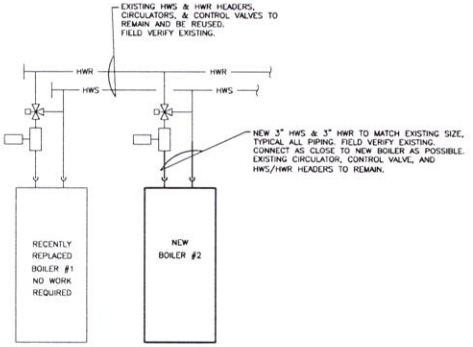


3 / PME101 ENLARGED TEDC BUILDING PROPOSED BOILER #2 HWS & HWR PIPING INSTALLATION SCHEMATIC

SCALE: APPROXIMATELY 1/2" = 1'-0" (DO NOT SCALE DIMENSIONS FROM PLANS)

NOTES:
1. EXISTING HOT WATER SUPPLY, HOT WATER RETURN, MAKE-UP WATER, PUMPS, AND VALVES TO BE REUSED. INSPECT ALL EXISTING COMPONENTS TO BE REUSED FOR WEAR AND REPLACE AS NEEDED. ALL EXISTING CONDITIONS MUST BE FIELD VERIFIED.
2. NEW BOILER TO BE INTEGRATED INTO EXISTING CONTROLS AND METASYS BUILDING AUTOMATION SYSTEM. COORDINATE WITH OWNER TO ENSURE THAT ALL EXISTING OPERATIONS FUNCTION AS THEY DID PRIOR TO BOILER REPLACEMENT.
3. ALL PIPING AND INSULATION MATERIALS TO BE EQUAL OR SUPERIOR TO EXISTING INSTALLATION. PLEASE SUBMIT CUT SHEETS TO ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.

BOILER SCHEDULE

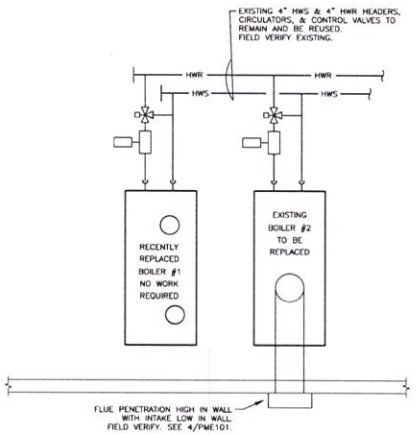
BOILER #2 – 106 GALLON CAPACITY, 186 SQ FT HEATING SURFACE, 350 GPM MAX FLOW RATE, 1,750,000 BTUH INPUT, 1,684,000 BTUH OUTPUT, 120V/1ø
LOCHINVAR #FBN1751

NOTES:
1. FOR LOCHINVAR INFORMATION PLEASE CONTACT:
   JEREMY BUTDORF – JAMES M. PLEASANTS COMPANY
   JEREMYB@JMPCO.COM
   OFFICE: (864) 478-1635
   MOBILE: (864) 270-3909

4 / PME101 EXISTING BOILER #2 INTAKE/VENT PENETRATION DETAIL

SCALE: NONE

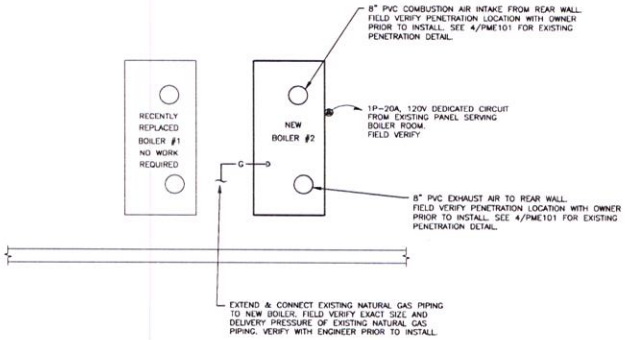
NOTES:
1. LAYOUT SHOWN ABOVE IS A PHOTO OF THE ORIGINAL INSTALLATION FOR THE INTAKE AND VENT PIPING SERVING ORIGINAL BOILER #1 & #2. FOR REFERENCE ONLY. BOILER #1 HAS BEEN REPLACED SINCE THIS PHOTO AND EXISTING CONDITIONS SHALL BE FIELD VERIFIED.
2. EXISTING INTAKE AND VENT PIPING IS TO BE REPLACED WITH NEW. BASIS OF DESIGN: INNOFLUE VENT SYSTEM BY CENTROTHERM ECO SYSTEMS. PIPING SHALL RE-USE EXISTING PENETRATIONS IF AT ALL POSSIBLE.



1 / PME101 TEDC BUILDING CURRENT BOILER CONFIGURATION – SHOWN FOR REFERENCE AND DEMOLITION NOTES ONLY

SCALE: NONE

NOTES:
1. LAYOUT SHOWN ABOVE IS AN APPROXIMATION OF THE CURRENT INSTALLATION AND IS ONLY SHOWN HERE TO GIVE A GENERAL BASIS OF EXISTING CONDITIONS. ALL EXISTING CONDITIONS MUST BE FIELD VERIFIED.
2. EXISTING 1,739,000 BTUH OUTPUT RAYPAK BOILER, NATURAL GAS FIRED BURNER, AND BOILER INTAKE & FLUE SERVING BOILER #2 ONLY TO BE REMOVED AND REPLACED ON A 1:1 BASIS. FLUE & INTAKE SERVING RECENTLY REPLACED BOILER #1 TO REMAIN.
3. ALL ASSOCIATED HOT WATER SUPPLY PIPING, HOT WATER RETURN PIPING, MAKE-UP WATER PIPING, NATURAL GAS PIPING, PUMPS, VALVES, AND POWER WIRING TO REMAIN AND BE REUSED. SEE 2 & 3/PME101.
4. BOILER CONTROLS AND CONTROL WIRING TO REMAIN FOR INTEGRATION WITH NEW BOILERS. SEE 2 & 3/PME101.



2 / PME101 TEDC BUILDING PROPOSED BOILER #2 NATURAL GAS & ELECTRICAL INSTALLATION SCHEMATIC

SCALE: APPROXIMATELY 1/2" = 1'-0" (DO NOT SCALE DIMENSIONS FROM PLANS)

NOTES:
1. EXISTING NATURAL GAS PIPING, PUMPS, VALVES, AND POWER WIRING TO BE REUSED AS PRUDENT. INSPECT ALL EXISTING COMPONENTS TO BE REUSED FOR WEAR AND REPLACE AS NEEDED.
2. NEW BOILER TO BE INTEGRATED INTO EXISTING CONTROLS AND METASYS BUILDING AUTOMATION SYSTEM. COORDINATE WITH OWNER TO ENSURE THAT ALL EXISTING OPERATIONS FUNCTION AS THEY DID PRIOR TO BOILER REPLACEMENT.
3. ALL PIPING AND INSULATION MATERIALS TO BE EQUAL OR SUPERIOR TO EXISTING INSTALLATION. PLEASE SUBMIT CUT SHEETS TO ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
4. SEE 4/PME101 FOR ADDITIONAL COMBUSTION AIR AND VENT PIPING DETAILS.

SIMS PROJECT # 2304

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derek@simsengineers.com
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042145 DERIK J. STEWART
Derek J. Stewart

TEDC BUILDING BOILER #2 REPLACEMENT

BLUE RIDGE COMMUNITY COLLEGE CAMPUS
FLAT ROCK, NORTH CAROLINA

DATE:	JANUARY 10, 2023
DESIGN BY:	DJS
DRAWN BY:	PAH
APPROVED BY:	DJS
SHEET NUMBER:	PME101

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 16 in addition to Division 1 – General Requirements.

1.2 SCOPE OF WORK

A. Provide electric meter, electric service, power distribution equipment, conductors, luminaires, wiring devices, fire alarm system, and other required materials and labor to produce a complete and operating electrical system. Coordinate service with utility and advise owner of service application procedure.
Provide conductors and conduit for all equipment in project.
Provide conduit with pull cords for HVAC control circuits.
B. Obtain all permits, pay all fees, and request inspection from authority having jurisdiction.
C. All work and materials shall be guaranteed for one year from date of substantial completion.
D. Provide temporary power during construction.

1.3 WORK SEQUENCE

A. Coordinate construction and utility outages (if any) with Owner, all other trades, and utility companies. After-hours work may be required to interrupt service.
B. Notify Engineer of discrepancies in the Contract Documents.
C. E-Mail questions or comments to derek@simsengineers.com or fax (828-251-1933) in lieu of telephone calls.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable State and Local Building Codes.
B. Fire Alarm: NFPA 72.
C. Electrical: NFPA 70.
D. Life Safety Code, NFPA 101.
E. The Contractor shall install all materials in accordance with State and Local Building Code. Any work that does not comply shall be made to comply at the contractor's expense.
F. All equipment shall be UL or ETL listed for purpose specified.

1.5 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
B. Prepare record drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding. Submit all changes on Record Documents as a requirement of Project Closeout.
C. Refer to Architectural Drawings for dimensions, locations, cabinets, etc. Do not scale Electrical Drawings.
D. Conceal all materials except where the Architect grants specific permission to do otherwise.
E. Arrange electrical work in a neat, well organized manner. Conduit shall run parallel with primary lines of the building construction.
F. Locate operating and control equipment with adequate access for operation and maintenance.
G. Give right-of-way to piping which must slope for drainage.
H. Advise other trades of openings required in their work for the subsequent move-in of large electrical equipment.
I. Coordination Drawings: For locations where several elements of electrical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings showing the actual dimensions required for the installation.

1.6 SUBSTITUTIONS:

The purpose of specifying equipment by catalog number is to establish quality standards, not necessarily to limit submittals. Substitutions may be accepted if approved as equivalent. Contact engineer prior to bid with any questions. If substitutes are not submitted within 14 days after the bid is accepted, then the equipment shall be provided as specified. Contractor submitting substitutions shall be responsible for any additional cost resulting from the substitution.

1.7 EXCAVATING FOR ELECTRICAL WORK

A. General: The work of this article is defined to include whatever excavating and backfilling is necessary to install the electrical work. The contractor shall coordinate the work with other excavating and backfilling in the same area, including dewatering, floor protection provisions, and other temporary facilities. Coordinate the work with other work in the same area, including other underground services, landscape development, paving, and floor slabs on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling.
B. General Standards: Except as otherwise indicated, comply with the applicable provisions of the Division 2 sections, for plumbing work excavating and backfilling. Refer instances of uncertain applicability to the Engineer for resolution before proceeding.
C. Rock Excavation shall be defined as the removal of a formation that cannot be excavated without systematic drilling and blasting or without the use of pneumatic tools. All rock excavation/removal shall be performed by the General Contractor.
The Electrical subcontractor shall lay out his work and perform all normal excavation.
If rock is encountered, it shall be removed by the General Contractor.
The General Contractor shall be responsible for providing backfill material.
D. Sequencing: Delay backfill and encasement of conduit until testing of conductors has been completed.

2. PART 2 GENERAL DESCRIPTION OF WORK

2.1 Coordinate work with other Trades.

2.2 General:

A. Provide all luminaires, wiring devices, conductors, switches, disconnects, fuses, fire alarm system, and other required materials. Coordinate electrical requirements for equipment supplied by other trades prior to ordering electrical materials.
B. Provide U.L. listed Fire-Stop penetrations through rated assemblies. See Architectural life safety plans to locate rated assemblies.
C. Identify major equipment with engraved Lamacoid labels.
D. Provide typed panelboard directories.
E. Gang mount switches. Provide continuous switchplate.
F. Electrical Contractor shall provide all penetrations and patching required to install electrical work.
G. Support all luminaires, materials, and equipment from building structure.
H. Install all materials and equipment in accordance with manufacturer's instructions.
I. Telephone service shall meet the requirements of and be coordinated with Utility.
J. Electrical service shall meet the requirements of and be coordinated with Utility.
K. Panelboards shall have copper bus unless otherwise noted.
L. Electrical circuits shall not share neutrals unless otherwise noted.

2.3 Design Requirements vs. Code Minimum Requirements.

A. Some of the design requirements stated for this project exceed the minimum requirements of the NEC. These decisions are usually made in order to:

1. Increase reliability of the system.
2. Increase service life of system components.
3. Enhance system safety beyond the minimum requirements of the NEC.

B. Design requirements that may exceed NEC minimum are most often associated with the following:

1. Insulation type.
2. Conductor size.
3. Conduit type.
4. Conduit couplings.
5. Size of equipment grounding conductor. See NEC section 250.4A5.

3. PART 3 CONDUCTORS & CONDUIT

3.1 Conductors:

A. Unless otherwise noted on plans:
1. Conductors above grade shall be THWN-2 copper.
2. Conductors underground or under slab shall be XHHW copper.
B. All conductors shall be in conduit or other approved raceway.
C. Provide EGC (equipment grounding conductor) with all circuits. Some EGCs are sized larger than the NEC minimum. This is done in order to reduce the probability of EGCs being damaged during ground faults.
D. Conductors smaller than #8 AWG shall be solid.
E. Approved manufacturers. (No other manufacturer's products are permitted.)
ENCORE WIRE
SOUTHWIRE
AFC
GENERAL CABLE
OKONITE
CERROWIRE
F. Line-voltage conductors shall not be smaller than #12 AWG.
G. Branch circuits longer than 75 feet shall be wired with conductors #10 AWG or larger.

3.2 Conduit and Raceway:

A. Above grade: EMT with compression-type steel couplings and connectors.
B. Below grade: Schedule 40 PVC with Schedule 80 PVC risers.
C. Raceway Seal: Where a raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with NEC 300.5(G). Spare or unused raceways shall also be sealed.
Sealant shall be American Polywater FST or equivalent.
D. Conduit shall be trade size 3/4" minimum unless otherwise noted.
Exceptions: control wiring, 120V receptacles, and switches may use trade size 1/2" if sized per NEC.
E. Type MC Cable with copper conductors and green ground may be used for concealed branch circuits.
Redhead bushings shall be provided at each termination.
F. Support conduit from building structure with threaded rods and hangers, trapeze hangers, channel and clamps, or other approved method.

4. PART 4 DOCUMENTS AND SUBMITTALS

4.1 SUBMITTALS

A. Submit under provisions of Contract Documents.
B. Identify items with marks to match those shown on drawings.
C. Architect shall approve all colors.
D. All submittals shall have the Contractor's stamp with approval signature.
E. Highlight deviations from specified materials.
F. Product Data: 6 sets, including 3 sets for maintenance manuals. Data shall include the following:

Luminaires
Wiring Devices
Panelboards
Safety Switches
Surge Protective Devices (SPDs)
Fire Alarm System

G. Test Reports (if required): 3 copies
H. Warranties: 6 copies, including 3 for maintenance manuals.
I. Maintenance Manuals: 3 complete sets in loose-leaf 3-ring binders, with rigid permanent vinyl covered back and front. Separators with index tabs shall be provided. One set shall have all sheets individually encased in clear, plastic document protectors.

4.2 CONTROL DATA: Provide control diagrams and wiring diagrams where applicable; include description of control systems, catalog data, and calibration instructions for all components.
Provide name and address of Controls manufacturer and installer.

4.3 MAINTENANCE INSTRUCTION: Typewritten instructions for maintenance of the systems in itemized form and with time schedule shall be furnished.
The instructions shall list each item of equipment requiring inspection, lubrication, or other service.
The operating personnel shall be instructed regarding each maintenance procedure.

5. PART 5 ELECTRICAL WORK CLOSEOUT

5.1 General: Refer to the Division 1 sections for general closeout requirements. Maintain a daily log of operational data on electrical equipment and systems through the closeout period; record hours of operation, assigned personnel, fuel consumption, etc. Submit copy to Owner.

5.2 Record Drawings: Give special attention to the complete and accurate recording of underground circuits, and other concealed or non-accessible work. Record change orders where not shown accurately by contract documents. Submit to Architect/Engineer at end of project one set of reproducible sepias that show all changes in the electrical work.

5.3 Closeout Equipment/Systems Operations: Contractor shall demonstrate sustained, satisfactory performance of all equipment and systems in a test run of appropriate duration.
The Owner's operating personnel shall be present. Adjust or correct equipment as required for proper performance. Clean equipment and luminaires.

5.4 Operating Instructions: Conduct a walk-through instruction seminar for the Owner's personnel. Explain the identification system, operation diagrams, emergency and alarm provisions, and sequencing requirements. Also explain requirements related to: seasonal provisions, security, safety, and efficiency.

5.5 Training: Contractor shall provide training on all major equipment, controls, etc, as part of the contract.

5.6 Turn-Over of Operations: At the time of substantial completion, turn over the prime responsibility for operation of the electrical equipment and systems to the Owner's operating personnel. However, until the time of final acceptance, provide one electrician, who is completely familiar with the work, to consult with and continue training the Owner's personnel.

END OF SECTION

SIMS PROJECT # 2304

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derek@simsengineers.com

NORTH CAROLINA PROFESSIONAL SEAL 042145 ENGINEER DEREK J. STEWART

Derek J. Stewart

TEDC BUILDING
BOILER #2 REPLACEMENT

BLUE RIDGE COMMUNITY COLLEGE CAMPUS
FLAT ROCK, NORTH CAROLINA

DATE: JANUARY 30, 2023
DESIGN BY: DJS
DRAWN BY: PAM
APPROVED BY: DJS
SHEET NUMBER:

PME102

SECTION 15010H
BASIC HVAC REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic HVAC Requirements specifically applicable to Division 15 Sections, in addition to Division 1 - General Requirements.

1.2 SCOPE OF WORK

A. Provide central HVAC equipment including, but not limited to, gas fired furnaces and A/C units, controls, thermostats, ventilators, piping, ducting, air distribution equipment, etc., and other required materials to produce complete and operating HVAC system as shown on drawing.
B. Obtain all permits, pay all fees and request inspection from authority having jurisdiction.
C. Provide demolition of all Mechanical materials made obsolete by this project and remove from site. Owner retains salvage rights.
D. All work and materials shall be guaranteed for one year from date of substantial completion.

1.3 WORK SEQUENCE

A. Coordinate construction and utility outages (if any) with Owner, Engineer, all other trades and utility companies.
B. Visit site before submitting bid to confirm existing conditions. Notify Engineer in writing of discrepancies in Contract Documents and existing conditions.
C. Please E-Mail questions and or comments to derek@simsengineers.com or fax (828-251-1933) in lieu of telephone calls.

1.4 SUBMITTALS

A. Submit under provisions of Contract Documents.
B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. Identify items with marks to match those shown on drawings.
C. Mark dimensions and values in units to match those specified.
D. Architect shall approve all colors.
E. All submittals shall have the General Contractor's stamp, with approval signature.
F. Highlight deviations from specified materials.
G. Shop Drawings: 6 sets, including 3 for maintenance manuals.
H. Product Data: 6 sets, including 3 sets for maintenance manuals. Data shall include the following, but not limited to:
   1. Gas fired furnaces and A/C units
   2. Insulation
   3. Air Distribution Equipment
   4. Exhaust Fans
   5. Valves
   6. Controls
I. Certifications: 3 copies
J. Test Reports: 3 copies
K. Warranties (Guarantees): 6 copies, including 3 for maintenance manuals.
L. Maintenance Manuals: 3 complete sets with individual sets each of this data bound in 10 1/2 x 11 1/2 loose-leaf 3-ring binders, 1 1/2", 2", or 3" ring size, with rigid permanent vinyl covered back and front. Separators with index tabs and loose-leaf sheet protectors shall be provided. One set shall have all sheets individually encased in clear, plastic document protectors.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable State and Local Building Codes.
B. Fire Protection: Conform to NFPA.
C. Electrical: National Electric Code.
D. Life Safety Code, NFPA 101.
E. All Codes shall be the most recent edition.
F. The Contractor shall install all materials per the State and Local Building Code. Any work that does not comply shall be made to comply at the Contractor's expense.
G. All equipment shall be UL approved for purpose specified.
H. Install all materials and equipment per manufacturer's instructions.

1.6 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
B. Prepare record drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding. Submit all changes on Record Documents as a requirement of project close out.
C. Refer to Architectural drawings for dimensions, locations, cabinets, etc. Do not scale HVAC Drawings.
D. Conceal all duct, piping, etc. except where the Architect/Engineer grants specific permission.
E. Arrange HVAC work in a neat, well organized manner with piping and similar services running parallel with primary lines of the building construction.
F. Locate operating and control equipment properly to provide easy access, and arrange entire mechanical work with adequate access for operation and maintenance.
G. Give right-of-way to piping which must slope for drainage.
H. Advise other trades of openings required in their work for the subsequent move-in of large units of mechanical work (equipment).
I. Coordination Drawings: For locations where several elements of mechanical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings (shop drawings) showing the actual dimensions (at accurate scale) required for the installation. Prepare and submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

1.7 SUBSTITUTIONS

All products listed are to establish design and quality standards, not to limit submittals. Substitutions may be accepted if approved as equivalent. Contact Engineer prior to bid with any questions. All substitutions must be submitted within 10 days after bid or supply as specified. Highlight substitution deviations from materials specified. Cost incurred to modify project to install substituted materials shall be the responsibility of the Contractor requesting the substitution.

1.8 Provide Valve Directory indicating number, size, manufacturer, location, function, and normal position. Valve tag numbers shall be as specified.

1.9 Mechanical Equipment: Show the following information for all mechanical equipment:
Nameplate designation
Manufacturer's nameplate data
Location of equipment
Area served
Complete parts drawing and list
Manufacturer's operating instructions
Manufacturer's maintenance instructions
Manufacturer's repair manuals
Manufacturer's installation instructions
Nearest supplier for parts and replacements with telephone number
Nearest service organization for equipment with telephone number

1.10 Control Data:
Control diagrams and wiring diagrams where applicable. Description of control systems.
Catalog data, maintenance and calibration instruction for all components.
Control supplier and address
Control installer and address

1.11 Maintenance Instruction: A typewritten form of instructions for maintenance of the systems in itemized form and with time schedule for maintenance work, shall be furnished. The instructions shall list each item of mechanical equipment requiring inspection, lubrication or service and describe the performance of such maintenance. The list shall include the type of bearings for each piece of equipment, the type of and frequency of lubrication required. The operating personnel shall be instructed in the care of the system in accordance with the typewritten instructions.

2. PART 2 DESCRIPTION OF WORK

2.1 GENERAL DESCRIPTION OF WORK

A. Coordinate work with other trades.
B. Fire stop all penetrations through rated assemblies. See Architectural sheets for locations of rated assemblies.
C. All major pieces of material shall be produced by the same manufacturer. Provide Lamicore labels.
D. HVAC Contractor shall provide all penetrations, etc. and patching required to install HVAC work.
E. Coordinate all required line voltage starters, disconnects, switches with Electrical Contractor for installation. Coordinate electrical requirements for equipment supplied with Electrical Contractor prior to ordering equipment.
F. Provide low voltage controls and control transformers.

2.2 DUCTWORK:

A. GALVANIZED STEEL LOW PRESSURE DUCT CONSTRUCTION

STL U.S. STD GAGE	DUCT DEMENSIONS IN INCHES	CONSTRUCTION TRANSVERSE JOINTS
24	UP THRU 12	S SLIP, DRIVE SLIP
	13 THRU 18 19 THRU 30	S SLIP, DRIVE SLIP BAR SLIP, DRIVE SLIP
22	31 THRU 42 43 THRU 54	POCKET LOCK ON 4' CENTERS, MECHANICAL BOLTED GASKETED, 20 GAGE MECHANICAL, GASKETED, 20 GAGE BOLTED
20	55 THRU 60	MECHANICAL BOLTED, GASKETED 18 GAGE JOINT ON 4' CENTERS 1 1/2 x 1 1/2 x 1/8 ANGELS 2 FEET FROM JOINT

1. Longitudinal joints may be either Pittsburged or snap locked.
2. Where round duct is indicated it shall be minimum 26 gage and otherwise conform to schedule for low pressure duct.
3. Branch take offs shall be throated with the area of the throat being 1.5 times the area of the branch. Takeoff shall incorporate single blade damper constructed of hemmed 24 gage steel with at least 2 galvanized strap hinges, connected to ¼" control rod operating through a nylon bearing.
4. Suspension of duct shall consist of 24 gage galvanized strap for duct through 18". For duct 19" through 30" use ¼" rod and 1 ¼" x 1 ¼" x ¼" galvanized angle on 4' centers, for duct through 60" use 3/8" rod and 2" x 2" x 1/8" galvanized angle on 3' centers.
5. Contractor shall confirm duct routing with engineer prior to fabrication and field installation.

B. GALVANIZED STEEL MEDIUM PRESSURE DUCT CONSTRUCTION

1. Medium pressure duct, 2" - 5" WG, or that duct in a VAV system between fan and terminal box shall be constructed of steel at least 2 U.S. gages heavier than specified for low pressure duct.
2. Test duct for leakage by applying a static pressure of at least 7" WG once the duct has been assembled but before terminals or fans are connected.

C. INSULATION

1. Line all ductwork with 'R' value 5.0 (minimum) acoustical duct liner with anti-microbial agent OR wrap with 'R' value 5.0 (minimum) duct wrap.
2. Provide additional duct wrap with 'R' value 3.0 (minimum) for total 'R' value of 8.0 (minimum) for ductwork routed in attics or non-conditioned space.

2.3 CONDENSATE PIPING:

Schedule 40 PVC

2.4 REFRIGERANT PIPING:

Copper, approved for use by unit manufacturers. Insulate suction line with Armaflex. Seal and paint insulation exposed to weather. Secure 5 feet on center.

2.5 WIRING

All control wiring (120V and less) to be complete to all motorized equipment, and control devices listed in this specification and shown on the mechanical drawings, shall be done under Division 15. The Contractor shall refer to Electrical plans and specifications to determine the source of electrical energy for the various control circuits. All wiring shall be in conduit, shall conform with Division 16 of these specifications, all local codes, the National Electrical Code, and shall be installed by an approved licensed electrician. Wiring diagrams indicating wire sizes and conduit runs for all electrical work that is required to be installed under this contract shall be submitted to the Engineer for prior approval before work is begun. Upon completion of the work, the wiring diagrams shall be revised to incorporate any additions or corrections and two copies of the "as installed" diagrams shall be furnished to the Owner and one to the Engineer on reproducible sepia paper.

Wiring shown on electrical plans is for mechanical equipment scheduled. Any equipment provided by the Contractor that differs from that scheduled in electrical characteristics that requires additional voltage, electrical design and/or electrical cost changes shall be the responsibility of this Contractor. Any cost incurred for additional electrical design and/or electrical changes due to any equipment other than equipment scheduled, shall be the responsibility of this Contractor.

In general interlock wiring between pieces of mechanical equipment shall be done under Division 15M (Example: Exhaust fan interlock with air handling unit).

2.6 FOUNDATIONS: All concrete foundations anchor forms, or pads indicated on the drawings that may be necessary and required for the installation of equipment specified under this contract, shall be furnished and installed. Provide anchor bolts for the equipment foundations/pads. Equipment to receive pads are pumps, boiler and air cooled chiller.

2.7 MISCELLANEOUS STEEL SUPPORTS: All supporting steel grillage, steel angles, channels, pipe or structural steel stands, and anchoring devices that may be required to adequately and rigidly support either piping, insulation, or equipment installed under this contract, shall be provided and installed.

2.8 CHASES AND OPENINGS: Lay out all chases and openings, required for the execution of this work well in advance of the structural work. Provide thimbles in walls and partitions. Thimbles shall be standard weight galvanized steel pipe.

2.9 HVAC SYSTEM IDENTIFICATION:

A. Piping System: All piping installed under this division of the specifications shall be identified as follows:
B. Painting: Piping in mechanical rooms to be painted. Refer to "Painting Mechanical Work."
C. Method of Marking: Colored stencil letter that designate the material being handled, shall be applied at not more than 15 foot intervals on straight pipe runs, adjacent to valves and where pipe passes through walls and floors. Piping shall be marked at all the equipment connections. All piping shall be identified.
D. Identification: Lettering shall be stenciled in block letters, size as scheduled below. Letters on covered (insulated) pipe shall be stenciled on covering. On uncovered pipe, painted bands shall be wide enough (See Table 1) to accommodate required letters. Letters shall be positioned so that it can be easily read by a man standing on the floor. Lettering on parallel groups of lines shall be neatly lined up. Surfaces of piping or insulation finished in dark colored shall be lettered in white; and that finished in light colors shall be lettered in black.

All lines also shall be marked with arrows indicating the direction of flow.

TABLE 1

Outside Diameter of Pipe or Converting (Inches) Letter Size	Size of Letter (Inches)
1/2 to 1-1/4	1/2
1-1/2 to 2	3/4
2-1/2 to 8	1-1/4

All dimensions are given in inches.

2.10 VALVE IDENTIFICATION

A. Tags: Polished brass with 1/4" high stamp-engraved lettering, different shapes for each generic piping service.
B. Application: Tag every valve and control device in each mechanical-work piping system; exclude check valves, valves within equipment units, and valves in fan coil units.
C. Valve Schedule: Prepare and submit valve tag schedules (in duplicate), listing each tagged valve by location, service, and tag description. Install each page of one copy of the valve schedule in glazed frames, and mount where directed.

2.11 EQUIPMENT

A. Signs: Provide engraved plastic-laminate signs at locations of major equipment units and primary control devices. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location, and mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
B. Selection: Refer to instances where either a plastic-laminate sign or plasticized tag might be appropriate to the Engineer for resolution.

2.12 ACCESSIBILITY:

A. No valves, controls, unions, etc., shall be placed in any pipe line at a location that will be inaccessible after the system is completed.

B. Any dampers, controls, valves and piping controls, expansion joints, or other apparatus which must be located in an inaccessible location shall be provided with suitable access doors (fitted in a framed hole) which will permit proper operation and servicing of the apparatus. Access doors aforementioned includes access doors in walls, ceilings, ductwork, and, where required, a combination of above. Access doors to be piano hinged.

2.13 EXCAVATING FOR MECHANICAL WORK

A. General: The work of this article is defined to include whatever excavating and backfilling (but excluding insulating backfill) is necessary to install the mechanical work. Coordinate the work with other excavating and backfilling in the same area, including dewatering, floor protection provisions, and other temporary facilities. Coordinate the work with other work in the same area, including other underground services, landscape development, paving, and floor slabs on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling.
B. General Standards: Except as otherwise indicated, comply with the applicable provisions of the Division 2 sections, for mechanical work excavating and backfilling. Refer instances of uncertain applicability to the Engineer for resolution before proceeding.
C. Rock Excavation shall be defined as the removal of a formation that cannot be excavated without systematic drilling and blasting or without the use of pneumatic tools. All rock excavation/removal shall be performed by the General Contractor. The Plumbing, Mechanical, and Electrical subcontractors shall lay out their work and perform all normal or earth excavation. Should these subcontractors encounter rock (bulk or trench), it shall be removed by the General Contractor using allowable funds. The General Contractor shall be responsible for providing fill material for backfill of rock excavations. Rock may be used for structural fill provided it is broken down by the excavation and compaction equipment into particles with a maximum dimension of 6". Otherwise, it must be removed from the site and legally disposed of. Placement of rock in the fill or removal from the site shall be done by the General Contractor at no additional cost to the Owner.
D. Piping Support: Support pipe 4" and smaller directly on undisturbed soil. Support pipe 6" and larger, on compacted and shaped sub-base material of depth shown but not less than 6" deep. Compact previously disturbed and unsatisfactory subsoil to provide adequate, uniform support for mechanical work; or excavate and replace with stable sub-base material or lean concrete.
E. Sequencing: Delay backfill and encasement of piping until testing of piping system has been completed.

2.14 PAINTING HVAC WORK

A. General: All piping in the mechanical rooms (3) to be painted in the colors as scheduled hereinafter. Refer to Contract Documents for type of paint to be used. All other piping in building requires no painting other than the sizing of the insulation jackets. Contractor to provided color stenciling of piping for identification; touching up paint that is chipped or scratched from mechanical equipment supplied; and 2 coats of black rust preventative on all exposed support metal and hangers mounted outdoors and in mechanical rooms.
B. Cleaning: Exterior surfaces of piping, materials, or equipment that is to be painted or insulated shall be cleaned to remove lint, grease and oil.

Ductwork, coils, fans and casing shall be cleaned on the inside before fans and filters are operated. After the equipment has been used for any purpose such as adjusting, testing, or temporary ventilation, filters shall be cleaned or replaced, as necessary, and supply, exhaust and return ducts shall be cleaned. All coils are to be combed to remove lint.

All components of the mechanical systems shall be cleaned on outside of dust, trash, paint and masonry dropping, and left in first class condition. Belt drives shall be adjusted for proper tension and sheaves aligned. All motor and equipment bearings shall be lubricated as recommended by the individual manufacturer and oil reservoir shall be left full.

2.15 TESTS

A. Provide written test results to the Engineer. Provide one week notice prior to all tests.
B. Adjustments shall be coordinated with cleaning and testing to assure equipment performance as specified.

The entire temperature control system shall be adjusted and placed in operation by the manufacturer. Readjustments necessary to accomplish the specified results during the first year of operation shall be made without cost to the Owner.

Air duct systems shall be adjusted and balanced so that air quantities are regulated to deliver or remove the required cfm at each supply, return and exhaust terminal as specified or shown on the drawings. Distribution from air terminals shall be free from drafts, and uniform over the face of each air terminal.

Adjustments shall be made so that splitters and volume adjusters close to air terminals will have the least pressure drop consistent with volume requirements. Additional pressure drop required for balancing of shorter runs shall be obtained by adjustment of the dampers at branch duct take-offs. Adjusting fan drives shall be used for making final adjustments of total air quantities. Provide all labor and/or replacement and furnishing of extra sheaves of different sizes to accomplish the scheduled specified quantities.

Direct reading velocity meters may be used for comparative adjustment of individual air terminals, but air quantities in trunk ducts shall be measured by means of pitot tube traverses. Factory fabricated plugged or capped openings for pitot tubes shall be provided as required.

Settings of dampers, splitters, and other volume adjusting devices shall be permanently marked so that they can be restored if disturbed at any time.

Record all fan static pressures, equipment rpm's and ammeter readings at each motor.
C. General: Capacities of air handling unit, fans, and other related equipment shall be determined by operating tests of not less than eight hours duration, after stable conditions have been established.

Tabulate the final readings and analysis, and deliver four typewritten copies of the completed reports to the Engineers. The Contractor shall advise the Engineers in writing not less than 10 days in advance of when final testing and balancing will begin.

All labor and technical personnel, instruments and appliances for balancing and tests shall be furnished. If gauges, thermometers, etc., which are to be left permanently installed are used for tests, they shall not be installed until just prior to the tests to avoid possible changes in calibration.

Water and electricity will be furnished by the Owner for the final operating tests.

All unfired pressure vessels furnished under this division shall be constructed, inspected and stamped in accordance with applicable sections of the ASME Codes. Data shall include inspector's National Board registration number.

3. PART 3 HVAC WORK CLOSEOUT

3.1 General: Refer to the Division 1 sections for general closeout requirements. Maintain a daily log of operational data on mechanical equipment and systems through the closeout period; record hours of operation, assigned personnel, fuel consumption and similar information; submit copy to Owner.

3.2 Record Drawings: For HVAC work, give special attention to the complete and accurate recording of underground piping, ductwork, other concealed and non-accessible work, branching arrangement and valve location for piping systems, locations of dampers and coils in duct systems, locations of control system sensors and other control devices, and work of change orders where not shown accurately by contract documents. Submit to Engineer at end of project one set of reproducible sepias that show all recorded changes in the mechanical work.

3.3 Closeout Equipment/Systems Operations: Sequence operations properly so that work of project will not be damaged or endangered. Coordinate with seasonal requirements. Operation each item of equipment and each system in a test run of appropriate duration (with the Engineer present, and with the Owner's operating personnel present), to demonstrate sustained,satisfactory performance. Adjust and correct operations as required for proper performance. Clean and lubricate each system, and replace dirty filters, excessively worn parts and similar expendable items of the work.

3.4 Operating Instructions: Conduct a day walk-through instruction seminar for the Owner's personnel to be involved in the continued operation and maintenance of mechanical equipment and systems. Explain the identification system, operation diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security, safety, efficiency, and similar features of the systems.

3.5 Training: Contractor to provide training on all major equipment, controls, etc., as part of the contract.

3.6 Turn-Over of Operations: At the time of substantial completion, turn over the prime responsibility for operation of the mechanical equipment and systems to the Owner's operating personnel. However, until the time of final acceptance, provide one full-time employee, who is completely familiar with the work, to consult with and continue training with the Owner's personnel.

END OF SECTION

SIMS PROJECT # 2304

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TEDC BUILDING
BOILER #2 REPLACEMENT

BLUE RIDGE COMMUNITY COLLEGE CAMPUS
FLAT ROCK, NORTH CAROLINA

DATE: JANUARY 30, 2023
DESIGN BY: DJS
DRAWN BY: PAM
APPROVED BY: DJS
SHEET NUMBER:
PME103