THINK LEARN BE MORE TOGETHER

POCATELLO/CHUBBUCK SCHOOL DISTRICT 25

LEARNING TODAY FOR THE POSSIBILITIES OF TOMORROW

Administration Office
3115 Pole Line Road
Pocatello, Idaho

SPECIFICATIONS FOR

2024 CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT AT:

Jefferson Elementary School
1455 Gwen
Pocatello, ID

BIDS WITH CONDITIONS WILL NOT BE ACCEPTED

BID OPENING

MARCH 27, 2024
9:30 AM

POCATELLO/CHUBBUCK SCHOOL DISTRICT NO. 25
INVITATION TO BID

Sealed bids will be received by a Representative of the Board of Trustees of Pocatello/Chubbuck School District No.25, Bannock County, Idaho at 3115 Pole Line Road, Pocatello, Idaho, 83201, until 9:30 AM, MST on March 27, 2024 for the following:

2024 CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT

A **mandatory pre-bid** conference and walk-thru to review the projects will be held at the District Maintenance Shop, 185 E. Maple, Pocatello, Idaho, on March 14, 2024 at 10:00 AM.

Specifications or additional details, (including bid forms), may be secured at the Business Office, 3115 Pole Line Road, Pocatello, Idaho, 83201. Each bid shall be accompanied by a certified check, cashier's check, or a bidder's bond, (executed by a qualified surety company with the power to do business in the State of Idaho) in the sum of not less than five percent, (5%) of the total bid, made payable to Pocatello/Chubbuck School District No. 25, Bannock County, Pocatello, Idaho. This surety shall be forfeited by the bidder in the event of failure to enter into a contract. Personal or company checks will not be accepted. Compliance with Idaho Public Works Law is required.

All bids shall be in a sealed envelope and clearly marked: **2024 CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT**; Opened at 9:30 AM MST on
March 27, 2024.

The Board of Trustees reserves the right to reject any or all bids or to waive any informalities, or to accept the bid or bids deemed best for Pocatello/Chubbuck School District No. 25, Bannock County, Pocatello, Idaho.

Renae Johnson, Clerk
School District No. 25

Published dates:

March 1, 2024
March 8, 2023

IDAHO STATE JOURNAL

INSTRUCTIONS TO BIDDERS

BIDS:

Sealed "BIDS" will be received on or before the time and date set forth under "INVITATION TO BID".

The owner reserves the right to accept or reject any part or all bids.

Bidders submitting a "Bid" on this work will be required to figure and furnish everything as called for by these specifications and the requirements of the "Bid" sheet.

All bids shall be in a sealed envelope addressed: Business Office, 3115 Pole Line Road, Pocatello, Idaho, 83201. The following shall be written on the exterior of the envelope:

"**2024 CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT TO BE OPENED AT 9:30 AM MST on March 27, 2024"**

Bids not delivered by contractors at time of bid opening must be received in mail no later than 4:00 PM MST on March 26, 2024, the day before the bid opening.

EXAMINATION OF THE SITE AND DOCUMENTS:

Refer all questions to Brian Glenn, School Plant Coordinator, (208) 233-2604. Contact with other district staff, Board of Trustees, or Administration, will be by written permission only.

A **mandatory** pre-bid conference and walk-thru to review projects will be held at 10:00 AM MST on March 14, 2024 at the District Maintenance Shop, 185 E. Maple, Pocatello, Idaho.

Before submitting a proposal, the bidder shall:

1. Carefully examine the specifications.
2. Visit the worksite.
3. Be fully informed of existing conditions and limitations.
4. Include in the bid, sums sufficient to cover all items required by the contract, and shall rely entirely upon his own examinations in making his proposal.

INTERPRETATIONS:

Should a bidder find discrepancies in or omissions from the specifications, or be in doubt as to their meaning, he should at once notify the Owner, who will send written instructions or addenda to all bidders. The owner will not be responsible for oral interpretations. Questions received less than 48 hours before time for bid opening cannot be answered. All addenda issued during the time of bidding will be incorporated in the contract.

BID GUARANTEE:

As a guarantee that, if awarded the contract, the bidder will execute same and furnish bond. Each bid will be accompanied by a Certified check, Cashier's Check, or Bid Bond for not less than five percent (5%) of the base bid payable to the Owner. NO PERSONAL OR COMPANY CHECKS WILL BE ACCEPTED.

OBJECTIONS:

Written objections to specifications or bid procedures must be received by the clerk, secretary, or other authorized official of the District at least one (1) business day before the date and time upon which bids are scheduled to be received, per Idaho Code Section 68-2806(c).

LAWS AND ORDINANCES:

The contractor hereby binds himself to protect and save harmless the owner from all damages arising from the violation of any and all Federal, State, County, City, and all other laws, rules, regulations, in the performance of the terms of the contract.

HOLD HARMLESS AGREEMENTS:

The District expects your work to conform to professional standards. The contractor is expected to hold the District harmless for all damages or claims arising out of the work performed by the contractor. The District will not agree to hold the contractor harmless for damages or claims.

EQUIPMENT:

The contractor shall provide all labor, materials, tools, and equipment, etc. necessary for the complete and substantial execution of everything described in the specifications.

STORAGE OF MATERIALS:

The contractor shall make arrangement and coordinate with the Maintenance Department for storage of materials. Any damages of life or property caused by storage of materials on the above indicated place shall be paid for by the contractor, who shall hold the owner harmless for any damages concerning the same.

SUPERVISION:

The supervision of this work will be done by School District #25 Maintenance Department.

EVIDENCE OF QUALIFICATIONS:

Upon request of the owner, a bidder whose bid is under consideration for award of the contract shall submit, promptly, satisfactory evidence of his financial resources, his experiences, and the organization and equipment he has available for performance of the contract.

EMPLOYMENT OF RESIDENTS OF IDAHO:

In compliance with Idaho Laws, Section 44-1001 and 44-1002 Idaho Code, the contractor must employ ninety-five percent 95% bona fide Idaho residents as employees on any such contracts except where under such contracts fifty (50) or less persons are employed the contractor may employ ten percent (10%) nonresidents, provided however, in all cases such employers must give preference to the employment of bona fide Idaho residents in the performance of such work.

CONTRACTOR'S LICENSE:

In compliance with Idaho Laws, the contractor must be registered with the State of Idaho, and hold the required *Public Works Contractor's License* before obtaining the contract documents and before submitting a bid for this work.

INSURANCE:

All contractors who provide goods or services to the District are required to provide the District with certificates of insurance for General Liability, Auto Liability, Workers Compensation, and Professional Liability if applicable.

The General Liability and/or Professional Liability certificate must name the District as an additional insured under the contractor's policy. Certificates are to be provided to the District prior to any work commencing on District property. This would include the placement of any equipment or materials at the work site

Minimum Insurance Limits

General Liability	$1,000,000 per occurrence $1,000,000 products and completed operations $1,000,000 annual aggregate
Auto Liability	$1,000,000 per occurrence
Worker' Compensation	Statutory
Professional Liability	$1,000,000 per occurrence $1,000,000 annual aggregate

OWNER/CONTRACTOR AGREEMENT:

The Agreement for the work will be written on a District provided Form of Agreement between Owner and Contractor where the basis of payment is a stipulated sum.

PERFORMANCE BOND:

The successful bidder will be required to furnish a 100% performance bond when entering into the contract work, per Idaho Code Section 54-1926, "...conditioned upon the faithful performance of the contract in accordance with the plans, specifications and conditions thereof."

PAYMENT BOND:

The successful bidder will be required to furnish a 100% payment bond when entering into the contract work, per Idaho Code Section 54-1926, "solely for the protection of persons supplying labor or materials, or renting, leasing, or otherwise supplying equipment to the contractor or his subcontractors in the prosecution of the work provided for in such contract."

5% RETAINAGE:

The Owner will retain 5% of the Contractor's earned sum to ensure faithful performance. This 5% will be released to the Contractor upon receipt of approval from State of Idaho.

LIQUIDATED DAMAGES:

Contractor shall be required to pay Owner as liquidated damages the sum of $500 for each day, after the scheduled completion date, that the project is unfinished.

CHANGES IN THE WORK:

The owner, without invalidating the contract, may order extra work or make changes by altering, adding to, or deducting from the work; the contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract, except that any claim for extension of the time caused thereby shall be adjusted at the time of ordering such change.

The total allowance for combined overhead and profit for changes shall be included in the total cost to the owner and shall be based on the following schedule:

a) For the Contractor, 10% over cost;
b) For the Sub-Contractor, 15% over cost to be divided 10% for Sub-Contractor and 5% for Contractor; and
c) For any Sub-Subcontractor, 15% over cost to be divided 5% for Contractor, 5% for Sub-Contractor, and 5% for Sub-Subcontractor.

FORM WH5:

Per Idaho Code Section 54-1904A, within thirty (30) days of award of bid, the contractor shall file with the State Tax Commission a form WH-5, Public Works Contract Report.

INSPECTION OF WORK:

The representative of the owner shall at all times have access to the work wherever it is in preparation or progress and the contractor shall provide facilities for such access and for inspection.

WARRANTY:

Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of one year from date of delivery.

Warranty shall cover repair or replacement of such parts determined defective upon inspection. Warranty does not cover any product or part of a product subject to accident, negligence, alteration, abuse or misuse. Warranty does not cover any accessories or parts not supplied by the manufacturer.

Warranty shall not cover any labor expended or materials used to repair any equipment without manufacturer's prior written authorization.

CLEAN UP:

The contractor shall at all times keep the premises free from accumulations of waste material or rubbish caused by his employees or work, and at the completion of the work he shall remove all his rubbish from and about the building and all tools and surplus materials and shall leave his work clean. In case of dispute, the owner shall remove the rubbish and surplus materials and charge the cost to the contractor.

IDAHO EMPLOYER ALCOHOL AND DRUG-FREE WORKPLACE ACT: Include with your bid sheet a contractor's affidavit pursuant to Idaho Code Section 72-1717.

BIDDER CERTIFICATION FORM: All bidders must complete and submit the Bidder Certification Form included with this bid request.

PAYMENT:

Prices must remain firm as quoted by supplier until quantity awarded is received. Application for payment dated on or before the 25th of the month, shall be paid by the 15th of the following month. Application for payment dated after the 25th of the month, shall be paid within 30 days.

Delivery may be accepted any time, however, payment for the 2023-2024 fiscal year cannot be made until after July 1, 2023 when those funds have been released.

BID:

The following universal specifications are being used as a guideline. Alternate bids for equal equipment may be considered. Substitutions or major alternations must be indicated upon the proposal sheet at the time of the bid submission. Bids must be based upon conditions at the site and these specifications. Bids shall be submitted in accordance with the requirements shown on the bid form.

BID EVALUATION CRITERIA:

Contractor selection on this project will be evaluated based on the following:

1) Price
2) Contractor reputation for quality of work with current customers or past performance with District 25. (please list all jobs/contracts greater than $10,000 performed in the past two years if contractor has not performed one for the District in past 5 years)
3) Vendor ability to best match the listed criteria as specified.

DELIVERY AND START OF WORK:

The time frame for the replacement of HVAC Equipment to be completed is between June 3, 2024 and August 9, 2024.

2024 CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT
MECHANICAL SPECIFICATIONS

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23 81 46 **Water to Water Heat Pumps**

SECTION 23 05 00

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes specific requirements, products, and methods of execution which are typical throughout the mechanical work of this project. Additional requirements for the specific systems will be found in the sections specifying those systems, and supersede these requirements.

1.2 PROJECT CONDITIONS

A. Obtain approval from A/E prior to cutting any structural members of furring elements.

B. Coordinate with structural and architectural work to determine acceptable locations for sleeves and supports which are required but may not be specifically show on the plans. Schedule installation of sleeves and special supports in manner timely to the work of other crafts. Provide offsets necessary for proper coordination with other work and reroute systems appropriately.

C. Replace any spray applied fireproofing damaged by installation of mechanical if present in construction.

1.3 DIMENSION AND FIT

A. Fabricate materials accurately from measurements taken at the project site, not from the drawings.

B. Do not spring or bend pipe to fit conditions or make up joints.

1.4 SERVICEABILITY OF PRODUCTS

A. Furnish all products to provide the proper orientation of serviceable components to access space provided.

B. Coordinate installation of piping, ductwork, equipment, system components, and other products to allow proper service of all items requiring periodic maintenance or replacement.

C. Replace or relocate all products incorrectly ordered or installed to provide proper serviceability.

D. Provide code required access, power and lighting, and platforms as required.

1.5 ACCESSIBILITY

A. Provide access doors in ceilings, walls, floors, ducts, etc., for access to traps, valves, dampers, automatic devices, and all serviceable or operable equipment in concealed areas.

1.6 ROUTING

A. Route all pipelines and ductwork parallel with building lines and as high as possible except where underground or shown otherwise on the building plans.

B. Route piping and ducts to clear all doors, windows, and other openings, and to avoid all other pipes and ducts, light fixtures, and similar products.

C. Conceal all pipes and ducts where routed through finished areas, unless authorized by Architect/Engineer or otherwise indicated on plans.

D. Priority: In general, medium pressure ducts (over 3.0 inches W.G.), graded pipes, and electrical raceways have priority of routing. Route other work elsewhere, over or under, as

necessary. Order of priority does not reduce requirements for all trades to fully coordinate work.

1.7 SEISMIC PROTECTION

A. Description

1. Included but not limited to:

a. The requirements for seismic protection measures to be applied to mechanical equipment and systems specified herein are in addition to any other items called for in other sections of these specifications. Mechanical equipment shall include all ductwork, piping, and equipment specified in Division 23.

2. Exclusion

a. Floor mounted equipment weighing less than 400 lb, furniture or temporary or movable equipment.

B. Quality Assurance

1. Reference Standards

a. All ductwork and piping shall be provided with seismic restraints in accordance with Seismic Hazard Level (SHL) B of the Seismic Restraint Manual: Guidelines for Mechanical Systems dated 1991 and Addenda, as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) and in accordance with the International Building Code.

2. Design Criteria

a. This facility is located in seismic zone 3.

b. The occupancy category is special occupancy structure.

c. The importance factor is 1.0.

1.8 ACCESS PANELS

A. Furnish minimum 18 x 18 inch panels for ceilings and for access to equipment in soffits and shafts, and minimum 12 x 12 inch panels for walls unless indicated otherwise. Access panel shall be lockable.

B. Furnish where indicated and where required to access temperature control dampers, valves, fire dampers, trap primers, shock arresters, and other appurtenances requiring operation, service, or maintenance. Review locations with the Owner's Representative prior to installation.

1.9 PIPE SLEEVES

A. Interior Wall Sleeves: 12 gauge galvanized steel, flush with wall on both sides.

B. Interior Floor Sleeves: 12 gauge galvanized steel and extend two inches above finish floor.

C. Exterior Wall Sleeves: Cast iron, flush with wall on both sides.

D. On Grade Floor Sleeves: Same as exterior wall sleeves.

1.10 FLOOR, WALL, AND CEILING ESCUTCHEON PLATES

A. Furnish split type plates as follows:

1. Floor Plates: Cast brass, chrome plated

2. Wall and Ceiling Plates: Spun aluminum

1.11 PIPING MARKERS

A. Acceptable Manufacturers: W.H. Brady, Seton

B. Pipes shall be labeled with all-vinyl, self-sticking labels or letter. For pipe covering sizes up to and including 1 ¼-inch outside diameter, select labels with ½-inch letters. For sizes from 1 ½-inch through 2-inch outside diameter, ¾-inch letters; for sizes from 2 1/2-inch through 6 inch outside diameter, 1 ¼-inch letters. The pipe markers shall be identified and color coded as follows. Install directional arrow adjacent to pipe marker indicating direction of flow. Arrows shall be same sizes and color as identification labels.

Service	Pipe Marker	Background Color
Heating Hot Water	Glycol Heating Supply	Yellow
	Glycol Heating Return	Yellow
Chilled Water	Chilled Water Supply	Green
	Chilled Water Return	Green
Storm Drain Water	Storm Drain	Green
Cold Water	Domestic Cold Water	Green
Hot Water	Domestic Hot Water Supply	Yellow
	Domestic Hot Water Recirc	Yellow
Sanitary Waste	Sanitary Waste	Green
Vent	Vent	Green
Fuel Gas	Natural Gas	Yellow

1.12 MECHANICAL SUPPORTING DEVICES

A. General

1. Securely fasten all mechanical work to the structure to prevent hazard to human life and limb, and to prevent damage to products of construction under all conditions of operation.

B. Foundation and Supports

1. Mount all equipment, plenums, piping and ductwork on foundations or suspend from primary building structure with additional structural members as required to provide secure and safe permanent installation. Design additional structural members for load imposed. Provide vibration isolation between equipment and supporting structure.

2. Provide concrete foundations, including housekeeping pads for all mechanical equipment located on cast-in-place concrete structures. Coordinate final sizes and locations.

3. Provide fabricated steel supports, frames, bases, and support or appurtenances for proper installation for all equipment.

4. Where Superstrut framing channel product series numbers are the only numbers listed, equal products by Uni-Strut or 0 – Strut with equivalent finish may be used.

C. Pipe Supports

1. Standard components, selected in accordance with MSS SP69, that satisfy the criteria of MSS SP-58, and framing channels and clamps.

2. Single Pipes: Install hangers for cold piping outside the insulation using high density (6 lb. per cubic foot) insulation and 18 gal. galvanized sheet metal shield or saddle. Provide copper plated hangers for copper pipe.

3. Trapeze Hangers: Where pipes are clustered, parallel, and in the same plane, they may be supported by trapeze hangers. Provide rods and framing channel sized to suit load imposed.

4. Provide inserts for poured concrete and drop-in expansion anchors for pre-cast slabs.

5. Manufacturers: Grinnell, C & P, Michigan, Super Strut

D. Inserts: Provide all inserts required for installation of piping. In poured concrete provide wrought steel or malleable iron adjustable type. Where expansion bolts are necessary to secure piping or equipment, use drop-in type anchors, to be inserted by drilling concrete. Power driven inserts not permitted for supporting piping to ceiling.

1.13 SEISMIC PROTECTION

A. Materials and equipment shall conform to the respective specifications and other requirements specified below.

1. Square-head bolts and heavy hexagon nuts, ANSI B18.2.1 and BI 8.2.2 and ASTM A 307 or A 576.

2. Bolts underground, ASTM A 325.

3. Sway brace shall conform to applicable requirements of MSS SP-58 and SP-69. Material used for members listed in Table shall be structural steel conforming with ASTM A36.

4. Flexible Couplings: Flexible couplings shall have same pressure ratings as adjoining pipe.

5. Flexible ball joints conforming to the following requirements may be employed on aboveground piping. Joints shall have cast or wrought steel casing and ball parts capable of 360 degrees rotating plus not less than 15 degrees angular movement. Joints shall be certified to be suitable for the service intended by the manufacturer, based on not less than 2 years satisfactory operation in a similar application.

6. Flexible couplings and joints of the mechanical joint type may be used for aboveground or underground piping.

7. Mechanical couplings for steel or cast-iron pipe shall be of the sleeve type and shall provide a tight flexible joint under all reasonable conditions, slight settling or shifting of the ground, minor variations in trench gradients, and traffic vibrations. Where permitted in other sections of these specifications, joints utilizing split-half couplings with grooved or shouldered pipe ends may be used.

8. Sleeve-type couplings shall be sued for joining plain-end pipe sections. The coupling shall consist of one steel middle rim, two steel followers, two gaskets, and necessary steel bolts and nuts to compress the gaskets. Underground bolts shall be high-strength type as specified.

1.14 DISCONNECT SWITCHES

A. All mechanical equipment requiring disconnect switches and over current protection shall be supplied per manufacturer recommendations and meet the National Electrical Code.

1.15 EQUIPMENT EFFICIENCY

A. Efficiency of Mechanical equipment and electric motors supplied with mechanical equipment: Meet or exceed the requirements of the International Energy Conservation Code.

1.16 ACCESS PANELS

A. Install in accordance with manufacturer's recommendations, coordinated with architectural features.

1.17 PIPE SLEEVES

A. Interior Floor and Wall Sleeves: Large enough in diameter to provide ¼ inch clearance around pipe or insulation. Pipe penetrations through mechanical room and fan room floors shall be made watertight.

B. Penetrations through Rated Floors and Walls: Caulk with fire barrier sealing system approved by authority having jurisdiction and Owner's insurance underwriter, with rating equal to floor or wall penetrated.

C. Exterior Wall Sleeves: Large enough to allow for caulking and made watertight. Caulking shall be from outside. Secure sleeves against displacement.

D. On-Grade floor Sleeves: Same as exterior wall sleeves, caulked from inside.

E. Layout work in advance of pouring of slabs or construction of wall and furnish and set inserts and sleeves necessary to complete the work.

F. Coordination: Cutting and patching required as a result of lack of coordination of this operation shall be at no additional cost.

1.18 FLOOR, WALL, AND CEILING ESCUTCHEON PLATES

A. Install on piping passing though finished walls, floors, ceilings, partitions and plaster furring. Escutcheon plates shall completely cover opening around pipe.

B. Secure wall and ceiling plates to pipe or structure.

C. Plates shall not penetrate insulation vapor barriers.

D. Plates not required in unfinished spaces.

1.19 PIPING MARKERS

A. Install in accordance with ANSI A13.1 or the following, whichever is more stringent, apply labels or letters after completion of pipe cleaning, insulation, painting, or other similar work, as follows.

1. Every 20 feet along continuous exposed lines.

2. Every 10 feet along continuous concealed lines.

3. Adjacent to each valve and stub-out for future.

4. Where pipe passes through a wall, into and out of concealed spaces.

5. On each riser.

6. On each leg of a ‘T’ fitting.

B. Further apply labels or letters to lower quarters of the pipe on horizontal runs except where view is not obstructed on the upper quarters and pipe is normally viewed from above.

1.20 MECHANICAL PIPING AND SUPPORTING DEVICES

A. Fabricate and install piping and tubing in accordance with ASME B31.9 or the Idaho State Plumbing Code as applicable, the drawings, and this specification.

1. Install all piping systems in accordance with manufacturer’s recommendations. Provide pipe racks, pipe stands, trapeze hangers, etc., as required.

2. Provide adjustable hangers complete with inserts, adjusters, bolts, nuts, swivels, all-thread rods, etc., except where specified otherwise, for all pipes.

3. Do not use wire or perforated metal to support piping.

4. Except as otherwise indicated for exposed continuous pipe, runs, install hangers and supports of same type and style as installed for adjacent similar piping.

B. Foundations and Supports

1. Provide where shown on drawing, or as specified, and per manufacturer’s installation instructions.

C. Pipe Supports

1. Suspended Piping: support piping at each change in direction. Support piping on either side of control valves, pumps, at equipment connections, and wall penetrations so that piping is independently supported.

2. Piping shall be independently supported form pipe hangers and shall not be laid through trusses or supported from other piping or ductwork.

3. Riser piping shall be supported at the top and bottom of the riser with intermediate supports as required. Riser piping shall not depend on a friction clamp for load bearing support.

D. Vertical Piping

1. Pipe supports shall hold piping away from wall unless otherwise approved.

2. Riser clamps to be directly under fitting (mechanical couplings not included) or welded to pipe.

3. Risers to be supported at each floor penetration.

4. Provide structural steel supports at the base of pipe risers. Size supports to carry all forces exerted by piping system when systems are in operation.

E. Horizontal Piping

1. Support within two feet at each change in direction.

2. For cast iron no-hub piping and fitting assemblies less than 5'-0" long, provide hangers at each pipe end and fittings.

F. Building Attachments

1. Fastening or attaching to deck structure is prohibited. Support all piping from primary structural members, beams, joists, or provide intermediate supporting members between joists or beams.

2. Provide all additional structural steel angles, channels, or other intermediate members required to support piping where structures do not occur as required for proper support.

3. Arrange supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.

1.21 Cleaning and Adjusting

A. Thoroughly clean Mechanical and plumbing equipment, fixtures, piping and ductwork of stampings and markings (except those required by codes), iron cuttings and other refuse. Clean plenums and equipment casings of debris and small particles of rubbish and dust before installing and making final duct connections. Provide temporary filters for all equipment with filters, replace with new filters after construction activities in building are complete.

B. Painted Surfaces: Clean scratched or marred factory finished and painted surfaces of rust or other foreign matter and paint with matching color industrial enamel or manufacturer supplied touch up paint.

C. Adjusting: After mechanical equipment has had minimum of thirty days of operation, lubricate and grease all equipment. Re-tighten belts to proper tension. Adjust fans, valves, control valves and other miscellaneous equipment requiring adjustment to setting indicated or directed.

D. Additional requirements are specified under specific sections of this Division.

END OF SECTION

SECTION 23 05 14

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.22 DESCRIPTION

A. This specification is to cover a complete Variable Frequency Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with induction (asynchronous) motors, permanent magnet motors, Synchronous reluctance motor (SynRM) and permanent magnet-assisted synchronous reluctance motor (PMa-SynRM/EC Titanium).
B. The drive manufacturer shall supply the drive and all necessary options as specified. All drives installed on this project shall be from the same manufacturer and have a common user interface (control panel). The manufacturer shall have been engaged in the production of this type of equipment for a minimum of 30 years. Drives that are manufactured by a third party and "brand labeled" shall not be acceptable. Drive manufacturers who do not build their own power boards and assemblies, or do not have full control of the power board manufacturing and quality control, shall be considered as a "brand labeled" drive.
C. This specification is intended to supplement a drive schedule. The drive schedule identifies the optimized BOM for the project and includes quantity, size, voltage, enclosure rating, options, and harmonic mitigation requirements of the drives. IEEE 519-2014 is an electrical system standard for harmonic mitigation and is not intended to be applied to an individual piece of equipment. Drives are only one of many sources of harmonics, thus verification of system IEEE 519-2014 compliance is beyond the VFD manufacturer's scope. The EOR (Engineer of Record) is responsible for conducting an electrical system study and verifying the drive schedule has specified proper harmonic mitigation for the drives.

1.23 QUALITY ASSURANCE

A. Referenced Standards and Guidelines:
   1. Institute of Electrical and Electronic Engineers (IEEE)
      a. IEEE 519-2014, IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
   2. Underwriters Laboratories (as appropriate)
      a. UL 508A
      b. UL 61800-5-1
   3. National Electric Code (NEC)
      a. NEC 430.120, Adjustable-Speed Drive Systems
   4. CSA Group
      a. CSA C22.2 No. 274
   5. International Building Code (IBC)
      a. IBC 2018 Seismic – referencing ASCE 7-16 and ICC AC-156
B. Qualifications:
   1. Drives shall be UL labeled as a complete assembly. The base VFD shall be UL listed for 100 kA SCCR when installed in accordance with the manufacturer's guidelines.
   2. CE Mark – The base drive shall conform to the European Union Electromagnetic Compatibility directive, a requirement for CE marking. The base drive shall meet product standard EN 61800-3 for the First Environment restricted distribution (Category C2).
   3. The base drive shall be seismically certified and labeled as such in accordance with the 2018 International Building Code (IBC):
      a. Seismic importance factor of 1.5, and minimum 2.5 S_{DS} rating is required.
      b. Ratings shall be based upon actual shake test data as defined by ICC AC-156, via all three axis of motion.

c. Seismic certification of equipment and components shall be provided by HCAI (formerly OSHPD) preapproval.

4. The base drive shall be SEMI-F47 certified. The drive must tolerate voltage sags to 50% for up to 0.2 seconds, sags to 70% for up to 0.5 seconds, and sags to 80% for up to one second.
5. Acceptable Manufacturers
   a. ABB ACH Series.
   b. Alternate manufacturer's requests shall be submitted in writing to the Engineer for approval at least 20 working days prior to bid. Approval does not relieve the supplier of specification requirements.

1.24 SUBMITTALS

A. Submittals shall include the following information:
   1. Outline dimensions, conduit entry locations and weights.
   2. Electrical diagrams must be drive package specific and generic drawings are not allowed. Hand marked or manually modified diagrams are not acceptable.
   3. HCAI (formerly OSHPD) preapproval, seismic certification, and installation requirements where applicable.
   4. Complete technical product description with complete list of options provided. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.
   5. Building Information Modeling (BIM) objects shall be available online.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES

A. The drive package as specified herein and defined on the drive schedule shall be enclosed in a UL Type enclosure (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer to ISO9001 standards.

B. The drive shall provide full rated output from a line of +10% to -15% of nominal voltage. The drive shall continue to operate without faulting from a line of +25% to -35% of nominal voltage.

   1. Drives shall be capable of continuous full load operation under the following environmental operating conditions:

      a. Ambient temperature -15 to 40° C (5 to 104° F).

      b. Altitude 0 to 1000 m (0 to 3,300 ft) above sea level.

      c. Humidity 5 to 95%, non-condensing.

C. All drives shall utilize the same Advanced Control Panel (keypad) user interface.
   1. Plain English text
      a. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable).
      b. Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.
      c. Safety interlock, run permissive, Supervisory, external fault status, drive name, drive fault contact info and override shall have the option of additional customized project specific terms, such as: AHU-1 End Switch, Office Smoke Alarm, CT-2 Vibration.

2. The control panel shall include at minimum the followings controls:
    a. Four navigation keys (Up, Down, Left, Right) and two soft keys to simplify operation and programming.
    b. Hand-Off-Auto selections and manual speed control without having to navigate to a parameter.
    c. Fault Reset and Help keys. The Help key shall include assistance for programming and troubleshooting.
3. Multiple Home View screens shall be capable of displaying up to 21 points of information. Customizable modules shall include bar charts, graphs, meters, and data lists. Displays shall provide real time graphical trending of output power, frequency, and current within selectable intervals of 15/30/60 minutes and 24 hours.
4. The control panel shall display the following items on a single screen; output frequency, output current, reference signal, drive name, time, and operating mode (Hand vs Auto, Run vs Stop). Bi-color (red/green) status LED shall be included. Drive (equipment) name shall be customizable.
5. There shall be a built-in time clock in the control panel. The clock shall have a battery backup with 10 years minimum life span. Daylight savings time shall be selectable.
6. I/O Summary display with a single screen shall indicate and provide:
    a. The status/values of all analog inputs, analog outputs, digital inputs, and relay outputs. Drives that require access to internal or live components to measure these values, are not acceptable.
    b. The programmed function of all analog inputs, analog outputs, digital inputs, and relay outputs.
    c. The ability to force individual digital I/O high or low and individual analog I/O to desired value, for increased personal protection during drive commissioning and troubleshooting. Drives that require access to internal or live components to perform these functions, are not acceptable.
7. The drive shall automatically backup parameters to the control panel. In addition to the automatic backup, the drive shall allow two additional unique backup parameter sets to be stored. Backup files shall include a time and date stamp. In the event of a drive failure, the control panel of the original drive can be installed on the replacement drive, and parameters from that control panel can be downloaded into the replacement drive.
8. The control panel shall display local technical support contact information as part of drive fault status.
9. The control panel shall be removable, capable of remote mounting.
10. The control panel shall have the ability to store screen shots, which are downloadable via USB.
11. The drive shall generate a QR code, which contains drive identification data, information on the latest events, and values of status and counter parameters.
12. The LCD screen shall be backlit with the ability to adjust the screen brightness and contrast, with inverted contrast mode. A user-selectable timer shall dim the display and save power when not in use.
13. The control panel shall include assistants specifically designed to facilitate start-up. Assistants shall include: First Start Assistant, Basic Operation, Basic Control, and PID Assistant.
14. Primary settings for HVAC shall provide quick set-up without the use of alpha-numerical parameters, for commissioning the drive and customer interfaces to reduce programming time.
15. The drive shall be able to operate with the control panel removed.
16. The drive shall be able to support a Bluetooth Advanced Control Panel. The Bluetooth control panel shall be FCC and QDL (Qualified Design Listing) certified.

a. A free app (iOS and Android) shall replicate the control panel on a mobile device or tablet. The control panel's programming and control functionality shall function on the device. Customizing text, such as AHU-1 End Switch, shall be supported by the device's keyboard.
b. Bluetooth connectivity shall allow uploading, downloading, and emailing of parameter sets.
c. Bluetooth connectivity shall include two pairing modes: Always discoverable with a fixed passcode, and manual discovery with a unique generated passcode every pairing.
d. Bluetooth connectivity shall be capable of being switched.

D. All drives shall have the following hardware features/characteristics as standard:

1. Two (2) programmable analog inputs shall accept current or voltage signals. Current or Voltage selection configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
2. Two (2) programmable analog outputs. At least one of the analog outputs shall be adjustable for current or voltage signal, configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
3. Six (6) programmable digital inputs. All digital inputs shall be programmable to support both active high and active low logic and shall include adjustable on/off time delays. The digital input shall be capable of accepting both 24 VDC and 24 VAC.
4. Three (3) programmable Form-C relay outputs. The relay outputs shall include programmable on/off time delays. The relays shall be rated for a continuous current rating of 2 Amps. Maximum switching voltage of 250 VAC / 30 VDC. Open collector and Form-A relays are not acceptable. Drives that have less than (3) Form-C relay outputs shall provide an option card to provide additional relay outputs.
5. Drive terminal blocks shall be color coded for easy identification of function.
6. The drive shall include an isolated USB port for interface between the drive and a laptop. A non-isolated USB port is not acceptable.
7. An auxiliary power supply rated at 24 VDC, 250 mA shall be included.
8. At a minimum, the drives shall have internal impedance equivalent to 5% to reduce the harmonics to the power line. 5% impedance may be from dual (positive and negative DC link) chokes, or AC line reactor. Drives with only one DC link choke shall add an AC line choke integral to the drive enclosure. Reference the drive schedule to determine if additional harmonic mitigation is required for the system to comply with IEEE 519-2014.
9. The drive shall have cooling fans that are designed for field replacement. The primary cooling fan shall operate only when required and be variable speed for increased longevity and lower noise levels. Drives whose primary cooling fans are not variable speed, shall include a spare cooling fan.
10. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 135% overload for 2 seconds every minute. The minimum current rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.

11. The input current rating of the drive shall not be greater than the output current rating. Per NFPA 70 430.122, drives with higher input current ratings may require the upstream wiring, protection devices, and source transformers to be upsized.
12. Circuit boards shall be coated per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2.
13. Earth (ground) fault detection shall function in both modulating (running) and non-modulating modes.
14. Coordinated AC transient surge protection system consisting of 4 MOVs (phase-to-phase and phase-to-ground), a capacitor clamp, and internal chokes. The MOVs shall comply with UL 1449 4th Edition. Drives that do not include coordinated AC transient surge protection shall include an external TVSS/SPD (Transient Voltage Surge Suppressor/Surge Protection Device).
15. The drive shall include a robust DC bus to provide short term power-loss ride through. The DC bus Joule to drive kVA ratio shall be 4.5 J/kVA or higher. An inertia-based ride through function should help maintain the DC bus voltage during power loss events. Drives with control power ride through only, are not acceptable.

E. All drives shall have the following software features as standard:

1. A Fault Logger that stores the last 16 faults in non-volatile memory.
   a. The most recent 5 faults save at least 9 data points, including but not limited to: Time/date, frequency, DC bus voltage, motor current, DI status, temperature, and status words.
   b. The date and time of each fault and fault reset attempt shall be stored in the Fault Logger.
2. An Event Logger that stores the last 16 warnings or events that occurred, in non-volatile memory.
   a. Events shall include, but not limited to: Warning messages, checksum mismatch, run permissive open, start interlock open, automatic reset of a fault, power applied, auto start command, auto stop command, modulating started, and modulating stopped.
   b. The date and time of each event's start and completion points shall be stored in the Event Logger.
   c. The drive shall also provide the user the ability to configure what events to log for application specific requirements.
3. Programmable start method. Start method shall be selectable based on the application and function even if the motor was freewheeling in the reverse direction: Flying-start, Normal-start, and Brake-on-start.
4. Programmable loss-of-load (broken belt / coupling) indication. Indication shall be selectable as a control panel warning, relay output, or over network communications. This function to include a programmable time delay to eliminate false loss-of-load indications.
5. The following three-phase AC motor technologies shall be compatible:
   a. Asynchronous induction motors
   b. Permanent magnet synchronous (non-salient pole) motor
   c. Synchronous reluctance motor (SynRM)
   d. Permanent magnet assisted synchronous reluctance motor (PMaSynRM)

6. Motor heating function to prevent condensation build up in the motor. Motor heating adjustment, via parameter, shall be in “Watts.” Heating functions based only on “percent current” are not acceptable.
7. Motor disconnect detection function enables the drive to detect when an output disconnect is opened, disable the drive output, and provide an indication message. Drives without this functionality shall have a disconnect switch auxiliary contact wired through dedicated conduit back to the drive enable control circuit.
8. Motor phase order shall be changeable through software interface
9. Advanced power metering abilities shall be included in the drive and must be available over network communications. Drives without these data points, must include a separate power meter with each drive.
    a. Instantaneous output power (kW)
    b. Total power, broken down by kWh, MWh, and GWh units of measurement. Power meters that only display kWh and roll over or “max out” once the maximum kWh value is reached, are not acceptable. There shall be resettable and non-resettable total power meters within the drive.
    c. Time based kWh metering for: current hour, previous hour, current day, and previous day.
    d. Energy saving calculation shall be included that shows the energy and dollars saved by the drive.
10. The drive shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise.
11. DC bus voltage ripple function shall provide a DC voltage reference for troubleshooting AC line issues or bus capacitor health
12. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. The drive shall provide a relay output to the damper actuator, monitor end-switch status, and start running the motor based on application requirements. Damper control shall include the following configurable features fully functional in both Hand and Auto modes:
    a. A timeout function that identifies and annunciates a specific warning message when a damper has not opened or closed within the allotted time.
    b. Ability to interface with both damper open and damper closed end-switches on a single damper actuator.
    c. Sequence control that runs the fan initially at a fixed speed before commanding a discharge air damper to open. Required for all applications feeding a common plenum/space to prevent the fan from freewheeling backwards while damper strokes open.
    d. Multiple damper sequence control to support units with discharge air and outside air dampers. The drive shall command and verify the outside air damper is open before ramping the fan to a fixed speed, and then commanding the outside air damper open.
    e. Time based damper control for when an end-switch is not provided. For units with outside air and discharge air dampers, both dampers should have independent time-based control capability.
13. Start interlock circuit - Four separate start interlock (safety) inputs shall be provided. When any safety is opened, the motor shall be commanded to stop.

The control panel will display the specific safety(s) that are open. The status of each safety shall be transmitted over the network communications. Wiring multiple safeties in series is not acceptable.

14. External fault circuit – Three separate external fault inputs shall be provided. This circuit shall have the same features and functionality as the start interlock circuit, except it shall require a manual reset before the drive is allowed to operate the motor.
15. The drive shall provide automatic protections to allow uninterrupted operations at a reduced speed or switching frequency.
    a. Switching frequency control circuit, that reduces the switching frequency based on actual drive temperature and allows higher switching frequency settings without derating the drive. It shall be possible to set a minimum and a target switching frequency.
    b. The drive shall include a temperature limit that when exceeded will reduce the drive output current.
    c. Input phase loss protection shall be provided, whereas the output current is automatically derated by 50% if an input phase loss is detected by the drive.
16. Visual function block adaptive programming allowing custom control schemes, minimizing the need for external controllers. I.e. cooling tower staging logic. A free software tool shall be used to configure adaptive programming.
17. The ability to automatically restart after an over-current, over-voltage, under-voltage, external fault, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable. Each of these faults may have automatic restart individually disabled via a parameter selection.
18. Three (3) programmable critical frequency lockout ranges to prevent the drive from operating the load continuously at an unstable speed/load.
19. The drive shall have three methods to control constant frequency/speed references:
    a. Seven (7) programmable preset frequencies/speeds using (3) inputs.
    b. Six (6) different programable preset frequencies/speed tied to 6 independent control inputs and requires an additional start command.
    c. Six (6) different programable preset frequencies/speed tied to 6 independent control inputs and does not require any additional start command input.
20. Two independently adjustable accel and decel ramps sets with 1 – 1800 seconds adjustable time ramps.
21. PID functionality shall be included in the drive.
    a. Programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped based on the level of a process feedback signal.
    b. The drive shall include an independent PID loop for customer use, assigned to an Analog Output. This PID loop may be used for cooling tower bypass valve control, chilled water valve, etc.
22. At least 4 parameter user sets that can be saved to the permanent memory and recalled using a digital input, timed function, or supervision function.

23. Drive shall be compatible with an accessory that allows the control board to be powered from an external 24 VDC/VAC source, allowing the drive control to remain powered by a UPS during an extended power outage.
24. A computer-based software tool shall be available to allow a laptop to program the drive. The drive shall be able to support programming without the need for line voltage. All necessary power shall be sourced via the laptop USB port.
25. The drive shall include a fireman's override mode. Upon receipt of a contact closure from the Fire Alarm Life Safety system, the drive shall operate in a dedicated Override mode distinct and separate from the drive's Normal operation mode. The following features will be available in the drive override function:
    a. The Override mode shall be secured by passcode to prevent changes once programmed.
    b. The drive shall ignore external inputs and commands not defined as part of the override function.
    c. Override operation mode shall be selectable between: single frequency, multiple fixed frequencies, follow an analog input signal, PID control, or come to a forced stop.
    d. High priority safeties shall stop the drive and lower priority safeties shall be ignored in Override mode.
    e. Drive faults shall be defined in Critical and Low priority groups. Critical faults shall stop the drive. Low priority faults shall be reset. Reset trials and timing shall be programmable.
    f. The drive shall be configurable to receive from 1 to 3 discrete digital input signals and operate at up to three discrete speeds.
26. The drive shall have multi-pump functionality and an intelligent floating leader/follower configuration, so no one drive takes down the system, for controlling up to 8 parallel pumps equipped with drives. The drive shall have a parameter synchronization feature to program the PID, multi-pump, and AI parameters in all parallel drives. The functionality to start and stop the pumps based on capacity, operating time or efficiency of the pump to ensure each pump is operated regularly.
    a. The multi-pump functionality shall control:
        1. Flow Control
        2. Pressure Control
        3. Pump Alternation
27. The drive shall have pump protection functions for flow and pressure to avoid damages to the pump such as dry pump protection, min/max flow and pressure protection

F. Security Features

1. The drive manufacture shall clearly define cybersecurity capabilities for their products.
2. The drive shall include passcode protection against parameter changes.
    a. There shall be multiple levels of passcode protection including: End User, Service, Advanced, and Override.
    b. The drive shall support a customer generated unique passcode between 0 and 99,999,999.

c. The drive shall log an event whenever the drive passcode has been entered.
d. The drive shall provide a security selection that prevents any “back door” entry. This selection even prevents the drive manufacturer from being able to bypass the security of that drive.
e. A security level shall be available that prevents the drive from being flashed with new firmware.

3. A checksum feature shall be used to notify the owner of unauthorized parameter changes made to the drive. The checksum feature includes two unique values assigned to a specific programming configuration.
   a. One checksum value shall represent all user editable parameters in the drive except communication setup parameters. A second checksum value shall represent all user editable parameters except communication setup, energy, and motor data parameters.
   b. Once the drive has been commissioned the two values can be independently saved in the drive.
   c. The drive shall be configurable to either: Log an Event, provide a Warning, or Fault upon a parameter change when the current checksum value does not equal the saved checksum value.
4. The “Hand” and “Off” control panel buttons shall have the option to do the following:
   a. Be individually disabled (via parameter) for drives mounted in public areas to prevent unauthorized changes.
   b. Require a second button press of “Hand” or “Off” within 5 seconds of the original selection to confirm the change and prevent accidental transition out of “Auto” mode.

G. Network Communications

1. The drive shall have an EIA-485 port with removable terminal blocks. The onboard protocols shall be BACnet MS/TP, Modbus, and Johnson Controls N2. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, EtherNet/IP, Modbus TCP, and DeviceNet shall be available. The use of third-party gateways are not acceptable.
2. The drive shall have independent end of line (EOL) termination and biasing switches for EIA-485 networks.
3. The drive shall contain EIA-485 network self-diagnostics to assist in troubleshooting issues such as incorrect polarity, incorrect baud rate, noise on the wire or addressing errors.
4. The drive shall have the ability to communicate via two protocols at the same time, one onboard protocol and one option card-based protocol. Once installed, the drive shall automatically recognize any optional communication cards without the need for additional programming.
5. The drive shall not require a power cycle after communication parameters have been updated.
6. The embedded BACnet connection shall be a MS/TP interface. The drive shall be BTL Listed to Revision 14 or later. Use of non-BTL Listed drives are not acceptable.

7. The drive shall be classified as an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
   a. Data Sharing: Read Property Multiple-B, Write Property Multiple-B, COV-B
   b. Device Management: Time Synchronization-B
   c. Object Type Support: MSV, Loop
8. The drive's relay output status, digital input status, analog input/output values, Hand-Auto status, warning and fault information shall be capable of being monitored over the network. The drive's start/stop command, speed reference command, relay outputs and analog outputs shall be capable of being controlled over the network. Remote drive fault reset shall be possible.

H. Disconnect – A circuit breaker or disconnect switch shall be provided when indicated on the drive schedule. The disconnect shall be door interlocked and padlockable. Drive input fusing shall be included on all packaged units that include a disconnecting means. All disconnect configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508A label. Disconnect packages manufactured by anyone other than the drive manufacturer, are not acceptable.

I. Bypass – Bypass drive packages shall be provided when indicated on the drive schedule. All drive/bypass configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508A label. Bypasses manufactured by anyone other than the drive manufacturer, are not acceptable.

1. The drive and bypass package shall be a complete factory wired and tested bypass system consisting of a padlock-able disconnect device, drive output contactor, bypass contactor, and drive input fuses.
2. The drive and bypass package shall have a UL listed short circuit current rating of 100 kA, for 240 VAC and 480 VAC systems, and this rating shall be indicated on the rating label.
3. The bypass control shall be powered by a three-phase switch mode power supply with a voltage tolerance of +30%, -35%. Single-phase power supplies and control power transformers (CPT) are not acceptable.
4. The drive and bypass package shall be seismic certified and labeled to the IBC. Seismic importance factor of 1.5 rating is required and shall be based upon actual shake table test data as defined by ICC AC-156. Seismic certification of equipment and components shall be provided by HCAI (formerly OSHPD) preapproval.
5. All bypass packages shall utilize a dedicated LCD bypass control panel (keypad) user interface. The bypass control panel must be a separate display from the drive control panel. Bypass packages that use a single shared drive/bypass control panel are not acceptable, due to that control panel acting as a single point of failure.
   a. The bypass shall include a two-line, 20-character LCD display. The display shall allow the user to access parameters and view:
      1. All three phases of the bypass input voltage, current (Amps) and power (kW)
      2. Bypass faults, warnings, and fault logs
      3. Bypass operating time and energy consumption (resettable)

b. The bypass control panel shall include the following controls:
    1. Four navigation keys (Up, Down, Enter, Escape)
    2. Bypass Hand-Off-Auto, Drive mode / Bypass mode selectors, Bypass fault reset.
c. The following indicating lights (LED PTT type)or control panel display indications shall be provided.
    1. Drive mode selected, Bypass mode selected
    2. Drive running, Bypass running
    3. Drive fault, Bypass fault
d. Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.

6. All bypasses shall have the following hardware features/characteristics as standard:
    a. Six (6) digital inputs and five (5) Form-C relay outputs. The digital inputs shall be capable of accepting both 24 VDC and 24 VAC. The bypass control board shall include an auxiliary power supply rated 24 VDC, 250 mA.
    b. Drive isolation fuses shall be provided. Bypass designs which have no such fuses, or that only incorporate fuses common to both the drive and the bypass are not acceptable. Third contactor “isolation contactors” and service switches are not an acceptable alternative to drive isolation fuses.
    c. The bypass shall be able to detect a single-phase input power condition before the bypass contactor closes or while running the motor in bypass, by monitoring all three phases of input voltage. Relying on a high current trip if the motor is single-phased is not acceptable.
    d. The bypass shall be designed for stand-alone operation and be completely functional in both Hand and Automatic modes, even if the drive and/or drive’s control board has failed. Network communications shall remain functional. Bypass systems that do not maintain full functionality in the event of a drive failure, are not acceptable.

7. All bypasses shall have the following software features as standard:
    a. Programmable loss-of-load (broken belt / coupling) indication shall be functional in drive and bypass mode.
    b. The bypass shall also support run permissive and start interlock control functionality, including start delay, as previously specified in the drive section.
    c. The bypass control shall monitor the status of the drive and bypass contactors and indicate when there is a welded contactor contact or open contactor coil.
    d. The bypass shall include a selection for either manual or automatic transfer to bypass. The automatic transfer mode shall allow the user to select the specific drive fault types that result in an automatic transfer to bypass. The automatic transfer mode shall not allow a transfer to bypass on motor related faults. Automatic transfer schemes that do not differentiate between fault types, are not acceptable.
    e. The bypass shall include the ability to select the operating mode of the system (Drive/Bypass) from either the bypass control panel or digital input.

f. The bypass shall include the ability to know the phase sequence and provide a phase sequence fault to indicate if the bypass and drive would run the motor in the opposite direction, this feature shall be enabled by default
g. The bypass shall include a supervisory control mode that monitors the value of the drive's analog input (feedback). This feedback value is used to control the bypass contactor on/off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps.
h. Selectable Class 10, 20, or 30 electronic motor overload protection shall be included in both drive and bypass mode.
i. The drive and bypass shall be designed to operate as an integrated system when in Override mode. Whether operating in drive or bypass mode, the low priority safeties will be ignored, and high priority safeties will be followed. External start/stop commands will be ignored. There shall be four selectable Override modes:

    1. Bypass only, with two smoke control modes:

        i. Fixed pre-configuration of digital inputs.
        ii. Configurable high/low priority safeties and faults, to allow configuration to meet needs of local Authority Having Jurisdiction.

    2. Drive only
    3. Drive then transfer to bypass, in the event of a drive fault.
    4. Force to Stop

j. Before the bypass circuit can be tested in commissioning, the drive must start the motor to check for shorts and ground faults.

8. Network communications – the bypass shall include BACnet MS/TP, Modbus, and Johnson Controls N2 as standard. The bypass BACnet implementation shall be BTL Listed to Revision 14 or later. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, Ethernet/IP, Modbus TCP, and DeviceNet shall be available.

    a. The bypass relay output status, digital input status, warning and fault information can be monitored over the network. Status information shall be monitored, including; operating mode (drive vs bypass), current drawn in bypass mode, broken belt, and phase-to-phase voltage. The bypass start/stop command, force to bypass command, and relay outputs shall be capable of being controlled over the network.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The responsible party shall install the drive in accordance with the recommendations of the drive manufacturer as outlined in the drive installation manual.
B. Power wiring shall be completed by the responsible party. All wiring shall be installed in accordance with the recommendations of the drive manufacturer as outlined in the installation manual.

C. Installation shall be in accordance with national, state and local building and electrical codes as may be in force in the installation area.

3.2 START-UP

A. Start-up shall be provided for each drive by an authorized local service provider.

3.3 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. A toll free 24/365 technical support line connected to factory support personnel located in the US and Canada shall be available.
B. Training shall include installation, programming and operation of the drive, bypass and network communications. Owner training shall be provided locally upon request.

3.4 WARRANTY

A. The drive Product Warranty shall be 30 months from the date of shipment from the factory. The warranty shall include: Parts, on-site labor, and travel time and travel costs, or replacement of the complete drive as determined by the drive manufacturer's technical support.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 4 - GENERAL

4.25 DESCRIPTION

A. Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for pressure piping.
B. Do not hang any mechanical item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.
C. Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.
D. Protect insulation at all hanger points.

4.26 DESIGN CRITERIA

A. Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58 unless noted otherwise.
B. Piping connected to base mounted pumps, compressors, or other rotating or reciprocating equipment is to have vibration isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the 100 pipe diameter/3 support distance.
C. Piping flexible connections and vibration isolation supports are required for piping connected to coils that are in a fan assembly where the entire assembly is mounted on vibration supports; the vibration isolation supports are required for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Piping flexible connection and vibration isolation supports are not required when the fan section is separately and independently isolated by means of vibration supports and duct flexible connections. Standard pipe hangers/supports as specified in this section are required when there are no vibration isolation devices in the piping and beyond the 100 pipe diameter/3 support distance.
D. Piping supported by laying on the bottom chord of joists or trusses will not be accepted.
E. Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.
F. Allow sufficient space between adjacent pipes and ducts for insulation, valve operation, routine maintenance, etc.

PART 5 - PRODUCTS

5.1 PIPE HANGER AND SUPPORT MANUFACTURERS

A. Anvil, B-Line, G-Strut, Fee and Mason, Kindorf, Michigan Hanger, Unistrut, or approved equal. Anvil figure numbers are listed below; equivalent material by other manufacturers is acceptable.

5.2 STRUCTURAL SUPPORTS

A. Provide all supporting steel required for the installation of mechanical equipment and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support tanks and equipment.

5.3 PIPE HANGERS AND SUPPORTS

A. Hangers for steel pipe sizes 1/2” through 2”:

1. Carbon steel, adjustable, clevis, black finish**.** Anvil figure 65 or 260.

B. Hangers for steel pipe sizes 2-1/2” and over:

1. **Carbon steel, adjustable, clevis, black finish. Anvil figure 260.**
2. **Adjustable steel yoke, cast iron roll, double hanger. Anvil figure 181.**

C. Multiple or trapeze hangers:

1. Steel channels with welded spacers and hanger rods if calculations are submitted.

D. Wall support:

1. Welded steel bracket with hanger. B-Line 3068 Series, Anvil 194 Series.
2. Perforated epoxy painted finish, 16-12 gauge min., steel channels securely anchored to wall structure with interlocking, split type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000 series clamps, Anvil type AS200 H with AS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Anvil cushion clamp assembly.

E. Vertical riser support:

1. Carbon steel riser clamp, copper plated when used with copper pipe. Anvil figure 261 for steel pipe, figure CT121 for copper pipe.

F. Floor support for pipe sizes through 4”:

1. Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

G. Floor support for pipe sizes 5” and over:

1. Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

H. Copper pipe support:

1. Carbon steel ring, adjustable, copper plated or polyvinylchloride coated.

I. Insulation protection shields:

1. Galvanized carbon steel of not less than 18 gauge for use on insulated pipe 2-1/2 inch and larger. Minimum shield length is 12 inches. Equal to Anvil figure 167.

J. Steel hanger rods:

1. Threaded both ends, threaded one end, or continuous threaded, black finish.
2. Size rods for individual hangers and trapeze support as indicated in the following schedule.
3. Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated. Provide rods complete with adjusting and locking nuts.

Maximum Load (Lbs.) (650°F Maximum Temp.)	Rod Diameter (inches)
610	3/8
1130	1/2
1810	5/8
2710	3/4
3770	7/8
4960	1
8000	1-1/4

5.4 BEAM CLAMPS

A. MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick for single threaded rods of 3/8, 1/2, and 5/8 inch diameter, for use with pipe sizes 4 inch and less. Furnish with a hardened steel cup point set screw. Anvil figure 86.

B. MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter but limited in application to pipe sizes 8 inch and less without prior approval. Anvil figure 228.

5.5 CONCRETE INSERTS

A. Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

5.6 ANCHORS

A. Use welding steel shapes, plates, and bars to secure piping to the structure.

5.7 ROOF MOUNTED SUPPORTS

A. Height of supports:

1. Based on the length of the longest main support member, the height of the support member above the roof deck to be as follows:

Length of Longest Support Member (inches)	Min. Height of Support Above Finished Roof
Up to 36”	18 inches
37” and Over	36 inches

B. Supports 18” or less in height:

1. Prefabricated Metal Sleeper Curb:

a. Constructed of not less than 18 gauge galvanized steel reinforced so it is structurally capable of supporting the intended load with no penetrations through the curb flashing, inside and outside corner sections that are mitered and continuously welded, filled with 3 pound density rigid fiberglass insulation, integral deck mounting flange, nominal two inch wood nailer, galvanized steel counter flashing with metal receiver cap Attach a galvanized steel channel track for securing pipe or duct roller and roller support. Do not use built-in metal base flashings or cants.

2. Wood Build Sleeper Curb:

a. Constructed of wood blocking anchored to the deck. The curb must be structurally capable of supporting the intended load with no penetration through the curb flashing. Galvanized steel counter flashing with metal receiver cap. Attach a steel channel track for securing pipe or duct roller support. Do not use built-in metal base flashings or cants.

b. Use galvanized structural steel members supported by pipe supports and use pipe or duct rollers fastened to the structural member. Pipe supports to be secured to the roof structure and sealed per pipe penetrations through roof specifications as specified in this section.

C. Supports 36” or more in height:

1. Roof Support Stand/Equipment Roof Support Stand:

a. Use galvanized structural steel members supported by pipe supports and use pipe or duct rollers fastened to the structural member. Pipe supports to be secured to the roof structure and sealed per pipe penetrations through roof specifications as specified in this section.

5.8 EQUIPMENT CURBS

A. Prefabricated Metal Curb:

1. Constructed of not less than 18 gauge galvanized steel reinforced so it is structurally capable of supporting the intended load with no penetrations through the curb flashing, inside and outside corner sections that are mitered and continuously welded, filled with 3 pound density rigid fiberglass insulation, integral deck mounting flange, nominal two inch wood nailer, galvanized steel counter flashing. Do not use built-in metal base flashings or cants. Use 18 inch high equipment curbs where the curb completely surrounds the perimeter of the equipment and there is no roof exposed to the weather.

B. Wood Build Sleeper Curb:

1. Constructed of wood blocking and anchored to the deck. The curb must be structurally capable of supporting the intended load with no penetration through the curb flashing. Galvanized steel counter flashing. Do not use built-in metal base flashings or cants. Use 18-inch-high equipment curbs where the curb completely surrounds the perimeter of the equipment and there is no roof exposed to the weather.

5.9 PIPE PENETRATIONS THROUGH ROOF

A. Multiple Pipe Penetrations:

1. Refer to acceptable Equipment Curb types listed above for curb specifications. An 8" high (minimum) curb height is required. The coping cap shall be constructed from laminated acrylic clad thermoplastic (ABS) with graduated step boots to accommodate various size pipes, stainless steel fastening screws for cover, stainless steel band clamps for securing boots around the pipe, and stainless-steel band clamp or mechanical locking seal for securing boots around the ABS coping cap flanges.

B. Single Pipe Penetrations:

1. A stack flashing penetration may be utilized for single pipe penetrations through built up roofs and single ply membrane roofs. Utilize high temperature sealant for all high temperature applications. This includes but is not limited to steam condensate vent piping, steam safety relief piping, and flues.

2. A single pre-manufactured boot may be utilized for single pipe penetrations through single ply membrane roofs only.

5.10 PRIMER AND PAINT FOR NEW STRUCTURAL STEEL

A. Primer: One coat of Sherwin Williams Epo-Phen FF Or approved Equal. Primer shall be suitable for temperature of at least 425° F Continuous, 450°F Intermittent. 7 DMils thickness. Shop applied.

B. Finish Coat: Additional two coats of Sherwin Williams KEM HI TEMP Heat Flex II 500. Finish Coat shall be suitable for continuous temperature to at least 450° F.

5.11 PRIMER AND PAINT FOR EXISTING STRUCTURAL STEEL

A. Primer: One coat of Sherwin Williams Epo-Phen FF Or approved Equal. Primer shall be suitable for temperature of at least 425° F Continuous, 450°F Intermittent. 7 DMils thickness. Shop applied.

B. Finish Coat: Additional two coats of Sherwin Williams KEM HI TEMP Heat Flex II 500. Finish Coat shall be suitable for continuous temperature to at least 450° F. 3 DMils thickness.

1. Low odor, high solids, water-based epoxy coating equal to TNEMEC Typoxy Series 27WB 250 °F continuous service. Color Gray.

5.12 PIPE WELDS

A. Primer: 450°F minimum continuous temperature rated corrosion resistant primer. Rustoleum High Heat Primer, V2100 or equal. 3 DMils thickness.

B. Finish coat: 450°F minimum continuous temperature rated corrosion resistant primer or paint. Rustoleum V2100 or equal. 3 DMils thickness.

PART 6 - EXECUTION (not used)

END OF SECTION

DDC CONTROL SYSTEM FOR HVAC

PART 7 - GENERAL

7.13 DESCRIPTION

A. This section describes specific requirements, products, and methods of execution which are typical throughout the mechanical work of this project. Additional requirements for the specific systems will be found in the sections specifying those systems and supersede these requirements.

PART 8 - PRODUCTS

8.14 DDC CONTROL SYSTEM:

A. All temperature control systems shall be provided and installed by **Clima-Tech**. For questions or information contact **Mike Scott @ (208) 283-4808.**

B. Statement of Intent

1. The intent of this specification is to provide a high-quality Direct Digital Control system with Web based software front end and top-of-the-line control hardware. System is to include a Graphical User Interface (GUI) residing on a WebServer accessible with an industry standard non-proprietary Web Browser. Connectivity shall be over the owner's internal Ethernet system and, when allowed, over the Internet using the servers IP address. Connection to the WebServer software shall be thin client access and shall not require that the browser device have special software or applets for access. If connection to an Intranet or to the Internet is not available on initial installation, the server shall be accessed via a web browser locally hosted on the server. The graphic user interface shall display real time values of all system operating conditions. Additionally, it shall include graphic displays of system programming, operating logic and logic flow. It shall display logic flow with real time values of logical inputs and outputs. This graphical display capability is required for system diagnostics of both the mechanical systems controlled by the DDC system and of the operating logic and sequences themselves. The features of the system must be fully installed, configured, and demonstrated in a manner that provides maximum benefit to the end user.

C. Specification Compliance

1. These specifications are intended to provide minimum capability for the DDC system. Manufacturer's data sheets included in the submittals will be reviewed to verify significant hardware and software system features. Key system features must be documented by the manufacturer's data sheets in the submittals or by demonstration of an existing installation.

D. Approved DDC Contractor and System

1. DDC Control System shall be: WebCTRL / Automated Logic Corporation by Clima-Tech (Boise, ID.) No Substitution.

PART 9 - EXECUTION

9.15 BASE BID SCOPE

A. Disconnect existing Automated Logic Controls and reconnect to New Heat Pumps.
    1. Heat Pump Controllers to Remain in Central Panel Location.
    2. Reuse existing Isolation Control Valves.
B. Provide and install new ZS2Plus Zone Sensors and wiring to replace existing Honeywell thermostats. (New sensors installed at existing thermostat locations)
C. Provide programming, graphics, download and point-to-point checkout.
D. Standard 1-year warranty following substantial completion.
E. 4 hours of Factory Certified Training.

9.16 OPTION #1 SCOPE (CENTRAL PLANT UPDATES):

A. Disconnect existing HW system IO devices.
B. Reconnect devices after NEW Boiler is installed.
C. Install Owner Provided SE6104A in existing enclosure. (Control module to be relocated from Irving Middle School)
D. Provide new Control points for (2) NEW Tower Pump VFDs. (VFD's provided and installed by others, unless noted otherwise)
E. Provide programming, graphics, download and point-to-point checkout.
F. Standard 1-year warranty following substantial completion.

END OF SECTION

SECTION 23 21 16

HYDRONIC PIPING SPECIALTIES

PART 10 - GENERAL

10.17 DESCRIPTION

A. Hydraulic separators with integrated air eliminator and dirt separator.

B. Automatic air vents.

C. Expansion tanks.

10.18 REFERENCES

A. ASME Section VIII, Division 1 - Boiler and Pressure Vessel Code - Pressure Vessels.

10.19 SUBMITTALS

A. Product Data: Submit for manufactured products and assemblies used in this Project.

1. Manufacturer's data and list indicating use, operating range, total range, accuracy, and location for manufactured components.
2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each piping specialty.

10.20 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum twenty years of documented experience.

10.21 WARRANTY

A. Manufacturer standard warranty indicating that units shall be free from material and workmanship defects from the date of substantial completion for the time periods indicated below:

1. Fabricated steel units: 3 Years
2. Cast brass units: 20 Years

10.22 DELIVERY, STORAGE, AND HANDLING

A. Protect components from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

PART 11 - PRODUCTS

11.23 HYDRAULIC SEPARATOR WITH INTEGRATED AIR ELIMINATOR AND DIRT SEPARATOR

A. Manufacturers

1. Spirotherm Inc, Taco

B. Full flow coalescing type hydraulic separator shall be fabricated steel, rated for 150 PSIG working pressure, stamped, and registered in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and include three performance chambers within the vessel. One chamber above the higher nozzle set for air elimination, one below the lower nozzle set for dirt separation, and one between the nozzles for hydraulic separation.

C. Selection shall be based upon system flows with pipe size as a minimum.

D. Unit shall include internal structured elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. Dirt separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. The elements must be fabricated by the manufacturer and consist of a copper core tube with continuous wound copper wire medium permanently attached and followed by a separate continuous wound copper wire permanently affixed.

E. Each unit shall have a separate venting chamber to prevent system contaminants from harming the float and venting valve operation. At the top of the venting chamber shall be an integral full port float actuated brass venting mechanism.

F. Unit shall be manufactured with a removable lower head for internal inspection if so noted on the drawings and schedule.

11.24 AUTOMATIC AIR VENTS

A. Manufacturers

1. Spirotherm Inc, Taco

B. All valves shall be cast brass, rated for 150 psig design pressure and 270°F operating temperature.

C. Units to include non-ferrous floats, stainless steel linkage and a Viton seal which closes against a brass spring-operated seat.

11.25 EXPANSION TANKS

A. Manufacturers

1. Taco, B&G, Wessels, Amtrol

B. Provide expansion tank, constructed of welded steel with butyl rubber bladder, replaceable and full acceptance volume, ASME stamped for 125 psig at 240F. Tank shall have capacity, size and operating pressures as shown on drawings.

PART 12 - EXECUTION

12.26 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Air eliminator should be installed at the point of lowest solubility in the system: that being where the temperature is the highest (i.e. after the boiler and/or heat exchanger or before the chiller) and the pressure is the lowest (i.e. before the pump suction).

C. Dirt separators should be installed upstream of the system components that are affected by the dirt in the system. It does not take the place of a system strainer and should be installed after that a strainer to ensure no large construction type debris enters the dirt separator.

D. Air eliminator, dirt separators and hydraulic separators must be mounted in a straight run of horizontal piping in a perfectly upright position to allow the vent to operate freely and/or dirt to settle. There is no minimum length of straight run required before or after the unit.

E. The flow may be directed to either side of the unit. There is NO directional arrow. Either connection may be used for inlet or outlet.

F. Automatic air vents should be installed at high points in the system and / or on specific components requiring a separate vent.

12.27 MAINTENANCE

A. Periodic blow-down through the bottom connection to purge any dirt or sediment collected in the bottom of the vessel is system dependent and may or not be necessary subject to other installed components and overall piping or system condition. A container should be used to catch any debris.

B. Units with optional removable head can be disassembled and the elements removed for inspection or cleaning. The removable head is a user-specified feature and frequency of inspection and/or cleaning is user or system dependent.

END OF SECTION

SECTION 23 52 16

CONDENSING BOILERS

PART 13 - GENERAL

13.28 RELATED DOCUMENTS

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

13.29 SUMMARY

A. Section includes gas-fired, water-tube condensing boilers, trim, and accessories for generating hot water.

13.30 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes for boilers, rated capacities, operating characteristics, and furnished options and accessories.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 90.1.

C. Shop Drawings: For boilers, boiler trim, and accessories.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

13.31 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and sections, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Source quality-control reports.

C. Field quality-control reports.

D. Warranty: Standard warranty, shown below.

E. Product Certificates:

1. ASME Stamp Certification and Report: Submit ASME stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler. For Canadian installations, CSA B51 pressure vessel Canadian Registration Number (CRN)

13.32 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.

13.33 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period. Where "prorated" is indicated, the boiler manufacturer will cover the indicated percentage of cost of replacement parts. With "prorated" type, covered cost decreases as age of equipment increases.

1. Warranty Periods: Limited warranty is effective as of the date of installation or 6 months after the date of installation, whichever is first.

a. Heat Exchanger Failure Due to Thermal Shock: 25 years.
b. Heat Exchanger Failure Due to Other Than Thermal Shock: 10 years, with years 6 to 10 prorated.
c. Components Other Than Heat Exchanger: 1 year.

PART 14 - PRODUCTS

14.34 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASME Compliance: Constructed in accordance with ASME Boiler and Pressure Vessel Code, Section IV, and labeled with ASME H-Stamp.

C. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency in accordance with Table 6.8.1-6 and other requirements in Ch. 6 of ASHRAE/IES 90.1.

D. AHRI:

1. Boiler thermal and combustion efficiencies shall be certified and listed by AHRI.

E. CSA Compliance: Test boilers for compliance with the latest edition of ANSI Z 21.13/CSA 4.9.

F. Air Quality Compliance: Meets or exceeds the requirements of the most stringent air quality management codes, including but not limited to: SCAQMD, Rules 1146, 1146.1, or 1146.2 and Texas Commission on Environmental Quality (TCEQ) Title 30 Chapter 117, and Rule 117.465.

G. Mounting Base: For securing boiler to concrete base.

14.35 FLOOR-MOUNTED, WATER-TUBE CONDENSING BOILERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Laars Heating Systems Company NeoTherm Indoor Model XTR Series boiler.

B. Description: Factory-fabricated, -assembled, and -tested, stainless steel water-tube, condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including powder coat, thermal set jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.

C. Heat Exchanger: Stainless steel heat exchangers.

D. Combustion Chamber: Stainless steel, sealed.

E. Burner: Forced draft drawing from gas-premixing valve, available for natural gas or propane.

F. Blower: Operates during burner-firing, pre-purge, and post-purge of the combustion chamber.

1. Motors: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 “Common Motor Requirements for HVAC Equipment.”

a. Motor Sizes: Large enough so driven load will not require motor to operate in service factor range above 1.0.

G. Gas Train: Equipped with a zero-governing, negative pressure regulator valve and manual shutoff valve.

H. Vent / Air Piping:

1. Boiler shall be designed, and CSA certified for horizontal and vertical Category IV venting, using up to 100 equivalent feet of PVC, CPVC, polypropylene, or stainless-steel vent material.

2. Air may be taken from the room or ducted directly to the boiler using up to 100 equivalent feet of PVC, CPVC, galvanized steel, ABS, stainless steel, or polypropylene air pipe material.

I. Modulating Range: From 10-100% of full fire (10:1 turndown), without the use of gas valves that stage.

J. Ignition: Spark ignition, with flame sensor with 100 percent main-valve shutoff and flame safety supervision.

K. Casing:

1. Jacket: Sheet metal, with snap-in, mechanically fastened and/or interlocking closures.

2. Control Compartment Enclosures: Integral to boiler jacket.

3. Finish: Thermal set powder coat paint with textured finish or stainless steel.

L. Capacities and Characteristics:

1. Heating Medium: Hot water.

2. Design Water-Pressure Rating: 160 psig (1100 kPa).

3. Safety Relief Valve Setting: 75 psig (516 kPa).

4. Entering-Water Temperature: Minimum 40 deg F (4.4 deg C)>.

5. Leaving-Water Temperature: Maximum 195 deg F (90.5 deg C)>.

M. Trim

1. Controller:

a. Modulating operating.
b. Large color touchscreen
c. Ignition.

d. Manual reset high limit.

2. Safety Relief Valve: ASME rated, 75psi.
3. Pressure and Temperature Gauge: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gauge in compliance with ASME Pressure code.
4. Water Flow Switch (models 399-850).
5. Boiler Air Vent: Manual.
6. Drain Valve: Minimum NPS 3/4 (DN 20) valve in compliance with ASME pressure vessel code.
7. Condensate Trap: Primeless condensate trap with overflow protection.
8. Options – Boiler Mounted:
    a. ASME CSD-1 (500-850)
    b. Low water cutoff
    c. High & low gas pressure switches
    d. 60psi pressure relief valve
9. Options – Field Installed:
    a. Condensate neutralizer kit

N. CONTROLS

1. Boiler operating controls shall include the following devices and features:
    a. Large color touch screen user interface
    b. Screen cleaning mode that allows user to clean screen without activating touch screen.
    c. Quick start menu option.
    d. Modulates from 10 percent to 100 percent of full fire (10:1 turndown)
    e. Control transformer.
    f. Maximum vent temperature cutoff.
    g. Water flow switch.
    h. Dry alarm contacts for ignition failure.
    i. Manual reset high limit stops burner if operating conditions rise above maximum boiler design temperature.
    j. On/off toggle switch, lighted.
    k. Adjustable set points.
        i. Boiler temperature
        ii. Domestic water temperature
        iii. Boiler high limit.
        iv. Deg F or deg C display.
        v. PID parameters.
        vi. Manual firing rate control (forced min or max firing rate).
        vii. Pump exercise mode.
        viii. Anti-short cycle.
    l. Integrates indirect domestic water heating.
        i. Indirect water heater priority.
        ii. DHW temp sensor included.
        iii. Recognizes DHW sensor or closure from tank stat.

m. Multiple pump control for boiler pump, system pump, and indirect domestic water pump, each with delay.

n. Direct spark ignition

o. 24-V control circuit.

p. Accepts 4-20 mA or 0-10 V modulation signal from external control or building automation system, with automatic remote signal detection.

q. Outdoor Reset:

    i. Customizable reset curves based on outdoor temperatures and desired system water temperature.
    ii. Warm weather shutdown.
    iii. Outdoor air temperature sensor included.

r. Cascade and lead-lag up to eight boilers without additional controllers.

    i. Selectable firing sequence methods:

        1. Keep each boiler at lowest firing rate and modulate together to maximize efficiency.
        2. Each boiler shall be brought to high fire before additional boilers fired.

    ii. Provides equal runtime for boilers.

    iii. Boiler control shall display the following system information:

        1. Graphically depict the firing rate of each boiler in the system.
        2. Outdoor temperature displayed.
        3. System temperature displayed.

s. Boiler control shall display information about the following for each boiler it is monitoring:

    i. Icon color shall indicate boiler status; normal operation, lockout, standby, hold state, communication error.
    ii. Domestic hot water.
    iii. Burner control.
    iv. Demand.
    v. Modulation.
    vi. Inlet temperature.
    vii. Blower.
    viii. Domestic water pump.
    ix. Boiler pump.
    x. System pump.
    xi. Flame detection.
    xii. Statistics.
    xiii. Vent temperature limit.
    xiv. Frost protection.

t. Three levels of password protection:

    i. User level.
    ii. Installer level.
    iii. OEM level.

u. Information available from Modbus connection:

    i. Inlet water temperature.

ii. Outlet water temperature.
iii. Flue gas temperature.
iv. DHW temperature.
v. DHW priority.
vi. System temperature.
vii. Frost protection.
viii. Warm weather shutdown.
ix. Status for all sensors.
x. Fan speed.
xi. All setpoints.
xii. Remote control input.
xiii. Burner status.
xiv. Lockout codes.
xv. Alarm reasons.
xvi. Domestic water pump status.
xvii. Boiler pump status.
xviii. System pump status.

v. Control diagnostics shall include:

i. Ignition failure.
ii. Grounded flame rod.
iii. Safety chain interrupt.
iv. Boiler high limit exceeded.
v. Domestic water high limit exceeded.
vi. Temperature rise limit exceeded.
vii. Flue gas temperature limit exceeded.
viii. Pressure sensor fault.
ix. Combustion pressure fault.
x. Blocked air intake.
xi. Sensor errors (open or short).
xii. Control voltage high or low.
xiii. Modulation fault.
xiv. Pump fault.
xv. AC input phases reversed.
xvi. Fan speed proving rate failure.

w. Control shall have a clock with battery backup and runtime indicators for:

i. Burner runtime.
ii. Burner cycle count.
iii. Boiler pump.
iv. DHW pump.
v. System pump.

x. The control shall differentiate between a lockout, a hold, or an alert. If an issue occurs, the system will display a brief description of the issue on the control screen. The user shall be able to tap the display to be presented with a more detailed explanation of the issue.

2. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.

a. Burner operating control shall be integral to the boiler control.

PART 15 - EXECUTION

15.36 EXAMINATION

A. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance of the Work.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

15.37 BOILER INSTALLATION

A. Install floor-mounted boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install any optional boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

15.38 PIPING CONNECTIONS

A. Comply with requirements for hydronic piping specified in Section 232113 "Hydronic Piping."

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. When installing piping adjacent to boiler, allow space for service and maintenance of condensing boilers. Arrange piping for easy removal of condensing boilers.

D. Install condensate drain piping from equipment drain connection to nearest floor drain, or, if a neutralization system is used, to the condensate-neutralization unit and from neutralization unit to nearest floor drain. Piping shall be at least full size of connection. Install piping with a minimum of 2 percent downward slope in direction of flow.

E. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.

F. Connect hot-water piping to supply- and return-boiler taps with shutoff valve, and union or flange at each connection.

G. Install piping from safety relief valves to nearest floor drain.

15.39 DUCT CONNECTIONS

A. Boiler Intake and Exhaust Vent Piping:

1. Install flue-venting kit and combustion-air intake:

a. Intake air may be taken from the room or ducted to the boiler. When ducted, air pipe material may be PVC, CPVC, galvanized steel, polypropylene, stainless steel, or ABS.

2. Comply with all boiler manufacturer’s installation instructions.

15.40 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

15.41 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

15.42 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Perform installation and startup checks in accordance with manufacturer's written instructions.

2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.

b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Boiler will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Occupancy Adjustments: When requested within 2 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION

SECTION 23 65 00

COOLING TOWERS

PART 16 - GENERAL

16.43 SUMMARY

A. Furnish an induced draft, counter-flow, factory-assembled cooling tower, manufactured by REYMSA Cooling Towers, Inc., or equal in all respects to REYMSA (1) RTU-707103-A-LS cooling tower model. The cooling tower consists of one body & basin section, with one fan duct(s).

16.44 THERMAL PERFORMANCE

A. The cooling tower has the capacity to cool 200 U.S. GPM of water, from 85 Deg. F to 75 Deg. F, at a design entering air wet-bulb temperature of 67 Deg. F.

B. Thermal performance is certified by the Cooling Technology Institute (CTI) in accordance with CTI Certification Standard STD-201. In addition, the manufacturer guarantees that the cooling tower meet the specified performance conditions when installed according to plans and per the guidelines established in the cooling tower manufacturer's Installation, Operation & Maintenance (IOM) Manual.

PART 17 - PRODUCTS

17.45 REQUIREMENTS

A. The cooling tower shall be designed and constructed to withstand wind pressure of no less than 30 pounds-force per square foot (psf) on external surfaces. The top of the cooling tower's body shall be designed and constructed to withstand a live load of no less than 40 psf in addition to the concentrated loads of the fan or other equipment mounted thereon.

17.46 BODY & BASIN SECTION

A. The Cooling Tower has one seamless piece body & basin section, water-tight and leak-proof, constructed of high-performance resins with corrosion-resistant Fiberglass Reinforced Polyester (FRP) with Ultraviolet (UV) resistant. The Fiberglass Reinforced Polyester (FRP) walls must have a thickness no less than 1/4 inch; also, to ensure the structural strength, the framing structural members, the basin's structure, walls and bottom must be specially reinforced. A high grade Isophthalic Polyester Resin with UV inhibitor is only be used for the manufacturing process. No side fasteners will be allowed in the sidewalls of the basin. There are no metal supports or structure in direct contact with water

B. Following water connections are furnished:

Hot Water Inlet: 6 in	Water make-up: 1 in
Cold Water Outlet: 6 in	Drain: 1 1/2 in
Overflow(in): 1 1/2 in	Purge: 3/4 in

1. Fittings of 3 inch and smaller are NPT, and fittings larger than 3 inch use ANSI flange. A standard make-up water mechanical float valve is provided.

17.47 FAN DUCT

A. The Cooling Tower has one fan duct, constructed of high-performance corrosion-resistant Fiberglass Reinforced Polyester (FRP) with Ultraviolet (UV) resistant resins. Fiberglass Reinforced Polyester (FRP) material has a thickness no less than 1/4 inch; the fan duct are specially reinforced to ensure its structural strength. The fan Duct contains a direct-drive fan, a motor mounted on an FRP structure, and a corrosion-resistant safety screen mesh (also known as fan guard).

17.48 MECHANICAL EQUIPMENT

A. STANDARD FAN

1. The Cooling Tower contains one fan. Fan is direct-drive, with axial, propeller type, adjustable-pitch fan blades. Fan blades are manufactured of spark and corrosion resistant Fiberglass Reinforced Polyamide (PAG) and are suitable for operation on a temperature range of -50 Deg. F (-45 Deg. C) to 250 Deg. F (120 Deg. F). Fan hubs are manufactured of a pressure die cast aluminum alloy.

B. FAN MOTORS

1. The cooling tower contains one fan motor, rated at 5.0 HP and 850 RPM.
2. The fan motor is single speed, Totally Enclosed Air Over (TEAO), and are suitable for 230/460 Volts, 3 phases, 60Hz, continuous operation, 1.15 service factor on sine wave, NEMA Premium efficiency, severe duty – IEEE841, marine duty – meets IEEE45 IP56, and inverter rated. Fan motor's construction is 100% cast iron and has Class F Insulation System. The fan motor meets NEMA MG1 – 1.26.6, has a Division 2 CSA certification nameplate for hazardous locations, Class I Groups A, B, C and D, and is Underwriters Laboratories (UL) Recognized CSA Certified.

C. FILL MEDIA MODULES

1. Fill media modules are fabricated from rigid, corrugated UV protected Polyvinyl Chloride (PVC) sheets that are conducive to cooling water. Polyvinyl Chloride (PVC) corrugated sheets form a cross-corrugated pattern with an angle of 60 degrees from the horizontal between adjacent sheets, to provide a continuous and horizontal redistribution of air and water. Fill media modules provide no less than 69 ft^2/ft^3 of surface area and a void-to-volume ratio of 95%. The manufacturing material, Polyvinyl Chloride (PVC), are resistant to rot, fungi, bacteria and organic/inorganic acids and alkalis as commonly found in cooling towers; and meet CTI STD-136. Fill media modules' flame spread rating is less than 20 according to ASTM E84; and regarding flammability, fill media is self-extinguishing in less than 5 seconds according to ASTM D635.

D. DRIFT ELIMINATORS

1. Drift eliminators are fabricated from rigid, corrugated UV protected Polyvinyl Chloride (PVC) sheets and is furnished in lightweight, easily removable sections with 2 changes in air direction to remove entrained water particles from the leaving

airstream. Drift losses not exceed 0.0005% of the design circulating flow. The manufacturing material, Polyvinyl Chloride (PVC), are resistant to rot, fungi, bacteria and organic/inorganic acids and alkalis as commonly found in cooling towers, and meet CTI STD-136. Drift eliminators' flame spread rating is less than 25 according to ASTM E84, and regarding flammability, drift eliminators are self-extinguishing.

E. AIR INLET LOUVERS

1. Air inlet louvers are cellular type and designed to minimize splash-out of falling water, reduce light transmission into the tower and reduce sound transmission out of the tower at minimal airside pressure loss. Air inlet louvers are fabricated from rigid, corrugated UV protected Polyvinyl Chloride (PVC) sheets and are easily removable to provide access for cleaning. The manufacturing material, Polyvinyl Chloride (PVC), are resistant to rot, fungi, bacteria and organic/inorganic acids and alkalis as commonly found in cooling towers and meet CTI STD-136. Air Inlet Louvers' flame spread rating is less than 20 according to ASTM E84, and regarding flammability, air inlet louvers are self-extinguishing in less than 5 seconds according to ASTM D635.

F. HOT WATER DISTRIBUTION SYSTEM

1. Hot water enters into the cooling tower through a single inlet per module. All interior distribution piping is Polyvinyl Chloride (PVC) schedule 40 pipe. Water is evenly distributed over the fill media by removable 2-1/2 inch spray nozzles made of Polypropylene (PP). Spray nozzles contain internal, interchangeable flow devices to provide an optimal spray pattern within the 5 psig operating pressure range.

17.49 ACCESSORIES

A. VIBRATION SWITCH

1. The Cooling Tower is provided with one vibration cut-out switch for shutdown of fan motor. The vibration switch is installed by others. Vibration switch case are equal to NEMA 3R. Vibration switch contacts are Single Pole Double Throw (SPDT)-double make leaf contacts for 5 amperes @ 480 VAC.

B. ELECTRIC WATER LEVEL CONTROL

1. The cooling tower shall be provided with 1 electric water level control system and shall be installed by others. The electric water level control system shall consist of one (01) 5-probe water level controller and one (01) stilling chamber. Water level controller's enclosure shall be furnished with NEMA 4X Glass-Filled Polycarbonate, shall have a full gasket cover, and shall meet flammability rating U194V-1. Water level controller's electrodes shall be 1/4 inch stainless steel probes and shall sense high water alarm, low water alarm, high water level, and low water level using a common ground. Stilling chamber shall consist of a 2 inch Polyvinyl Chloride (PVC) schedule 80 Body, 1/2 inch MPT Polyvinyl Chloride (PVC) schedule 80 mounting nipples, and 1/2 inch MPT drain plug.

C. MOTOR SHAFT GROUNDING RING

1. In order to protect against electrical bearing damage, due to VFD-Induced Shaft Currents, the fan motors are provided with a motor shaft grounding ring each.

PART 18 - REFERENCE STANDARDS AND CODES

ASSOCIATION	***STANDARD / CODE***	
Cooling Technology Institute (CTI)	CTI STD-201	Standard for the Certification of Water-cooling Tower Thermal Performance.
	CTI STD-136	Polyvinyl Chloride materials used for film fill, splash fill, louvers, and drift eliminators.
American Society for Testing and Materials (ASTM)	ASTM E84	Standard test method for Surface burning characteristics of building materials
	ASTM D635	Standard test method for rate of burning of plastics in a horizontal position.
National Electrical Manufacturers Association (NEMA)	MG1	Motors and generators.
	MG1 – 1.26.6	Waterproof Specification.
Occupational Safety & Health Administration (OSHA)	1910.23	Guarding floor and wall openings and holes.

END OF SECTION

SECTION 23 73 33.16

INDOOR INDIRECT GAS-FIRED HEATING AND VENTILATING UNITS

PART 19 - GENERAL

19.50 SUMMARY

A. An Indirect-fired gas heating and ventilating unit(s), as indicated on the drawings shall be furnished. Orientation shall be horizontal discharge. Unit(s) shall be factory assembled, tested, and shipped as a complete packaged assembly, for indoor or outdoor mounting, consisting of the following:

1. Gas furnace.
2. Centrifugal blower (forward-curved double width/double inlet or backward inclined).
3. Motor starter with thermal overload protection.
4. Motor and drive assembly.
5. Fuel burning and safety equipment.
6. Temperature control system, and
7. Gas piping.

B. Unit(s) assembly shall be tested in accordance with Standard, ANSI Z83.8-2006 and CSA 2.6-2006 and shall bear the ETL label. The duct furnace shall be certified by the American Gas Association and approved by the Canadian Gas Association.

PART 20 - PRODUCTS

20.51 INDOOR INDIRECT GAS-FIRED HEATING AND VENTILATING UNITS

A. Summary

1. Indirect bent tube gas fired heater with 20" mixed flow direct drive fan, 1 furnace, electronic full modulation, constant 80% efficiency, and 6:1 max turndown for NG. Stainless steel burner and heat exchanger.
2. V-bank EZ filters - indoor.
3. Side discharge - air flow right -> left.
4. Gas pressure gauge, 0-35", 2.5" diameter, 1/4" thread size.
5. Gas pressure gauge, 0 to +10 inches wc., 2.5" diameter, 1/8" thread size, rear thread.
6. Motorized back draft damper 22.75" x 24" for size 2 standard & modular heater units w/extended shaft, standard galvanized construction, 3/4" rear flange, low leakage, lf120s actuator included.
7. Specially sized orifices for applications above 2,000', notify engineering.
8. Used with size 1 and size 2 side discharge IBT modules.
9. Commercial smoke detector interlock (detector by others).

10. Single point electrical connection for all IBT heaters with 1 module. Qnty 1 750va transformer used. If a non-dcv prewire is used on the IBT heater, the #28, #47, "ma", or "e2" option prewire must be selected. Do not provide supply starter in prewire.
11. Occupied scheduling defaulted for IBT/RTU.
12. Freezestat factory set at 35°F and 10 minutes.
13. VAV (variable-air-volume) wiring package for commercial fans. Manual speed control variable frequency drive included.
14. Mount load reactor in fan.
15. VFD factory mounted and wired in unit control vestibule.
16. Insulation for V-bank intake option.
17. Hinged double wall insulated door assembly (burner/blower section).
18. 2 year entire unit parts warranty, 25 year stainless steel furnace parts warranty.

B. Unit Cabinet

1. Unit housing shall be constructed of 20 Gauge G-90 galvanized steel. The wall panels and roof panels shall be fabricated by forming double-standing, self-locking seams that require no additional support. The floor and wall panels shall be caulked airtight with a silicone caulk. All casing panels shall be attached with sheet-metal screws or rivets, which can be removed to field service large components. The unit base shall be suitable for curb or flat mount. The base shall be constructed of galvanized steel for improved rigidity. Base shall be structurally reinforced to accommodate the blower assembly and burner. Housing construction should be suitable for outdoor or indoor installation.
2. All doors and at least one side of every sheet metal surface of the unit separating two air-masses of different air temperatures shall be faced with properly secured 1” aluminum-faced insulation for condensation prevention.
3. The discharge of the unit (Down/Side/Up) shall be internal to the heating module containing the furnaces.
4. All electrical controls on the control board shall be mounted in an isolated, fully enclosed, and insulated vestibule, completely separated from any combustion air, but accessible for servicing needs.
5. All furnace exhaust flues shall be of double-wall construction. All furnace exhaust flue connections and roof-penetration seams shall be sealed with High-Temp Fire-Barrier 2000+ type silicone caulking.
6. All unit housings, sizes 1-3, shall be equipped with Internal Air Distribution Screens on the upstream side of each furnace heat-exchanger.
7. All gas valves and electrical safety-limits shall be mounted within the burner vestibule; wiring to these components shall be properly secured and away from all high temperature metal surfaces. The burner vestibule shall be an integral part of the unit and not extend outside the exterior casing of the unit and not exposed to the main air stream.

8. The vestibule full-size door shall provide easy access to controls and gas-train components. Blower door shall provide easy access to blower, motor and drives. Access doors shall be provided on both front and back side of unit providing full access to every part of the unit.

C. Blower

1. Wheels shall be balanced in two planes and done in accordance with AMCA standard 204-96, *Balance Quality and Vibration Levels for Fans*. The wheel blades shall be aerodynamically designed to minimize turbulence, increase efficiency and reduce noise. The wheel blades shall be securely attached to the wheel inlet ring. The wheel shall be firmly attached to the fan shaft with set screws and keys. The blower assembly shall be isolated from the fan structure with vibration isolators.
2. See drawing schedules for blower capacity. All blowers shall be tested and set at rated speed after being installed in the factory-assembled unit.
3. Direct drive blower assembly shall consist of a centrifugal backward inclined, non-overloading wheel secured directly to a heavy duty, ball bearing type motor via two set screws. The motor and wheel assembly shall be mounted to a heavy gauge galvanized steel frame. The motor shall be controlled by a variable frequency drive, allowing for variable airflow without the need of belts and pulleys.

D. Motor & Motor Compartment

1. Motors shall be heavy duty ball bearing type and furnished at the specified voltage, phase, and enclosure. Motor mounting plate shall be constructed of heavy gauge galvanized steel and shall be designed to provide easy adjustment of belt tension.

E. Shaft & Bearings

1. Shafts shall be precision ground and polished. Heavy duty, pre-lubricated bearings shall be selected for a minimum (L50) life in excess of 200,000 hours of operation at maximum cataloged operating speed. They shall be designed for, and individually tested specifically for use in air handling applications.

F. Burner & Heat Exchanger

1. The gas burner shall be an indirect-fired, push-through type, sized per the drawing schedule (7" w.c. minimum Nat. Gas, 11" w.c. minimum LP Gas). Burner shall be a tubular in-shot fired design capable of using natural or LP type gas. Each burner ignition shall be of a direct-spark design with remote flame sensing at inlet of the last firing tube of the gas manifold. Each burner ignition module shall be pre-programmed with an ignition sequence comprised of a 1-minute pre-purge, 1-minute inter-purge, 2-minute post-purge, 15 second ignition, 3 trials for ignition, and 60 min lockout.
2. Direct-sparking sequence shall last through the complete during of the trial for ignition period for guaranteed light-off. Burner shall always be lit at maximum gas flow and combustion airflow for guaranteed light-off. Each burner ignition module shall have LED indicators for troubleshooting and a set of exposed prongs for testing flame indication signal.

3. All furnaces shall be controlled by an electronic vernier-type fully modulating control system capable of achieving 80% combustion efficiency over the entire gas firing range of the unit.
4. Each furnace shall have:
    a. A minimum turndown ratio of 6:1 for natural gas and 5:1 for LP gas.
    b. Each furnace heat exchanger shall be a bent-tube style design made entirely of type 409 stainless steel.
    c. Each furnace shall include a blocked vent safety airflow switch with high temperature silicone tubing operating off of absolute pressure measured inside of the power-vent blower housing.
    d. Each furnace shall include a high temperature auto-recycling limit with a maximum non-adjustable set-point of 200F.
    e. Each furnace shall include a manual reset high temperature flame roll out switch with a non-adjustable set-point of 325F.
    f. Each Furnace shall be accessible from both sides of unit.
    g. Each Furnace shall include a power-vent assembly for exhausting flue gases with a type PSC type motor that is securely mounted with rubber vibration isolators and easily accessible/removable for service.
    h. Every heat exchanger shall have a manufacturer-backed 10-year pro-rated warranty.
    i. Every power-vent blower motor and housing shall have a standard 1-year manufacturer-backed warranty.
5. Each furnace module gas inlet shall be equipped with a 0-35” w.c. gas pressure gauge. A 0-10” w.c. gas pressure gauge shall be installed on the gas manifold of each furnace.

G. Gas equipment
1. All gas equipment shall conform to local-Code requirements.
2. Components:
    a. Modulating-gas valve
    b. On/off redundant gas valve
    c. Burner
    d. Main-gas shut-off valve
    e. Main-gas regulator
    f. Two solenoid valves
3. All gas manifold components shall be piped and wired at the factory.

H. Safety controls
1. Motor starter with adjustable overloads
2. Main air-flow safety switch
3. Electronic flame-safety relay
4. High-temperature limit switch
5. Non-fused disconnect.

6. Flame roll-out switch.
7. Main-gas regulator
8. Two solenoid valves
9. Modulating-gas valve
10. Burner
11. Combustion air-proving switch

I. Temperature control systems

1. HMI Control: One HMI or Human-Machine Interface to be provided standard. Space HMI or room sensor shall be provided for temperature control utilizing space temperature. Additional HMIs or room sensors can be provided for space averaging. Cat5 connections shall be utilized between all HMIs. All settings and set points shall be able to be controlled at any HMI.
2. Activate Based on: Shall have the ability to activate heating/cooling based on the following.
    a. Intake temperature only
    b. Space temperature only
    c. Intake and space temperature
    d. Intake or space temperature
3. Tempering Mode: Shall have the ability to control heating/cooling based on the following.
    a. Discharge – Unit shall modulate to maintain discharge temperature.
    b. Space – Unit shall modulate to maintain space temperature.
    c. BAS – Unit shall be controlled via call for fan, call for heat, call for cool (optional), as well as a modulating heat input (0-20mA, 4-20mA, 0-10V, or 2-10V).
    d. (Optional) DDC – Unit shall be controlled via a DDC controller. Protocols to include BACnet or Lonworks.
4. Blower Mode:
    a. Manual (On) – Blower shall run constantly regardless of heating/cooling based on blower on/off button on HMI.
    b. Auto – Blower shall only run on a call for heating or cooling.
    c. Interlock (Off) – Blower shall only run when unit interlock is energized.
5. Service Functionality:
    a. Ability to monitor temperatures and VFD feedback real-time throughout unit.
    b. Test Fan, Heat (high/low fire setting) and Cooling.
    c. Fault history storing past twenty faults.
    d. VFD parameter adjustment through HMI.

J. Wiring and electrical

1. The control circuit voltage shall be 24 volts.
2. A control transformer shall be provided.
3. Unit shall have standing 120 VAC power.

4. The control wiring shall be carried in wire channel or conduit.
5. Wiring in control enclosures shall be in accordance with the National Electrical Code and the local code, as it may affect the installation.
6. Motor starter shall be provided.
7. Starter shall be line voltage, definite purpose type.
8. Unit(s) shall be complete with all items such as relays, starters, switches, safety controls, conduit and wire as previously mentioned, and as required for proper operation.
9. All factory-mounted controls shall be factory prewired to the unit control panel.

PART 21 - EXECUTION

21.52 Factory Tested

A. Unit(s) shall be operated, tested, and set at the factory using job-site conditions for electrical and gas input. All operating and safety controls shall be tested and set at the factory. Adjustable, or fixed sheaves shall be set for proper RPM at specified conditions. Gas-pressure regulator shall be set for specified burning rate at specified inlet pressure.

21.53 Service and parts

A. The supplier shall furnish gas piping schematics, as built wiring connection and control-circuit diagrams, dimension sheets and a full description of the unit(s). Service manuals, showing service and maintenance requirements, shall be provided with each unit.

END OF SECTION

SECTION 23 81 46

WATER TO WATER HEAT PUMPS & ACCESSORIES

PART 22 - GENERAL

22.54 SUMMARY

A. Furnish and install **FHP** water source heat pumps as indicated on the plans with capacities and characteristics as listed in the schedule and the specifications that follow. The units shall be manufactured in an ISO 9001:2000 certified facility.

PART 23 - PRODUCTS

23.55 HORIZONTAL/VERTICAL/COUNTERFLOW WATER SOURCE HEAT PUMPS

A. The units shall be designed to operate with entering fluid temperatures between 50˚F (10˚C) and 100˚F (38˚C) in cooling and between 50˚F (10˚C) and 80˚F (27˚C) in heating. With the optional factory installed extended range package, units shall operate with entering fluid temperatures between 50˚F (10˚C) and 110˚F (43.3˚C) in cooling and between 20˚F (-6.6˚C) and 80˚F (27˚C) in heating. Equivalent units from other manufacturers can be proposed, provided approval to bid is given 10 days prior to bid closing. All equipment with a nominal capacity of 135,000 BTUH Total Cooling or lower must be listed in the current AHRI Applied Equipment Directory under the AHRI Standard AHRI/ISO- 13256-1, WLHP, GWHP and GLHP certification points.

B. All equipment in this section must meet or exceed the DOE mandated minimum EER's and COP's as listed in ASHRAE 90.1 as follows:

C. For the AHRI/ISO-13256-1, WLHP Rating (12.0 EER and 4.2 COP for units larger than a nominal 17,000 BTUH Total Cooling – 11.2 EER and 4.2 COP for units below a nominal 17,000 BTUH Total Cooling).

D. For the AHRI/ISO-13256-1, GLHP Rating a minimum 13.4 EER and 3.1 COP. All units shall be listed with Underwriters Laboratories (UL) for safety.

23.56 BASIC CONSTRUCTION

A. Units shall have the airflow arrangement as shown on the plans. If units with these arrangements are not used, the contractor supplying the water source heat pumps is responsible for any extra costs incurred by other trades and must submit detailed mechanical drawings showing ductwork requirements and changes or relocation of any other mechanical or electrical system. If other arrangements make servicing difficult, the contractor must provide access panels and clear routes to ease service. The engineer must approve all changes 10 days prior to bid.

B. All units shall have stainless steel drain pans to comply with this project's IAQ requirements. Painted steel or plastic is not acceptable.

C. The cabinet shall be fabricated from heavy-gauge G-90 galvanized steel for superior corrosion protection. All interior surfaces shall be lined with 1/2" (12.7mm) thick, multi density, coated, glass fiber insulation. Insulation within the air handling section shall not have any exposed edges. All insulation must meet NFPA 90A and be certified to meet the GREENGUARD® Indoor Air Quality Standard for Low Emitting Products.

One blower access panel and two compressor compartment access panels shall be removable with supply and return air ductwork in place.

D. Unit shall have a floating compressor or pan consisting of a 1/2" (12 mm) thick high density elastomeric pad between the compressor base plate and the unit base pan to prevent transmission of vibration to the structure.

E. Units shall have a 1" filter rack and 1" thick throwaway type glass fiber filter as standard. Units shall have an optional 2" thick pleated MERV 8 filter (size 007-070) or MERV 13 filter (size 015 and larger with upgraded ECM) available. The filter rack shall incorporate a 1" duct flange. The units shall have an insulated divider panel between the air handling section and the compressor section to minimize the transmission of compressor noise, and to permit service testing without air bypass.

F. Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring.

G. Supply and return water connections shall be brass female pipe thread fittings and mounted flush to cabinet exterior. Connections that require a back up wrench or that extrude past the unit corner post are not acceptable. Condensate connections will be stainless steel female pipe thread fittings. Plastic is not acceptable.

H. Hanging brackets shall be provided as standard for horizontal units.

23.57 FAN AND MOTOR ASSEMBLY

A. The fan shall be direct-drive centrifugal forward curved type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low velocity operation. The blower housing shall feature a removable inlet ring to facilitate removal and servicing of the fan motor. The fan motor shall be 3-speed, permanently lubricated, PSC type with thermal overload protection.

B. 15,000 Btu/Hr to 70,000 Btu/Hr models shall have an optional constant torque electronically commutated motor for premium fan efficiency. These motors shall feature 5 pre-programmed torque settings that can be changed in the field to match design requirements. 460 V – 3 Ph – 60 Hz units with these motors must be able to operate without the need for a neutral wire for the motor.

C. 15,000 Btu/Hr to 70,000 Btu/Hr models shall have an optional constant CFM electronically commutated motor for premium fan efficiency and constant air delivery over a wide range of external static pressures. These motors shall be field adjustable for +/- 15% of nominal design airflow. These motors shall provide feedback to the unit control box to verify motor operating mode and delivered CFM.

23.58 REFRIGERANT CIRCUIT

A. Units shall use R-410A refrigerant. All units shall have a factory sealed and fully charged refrigerant circuit with the following components:

B. Hermetic compressor: Hermetic reciprocating, rotary, or scroll compressors shall be specifically designed for R-410A refrigerant and shall be internally sprung (if reciprocating), externally isolated and with thermal overload protection.

C. Refrigerant metering thermal expansion valves or capillary tubes.

D. The finned tube heat exchanger shall be constructed of lanced aluminum fins not exceeding sixteen fins per inch bonded to rifled copper tubes in a staggered pattern and will have a 600 PSIG (4140 kPa) working pressure. The heat exchanger shall have aluminum end sheets. Optional Air Coil Protection: The finned tube heat exchanger shall have optional DuoGuard™ protective coil coating. This corrosion protection shall consist of tin plated copper tubing with coated aluminum fins that must pass 1000 hours of ASTM B117 salt fog testing. Painted, dipped or e-coated heat exchangers are not acceptable.

E. Reversing valve. Reversing valves shall be four-way solenoid activated refrigerant valves which shall fail to the heating operation should the solenoid fail to function. Reversing valves which fail to the cooling operation shall not be allowed.

F. Coaxial (tube in tube) refrigerant to water heat exchanger. Refrigerant to water heat exchangers shall be of copper inner water tube and steel outer refrigerant tube design rated to withstand 600 PSIG working refrigerant pressure and 400 PSIG working water pressure. Shell and Tube style refrigerant to water heat exchangers shall be treated as pressure vessels and shall require refrigerant pressure relief valves piped to the exterior of the building. The contractor supplying the water source heat pumps with Shell and Tube heat exchangers shall be responsible for any additional installation costs. Brazed Plate water to refrigerant heat exchangers shall require additional centrifugal separators added to the supply water piping at each unit. Each separator shall have an automated clean out valve piped to a waste line. The contractor supplying water source heat pumps with Brazed Plate heat exchangers shall be responsible for any additional costs.

    1. Option: Cupro-Nickel water coil – The refrigerant to water heat exchanger shall be of Cupro-Nickel inner water tube construction.

G. Safety controls include both a high pressure and low pressure switch. Temperature sensors shall not replace these safety switches. See the controls section of this specification for additional information.

H. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service.

I. Activation of any safety device shall prevent compressor operation via a lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. Units which may be reset at the disconnect switch only shall not be acceptable. Refer to solid state safety circuit below.

23.59 ELECTRICAL

A. Controls and safety devices will be factory wired and mounted within the unit. Controls shall include fan relay, compressor contactor, 24V transformer, reversing valve coil and solid state lockout controller, Unit Protection Module (UPM). The standard transformer shall be rated for a minimum 50 VA. All units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volts.

    1. Option: Optional transformers shall be rated 75VA and shall have a push button reset circuit breaker on the secondary power.

B. Solid-state safety circuit

1. All units shall have a solid-state UPM safety control circuit with the following features:
    a. Anti-short cycle time delay (5 minute delay on break).
    b. Random start time delay on initial power.
    c. Brown out/surge/power interruption protection.
    d. 120 second low pressure switch bypass timer.
    e. High refrigerant pressure shutdown.
    f. Low refrigerant pressure shutdown.
    g. Low water temperature shutdown (adjustable for closed loop systems).
    h. Air coil freeze protection shutdown.
    i. High condensate level shutdown.
    j. 24 VAC alarm output for remote fault indication.
2. The UPM shall automatically reset after a safety shut down. Restart the unit if the cause of the shut down no longer exists (except for low temperature and high condensate level shutdowns). Should a fault re-occur within 60 minutes after reset, then a “hard” lockout will occur. A light emitting diode (LED) shall annunciate the following alarms: brown out, high refrigerant pressure, low refrigerant pressure, low water temperature and a high level of condensate in the drain pan. The LED will display each fault condition as soon as the fault occurs. If a hard lockout occurs, then the fault LED will display the type of fault until the unit is reset.
3. The UPM shall feature the following field configurable adjustments:
    a. Lock out reset on thermostat interruption or power reset.
    b. 2 or 4 restart attempts before a hard lockout.
    c. Test mode (reduces all time delays to 5 seconds for diagnostic work).
    d. Antifreeze setting for low water temperature sensor.
4. Safety devices include:
    a. Low pressure cutout set a 40 PSIG (280 kPA) for loss of charge protection (freezestat and/or high discharge gas temperature sensor is not acceptable).
    b. High pressure cutout control set at 600 PSIG (4125 kPA).
    c. Low supply water temperature sensor that detects drops in refrigerant temperature that could result in water coax heat exchanger freezing.
    d. Low air coil temperature sensor that detects drops in refrigerant temperature that could result in air heat exchanger freezing.
    e. High level condensate sensor that shuts off the compressor if the condensate drain pan fills with water.
    f. On board voltage detection that disables the compressor control circuit if there are extreme variations in supply voltage.
5. An energy management relay that allows unit control by an external source shall be factory installed. A terminal block with screw terminals shall be provided for control wiring.

23.60 OPTIONS

A. Extra quiet construction: compressor blanket shall be provided on units having a capacity above 18,000 BTUH.

B. Factory-installed control options: Water differential pressure switch, 75 VA transformer (resettable), phase loss and reversal protection, and unit mounted disconnect switch.

C. A 2" four-sided filter rack to accommodate nominal 2" thick pleated filters.

23.61 HOSE KITS

A. All units shall be connected with hoses. The hoses shall be 3 feet long, braided stainless steel, fire rated hoses complete with adapters. Non-fire rated hoses are not acceptable. Ball valves with P/T ports, flow controller, Y strainer shall be included as specified in the schedule.

END OF SECTION

BID SHEET
202 HVAC-CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNITS REPLACEMENT AT JEFFERSON ELEMENTARY SCHOOL

Board of Trustees
Pocatello/Chubbuck School District No. 25 Date: _____
3115 Pole Line Road
Pocatello, ID 83201

We, the undersigned, propose to furnish all labor, materials, tools, and equipment and complete all work called for by these specifications in connection with HVAC Equipment Replacement, under the supervision of the School Plant Coordinator and the Director of Business Operations, for the sum of:

PROJECT	**AMOUNT**
Jefferson Elementary School	$ _____

We further acknowledge Addendum(s) received, if applicable. No._____, dated_____.

Work can begin June 3, 2024 and must be completed by August 9, 2024.

The Board of Trustees reserves the right to reject any/or all bids or to waive any informalities, or to accept the bid or bids deemed best for School District No. 25, Bannock County, Pocatello, Idaho.

Respectfully submitted,

- Attached, if applicable, is a listing of subcontractors names and addresses for this project.
- Attached is our Affidavit of Alcohol and Drug-Free Worksite, as pursuant to Idaho Code 72-1717.
- Attached is Bidder Certification Form.

Company Name	Authorized Signature / Date
Address	Title
City, State, Zip	Public Works License Number
Phone / Fax Number	Worker's Comp & Liability Insurance Exp. Date

CONTRACTOR'S AFFIDAVIT
CONCERNING ALCOHOL AND DRUG-FREE WORKPLACE

STATE OF _____

COUNTY OF _____

Pursuant to the Idaho Code, Section 72-1717, I, the undersigned, being duly sworn, depose and certify that named contractor is in compliance with the provisions of Idaho Code section 72-1717; that named contractor provides a drug-free workplace program that complies with the provisions of Idaho Code, title 72, chapter 17 and will maintain such program throughout the life of a state construction contract and that named contractor shall subcontract work only to subcontractors meeting the requirements of Idaho Code, section 72-1717(1)(a).

_____
Name of Contractor

_____
Address

_____
City and State

By: _____
(Signature)

Subscribed and sworn to before me this _____ day of _____, 2024.

Commission expires:

_____
NOTARY PUBLIC, residing at

_____

_____

BIDDER CERTIFICATION FORM

1. **Debarment and Suspension** – In submitting this bid proposal, we hereby certify that we have not been suspended or in any way excluded from Federal procurement actions by any Federal Agency. We fully understand that if information contrary to this certification subsequently becomes available, such evidence may be grounds for non-award or nullification of a bid contract.

2. **Anti-Collusion** – In submitting this bid proposal, we hereby certify this proposal was developed and prepared without any collusion with any competing bidder or District employee. The content of this proposal has not been disclosed to any competing or potentially competing bidder prior to the proposal due date and time. Furthermore, no action to persuade any person, partnership or corporation to submit or withhold a bid has been made.

3. **Anti-Lobbying** – In submitting this bid proposal, we hereby certify that to the best of our knowledge and belief, no appropriated Federal funds have been paid or will be paid by or on behalf of person associated with this proposal to any person for influencing or attempting to influence and officer or employee of any agency, a member of Congress, an office or employee of Congress or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan or cooperative agreement.

4. **National Sexual Offender Registry** – In submitting this bid proposal, you certify to the District that your company will prohibit any persons in your employ who are registered or required to register under the Idaho Sex Offender Registration Act from participation in company business with the District if such participation would require them to be present on school property. You certify further that you have cross checked such employees against the National Sex Offender Registry found at the following web link: http://www.nsopr.gov/

Signed: _____ Date: _____

Name & Title: _____

Company: _____ Phone: _____

Address: _____

City/State/Zip: _____

POWER SYMBOL SCHEDULE

NOTE: ALL SYMBOLS MAY NOT BE USED

SYMBOL	DESCRIPTION
'MSB'	ELECTRICAL SWITCHBOARD EQUIPMENT, (SEE POWER RISER AND PANEL SCHEDULES FOR ADDITIONAL INFORMATION)
'T##'	DRY-TYPE TRANSFORMER, (SEE POWER RISER FOR ADDITIONAL INFORMATION)
'LA'	ELECTRICAL PANELBOARD, (SEE POWER RISER AND PANEL SCHEDULES FOR ADDITIONAL INFORMATION)
30A/3P/3R	DISCONNECT SWITCH, SIZE/POLES/TYPE AS INDICATED TYPES: 1=NEMA 1, 3R=NEMA 3R, 4X=NEMA 4X
30A/3P/3R (30A FUSES)	FUSED DISCONNECT SWITCH, SIZE/POLES/TYPE AS INDICATED TYPES: 1=NEMA 1, 3R=NEMA 3R, 4X=NEMA 4X
30A/3P/3R SIZE 1 (30A FUSES)	COMBINATION STARTER & FUSED DISCONNECT SWITCH, SIZE/POLES/TYPE AS INDICATED. TYPES: 1=NEMA 1, 3R=NEMA 3R, 4X=NEMA 4X
J	JUNCTION BOX CR = CORD REEL; SEE DRAWINGS FOR INFORMATION CD = CORD DROP; SEE DRAWINGS FOR INFORMATION
	EQUIPMENT CONNECTION; COORDINATE CONNECTION WITH EQUIPMENT PRIOR TO ROUGH-IN
M	MOTOR CONNECTION
F	SMALL EXHAUST FAN CONNECTION
	POWER AND/OR DATA SERVICE POLE
FB#	FLOORBOX (SEE FLOORBOX SCHEDULE FOR ADDITIONAL INFORMATION)
	PUSHBUTTON STATION
	SPECIAL RECEPTACLE (COORDINATE NEMA TYPE WITH EQUIP.) (REFER TO PANEL SCHEDULES FOR AMPS)
	CEILING MOUNTED DUPLEX RECEPTACLE (COORDINATE PLACEMENT WITH CEILING EQUIPMENT PRIOR TO ROUGH-IN)
	DUPLEX RECEPTACLE, UL TAMPER-RESISTANT WHERE MOUNTED BELOW 5FT
	GFCI-TYPE DUPLEX RECEPTACLE, UL TAMPER-RESISTANT WHERE MOUNTED BELOW 5FT
	DOUBLE-DUPLEX RECEPTACLE, UL TAMPER-RESISTANT WHERE MOUNTED BELOW 5FT
	GFCI-TYPE DOUBLE-DUPLEX RECEPTACLE, UL TAMPER-RESISTANT WHERE MOUNTED BELOW 5FT.

RECEPTACLE AND EQUIPMENT SUBSCRIPTS

AC	ABOVE COUNTER	TV	120V RECEPT. FOR TV; VERIFY HEIGHT WITH ARCH. DRAWINGS & ELEVATIONS
WP	WEATHERPROOF (UL LISTED WEATHER-RESISTANT)	USB	120V RECPT. WITH USB CHARGING PORTS
42"	MOUNTING HEIGHT AFF OR AFG	EWC	ELECTRIC WATER COOLER; (SEE DETAIL. RECPT. SHALL BE ACCESSIBLE, DO NOT MOUNT BEHIND HOUSING.)
IG	ISOLATED GROUND		
S	SURGE-PROTECTION TYPE	DISP	GARBAGE DISP. (UNDER SINK)
REF	REFRIGERATOR	DW	DISHWASHER (COORDINATE W/ MILLWORK, INSTALL PER NEC 422.16(B)(2)).
W	WASHING MACHINE		
D	DRYER (30A-240V RATED RECPT.)	M/R	MICROWAVE/RANGE HOOD (COORDINATE W/ MILLWORK)
M	MICROWAVE	R	ELECTRIC RANGE (50A-240V RATED RECPT.)

T OR S	HVAC THERMOSTAT OR SENSOR; PROVIDE & INSTALL BACKBOX,3/4" CONDUIT AND CONDUCTORS TO ASSOCIATED HVAC UNIT. COORDINATE EXACT LOCATION & SIZE AND NUMBER OF CONDUCTORS WITH M.C.

GENERAL SPECIAL SYSTEM NOTES:

A. ALL DEVICES SHOWN AT OR NEAR MILLWORK/CASEWORK SHALL BE COORDINATED WITH THE ARCHITECTURAL ELEVATION DRAWINGS AND MILLWORK INSTALLER TO INSURE PROPER MOUNTING HEIGHTS. CONTRACTOR SHALL ADJUST DEVICES AS NECESSARY IN ORDER TO POSITION DEVICES SUCH THAT THEY WILL NOT FALL BEHIND MILLWORK, CABINETS OR BE DIRECTLY ABOVE SINKS OR MIDWAY BETWEEN TILEWORK/WALL OR WAINSCOATING, ETC.

B. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL A GFCI TYPE RECEPTACLE FOR ALL RECPTACLES SHOWN IN TOILET RMS, BATHROOMS, KITCHENS/SERVING AREAS, ROOFTOP, OUTDOORS OR WITHIN 6FT OF ANY SINK, BASIN, TUB OR FLOOR SINK AND ALL OTHER AREAS DEFINED BY THE NEC.

CIRCUITING & GENERAL SYMBOL SCHEDULE

NOTE: ALL SYMBOLS MAY NOT BE USED

SYMBOL	DESCRIPTION
1	KEYED NOTE REFERENCE
1 / ES101	DETAIL # / SHEET REFERENCE
A-1,3,5 3/4"C.-6#12,1#12G	BRANCH CIRCUIT HOME-RUN TO PANEL INDICATED A-1,3,5 — PANEL AND CIRCUIT DESIGNATIONS 3/4"C.-6#12,1#12G QTY & SIZE OF EQUIPMENT GROUND CONDUCTOR QTY & SIZE OF NEUTRAL AND PHASE CONDUCTOR(S) SIZE OF CONDUIT
	TICK MARKS
	EQUIPMENT GROUNDING CONDUCTOR
	NEUTRAL CONDUCTOR(S)
	PHASE AND/OR SWITCH-LEG CONDUCTOR(S)
*25,000A	CALCULATED AVAILABLE FAULT CURRENT AT EQUIPMENT(SEE POWER RISER)
	BRANCH CIRCUIT/FEEDER CONCEALED IN CEILING OR WALL
	BRANCH CIRCUIT/FEEDER CONCEALED UNDERGROUND OR FLOOR
	NEW EQUIPMENT, DEVICES, ETC.
	EXISTING EQUIPMENT, DEVICES, ETC.
	DEMOLITION EQUIPMENT, DEVICES, ETC.

PROJECT GENERAL NOTES:

A. E.C. SHALL REFER TO THE MECHANICAL DRAWINGS FOR EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT AND ELECTRICAL CONNECTIONS.
B. E.C. SHALL PROVIDE MINIMUM WORKING CLEARANCE AS PER NEC BEFORE INSTALLING ANY ELECTRICAL PANELS OR CABINETS. SEE ELECTRICAL EQUIPMENT CLEARANCE DETAIL.
C. INSTALL ALL LIGHT FIXTURES IN MECHANICAL ROOM AFTER THE MECHANICAL EQUIPMENT IS IN PLACE. ADJUST AS NECESSARY. PROVIDE CHAIN SUSPENSION KITS AS REQUIRED.
D. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN(S) FOR EXACT FIXTURE LOCATIONS, CEILING TYPES, ETC.
E. E.C. SHALL PROVIDE ALL CONCRETE PADS AS REQUIRED FOR ALL ELECTRICAL EQUIPMENT.
F. CONFIRM EXACT LOCATIONS OF ALL TELEPHONE/DATA OUTLETS WITH OWNER PRIOR TO ROUGH-IN.
G. LOCATE SWITCHES, OUTLETS, ETC., SHOWN AT ROOM ENTRY DOORWAYS, AS CLOSE TO DOOR FRAME AS POSSIBLE, SO AS NOT RO INTERFERE WITH ROOM CABINETS, ETC.
H. SUPPORT ALL LIGHT FIXTURES INDEPENDENT OF CEILING.
I. ELECTRICAL CONTRACTOR SHALL OBTAIN ALL APPLICABLE PERMITS FOR WORK AND PAY ASSOCIATED FEES.
J. MAINTAIN 24" MIN. CLEARANCE FROM ALL COMMUNICATIONS CABLING AND ELECTRONIC BALLASTS.
K. UNLESS SPECIFICALLY INDICATED OTHERWISE, E.C. SHALL COORDINATE WITH ANY SPECIAL SYSTEMS SUPPLIER/SHOP DRAWINGS; DENTAL, MEDICAL, KITCHEN, SPECIALIZED EQUIPMENT, ETC. FOR THE EXACT ROUGH-IN REQUIREMENTS FOR THEIR EQUIPMENT. ALSO UNLESS INDICATED OTHERWISE, THE E.C. TO BE RESPONSIBLE FOR FINAL ELECTRICAL CONNECTIONS TO ALL SPECIAL EQUIPMENT.
L. ALL CONDUIT/RACEWAY/CABLES TO BE CONCEALED IN WALLS OR ABOVE CEILINGS. IF ANY SURFACE WORK IS NECESSARY, IT SHALL BE APPROVED BY THE ARCHITECT/ENGINEER PRIOR TO INSTALLATION.
M. ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO BID AND THOROUGHLY INVESTIGATE THE EXISTING CONDITIONS, AS THEY RELATE TO THE SCOPE OF WORK DESCRIBED. MAKE NECESSARY PROVISIONS IN THE BASE BID TO ADEQUATELY ACCOMMODATE THESE CONDITIONS.
N. DATA CABLING SYSTEM PRE-INSTALLATION CONFERENCE:
   1. E.C. SHALL SCHEDULE A MEETING A MINIMUM OF FIVE CALENDAR DAYS PRIOR TO BEGINNING DATA CABLING INSTALLATION . ATTENDEES SHOULD INCLUDE OWNER'S REP., ENGINEER, GC, EC AND CABLING SUB. REFER TO SECTION 26 6210(1.4)(E) FOR ADDITIONAL INFORMATION.

ELECTRICAL SPECIFICATIONS

1. INTENT:
   Provide and install complete and operable electrical systems including but not not limited to; lighting, power, receptacles, data, fire alarm ande etc.
   Provide all required connections to all Mechanical and Plumbing equipment, as indicated and required, including all conduits, wiring and controls. Coordinate with mechanical contractor and drawings.
2. COMPLIANCE WITH CODES:
   All work and material shall comply with all applicable codes, safety orders, laws, ordinances and regulations of governing authorities and other agencies having jurisdiction including regulations of the State and Local Fire Marshall, unless detailed as specified to a more restrictive standard or higher requirement.
3. INTERPRETATION OF DRAWINGS:
   The electrical drawings are essentially diagrammatic in that all provisions necessary to conform to structural, architectural, mechanical and plumbing systems can not be shown. All installations shall be adjusted as necessary to conform and to avoid obstructions, without additional cost to the owner.
   All work, material and equipment called for by notes, schedules or otherwise indicated on the drawings shall be furnished and isntalled as though fully set forth in these specifications.
4. VISITING THE SITE:
   Contractor shall visit the site and become acquainted with conditions to be encountered. Extra funds will not be allowed due to failuer to examine the site and to included existing conditions in bid price.
5. COORDINATION WITH UTILITIES:
   These plans have been prepared without utility company comments. The contractor shall verify exact requirements for the electrical, telephone and communication services with the utility company representatives and provide all work and pay all costs for a complete and operating systems, as directed by the governing utilities.
6. MATERIALS AND WORKMANSHIP:
   All workmanship shall be performed by skilled electricians using the best standard practives of the trade. All materials shall, unless otherwise noted, be new and in perfect condition and working order. All material for similar uses shall be of the same type, material and manufacturer for ease of future maintaenance.
   All equipment shall be readily accessible for maintenance and repairs. All materials, fixtures and equipment shall be covered or sealed upon installation so as to provide for safety and to insure that operation and appearance will be maintained after subsequent construction operations.
7. EXECUTION:
   Raceway installation: Seperate underground conduits in a common trench 4" minimum horizontally, 12" minimum from other utility lines. Minimum conduit depth shall be 18".
   Coordinate conduit installation with pipes, steel, footings and ducts installed by other trades. Install conduit runs exposed to view parallel or at right angles to structural members, walls or building lines. Support conduit with one-hole malleable factory made pipe straps, fastended with screws.
8. OPERATING AND ADJUSTING:
   The owner reserves the right to operate any systems of equipment prior to final comletion and acceptance of the work. Such perliminary operation shall not be construed as an acceptance of any work.
   Each piece of equipment and all of the systems shall be adjusted to insure proper functioning and shall be left in first class operating condition.
9. CUTTING AND PATCHING:
   Do all drilling and cutting as necessary for installation of equipment or conduit. Cutting or drilling of structure is only permitted with prior approval of the owner and structural engineer.
   Where cutting and patching of work is necessary, use the same materials, workmanship and finish to neatly match all surrounding work.
10. CONDUIT:
    All conduit material and installation methods shall be as allowed by the NEC, local AHJ and as directed by the owner.
11. CONDUCTORS:
    Type THWN or THHN copper wire insulated for 600V. Smallest wire shall be #14 AWG unless noted otherwise. All wiring shall be Copper unless indicated otherwise.

    Use "Ideal Yellow" pulling compound for all wire pulls. Use Scotchlock connectors for all splices in #12 wire and tape bolted pressure connectors for larger wire.
12. GROUNDING:
    All conduit, branch circuits, feeders and etc. shall be provided with a grounding conductor. All grounding conductors shall be insulated and green in color, size as shown.
13. WIRING DEVICES:
    Devices shall be Standard type, Specification grade, color as selected by owner. Decora style devices are prohibited. Utilize GFCI and Tamper-proof devices in all locations as defined by the NEC.
    Wiring devices shall be as installed as allowed by the NEC, local AHJ.
14. DEVICE PLATES:
    Devices plate type and color shall be as directed by owner and as required by the NEC.
15. LIGHTING FIXTURES:
    As selected by owner and/or indicated in schedules. All light fixtures shall be installed and connected by the Electrical Contractor.
16. SERVICE EQUIPMENT & PANELBOARDS:
    Service Equipment: Shall be rated as such and shall comply with local utility co. requirments. ,
    Panelbards: Shall be provided with typed writtend directories indicating loads being served.
    Maintain all required clearances around equipment as required by the NEC.
    All equpment dimensions to be field verified.
17. CLEAN-UP:
    Upon completion of the work, prior to final inspection, thoroughly clean all exposed fixtures, trim and equipment and leave the entire installation in a neat, clean and usable condition. Remove all cement, paint, grease, oil and other foreign substances.
18. TEST:
    Test all conductors for shorts, opens, grounds or other defects. Correct any defective work and re-test.
    Demonstrate continuous satisfactory operation of all electrical systems and equipment.
    Provide training to the owner on electrical systems as needed for owner operation and maintenance of building.
19. GUARANTEE:
    Prior to final acceptacne of the project, deliver to the owner a written one year guarantee on all workmanship, materials and equipment and agree to repair or replace all such defective items promptly that may occure during the warranty period; including repair or replacement of the premises that may be damaged due to faulty work and materials furnished under contract.

PANEL: P

PAYNE ENGINEERING

LOCATION:
FED FROM:
MOUNTING: SURFACE
ENCLOSURE: NEMA 1
MFG & MODEL: GOULD/ITE

VOLTAGE: 120/208 Wye
PHASES: 3
WIRES: 4
BUSSING: SEE SPEC'S
DIMENSIONS: 20"W x 5.8"D x **"H

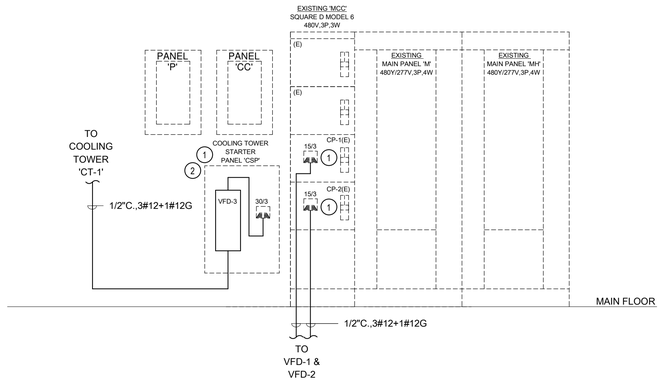
A.I.C. RATING: (E)
PANEL TYPE: MLO
PANEL AMPS: 225 A
MBR AMPS: N/A
FEED: BOTTOM

PROJECT:
EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNIT REPLACEMENT

NOTES:
EXISTING PANEL

CKT	CIRCUIT DESCRIPTION	NOTE	AMPS	P	A	B	C	P	AMPS	NOTE	CIRCUIT DESCRIPTION	CKT
1	EXISTING	--	20 A	1	0 0			1	20 A	--	EXISTING	2
3	EXISTING	--	20 A	1		0 0		1	20 A	--	EXISTING	4
5	EXISTING	--	20 A	1			0 0	1	20 A	--	SPARE	6
7	EXISTING	--	20 A	1	0 0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1		0 0		1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0 0	2	30 A	--	EXISTING	12
13	SPARE	--	20 A	1	0 0							14
15	SPARE	--	20 A	2		0 0						16
17							0 0	3	30 A	--	EXISTING	18
19	BOILER	N	15 A	1	576 0							20
21	BOILER	N	15 A	1		576 --		1	--	--	PREPARED SPACE	22
23	PREPARED SPACE	--	--	1			-- --	1	--	--	PREPARED SPACE	24
25					0 --			1	--	--	PREPARED SPACE	26
27	EXISTING	--	60 A	3		0 --		1	--	--	PREPARED SPACE	28
29							0 --	1	--	--	PREPARED SPACE	30
					TOTAL LOAD:	0.6 kVA	0.6 kVA 0.0 kVA					
					TOTAL AMPS:	6 A	6 A 0 A					
					TOTAL ESTIMATED DEMAND AMPS:		3 A					

BRK NOTES:
A = ARC-FAULT BREAKER
S = SHUNT-TRIP BREAKER
GP = GFEPD BREAKER
G = GFCI BREAKER
N = NEW CIRCUIT BREAKER, SIZE/TYPE AS INDICATED
R = RED HANDLED, LOCK-OUT TYPE



1 PARTIAL POWER RISER DIAGRAM
SCALE: NONE

KEY NOTES:

1 E.C. SHALL REMOVE ALL STARTER COMPONENTS, CONTROLS, LIGHTS, ETC. FROM MCC BUCKETS SUPPLING COOLING TOWER/CHILLED WATER PUMPS AND MAINTAIN CIRCUIT BREAKER ONLY FOR CONNECTION TO NEW VFD'S.
2 E.C. SHALL INSTALL NEW VFD FOR COOLING TOWER IN EXISTING STARTER ENCLOSURE IF POSSIBLE, OTHERWISE INSTALL IN A LOCATION THAT WILL MAINTAIN REQUIRED ELECTRICAL CLEARANCES PER NEC. FIELD VERIFY EXACT PLACEMENT WITH EXISTING CONDITIONS.

P.E. JOB #2316
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PROFESSIONAL ENGINEER
REGISTERED
13053
02/23/24
STATE OF IDAHO
SHAWN A. MEADOR

2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT
EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District 25
1455 Gwen Drive
Pocatello, Idaho 83204

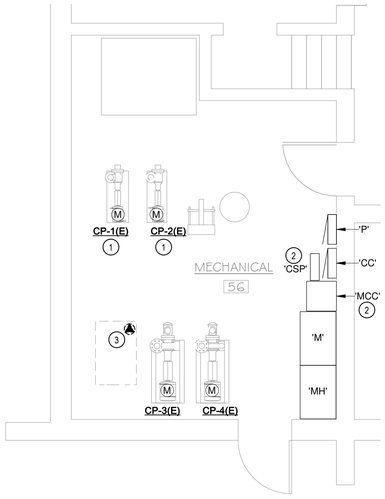
Revisions

No.	Description	Date

Project Number:	2431
Date:	02/23/2024
Designed By:	SAM
Checked By:	TEP

Sheet Title:
ELECTRICAL SYMBOLS, SCHEDULES & DETAILS

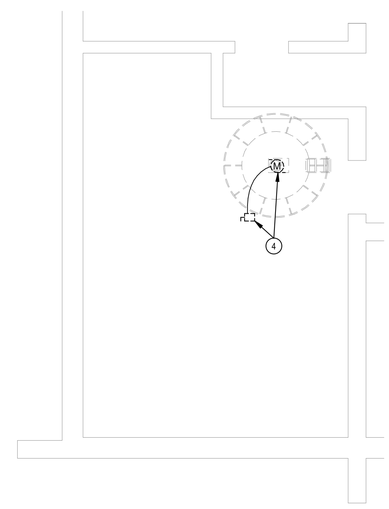
Sheet:
E0.0



A EXISTING ELECTRICAL PLAN - BOILER ROOM

SCALE: 1/4" = 1'-0"

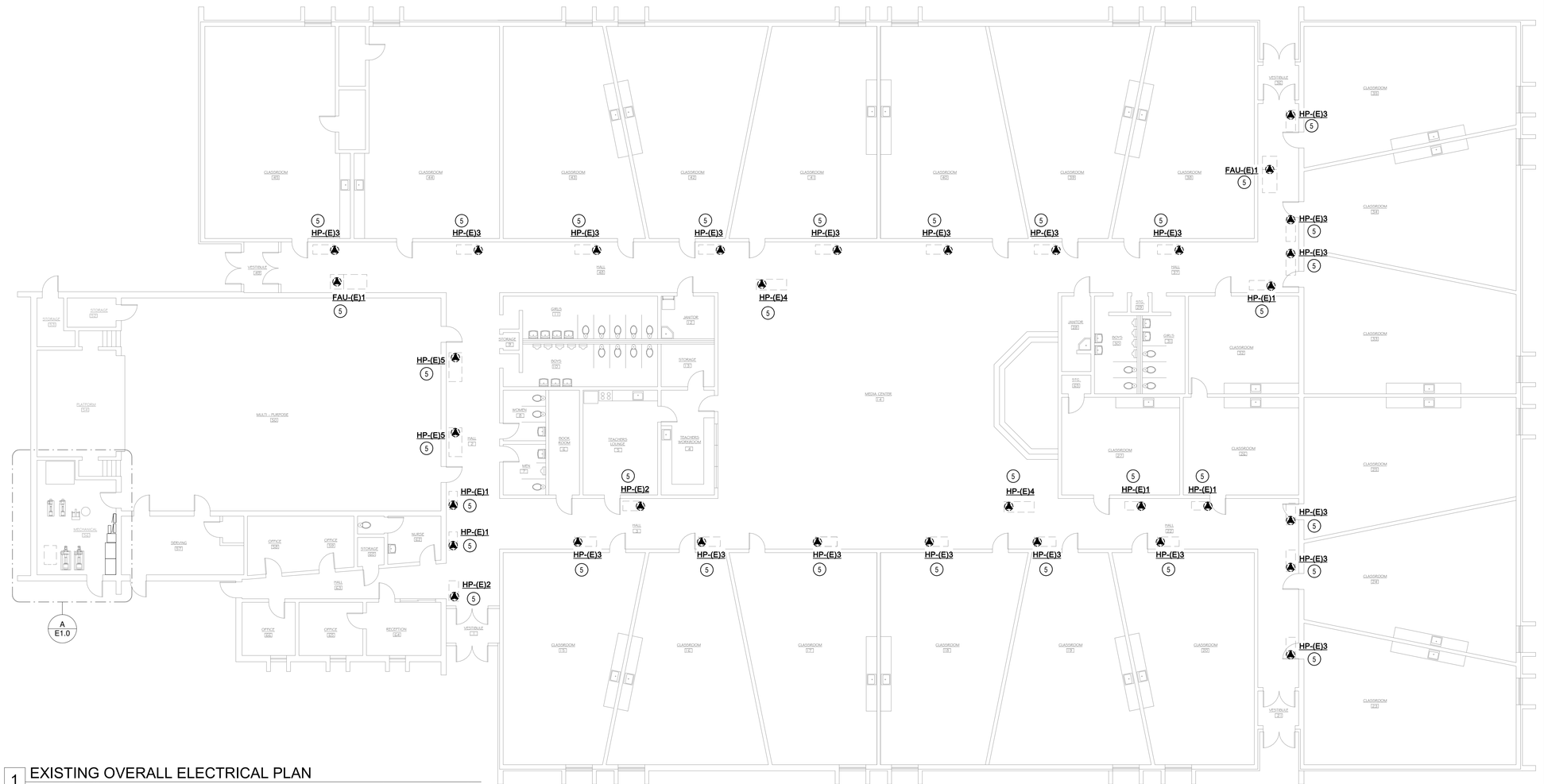
0" 4' 8'



B EXISTING ELECTRICAL PLAN - BOILER ROOM ROOF

SCALE: 1/4" = 1'-0"

0" 4' 8'



1 EXISTING OVERALL ELECTRICAL PLAN

SCALE: 3/32" = 1'-0"

0" 8' 16'

DEMOLITION GENERAL NOTES:

A. ALL EXISTING ELECTRICAL MAY NOT APPEAR ON THESE PLANS, HOWEVER THE ABOVE INFORMATION APPLIES.
B. PROVIDE AND INSTALL BLANK COVERS ON ALL UNUSED SWITCH/OUTLET/J-BOXES WHERE REQUIRED.
C. ALL WALL DEVICES THAT ARE EXISTING TO REMAIN, SHALL BE ADAPTED TO NEW WALL COVERINGS, REFER TO ARCHITECTURAL DRAWINGS FOR EXACT WALL LOCATIONS, THICKNESS, ETC.
D. PRIOR TO THE START OF ANY DEMOLITION WORK, DISCONNECTING ANY POWER AND OR TELE/DATA SYSTEMS, THE CONTRACTOR SHALL COORDINATE DOWN-TIME WITH THE OWNER.
E. REMOVE OR RELOCATE ELECTRICAL AS NECESSARY FOR NEW WORK.
F. WHERE EXISTING CIRCUITS ARE TO BE RE-USED, EXTEND AS NECESSARY. MAINTAIN ELECTRICAL CONTINUITY TO DOWNSTREAM EQUIPMENT TO REMAIN.
G. EXISTING SHOWN TO REMAIN, MAY NEED TO BE REMOVED AND RE-INSTALLED ONLY AS NECESSARY FOR EXTENDING OR MODIFICATION OF EXISTING CIRCUITS OR WIRING.
H. REFER TO MECHANICAL PLANS FOR EXTENT OF MECHANICAL EQUIPMENT TO BE REMOVED OR RELOCATED.
I. REMOVE ALL UNUSED EQUIPMENT WIRING, CONDUIT AND BOXES IN ALL AREAS. ABANDON ONLY IN CONCEALED AREAS.
J. CONTRACTOR MY UTILIZE ANY EXISTING CONDUIT WHERE COMPATIBLE WITH NEW DESIGN, AND IF IN GOOD CONDITION AND COMPLIES WITH SPECIFICATIONS.
K. WHEN ANY MODIFICATIONS ARE MADE TO ANY EXISTING ELECTRICAL PANEL TO REMAIN, CONTRACTOR TO PROVIDE NEW TYPE WRITTEN INDEX TO REFLECT ALL NEW AND EXISTING LOADS.
L. REMOVE ALL EQUIPMENT, RACEWAYS, CABLES,ETC. NOT USED IN FINISHED AREAS.

(#) KEY NOTES:

1 EXISTING CHILLED WATER PUMP FED FROM EXISTING MCC. E.C. SHALL ELECTRICALLY DISCONNECT EXISTING PUMP FOR INSTALLATION OF NEW VFD. VFD PROVIDED BY M.C., INSTALLED/CONNECTED BY E.C. RE-ROUTED EXISTING CIRCUIT THROUGH VFD AND RECONNECT PUMP.

2 E.C. SHALL REMOVE ALL STARTER COMPONENTS, CONTROLS, LIGHTS, ETC. FROM MCC BUCKETS SUPPLING COOLING TOWER/CHILLED WATER PUMPS AND MAINTAIN CIRCUIT BREAKER ONLY FOR CONNECTION TO NEW VFD'S.

3 EXISTING GAS BOILER TO BE REMOVE/REPLACED BY M.C. E.C. SHALL ELECTRICALLY DISCONNECT EQUIPMENT FOR REMOVAL. REMOVE ALL ASSOCIATED CONDUIT AND CONDUCTORS BACK TO SOURCE. MAINTAIN/RE-ESTABLISH ALL DOWNSTREAM DEVICES THAT ARE TO REMAIN. COORDINATE WITH MECH. CONTRACTOR.

4 EXISTING COOLING TOWER FAN FED FROM STARTER PANEL 'CSP'. E.C. SHALL ELECTRICALLY DISCONNECT EXISTING COOLING TOWER AND REMOVED ASSOCIATED CONDUIT/CONDUCTORS FOR INSTALLATION OF NEW COOLING TOWER. NEW COOLING TOWER TO BE CONTROLLED BY VFD PROVIDED BY M.C., INSTALLED/CONNECTED BY E.C. PROVIDE CONDUIT AND CONDUCTORS AS INDICATED FROM EXISTING STARTER PANEL 'CSP' THROUGH VFD AND TO NEW COOLING TOWER.

5 EXISTING HVAC EQUIPMENT IN MECH. MEZZANINE TO BE REPLACE BY M.C. E.C. SHALL ELECTRICALLY DISCONNECT UNIT AND REMOVED ASSOCIATED DISC. SWITCH. PULL-BACK EXISTING BRANCH CIRCUIT AS REQUIRED FOR REMOVAL OF EQUIPMENT. ONCE NEW EQUIPMENT IS INSTALLED, E.C EXTEND EXISTING BRANCH CIRCUIT TO NEW EQUIPMENT, PROVIDE AND INSTALL NEW FUSED, DISCONNECT SWITCH NEXT TO EQUIPMENT AND FUSE PER EQUIPMENT NAMEPLATE. SEE MECH. SCHEDULES FOR ADDITIONAL INFORMATION ON NEW EQUIPMENT.

P.E. JOB #2306
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2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District 25
1455 Gwen Drive
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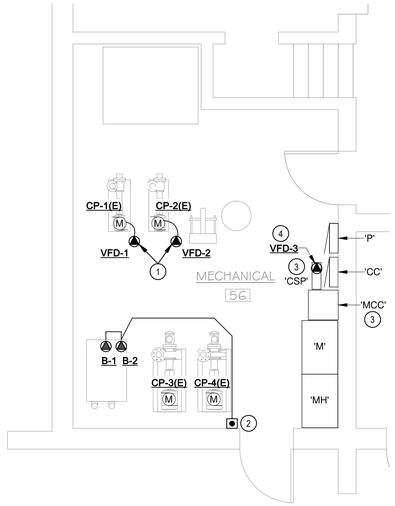
Revisions		
No.	Description	Date

Project Number:	2431
Date:	02/23/2024
Designed By:	SAM
Checked By:	TEP

Sheet Title: EXISTING ELECTRICAL PLANS

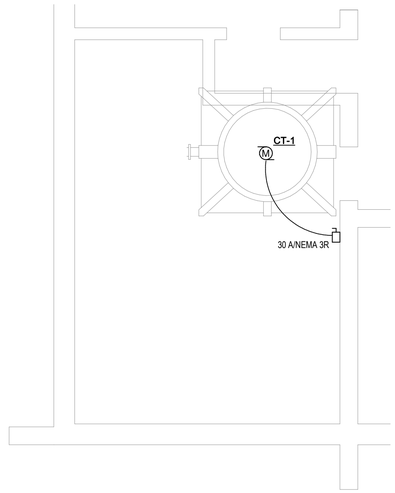
Sheet: E1.0



A NEW ELECTRICAL PLAN - BOILER ROOM

SCALE: 1/4" = 1'-0"

0" 4' 8'



B NEW ELECTRICAL PLAN - BOILER ROOM ROOF

SCALE: 1/4" = 1'-0"

0" 4' 8'

MECHANICAL - HEAT PUMP SCHEDULE

EQUIP. ID	VOLTAGE / PH.	HP	AMPS	FEEDER	DISCONNECT	NOTES
HP-1	277 V / 1 PH.	0.1	5.6 A	REUSE EXISTING	30 A/FUSED/1	1
HP-2	277 V / 1 PH.	0.33	10.0 A	REUSE EXISTING	30 A/FUSED/1	1
HP-2b	277 V / 1 PH.	0.33	13.8 A	REUSE EXISTING	30 A/FUSED/1	1
HP-3	480 V / 3 PH.	0.5	8.5 A	REUSE EXISTING	30 A/FUSED/1	1
HP-4	480 V / 3 PH.	0.75	10.9 A	REUSE EXISTING	30 A/FUSED/1	1
HP-5	480 V / 3 PH.	0.5	18.2 A	REUSE EXISTING	30 A/FUSED/1	1

MECHANICAL - FRESH AIR UNIT SCHEDULE

EQUIP. ID	VOLTAGE / PH.	HP	AMPS	FEEDER	DISCONNECT	NOTES
FAU-1	480 V / 3 PH.	2	4.5 A	REUSE EXISTING	30 A/FUSED/1	1
FAU-2	480 V / 3 PH.	2	4.5 A	REUSE EXISTING	30 A/FUSED/1	1

MECHANICAL - COOLING TOWER SCHEDULE

EQUIP. ID	VOLTS	PH.	HP	FLA	CIRCUIT	FEEDER	DISCONNECT	NOTES
CT-1	480 V	3	3	5 A	FED FROM VFD-3	3/4"C.,3#12+1#12G	30 A/NON-FUSED/3R	1

MECHANICAL - BOILER SCHEDULE

EQUIP. ID	VOLTS/PH.	FLA	MOCP	CIRCUIT	FEEDER	NOTES
B-1	120 V / 1	5 A	15 A	P-19	1/2"C., 3#12+1#12G	3
B-2	120 V / 1	5 A	15 A	P-21	1/2"C., 3#12+1#12G	3

MECHANICAL - VFD SCHEDULE SCHEDULE

EQUIP. ID	VOLTS	PH.	MOCP	CONTROL FOR	FEEDER	NOTES
VFD-1	480 V	3	15 A	CP-1(E)	1/2"C., 3#12+1#12G	2
VFD-2	480 V	3	15 A	CP-2(E)	1/2"C., 3#12+1#12G	2
VFD-3	480 V	3	15 A	CT-1	1/2"C., 3#12+1#12G	2

MECHANICAL SCHEDULE NOTES:

1. E.C. SHALL PROVIDE LOCAL DISCONNECT SWITCH FOR EQUIPMENT; SIZE AND TYPE AS INDICATED IN SCHEDULE. IF FUSED DISCONNECT IS SPECIFIED FOR EQUIPMENT, FUSE PER EQUIPMENT NAMEPLATE RATING.
2. VFD PROVIDED WITH INTEGRAL DISCONNECT AND OVERCURRENT PROTECTION. E.C. SHALL MAKE ALL REQUIRED CONNECTIONS BETWEEN MCC - VFD - EQUIPMENT.
3. E.C. SHALL PROVIDE AND INSTALL NEW BREAKER IN EXISTING PANEL.

GENERAL NOTES:

A. REFER TO SYMBOL SCHEDULE SHEET FOR PROJECT GENERAL NOTES AND GENERAL NOTES ASSOCIATED WITH THE INSTALLATION OF EACH SYSTEM, INCLUDINB BUT NOT LIMITED TO; LIGHTING, POWER, FIRE ALARM, SPECIAL SYSTEMS, ETC.

(#) KEY NOTES:

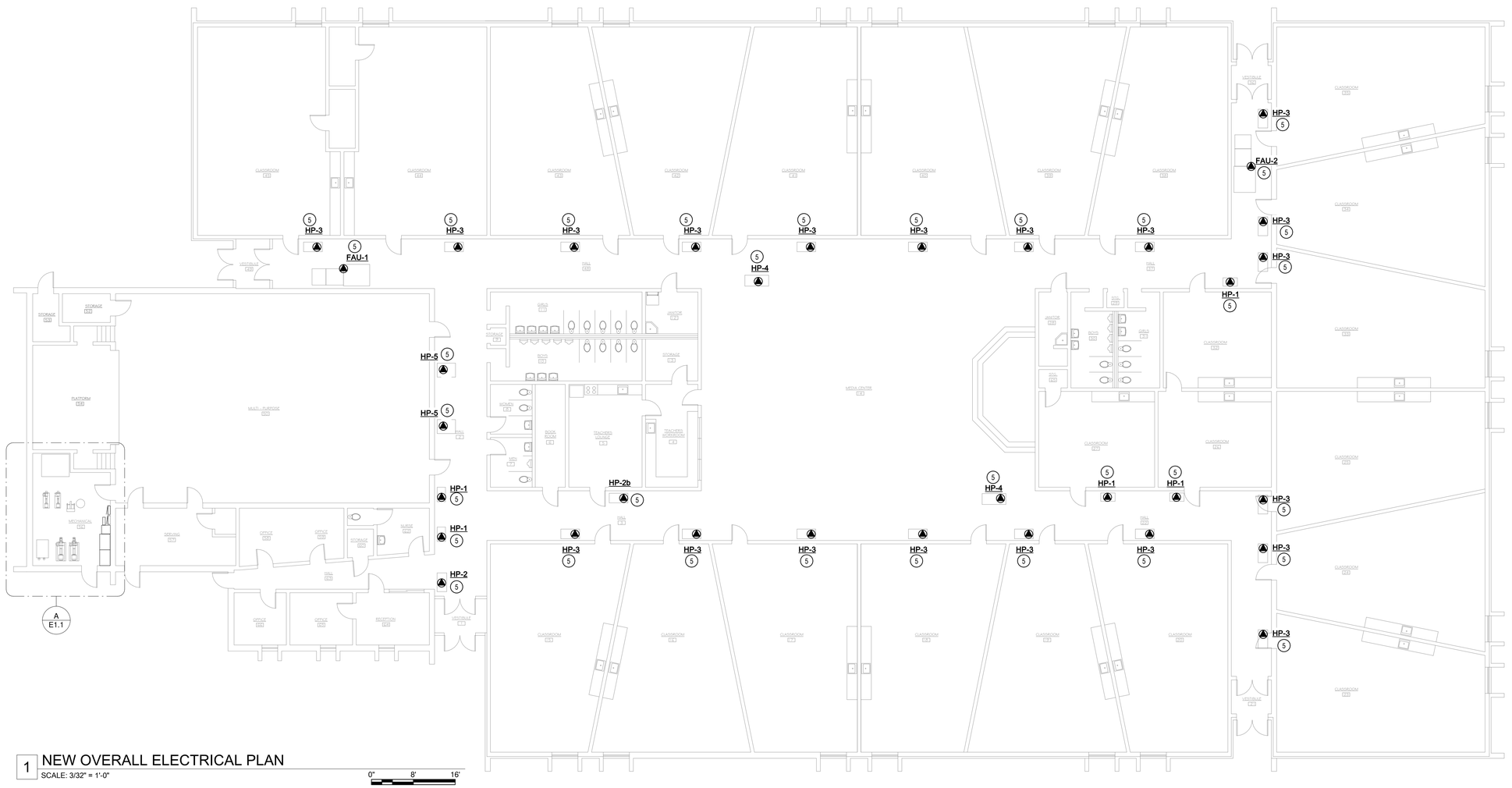
1 E.C. SHALL INSTALL NEW VFD(S) ON UNISTRUT RACK AS REQUIRED TO MAINTAIN REQUIRED ELECTRICAL CLEARANCES PER NEC. FIELD VERIFY EXACT PLACEMENT WITH EXISTING CONDITIONS.

2 E.C. SHALL PROVIDE AND INSTALL AN RED MUSHROOM 'EPO' SWITCH FOR EMERGENCY SHUT-DOWN OF ALL BOILERS, COORDINATE WIRING WITH M.C. PRIOR TO ROUGH-IN. ALPS CONTROLS INC. P/N: BSD120N1 OR EQUAL. MOUNT NEXT TO DOOR.

3 E.C. SHALL REMOVE ALL STARTER COMPONENTS, CONTROLS, LIGHTS, ETC. FROM MCC BUCKETS SUPPLING COOLING TOWER/CHILLED WATER PUMPS AND MAINTAIN CIRCUIT BREAKER ONLY FOR CONNECTION TO NEW VFD'S.

4 E.C. SHALL INSTALL NEW VFD FOR COOLING TOWER IN EXISTING STARTER ENCLOSURE IF POSSIBLE, OTHERWISE INSTALL IN A LOCATION THAT WILL MAINTAIN REQUIRED ELECTRICAL CLEARANCES PER NEC. FIELD VERIFY EXACT PLACEMENT WITH EXISTING CONDITIONS.

5 EXISTING HVAC EQUIPMENT IN MECH. MEZZANINE TO BE REPLACE BY M.C. E.C. SHALL ELECTRICALLY DISCONNECT UNIT AND REMOVED ASSOCIATED DISC. SWITCH. PULL-BACK EXISTING BRANCH CIRCUIT AS REQUIRED FOR REMOVAL OF EQUIPMENT. ONCE NEW EQUIPMENT IS INSTALLED, E.C EXTEND EXISTING BRANCH CIRCUIT TO NEW EQUIPMENT, PROVIDE AND INSTALL NEW FUSED, DISCONNECT SWITCH NEXT TO EQUIPMENT AND FUSE PER EQUIPMENT NAMEPLATE. SEE MECH. SCHEDULES FOR ADDITIONAL INFORMATION ON NEW EQUIPMENT.



1 NEW OVERALL ELECTRICAL PLAN

SCALE: 3/32" = 1'-0"

0" 8' 16'

PAYNE Engineering Inc.
P.E. JOB #2316
1823 E. Center
Pocatello, Idaho 83201
tel (208) 232-4429
www.payneengineeringinc.com

PROFESSIONAL ENGINEER REGISTERED 13053 02/23/24 STATE OF IDAHO SHAWN A. MEADOR

2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District 25
1455 Gwen Drive
Pocatello, Idaho 83204

Revisions

No.	Description	Date

Project Number:	2431
Date:	02/23/2024
Designed By:	SAM
Checked By:	TEP

Sheet Title: NEW ELECTRICAL PLANS

Sheet: E1.1

COMcheck Software Version 4.1.5.5

Mechanical Compliance Certificate

Project Information

Energy Code:	90.1 (2013) Standard
Project Title:	Jefferson Elementary Plant Upgrades
Location:	Pocatello, Idaho
Climate Zone:	6b
Project Type:	Alteration

Construction Site:
1455 Gwen Drive
Pocatello, ID 83204

Owner/Agent:
Pocatello/Chubbuck School District
Pocatello, ID

Designer/Contractor:
Trent Hall
Gate City Engineering Services
340 E Clark St
Pocatello, ID 83204
208-589-6888
trentgces@gmail.com

Mechanical Systems List

Quantity	System Type & Description
5	HP-1 Water Source Heat Pump Heating Mode: Capacity = 14 kBtu/h, Proposed Efficiency = 4.40 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 12 kBtu/h, Proposed Efficiency = 14.00 EER, Required Efficiency: 12.20 EER Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 1 Supply, Constant Volume, 350 CFM, 0.1 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
1	HP-2 Water Source Heat Pump Heating Mode: Capacity = 24 kBtu/h, Proposed Efficiency = 4.50 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 22 kBtu/h, Proposed Efficiency = 14.00 EER, Required Efficiency: 13.00 EER Fan System: FAN SYSTEM 2 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 2 Supply, Constant Volume, 600 CFM, 0.3 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
1	HP-3 Water Source Heat Pump Heating Mode: Capacity = 28 kBtu/h, Proposed Efficiency = 4.30 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 26 kBtu/h, Proposed Efficiency = 15.10 EER, Required Efficiency: 13.00 EER Fan System: FAN SYSTEM 3 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 3 Supply, Constant Volume, 800 CFM, 0.3 motor nameplate hp, 0.0 fan efficiency grade

Quantity	System Type & Description
	SYSTEM VERIFICATION REQUIRED.
20	HP-4 Water Source Heat Pump Heating Mode: Capacity = 34 kBtu/h, Proposed Efficiency = 4.60 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 32 kBtu/h, Proposed Efficiency = 15.90 EER, Required Efficiency: 13.00 EER Fan System: FAN SYSTEM 4 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 4 Supply, Constant Volume, 800 CFM, 0.5 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
2	HP-5 Water Source Heat Pump Heating Mode: Capacity = 56 kBtu/h, Proposed Efficiency = 4.70 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 51 kBtu/h, Proposed Efficiency = 15.50 EER, Required Efficiency: 13.00 EER Fan System: FAN SYSTEM 5 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 5 Supply, Constant Volume, 16 CFM, 0.8 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
2	HP-6 Water Source Heat Pump Heating Mode: Capacity = 123 kBtu/h, Proposed Efficiency = 4.80 COP, Required Efficiency = 4.30 COP Cooling Mode: Capacity = 106 kBtu/h, , Water Economizer Proposed Efficiency = 16.00 EER, Required Efficiency: 13.00 EER Fan System: FAN SYSTEM 6 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 6 Supply, Constant Volume, 3000 CFM, 3.0 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
2	FAU-1, 2 Heating: 1 each - Duct Furnace, Gas, Capacity = 246 kBtu/h Proposed Efficiency = 81.00% Ec, Required Efficiency: 80.00 % Ec Fan System: FAN SYSTEM 7 -- Compliance (Motor nameplate HP method) : Passes Fans: FAN 7 Supply, Constant Volume, 1500 CFM, 2.0 motor nameplate hp, 0.0 fan efficiency grade SYSTEM VERIFICATION REQUIRED.
1	BOILER 1, 2 Heating: Hot Water Boiler, Capacity 500 kBtu/h, Gas, with Waterloop Heat Pump Proposed Efficiency: 97.00 % Et, Required Efficiency: 80.00 % Et PLANT COMPLIANCE REQUIRED.

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2013) Standard requirements in *COMcheck* Version 4.1.5.5 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Trent Hall - Mechanical Engineer
Name - Title

Trent Hall
Signature

2/22/2024
Date

HVAC GENERAL NOTES:

1. VERIFY ALL PROJECT SITE DIMENSIONS AND CONDITIONS PRIOR TO COMMENCEMENT OF WORK.
2. ALL APPLICABLE BUILDING CODES SHALL BE FOLLOWED FOR PERFORMANCE OF THIS WORK.
3. INSTALLATION OF ALL DUCTWORK SHALL FOLLOW APPLICABLE SMACNA STANDARDS.
4. FLEX DUCT LENGTH SHALL NOT EXCEED 6 FT.
5. DUCT DIMENSIONS SHOWN ON THE DRAWINGS INDICATE INSIDE FREE AREA. DUCT LINER SHALL BE ADDED TO OVERALL DIMENSION OF THE DUCT.
6. SPECIAL CONDITIONS APPLY TO ALL DUCTWORK AND PIPING PASSING THROUGH FIRE RATED WALLS. SEE APPLICABLE FIRE CODE FOR FIRE STOPPING REQUIREMENTS.
7. ALL REQUIRED MECHANICAL AND ELECTRICAL EQUIPMENT AND DEVICE ACCESSES SHALL BE MAINTAINED TO THE APPLICABLE CODES FOR ALL MECHANICAL ITEMS SHOWN.
8. REFER TO ELECTRICAL DRAWINGS FOR MOUNTING HEIGHTS OF THERMOSTATS.
9. MECHANICAL OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED IN A THREE RING BINDER CONTAINING SUBMITTALS, INSTRUCTIONS, AND WARRANTY (3) REQUIRED.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
	DUCTWORK
	CONCENTRIC SQUARE TO ROUND TRANSITION
M	MOTORIZED DAMPER
F	FIRE DAMPER
	MANUAL VOLUME DAMPER
$	SWITCH
T	THERMOSTAT
	SUPPLY DIFFUSER
	RETURN GRILLE
	EXHAUST GRILLE
G	GAS LINE

PLUMBING GENERAL NOTES:

1. PROVIDE ALL LABOR, MATERIAL, AND EQUIPMENT TO CONSTRUCT A COMPLETE AND OPERABLE PLUMBING SYSTEM AS SHOWN. ALL PERMITS AND APPLICABLE FEES SHALL BE INCLUDED.
2. ALL INSTALLATION OF THE PLUMBING SYSTEM SHALL COMPLY WITH ALL JURISDICTION ADOPTED CODES. LOCAL, STATE, UNIFORM, OR INTERNATIONAL CODES IN EFFECT AT THE BEGINNING OF THE PROJECT CONSTRUCTION SHALL GOVERN PROJECT REQUIREMENTS.
3. ALL INSTALLATION SHALL BE COORDINATED WITH ALL OTHER TRADES. CONFLICTS WITH ALL OTHER TRADES SHALL BE RESOLVED BEFORE FABRICATION AND INSTALLATION OF ALL MATERIALS AND EQUIPMENT.
4. CONTRACT DRAWINGS ARE SHOWN AS A GENERAL DESIGN IN ARRANGEMENT AND INTENT. CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING MINOR ADJUSTMENTS AS MAY BE REQUIRED TO MAKE A COMPLETE AND OPERABLE SYSTEM. ALL MAJOR DEVIATIONS IN COMPONENT SIZE AND EQUIPMENT VARIATIONS FROM THE CONTRACT DRAWINGS SHALL HAVE PRIOR APPROVAL BY THE CONSULTING ENGINEER.
5. ALL SYSTEM COMPONENTS MAY NOT BE SHOWN ON THESE DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR COMMUNICATION WITH OTHER TRADES AND COORDINATION OF ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.
6. NOT EVERY OFFSET, BEND OR ELBOW ARE SHOWN ON THE DRAWINGS DUE TO THE DIAGRAMMATIC INTENT AND SCALE OF THE DRAWINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EQUIPMENT LOCATIONS WITH ALL OTHER DRAWINGS AND TRADES.
7. ALL EQUIPMENT, FIXTURES AND COMPONENTS SHALL BE INSTALLED PER THE MANUFACTURES WRITTEN INSTRUCTIONS AND RECOMMENDATIONS. ALL TRANSITIONS, VALVES AND ANY OTHER REQUIRED DEVICES SHALL BE INSTALLED TO MAKE A COMPLETE SYSTEM.
8. ALL EQUIPMENT AND PIPING SHALL BE BRACED TO MEET SEISMIC REQUIREMENTS PER THE LOCAL IDENTIFIED ZONE. ALL BRACING SHALL BE INSTALLED IN ACCORDANCE WITH THE ADOPTED EDITIONS OF UBC, AND IUPC STANDARDS.
9. ALL PIPING SHALL BE INSTALLED FOR PROPER EXPANSION AND MOVEMENT.
10. ALL DOMESTIC WATER PIPING SHALL BE TYPE L COPPER OR PEX PIPING.

PLUMBING LEGEND

SYMBOL	DESCRIPTION
VTR	VENT THRU ROOF
V	VENT
COTG	CLEANOUT TO GRADE
WCO	WALL CLEANOUT
CO	CLEANOUT
	PIPE RISE
	PIPE DROP
	BALL TYPE ISOLATION VALVE
	NATURAL GAS REGULATOR
G	GAS PIPING
RDO	ROOF OVERFLOW DRAIN PIPING
RD	ROOF DRAIN PIPING
	VENT LINE PIPING
	SOIL OR WASTE PIPING
	DOMESTIC HOT WATER PIPING
	DOMESTIC COLD WATER PIPING
	DOM. HOT WATER RECIRC PIPING
	CONNECTION POINT TO EXISTING

Gate City
ENGINEERING SERVICES
340 E. CLARK ST.
POCATELLO, IDAHO 83204
208.221.9506

REGISTERED PROFESSIONAL ENGINEER
LIS 6159
STATE OF IDAHO
RON D. RICE

ORIGINAL DRAWING SIGNED BY: RON D. RICE
DATE ORIGINAL SIGNED: 2/26/2024
ORIGINAL ON FILE AT
340 E CLARK ST, POCATELLO, IDAHO 83204

2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP, & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District
1455 Gwen Drive
Pocatello, Idaho 83204

REVISIONS

REV.	DATE	DESCRIPTION

PROJECT No.: 2378
DATE: 2/26/2024
SCALE: As Shown
ENGINEER: TRENT HALL
DWG. BY: TRENT HALL

MECHANICAL COVER SHEET

M0.0

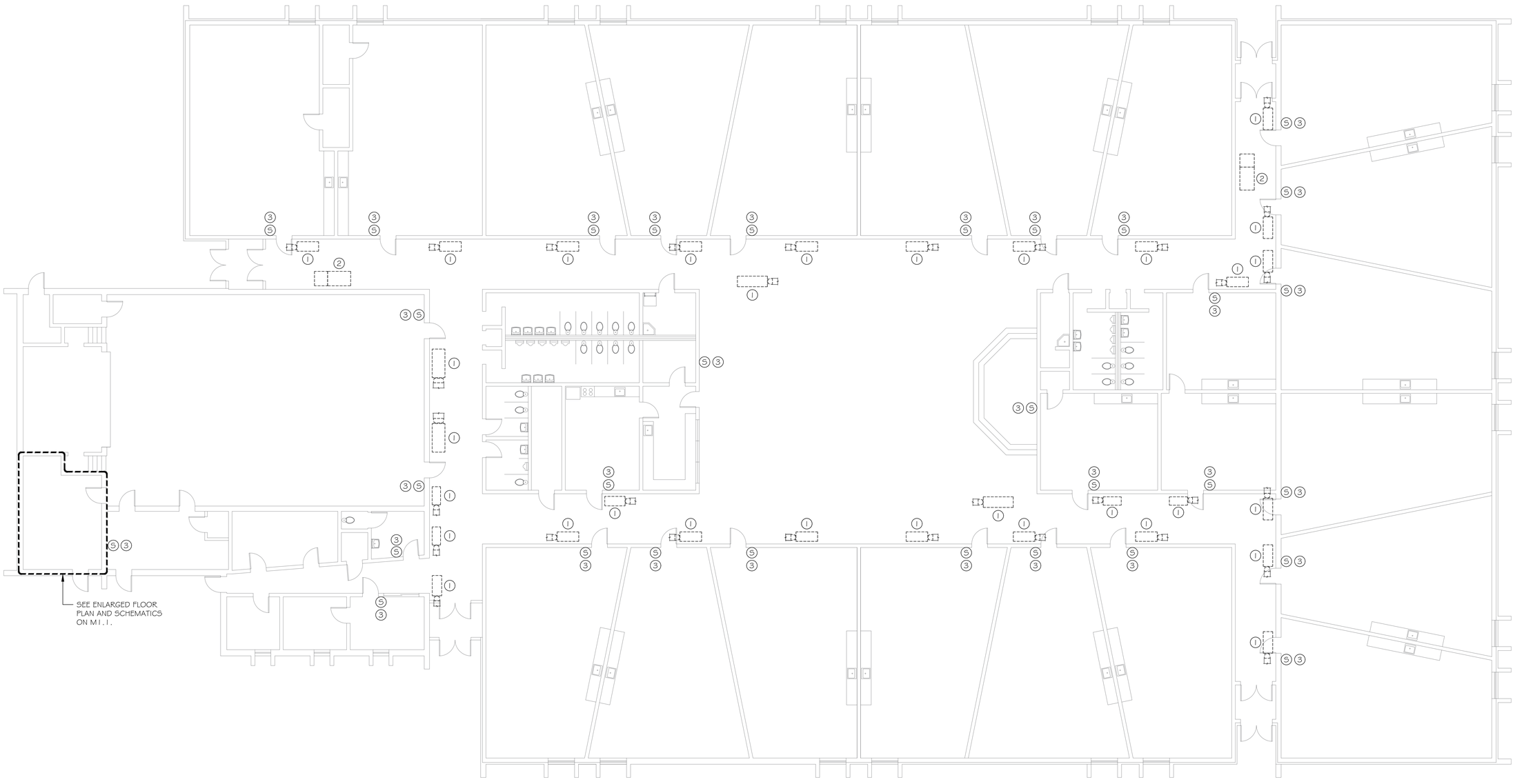
SHEET: 1

KEY NOTES:

1. EXISTING HORIZONTAL HEAT PUMP THIS AREA TO BE REMOVED AND REPLACED. DISCONNECT AND REMOVE SUPPLY DUCTWORK AS NEEDED TO ACCOMMODATE NEW SCOPE. HEAT PUMP SUPPLY(HPS) PIPING SHALL BE COMPLETELY REMOVED BACK TO (FIRE SPRINKLER) MAIN AND BRANCH TO BE CAPPED. HEAT PUMP RETURN PIPING AND CONDENSATE PIPING SHALL BE REMOVED AS NECESSARY TO ACCOMMODATE NEW SCOPE.

2. EXISTING FRESH AIR UNIT THIS AREA TO BE REMOVED. DISCONNECT AND REMOVE ALL UTILITIES AS NEEDED TO ACCOMMODATE NEW SCOPE.

3. EXISTING TEMPERATURE SENSOR AND ASSOCIATED WIRING THIS AREA TO BE REPLACED.



OVERALL DEMOLITION FLOOR PLAN

Gate City
ENGINEERING SERVICES
340 E. CLARK ST.
POCATELLO, ID 83201
208.221.9506

REGISTERED PROFESSIONAL ENGINEER
LIS 6159
STATE OF IDAHO
RON D. RICE

ORIGINAL DRAWING SIGNED BY: RON D. RICE
DATE ORIGINAL SIGNED: 2/26/2024
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2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP, & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District
1455 Gwen Drive
Pocatello, Idaho 83204

REVISIONS

REV	DATE	DESCRIPTION

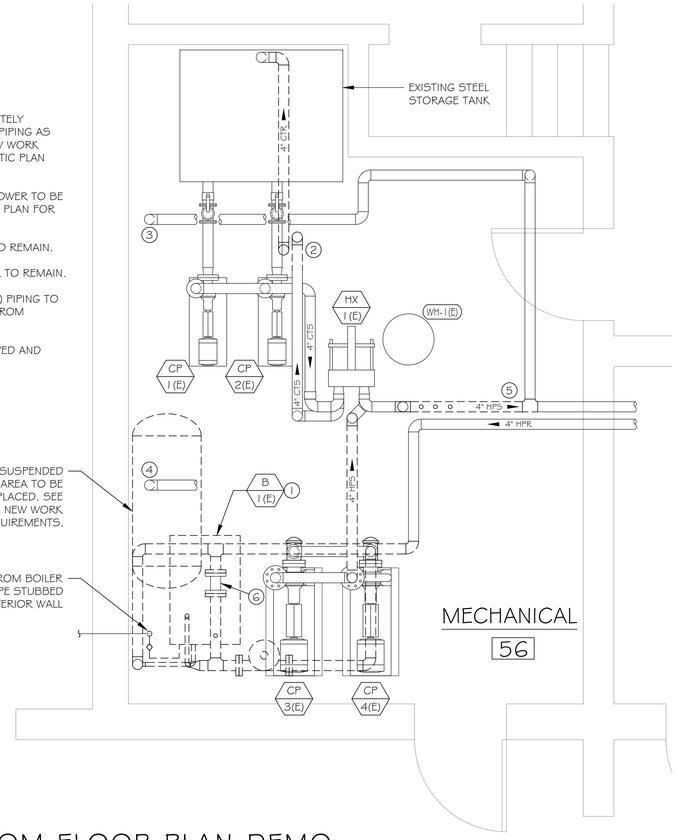
PROJECT No.: 2378
DATE: 2/26/2024
SCALE: As Shown
ENGINEER: TRENT HALL
DWG. BY: TRENT HALL

OVERALL DEMOLITION FLOOR PLANS
M1.0

SHEET: 2

KEY NOTES:

1. EXISTING EQUIPMENT TO BE COMPLETELY REMOVED AND REPLACED. REMOVE PIPING AS NECESSARY TO ACCOMMODATE NEW WORK SCOPE. SEE BOILER ROOM SCHEMATIC PLAN AND NEW SCOPE FOR DETAILS.
2. 4" PIPING TO AND FROM COOLING TOWER TO BE REMOVED. SEE BOILER ROOM ROOF PLAN FOR CONTINUATION.
3. EXISTING 4" FIRE SPRINKLER RISER TO REMAIN.
4. EXISTING 3" DOMESTIC WATER RISER TO REMAIN.
5. EXISTING 4" HEAT PUMP SUPPLY(HPS) PIPING TO BE DISCONNECTED AND REMOVED FROM SHARED FIRE SPRINKLER LINE.
6. EXISTING CIRCUIT SETTER TO REMOVED AND RETAINED FOR RE-USE.

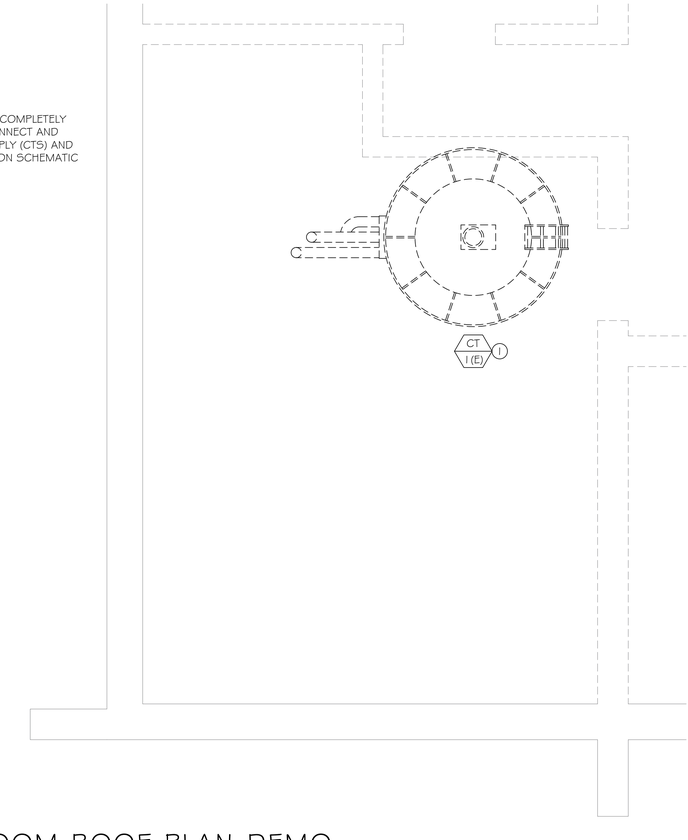


BOILER ROOM FLOOR PLAN-DEMO

SCALE- 1/2" = 1'-0"

KEY NOTES:

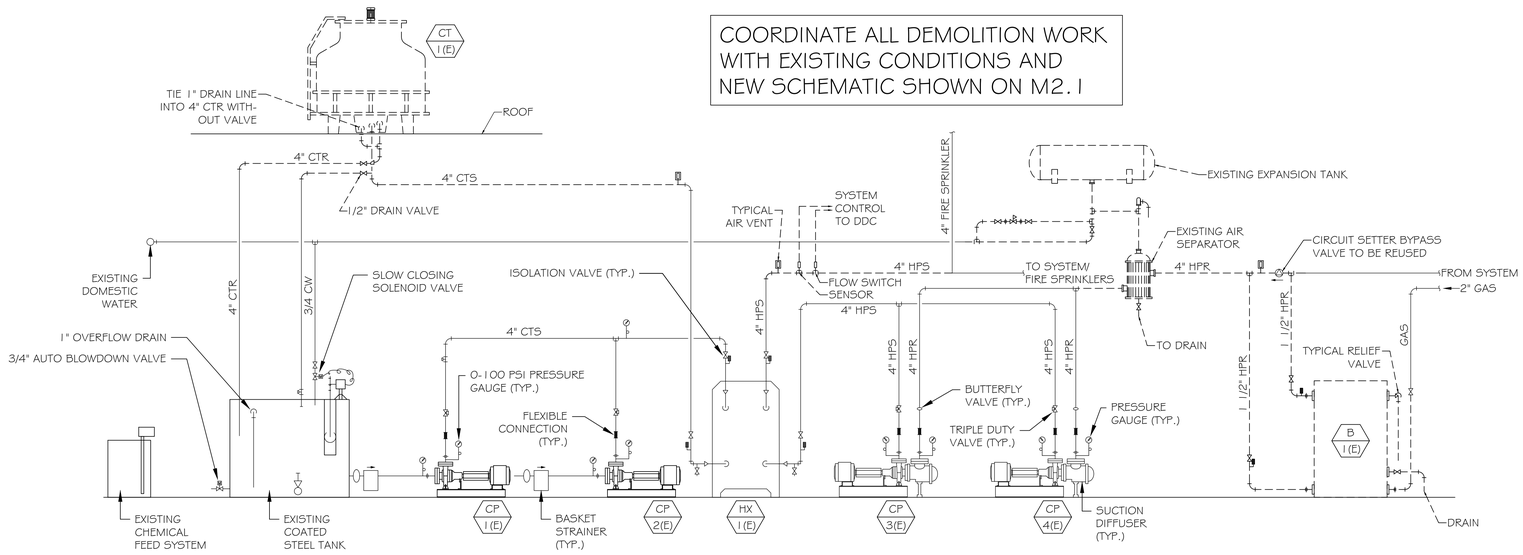
1. EXISTING COOLING TOWER TO BE COMPLETELY REMOVED AND REPLACED. DISCONNECT AND REMOVE 4" COOLING TOWER SUPPLY (CTS) AND RETURN (CTR) PIPING AS SHOWN ON SCHEMATIC AND FLOOR PLAN.



BOILER ROOM ROOF PLAN-DEMO

SCALE- 1/2" = 1'-0"

COORDINATE ALL DEMOLITION WORK WITH EXISTING CONDITIONS AND NEW SCHEMATIC SHOWN ON M2.1



BOILER ROOM SCHEMATIC-DEMOLITION

NOT TO SCALE

Gate City
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340 E. CLARK ST.
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RON D. RICE

ORGINAL DRAWING SIGNED BY: RON D. RICE
DATE ORIGINAL SIGNED: 2/26/2024
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2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP, & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District
1455 Gwen Drive
Pocatello, Idaho 83204

REVISIONS

REV	DATE	DESCRIPTION

PROJECT No.:	2378
DATE:	2/26/2024
SCALE:	As Shown
ENGINEER:	TRENT HALL
DWG. BY:	TRENT HALL

ENLARGED DEMOLITION FLOOR PLANS

M1.1

SHEET: 3

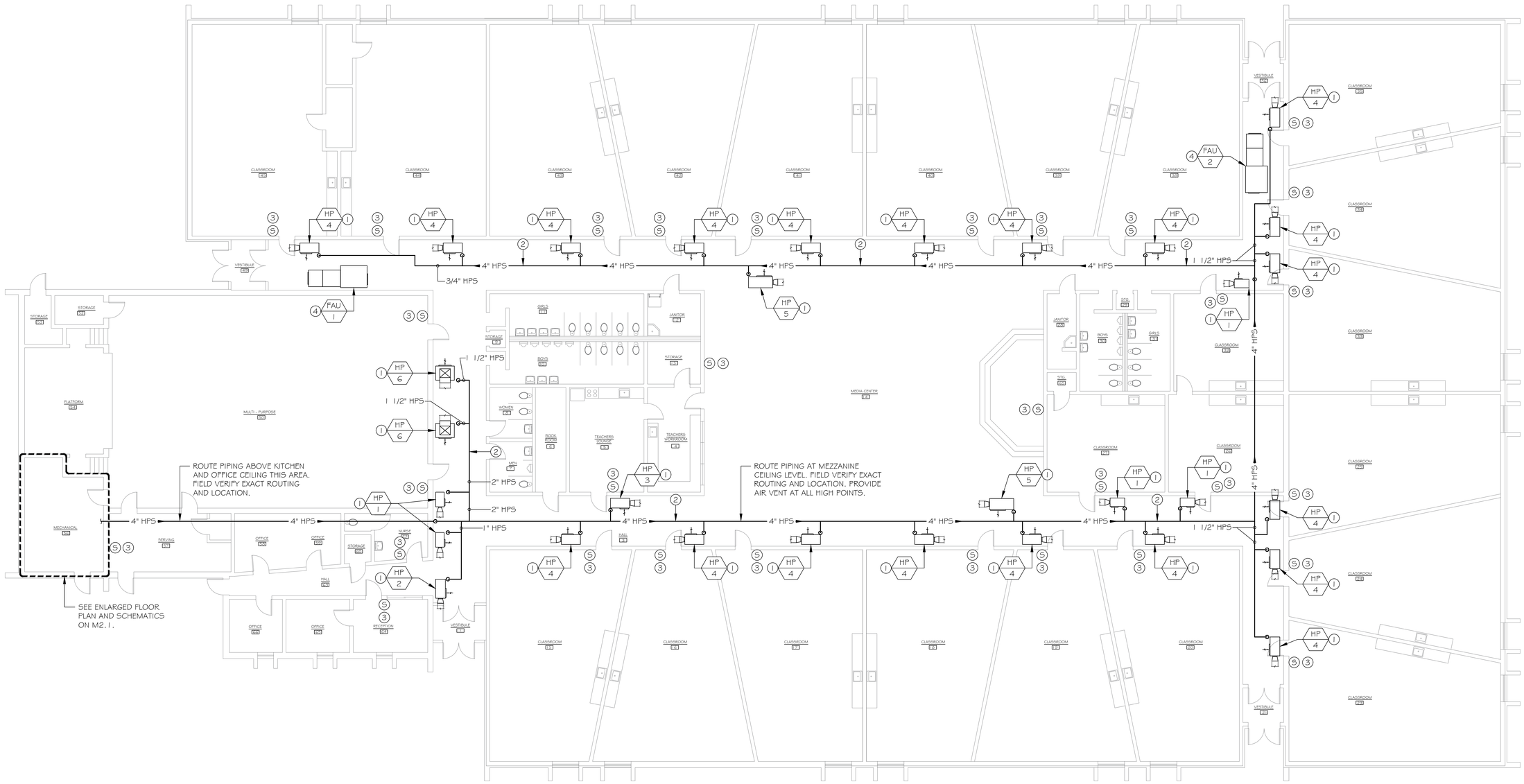
KEY NOTES:

1. NEW HEAT PUMP TO BE INSTALLED IN SAME LOCATION AS REMOVED EQUIPMENT. FIELD VERIFY EXACT CONFIGURATION OF RETURN AND SUPPLY DUCT CONNECTIONS PRIOR TO ORDERING. PROVIDE FLEXIBLE DUCT CONNECTION ON ALL DUCTED SA AND RA CONNECTIONS. CONNECT NEW HPR FLEX HOSE TO EXISTING HPR BRANCH LINE. EXISTING HPR PIPING TO BE EXTENDED AND/OR REMOVED AS NECESSARY. RE-CONNECT ALL UTILITIES PER DETAIL, SHEET M4.0.

2. NEW SIZE NOTED HPS PIPING TO BE INSTALLED THIS AREA. FIELD VERIFY EXACT LOCATION AND ELEVATION. ALL BRANCH LINES FOR NEW EQUIPMENT SHALL BE 1" UNLESS NOTED OTHERWISE. SEE HEAT PUMP SCHEDULE FOR HPS RUN-OUT SIZE.

3. NEW SENSOR TO BE CLIMA-TECH ZS2PLUS ZONE SENSOR. COORDINATE ALL REQUIREMENTS WITH CONTROLS CONTRACTOR.

4. NEW FRESH AIR UNIT TO BE INSTALLED THIS AREA. EXTEND AND/OR REMOVE AND RE-CONNECT ALL UTILITIES. PROVIDE FLEXIBLE DUCT CONNECTION ON ALL DUCTED CONNECTIONS.



OVERALL MECHANICAL FLOOR PLAN

SCALE- 1/8" = 1'-0"

Gate City
ENGINEERING SERVICES
340 E. CLARK ST.
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208.221.9506

REGISTERED PROFESSIONAL ENGINEER
LIS 6159
STATE OF IDAHO
RON D. RICE

ORIGINAL DRAWING SIGNED BY: RON D. RICE
DATE ORIGINAL SIGNED: 2/26/2024
ORIGINAL ON FILE AT
340 E CLARK ST, POCATELLO, IDAHO 83204

2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP, & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District
1455 Gwen Drive
Pocatello, Idaho 83204

REVISIONS

REV	DATE	DESCRIPTION

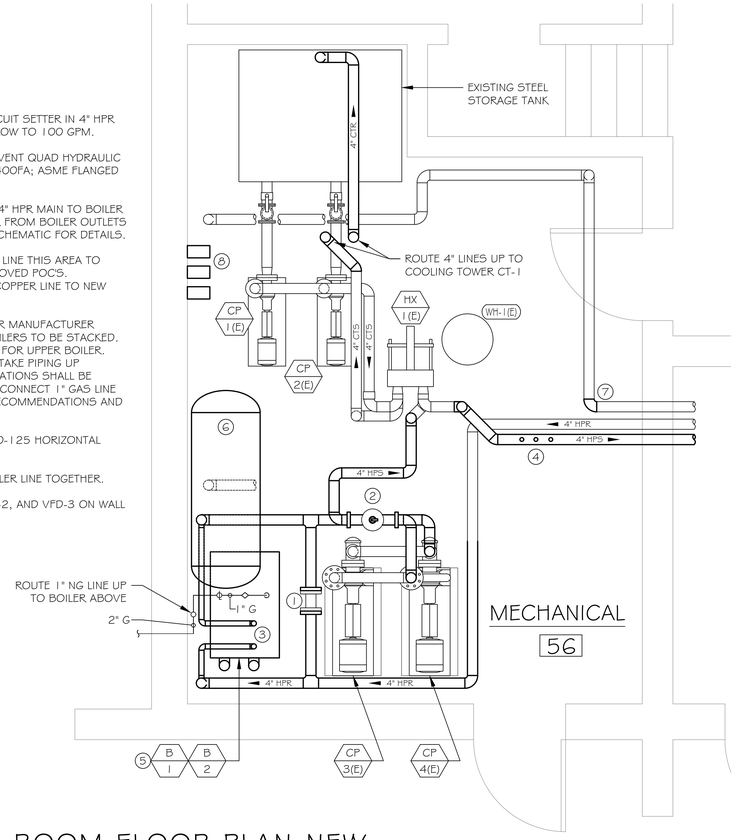
PROJECT No.: 2378
DATE: 2/26/2024
SCALE: As Shown
ENGINEER: TRENT HALL
DWG. BY: TRENT HALL

OVERALL MECHANICAL FLOOR PLANS
M2.0

SHEET: 4

KEY NOTES:

1. RE-INSTALL EXISTING CIRCUIT SETTER IN 4" HPR PIPING THIS AREA. SET FLOW TO 100 GPM.
2. NEW SPIROTHERM SPIROVENT QUAD HYDRAULIC SEPARATOR MODEL VXN400FA; ASME FLANGED AND REMOVABLE HEAD.
3. ROUTE (2) 2" HPR FROM 4" HPR MAIN TO BOILER INLETS. ROUTE (2) 2" HPR FROM BOILER OUTLETS TO 4" HPR. SEE PIPING SCHEMATIC FOR DETAILS.
4. NEW 1" POC'S ON 4" HPS LINE THIS AREA TO MATCH PREVIOUSLY REMOVED POC'S. RE-CONNECT REMOVED COPPER LINE TO NEW POC.
5. INSTALL NEW BOILERS PER MANUFACTURER RECOMMENDATIONS. BOILERS TO BE STACKED. PROVIDE SUPPORT RACK FOR UPPER BOILER. ROUTE 4" FLUE AND 4" INTAKE PIPING UP THROUGH ROOF. PENETRATIONS SHALL BE SEALED WEATHER TIGHT. CONNECT 1" GAS LINE PER MANUFACTURER'S RECOMMENDATIONS AND DETAIL, SHEET M4.0.
6. NEW TACO MODEL CA450-125 HORIZONTAL EXPANSION TANK.
7. CONNECT 4" FIRE SPRINKLER LINE TOGETHER.
8. MOUNT NEW VFD-1, VFD-2, AND VFD-3 ON WALL THIS AREA.

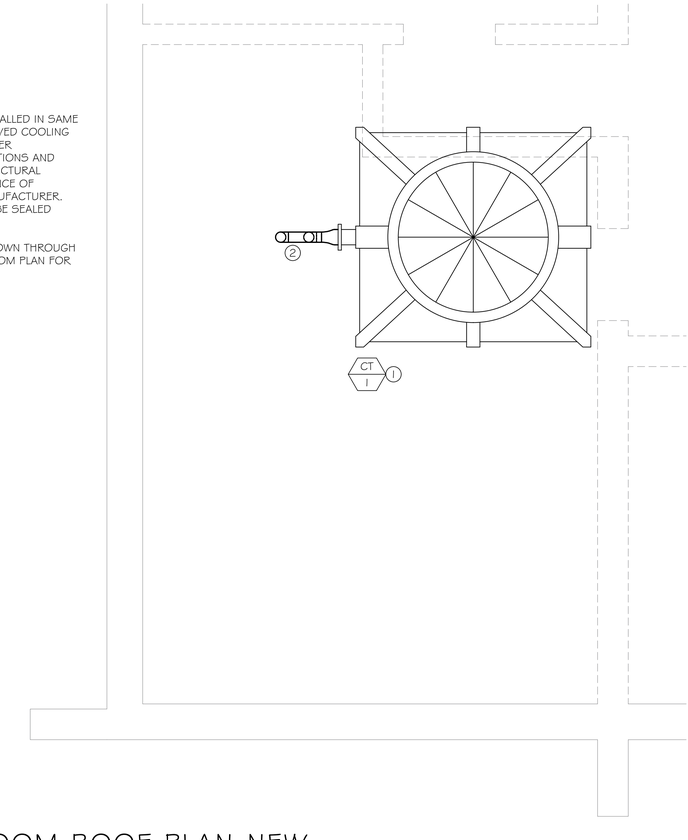


BOILER ROOM FLOOR PLAN-NEW

SCALE- 1/2" = 1'-0"

KEY NOTES:

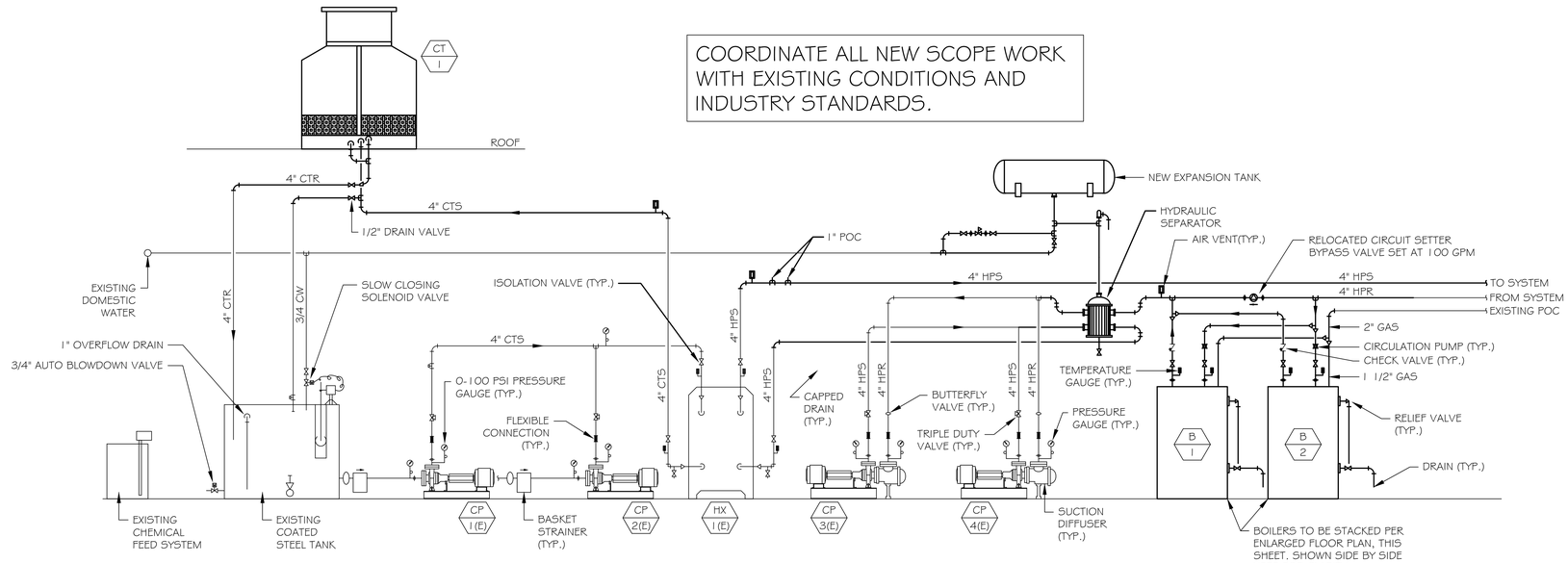
1. NEW COOLING TOWER TO BE INSTALLED IN SAME LOCATION AS PREVIOUSLY REMOVED COOLING TOWER. CONNECT ALL UTILITIES PER MANUFACTURER'S RECOMMENDATIONS AND PIPING SCHEMATIC. INSTALL STRUCTURAL SUPPORT AS NEEDED PER GUIDANCE OF STRUCTURAL ENGINEER AND MANUFACTURER. ALL ROOF PENETRATIONS SHALL BE SEALED WEATHER TIGHT.
2. ROUTE 4" CTS AND CTR PIPING DOWN THROUGH ROOF. SEE ENLARGED BOILER ROOM PLAN FOR CONTINUATION.



BOILER ROOM ROOF PLAN-NEW

SCALE- 1/2" = 1'-0"

COORDINATE ALL NEW SCOPE WORK WITH EXISTING CONDITIONS AND INDUSTRY STANDARDS.



BOILER ROOM SCHEMATIC-NEW SCOPE

NOT TO SCALE

Gate City
ENGINEERING SERVICES
340 E. CLARK ST.
POCATELLO, ID 83201
208.221.9506

REGISTERED PROFESSIONAL ENGINEER
LIS 6159
STATE OF IDAHO
RON D. RICE

ORGINAL DRAWING SIGNED BY: RON D. RICE
DATE ORIGINAL SIGNED: 2/26/2024
ORIGINAL ON FILE AT
340 E CLARK ST, POCATELLO, IDAHO 83204

2024 JEFFERSON ELEMENTARY SCHOOL CENTRAL PLANT EQUIPMENT, HEAT PUMP, & OUTDOOR AIR UNIT REPLACEMENT

Pocatello/Chubbuck School District
1455 Gwen Drive
Pocatello, Idaho 83204

REVISIONS

REV.	DATE	DESCRIPTION

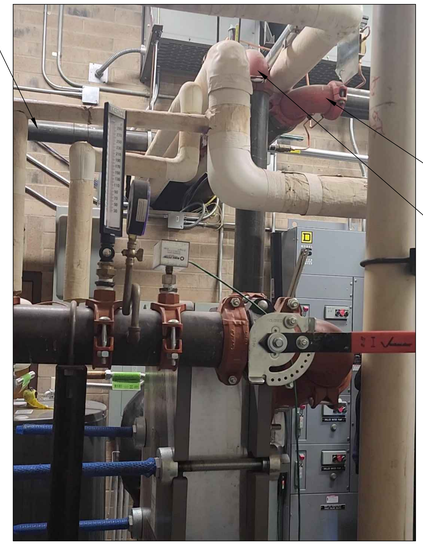
PROJECT No.: 2378
DATE: 2/26/2024
SCALE: As Shown
ENGINEER: TRENT HALL
DWG. BY: TRENT HALL

ENLARGED MECHANICAL FLOOR PLANS
M2.1

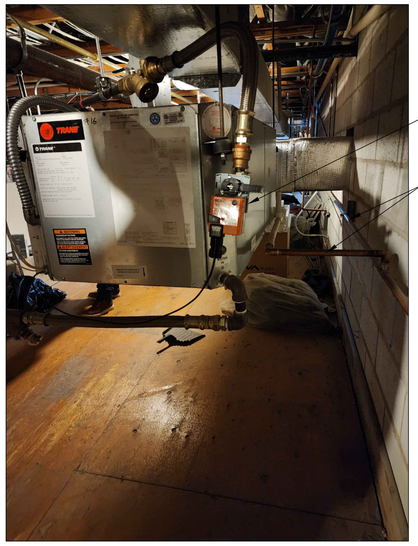
SHEET: 5

TYPICAL EXISTING HEAT PUMP

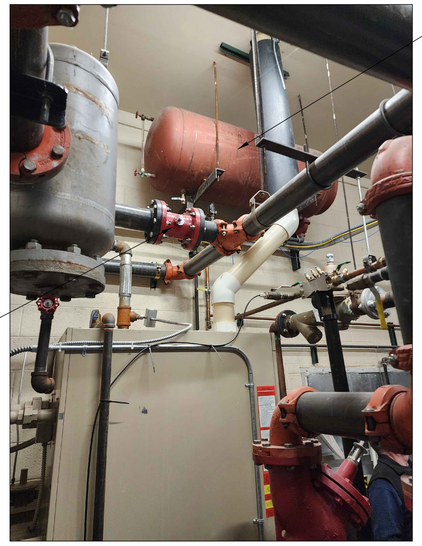
EQUIPMENT MEZZANINE LEVEL



EXISTING MECHANICAL ROOM



TYPICAL EXISTING HEAT PUMP



EXISTING MECHANICAL ROOM

EXISTING COOLING TOWER

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MECHANICAL PHOTOS

M3.0

SHEET: 6

HORIZONTAL WATER SOURCE HEAT PUMP SCHEDULE

MARK	MANUFACTURER & MODEL NUMBER	SUPPLY FAN			ELECTRICAL			HEATING					COOLING					GPM	MAX WPD	HPS RUNOUT	WEIGHT	NOTES
		CFM	ESP	HP	VOLTAGE	MCA	MOCP	MBH	COP	EAT	EWT	LWT	MBH	EER	EAT	EWT	LWT					
HP 1	FLORIDA HEAT PUMP COMPACT LV012	350	0.4	0.1	265/1/60	5.6	15	14.2	4.4	70	70	62.8	11.9	14	80/67	80	89.9	3	8.3	3/4"	105	CONSTANT CFM ECM MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR
HP 2	FLORIDA HEAT PUMP COMPACT LV018	600	0.45	0.33	265/1/60	10.1	15	23.8	4.5	70	70	60.7	21.7	15.1	80/67	80	93.4	4	6.2	3/4"	175	CONSTANT CFM ECM MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, COMPRESSOR BLANKET, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR
HP 3	FLORIDA HEAT PUMP COMPACT LV024	800	0.5	0.33	265/1/60	13.8	20	28.2	4.3	70	70	61.4	25.7	15.1	80/67	80	92.4	5	9.7	3/4"	185	CONSTANT CFM ECM MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, COMPRESSOR BLANKET, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR
HP 4	FLORIDA HEAT PUMP COMPACT LV030	800	0.5	0.5	460/3/60	8.5	15	34.3	4.6	70	70	61.1	31.8	15.9	80/67	80	92.7	6	9.6	3/4"	190	CONSTANT CFM ECM MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, COMPRESSOR BLANKET, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR
HP 5	FLORIDA HEAT PUMP COMPACT LV048	1600	0.5	0.75	460/3/60	10.9	15	56.2	4.7	70	70	61.5	51.3	15.5	80/67	80	92.4	10	4.7	1"	275	CONSTANT CFM ECM MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, COMPRESSOR BLANKET, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR
HP 6	FLORIDA HEAT PUMP EC096	3000	0.5	3	460/3/60	18.2	20	122.5	4.8	70	70	61.1	106.1	16	80/67	80	92.1	21	15.5	1 1/2"	705	BELT DRIVE MOTOR, 36" FLEX HOSE KIT W/ VALVES, STRAINER, TEST PLUGS, CIRCUIT SETTER, 2" MERV8 FILTER, COMPRESSOR BLANKET, 50 VA TRANSFORMER, CONFIRM CONTROLS WITH DDC CONTRACTOR

COOLING TOWER SCHEDULE

MARK	MANUFACTURER & MODEL NUMBER	PERFORMANCE						ELECTRICAL				NOTES
		EAT(°F)	WB(°F)	EWT(°F)	LWT(°F)	GPM	CFM	HP	AMPS	RPM	VOLTAGE	
CT 1	REYMSA RTU-707103-A-LS	95	67	85	75	200	19,900	3	5	850	460/60/3	VIBRATION SWITCH, MOTOR SHAFT GROUNDING RING FOR VFD, CONFIRM CONTROL OPTIONS WITH DDC CONTRACTOR

CONDENSING BOILER SCHEDULE

MARK	MANUFACTURER & MODEL NUMBER	PERFORMANCE						ELECTRICAL			NOTES
		INPUT	OUTPUT	PRESS.	FUEL	GAS	WATER	VOLTAGE	MCA	MOCP	
B 1	LAARS NEOTHERM XTR 500	500 MBH	483 MBH	160 PSI	NG	1"	2"	120/60/1	6.3A	15A	60 PSI PRESSURE RELIEF VALVE, CSD-1 (LOW WATER CUTOFF, HIGH/LOW GAS PRESSURE SWITCHES), CONDENSATE NEUTRALIZER, CIRCULATOR PUMP, CONFIRM CONTROL OPTIONS WITH DDC CONTRACTOR
B 2	LAARS NEOTHERM XTR 500	500 MBH	483 MBH	160 PSI	NG	1"	2"	120/60/1	6.3A	15A	60 PSI PRESSURE RELIEF VALVE, CSD-1 (LOW WATER CUTOFF, HIGH/LOW GAS PRESSURE SWITCHES), CONDENSATE NEUTRALIZER, CIRCULATOR PUMP, CONFIRM CONTROL OPTIONS WITH DDC CONTRACTOR

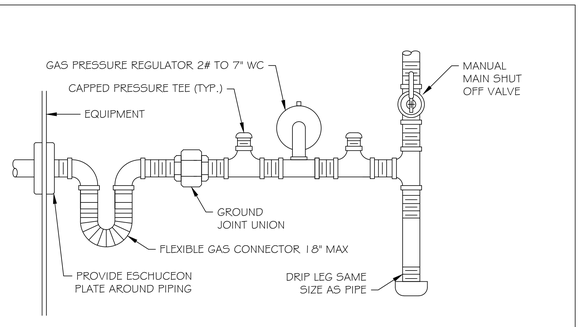
FRESH AIR UNIT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER & MODEL NUMBER	SUPPLY FAN			ELECTRICAL			HEATING INPUT	HEATING OUTPUT	AFUE	NOTES
			CFM	ESP	HP	VOLTAGE	MCA	MOCP				
FAU 1	INDOOR FRESH AIR UNIT	ECONAIR EA2-IBT-300-20D	1,500	0.75	2.0	460/3	4.5A	15	246,000	199,000	81%	COORDINATE ALL UNIT OPTIONS AND ACCESSORIES WITH EXISTING DDC SYSTEM
FAU 2	INDOOR FRESH AIR UNIT	ECONAIR EA2-IBT-300-20D	1,500	0.75	2.0	460/3	4.5A	15	246,000	199,000	81%	COORDINATE ALL UNIT OPTIONS AND ACCESSORIES WITH EXISTING DDC SYSTEM

VARIABLE FREQUENCY DRIVE SCHEDULE

NEW VFD SCHEDULES						ASSOCIATED EQUIPMENT		
MARK	MANUFACTURER & MODEL NUMBER	BASE DRIVE FRAME SIZE	DRIVE CURRENT	INTERNAL FUSE RATING		MARK	DESCRIPTION	MANUFACTURER & MODEL NUMBER
				CURRENT RATING	CLASS			
VFD 1	ABB ACH580-01-03A5-4	R1	3.5A	15A	CLASS T	CP 1(E)	EXISTING COOLING TOWER CIRCULATION PUMP	EXISTING B&G SERIES 1510
VFD 2	ABB ACH580-01-03A5-4	R1	3.5A	15A	CLASS T	CP 2(E)	EXISTING COOLING TOWER CIRCULATION PUMP	EXISTING B&G SERIES 1510
VFD 3	ABB ACH580-01-04A8-4	R1	4.8A	15A	CLASS T	CT 1	NEW COOLING TOWER	SEE COOLING TOWER SCHEDULE

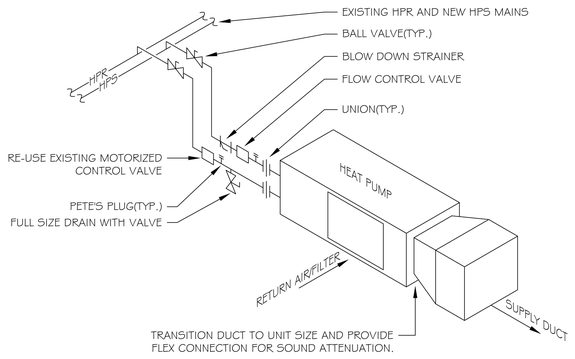
FIELD VERIFY VOLTAGE
ON ALL EQUIPMENT
BEFORE ORDERING



GAS PRESSURE REGULATOR DETAIL | NO SCALE

INSTALLATION NOTES:

- MAINTAIN ALL REQUIRED SERVICE AND MAINTENANCE CLEARANCE PER MANUFACTURER'S RECOMMENDATIONS.
- CONDENSATE LINE SHALL BE TRAPPED AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
- HEAT PUMP AND ALL ASSOCIATED EQUIPMENT SHALL BE PROVIDED, INSTALLED, CONNECTED, AND CONTROLLED PER EXISTING HEAT PUMP CONTROL SEQUENCE. COORDINATE DDC REQUIREMENTS BEFORE ORDERING EQUIPMENT.



HEAT PUMP INSTALLATION DETAIL | NO SCALE

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MECHANICAL DETAILS & SCHEDULES
M4.0

SHEET: 7