM:**

- A. Valves to have body to match adjacent piping with bronze or stainless steel trim and to be of the center guide type.

2.10 **TRIPLE DUTY VALVES:**

- A. Provide triple duty valves serving as check, throttling and shut-off valves at discharge side of all pumps, unless noted otherwise.
- B. Valve disc shall be equipped with a linear contoured disc to eliminate noise under low flow conditions. Valve shall have calibrated stem for balancing. Valve shall be designed for replacing under full line pressure.

- C. Valve construction: Bronze or Cast iron body to match adjacent piping, bronze disc and seat, stainless steel stem, teflon packing.
- D. Acceptable Manufacturers: Subject to compliance with requirements, provide triple duty valves of one of the following:
 - 1. Armstrong FTV
 - 2. Bell & Gossett 3D Series
 - 3. Taco

2.11 **DRAIN VALVES:**

- A. Provide drain valves with threaded ends for hose connections at drain points, at main shutoff valves, low points of piping systems, bases of vertical risers, and at equipment. Drain valves on the portable water system shall have permanently attached vacuum breakers on the hose thread connection.
- B. Brass ball valve with cap with chain, ¾ inch hose thread .

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Make piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION:

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through masonry partitions, walls and floors.
- F. Provide air vents at all high points of piping and at tops of all downflow risers greater than 4 feet.

- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 3. Where inserts are omitted, drill concrete slab from below and provide expansion anchor or use an appropriate powder driven stud where permitted.
- I. Pipe Hangers and Supports:
 - 1. Install in accordance with ASTM B31.9.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 30 inches of each horizontal elbow or tee.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Arrange hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed insulated parallel and at same elevation, provide trapeze hangers.
 - 8. Prime coat exposed steel hangers and supports and prepare for finish painting. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- K. Provide access where valves and fittings are not exposed.
- L. Arrange system to drain at low points. Use eccentric reducers to maintain proper grade.
- M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Pipe Joints: Unless otherwise specified, join pipes as follows:
 - 1. Steel pipe 2-1/2" to 4 welded joints.
 - 2. Steel pipe 4" and larger, welded or flanged joints.
 - 3. For welded joints, use only welding type fittings and welding neck flanges with the following exception:
 - a. "Weldolet" or "Threadolet" type of welding fittings for intersection welding of small branches to mains may be used where branch is two-pipe sizes smaller than the main

- P. Do not make direct welded connections to valves, expansion joints, strainers, apparatus, or any other units which are intended to be removable.
- Q. Copper tube, Type "K" and "L" shall have soldered copper joints with sweat joint type bronze or copper fittings. Flared joints with flare type bronze fittings may be used where approved for specific service.
- R. For screwed joints, use Teflon tape or approved pipe joint compound; apply only on male threads.
- S. Install eccentric reducers flat side up to prevent trapping of air.
- T. Branch connections are to be made from center line of mains in horizontal runs. No branch connections are to be made from bottom of piping.
- U. Utilize long radius elbows for all piping greater than 2".

3.3 CLEANING

- A. Clean new piping internally by flushing prior to the application of pressure tests.
- B. Thoroughly flush piping with water under pressure, clear of foreign matter, and then drain before proceeding with pressure testing. Blow down accumulations of grit, dirt and sediment at each strainer and each low point in the piping systems.
- C. Bypass flush valves and required piping to permit full circulation of water during the washout of the piping systems. Close shutoff and balancing valves on branch piping to the terminal equipment units during the washout operation to prevent water circulation through the automatic control valves.

3.4 FILLING OF WATER SYSTEMS:

- A. After completion of chemical cleanout, fill each water system with fresh water, vent air, and add chemical treatment.

3.5 PRESSURE TESTING OF HYDRONIC SYSTEMS:

- A. All hydronic piping systems shall be hydrostatically tested to 100 psi for a minimum of four hours.
- B. Where equipment has relief valves with lower ratings, isolate said equipment by closing isolation valves during tests.
- C. Air testing for contractor's purposes may be done at any time, but does not substitute for hydrostatic testing.

3.6 PIPE EXPANSION:

- A. For hot water piping only where indicated on drawings, provide loops, anchors and guides as required to accommodate pipe expansion.
- B. Submit calculations and shop drawings sealed by a Professional Engineer licensed in North Carolina.
- C. Calculations shall be based on the following criteria:
 - Water temperature: 180°F
 - Installation temperature: 40° F
 - Allowable stress: 15,000 psi for steel and 6,000 psi for copper
- D. Pipe expansion loops may be constructed of the same materials as specified for piping systems or Tri Flex Loop, stainless steel corrugated hose with stainless steel overbraid, as manufactured by Flex Hose Company or by Metraflex is accepted as a substitute material. Sealed shop drawings per 3.6, B are still required. Other manufacturers may be submitted for approval prior to bid in accordance with the product substitution provisions of the specification.

END OF SECTION 232113

PART 1 - GENERAL**1.1 DESCRIPTION OF WORK**

- A. Extent of HVAC pumps work required by this section is indicated on drawings and schedules, and by requirements of this section.
- B. Types of pumps specified in this section include the following:
 - 1. In-Line Circulator
 - 2. Base Mounted end-suction centrifugal pumps

1.2 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of general-use centrifugal pumps with characteristics, sizes and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. HI Compliance: Design, manufacture, and install HVAC pumps in accordance with HI "Hydraulic Institute Standards".
 - 2. UL Compliance: Design, manufacture, and install HVAC pumps in accordance with UL 778 "Motor Operate Water Pumps".
 - 3. UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's pump specifications, installation and start-up instruction, and current accurate pump characteristic performance curves with selection points clearly indicated.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to HVAC pumps. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

- D. Maintenance Data: Submit maintenance data and parts lists for each type of pump, control, and accessory; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Handle HVAC pumps and components carefully to prevent damage, breaking, denting scoring. Do not install damaged HVAC pumps or components; replace with new.
- B. Store HVAC pumps and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with Manufacturer's rigging and installation instructions for unloading HVAC pumps, and moving them to final location.

PART 2 - PRODUCTS

2.1 PUMPS

- A. General: Provide factory-tested pumps, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. Type, size, and capacity of each pump is listed in pump schedule. Provide pumps of same type by same manufacturer.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide pumps of one of the following:
 - 1. Bell & Gossett
 - 2. Taco
 - 3. Armstrong
 - 4. Patterson Pumps

2.2 IN-LINE CIRCULATORS

- A. Type: Horizontal mount, vertical split case, oil lubricated, designed for 125 psi working pressure, 225°F (107°C) continuous water temperature.
- B. Body: Cast iron, bronze fitted with suction and discharge gage tappings.
- C. Shaft: Hardened alloy steel.
- D. Seal: Mechanical, with carbon seal ring and ceramic seat.
- E. Motor: "Premium efficiency", non-overloading at any point on pump curve, open, TEFC, resilient mounted construction, built-in thermal overload protection on

single phase motors. Inverter duty rated where VFD is indicated.

- F. Coupling: Close Coupled or bearing assembly as indicated.
- G. Impeller: Enclosed type, hydraulically and dynamically balanced, and keyed to shaft.

2.3 FRAME-MOUNTED END SUCTION PUMPS

- A. General: Provide horizontal base mounted, single stage, vertical split case, flexible coupling, designed for 175 psi working pressure.
- B. Casing: Close grain cast iron, bronze fitted with replaceable bronze case wear ring, 125 psi ANSI flanges of equal size, tappings for gage and drain connections. Casings shall be designed to allow back pull-out servicing so that the rotating assembly can be removed without disconnecting the piping or motor.
- C. Shaft: Steel with replaceable shaft sleeve.
- D. Bearings: Regreasable ball bearings.
- E. Seal: Internally flushed, drip-tight mechanical seal, with carbon seal ring and ceramic seat suitable for the specified maximum temperature and pressure.
- F. Motor: Shall meet NEMA specifications, premium efficiency, TEFC, ball bearings, rated for use with variable speed drives, where VFD is indicated. Non overloading at any point on pump curve.
- G. Impeller: Enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.
- H. Baseplate: Structural steel with welded cross members, and open grouting area.
- I. Coupling: Flexible, capable of absorbing torsional vibration, equipped with coupling guard. Capable of being removed and replaced without altering alignment of pump or motor shaft.
- J. Shaft Gaurds: Fully encapsulate rotating shaft and comply with OSHA 1910.219 and ANSI B15.1 requirements.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which HVAC pumps are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF PUMPS

- A. General: Install HVAC pumps where indicated, in accordance with manufacturer's published installation instructions, complying with recognized industry practices to ensure that HVAC pumps comply with requirements and serve intended purposes.
- B. Access: Provide access space around HVAC pumps for service as indicated, but in no case less than that recommended by manufacturer.
- C. Support:
 - 1. Install in-line pumps not supported from piping system, with supplemental pipe supports provided at both pump flanges.
 - 2. Install base-mounted pumps on minimum of 4" high concrete base equal or greater than 3 times total weight of pump and motor, with anchor bolts poured in place. Set and level pump, grout under pump base with non-shrink grout. For base-mounted close-coupled pumps, mount with threaded inserts in concrete and removable bolts so motor and shaft assembly can be removed from the pump casing without disturbing the piping connections.
- D. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.
- E. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
- F. Piping Connections: Refer to Division-23 HVAC piping sections. Provide piping, valves, accessories, gauges, supports, and flexible connections as indicated.

3.3 ADJUSTING AND CLEANING

- A. Alignment: Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer, and in presence of manufacturer's service representative.
- B. Start-Up: Lubricate pumps before start-up. Start-up in accordance with

manufacturer's instructions. Laser align pump to a tolerance of +/- 0.002 inches. Each unit shall be checked by the Contractor and regulated for proper differential pressure, voltage and amperage draw. This data shall be noted on a permanent tag or label fastened to the pump for owner's reference.

- C. Refer to Division-23 section "HVAC Test-Adjust-Balance" for pump system balancing, not work of this section.
- D. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint
- E. Identification: Provide mechanical identification per Section 23 05 53.

END OF SECTION 232123

PART 1 GENERAL**1.1 SECTION INCLUDES**

- A. Extent of piping specialties work required by this section is indicated on drawings and schedules and by requirements of this section.
- B. Types of piping specialties specified in this section include the following:
 - 1. Pipe Escutcheons.
 - 2. Pipeline Strainers.
 - 3. Mechanical Sleeve Seals.
 - 4. Drip Pans.
 - 5. Pipe Sleeves.
 - 6. Sleeve Seals.

1.2 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ASME Compliance: Manufacture and install hydronic specialties in accordance with ASME B31.9 "Building Services Piping".
- C. FCI Compliance: Test and rate "Y" type strainers in accordance with FCI 73-1 "Pressure Rating Standard for "Y" Type Strainers". Test and rate other type strainers in accordance with FCI 78-1 "Pressure Rating Standard for Pipeline Strainers Other than "Y" Type".

1.3 SUBMITTALS

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years).
- B. Maintenance Data: Submit maintenance data and spare parts lists for each type of manufactured piping specialty. Include this data, product data, and shop drawings in maintenance manual.

PART 2 PRODUCTS

2.1 PIPING SPECIALTIES

- A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 PIPE ESCUTCHEONS

- A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
- B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
- C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
- D. Acceptable Manufacturers: Subject to compliance with requirements, provide pipe escutcheons of one of the following.
1. Chicago Specialty Mfg. Co.
 2. Producers Specialty & Mfg. Corp.
 3. Sanitary-Dash Mfg. Co.

2.3 Y-PIPE PIPELINE STRAINERS

- A. General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for respective working pressure of piping systems specified in Section 23 05 29, with Type 304 stainless steel screens, with 3/64" perforations @ 233 per sq. in..
- B. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
- C. Threaded Ends, 2½" and Larger: Cast-iron or bronze body, bolted screen retainer with off-centered blowdown fitted with drain valve per Section 23 21 13.
- D. Flanged Ends, 2½" and Larger: Cast-iron body, bolted screen retainer with off-centered blowdown fitted with drain valve per Section 23 21 13.

- E. Butt Welded Ends, 2½" and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with drain valve per Section 23 21 13.
- F. Grooved Ends, 2½" and Larger: Wye pattern, ductile-iron or malleable-iron body and access end cap with off-center blowdown fitted with drain valve per Section 23 21 13, access coupling with EDPM gasket.
- G. Acceptable Manufacturers: Subject to compliance with requirements, provide low pressure Y-type strainers of one of the following:
 - 1. Armstrong Machine Works
 - 2. Hoffman Specialty ITT; Fluid Handling Div.
 - 3. Metraflex Co.
 - 4. R-P&C Valve; Div. White Consolidated Industries, Inc.
 - 5. Spirax Sarco.
 - 6. Trane Co.
 - 7. Tyler Pipe; Gustin-Bacon Division
 - 8. Victaulic Co. of America
 - 9. Watts Regulator Co.

2.4 MECHANICAL SLEEVE SEALS

- A. General: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide mechanical sleeve seals of the following:
 - 1. Thunderline Corp.
 - 2. Link Seal
 - 3. BMW Company

2.5 FABRICATED PIPING SPECIALTIES

- A. Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2½". Reinforce top, either by structural angles or by rolling top over ¼" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.
- B. Pipe Sleeves: Provide pipe sleeves of one of the following:
- C. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6" 16 gage; over 6", 14 gage.

- D. Steel-Pipe: Fabricate from Schedule 40 steel pipe; remove burrs; galvanize after fabrication.
- E. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.
- F. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.
- G. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls of one of the following:
- H. Elastic Sealant and Oakum: Caulked between sleeve and pipe.
- I. Mechanical Sleeve Seals: Installed between sleeve and pipe.

2.6 ROOF PIPING PORTALS

- A. Furnish and install Pipe Portal System at all pipes, tubes, conduits 6" or less penetrating roofs.
- B. Each complete unit shall include a roof curb, a base with a molded sealing ring on a collared opening, and an EPDM compression molded rubber cap. The cap and base are locked together with a weather tight pressure seal. The caps shall include stainless steel clamps as required. Sealing units to roof shall be in conjunction with roofing manufacturer's recommendations.
- C. Acceptable Manufacturers: Subject to compliance with requirements, provide roof piping portals of one of the following:
 - 1. The Pate Company
 - 2. Portals Plus, Inc.
 - 3. RPS
 - 4. Approved equal of above.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPING SPECIALTIES

- A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceiling where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.
- B. Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blowdown connection, full size of connection, except for strainers 2" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blowdown connection.

- C. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:
 - 1. Pumps (Delete if Suction Diffuser is used).
 - 2. Steam traps serving steam main drips.
 - 3. Temperature control valves.
 - 4. Pressure reducing valves.
 - 5. Temperature or pressure regulating valves.
- D. Install dielectric union or full port Teflon seat bronze ball valve at each piping joint between ferrous and non-ferrous piping.
- E. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.
- F. Fire Barrier Penetration Seals: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES

- A. Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.
- B. Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Professional. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for continuous insulation installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 1/4" above level floor finish, and 3/4" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
 - 1. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
 - 2. Install galvanized steel sleeves at exterior penetrations; both above and below grade.
 - 3. Do not support pipes by resting clamps on sleeves. Clamps must extend beyond sleeve and be supported outboard of sleeve in an

approved manner. In no case shall sleeves be cut or slotted to accommodate pipe clamps.

4. Where space for future ducts, pipes and conduits is required or indicated in masonry walls, provide sleeves and fill with lightweight concrete.
5. Slab Penetrations and Sleeves: All required openings and penetrations in new poured concrete slabs shall be sleeved or formed. This applies to pipes, conduit, ductwork and work of other trades. Field coring of the slab is not permitted. Mechanical Contractor, Plumbing Contractor, Fire Protection Contractor and subcontractors shall be required to coordinate and locate in the field all sleeved openings in poured concrete slabs, required by their work.

C. Sleeve Seals:

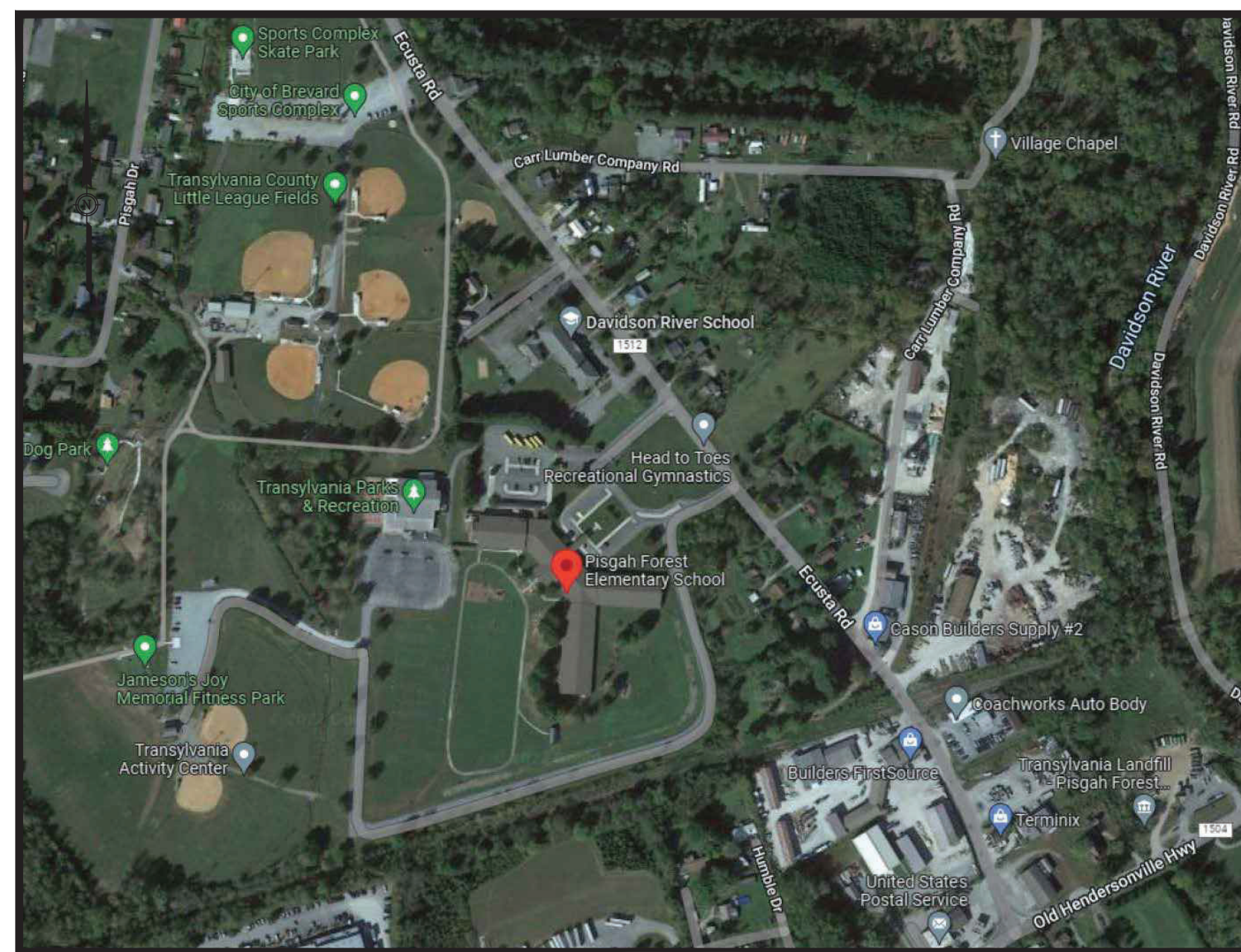
1. Non Fire-Rated: Fill and pack annular space between sleeve and pipe with mineral wool and seal all around with a sealant that will remain flexible.
2. Fire-Rated: Fill and pack annular space between sleeve and pipe with penetration firestop sealant in accordance with manufacturer's requirements and other local governing authority.
3. Foundation Wall Below Grade or Exterior Walls: Either fill and pack annular space between sleeve and pipe with oakum caulk, on both sides, or use mechanical sleeve seals installed per manufacturer's requirements.

END OF SECTION 232600

PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA



VICINITY MAP

BIDDING DOCUMENTS



Daniel L. Griffe
Digitally signed by Daniel L. Griffe
Date: 2023.02.07 14:07:44 -05'00'

FEBRUARY 2023

SCHEDULE OF DRAWINGS

G-001	....	COVER SHEET
G-002	....	APPENDIX B 2018 BUILDING CODE SUMMARY
LS-101	....	WALL RATING SUMMARY
M-001	....	MECHANICAL LEGEND
MD-101	....	WEST WING PIPING PLAN - DEMOLITION
MD-102	....	CENTRAL AREA PIPING PLAN - DEMOLITION
MD-103	....	SOUTH WING PIPING PLAN - DEMOLITION
MD-104	....	EAST WING PIPING PLAN - DEMOLITION
MD-401	....	ENLARGED PIPING PLANS - DEMOLITION
M-101	....	WEST WING PIPING PLAN - NEW WORK
M-102	....	CENTRAL AREA PIPING PLAN - NEW WORK
M-103	....	SOUTH WING PIPING PLAN - NEW WORK
M-104	....	EAST WING PIPING PLAN - NEW WORK
M-301	....	CHILLED AND HOT WATER SYSTEM ISOMETRIC - NEW WORK
M-401	....	ENLARGED PIPING PLANS - NEW WORK
M-501	....	DETAILS
M-502	....	DETAILS
M-601	....	SCHEDULES
M-701	....	CONTROLS
E-001	....	ELECTRICAL, LEGEND, NOTES, SCHEDULES, AND ABBREVIATIONS
E-101	....	ELECTRICAL PLAN - WEST WING - NEW WORK
E-401	....	MAIN MECHANICAL AREA PLAN - ELECTRICAL PLANS
E-601	ELECTRICAL DETAILS AND NOTES
E-602	ELECTRICAL SCHEDULES AND DIAGRAMS



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**APPENDIX B
2018 BUILDING CODE SUMMARY
FOR ALL COMMERCIAL PROJECTS
(EXCEPT ONE- AND TWO-FAMILY DWELLINGS AND TOWNHOUSES)**

Name of Project: **MECHANICAL RENOVATIONS, PISGAH FOREST ELEMENTARY SCHOOL**
 Address: **1160 ECUSTA ROAD, BREVARD, NC** Zip Code **28712**
 Owner/Authorized Agent: **ALAN JUSTICE** Phone # **(828)884-6173** Email **ajjustice@csnc.org**
 Owned By: City/County Private State
 Code Enforcement Jurisdiction: City County **TRANSYLVANIA** State

CONTACT:

DESIGNER	FIRM	NAME	LICENSE #	TELEPHONE #	EMAIL
Architectural					
Civil					
Electrical					
Fire Alarm					
Plumbing					
Mechanical	MC GILL ASSOCIATES, P.A.	DANIEL GRIFFEE	40817	(828)252-0575	daniel.griffee@mcgillassociates.com
Sprinkler-Standpipe					
Structural					
Retaining Walls > 5' High					
Other					

(*Other* should include firms and individuals such as truss, precast, pre-engineered, interior designers, etc.)

2018 NC BUILDING CODE: New Building Shell/Core 1st Time Interior Completions
 Addition Phased Construction-Shell Core

2018 NC EXISTING BUILDING CODE: (check all that apply)
 Prescriptive Alteration Level I Historic Property
 Repair Alteration Level II Change of Use
 Chapter 14 Alteration Level III

CONSTRUCTED: (date) **1989** CURRENT USE(S) (Ch. 3): **K-12 SCHOOL (E)**
 RENOVATED: (date) _____ PROPOSED USE(S) (Ch. 3): **PROPOSED USE K-12 SCHOOL (E)**
 OCCUPANCY CATEGORY (Table 1604.5): Current: **III** Proposed: **III**

BASIC BUILDING DATA

Construction Type: I-A II-A III-A IV V-A IV UNP (1978 CODE)
 I-B II-B III-B V-B

Sprinklers: No Partial NFPA 13 NFPA 13R NFPA 13D

Standpipes: No Class I II III Wet Dry

Primary Fire District: No Yes Flood Hazard Area: No Yes

Special Inspections Required: No Yes

Floor	GROSS BUILDING AREA TABLE		Subtotal
	Existing (sq ft)	New (sq ft)	
3rd Floor	0		0
2nd Floor	0		0
Mezzanine	0		0
1st Floor	61,155	0	61,155
Basement	0		0
TOTAL	61,155		61,155

ALLOWABLE AREA

Primary Occupancy Classification(s):
 Assembly A-1 A-2 A-3 A-4 A-5
 Business
 Educational
 Factory F-1 Moderate F-2 Low
 Hazardous H-1 Detonate H-2 Deflagrate H-3 Combust H-4 Health H-5 HPM
 Institutional I-1 I-2 I-3 I-4
 I-3 Condition 1 2
 I-2 Condition 1 2
 I-3 Condition 1 2 3 4 5
 Mercantile
 Residential R-1 R-2 R-3 R-4
 Storage S-1 Moderate S-2 Low High-piled
 Parking Garage Open Enclosed Repair Garage
 Utility and Miscellaneous

Accessory Occupancy Classification(s): _____
 Incidental Uses (Table 509): **MECHANICAL AND BOILER ROOMS**
 This separation is not exempt as a Nonseparated Use (see exceptions).
 Special Uses (Chapter 4 - List Code Sections): _____
 Special Provisions (Chapter 5 - List Code Sections): _____
 Mixed Occupancy: No Yes Separation: _____ Hr. Exception: _____
 Non-separated Use (508.3)
 Separated Use (508.4) - See below for area calculations for each story, the area of the occupancy shall be such that the sum of the ratios of the actual floor area of each use divided by the allowable floor area for each use shall not exceed 1.
 Select one

$$\frac{\text{Actual Area of Occupancy A}}{\text{Allowable Area of Occupancy A}} + \frac{\text{Actual Area of Occupancy B}}{\text{Allowable Area of Occupancy B}} \leq 1.00$$

**BID SET,
NOT FOR
CONSTRUCTION
UNLESS SO ISSUED**

STORY NO.	DESCRIPTION AND USE	(A) BLDG AREA PER STORY (ACTUAL)	(B) TABLE 506.2.4 AREA	(C) AREA FOR FRONTAGE INCREASE 1.5	(D) ALLOWABLE AREA PER STORY OR UNLIMITED 2.3
STORY NO.	USE	AREA	AREA	AREA	AREA

- Frontage area increases from Section 506.2 are computed thus:
 - Perimeter which fronts a public way or open space having 20 feet minimum width - _____ (F)
 - Total Building Perimeter = _____ (P)
 - Ratio (F/P) = _____ (F/P)
 - W = Minimum width of public way = _____ (W)
- Unlimited area applicable under conditions of Section 507.
- Maximum Building Area = total number of stories in the building X D (maximum 3 stories) (506.2).
- The maximum area of open parking garages must comply with Table 406.5.4. The maximum area of air traffic control towers must comply with Table 412.3.1.
- Frontage increase is based on the unsprinklered area value in Table 506.2.

NO CHANGE

EXISTING HEIGHT

	ALLOWABLE	SHOWN ON PLANS	CODE REFERENCE
Building Height in Feet (Table 504.3)		18 FT. AVERAGE EAVE TO RIDGE	
Building Height in Stories (Table 504.4)		1	

- Provide code reference if the "Shown on Plans" quantity is not base on Table 504.3 or 504.4.

FIRE PROTECTION REQUIREMENTS

FOR ALTERATION LEVEL II IT IS REQUIRED TO MAINTAIN EXISTING LEVEL OF FIRE PROTECTION. FIRE PROTECTION REQUIREMENTS ARE FROM PLANS DATED 10-31-1989 ENTITLED "PENROSE/STRAUS ELEMENTARY SCHOOL" PREPARED BY MARTIN, BARDSLEY, ANTHONY ARCHITECTS, CODE EDITION IS NOT SPECIFIED BUT APPEARS TO BE 1978.

BUILDING ELEMENT	FIRE SEPARATION DISTANCE (feet)	RATING		DETAIL # AND SHEET #	DESIGN # FOR RATED ASSEMBLY	SHEET # FOR RATED PENETRATION	SHEET # FOR RATED JOINTS
		REQ'D	PROVIDED (W/ REDUCTION)				
Structural Frame Including columns, girders, trusses							
Bearing Walls							
Exterior							
North							
East							
West							
South							
Interior							
Nonbearing walls and partitions							
Exterior walls							
North							
East							
West							
South							
Interior walls and partitions							
Floor Construction Including supporting beams and joists							
Floor Ceiling Assembly							
Columns Supporting Floors							
Roof Construction, including supporting beams and joists							
Roof Ceiling Assembly							
Columns Supporting Roof							
Shaft Enclosures - Exit							
Shaft Enclosures - Other							
Corridor Separation	1			ULU903			
Occupancy/Fire Barrier Separation							
Party/Fire Wall Separation	4			ULU901			
Smoke Barrier Separation							
Smoke Partition							
Tenant/Dwelling Unit/Sleeping Unit Separation							
Incidental Use Separation	2			ULU905 WALLS & P404 CEILINGS			

* Indicate section number permitting reduction
 MIXED OCCUPANCY SEPARATION SHOWN AS REQUIRING 2 HR. SEPARATION (SMALL ASSEMBLY) WITH NO. UL# GIVEN. NO INDICATION WAS GIVEN IN TABLE THAT CEILINGS OUTSIDE OF MECHANICAL AND ROOMS ARE RATED BUT NOTE AND DRAWINGS INDICATE THAT CORRIDOR CEILINGS ARE RATED.

PERCENTAGE OF WALL OPENING CALCULATIONS

FIRE SEPARATION DISTANCE (feet) FROM PROPERTY LINES	DEGREE OF OPENINGS PROTECTION (TABLE 705.8)	ALLOWABLE AREA (%)	ACTUAL SHOWN ON PLANS (%)

LIFE SAFETY SYSTEM REQUIREMENTS

- Emergency Lighting: Yes No
 Exit Signs: Yes No
 Fire Alarm: Yes No
 Smoke Detection Systems: Yes No
 Carbon Monoxide Detection: Yes No

NO CHANGE

LIFE SAFETY PLAN REQUIREMENTS

- Life Safety Plan Sheet #: _____
 Fire and/or smoke rated wall locations (Chapter 7)
 Assumed and real property line locations (if not on the site plan)
 Exterior wall opening area with respect to distance to assumed property lines (705.8)
 Occupancy Use for each area as it relates to occupant load calculation (Table 1004.1.2)
 Occupant loads for each area
 Exit access travel distances (1017)
 Common path of travel distances [Tables 1006.2.1 & 1006.3.2(1)]
 Dead end lengths (1020.4)
 Clear exit widths for each exit door
 Maximum calculated occupant load capacity each exit door can accommodate based on egress width (1005.3)
 Actual occupant load for each exit door

- A separate schematic plan indicating where fire rated floor/ceiling and and/or roof structure is provided for purposed of occupancy separation
- Location of doors with panic hardware (1010.1.10)
- Location of doors with delayed egress locks and the amount of delay (1010.1.9.7)
- Location of doors with electromagnetic egress locks (1010.1.9.9)
- Location of doors equipped with hold-open devices
- Location of emergency escape windows (1030)
- The square footage of each fire area (202)
- The square footage of each smoke compartment for Occupancy Classification I-2 (407.5)
- Note any code exceptions or table notes that may have been utilized regarding the items above

**ACCESSIBLE DWELLING UNITS
(SECTION 1107)**

TOTAL UNITS	ACCESSIBLE UNITS REQUIRED	ACCESSIBLE UNITS PROVIDED	TYPE A UNITS REQUIRED	TYPE A UNITS PROVIDED	TYPE B UNITS REQUIRED	TYPE B UNITS PROVIDED	TOTAL ACCESSIBLE UNITS PROVIDED

N/A

**ACCESSIBLE PARKING
(SECTION 1106)**

LOT OR PARKING AREA	TOTAL # OF PARKING SPACES		# OF ACCESSIBLE SPACES PROVIDED			TOTAL # ACCESSIBLE PROVIDED
	REQUIRED	PROVIDED	REGULAR WITH 5' ACCESS AISLE	132" ACCESS AISLE	8' ACCESS AISLE	
TOTAL						

NO CHANGE

**PLUMBING FIXTURE REQUIREMENTS
(TABLE 2902.1)**

USE	WATERCLOSETS			URINALS	LAVATORIES			SHOWERS/TUB	DRINKING FOUNTAINS	
	MALE	FEMALE	UNISEX		MALE	FEMALE	UNISEX		REGULAR	ACCESSIBLE

NO CHANGE

SPECIAL APPROVALS

Special approval: (Local Jurisdiction, Department of Insurance, OSC, DPI, DHHS, ICC, etc., describe below)
 NC DPI

ENERGY SUMMARY

ENERGY REQUIREMENTS:
 The following data shall be considered minimum and any special attribute required to meet the energy code shall also be provided. Each Designer shall furnish the required portions of the project information for the plan data sheet. If performance method, state the annual energy cost for the standard reference design versus the annual energy cost for the proposed design.

Existing building envelope complies with code: (If checked, the remainder of this section is not applicable)
 Exempt Building: Provide code or statutory reference: _____
 Climate Zone: 3A 4A 5A
 Method of Compliance:
 Energy Code: Performance Prescriptive
 ASHRAE 90.1: Performance Prescriptive
 Other: Performance (specify source) _____

THERMAL ENVELOPE: (Prescriptive method only)

- Roof/ceiling Assembly (each assembly) **NO CHANGE**
 Description of assembly: _____
 U-Value of total assembly: _____
 R-Value of insulation: _____
 Skylights in each assembly:
 U-Value of skylight: _____
 total square footage of skylights in each assembly: _____
 Exterior Walls (each assembly)
 Description of assembly: _____
 U-Value of total assembly: _____
 R-Value of insulation: _____
 Openings (windows or doors with glazing)
 U-Value of assembly: _____
 Solar heat gain coefficient: _____
 projection factor: _____
 Door R-Values: _____
 Walls below grade (each assembly)
 Description of assembly: _____
 U-Value of total assembly: _____
 R-Value of insulation: _____
 Floors over unconditioned space (each assembly)
 Description of assembly: _____
 U-Value of total assembly: _____
 R-Value of insulation: _____
 Floors slab on grade
 Description of assembly: _____
 U-Value of total assembly: _____
 R-Value of insulation: _____
 Horizontal/vertical requirement: _____
 slab heated: _____



55 Broad Street
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NC Firm License # C-0459
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SIGNED AND DATED:
Daniel L. Griffiee
 PROFESSIONAL ENGINEER
 SEAL 040817
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NO.	DATE	BY	DESCRIPTION

**PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS**

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA

AS NOTED

OFFICE MANAGER M. CATHEY	DESIGNER
PROJECT MANAGER D. GRIFFEE	REVIEWER

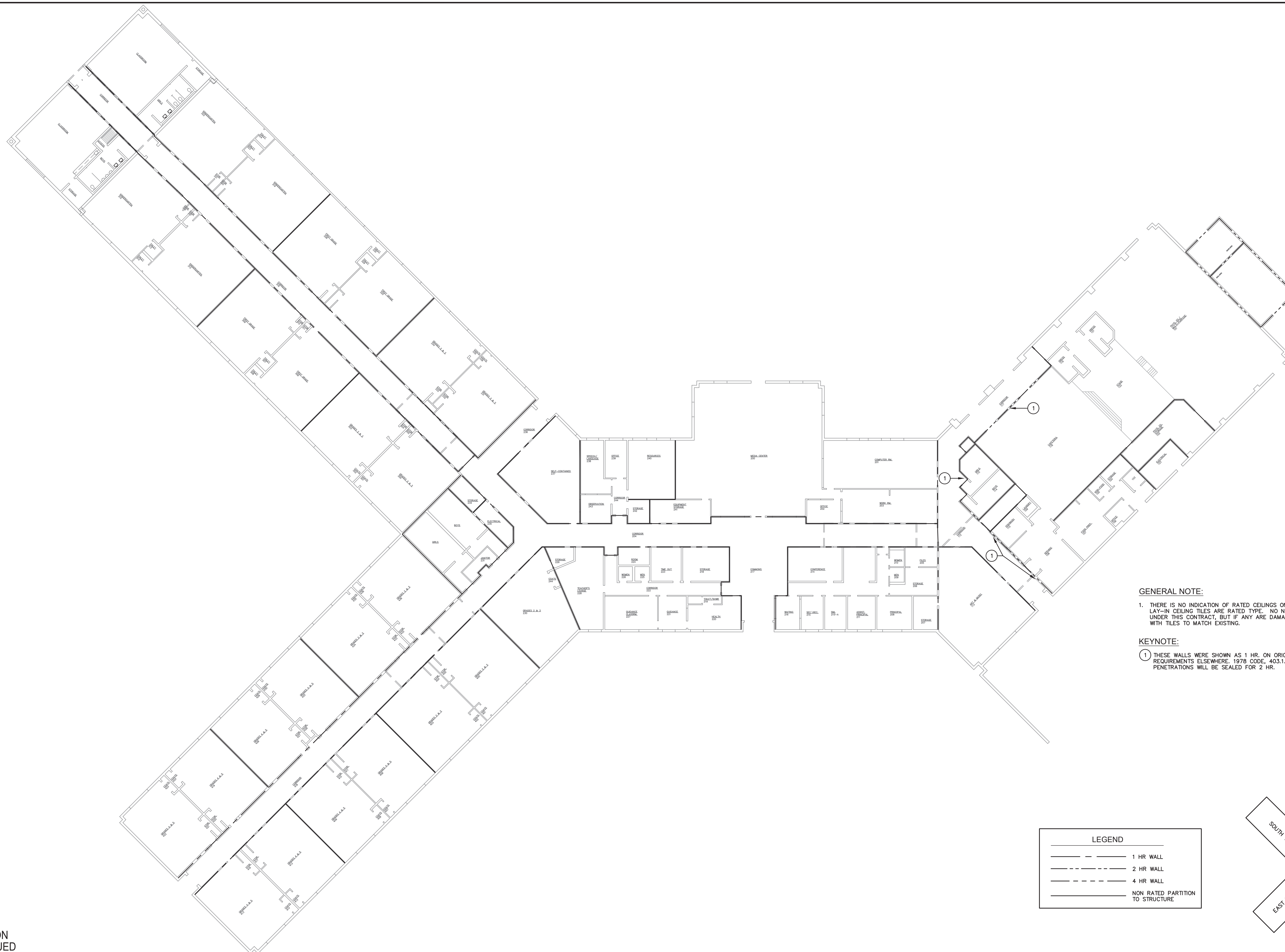
**APPENDIX B
2018 BUILDING CODE SUMMARY**

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
G-002

P:\2022\22.00607-TRANSLVANIACOUNTYSCHOOLS-PISGAHFOREST-ELEMENTARY-HVAC-PIPING-IMPROVEMENTS\FIRE PROTECTION\22.00607 LIFE SAFETY PLAN.DWG PLOT DATE: 1/12/2023 3:07 PM LEO COOPER

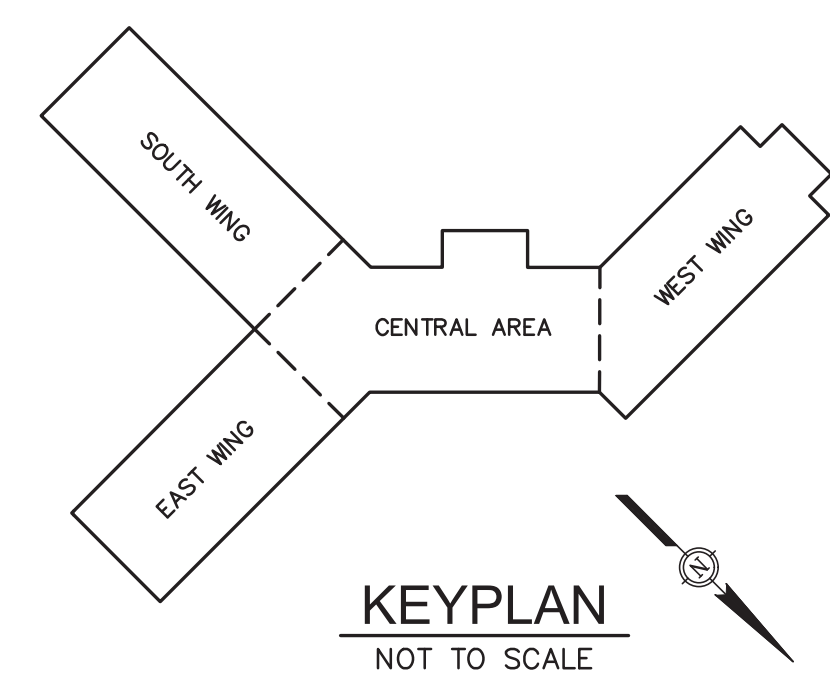
22.00607 TRANSLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS



GENERAL NOTE:
 1. THERE IS NO INDICATION OF RATED CEILING ON ORIGINAL PLANS, BUT ALL EXISTING LAY-IN CEILING TILES ARE RATED TYPE. NO NEW CEILING TILES ARE TO BE INSTALLED UNDER THIS CONTRACT, BUT IF ANY ARE DAMAGED AND NEED TO BE REPLACED, REPLACE WITH TILES TO MATCH EXISTING.

KEYNOTE:
 ① THESE WALLS WERE SHOWN AS 1 HR. ON ORIGINAL PLANS BUT INDICATED AS 2 HR. REQUIREMENTS ELSEWHERE. 1978 CODE, 403.1.C REQUIRES 2 HR. SEPARATION. ALL NEW PENETRATIONS WILL BE SEALED FOR 2 HR.

LEGEND	
	1 HR WALL
	2 HR WALL
	4 HR WALL
	NON RATED PARTITION TO STRUCTURE



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 NOT FOR
 CONSTRUCTION
 UNLESS SO ISSUED

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SIGNED AND DATED:
Daniel L. Griffie
Digitally signed by Daniel L. Griffie
 Date: 2023.01.12 14:10:10 -0500

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
 HVAC PIPING IMPROVEMENTS
TRANSLVANIA COUNTY SCHOOLS
 TRANSLVANIA COUNTY, NORTH CAROLINA

NOT TO SCALE

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

WALL RATING SUMMARY

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
LS-001

HVAC LEGEND

GENERAL HVAC

- SPECIFIC OR NEW WORK NOTES
- REVISION NOTES
- DEMOLITION NOTES
- COLUMN LINE IDENTIFICATION
- EXISTING WORK TO REMAIN
- NEW WORK (OR EXISTING WORK TO BE REMOVED ON DEMOLITION PLAN)
- EC ELECTRICAL CONTRACTOR
- GC GENERAL CONTRACTOR
- MC MECHANICAL CONTRACTOR
- PC PLUMBING CONTRACTOR
- AFF ABOVE FINISH FLOOR
- BFF BELOW FINISHED FLOOR
- BOS BOTTOM OF STRUCTURE
- CL CENTER LINE
- EX EXISTING
- FLA FULL LOAD AMPS
- HSKP HOUSEKEEPING PAD
- OA OUTSIDE AIR
- UON UNLESS OTHERWISE NOTED

ELECTRICAL WORK FOR HVAC

- MOTOR
- DISCONNECT SWITCH, WITH CLEARANCE, FUSIBLE OR NON-FUSIBLE AND NUMBER OF POLES AS INDICATED ON DRAWINGS.
- MOTOR STARTER, NEMA SIZE AS NOTED
- COMBINATION MOTOR STARTER, NEMA SIZE AS NOTED
- EMERGENCY STOP SWITCH

GENERAL PIPE & FITTING SYMBOLS

- BLIND FLANGE
- DIRECTION OF FLOW
- PIPE CAP
- PIPE TURNING DOWN
- PIPE TURNING UP
- TEE WITH BRANCH OFF TOP OF MAIN
- TEE WITH BRANCH OFF BOTTOM OF MAIN

VALVES

- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE, SWING (SCV)
- DRAIN VALVE (HOSE END)
- TRIPLE DUTY VALVE (TDV)
- VALVE IN VERTICAL PIPE (NOTED AS TO TYPE)

PIPING SPECIALTIES

- STRAINER WITHOUT BLOWDOWN VALVE
- Y PATTERN STRAINER WITH BLOWDOWN VALVE
- UNION
- COMPANION FLANGE

METERS, GAUGES AND THERMOMETERS

- THERMOMETER
- PRESSURE GAUGE AND BALL VALVE

HYDRONIC PIPE AND SPECIALTIES

- AUTOMATIC AIR VENT (AAV)
- PRESSURE REDUCING VALVE (PRV)
- SAFETY OR RELIEF VALVE
- COOLING COIL DRAIN (CONDENSATE)
- DRAIN LINE
- CHEMICAL FEED
- CHILLED WATER SUPPLY
- CHILLED WATER RETURN
- HOT WATER SUPPLY
- HOT WATER RETURN
- EXPANSION TANK LINE

HYDRONIC PUMPS

- IN-LINE PUMP

HVAC INSTRUMENTATION & CONTROLS

- TEMPERATURE SENSOR
- FLOW MEASURING SENSOR
- AUTOMATIC CONTROL VALVE - 2 WAY
- AUTOMATIC CONTROL VALVE - 3 WAY

HVAC EQUIPMENT

- AHU AIR HANDLING UNIT
- AS AIR SEPARATOR
- B BOILER
- BT BUFFER TANK
- CH CHILLER
- CP CONDENSATE PUMP
- ET EXPANSION TANK
- F FAN
- P PUMP
- RF RETURN FAN
- UH UNIT HEATER

RATED WALL LEGEND

- 1 HR WALL
- 2 HR WALL
- 4 HR WALL
- NON RATED PARTITION TO STRUCTURE

SEISMIC NOTE

NOTHING ADDED UNDER THIS PROJECT WOULD REQUIRE SEISMIC RESTRAINT.

GENERAL NOTES - SCOPE OF WORK

1. THE EXISTING 2 PIPE HYDRONIC SYSTEM IS TO BE REPLACED WITH A 4 PIPE HYDRONIC SYSTEM. SYSTEM WILL OPERATE AS A 2 PIPE SYSTEM PENDING FUTURE AHU REPLACEMENT PROJECT. EITHER THE CHILLED WATER SYSTEM OR HOT WATER SYSTEM WILL OPERATE BUT NOT BOTH SIMULTANEOUSLY.
2. NO HYDRONIC PIPING IS TO BE REUSED EXCEPT AS SPECIFICALLY NOTED.
3. NO HYDRONIC PIPING OR EQUIPMENT IS TO BE ABANDONED IN PLACE EXCEPT WHERE SPECIFICALLY NOTED.
4. NO CONTROL VALVES ON THE HYDRONIC SYSTEM ARE TO BE REUSED.
5. NO HYDRONIC PUMPS WILL BE REUSED.
6. NO AIR SEPARATORS OR EXPANSION TANKS WILL BE REUSED.
7. EXISTING BOILERS WILL BE REUSED.
8. EXISTING CHILLER WILL BE REUSED.
9. EXISTING AHU'S WILL BE REUSED.
10. EXISTING FCU'S WILL BE REUSED.
11. EXISTING UH'S WILL BE REUSED.
12. EXISTING 2 PIPE HYDRONIC SYSTEM IS TO REMAIN IN SERVICE UNTIL 4 NEW PIPE SYSTEM IS COMPLETE AND READY FOR SWITCHOVER. SYSTEM OUTAGES AS REQUIRED FOR SWITCHOVER WILL BE COORDINATED WITH THE SCHOOL CALENDAR. IF THEY OCCUR DURING THE SCHOOL YEAR THEY WILL OCCUR EVENINGS, WEEKENDS AND SCHOOL HOLIDAYS.
13. ALL EXISTING AND NEW PIPE IS RUN ABOVE EXISTING LAYIN CEILINGS EXCEPT WHERE SPECIFICALLY NOTED. CEILINGS SHALL BE REMOVED, PROTECTED AND REINSTALLED AS REQUIRED FOR THE WORK. WHERE EXISTING PIPE IS NOTED TO RUN ABOVE EXISTING HARD CEILINGS IT MAY BE ABANDONED IN PLACE AND CAPPED ON BOTH ENDS.

ACCESS TO SITE

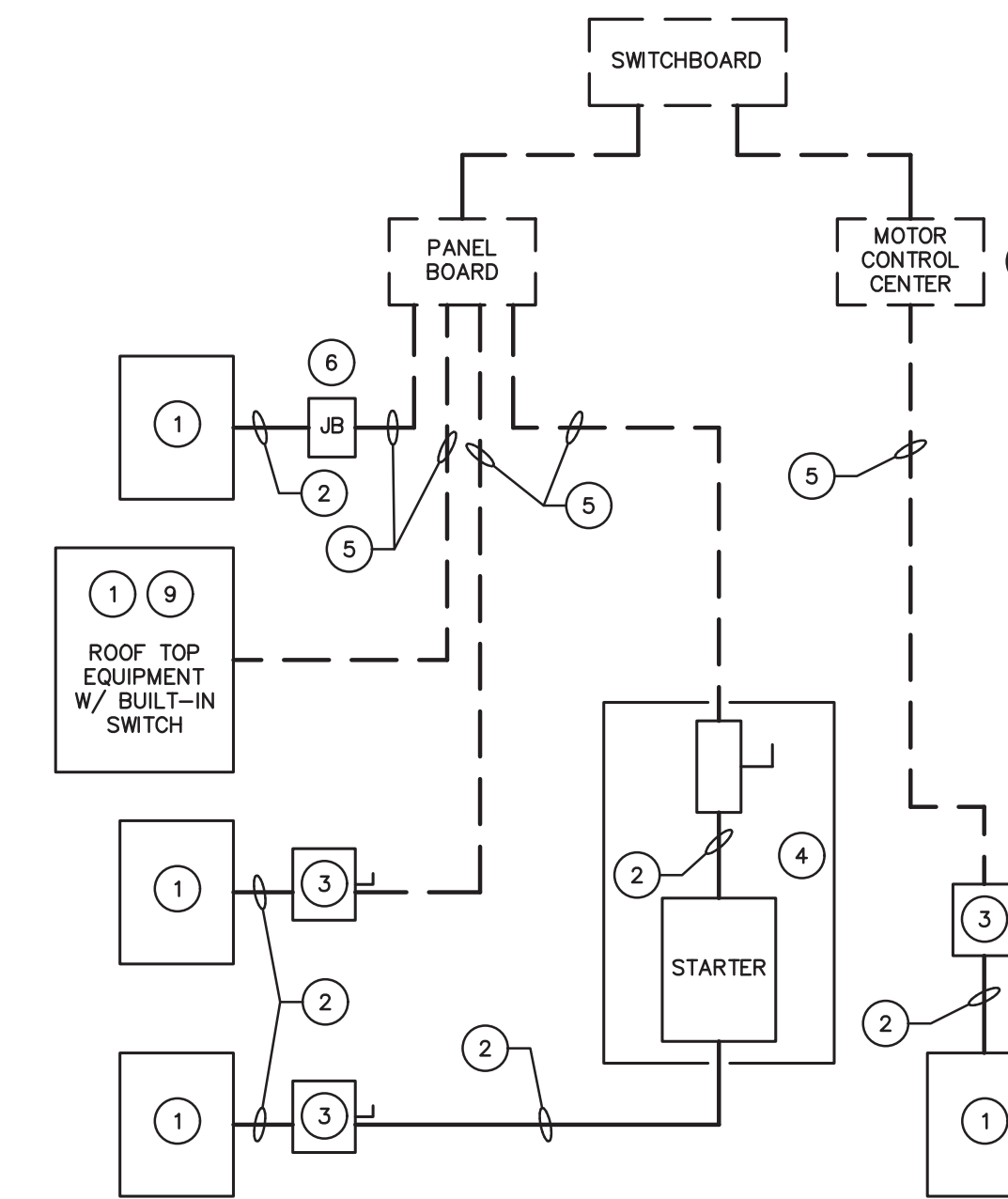
- 1) THE PROJECT SITE IS AN EXISTING SCHOOL.
- 2) THE SITE WILL BE PRIMARILY AVAILABLE FOR CONTRACT WORK DURING THE SUMMER BREAK. THERE MAY BE LIMITED OCCUPANCY BY ADMINISTRATIVE AND OTHER PERSONNEL DURING THAT TIME.
- 3) ANY WORK DONE OUTSIDE OF THE SUMMER BREAK WILL BE COORDINATED WITH THE CURRENT SCHOOL CALENDAR. ACTIVITIES THAT WOULD IMPACT NORMAL USE OF THE SCHOOL WILL NOT BE PERMITTED DURING SCHOOL HOURS.
- 4) FOR ANY WORK DONE OUTSIDE OF SCHOOL HOURS THE SCHOOL SHALL BE RETURNED TO USABLE CONDITION PRIOR TO SCHOOL HOURS.
- 5) CURRENT SCHOOL CALENDAR IS AVAILABLE AT THE TRANSYLVANIA COUNTY SCHOOLS WEBSITE. CALENDAR IS SUBJECT TO REVISION DUE TO WEATHER AND OTHER CAUSES.

HVAC GENERAL NOTES

1. THE FOLLOWING NOTES ARE GENERAL IN NATURE AND PERTAIN TO THE ENTIRE PROJECT. WHERE THERE ARE EXCEPTIONS, ADDITIONS OR REVISIONS TO THESE NOTES SUCH ARE SO NOTED ON THE PARTICULAR DRAWING WHERE THEY OCCUR. REFER TO SPECIFICATION SECTION 230000 FOR GENERAL REQUIREMENTS OF ALL HVAC WORK.
2. THE DRAWINGS SHALL BE WORKED IN CONJUNCTION WITH THE PROJECT MANUAL, THE PROJECT MANUAL FORMS A PART OF THE CONTRACT DOCUMENTS AND CONTAINS ADDITIONAL INFORMATION REQUIRED TO CONSTRUCT THE WORK OF THIS CONTRACT.
3. ALL REFERENCES TO SPECIFIC CONTRACTORS AND/OR SUBCONTRACTORS ARE SOLELY FOR THE CONTRACTOR'S CONVENIENCE AS TO THE GENERAL INTENT OF THE DIVISION OF WORK ACCORDING TO OFFICE AND COMMON CONSTRUCTION PRACTICE. IT IS AT THE PRIME CONTRACTOR'S DISCRETION TO APPORTION THE WORK AND BE SOLELY RESPONSIBLE FOR ITS COMPLETE AND ACCURATE EXECUTION.
4. PRIOR TO COMMENCING ANY WORK THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE WORK OF OTHER TRADES. CONFLICTS ARISING FROM FAILURE TO DO SO SHALL BE RECTIFIED BY THE CONTRACTORS AT NO ADDITIONAL COST.
5. THE DRAWINGS ARE DIAGRAMMATIC AND SHOULD NOT BE SCALED FOR EXACT WORK. IT IS THE INTENT OF THE CONTRACT DOCUMENTS TO ESTABLISH OVERALL SCOPE, MATERIALS AND QUALITY LEVEL FOR COMPLETE AND OPERATIONAL HVAC SYSTEMS. THEREFORE, THE CONTRACTOR SHALL MAKE ADJUSTMENTS AS REQUIRED FOR A COMPLETE INSTALLATION. CONTRACTOR SHALL CLOSELY EXAMINE ALL CONTRACT DOCUMENTS OF ALL TRADES TO UNDERSTAND WORK REQUIRED AND TO AVOID INTERFERENCE WITH EXISTING AND NEW WORK SUCH AS DUCTS, PIPING, LIGHTING FIXTURES, STRUCTURAL BEAMS, ETC. THESE DRAWINGS ARE BASED ON DOCUMENTS MADE AVAILABLE BY THE CLIENT, THE CONTRACTOR SHALL FIELD VERIFY ALL LAYOUTS AND MAKE NECESSARY ADJUSTMENTS AT NO ADDITIONAL COST.
6. THE HVAC CONTRACTOR SHALL PROVIDE ALL TOOLS, MATERIALS, EQUIPMENT AND NECESSARY FACILITIES, AND PERFORM ALL LABOR AND SERVICES OF EVERY DESCRIPTION AS MAY BE NECESSARY TO COMPLETE THE SCOPE OF WORK DEFINED IN THE DOCUMENTS.
7. PERFORM ALL WORK IN STRICT ACCORDANCE WITH OSHA, ALL APPLICABLE STATE AND LOCAL CODES, AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THE CONTRACT. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOGNIZED INDUSTRY STANDARDS.
8. UNLESS ITEMS OF MATERIAL, EQUIPMENT OR WORK ARE SPECIFICALLY NOTED TO BE PROVIDED OR FURNISHED BY OTHERS, THEY SHALL BE PROVIDED UNDER THIS CONTRACT.
9. PROTECT ALL EQUIPMENT AND MATERIALS FROM DAMAGE THAT ARE STORED OR SET IN PLACE ON THE JOBSITE.
10. INSTALL ALL EQUIPMENT AND DEVICES REQUIRING ACCESS IN A MANNER TO BE READILY ACCESSIBLE. EQUIPMENT SHALL BE INSTALLED SO IT IS ACCESSIBLE FOR MAINTENANCE AND REPLACEMENT WITHOUT REMOVAL OF RELATIVELY FIXED BUILDING ELEMENTS OR OTHER EQUIPMENT. PRIOR TO INSTALLATION OF SUCH ITEMS, THE HVAC CONTRACTOR SHALL VERIFY SERVICE CLEARANCE REQUIREMENTS AND REPORT ANY INADEQUACIES TO THE ARCHITECT/ENGINEER.
11. PRIOR TO BID, THE CONTRACTOR SHALL EXAMINE ALL PROJECT SPECIFICATIONS, DRAWINGS, AND SHALL PERFORM A THOROUGH SITE VISIT TO DEVELOP A COMPLETE UNDERSTANDING OF THE PROJECT SCOPE INCLUDING EXISTING CONDITIONS. FAILURE TO DO SO SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO PERFORM ALL WORK REQUIRED. THE CONTRACTOR SHALL, UPON REVIEW OF THE DOCUMENTS AND PRIOR TO INSTALLATION OF ANY WORK, ADVISE THE ENGINEER OF ANY DISCREPANCIES WHICH WILL AFFECT THE WORK REQUIRED. ANY EQUIPMENT, TRIM, HARDWARE AND/OR DEVICES CUSTOMARILY USED IN THIS TYPE AND CLASS OF WORK NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK (AS DETERMINED BY THE ARCHITECT/ENGINEER) SHALL BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR AS PART OF HIS TOTAL WORK WHETHER OR NOT SPECIFICALLY MENTIONED OR SHOWN IN THE DOCUMENTS.
12. WORK INDICATED AS HAVING MINOR DETAILS OBVIOUSLY OMITTED FOR CLARITY SHALL BE INCLUDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
13. THE HVAC CONTRACTOR SHALL VERIFY ALL ELECTRICAL CHARACTERISTICS OF HVAC EQUIPMENT WITH THE ELECTRICAL CONTRACTOR PRIOR TO ORDERING.
14. CONTRACTOR SHALL MAINTAIN ON SITE, AN EXTRA SET OF DRAWINGS AND SPECIFICATIONS FOR THE PURPOSE OF RECORDING CHANGES AND VARIATIONS DAILY, AS WELL AS ADDITIONAL INFORMATION SPECIFIED, AS INDICATED IN SPECIFICATION SECTION 230000. RECORD DRAWINGS SHALL IDENTIFY LOCATION OF MAJOR CONTROL LINES, ACCESS DOORS, TAGGED VALVES, SYSTEMS CONCEALED IN WALLS AND CEILINGS. ALL ITEMS TO BE CONCEALED SHALL BE IDENTIFIED WITH FIELD MEASURED LOCATING DIMENSIONS, AND INSPECTED BY OWNER PRIOR TO COMPLETING ENCLOSURE.
15. THE HVAC CONTRACTOR SHALL PROVIDE ALL MECHANICAL IDENTIFICATION PER THE SPECIFICATIONS.
16. SEAL SMOKE-TIGHT ALL DUCT AND PIPE PENETRATIONS THROUGH SMOKE RATED WALLS AND ALL FLOORS.
17. THE HVAC CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS STEEL SHAPES, HANGER RODS, STRAPS, ETC. REQUIRED FOR ALL HVAC SYSTEM INSTALLATIONS. ALL MECHANICAL SUPPORTS SHALL BE IN FULL COMPLIANCE WITH THE SEISMIC PROVISIONS OF THE CODE.
18. ALL EQUIPMENT INSTALLED ON FLOOR OR FINISHED GRADE SHALL BE MOUNTED ON A SITE POURED CONCRETE HOUSEKEEPING PAD. PAD SHALL BE 4" THICK AND EXTEND PAST EQUIPMENT EDGES BY 4". REINFORCE PAD WITH 6,6,10,10 WIRE MESH AND DOWEL INTO FLOOR SLAB WITH 5/8" REBAR SPACED MAXIMUM OF 2 FOOT ON CENTER. NO PAD SHALL HAVE FEWER THAN 4 DOWELS.
19. CHILLED WATER PIPING SHALL BE BLACK STEEL SCHEDULE 40, ASTM A53.
20. CHILLED WATER PIPE FITTINGS SHALL BE FORGED STEEL WELDING TYPE, ASTM A234.
21. BUTTERFLY VALVES SHALL BE BUBBLE TIGHT AT 150 PSI AND 200 F. CONSTRUCTION SHALL BE DUCTILE IRON BODY, EPDM SEAT, DUCTILE IRON OR ALUMINUM BRONZE DISC, 304 OR 316 SS STEM. PROVIDE 9" LEVER HANDLE WITH INFINITELY ADJUSTABLE THROTTLING PLATE WITH LOCK NUT AND MEMORY STOP. VALVES IN INSULATED PIPING SHALL HAVE EXTENDED NECK.
22. CHILLED WATER PIPING SHALL BE INSULATED WITH 2" THICKNESS RIGID CLOSED CELL POLYISOCYANURATE PIPE INSULATION, K VALUE 0.19 BTU-IN/HR-FT²-F. ASTM C-591. INSULATE FITTINGS WITH MOLDED SECTIONS SPECIFICALLY MADE FOR THAT PURPOSE OR MITERED SECTIONS WITH NOT LESS THAN 5 SECTIONS PER 90 DEGREE BEND. COVER ALL INSULATION WITH 0.16 INCH EMBOSSED ALUMINUM JACKET. FITTING JACKET SHALL BE DIE SHAPED FITTING COVERS WITH FACTORY ATTACHED PROTECTIVE LINER. BANDS SHALL BE 0.15 INCH THICK ALUMINUM. LOCATE ALL LONGITUDINAL SEAMS AT BOTTOM OF PIPE.
23. ALL WORK, INCLUDING JOINT CONNECTIONS AND TESTING SHALL BE IN ACCORDANCE WITH 2018 NC MECHANICAL CODE.
24. HEAT TRACE ALL EXTERIOR PIPING WITH 4 W/ FT. SELF REGULATING HEAT TAPE. DO NOT ATTACH HEAT TAPE TO PIPE AND DO NOT COIL HEAT TAPE AROUND PIPE. INTENT IS TO ALLOW OWNER TO REPLACE HEAT TAPE WITHOUT REMOVING INSULATION.
25. PROVIDE MANUAL AIR VENTS WITH BALL VALVE AND HOSE CONNECTION AT ALL HIGH POINTS OF PIPING.
26. ALL WALL & FLOOR PENETRATIONS ARE TO BE SEALED FOR THEIR FIRE RESISTANCE RATING, WHICH INCLUDES EXISTING PLUMBING WORK AS REQUIRED - SEE DETAIL 1/M-502.

NOTES:

- 1) EQUIPMENT OF TRADES OTHER THAN ELECTRICAL
- 2) CONDUIT AND WIRING BY HVAC, PLUMBING CONTRACTOR OR OTHER TRADES.
- 3) IF AN ADDITIONAL DISCONNECT IS REQUIRED BY NEC, IT SHALL BE PROVIDED AND INSTALLED BY THE EQUIPMENT CONTRACTOR.
- 4) A COMBINATION STARTER OR VFD MAY BE USED IN LIEU OF A SEPARATE DISCONNECT SWITCH AND STARTER. LOCATE ADJACENT TO EQUIPMENT.
- 5) FEEDER CIRCUIT WIRING AND CONDUIT IN ELECTRICAL WORK. SEE PANEL BOARD SCHEDULES FOR WIRE AND BREAKER SIZES.
- 6) WIRING TROUGH OR JUNCTION BOX (EQUIPMENT ROOMS, EQUIPMENT AREAS, ETC.) MAY BE SHOWN ON ELECTRICAL PLANS FOR SOME EQUIPMENT. IF NO STARTER OR DISCONNECT IS SUPPLIED, A WIRING TROUGH OR JUNCTION BOX SHALL BE INSTALLED ADJACENT TO EQUIPMENT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE LINE SIDE WIRING TO THE WIRING TROUGH OR JUNCTION BOX. LOAD SIDE WIRING WILL BE PROVIDED BY MECHANICAL CONTRACTOR OR OTHER TRADES.
- 7) PROJECTS UTILIZING AN MCC, THE STARTER CB OR VFD IN THE MCC ARE PROVIDED BY THE ELECTRICAL CONTRACTOR.
- 8) IN ALL CASES THE EQUIPMENT CONTRACTOR SHALL MAKE FINAL CONNECTIONS, START UP AND TEST EQUIPMENT.
- 9) IF THE ROOF TOP EQUIPMENT IS NOT PROVIDED WITH BUILT-IN SWITCH, THE ELECTRICAL CONTRACTOR SHALL PROVIDE A DISCONNECT SWITCH.
- 10) IN A SINGLE PRIME CONTRACT, IT IS THE RESPONSIBILITY OF THE PRIME CONTRACTOR TO COORDINATE BETWEEN THE ELECTRICAL AND OTHER TRADES.



MECH/ELEC DIVISION OF WORK
NOT TO SCALE

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Asheville, NC 28801
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SIGNED AND DATED:			
Digitally signed by Daniel L. Griffie Date: 2023.02.07 14:14:15 -0500			
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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

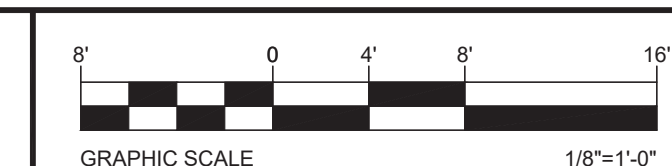
OFFICE MANAGER		DESIGNER	
M. CATHEY		D. GRIFFEE	
PROJECT MANAGER		REVIEWER	
D. GRIFFEE		B. WIGGINS	

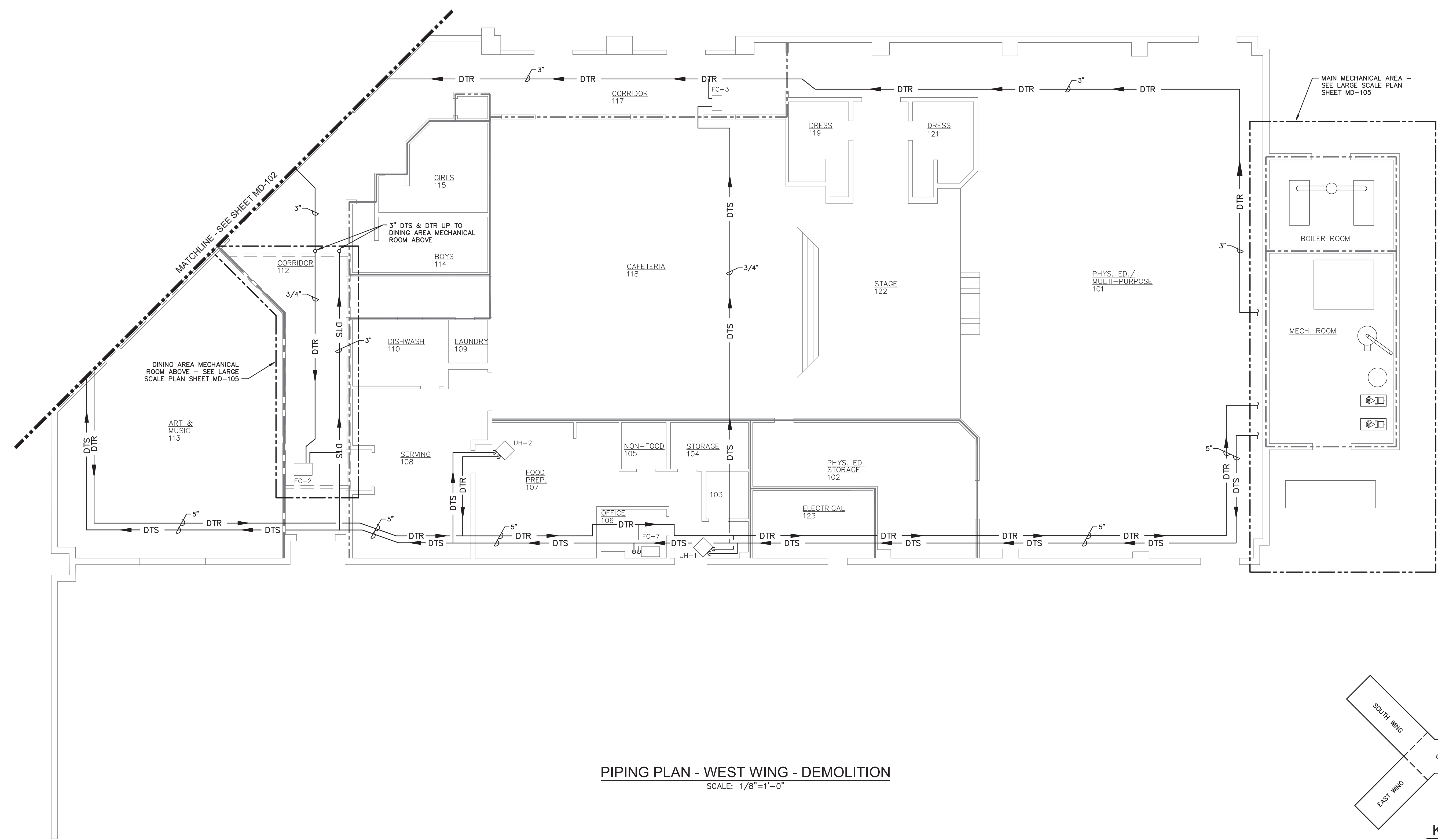
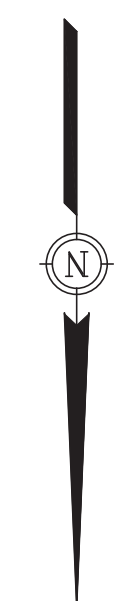
DATE		PROJECT #		FUNDING #	
FEBRUARY 2023		22.00607		N/A	

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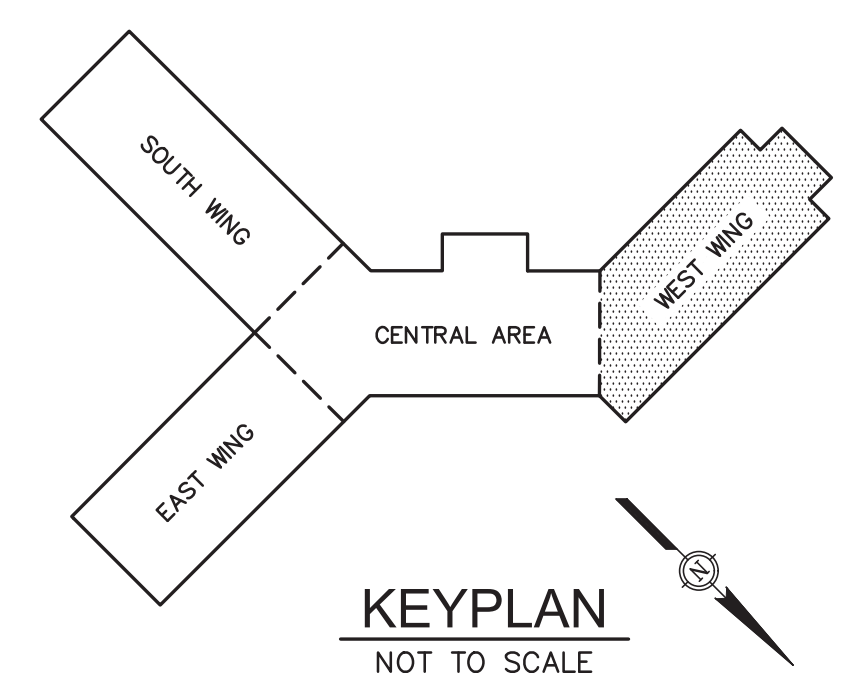
M-001

PIPING PLAN - WEST WING -
NEW WORK





PIPING PLAN - WEST WING - DEMOLITION
SCALE: 1/8"=1'-0"



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SIGNED AND DATED:
Digitally signed by Daniel L. Griffie
Date: 2023.02.07 14:31:01 -0500

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

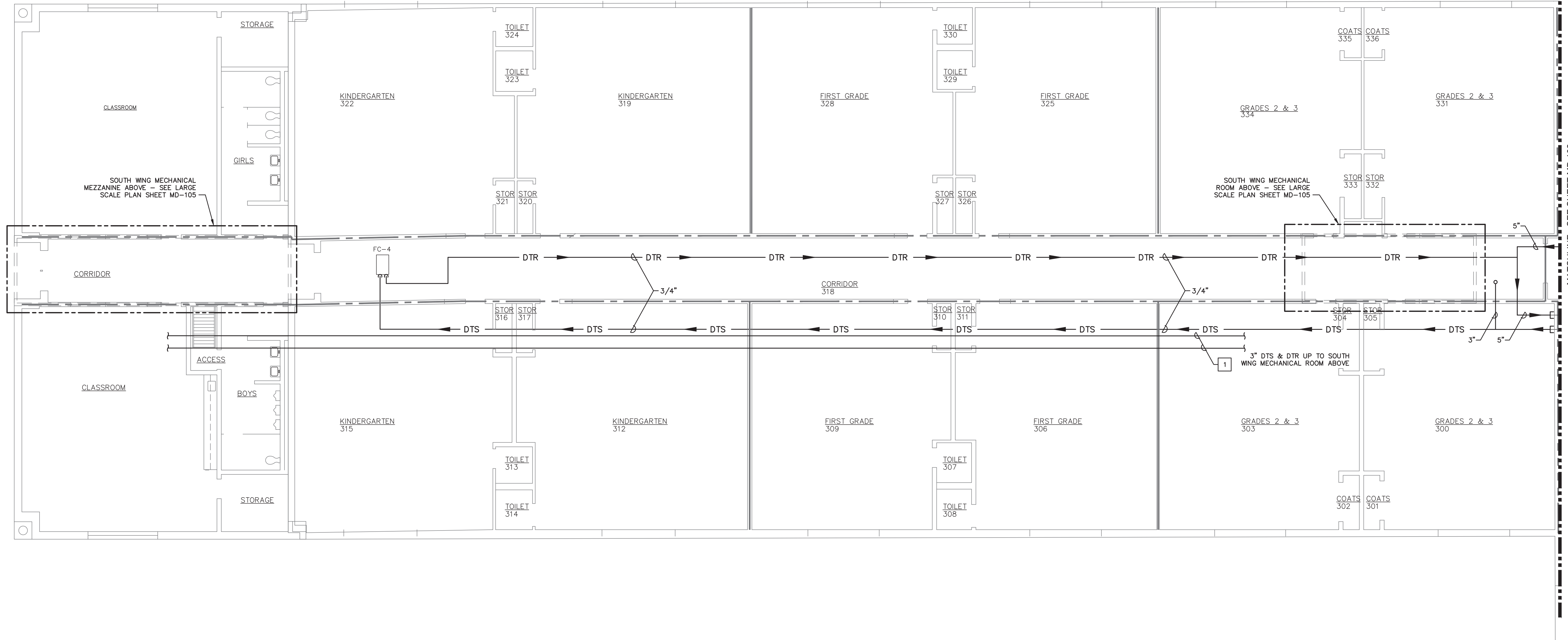
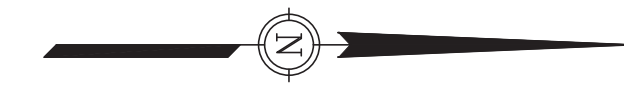
OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
MD-101

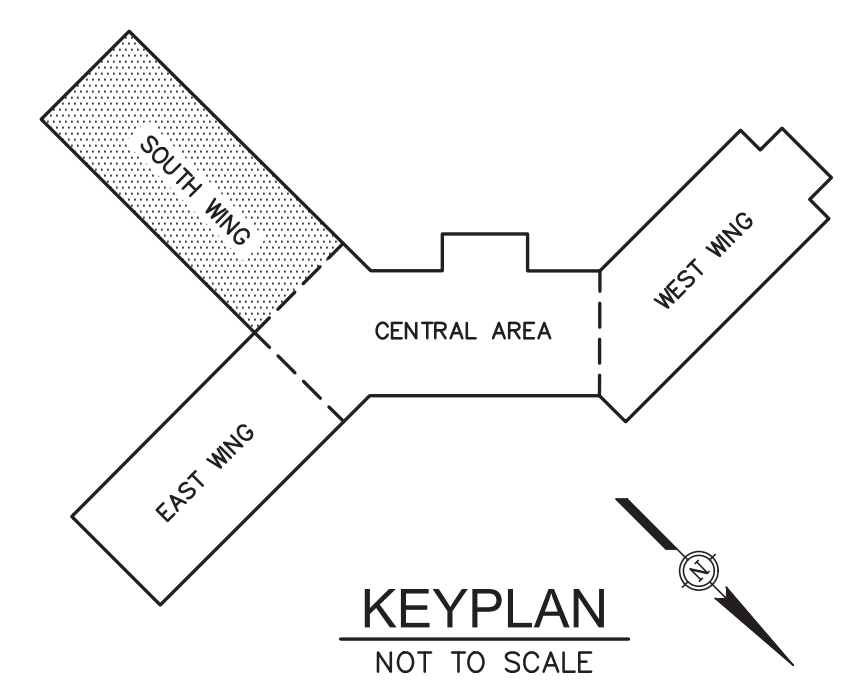
DEMOLITION NOTES:

- 1 1-1/4" DTS AND DTR CONNECTS AT SOUTH WING MECHANICAL ROOM AND RUNS TO (2) AHU'S ON MECHANICAL MEZZANINE. DEMO THIS BRANCH.



MATCHLINE - SEE SHEET MD-102

PIPING PLAN - SOUTH WING - DEMOLITION
SCALE: 1/8"=1'-0"



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828.252.0575
NC Firm License # C-0459
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SIGNED AND DATED:
Daniel L. Griffie
Digitally signed by Daniel L. Griffie
Date: 2023.02.07 14:33:19 -0500

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER
M. CATHEY

DESIGNER
D. GRIFFEE

PROJECT MANAGER
D. GRIFFEE

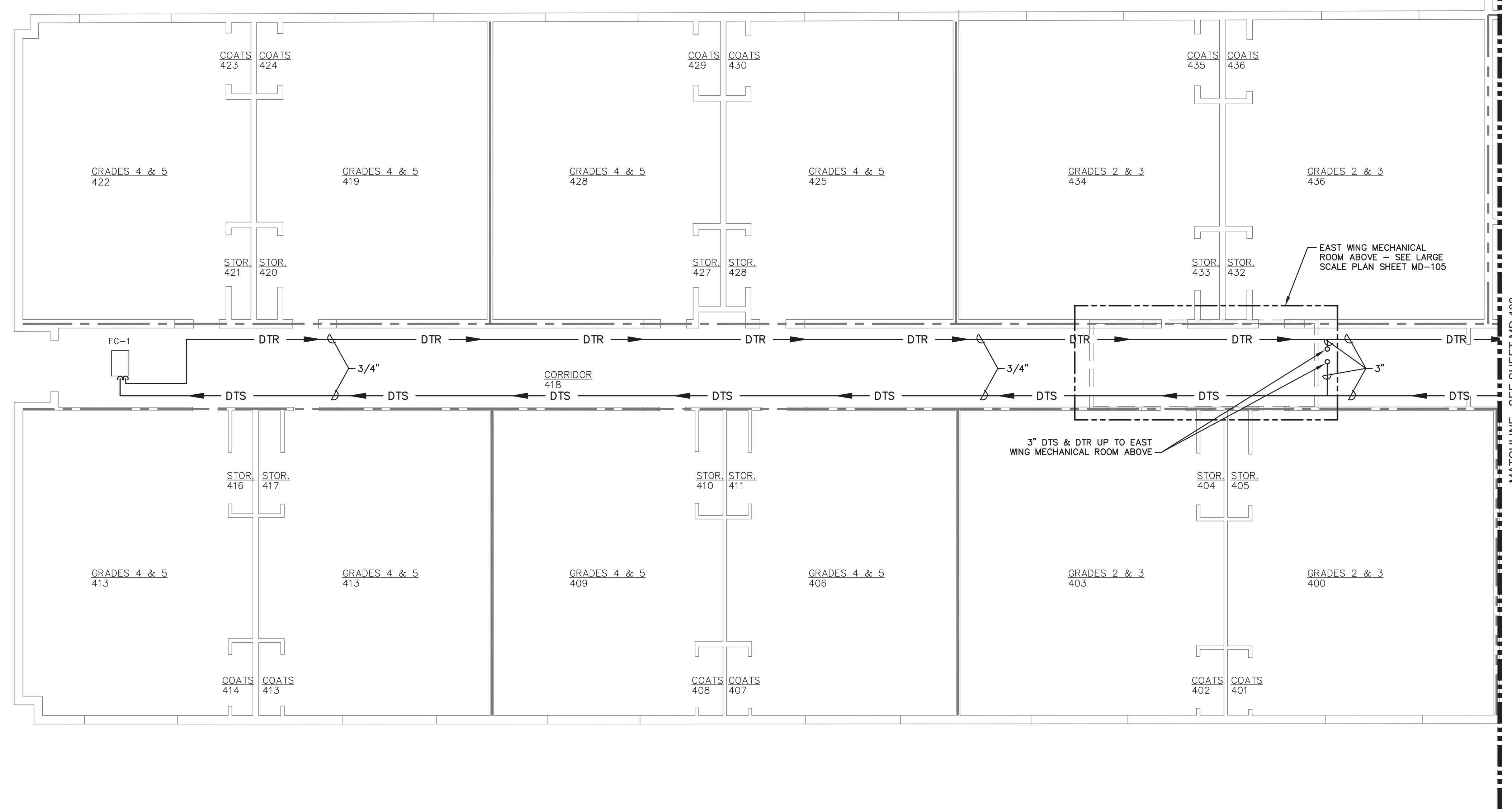
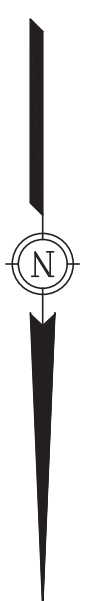
REVIEWER
B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
MD-103

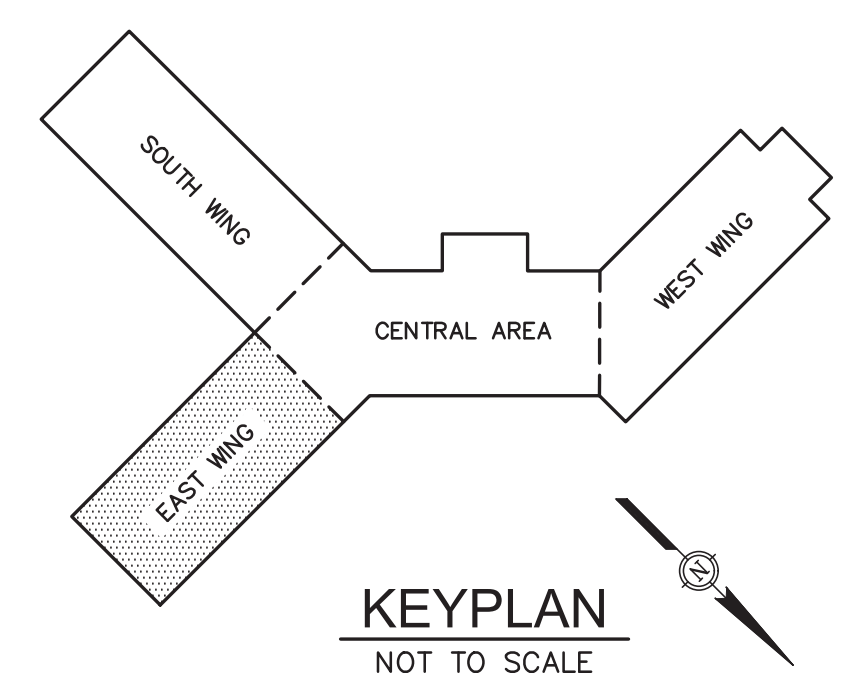
P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\MECHANICAL\22.00607 MD-101 - MD-104 FLOOR PLANS DEMO.DWG PLOT DATE: 1/12/2023 3:49 PM LED COOPER

22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS



MATCHLINE - SEE SHEET MD-102

PIPING PLAN - EAST WING - DEMOLITION
SCALE: 1/8"=1'-0"



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55 Broad Street
Asheville, NC 28801
828.252.0575
NC Firm License # C-0459
mcgillassociates.com



SIGNED AND DATED:
Daniel L. Griffie
Digitally signed by Daniel L. Griffie
Date: 2023.02.07 14:34:35 -0500
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NO.	DATE	BY	DESCRIPTION

**PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS**

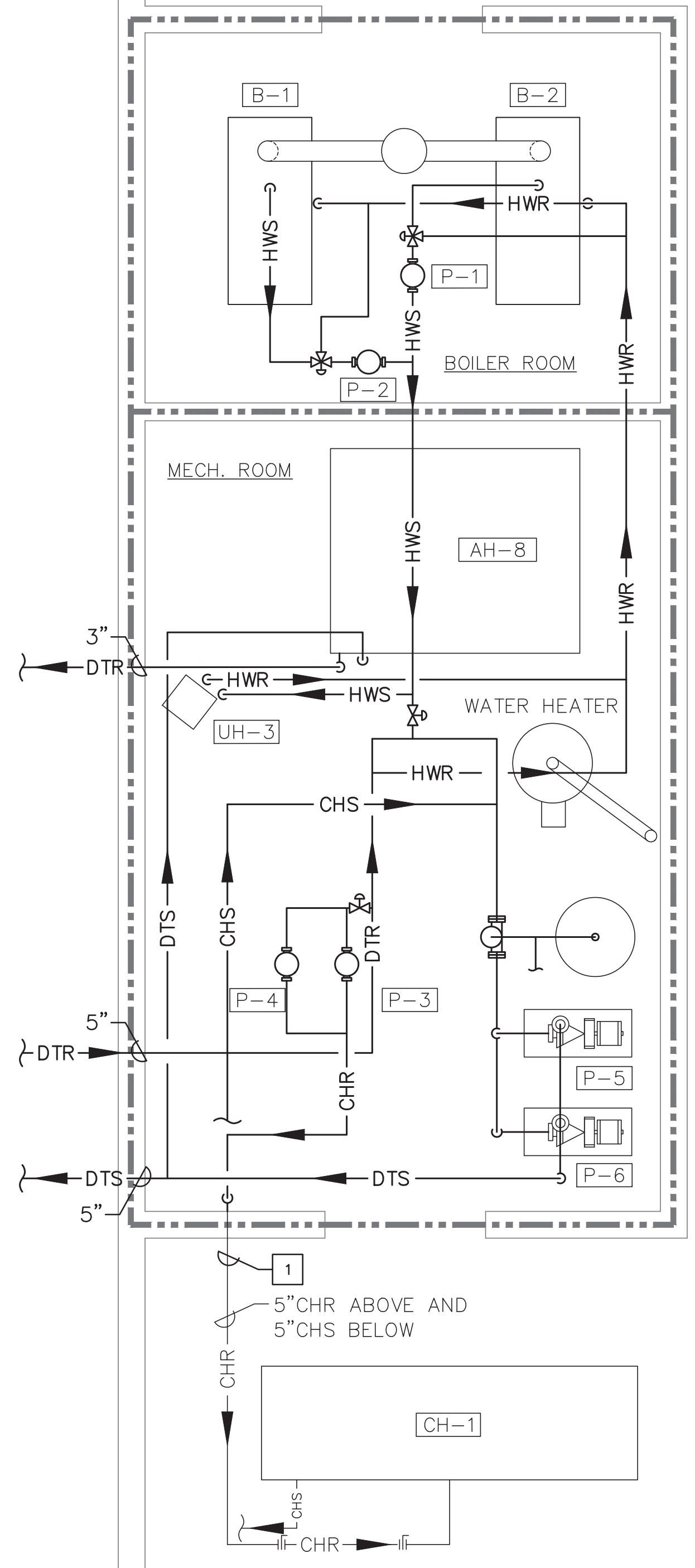
TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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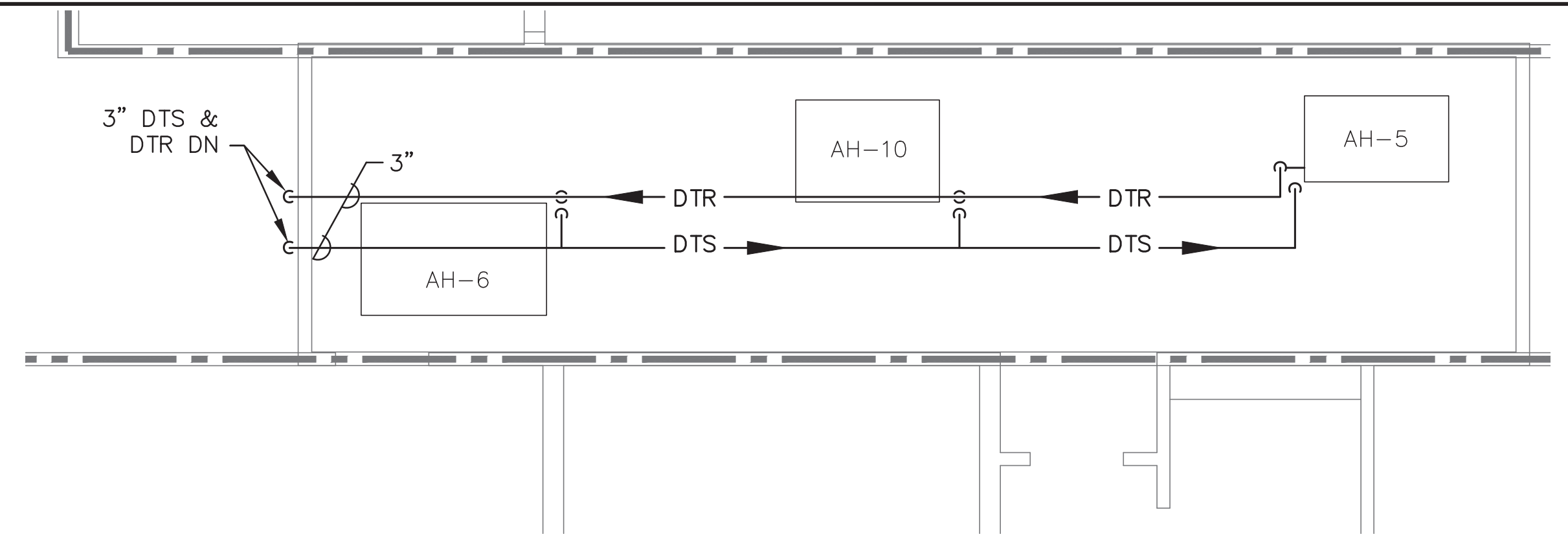
SHEET
MD-104

P:\2022\22.00607-TRANSLVANIACOUNTYSCHOOLS-PISGAHFOREST-ELEMENTARY-HVAC-PIPING-IMPROVEMENTS-DEMOLITION-PLANS-DEMO-DWG-01 ENLARGED PLANS DEMO DWG PLOT DATE 1/31/2023 3:48 PM ED COOPER

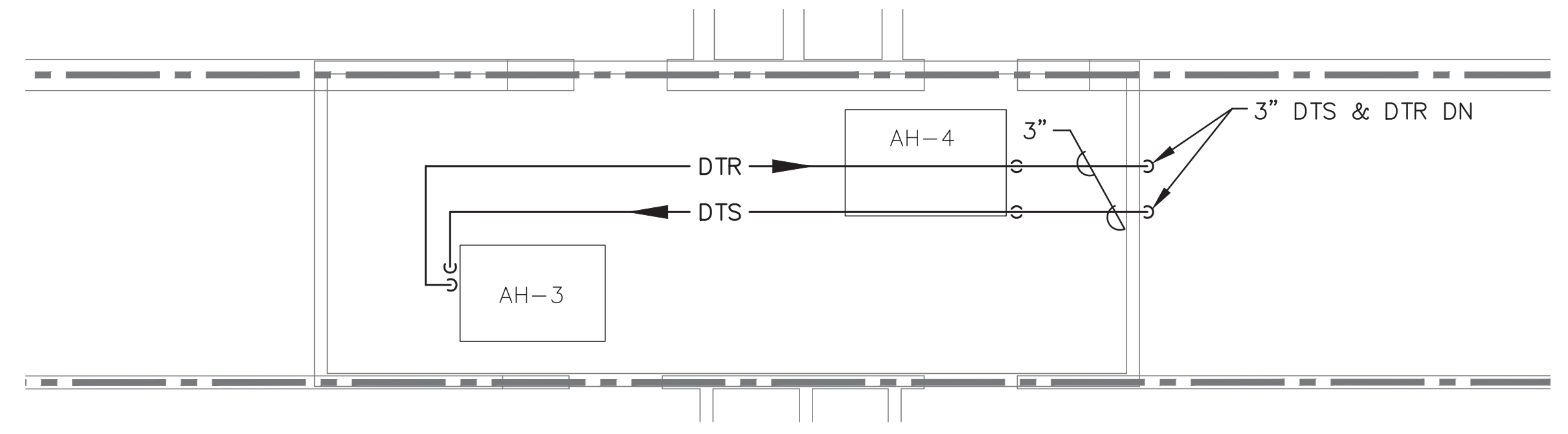


DEMOLITION NOTE:
1 OUTDOOR CHW PIPING IS TO BE REUSED. DEMO TO JUST INSIDE MECHANICAL ROOM WALL.

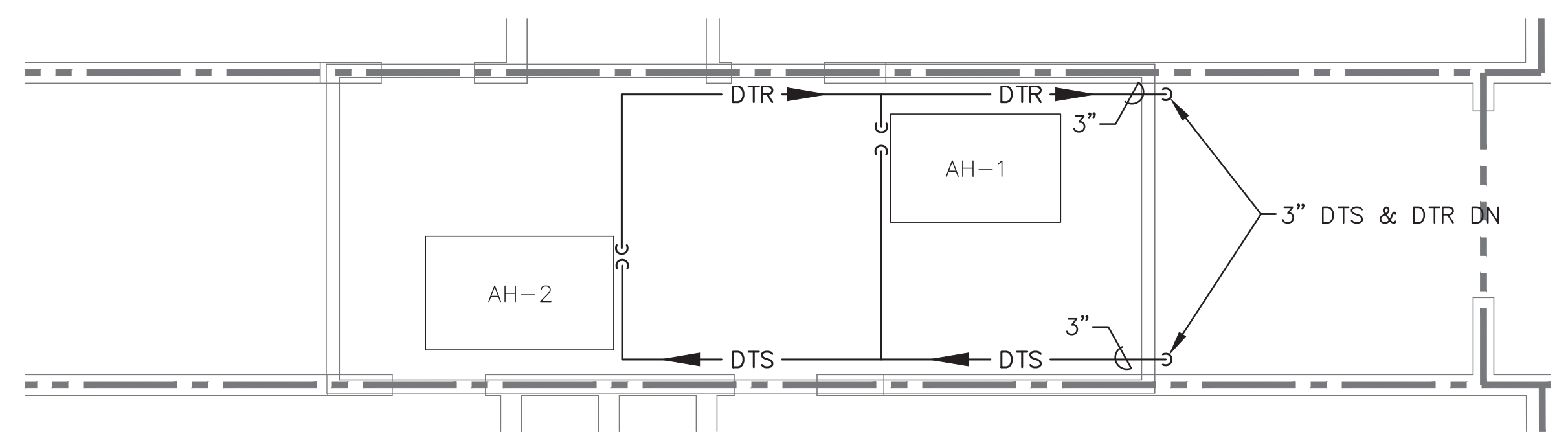
MAIN MECHANICAL AREA PLAN
SCALE: 1/4"=1'-0"



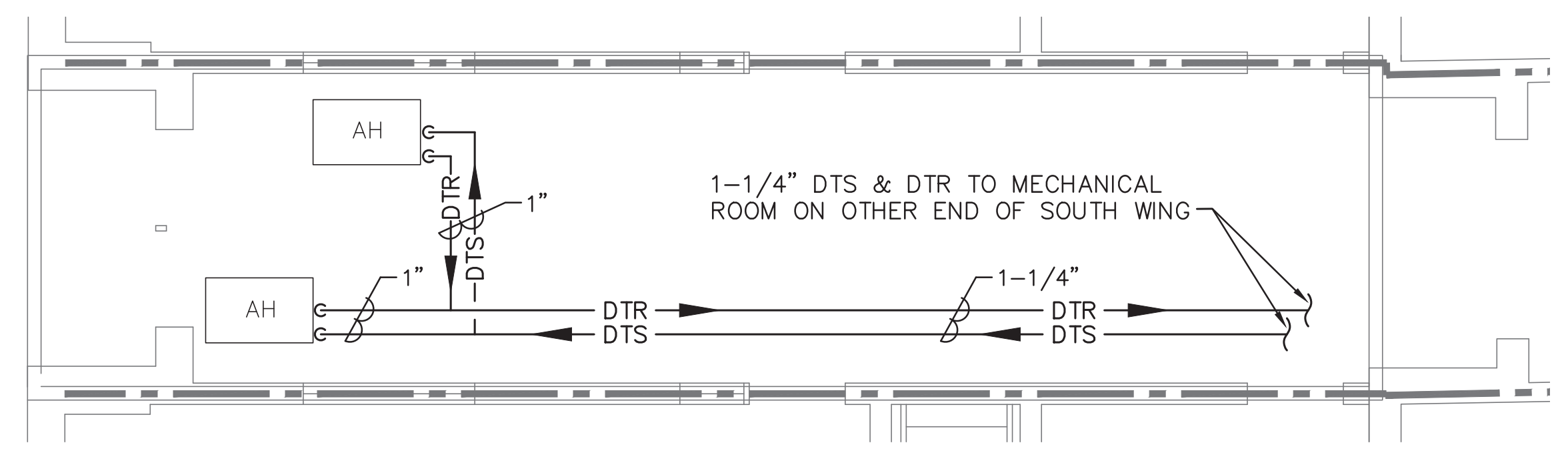
CENTRAL AREA MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



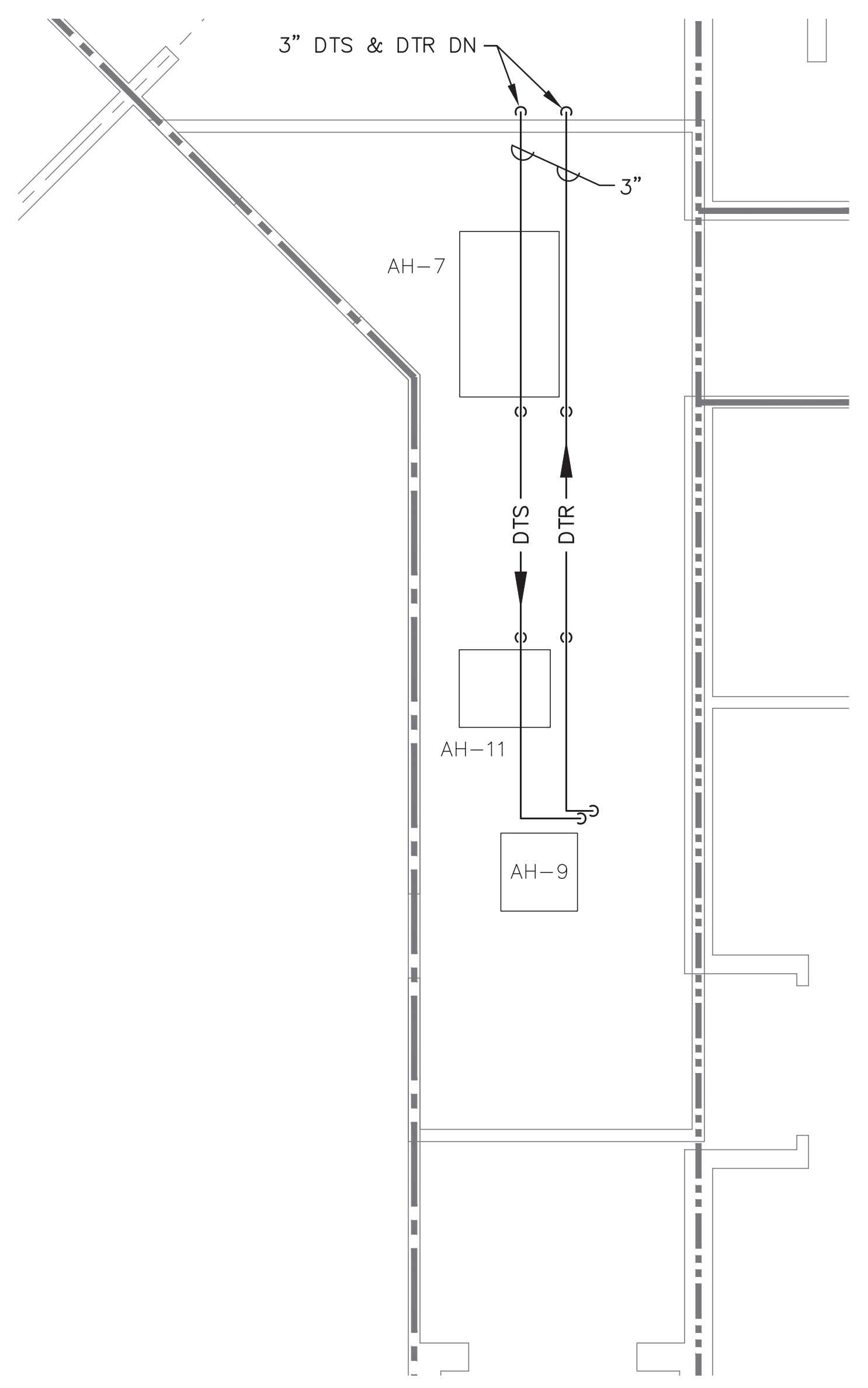
EAST WING MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



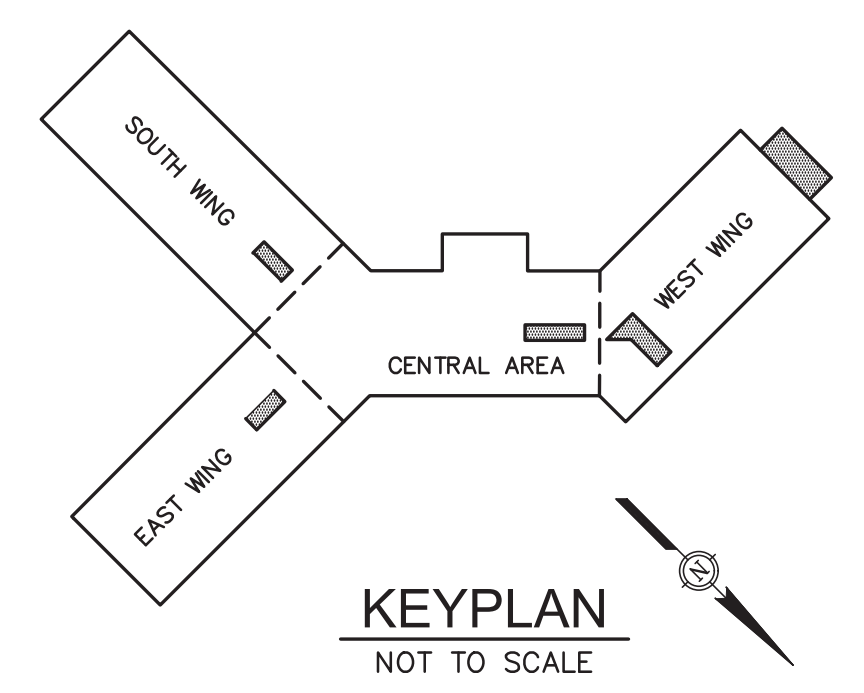
SOUTH WING MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



SOUTH WING MECHANICAL MEZZANINE PLAN
SCALE: 1/4"=1'-0"



DINING AREA MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSLVANIA COUNTY SCHOOLS
TRANSLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

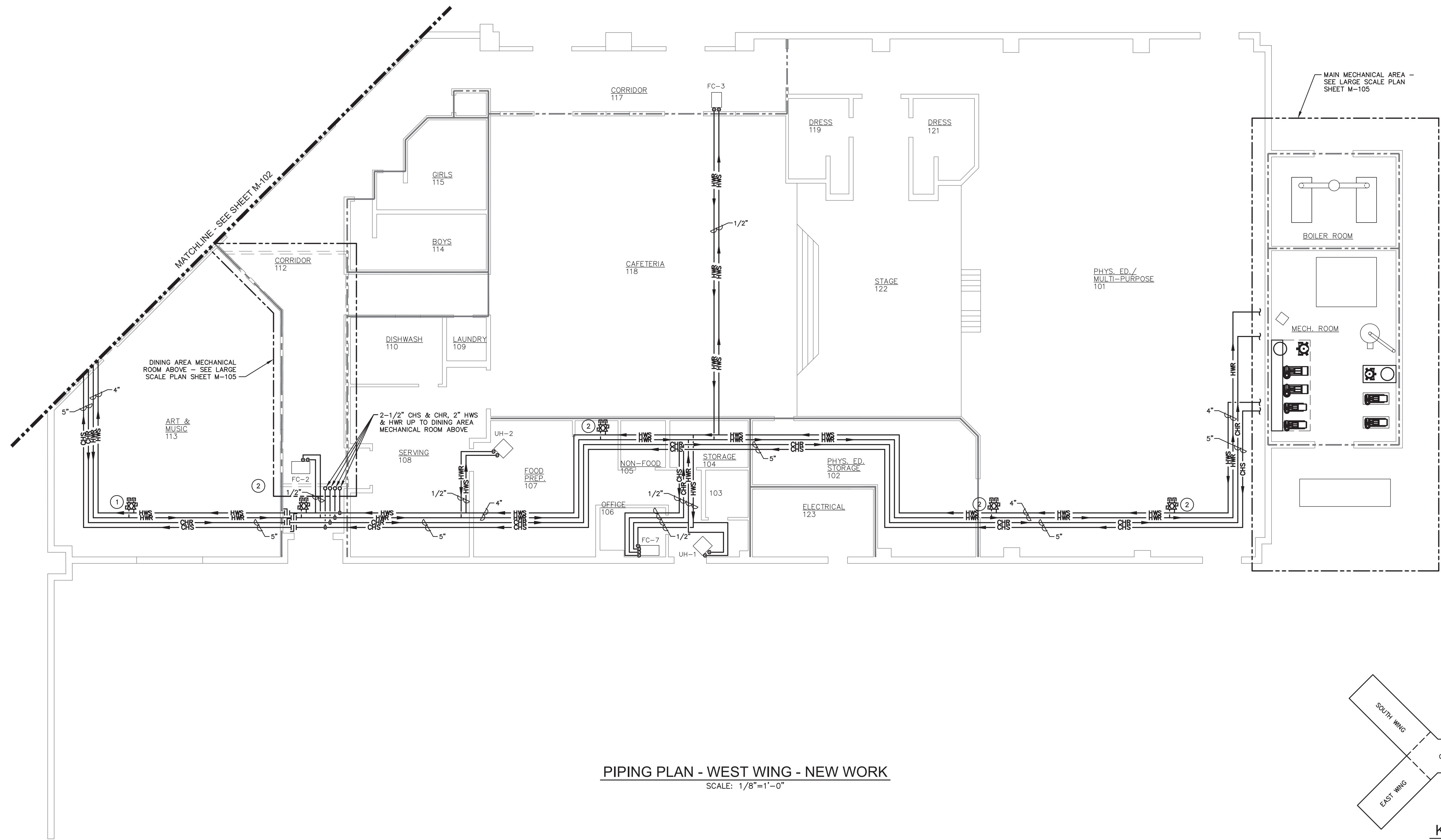
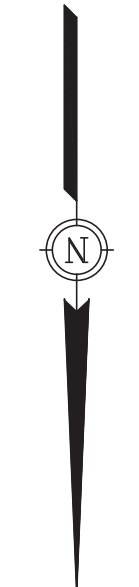
DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
MD-401

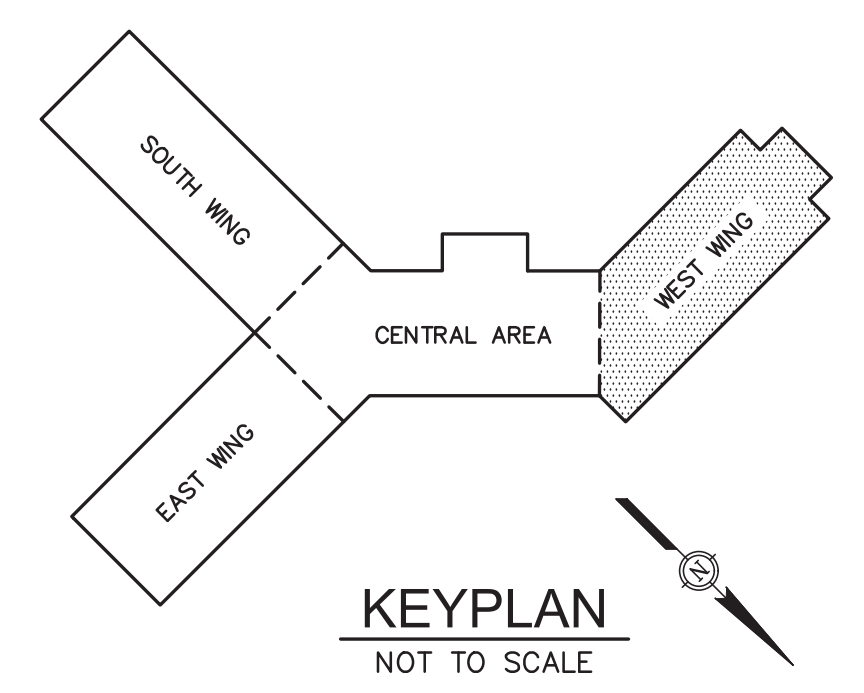
22.00607 TRANSLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

DRAWING NOTES:

- ① 1" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.
- ② 1-1/2" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.

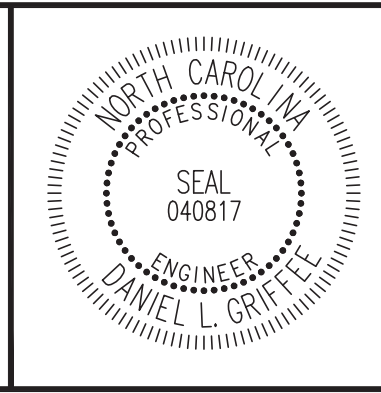


PIPING PLAN - WEST WING - NEW WORK
SCALE: 1/8"=1'-0"



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Date: 2023.02.07 14:15:54 -0500
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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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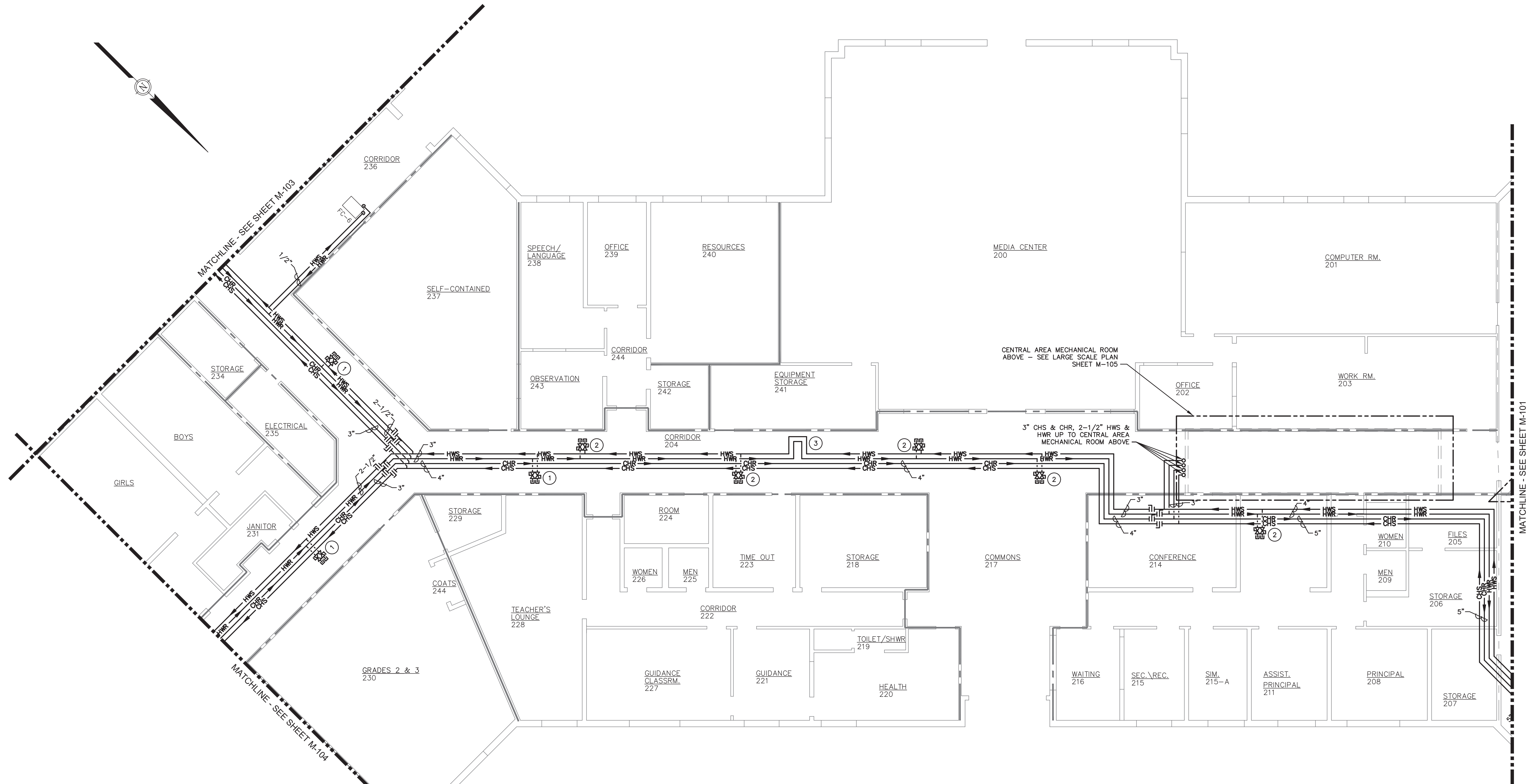
SHEET
M-101

P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\MECHANICAL\22.00607 M-101 - M104 FLOOR PLANS NEW WORK.DWG PLOT DATE 1/31/2023 3:50 PM ED COOPER

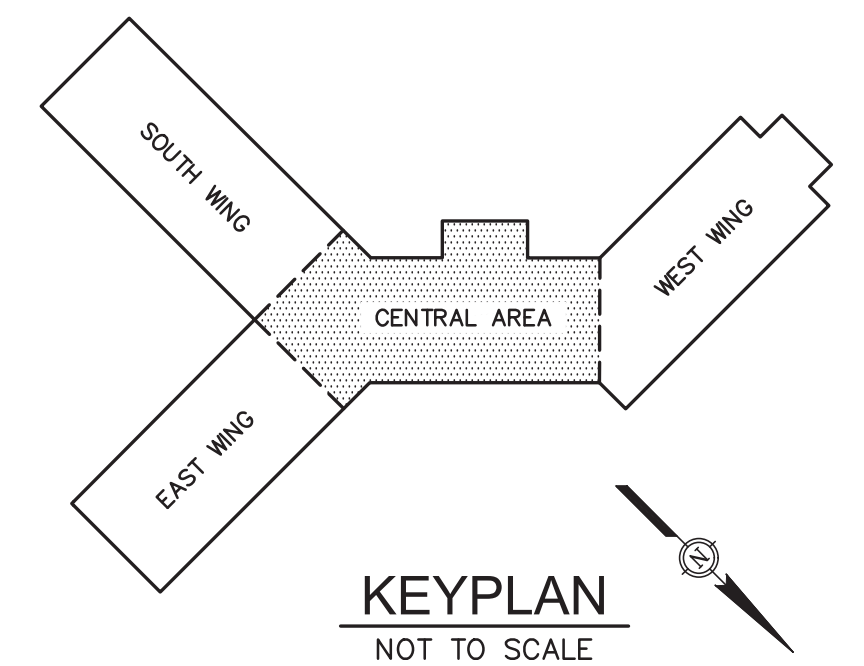
22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

DRAWING NOTES:

- ① 3/4" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.
- ② 1-1/2" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.
- ③ EXPANSION LOOP ON HWS AND HWR. SEE SPEC SECTION 232113.



PIPING PLAN - CENTRAL AREA - NEW WORK
SCALE: 1/8"=1'-0"



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PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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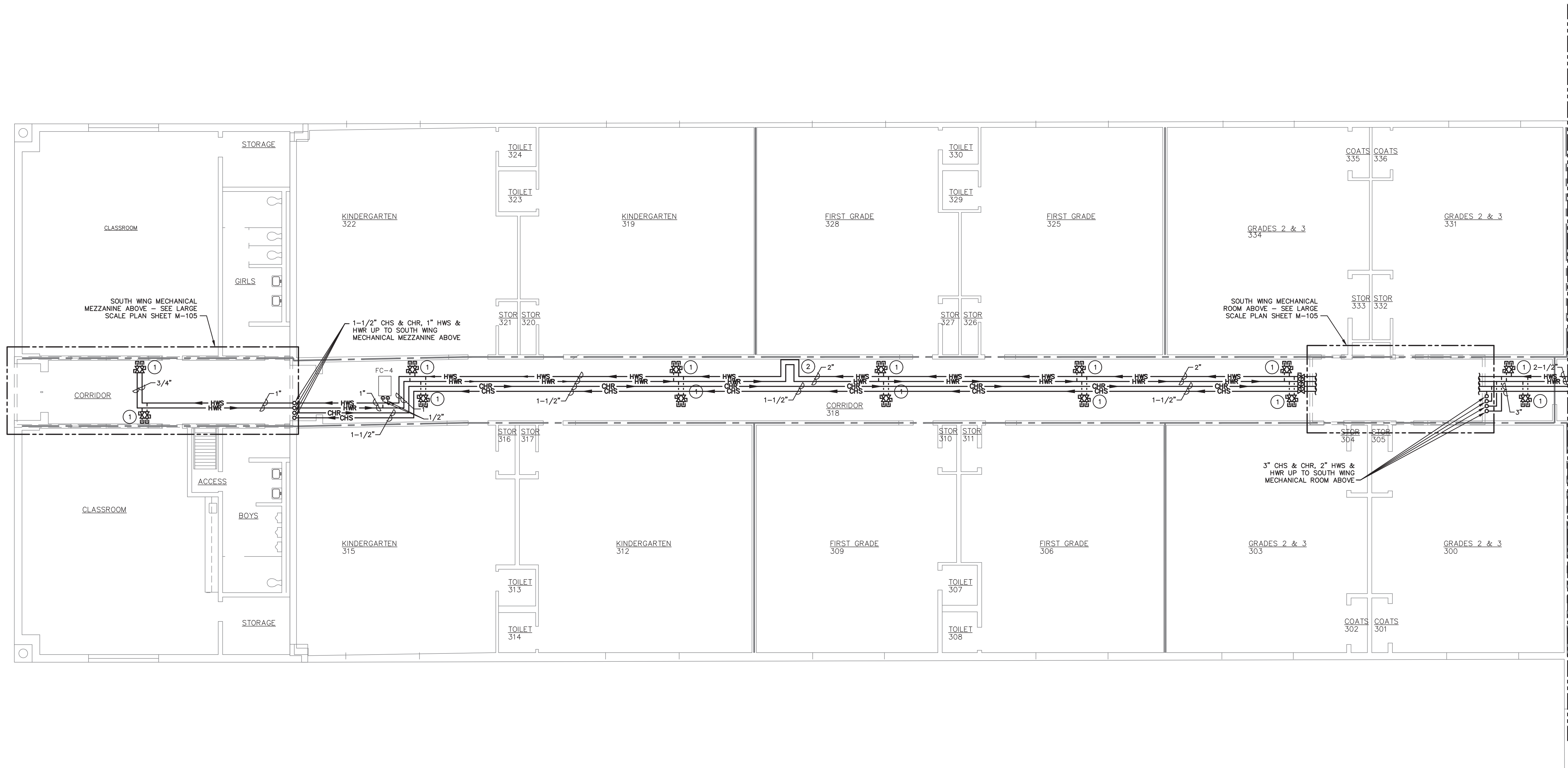
SHEET
M-102

P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\MECHANICAL\22.00607 M-101 - M104 FLOOR PLANS NEW WORK.DWG PLOT DATE 1/31/2023 3:49 PM ED COOPER

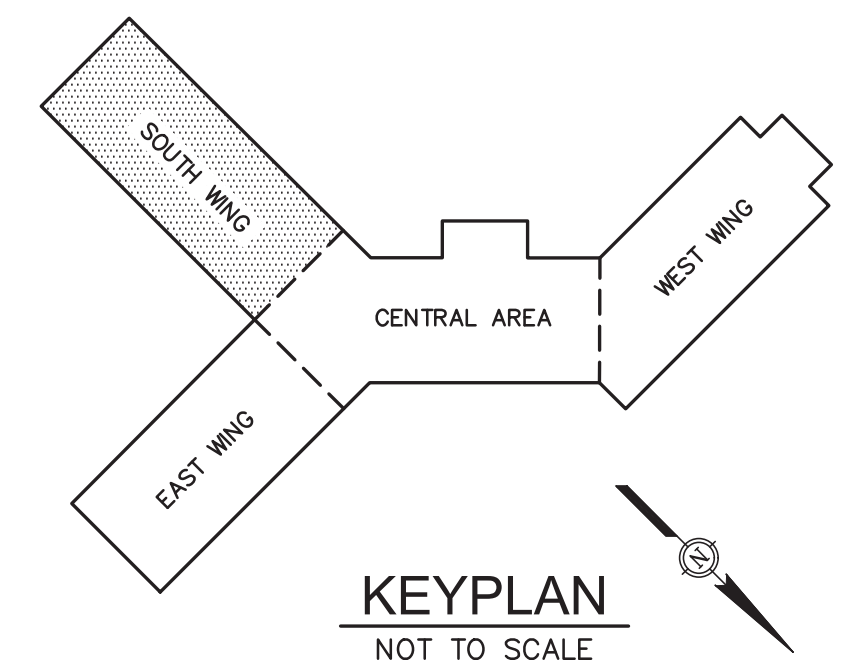
22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

DRAWING NOTES:

- ① 3/4" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.
- ② EXPANSION LOOP ON HWS AND HWR. SEE SPEC SECTION 232113.



PIPING PLAN - SOUTH WING - NEW WORK
SCALE: 1/8"=1'-0"



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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS
TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER
M. CATHEY

DESIGNER
D. GRIFFEE

PROJECT MANAGER
D. GRIFFEE

REVIEWER
B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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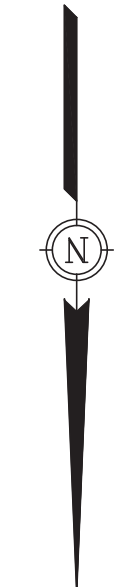
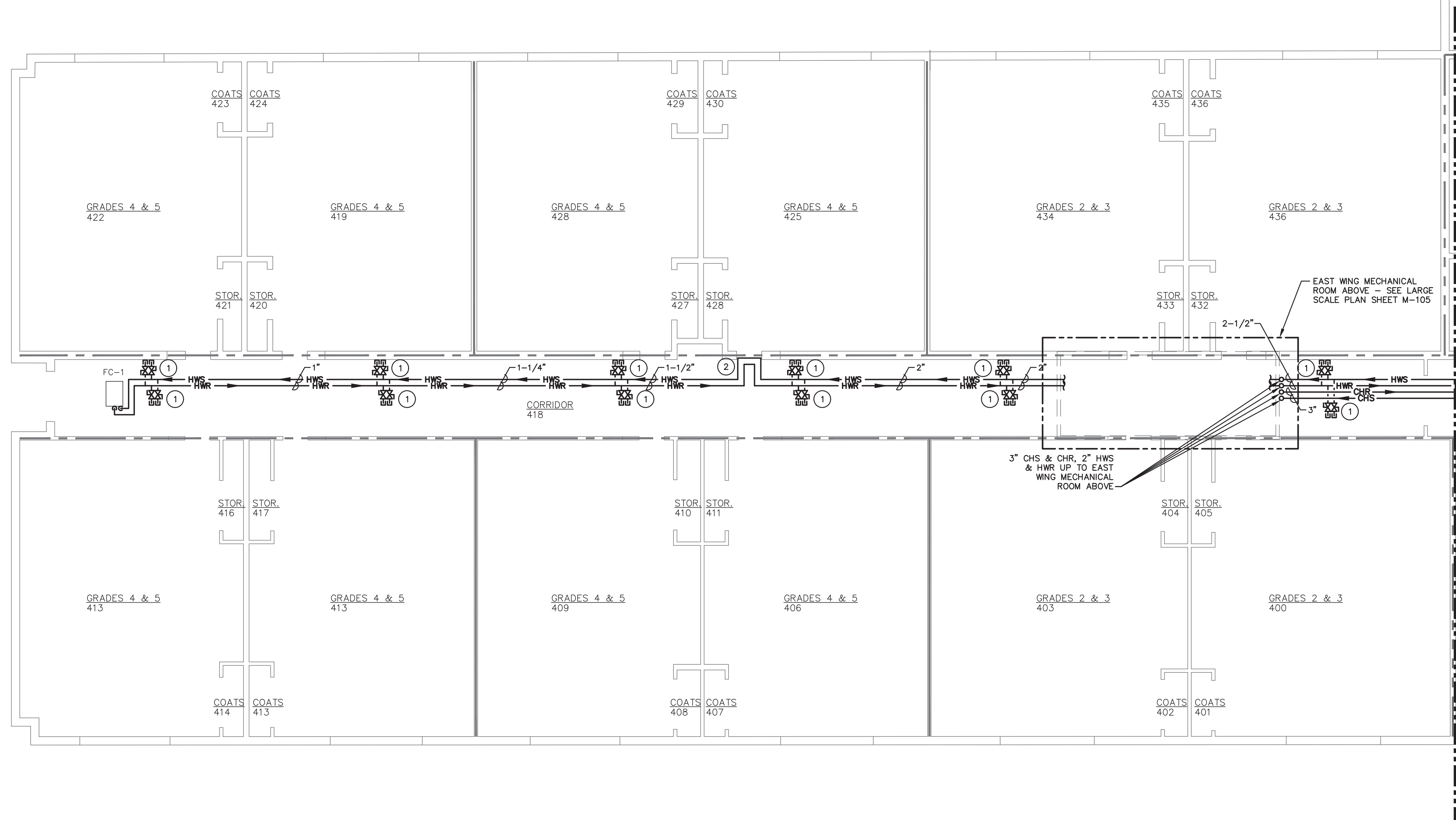
SHEET
M-103

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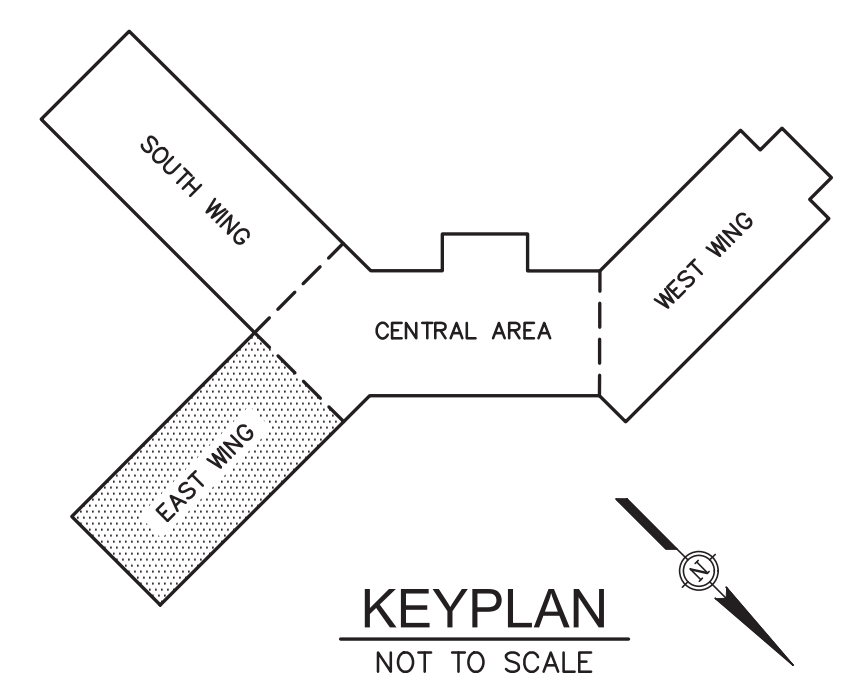
22.00607 TRANSYLVANIA COUNTY SCHOOLS -PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

DRAWING NOTES:

- 1 3/4" BRANCH WITH VALVE AND CAP, LEAVE VALVE OPEN.
- 2 EXPANSION LOOP ON HWS AND HWR. SEE SPEC SECTION 232113.

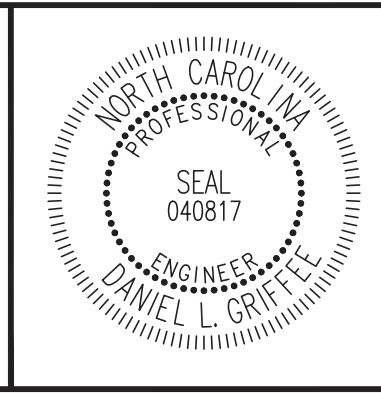


PIPING PLAN - EAST WING - NEW WORK
SCALE: 1/8"=1'-0"



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Asheville, NC 28801
828.252.0575
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SIGNED AND DATED:

Daniel L. Griffie

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

PIPING PLAN - EAST WING - NEW WORK	
DATE FEBRUARY 2023	FUNDING # N/A
PROJECT # 22.00607	

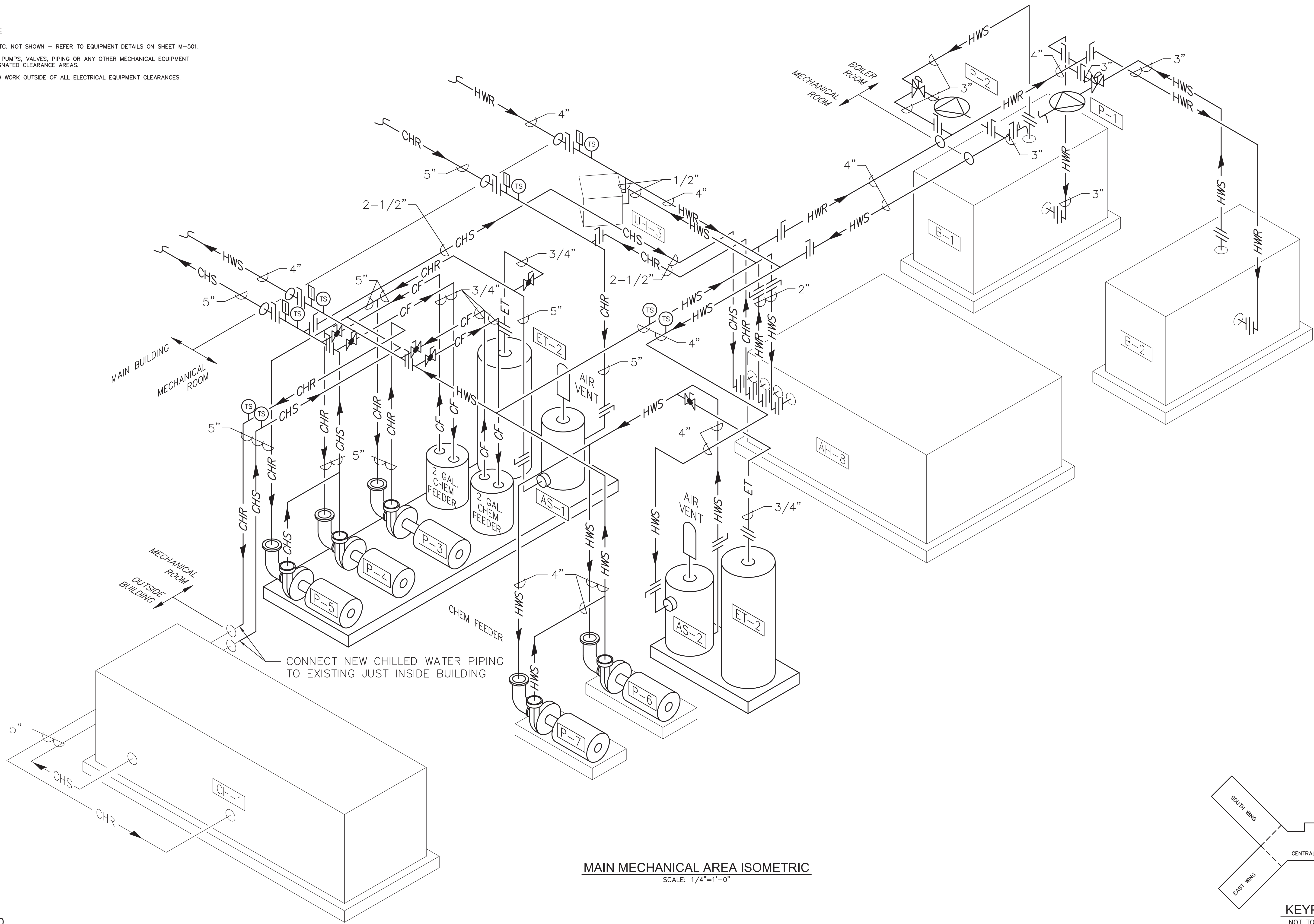
SHEET
M-104

P:\2022\22.00607-TRANSYLVANIA\KCSCH-PISGAH FOREST HVACDRANINGSMECHANICAL\22.00607 M-01 - M104 FLOOR PLANS NEW WORK.DWG PLOT DATE 1/31/2023 3:49 PM ED COOPER

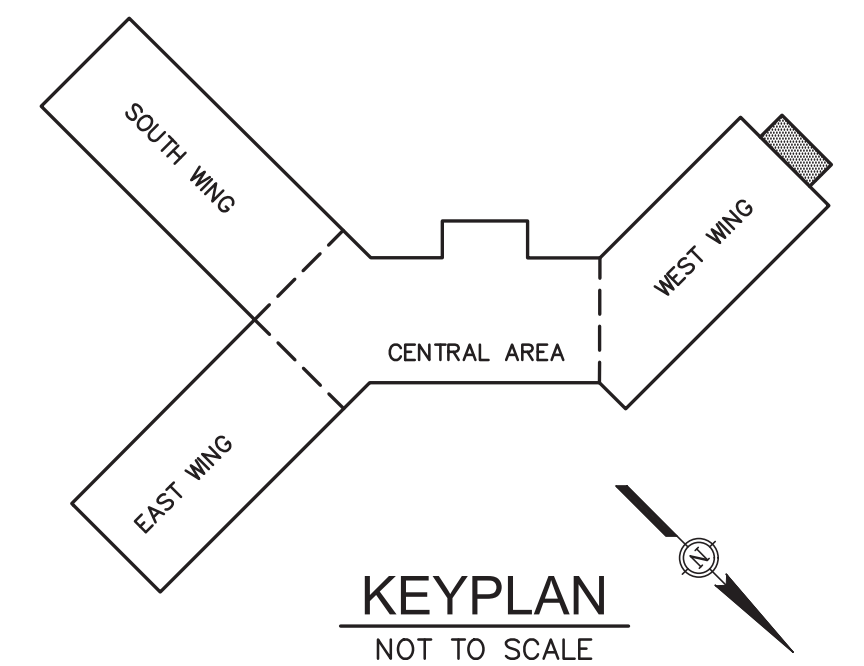
22.00607 TRANSYLVANIA COUNTY SCHOOLS -PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

GENERAL NOTES:

1. SOME VALVES, ETC. NOT SHOWN - REFER TO EQUIPMENT DETAILS ON SHEET M-501.
2. DO NOT INSTALL PUMPS, VALVES, PIPING OR ANY OTHER MECHANICAL EQUIPMENT WITHIN ALL DESIGNATED CLEARANCE AREAS.
3. INSTALL ALL NEW WORK OUTSIDE OF ALL ELECTRICAL EQUIPMENT CLEARANCES.



MAIN MECHANICAL AREA ISOMETRIC
SCALE: 1/4"=1'-0"



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Asheville, NC 28801
828.252.0575
NC Firm License # C-0459
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Daniel L. Griffie
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Date: 2023.02.07
14:23:45 -05'00'

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSLYVANIA COUNTY SCHOOLS
TRANSLYVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

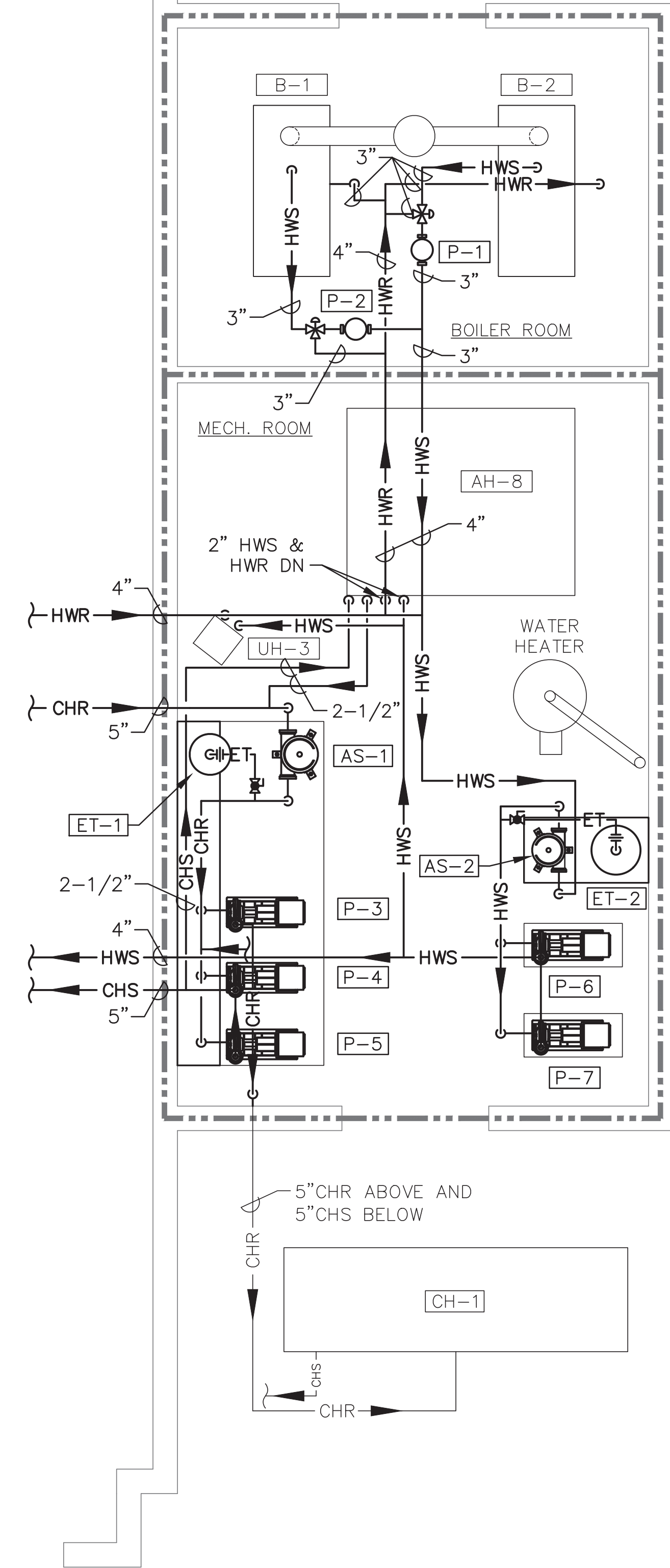
DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
M-301

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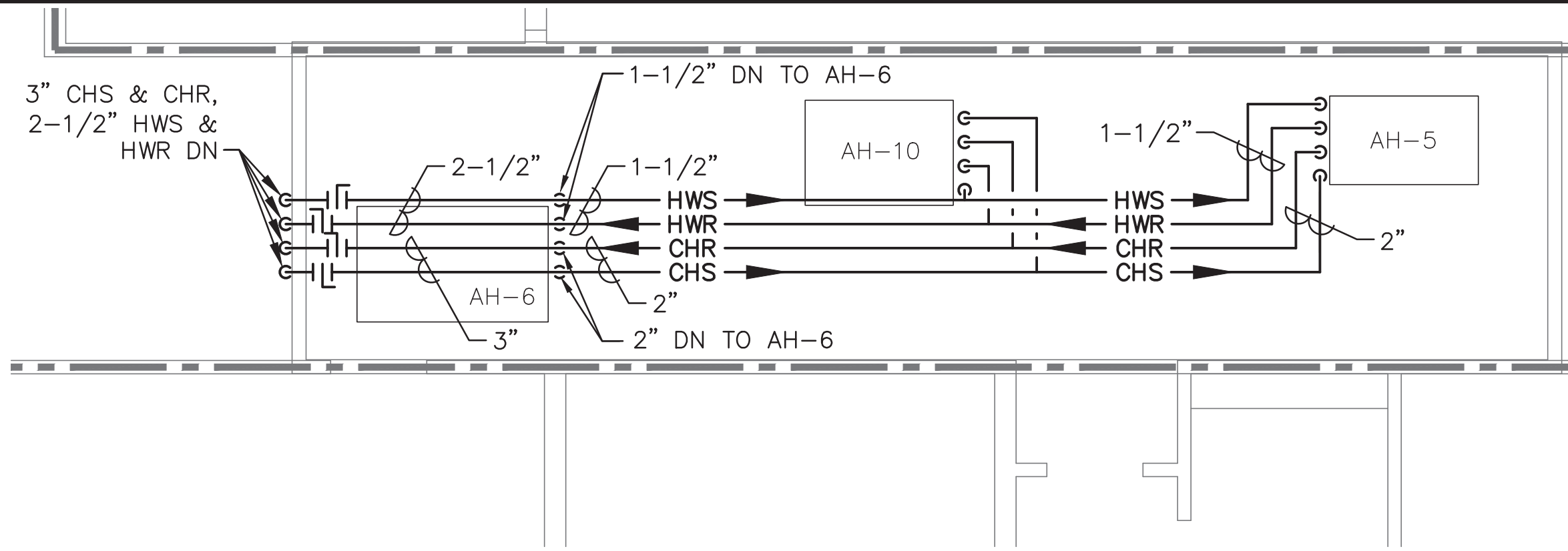
22.00607 TRANSLYVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

P:\2022\22.00607-TRANSLVANIACOUNTYSCHOOLS-PISGAHFOREST-ELEMENTARY-HVAC-PIPING-IMPROVEMENTS\22.00607-TRANSLVANIACOUNTYSCHOOLS-PISGAHFOREST-ELEMENTARY-HVAC-PIPING-IMPROVEMENTS-NEW-WORK-DWG.PLOT DATE: 1/31/2023 3:49 PM EDCOOPER

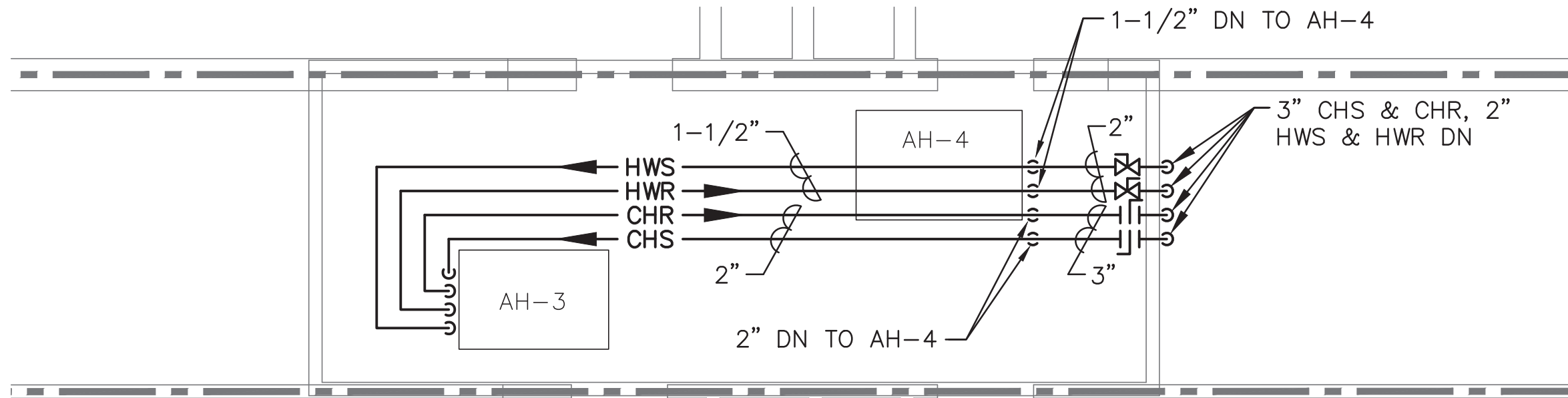


NOTE:
1. ALL VALVES, FITTINGS, PIPE SIZES, AND NEW CHEM FEEDERS WITH ASSOCIATED PIPING ARE NOT SHOWN ON THIS PLAN, REFER TO CHILLED AND HOT WATER SYSTEM ISOMETRIC ON SHEET M-301.

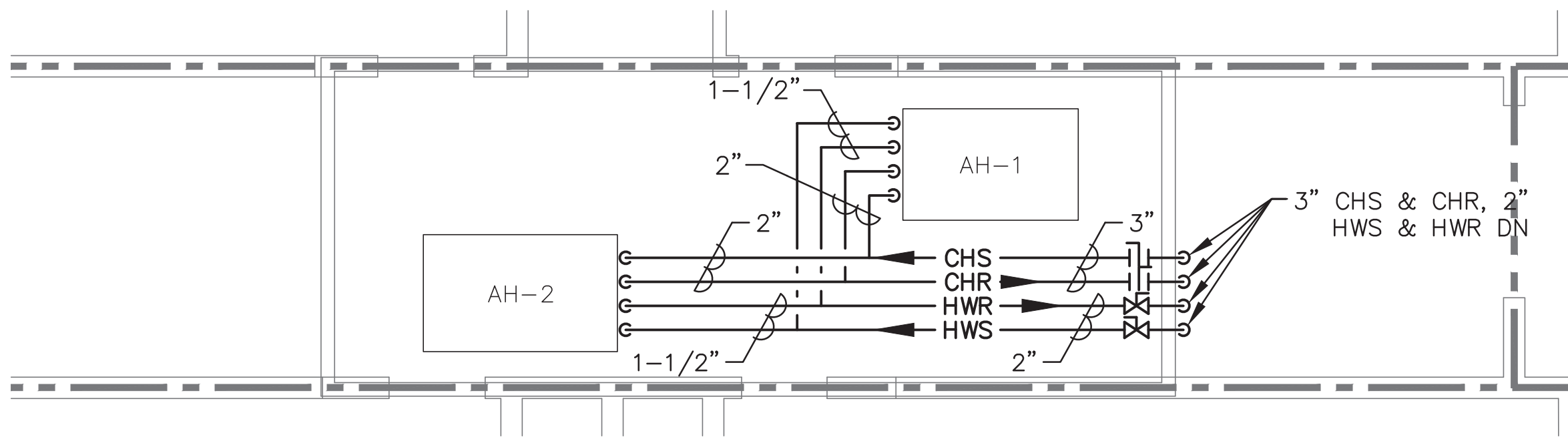
MAIN MECHANICAL AREA PLAN
SCALE: 1/4"=1'-0"



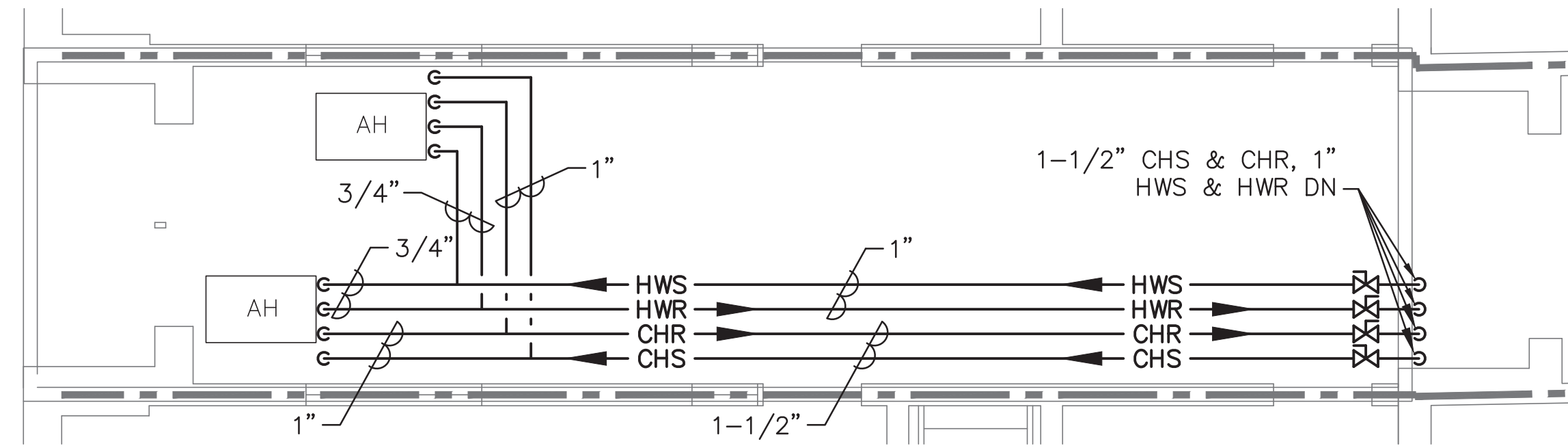
CENTRAL AREA MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



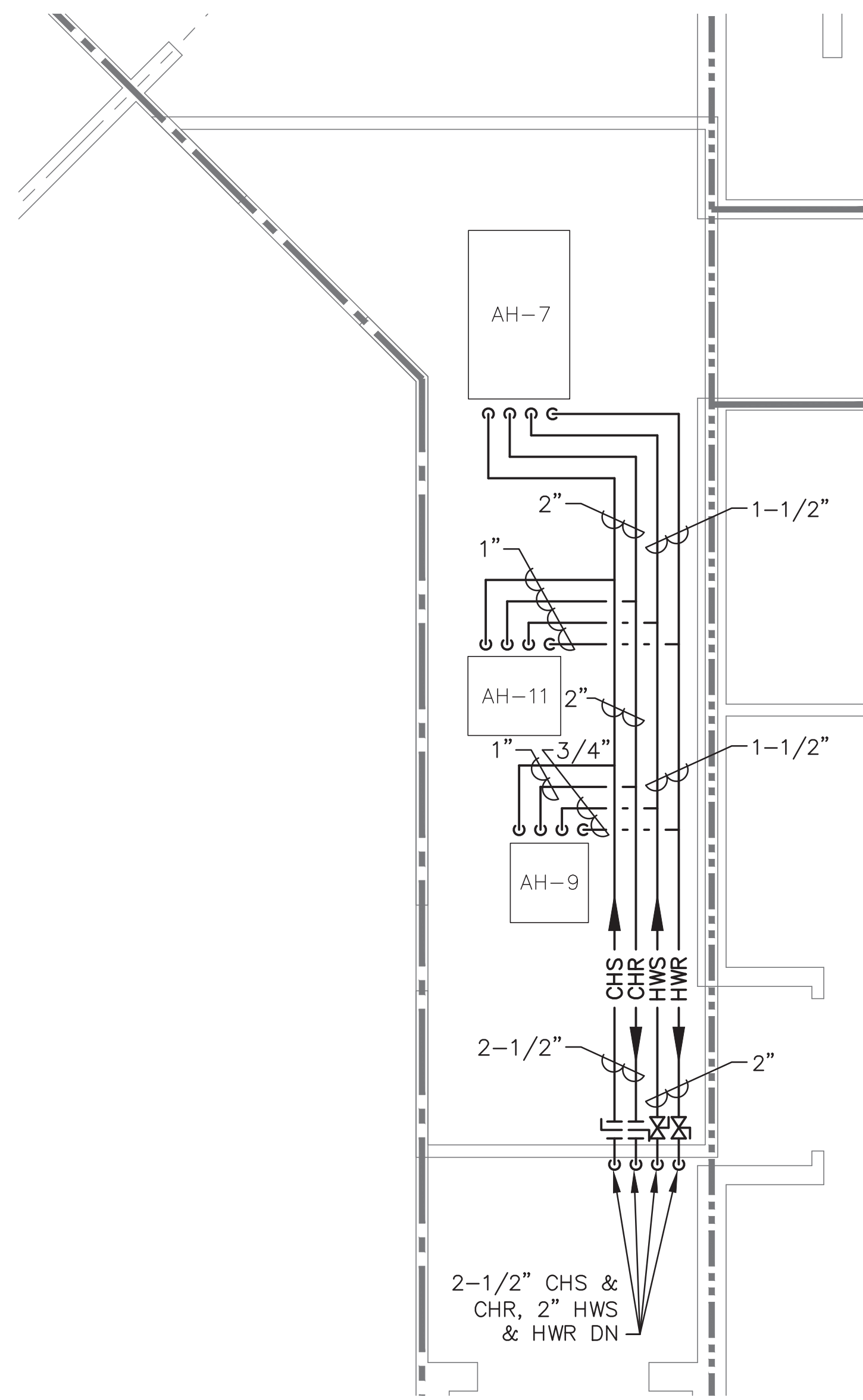
EAST WING MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



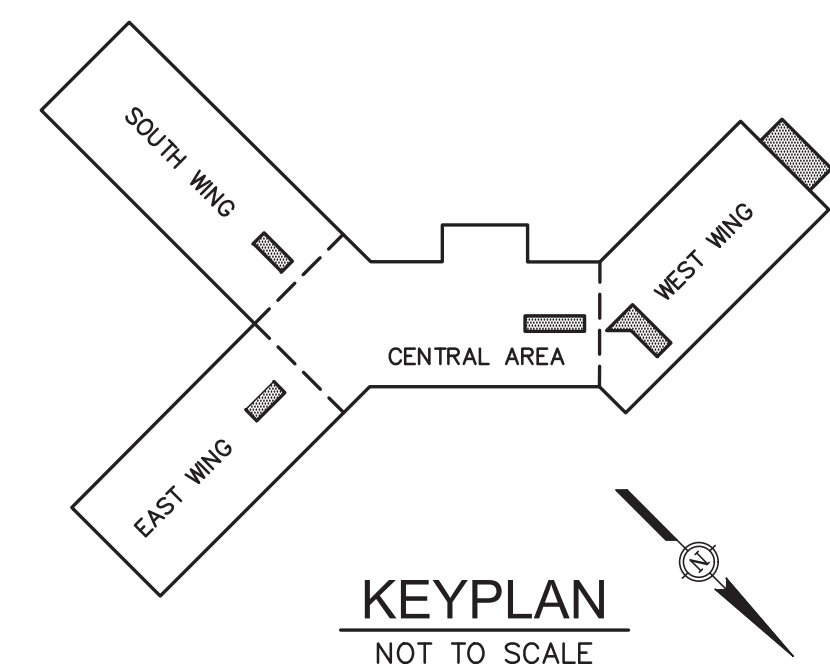
SOUTH WING MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



SOUTH WING MECHANICAL MEZZANINE PLAN
SCALE: 1/4"=1'-0"



DINING AREA MECHANICAL ROOM PLAN
SCALE: 1/4"=1'-0"



KEYPLAN
NOT TO SCALE

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SIGNED AND DATED:
Daniel L. Griffie
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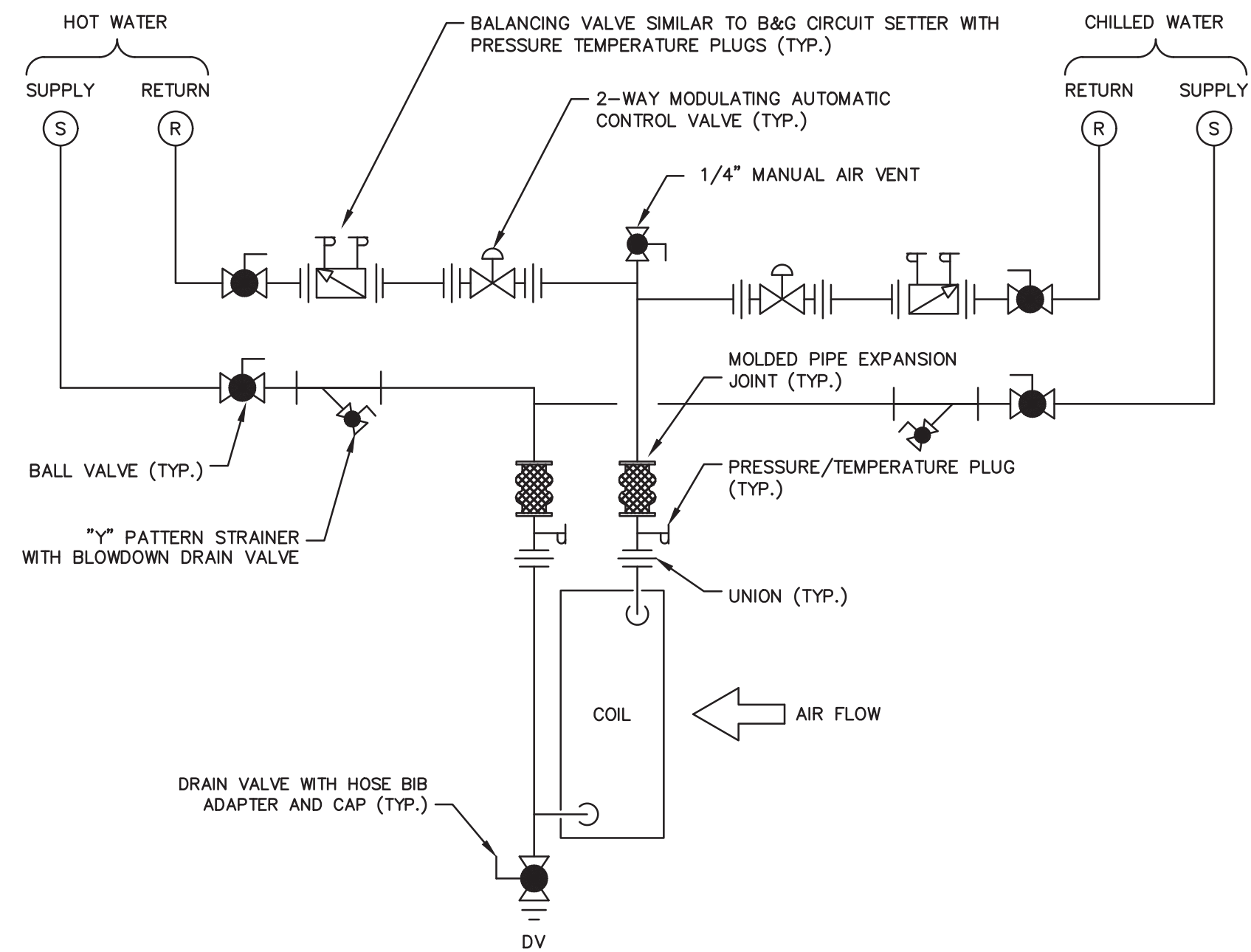
NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS
TRANSLVANIA COUNTY SCHOOLS
TRANSLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFIE
PROJECT MANAGER D. GRIFFIE	REVIEWER B. WIGGINS

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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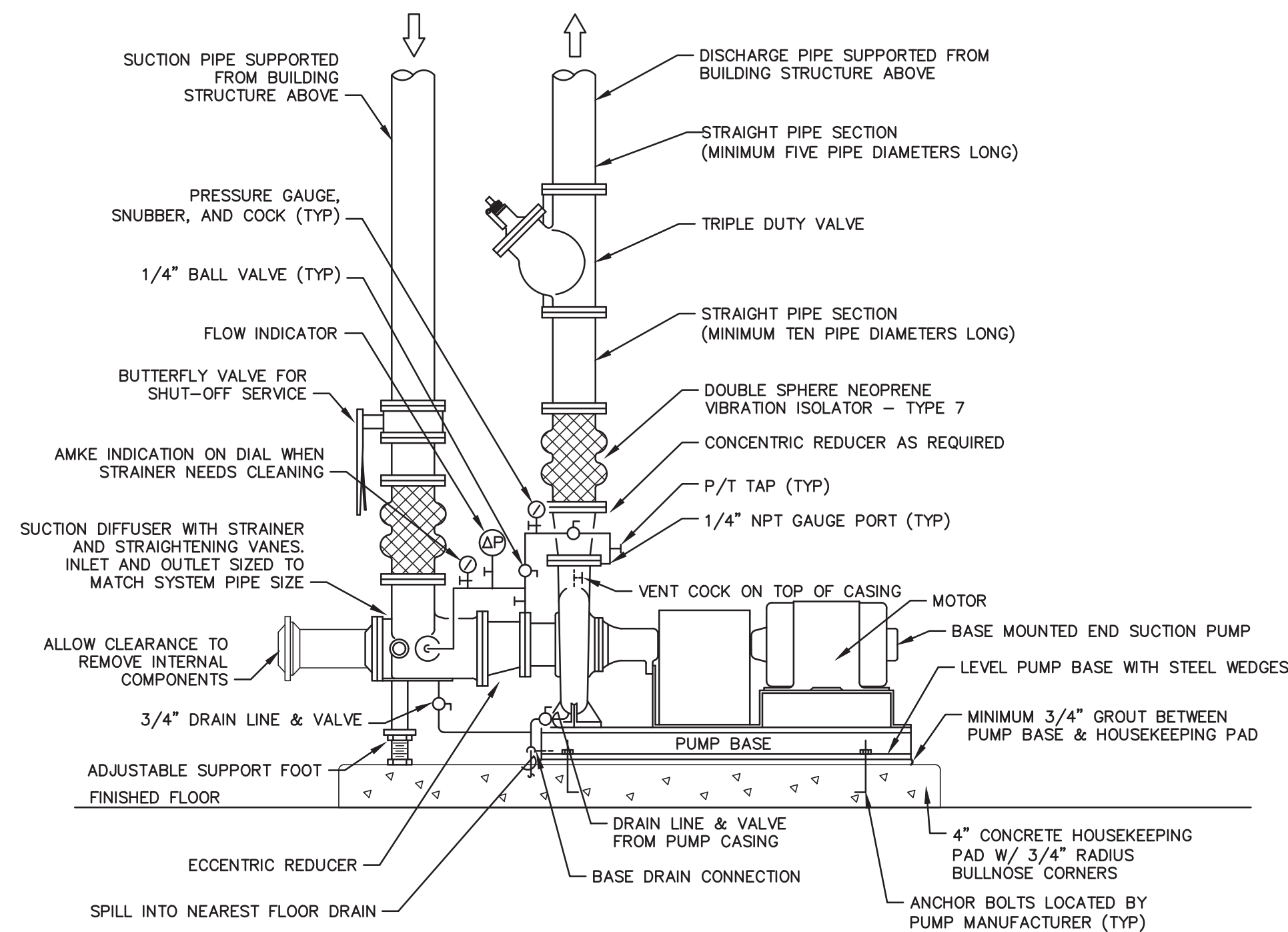
SHEET
M-401



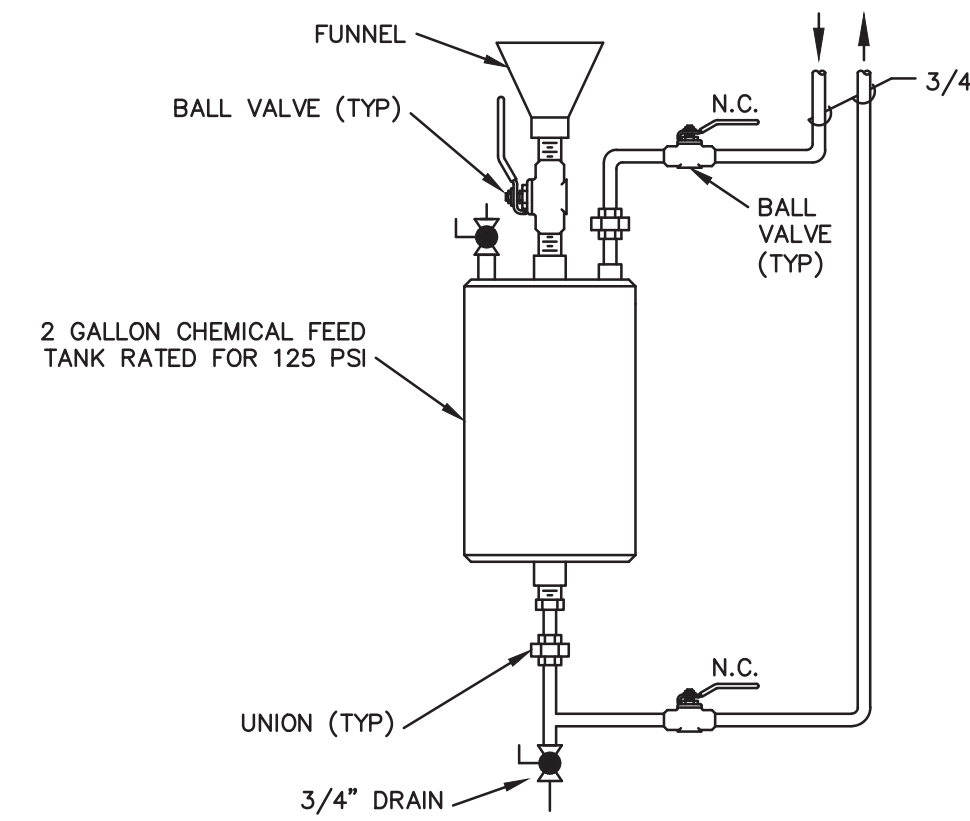
NOTES:

1. ALL SUPPLY AND RETURN PIPE AND TRIM (EXCEPT CONTROL VALVE) TO BE FULL SIZE FROM MAIN TO FINAL UNION CONNECTIONS AT COIL. (SEE PLANS FOR PIPE SIZES)
2. MAKE CONNECTIONS TO OBTAIN COUNTER FLOW AND TO ALLOW COIL REMOVAL WITHOUT DISASSEMBLING PIPE.
3. SEAL ALL PIPE PENETRATIONS TO CABINET AIR TIGHT.
4. LOCATE ALL VALVES, STRAINERS, UNIONS AND FLANGES SO THEY ARE ACCESSIBLE.

1 WATER COIL, 2-WAY VALVE, 2" AND SMALLER DETAIL
 (P-501) SCALE: NONE FOR ALL COILS OTHER THAN AHU-1



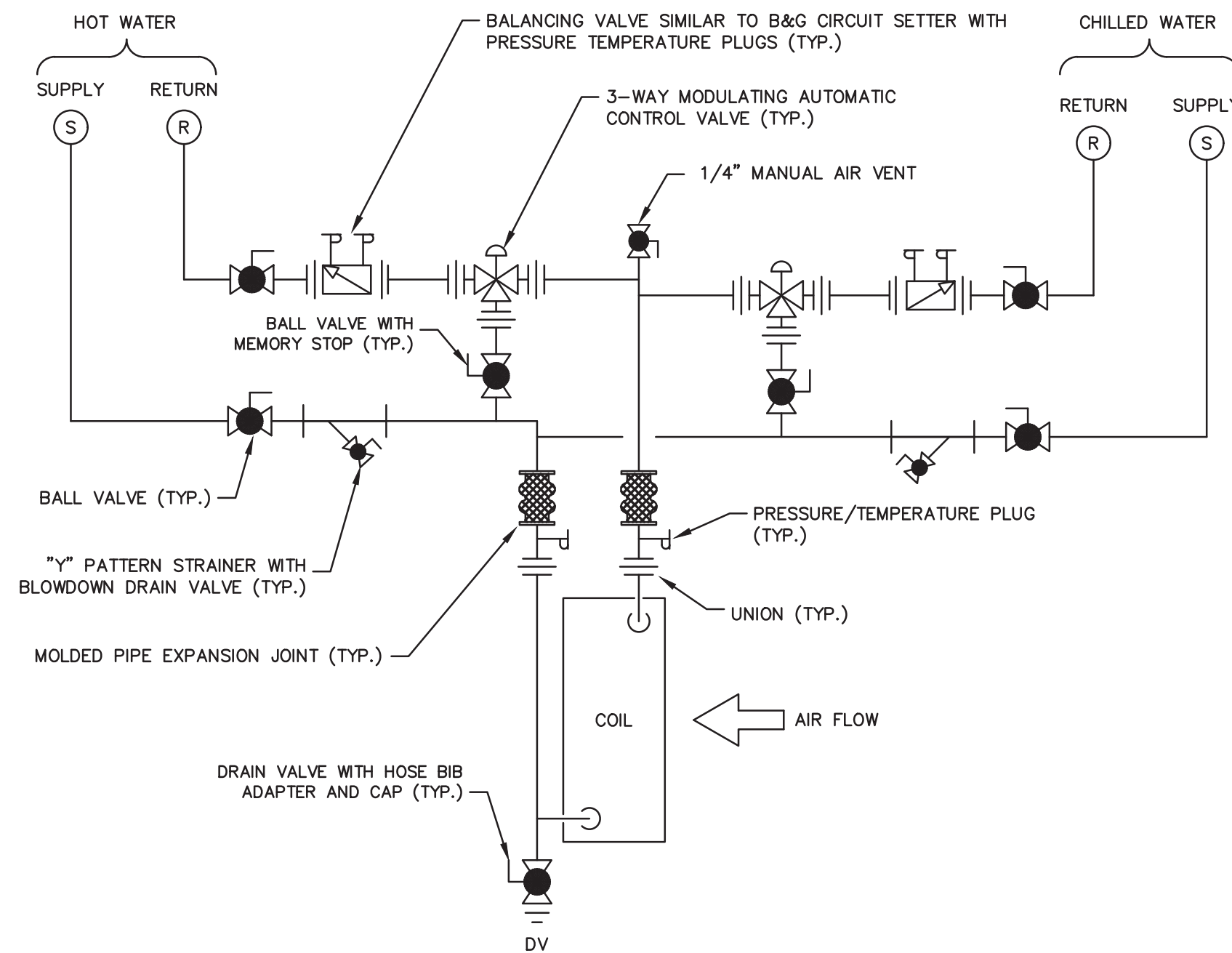
3 END SUCTION PUMP DETAIL (SLAB ON GRADE)
 (P-501) SCALE: NONE



NOTE:

1. EXTERIOR SHALL BE PAINTED WITH CORROSION RESISTANT PAINT.
2. ALL BALL VALVES SHALL BE FULL PORT.
3. PROVIDE CHEMICAL FEEDER WITH LEGS.

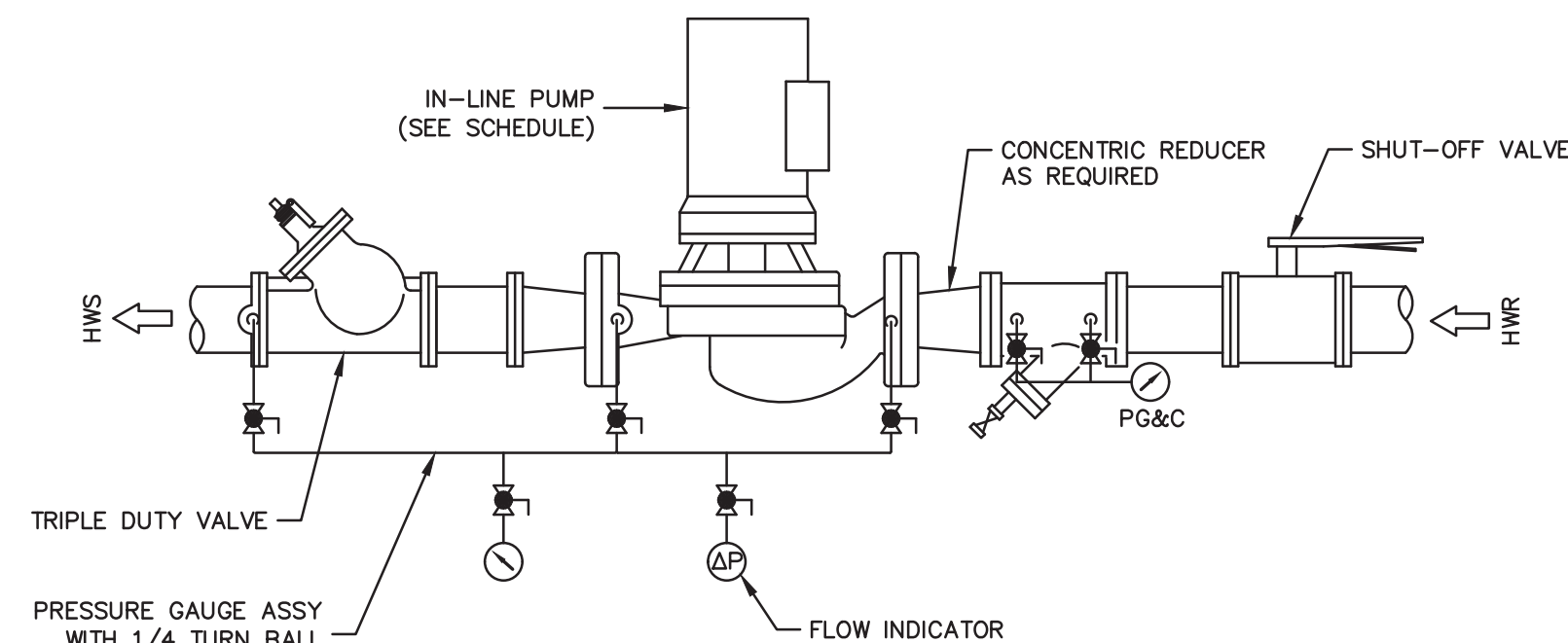
6 CHEMICAL BYPASS POT FEEDER DETAIL
 (P-501) SCALE: NONE



NOTES:

1. ALL SUPPLY AND RETURN PIPE AND TRIM (EXCEPT CONTROL VALVE) TO BE FULL SIZE FROM MAIN TO FINAL UNION CONNECTIONS AT COIL. (SEE PLANS FOR PIPE SIZES)
2. MAKE CONNECTIONS TO OBTAIN COUNTER FLOW AND TO ALLOW COIL REMOVAL WITHOUT DISASSEMBLING PIPE.
3. SEAL ALL PIPE PENETRATIONS TO CABINET AIR TIGHT.
4. LOCATE ALL VALVES, STRAINERS, UNIONS AND FLANGES SO THEY ARE ACCESSIBLE.

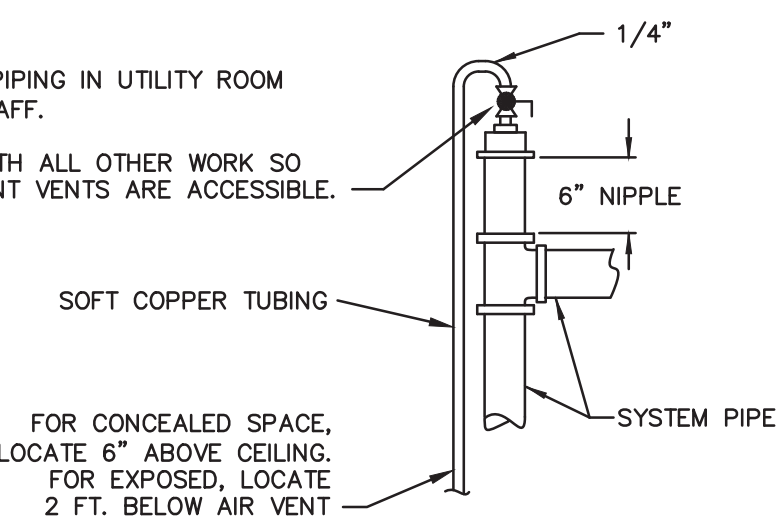
2 WATER COIL, 3-WAY VALVE, 2" AND SMALLER DETAIL
 (P-501) SCALE: NONE FOR AHU-1



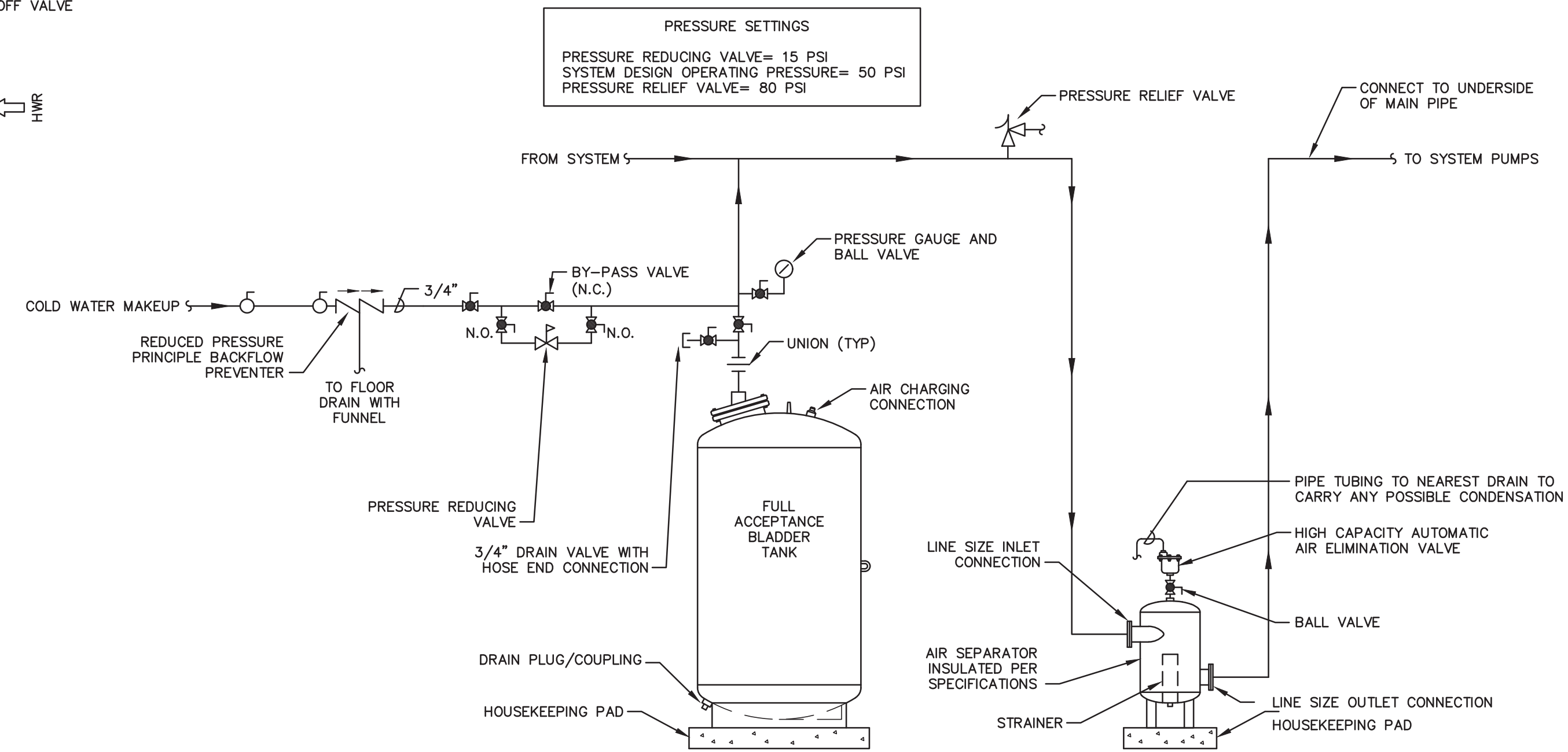
4 IN-LINE PUMP DETAIL
 (P-501) SCALE: NONE

BALL VALVE

1. FOR EXPOSED PIPING IN UTILITY ROOM LOCATE 3'-0" AFF.
2. COORDINATE WITH ALL OTHER WORK SO THAT HIGH POINT VENTS ARE ACCESSIBLE.



5 MANUAL AIR VENT DETAIL
 (P-501) SCALE: NONE

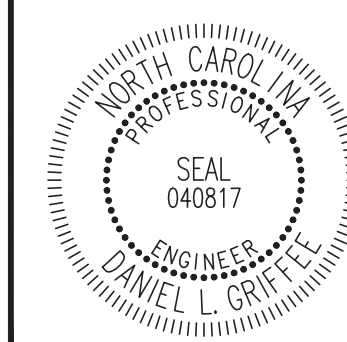


NOTE:

1. REFER TO MANUFACTURER DETAILS FOR FINAL EQUIPMENT CONNECTIONS.
2. WHERE SURGE TANK IS SHOWN IN PLACE OF AIR SEPARATOR, SUBSTITUTE FLOOR MOUNTED SURGE TANK FOR AIR SEPARATOR.

7 EXPANSION TANK, AIR SEPARATOR, AND MAKE-UP WATER DETAIL
 (P-501) SCALE: NONE

BID SET,
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 CONSTRUCTION
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SIGNED AND DATED:
 Daniel L. Griffiee
 THIS DOCUMENT HAS BEEN DIGITALLY SIGNED AND SEALED IN ACCORDANCE WITH THE STANDARD CERTIFICATION REQUIREMENTS FOUND IN NC ADMINISTRATIVE CODE 21-58.1103(E). THIS DIGITAL SIGNATURE HAS BEEN FOUND BY THE NC BOARD OF EXAMINERS FOR ENGINEERS AND SURVEYORS TO MEET THESE STANDARDS. PLEASE CONTACT THE SIGNER IF YOU NEED ASSISTANCE IN VALIDATING THE SIGNATURE.

NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
 HVAC PIPING IMPROVEMENTS
TRANSYLVANIA COUNTY SCHOOLS
 TRANSYLVANIA COUNTY, NORTH CAROLINA

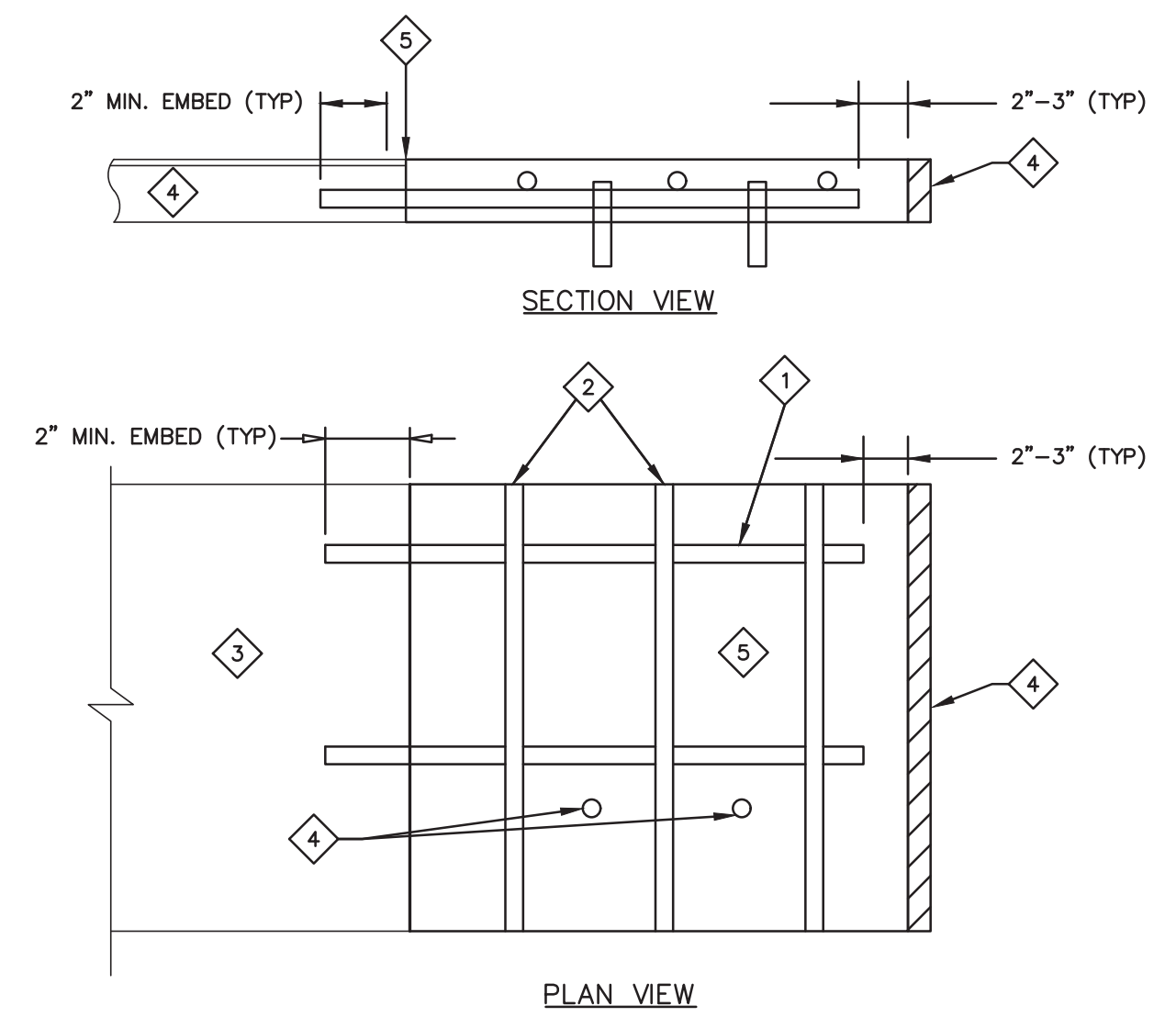
NOT TO SCALE
 OFFICE MANAGER: M. CATHEY
 PROJECT MANAGER: D. GRIFFEE
 DESIGNER: D. GRIFFEE
 REVIEWER: B. WIGGINS

DETAILS
 DATE: FEBRUARY 2023
 PROJECT #: 22.00607
 FUNDING #: N/A

SHEET
M-501

P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\MECHANICAL\22.00607 M-501 M-502 DETAILS.DWG PLOT DATE: 1/17/2023 3:50 PM E.D. COOPER

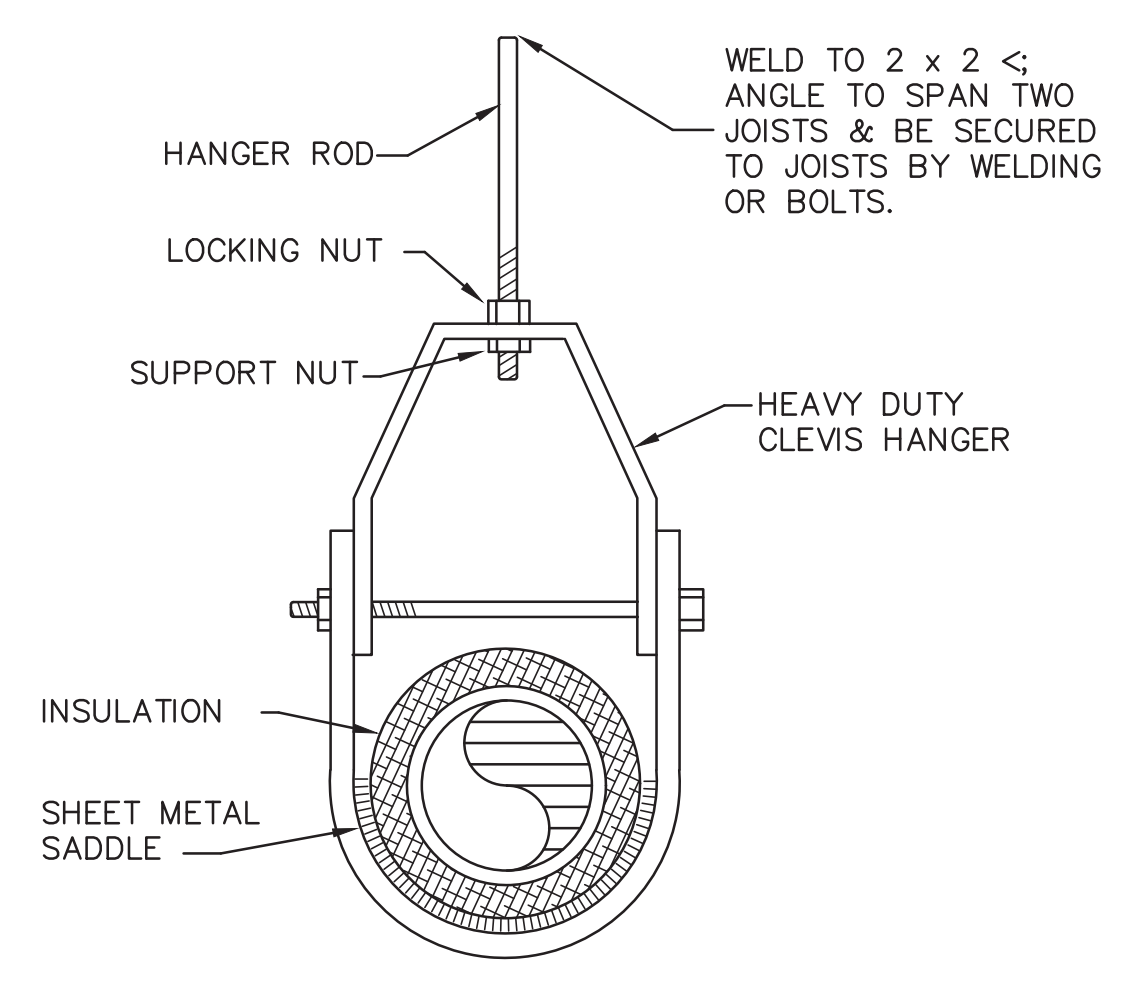
22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS



DETAIL NOTES:

- 1 1/2" REBAR EPOXIED INTO EXISTING PAD @ 24" MAX. @ AT APPROXIMATE CENTERLINE OF SLAB.
- 2 1/2" REBAR MAX. 12" @, MINIMUM 1 REBAR. REBAR SHALL BE GRADE 40 (40,000 PSI MINIMUM YIELD STRENGTH).
- 3 EXISTING HOUSEKEEPING PAD TO REMAIN.
- 4 DOWEL INTO EXISTING CONCRETE PAD MIN. 4 PLACES WITH 1/2" REBAR WITH 2" EMBED IN EXISTING SLAB AND NEW PAD.
- 5 MATCH HEIGHT OF EXISTING PAD. PAD IS APPROX. 6" HIGH ON SIDE BEING ADDED TO. CLEAN FACE OF EXISTING PAD OF DIRT AND DEBRIS WHERE NEW PAD MEETS EXISTING PAD AND COAT WITH A CONCRETE BONDING AGENT PRIOR TO POURING NEW CONCRETE.
- 6 MINIMUM COMPRESSIVE STRENGTH OF NEW CONCRETE 3,000 PSI AT 28 DAYS.
- 7 EXPANSION JOINT BETWEEN PAD EXTENSION AND EXISTING WALL.

1 DETAIL FOR ADDING TO EXISTING HOUSEKEEPING PAD
SCALE: NONE

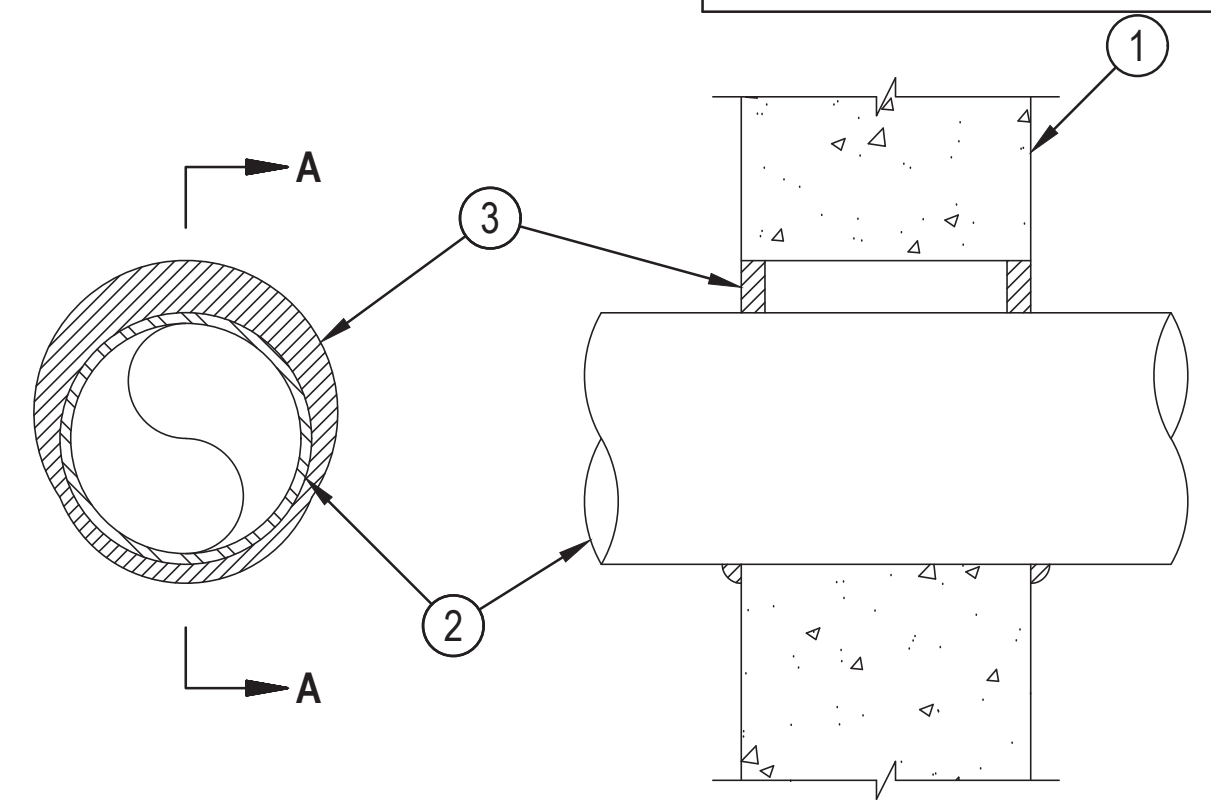


2 PIPE HANGER DETAIL
SCALE: NONE



System No. W-J-1067

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Items 1 and 3)	F Rating — 1 and 2 Hr (See Items 1 and 3)
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 1 and 2 Hr (See Items 1 and 3)
L Rating At 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — Less Than 1 CFM/sq ft



SECTION A-A

- Wall Assembly — Min 3-3/4 in. and 5 in. (95 and 127 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete for 1 and 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 32-1/4 in. (819 mm).
See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
- Through-Penetrants — One metallic pipe, conduit or tubing to be centered within the firestop system. The annular space shall be min 0 in. to max 2-1/4 in. (57 mm). Pipe may be installed with continuous point contact. Pipe, conduit or tube may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
 - A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
 - C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or 6 in. (152 mm) diam (or smaller) steel conduit.
 - D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
 - E. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
- Fill, Void or Cavity Material* — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe-wall interface on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



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ACCEPTABLE FIRE STOPPING MANUFACTURER SHALL BE ANY UL LISTED MANUFACTURER INCLUDING 3M, PROSET, AND HILTI

3 METALLIC PIPING THROUGH 1-2 HOUR CONCRETE WALL DETAIL
SCALE: NONE

BID SET,
NOT FOR
CONSTRUCTION
UNLESS SO ISSUED



SIGNED AND DATED:

Daniel L. Griffie

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER	DESIGNER
M. CATHEY	D. GRIFFEE
PROJECT MANAGER	REVIEWER
D. GRIFFEE	B. WIGGINS

DATE	PROJECT #	FUNDING #
FEBRUARY 2023	22.00607	N/A

SHEET
M-502

P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\MECHANICAL\22.00607 M-501 M-502 DETAILS.DWG PLOT DATE: 1/11/2023 3:50 PM EDC COOPER

22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

PUMP SCHEDULE

P #	TYPE	SERVICE	PERFORMANCE						ELECTRICAL			PARALLEL OPERATION	SUCTION DIFFUSER W/STRAINER	VFD	MANUFACTURER / MODEL NUMBER	NOTES
			GPM	TDH (FT)	TEMP (°F)	% GLYCOL	BHP	RPM	HP	VOLTS	PHASE					
P-1	IN-LINE	BOILER LOOP	110	30	68	-	1.21	1725	1.5	480	3	NO	NO	YES	B&G / SERIES E-90 2AB	-
P-2	IN-LINE	BOILER LOOP	110	30	68	-	1.21	1725	1.5	480	3	NO	NO	YES	B&G / SERIES E-90 2AB	-
P-3	END SUCTION	CHILLER LOOP	370	35	45	-	3.84	1707	5.0	480	3	NO	YES	YES	B&G / SERIES E-1510 3AD	ALL
P-4	END SUCTION	BUILDING CHW LOOP	185	80	45	-	4.95	1680	7.5	480	3	YES	YES	YES	B&G / SERIES E-1510 2BD	ALL
P-5	END SUCTION	BUILDING CHW LOOP	185	80	45	-	4.95	1680	7.5	480	3	YES	YES	YES	B&G / SERIES E-1510 2BD	ALL
P-6	END SUCTION	BUILDING HW LOOP	185	80	180	-	4.80	1680	7.5	480	3	NO	YES	YES	B&G / SERIES E-1510 2BD	ALL
P-7	END SUCTION	BUILDING HW LOOP	185	80	180	-	4.80	1680	7.5	480	3	NO	YES	YES	B&G / SERIES E-1510 2BD	ALL

NOTES:

- REFER TO SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS.
- PROVIDE WITH COMBINATION MOTOR STARTER/DISCONNECT, MOTOR OVERLOAD PROTECTION, HAND-OFF-AUTO SELECTOR SWITCH AND RUN INDICATOR LIGHT. MOUNT VFDS DISCONNECT ON WALL BEHIND PUMP.
- PROVIDE SUCTION DIFFUSERS WITH STRAINERS.

AIR SEPARATOR SCHEDULE

AS #	SYSTEM	TANK VOLUME & SIZE			WEIGHT SHPG / OPRG (LBS)	MANUFACTURER / MODEL NUMBER	NOTES
		VOLUME (GAL)	DIAM. (IN.)	HEIGHT (IN.)			
AS-1	HOT WATER	13	13	32.50	170 / 278	B&G / R-4F	ALL
AS-2	CHILLED WATER	25	16	37	220 / 429	B&G / R-5F	ALL

NOTES:

- ALTERNATE MANUFACTURERS: TACO, ARMSTRONG.
- WITH STRAINER.

EXPANSION TANK SCHEDULE

ET #	TYPE	SYSTEM	ORIENTATION	TANK VOLUME & SIZE				WEIGHT SHPG / OPRG (LBS)	MANUFACTURER/MODEL NUMBER	NOTES
				TOTAL (GAL)	ACCEPT. (GAL)	DIAM. (IN.)	LENGTH (IN.)			
ET-1	FULL ACCEPTANCE BLADDER	CHILLED WATER	VERTICAL	34	16.73	20	37	200 / 414	B&G B-130	ALL
ET-2	FULL ACCEPTANCE BLADDER	HOT WATER	VERTICAL	80	38.68	24	55	300 / 877	B&G B-300	ALL

NOTES:

- ALTERNATE MANUFACTURERS: TACO, ARMSTRONG.
- PROVIDE AUTOMATIC AIR VENTS AT HIGH POINTS IN LINE TO EXPANSION TANKS.
- SET AIR CHARGE EQUAL TO SETTING ON SYSTEM PRV WHEN WATER IN TANK IS NOT PRESSURIZED BY THE SYSTEM.

BID SET,
NOT FOR
CONSTRUCTION
UNLESS SO ISSUED



SIGNED AND DATED:
Daniel L. Griffie
Digitally signed by Daniel L. Griffie
 Date: 2023.02.07 14:28:21 -0500
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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
 HVAC PIPING IMPROVEMENTS
TRANSYLVANIA COUNTY SCHOOLS
 TRANSYLVANIA COUNTY, NORTH CAROLINA

GRAPHIC SCALE 1/8"=1'-0"

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

SCHEDULES	
DATE FEBRUARY 2023	PROJECT # 22.00607
FUNDING # N/A	

SHEET
M-601

P:\2022\22.00607-TRANSYLVANIA\KCSCH-PISGAH FOREST HVACDRAININGSMECHANICAL\22.00607 M-601 SCHEDULES.DWG PLOT DATE: 01/12/2023 3:48 PM ED COOPER

22.00607 TRANSYLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

CONTROL DESCRIPTIONS

GENERAL

THE EXISTING CONTROL SYSTEM IS A HYBRID OF ELECTRONIC AND PNEUMATIC CONTROLS. WHEN ANY DEVICE IS NEEDED TO BE REPLACED UNDER THIS PROJECT IS SHALL BE DDC.

THE EXISTING SUMMER WINTER SWITCH SHALL PLACE SYSTEM IN HEATING OR COOLING MODE. IN HEATING MODE THE HOT WATER SYSTEM SHALL BE AVAILABLE AND IN COOLING MODE THE CHILLED WATER SYSTEM SHALL BE AVAILABLE.

ALL SETTINGS GIVEN ARE INITIAL AND SHALL BE ADJUSTABLE. FOR SETTINGS INDEXED TO OUTSIDE AIR TEMPERATURES ALL RATIOS SHALL BE ADJUSTABLE. ALL TEMPERATURES ARE IN DEGREES F. ALL EQUIPMENT WHICH IS SPECIFIED TO BE AUTOMATICALLY STARTED AND STOPPED SHALL HAVE PROVISIONS FOR MANUAL OPERATION. WHEREVER MEASUREMENT OF A PARAMETER IS REQUIRED TO ACHIEVE THE CONTROL SEQUENCES, THE VALUE OF THAT PARAMETER SHALL BE AVAILABLE FROM THE OPERATOR'S OR REMOTE TERMINALS.

INTERNAL SAFETY CONTROLS FOR EQUIPMENT SHALL NOT BE OVERRIDDEN.

REFERENCES TO THERMOSTATS, AQUASTATS AND HUMIDISTATS INDICATE FUNCTION WHICH IS TO BE ACHIEVED WITH SENSORS AND CONTROL LOGIC.

THESE SEQUENCES ARE COMPLEMENTARY WITH CONTROL SCHEMATICS, ETC., GIVEN ON OTHER SHEETS AND WITH THE SPECIFICATIONS.

THE SEQUENCE OF OPERATIONS PROVIDED IN THE CONTRACT DOCUMENTS IS INTENDED TO COMMUNICATE THE GENERAL DESIGN INTENT TO THE CONTROLS SUBCONTRACTOR AND IS NOT INTENDED TO BE FULLY DEVELOPED OR COMPLETE. IN THE CONTROLS SUBMITTAL, THE SUBCONTRACTOR SHALL FULLY DEVELOP THE SEQUENCE OF OPERATIONS FOR ALL SYSTEMS IDENTIFIED AND SHALL PRESENT ALL SETPOINTS, CONTROL PARAMETERS, AND ALARM POINTS. THE CONTROLS SUBCONTRACTOR SHALL INCORPORATE STANDARD FEATURES SUCH AS MINIMUM RUN TIME DELAYS AND DEAD BANDS FROM SETPOINTS TO PREVENT EQUIPMENT FROM SHORT CYCLING AND WHEN HOVERING AROUND SETPOINTS. ALL MONITORED POINTS SHALL INCLUDE EARLY HIGH/LOW ALARM NOTIFICATIONS PRIOR TO HAVING TO TAKE CORRECTIVE ACTIONS OR EQUIPMENT SHUTDOWNS. TRANSMITTERS SHALL INCLUDE OUT-OF-RANGE, FAIL-SAFE POSITIONING FOR OPEN CIRCUITS OR LOSS OF COMMUNICATION. CONTROL CONTRACTOR SHALL SPECIFY TO FAIL DE-ENERGIZER, HOLD LAST STATE, OR DEFAULT TO A PREDETERMINED SETPOINT. THE PROGRAM SHALL ADDRESS OPERATIONAL ISSUES SUCH AS SUDDENLY APPLIED LOADS. THESE BASIC FEATURES THAT ARE NECESSARY AND ARE PART OF A ROBUST CONTROLS INSTALLATION SHALL BE ASSUMED INCLUDED IN THE SCOPE OF SERVICES FOR DELIVERABLES AT NO ADDITIONAL COSTS TO THE OWNER.

WHEN CHILLED WATER SYSTEM IS ON

THE CHILLER LOOP PUMP SHALL BE ON AND THE CHILLER SHALL OPERATE UNDER ITS OWN CONTROLS. THE LEAD BUILDING LOOP PUMP SHALL RUN AT A SPEED TO SATISFY A DP SENSOR LOCATED AT THE CENTRAL AREA MECHANICAL ROOM. WHEN THE SPEED OF THE LEAD PUMP EXCEEDS 90% FOR 15 MINUTES THE LAG PUMP SHALL START AND BOTH PUMPS SHALL RUN TOGETHER TO SATISFY THE DP SENSOR. WHEN THE SPEED OF BOTH PUMPS IS LESS THAN 40% FOR 15 MINUTES THE LAG PUMP SHALL STOP. LEAD AND LAG PUMPS SHALL SWITCH WEEKLY.

THE HW VALVE AT EACH AHU SHALL BE CLOSED.

THE CHW VALVE SHALL REMAIN FULLY CLOSED UNTIL THE HW VALVE IS CLOSED. ONCE THE HW VALVE IS FULLY CLOSED THE CHW VALVE AT EACH AHU SHALL MODULATE TO MAINTAIN THE THERMOSTAT SETTING.

FCU-7 IS THE ONLY FCU THAT HAS CHILLED WATER SERVICE. CONTROL FOR FCU-7 SHALL BE SAME AS FOR AHU'S.

THE VFD ON THE CHILLER LOOP PUMP IS TO BE USED FOR T&B BUT IS NOT TO BE CONTROLLED AT THIS TIME.

WHEN HOT WATER SYSTEM IS ON

WHENEVER A BOILER IS ON IT SHALL OPERATE UNDER ITS OWN CONTROLS AND THE BOILER LOOP PUMP ASSOCIATED WITH IT SHALL RUN AND THE 3 WAY VALVE ASSOCIATED WITH IT WILL MODULATE TO MAINTAIN THE EXISTING HW RESET SCHEDULE.

THE LEAD BOILER SHALL BE ACTIVE. THE LAG BOILER SHALL START WHEN THE OUTDOOR TEMPERATURE FALLS BELOW 35 F. THE LAG BOILER SHALL STOP WHEN THE OUTDOOR TEMPERATURE RISES ABOVE 45 F. IF THE SUPPLY WATER TEMPERATURE IS MORE THAN 10 F BELOW ITS SETPOINT FOR 30 MINUTES BOTH BOILERS SHALL START AND AN ALARMS SHALL BE SENT.

THE (2) BUILDING LOOP PUMPS ARE 100% REDUNDANT. LEAD AND LAG PUMPS SHALL SWITCH WEEKLY. THE LEAD BUILDING LOOP PUMP SHALL RUN AT A SPEED TO SATISFY A DP SENSOR LOCATED AT THE CENTRAL AREA MECHANICAL ROOM. WHEN THE SPEED OF THE LEAD PUMP AT 100% FOR 15 MINUTES AND THE SENSOR IS NOT SATISFIED THE LAG PUMP SHALL START AND BOTH PUMPS SHALL RUN TOGETHER TO SATISFY THE DP SENSOR AND AN ALARM SHALL BE SENT.

THE CHW VALVE AT EACH AHU SHALL BE CLOSED.

THE HW VALVE SHALL REMAIN FULLY CLOSED UNTIL THE CHW VALVE IS CLOSED. ONCE THE CHW VALVE IS FULLY CLOSED THE HW VALVE AT EACH AHU SHALL MODULATE TO MAINTAIN THE THERMOSTAT SETTING.

CONTROL FOR FCU-7 SHALL BE THE SAME AS FOR AHU'S.

THE HW VALVE AT EACH FCU-1 TO 6 AND EACH UH SHALL MODULATE TO MAINTAIN THE THERMOSTAT SETTING.

MONITORING POINTS

EACH PUMP STATUS SHALL BE MONITORED BY A DP SENSOR.

TEMPERATURE SENSOR LOCATIONS ARE SHOWN ON M-301.

NOTES:

- 1) CONTROLS WILL BE PROVIDED BY OWNER UNDER SEPARATE CONTRACT.
2) CONTROL CONTRACTOR WILL SUPPLY CONTROL VALVES FOR INSTALLATION BY M.C.
3) CONTROL CONTRACTOR WILL SUPPLY DP SENSORS FOR INSTALLATION BY M.C.
4) CONTROL CONTRACTOR WILL SUPPLY TEMPERATURE SENSORS FOR INSTALLATION BY M.C.
5) ALL CONTROL WIRING IS BY CONTROL CONTRACTOR.
6) M.C. WILL NOT BE RESPONSIBLE FOR WARRANTEE LABOR IF ANY COMPONENT PROVIDED BY CONTROL CONTRACTOR REQUIRES WARRANTEE SERVICE.
7) ANY WORK NOT SPECIFICALLY CALLED OUT AS BY CONTROL CONTRACTOR IS BY M.C.

P:\2022\22.00607-TRANSYLVANIA\KCSCH-PISGAH FOREST HVACDRAININGSMECHANICAL\22.00607 M-701 CONTROLS.DWG PLOT DATE: 1/11/2023 3:48 PM ED COOPER

22.00607 TRANSYLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

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mcgill logo and contact information: 55 Broad Street, Asheville, NC 28801, 828.252.0575, NC Firm License # C-0459, mcgillassociates.com



SIGNED AND DATED: Daniel L. Griffie, Digitally signed by Daniel L. Griffie, Date: 2023.02.07 14:29:28 -05'00'

Table with columns: NO., DATE, BY, DESCRIPTION. The table is currently empty.

Project title: PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS. Client: TRANSYLVANIA COUNTY SCHOOLS, TRANSYLVANIA COUNTY, NORTH CAROLINA. Includes a graphic scale (1/8"=1'-0") and a table with roles: Office Manager (M. Cathey), Designer (D. Griffie), Project Manager (D. Griffie), Reviewer (B. Wiggins), Date (February 2023), Project # (22.00607), Funding # (N/A).

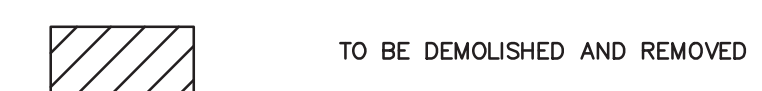
SHEET M-701

ELECTRICAL LEGEND

FLOOR MOUNTED	WALL MOUNTED	CEILING MOUNTED	ITEM DESCRIPTION
			LIGHT FIXTURES (USE LETTER DESIGNATION ADJACENT TO LIGHT FIXTURE AND LIGHT FIXTURE SCHEDULE TO DETERMINE THE EXACT TYPE OF FIXTURE AND OTHER CHARACTERISTICS)
			EMERGENCY LIGHT } USE LETTER DESIGNATION ADJACENT TO LIGHT FIXTURE AND LIGHT FIXTURE SCHEDULE TO DETERMINE THE SPECIFIED FIXTURE AND OTHER CHARACTERISTICS.
			NIGHT LIGHT - CIRCUIT SO THAT THE OUTER TWO LAMPS OPERATE 24 HOURS A DAY
			DUPLEX RECEPTACLE (SEE NOTE #1)
			SINGLE-POLE WALL SWITCH (SEE NOTE #2)
			SAFETY DISCONNECT SWITCH
			MOTOR OR OTHER POWER CONTROLLER
			COMBINATION CONTROLLER/DISCONNECTOR
			SURFACE MOUNTED PANELBOARD
			FLUSH MOUNTED PANELBOARD
			SWITCHBOARD
			JUNCTION BOX
			SURFACE MOUNTED TERMINAL CABINET
			FLUSH MOUNTED TERMINAL CABINET
			EQUIPMENT CONNECTION

FLOOR MOUNTED	WALL MOUNTED	CEILING MOUNTED	ITEM DESCRIPTION
			TELECOMMUNICATIONS SYSTEM EQUIPMENT (SEE NOTE #3)
			SWITCHED CIRCUITS
			UNSWITCHED CIRCUITS NUMBER OF HOT AND NEUTRAL CONDUCTORS IN CIRCUIT EACH LONG LINE REPRESENTS A NEUTRAL CONDUCTOR EACH SHORT LINE REPRESENTS A PHASE CONDUCTOR
			ARROWHEADS INDICATE HOMERUN CIRCUITS UNLESS OTHERWISE NOTED ON THE DRAWINGS
			SWITCHLEG WIRING TO GROUP OF SWITCHES
			HOMERUN CIRCUIT THROUGH CONTACTOR DENOTED BY SUBSCRIPT
			CONDUIT ONLY
			CIRCUIT TURNED UP
			CIRCUIT TURNED DOWN
			MULTIOUTLET ASSEMBLY - ARROWS ARE EXTENDED TO THE LIMITS OF INSTALLATION IN EACH DIRECTION AS APPLICABLE - TYPICAL FOR TYPE OF DEVICE SHOWN ON PLANS - NUMBER REPRESENTS NUMBER OF INCHES BETWEEN DEVICES.

PROPOSED DEMOLITION LEGEND



- NOTES:**
- 1) MOUNT AT 20" AFF TO TOP -U.O.N.- ADJUST TO MATCH MASONRY COURSES IF APPLICABLE. MOUNT ALL BOXES TRUE AND PLUMB.
 - 2) MOUNT AT 48" AFF TO TOP - ADJUST TO MATCH MASONRY COURSES IF APPLICABLE. MOUNT ALL BOXES TRUE AND PLUMB.
 - 3) MOUNT ALL TELEPHONE OUTLETS AT 20" AFF TO TOP -U.O.N.- ADJUST TO MATCH MASONRY COURSES IF APPLICABLE. MOUNT ALL BOXES TRUE AND PLUMB.

ABBREVIATIONS

A OR AMP	AMPERE	H.I.D.	HIGH INTENSITY DISCHARGE	P	# OF POLES IN CIRCUIT BREAKER
A.C.	ALTERNATING CURRENT	HP	HORSEPOWER	PH OR #	PHASE
AF	FRAME AMPERE	H.P.S.	HIGH PRESSURE PUMP STATION	PM	POWER MONITOR
A.F.F.	ABOVE FINISHED FLOOR	HSPS	HIGH SERVICE PUMP STATION	PMT	PAD MOUNTED TRANSFORMER
A.F.G.	ABOVE FINISHED GRADE	HVAC	HEAT-VENT-AIR CONDITIONING	PNL	PANEL
A.I.C.	AMPERE INTERRUPTING CURRENT	I.G.	ISOLATED GROUND	PSI	POUNDS PER SQUARE INCH
AS	AMMETER SELECTOR SWITCH	I.D.	INNER DIAMETER	PT	POTENTIAL TRANSFORMER
AT	TRIP AMPERE	IMC	INTERMEDIATE METAL CONDUIT	PVC	POLYVINYL CHLORIDE
A.T.S.	AUTOMATIC TRANSFER SWITCH	IND.	INDUSTRIAL	RM	REMOVE
AUTO	AUTOMATIC	JB	JUNCTION BOX	RP	REPLACE OR REPLACED
AWG	AMERICAN WIRE GAUGE	J.I.C.	JOINT INDUSTRIAL COUNCIL	QTY.	QUANTITY
B.F.G.	BELOW FINISHED GRADE	KA	KILOAMPERE	RGS	RIGID GALVANIZED STEEL
BLDG.	BUILDING	KCMIL	1000 CIRCULAR MILS	RVSS	REDUCED VOLTAGE SOLID STATE
C OR COND.	CONDUIT	KV	KILOVOLT	SC	SURGE CAPACITOR
CB	CIRCUIT BREAKER	KVA	KILOVOLT AMPERE	SCC	SYSTEM CONTROL CENTER
CKT	CIRCUIT	KW	KILOWATT	SER	SERVICE ENTRANCE RATED
CP	CONTROL PANEL	LA	LIGHTNING ARRESTOR	SM	SUB-METER
CPT	CONTROL PANEL TRANSFORMER	LC	LIGHTING CONTACTOR	SP	SPARE
CR	CONTROL RELAY	LTG	LIGHTING	SPD	SURGE-PROTECTIVE DEVICE
DESIG	DESIGNATION	MAX	MAXIMUM	S.S.	STAINLESS STEEL
DIA.	DIAMETER	MCB	MAIN CIRCUIT BREAKER	SWBD	SWITCHBOARD
DIV.	DIVISION	mA	MILLI-AMP	TBA	TO BE ABANDONED
DPDT	DOUBLE POLE, DOUBLE THROW	MC	MANUFACTURER'S CABLE	TBR	TO BE REMOVED
DS	DISCONNECT SWITCH	MCC	MOTOR CONTROL CENTER	TCC	TELECOMMUNICATIONS CLOSET
E.C.	ELECTRICAL CONTRACTOR	MFR	MANUFACTURER	TDC	TELECOMMUNICATIONS DISTRIBUTION CLOSET
EHH	ELECTRIC HANDHOLE	MIN.	MINIMUM	TYP.	TYPICAL
EMH	ELECTRIC MANHOLE	M.L.O.	MAIN LUG ONLY	UE	UNDERGROUND ELECTRIC
EP	EXPLOSION PROOF	M.O.D.	MOTOR OPERATED DAMPER	UH	UNIT HEATER
ELH	ELECTRIC UNIT HEATER	MS	MOTOR STARTER	UL	UNDERWRITERS LABORATORY
E.W.	EACH WAY	MTD.	MOUNTED	U.O.N.	UNLESS OTHERWISE NOTED
EX	EXISTING TO REMAIN	N/A	NOT APPLICABLE	UT	UNDERGROUND TELEPHONE
EXH	EXHAUST FAN	N.C.	NORMALLY CLOSED	UV	ULTRAVIOLET
FJ	FUSE	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION	V	VOLT
FRE	FIBERGLASS REINFORCED EPOXY	NID	NETWORK INTERFACE DEVICE (4 POSITION)	VAC	VOLTS ALTERNATING CIRCUIT
G.C.	GENERAL CONTRACTOR	N.O.	NORMALLY OPEN	VS	VOLTMETER SELECTOR SWITCH
GEN	GENERATOR	NO.	NUMBER	W	WIRE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	NPT	NOMINAL PIPE THREADS	W/	WITH
GND. OR GRD.	GROUND	OE	OVERHEAD ELECTRIC	WP	WEATHERPROOF
				XFMR	TRANSFORMER

GENERAL NOTES:

1. ALL MOUNTING HEIGHTS SHOWN ARE FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE DEVICE, UNLESS NOTED OTHERWISE.
2. ALL ELECTRICAL DEVICES SHALL BE ALIGNED WITH THE ARCHITECTURAL FEATURES OF THE BUILDING. DEVICES FOR VARIOUS SYSTEMS (LIGHT SWITCHES, RECEPTACLES, FIRE ALARM HORNS, THERMOSTATS, ETC.) LOCATED IN THE SAME GENERAL AREA SHALL BE ALIGNED AT THEIR RESPECTIVE MOUNTING HEIGHTS. THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE OTHER TRADES TO ENSURE ALIGNMENT OF ALL DEVICES. BACK BOXES SHALL BE MOUNTED ON THE SAME SIDE OF THE SAME WALL STUD TO PRESENT AN ALIGNED APPEARANCE. ANY DIMENSIONING SHOWN ON THE DRAWINGS SHALL SUPERSEDE THIS GUIDANCE. SEE DETAIL ON DRAWINGS FOR TYPICAL LOCATIONS AND MOUNTING HEIGHTS.
3. WHERE AN INDIVIDUALLY MOUNTED SAFETY SWITCH, STARTER, OR CIRCUIT BREAKER IS SHOWN ADJACENT TO ITS RESPECTIVE LOAD AND NOT MOUNTED ON A WALL, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL SUPPORTS, BRACKETS, ANCHORING, ETC. NECESSARY TO PROPERLY SUPPORT THE DEVICE.
4. SEE DETAIL SHEET(S) FOR TYPICAL INSTALLATION DETAILS.
5. FOR ANY WALL OR FLOOR PENETRATIONS MADE BY THE ELECTRICAL CONTRACTOR, THE ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE PROOFING TO SEAL ALL THE PENETRATIONS AFTER THE NECESSARY CONDUIT OR OTHER EQUIPMENT HAS BEEN INSTALLED. FIRE PROOFING FOR PENETRATIONS SHALL BE UL APPROVED PER THE PENETRATION MADE. REFER TO ARCHITECTURAL SHEETS FOR LOCATIONS OF RATED WALLS AND PARTITIONS.
6. THE ELECTRICAL CONTRACTOR SHALL CONCEAL ALL CONDUIT AND WIRING IN WALL OR CEILING SPACES, EXCEPT IN UNFINISHED AREAS.
7. UNLESS NOTED OTHERWISE, EXISTING CONDUIT AND CONDUCTORS MAY BE REUSED WHERE THEY ARE OF THE TYPE SPECIFIED, MEET THE REQUIREMENTS OF NEW CIRCUITS, AND REMAIN IN GOOD CONDITION.
8. THE ELECTRICAL CONTRACTOR SHALL DISCONNECT ALL EXISTING EQUIPMENT SHOWN TO BE REMOVED AND SHALL REMOVE ALL DISCONNECTS, STARTERS, CONDUIT, AND CONDUCTORS THAT SHALL NOT REMAIN IN PLACE. THE ELECTRICAL CONTRACTOR SHALL LEAVE ALL MODIFIED CIRCUITS IN A SAFE CONDITION.
9. PROVIDE ALL ACCESS PANELS AND ACCESS DOORS WHERE REQUIRED FOR SERVICING AND ADJUSTING ALL EQUIPMENT IN ACCESS PANELS AND DOORS.
10. ALL WORK SHOWN ON THE DRAWINGS IS NEW, UNLESS SPECIFICALLY INDICATED AS EXISTING.
11. EXISTING CONDUIT MAY BE REUSED IN EXISTING LOCATION FROM DEMOLITION IF IN GOOD CONDITION AND FEASIBLE FOR NEW WORK. REMOVE ALL UNUSED CONDUIT, PER DEMOLITION NOTES.
12. ALL EXISTING FIRE ALARM DEVICES ARE TO REMAIN IN SERVICE. E/C TO SECURE, COVER, PROTECT DURING CONSTRUCTION PERIOD.
13. 20 AMP SINGLE PHASE BRANCH CIRCUIT WIRE SIZING SHALL BE IN ACCORD WITH THE FOLLOWING TABLE:

VOLTS	DISTANCE	HOME RUN	REMAINDER OF CIRCUIT	GROUND
120V	0' - 60'	#12	#12	#12
	60' - 100'	#10	#12	#10
	100' - 150'	#8	#10	#10
14. THE EXISTING PORTIONS OF THIS FACILITY WILL REMAIN IN OPERATION DURING THIS CONSTRUCTION. CONTRACTOR SHALL COOPERATE FULLY WITH THE ADMINISTRATION IN ORDER TO CAUSE AS LITTLE DISRUPTION AS POSSIBLE TO THE FUNCTIONING OF THE FACILITY, AND TO MAINTAIN THE COMFORT AND SAFETY OF THE PUBLIC AND STAFF.
15. EXISTING CONDUIT RUNS, EQUIPMENT AND OUTLET LOCATIONS HAVE BEEN TAKEN FROM EXISTING DRAWINGS FURNISHED BY THE OWNER AND LIMITED SITE VISIT, ALL INFORMATION SHALL BE FIELD VERIFIED ON THE JOB SITE, BEFORE PROCEEDING WITH CONSTRUCTION.

GENERAL DEMOLITION NOTES:

1. REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC REQUIREMENTS PERTAINING TO THE REMOVAL, RELOCATION, AND MODIFICATION OF ITEMS RELATED TO EXISTING ARCHITECTURAL FEATURES.
2. IMMEDIATELY NOTIFY ENGINEER AND OWNER OF ANY MATERIALS ENCOUNTERED DURING DEMOLITION AND NEW WORK WHICH ARE SUSPECTED TO CONTAIN CONTAMINANTS POSSIBLY HAZARDOUS TO HUMAN HEALTH.
3. CONTRACTOR SHALL DELIVER TO OWNER ALL ITEMS INDICATED TO BE REMOVED UNLESS SPECIFICALLY NOTED OTHERWISE.
4. ALL DEMOLITION ACTIVITIES TO BE SCHEDULED AND COORDINATED WITH OWNER.
5. CONTRACTOR SHALL VISIT THE SITE AND INSPECT THE ELECTRICAL SYSTEMS TO DETERMINE THE EXTENT OF THE DEMOLITION WORK REQUIRED AND INCLUDE THE PRICE FOR THAT WORK IN HIS BID. NO EXTRA COMPENSATION WILL BE GIVEN FOR DEMOLITION WORK AS A RESULT OF FAILURE TO INSPECT THE SITE BEFORE BID.
6. WHEN AN ITEM IS INDICATED TO BE REMOVED, ALSO REMOVE WIRING, CONDUIT, BOXES AND ASSOCIATED ITEMS. CONDUIT AND WIRE SHALL BE REMOVED BACK TO THE SOURCE.
7. EXERCISE CARE WHEN REMOVING CEILING CONDUITS AND WIRING NOT TO REMOVE CONDUITS AND WIRING OF ITEMS NOT INDICATED TO BE REMOVED.
8. VERIFY THAT CONDUITS AND WIRING TO REMAIN MEET ALL PROVISIONS OF THE SPECIFICATIONS. IN NO CASE WILL NON-METALLIC SHEATHED CABLE BE REUSED.
9. REMOVE ALL ABANDONED CONDUIT AND WIRING, INCLUDING THAT ABANDONED DURING THIS CONTRACT AND EXISTING UNUSED ABANDONED CONDUIT AND WIRING. CONDUIT AND WIRING SHALL BE REMOVED BACK TO THE SOURCE.
10. EXISTING CONDUIT WHICH IS SCHEDULED TO BE REMOVED, MAY BE REUSED IF THE CONDUIT COMPLIES WITH ALL REQUIREMENTS (SIZE, SUPPORTS, COUPLINGS, ETC.) OF THE NEC AND THE SPECIFICATIONS.
11. REMOVE FROM THE SITE ALL REMOVED ELECTRICAL ITEMS NOT REQUESTED TO BE TURNED OVER TO THE OWNER.
12. REMOVE ALL DEVICES INDICATED ON THE DEMOLITION DRAWINGS EXCEPT THOSE INDICATED TO REMAIN.

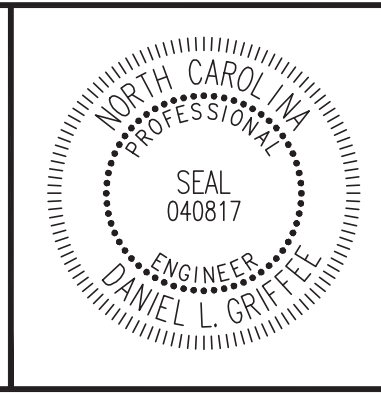
RATED WALL LEGEND



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Asheville, NC 28801
828.252.0575
NC Firm License # C-0459
mcgillassociates.com



SIGNED AND DATED:

Daniel L. Griffiee

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSLVANIA COUNTY SCHOOLS

TRANSLVANIA COUNTY, NORTH CAROLINA

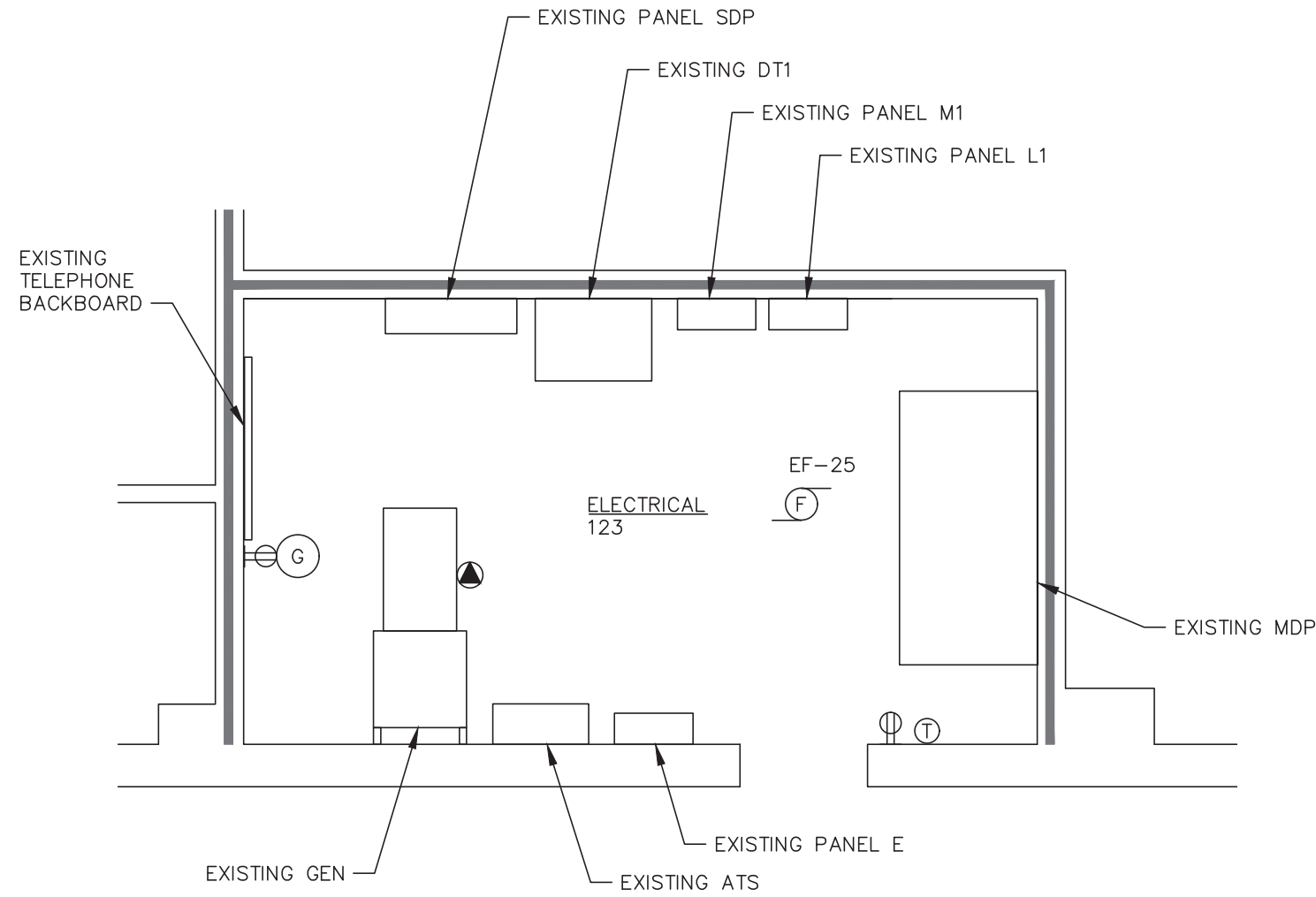
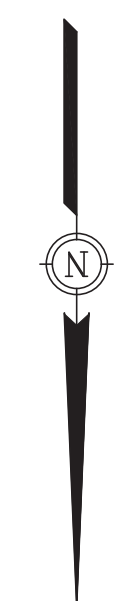
NOT TO SCALE

OFFICE MANAGER	DESIGNER
M. CATHEY	D. GRIFFEE
PROJECT MANAGER	REVIEWER
D. GRIFFEE	B. WIGGINS

ELECTRICAL LEGEND, NOTES, SCHEDULES, AND ABBREVIATIONS	
DATE	PROJECT #
FEBRUARY 2023	22.00607
FUNDING #	N/A

SHEET
E-001

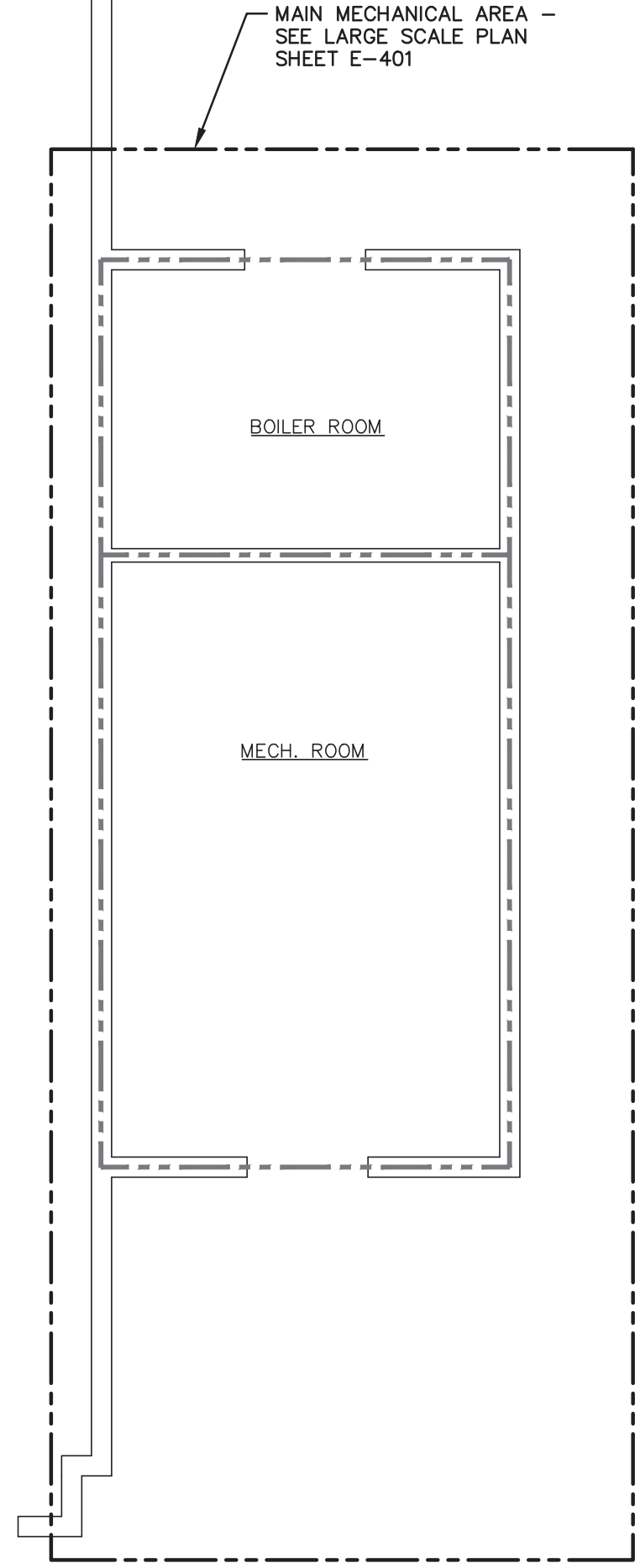
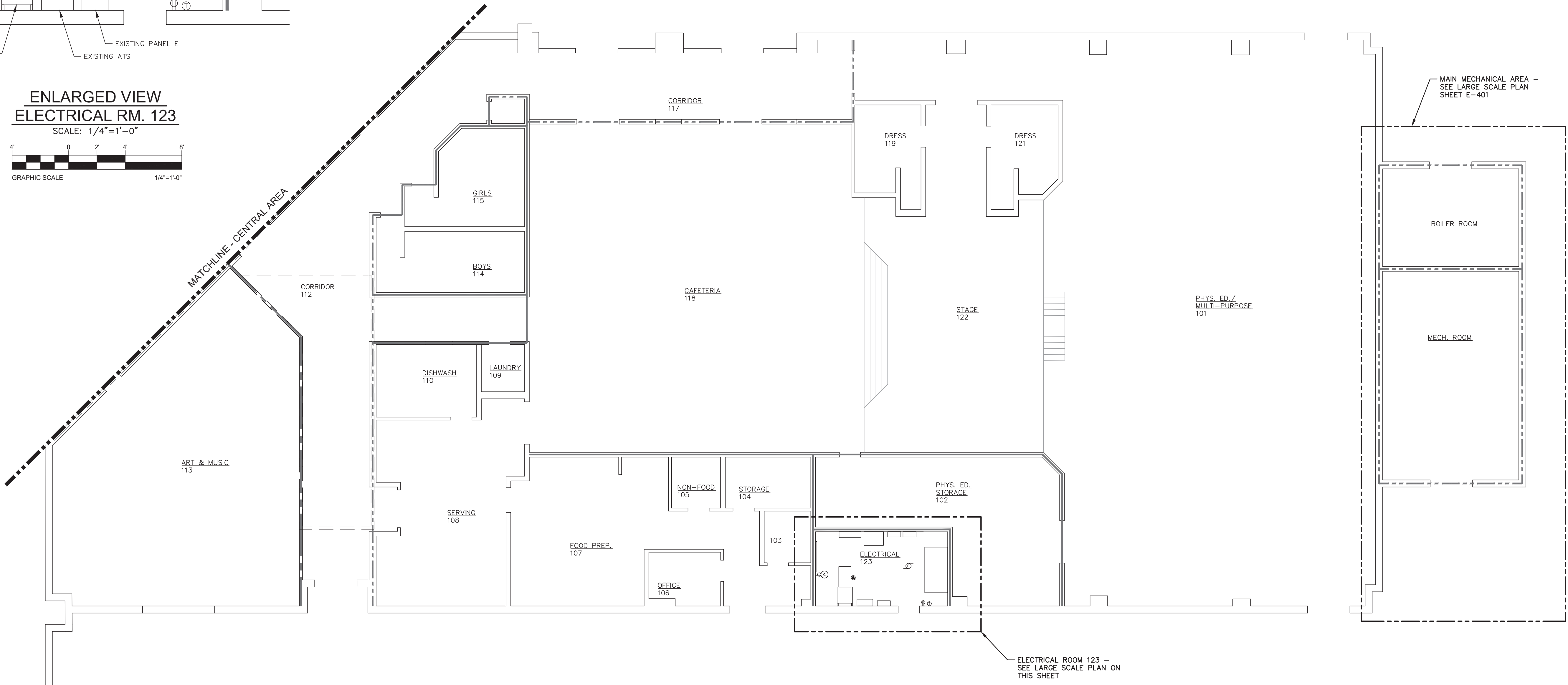
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**ENLARGED VIEW
ELECTRICAL RM. 123**
SCALE: 1/4"=1'-0"

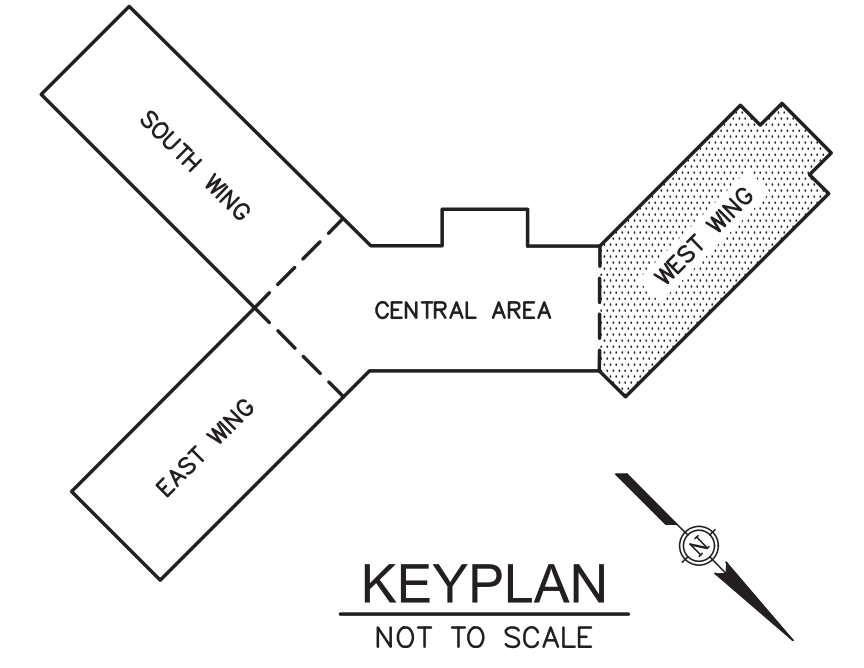
GRAPHIC SCALE 1/4"=1'-0"

MATCHLINE - CENTRAL AREA



ELECTRICAL ROOM 123 - SEE LARGE SCALE PLAN ON THIS SHEET

ELECTRICAL PLAN - WEST WING - NEW WORK
SCALE: 1/8"=1'-0"



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SIGNED AND DATED:
Daniel L. Griffie
Digitally signed by Daniel L. Griffie
Date: 2023.02.07
14:02:16 -05'00'

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

GRAPHIC SCALE 1/8"=1'-0"

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

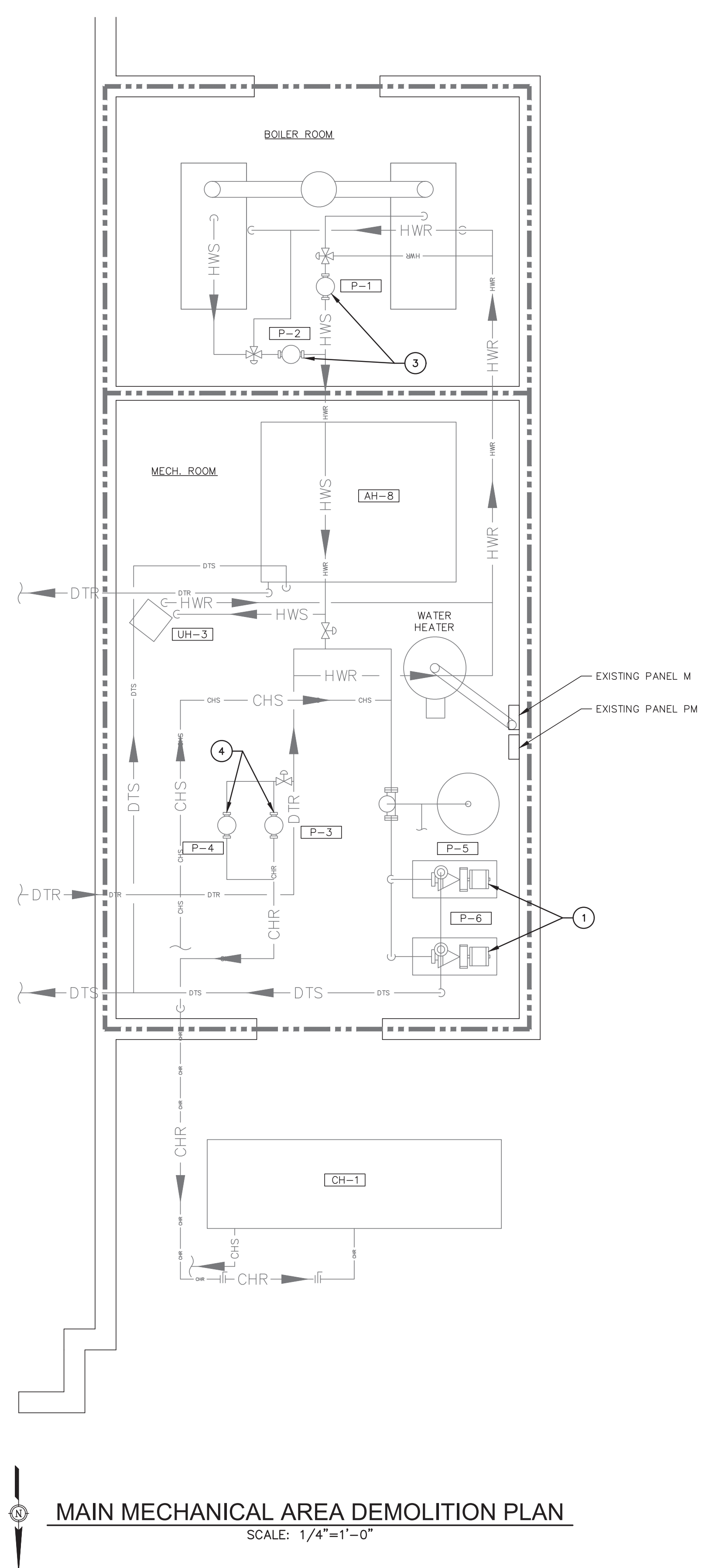
DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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E-101

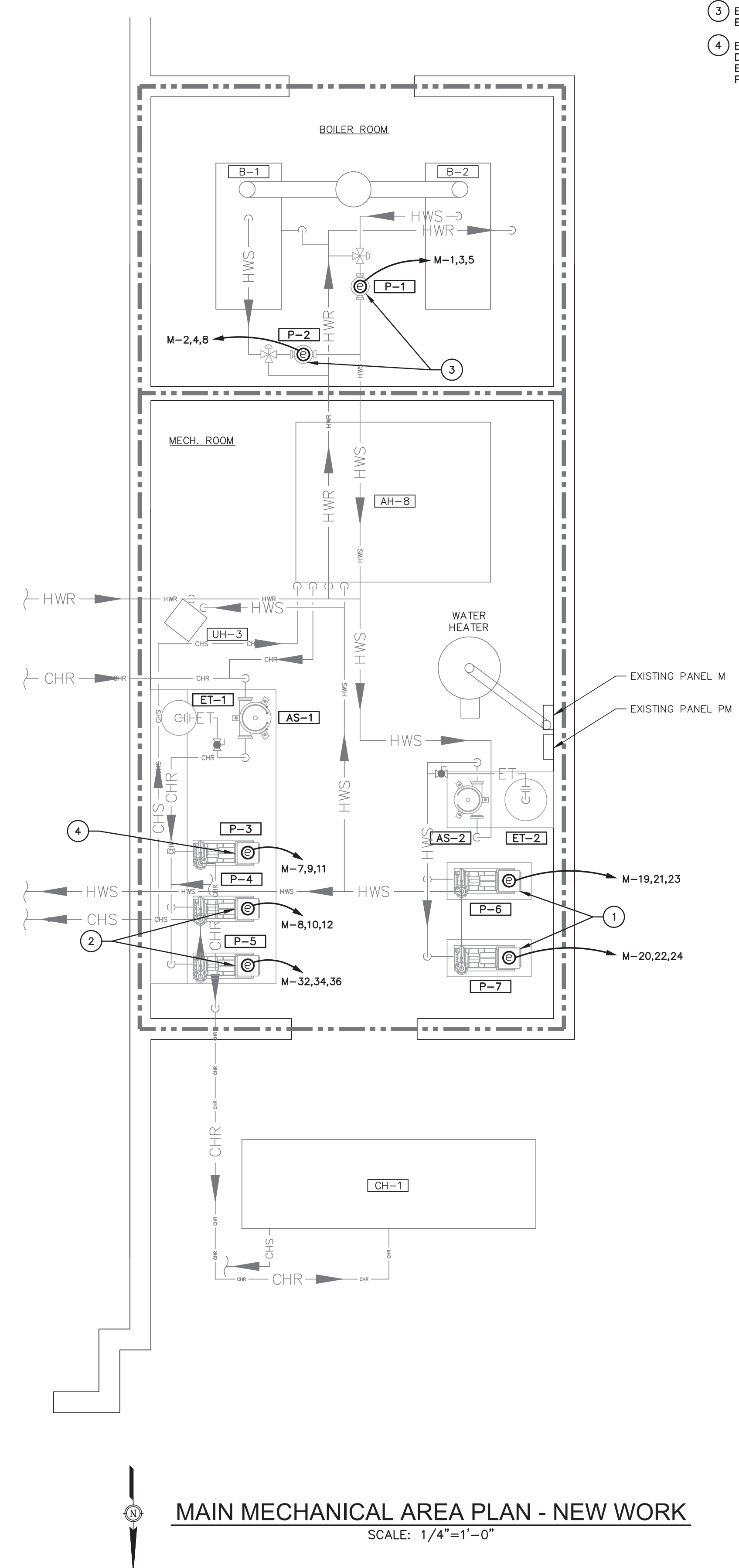
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22.00607 TRANSLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

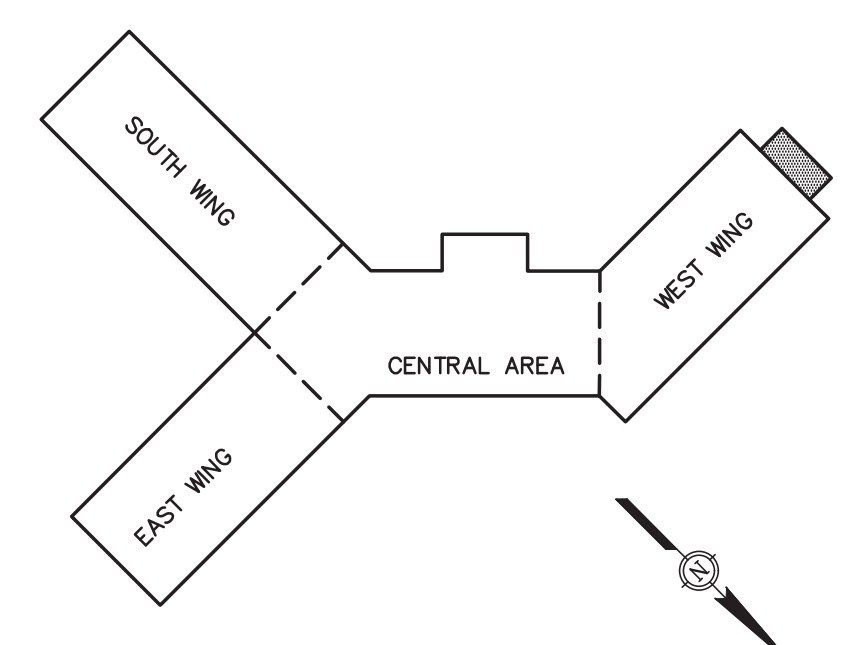
- DRAWING NOTES:**
- EXISTING DUAL TEMP WATER PUMPS P-5 AND P-6 ARE BEING REMOVED. HOT WATER SUPPLY PUMPS P-6 AND P-7 WILL BE INSTALLED IN THE SAME LOCATION AND USE THE SAME CIRCUIT FROM PANEL M. CONDUIT AND CONDUCTORS MAY BE REUSED WHERE POSSIBLE.
 - NEW PUMPS P-4 AND P-5 WILL BE CHILLED WATER PUMPS.
 - EXISTING BOILER LOOP PUMPS ARE BEING REPLACED. DISCONNECT EXISTING CIRCUIT AND EXTEND AS NECESSARY TO THE NEW PUMPING EQUIPMENT.
 - EXISTING CHILLER LOOP PUMPS ARE BEING REPLACED WITH A SINGLE LOOP PUMP (P-3). DISCONNECT EXISTING CIRCUIT FOR P-3 AND EXTEND AS NECESSARY TO THE NEW PUMP EQUIPMENT. THE CIRCUIT FOR P-4 SHALL BE USED TO POWER NEW BUILDING CHW LOOP PUMP P-4.



MAIN MECHANICAL AREA DEMOLITION PLAN
SCALE: 1/4"=1'-0"



MAIN MECHANICAL AREA PLAN - NEW WORK
SCALE: 1/4"=1'-0"



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SIGNED AND DATED:

Daniel L. Griffiee

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS

TRANSLVANIA COUNTY SCHOOLS

TRANSLVANIA COUNTY, NORTH CAROLINA

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFIEE
PROJECT MANAGER D. GRIFFIEE	REVIEWER B. WIGGINS

MAIN MECHANICAL AREA PLAN - ELECTRICAL PLANS	
DATE FEBRUARY 2023	PROJECT # 22.00607
FUNDING # N/A	

SHEET
E-401

System No. C-AJ-1044
XHEZ.C-AJ-1044
Through-penetration Firestop Systems

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, systems, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

XHEZ - Through-penetration Firestop Systems
System No. C-AJ-1044

March 15, 2007

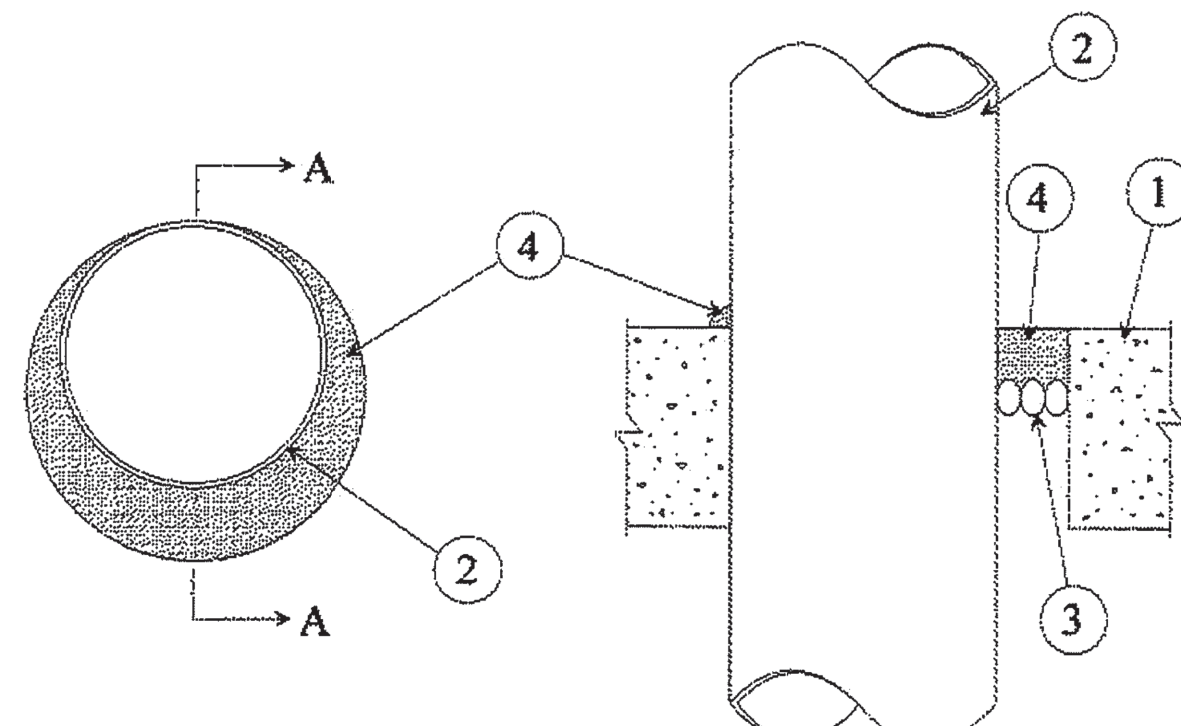
F Ratings — 2, 3, and 4 Hr (See Items 2A and 4)

T Rating — 0 Hr

L Rating At Ambient — 2 CFM/sq ft

L Rating At 400 F — less than 1 CFM/sq ft

W Rating — Class 1 (See Item 4)



SECTION A-A

1. Floor or Wall Assembly — Lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Except as noted in table under Item 4, min thickness of solid concrete floor or wall assembly is 4-1/2 in. (114 mm). Floor may also be constructed of any min 6 in. (152 mm) thick UL Classified hollow core **Precast Concrete Units***. When floor is constructed of hollow core precast concrete units, packing material (Item 3) and caulk fill material (Item 4) to be installed symmetrically on both sides of floor. Wall assembly may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening in solid lightweight or normal weight concrete floor is 32 in. (813 mm). Max diam of opening in floor constructed of hollow-core precast concrete units is 7 in. (178 mm)

See **Concrete Blocks (CA2T)** and **Precast Concrete Units (CFTV)** categories in the Fire Resistance Directory for names of manufacturers.

1A. Steel Sleeve — (Optional, Not Shown) — Nom 16 in. (406 mm) diam (or smaller) Schedule 10 (or heavier) steel sleeve cast or grouted into floor or wall assembly. Sleeve may extend a max of 2 in. (51 mm) above top of floor or beyond either surface of wall. As an alternate, nom 16 in. (406 mm) diam (or smaller) min 0.028 (0.71 mm) thick galvanized sheet steel sleeve cast or grouted into floor or wall assembly flush with floor or wall surfaces.

2. Through Penetrants — One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Max annular space between pipe, conduit or tubing and edge of through opening or sleeve is dependent on the parameters shown in Item 4. Min annular space between pipe or conduit and edge of through opening is 0 in. (point contact). Max annular space to be as shown in the table in Item 4. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:

- A. **Steel Pipe** — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
- B. **Iron Pipe** — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
- C. **Conduit** — Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit.
- D. **Conduit** — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.
- E. **Copper Tubing** — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tube.
- F. **Copper Pipe** — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.

3. Packing Material — Polyethylene backed roof or nom 1 in. (25 mm) thickness of tightly-packed mineral wool batt or glass fiber insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of caulk fill material (Item 4).

3A. Forming Material* — As an alternate to the packing material in Item 3, nom 4 in. (102 mm) wide strips of min 1/2 in. (13 mm) thick compressible mat to be stacked to a thickness greater than the width of the annular space and compression-fitted, edge-first, to fill the annular space to a min 4 in. (102 mm) depth. As an option, the strips of min 1/2 in. (13mm) thick compressible mat may be folded in half, lengthwise, and stacked to a thickness greater than the width of the annular space and compression-fitted, edge-first, to fill the annular space to a min 2 in. (51 mm) depth. Top of forming material to be recessed from top surface of floor or from both surfaces of wall as necessary to accommodate the required thickness of caulk fill material.

3M COMPANY — Fire Barrier Packing Material

4. Fill, Void or Cavity Material* — **Caulk, Sealant** — Applied to fill the annular space flush with top surface of floor. In wall assemblies, required caulk thickness to be installed symmetrically on both sides of wall, flush with wall surface. At point contact location between penetrant and sleeve or between penetrant and concrete, a min 1/4 in. (6 mm) diam bead of caulk shall be applied at top surface of floor and at both surfaces of wall. The hourly F Ratings and the min required caulk thicknesses are dependent upon a number of parameters, as shown in the following table:

Min Floor or Wall Thkns In.	Nom Pipe Tube or Conduit Diam In.	Max Annular Space In.	Min Caulk Thkns In.	F Rating Hr
2-1/2 (64)	1/2-12 (13-305)	1-3/8 (35)	1/2 (13)	2
2-1/2 (64)	1/2-12 (13-305)	3-1/4 (83)	1 (25)	2
4-1/2 (114)	1/2-6 (13-152)	1-3/8 (35)	1/4 (6) (a)	2
4-1/2 (114)	1/2-12 (13-305)	1-1/4 (32)	1/2 (13)	3
4-1/2 (114)	1/2-20 (13-508)	2 (51)	1 (25)	3
4-1/2 (114)	1/2-20 (13-508)	2 (51)	1 (25)	3
4-1/2 (114)	1/2-12 (13-305)	3-1/4 (83)	1 (25)	3
4-1/2 (114)	22-30 (558-762)	2 (51)	2 (51)	3
5-1/2 (140)	1/2-6 (13-152)	1-3/8 (35)	1 (25) (b)	4

(a) Min 2 in (51 mm) thickness of mineral wool batt insulation or forming material (Item 3A) required in annular space.

(b) Min 1 in. (25 mm) thickness of mineral wool batt insulation required in annular space on both sides of floor or wall assembly. Min 1 in. (25 mm) thickness of caulk to be installed flush with each surface of floor or wall assembly.

3M COMPANY — CP 23WB+ or FB-3000 WT.

(Note - W Rating applies only when FB-3000 WT is used.)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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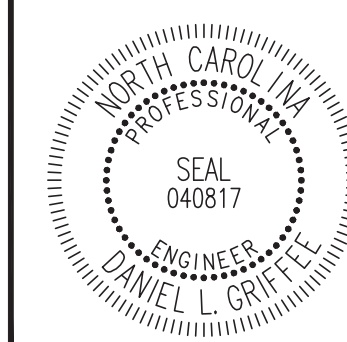
ELECTRICAL SPECIFICATIONS

- POWER CONDUCTORS AND CABLES
 - BRANCH CIRCUITS AND FEEDERS SHALL BE COPPER, TYPE THHN AND TYPE THWN-2.
 - ALL BRANCH CIRCUITS AND FEEDERS SHALL BE CONDUCTORS IN EMT CONDUIT.
 - WHERE POSSIBLE ALL CONDUITS AND CABLES SHALL BE CONCEALED WITHIN CONSTRUCTION EXCEPT IN ELECTRICAL AND MECHANICAL SPACES AND WHERE REQUIRED TO BE EXPOSED TO PROVIDE SERVICE TO EQUIPMENT.
- GROUNDING AND BONDING
 - PROVIDE A DEDICATED AND INSULATED EQUIPMENT GROUNDING CONDUCTOR WITH ALL FEEDERS AND BRANCH CIRCUITS.
- ELECTRICAL EQUIPMENT SUPPORTS
 - ALL SUPPORTS SHALL BE METALLIC. EXTERIOR SUPPORTS SHALL BE HOT-DIPPED GALVANIZED.
 - ALL ANCHORS SHALL BE METALLIC. PLASTIC ANCHORS ARE NOT PERMITTED.
 - ANCHORS SHALL BE SIZED AND DESIGNED TO SUPPORT THE EQUIPMENT BEING SUPPORTED IN EACH APPLICATION PLUS 200 LBS.
- RACEWAYS AND BOXES
 - BRANCH CIRCUITS AND FEEDERS CONDUITS SHALL BE EMT.
 - CONDUIT FITTINGS SHALL BE STEEL COMPRESSION TYPE WITH HEXAGONAL COMPRESSION NUTS.
 - FLEXIBLE METAL CONDUIT(FMC) OR LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC) SHALL BE USED FOR FINAL CONNECTIONS TO TRANSFORMERS OR MECHANICAL EQUIPMENT. LFMC SHALL BE USED IN ALL EXTERIOR LOCATIONS.
 - FMC FITTINGS AND CONNECTORS SHALL BE THOMAS AND BETTS TIGHT BITE OR APPROVED EQUAL.
 - DEVICE BOXES SHALL BE 4" SQUARE, 2.125" DEEP WITH PLASTER OR CUT TILE RING TO MATCH WALL CONSTRUCTION.
 - WHERE POSSIBLE CONCEAL ALL RACEWAY WITHIN BUILDING CONSTRUCTION EXCEPT IN MECHANICAL AND ELECTRICAL ROOMS WHERE EXPOSED CONSTRUCTION IS PERMITTED.
 - PAINT ALL EXPOSED RACEWAY IN FINISHED SPACES SUCH AS CLASSROOMS, CORRIDORS, AND OFFICES TO MATCH EXISTING ADJACENT FINISHES.
- ENCLOSED SWITCHES
 - ALL ENCLOSED SWITCHES SHALL BE FUSIBLE, UNLESS NOTED OTHERWISE.
 - ENCLOSED SWITCHES SHALL BE HEAVY-DUTY, QUICK MAKE, QUICK BREAK TYPE.
 - PROVIDE BY EATON OR APPROVED EQUAL.
- IDENTIFICATION
 - PROVIDE EQUIPMENT IDENTIFICATION LABELS FOR TRANSFORMERS, ENCLOSED SWITCHES, CONTACTORS AND PANELBOARDS.
 - EQUIPMENT ID LABELS SHALL BE ENGRAVED LAMINATED ACRYLIC OR MELAMINE PLASTIC AND SHALL BE MECHANICALLY ATTACHED TO EQUIPMENT.
 - LABEL ALL FIRE ALARM DEVICES WITH THEIR ADDRESS.

P:\2022\22-00607-TRANSYLVANIA\KOSCH-PISGAH FOREST HVAC\DWG\ELECTRICAL\22-00607-ELECTRICAL DETAILS DWG PLOT DATE: 1/11/2023 2:35 PM EED COOPER

BID SET,
NOT FOR
CONSTRUCTION
UNLESS SO ISSUED

55 Broad Street
 Asheville, NC 28801
 828.252.0575
 NC Firm License # C-0459
 mcgillassociates.com



SIGNED AND DATED:
 Daniel L. Griffie
 Digitally signed by Daniel L. Griffie
 Date: 2023.01.07 14:04:47 -0500

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
 HVAC PIPING IMPROVEMENTS

TRANSYLVANIA COUNTY SCHOOLS

TRANSYLVANIA COUNTY, NORTH CAROLINA

AS NOTED

OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

ELECTRICAL DETAILS AND NOTES

DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A
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SHEET
E-601

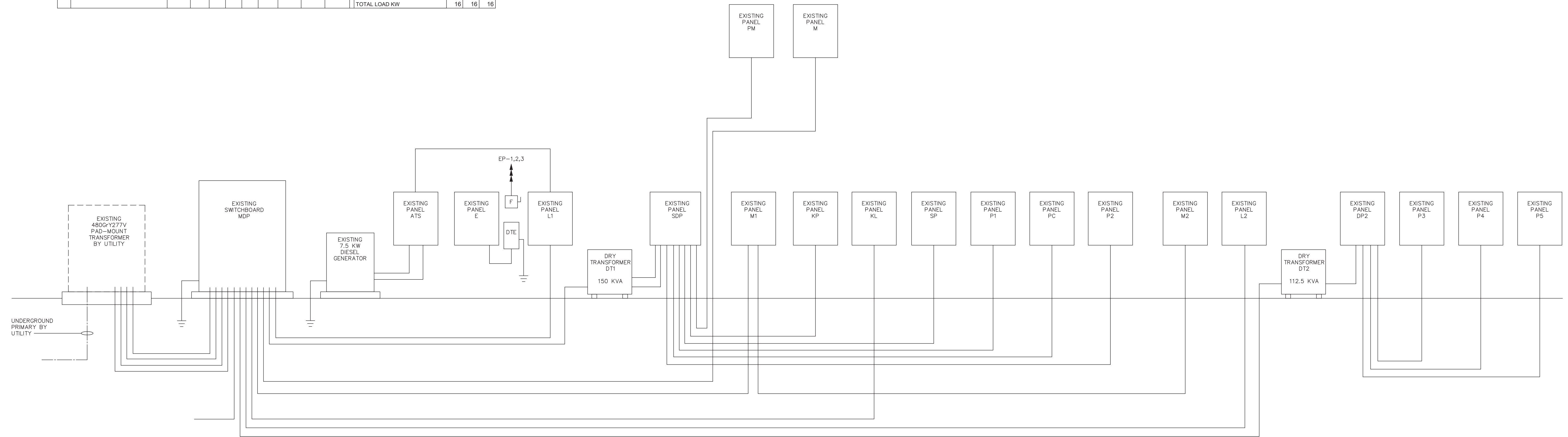
22-00607-TRANSYLVANIA COUNTY SCHOOLS - PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS

DRAWING NOTES:

- 1 REPLACE EXISTING PUMP CIRCUIT BREAKERS AS INDICATED ON PANEL SCHEDULE.

EXISTING PANEL M																		
MOUNTING SURFACE		BUS AMP 225A		MIN. A.I.C. 10,000		MAIN BREAKER MLO		VOLTAGE 480Y/277V										
LOCATION MECHANICAL ROOM		PHASE 3		WIRE 4		NEMA TYPE -		NOTE: WESTINGHOUSE POW-R-LINE C, PRL2 PANELBOARD										
CKT	DESCRIPTION	BREAKER			LOAD (KW)			WIRE			GND.			COND.			DESCRIPTION	CKT
		AMP	POLES		A	B	C	NO	SIZE	SIZE	SIZE	NO	A	B	C	POLES			AMP
1	BOILER LOOP PUMP 1 P-1	15	3	1														2
3					1													4
5						1												6
7							1											8
9	CHILLER LOOP PUMP 1 P-3	15	3	2														10
11					2													12
13																		14
15	AIR HANDLER AH-8	20	3	-														16
17																		18
19																		20
21	HW PUMP P-6 1	25	3	3														22
23					3													24
25																		26
27	AIR-COOLED COND. CU-1	30	3	-														28
29																		30
31																		32
33	CONTROLS AIR COMPRESSOR	15	3	-														34
35																		36
37	SPACE - PFFB																	38
39	SPACE - PFFB																	40
41	SPACE - PFFB																	42
SUB-TOTAL LOAD KW					6	6	6											
TOTAL LOAD KW					16	16	16											

EXISTING PANEL PM																		
MOUNTING SURFACE		BUS AMP 100A		MIN. A.I.C. 10,000		MAIN BREAKER MLO		VOLTAGE 208Y/120V										
LOCATION MECHANICAL ROOM		PHASE 3		WIRE 4		NEMA TYPE -		NOTE: WESTINGHOUSE POW-R-LINE C, PRL1 PANELBOARD										
CKT	DESCRIPTION	BREAKER			LOAD (KW)			WIRE			GND.			COND.			DESCRIPTION	CKT
		AMP	POLES		A	B	C	NO	SIZE	SIZE	SIZE	NO	A	B	C	POLES			AMP
1	BOILER B-1	20	1	-														2
3	BOILER B-2	20	1	-														4
5	CONDENSING UNIT CONTROL	20	1	-														6
7	CONDENSING UNIT CONTROL	20	1	-														8
9	FUEL PUMP P-7	20	1	-														10
11	DX PANEL CONTROL CIRCUIT	20	1	-														12
13	AHU-8 CONTROL CIRCUIT	20	1	-														14
15	SPARE	20	1	-														16
17	SPARE	20	1	-														18
19	SPARE	20	1	-														20
21	SPARE	20	1	-														22
23	SPARE	20	1	-														24
SUB-TOTAL LOAD KW					0	0	0											
TOTAL LOAD KW					0	0	0											



EXISTING POWER RISER DIAGRAM
NOT TO SCALE

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CONSTRUCTION
UNLESS SO ISSUED

mcgill
55 Broad Street
Asheville, NC 28801
828.252.0575
NC Firm License # C-0459
mcgillassociates.com



SIGNED AND DATED:
Digitally signed by
Daniel L. Griffie
Date: 2023.02.07
14:54:23 -05'00'

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NO.	DATE	BY	DESCRIPTION

PISGAH FOREST ELEMENTARY
HVAC PIPING IMPROVEMENTS
TRANSYLVANIA COUNTY SCHOOLS
TRANSYLVANIA COUNTY, NORTH CAROLINA

AS NOTED	
OFFICE MANAGER M. CATHEY	DESIGNER D. GRIFFEE
PROJECT MANAGER D. GRIFFEE	REVIEWER B. WIGGINS

ELECTRICAL SCHEDULES AND DIAGRAMS			
DATE FEBRUARY 2023	PROJECT # 22.00607	FUNDING # N/A	

SHEET
E-602

P:\2022\22.00607-TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST HVAC PIPING IMPROVEMENTS\ELECTRICAL\22.00607 ELECTRICAL DETAILS.DWG PLOT DATE: 2/7/2023 2:52 PM DANIEL GRIFFEE

22.00607 TRANSYLVANIA COUNTY SCHOOLS-PISGAH FOREST ELEMENTARY HVAC PIPING IMPROVEMENTS