TOWN OF DERRY, N.H.

DEPARTMENT OF PUBLIC WORKS

14 Manning Street, Derry, NH 03038 (603) 432-6144

INVITATION TO BID

Sealed bids will be received at the Derry Municipal Center, 14 Manning Street, Derry, NH 03038 until 4:00 pm, prevailing time, Friday, August 2, 2019 for the following items:

Derry Public Library 64 East Broadway Boiler Replacement Project

Bid invitations and specifications will be available at the Department of Public Works, 14 Manning Street, Derry, NH or on line at https://www.derrynh.org/bids-rfps

Questions regarding this request should be directed to Alan R Cote, Superintendent of Operations via email at alancote@derrynh.org or by facsimile at (603) 432-6130.

The Town of Derry reserves the right to waive any irregularities, reject any or all bids, and to accept the bid that appears to be in the best interest of the Town. Failure to submit all information called for may be sufficient for disqualification.

Alan R. Côté Superintendent of Operations

GENERAL:

- 1. Bids will be received by the Town of Derry, New Hampshire at the Derry Municipal Center, 14 Manning Street, 2nd floor until the time specified in the Invitation to Bid.
- 2. The following meanings are attached to the defined words when used in this document:
 - a. The word "Town" means the Town of Derry, New Hampshire.
 - b. The word "Bidder" means the person, firm, or corporation submitting a bid on these specifications or any part thereof.
 - c. The word "Contractor" means the person, firm, or corporation with whom the Contract is being made by carrying out the provisions of this Sealed Bid Invitation and the Contract.
 - d. The words "firm price" shall mean a guarantee against price increase during the life of the Contract.
- 3. Strict compliance with the requirements of the Invitation to Bid, terms and conditions, and instructions printed is necessary. All blank spaces must be filled in. Any changes and/or corrections shall be marked in red and initialed by the person making such corrections. Signatures of the responsible owner/representative of the firm must be in ink. No reproductions/duplications/copies will be accepted.
- 4. Each bid must give the full business address of the Bidder and be signed by him with his usual signature. Bids by partnerships must furnish the full names of all partners and must be signed with the partnership name by one of the members of the partnership or by an authorized representative, followed by the signature and title of the person signing. Bids by corporations must be signed with the legal name of the corporation, followed by the state of incorporation and by the signature and title of the president, secretary, or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. A bid by a person who affixes to his signature the word 'president', "secretary", "agent" or other title without disclosing his principal may be held to be the bid of the individual signing. When requested by the Town, satisfactory evidence of the authority of the signing officer signing on behalf of the corporation shall be furnished.

5. Bids must be securely sealed in a suitable envelope (facsimile and emailed submissions will not be accepted), addressed and marked on the outside as follows:

SEALED BID DERRY PUBLIC LIBRARY BOILER REPLACEMENT

The entire solicitation document is to be returned when submitting a proposal, unless otherwise directed by the solicitation document. Failure to return all pages may result in a determination that the submittal is non-responsive.

- 6. It will be the responsibility of the Bidder to see that their bid is received by the Public Works Department as specified.
- 7. Each bid is received with the understanding that the acceptance in writing via email by the Town to the Bidder to furnish any or all of the products /services described therein or as otherwise negotiated, shall constitute a contract between the Bidder (Contractor) and the Town, which shall bind the Bidder (Contractor) on his part to furnish and deliver the articles offered at the prices agreed upon and in accordance with the terms and conditions of said accepted bid; and the Town on its part to order from such Bidder (Contractor), except for causes beyond reasonable control; and pay for, at the agreed prices, all products/services specified and delivered.
- 8. Bids may be withdrawn upon written or electronic request received from Bidders prior to the time of opening. Negligence on the part of the Bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.
- 9. The solicitation document maintained by the Public Works Department, in the appropriate file folder, shall be considered the official copy. In the case of any inconsistency between bid documents submitted to the Town, but not clearly listed on the exception page of the document or as an exception by the Bidder, the language of the official copy shall prevail. Furthermore, any exception or changes to the specifications made by the Bidder may be cause to disqualify your bid.
- 10. A pre-bid walk through can be scheduled by contacting Michael St. Louis by email at mikes@derrypl.org or by calling (603) 432-6140.
- 11. No oral interpretations will be made to any Bidder as to the meaning of the specifications or terms and conditions of this Sealed Bid Invitation. Every request for such interpretation or request for change in the specifications or terms and conditions shall be made in writing, addressed and forwarded to:

Mail: Alan R. Cote, Supt of Operations

Derry Municipal Center 14 Manning Street Derry, NH 03038

Email: alancote@derrynh.org

Fax: (603) 432-6130

Attn: Alan R. Cote, Supt of Operations

Questions must be received by Friday, July 26, 2019 at noon. Every interpretation made to a Bidder will be in the form of an addendum to the Sealed Bid Invitation which, if issued, will then be posted on the website: : http://www.derry-nh.org/Pages/DerryNH Bids/ All such addenda shall become part of the complete Sealed Bid Invitation. It is the Bidder's responsibility to check the website prior to the submittal deadline to ensure that the Bidder has a complete, up-to-date bid package.

- 12. Bids that are incomplete, not properly endorsed or signed, or otherwise contrary to these instructions may be rejected as informal by the Town. The bid must be filled out completely and accurately. Please explain in detail any exceptions or deviations taken on this bid. Separate pages may be used if necessary.
- 13. Bids must be submitted on the bid schedule hereinafter provided. Prices shall be clearly and fully stated in units of quantities specified. No additional charges shall be passed to the Town, including all applicable taxes, delivery or surcharges that have not already been disclosed on the bid schedule. In case of discrepancy in computing the amount of the bid, unit prices quoted will govern.
- 14. Quotations shall include all charges for delivery, packing, crating, containers, etc. Unless otherwise stated by the Bidder, prices quoted will be considered as being based on delivery to destination designated, including any and all freight and packing charges.
- 15. As the Town is exempt from the payment of federal excise taxes, all prices quoted herein are not to include these taxes.
- 16. Prices stated shall remain firm for the duration of the contract.
- 17. Should the successful Contractor fail to make delivery or complete the contract within time specified, the Town reserves the right to procure the equipment/product from other sources and hold the Contractor liable for any excess cost.
- 18. The Town reserves the right to postpone the delivery date to allow for any change in operating conditions or for any other cause not now foreseen. In the event the Town elects to exercise this right, all prices quoted pursuant to this Sealed Bid Invitation will remain firm, and the Town shall incur no additional obligation to the Contractor on account of any delay of delivery date ordered by the Town.
- 19. It is agreed that deliveries and/or completion are subject to strikes, lockouts, accidents, and acts of God.

- 20. The time of proposed delivery must be stated in definite terms. If time of delivery for different equipment varies, the Bidder shall so state.
- 21. The apparent silence of these specifications and any supplemental specifications as to any detail or the omission from the specifications of a detailed description concerning any point shall be regarded as meaning that only the best commercial practices are to shall and correct type, size and design are to be used. All interpretations of these specifications shall be made on the basis of this statement.
- 22. The Town reserves the right to waive any informality in bids, to reject any and all bids wholly or in part, and to make awards in a manner deemed in the best interest of the Town.
- 23. Awards will be made in the best interest of the Town. In determining what would be in the best interest of the Town, the following shall be considered:
 - a. The ability, capacity, and skill of the Bidder to perform the Contract or provide the service required;
 - b. Whether the Bidder can perform the Contract or provide the service promptly or within the time specified, without delay or interference;
 - c. The character, integrity, reputation, judgment, experience, and efficiency of the Bidder;
 - d. The quality of performance of previous contracts or services:
 - e. The previous and existing compliance by the Bidder with laws and ordinances relating to the Contract or service;
 - f. The sufficiency of the financial resources and ability of the Bidder to perform the Contract or provide the service;
 - g. The quality, availability, and adaptability of supplies or contractual services to the particular use required;
 - h. The ability of the Bidder to provide future maintenance and services for the use of the subject of the Contract;
 - i. The number and scope of additions attached to this bid.

- 24. The Town reserves the right to make awards on this proposal by item or to accept all or part of the proposal or prices quoted. In addition, the Town reserves the right to award materials on the basis of the lowest total cost of the bid item to the Town, including the Town's cost of transportation to and from the source.
 - In cases where two or more Bidders have the same net bid, the Town may give preference to firms located within the Town.
- 25. Upon making an award, or giving notice of intent to award, the Town will place appropriate notice on the Purchasing website: http://www.derry-nh.org/Pages/DerryNH_Bids/
- 26. The Bidder must certify that no official or employee of the Town or State of New Hampshire, has a pecuniary interest in the proposal or in the Contract that the Bidder offers to execute or in the expected profits to arise there from, and that this bid is made in good faith without fraud, collusion or in connection with any other person submitting a proposal.
- 27. The Bidder, if awarded an order or contract, agrees to protect, defend and hold the Town harmless against any demand for the use of any patented material, process, article or device that may enter into the manufacture, construction or form a part of the work covered by either order or contract.
- 28. The Bidder, if awarded an order or contract, agrees to defend, indemnify, and hold harmless the Town from all damages to life and property arising out of the performance of this Contract due to the Bidder's negligence, that of his employees, subcontractors, etc., or due to the negligence of the Town, its employees, representatives, agents, etc.
- 29. The Revised Statutes Annotated of the State of New Hampshire, the Charter of the Town, and all Town Ordinances insofar as they apply to the laws of competitive bidding, contracts and purchases are made a part hereof.
- 30. The Bidder to whom a contract is awarded guarantees to the Town that all warrants of merchantability and fitness for a particular purpose as provided for in New Hampshire RSA 382A-2-314 and 2-314 shall remain in force and will not be disclaimed.
- 31. The Bidder, if awarded an order or contract, agrees to provide to the Town proof of Federal Identification Number (IRS Code Section 6723). Acceptable forms of documentation are a copy of a federal tax depository ticket, copy of IRS label showing name and Federal ID Number, IRS letter of taxpayer Identification Number assigned, other correspondence from the IRS with both individual/business name and Federal Identification or stationery/bills with Federal ID Number (and firm name and address) PREPRINTED on it. Any impertinent information may be blackened out before sending to the Town. Copies of tax returns must show taxpayer section and signature.

- 32. Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance pursuant to RSA 277-A when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to RSA 277-A. Failure to submit an MSDS and/or label on each container will place the vendor in noncompliance with the purchase order. Failure to submit MSDS and/or labels on each container may result in civil or criminal penalties, including debarment and action to prevent the vendors furnishing substances or mixtures. Vendors are cautioned to obtain and read the law referenced.
- 33. Payment Terms: Payments shall be made within 30 days of completion and acceptance of the project.

FAILURE TO COMPLY WITH THESE REQUIREMENTS COULD RESULT IN THE CANCELLATION OF AN ORDER OR CONTRACT

SPECIFICATIONS

The Town of Derry is hereby requesting firm pricing for supplying and installing new boilers as depicted on plans prepared by Design Day Mechanical dated July 9, 2019, Job number 19113 and titled Sheets M-1 and M-2.

PURPOSE:

The purpose of this bid invitation is to establish a contract with a company to install new boilers at the Derry Public Library as depicted on the plans referenced above.

COMPLETION OF WORK:

The completion of this project will require disabling the existing heating system in an occupied building. For this reason, the contractor must complete the work no later than September 30, 2019.

PAYMENT:

All payments will be made in accordance with the Town of Derry ordinances and procedures set forth within this document, item 33 Payment terms.

INSPECTION:

The work must be inspected and approved by a representative for the Town of Derry prior to acceptance and payment.

EXCEPTIONS/DEVIATIONS:

If the Bidder has any exceptions or deviations please submit those on your own letterhead and put a check mark in the box on page 10.

GENERAL:

Bid prices shall remain firm for the duration of the contract.

The Town reserves the right to terminate the contract entered into as a result of this bid if goods and services are at any time deemed to be unsatisfactory.

The work shall be completed by licensed personnel and the contractor shall apply for a fee-waived oil-burning equipment permit to the Fire Department/Fire Prevention Division, subject to applicable codes and regulations.

The contractor may dispose of construction and demolition debris generated by this project at the Derry Transfer Station at no cost.

The successful bidder must provide the Town of Derry a certificate of Liability Insurance of no less than one million dollars (\$1,000,000.00)

The successful bidder must provide a certificate of insurance for Workers' Compensation as required by New Hampshire Revised Statutes Annotated (NHRSA) 281-A.

Hours of operation for completion of this project will be Monday through Friday, 7am – 5pm unless otherwise approved by the Town of Derry, Dept. of Public Works.

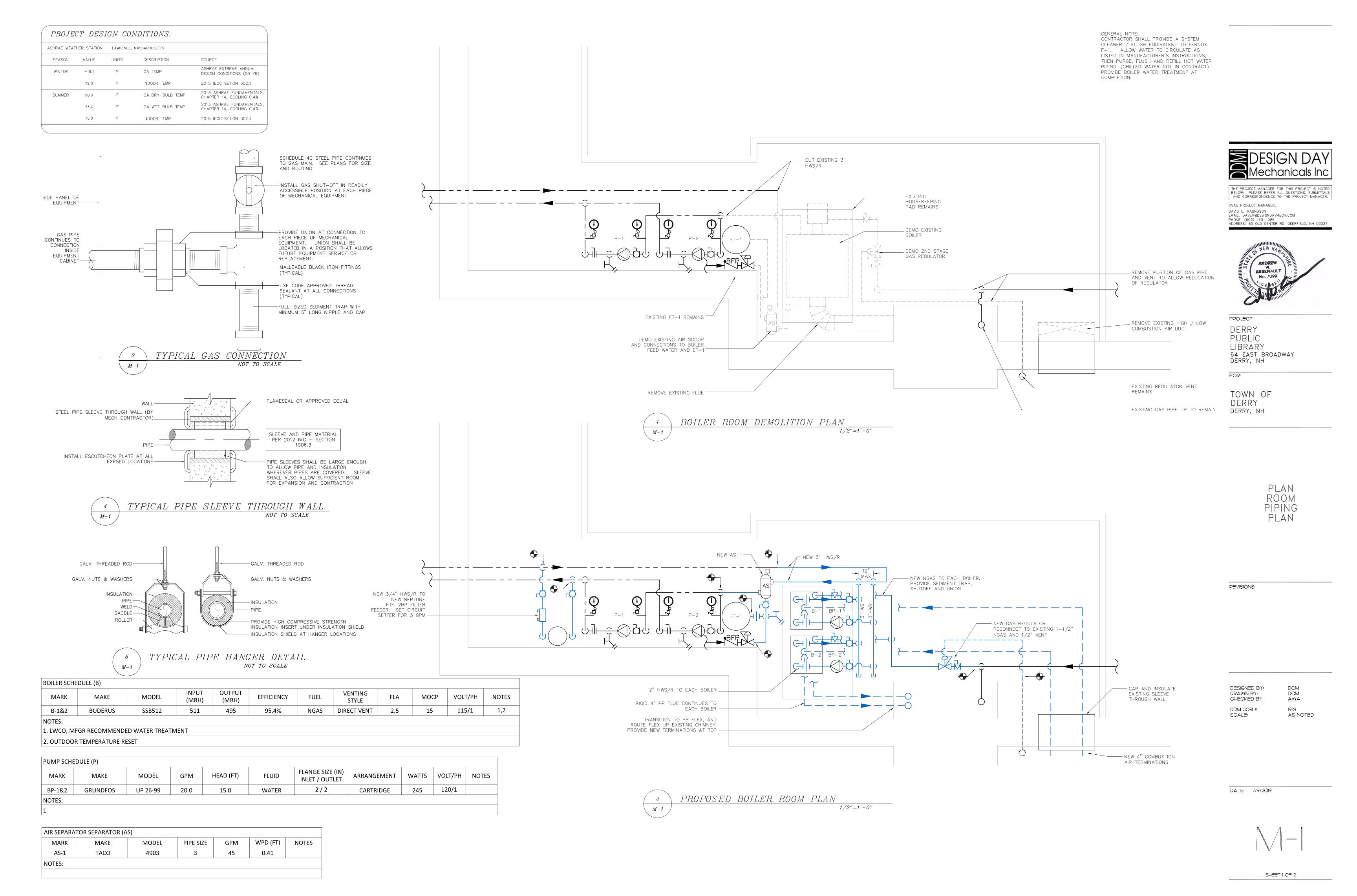
All workmanship, exclusive of defective materials, must be warrantied for a period of no less than two (2) years from the date of final payment by the Town of Derry to the contractor.

SCOPE OF WORK:

- The scope of work is completely described in the drawings (two pages) DDM Job # 19113 prepared by Design Day Mechanicals, Inc., dated July 9, 2019.

BID SCHEDULE

PROPOSAL FOR: PROJECT	DERRY PUBLIC LIBRARY BOILER REPLACEMENT
DATE & TIME:	August 2, 2019 AT 4 PM
carefully read the spe will contract with the	Bidder, hereby declares that before preparing this bid he/she ecifications and hereby agrees that if the proposal is accepted he/she e Town in accordance with the specifications, terms, and conditions sealed bid invitation.
Supply and install all	l components specified on plans by Design Day Mechanicals, Inc.:
\$	Price in Words:
Authorized signature	& title of Bidder
Print or type name &	title of Bidder
Company Name (Corp	poration/general partnership organized &existing under the laws of the State of)
Address	
City, State, Zip	
Date Quotation Made	e:Email Address
Phone #:	Fax #:
Minor exceptions to the a	above specifications must be duly noted on your letterhead as a separate sheet. have exceptions



DIVISION 23 - HVAC SPECIFICATIONS

I) GENERAL

A) WORK INCLUDED:

- 1)THESE SPECIFICATIONS INCLUDE GENERAL REQUIREMENTS FOR ALL WORK REPRESENTED ON THESE DRAWINGS. NOT ALL SYSTEMS OR SYSTEM COMPONENTS DESCRIBED IN THESE SPECIFICATIONS ARE NECESSARILY INCLUDED AS A PART OF THIS PROJECT.
- 2) THE HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) CONTRACTOR SHALL HEREAFTER BE DESCRIBED AS "THE CONTRACTOR" IN THIS HVAC SPECIFICATION. THE CONTRACTOR SHALL PROVIDE, INSTALL, PIPE, DUCT, AND WIRE, AS REQUIRED, HVAC SYSTEMS AS DESCRIBED BELOW, AND SHOWN OR DESCRIBED ON THESE PLANS AND SPECIFICATIONS.

B) QUALITY ASSURANCE:

- 1)INTERNATIONAL MECHANICAL CODE (IMC) 2009, AND THE INTERNATIONAL ENERGY CONSERVATION CODE (IEEC) 2009 ARE THE GOVERNING CODES FOR ALL HVAC WORK. THE CODES AND STANDARDS REFERENCED IN THE MECHANICAL CODE SHALL BE CONSIDERED A PART OF THE REQUIREMENTS OF CODE TO THE PRESCRIBED EXTENT OF EACH SUCH REFERENCE. WHERE DIFFERENCES OCCUR BETWEEN PROVISIONS OF THE CODE AND THE REFERENCED STANDARDS, THE PROVISIONS OF THE CODE SHALL APPLY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BE FAMILIAR WITH THE REQUIREMENTS OF ALL CODES AS THEY HAVE BEEN ADOPTED BY THE STATE AND LOCAL
- 2) EXCEPT AS SPECIFICALLY DESCRIBED OTHERWISE IN THESE SPECIFICATIONS, ALL COMPONENTS ALLOWED WITHIN THE ABOVE REFERENCED CODES SHALL BE ALLOWED AS A PART OF THE WORK.
- 3) THE WORKMANSHIP AND MATERIALS COVERED BY THESE SPECIFICATIONS SHALL CONFORM TO ALL ORDINANCES AND REGULATIONS OF ALL AUTHORITIES HAVING JURISDICTION, INCLUDING BUT NOT LIMITED TO, ALL APPLICABLE REGULATIONS OF THE CITY, COUNTY, AND STATE.
- 4) THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PAYING FOR HVAC PERMITS, INVESTMENT FEES, TAXES, CONNECTION AND INSPECTION FEES AS REQUIRED FOR THE COMPLETE INSTALLATION OF THE HVAC SYSTEM. THE CONTRACTOR SHALL PROVIDE TO THE OWNER ALL CERTIFICATES OF INSPECTION ISSUED BY THE JURISDICTION.
- 5) THE CONTRACTOR SHALL VISIT THE SITE AND EXAMINE ALL CONDITIONS AFFECTING THE PROPER EXECUTION OF THE CONTRACT, VERIFY ALL EXISTING CONDITIONS IN THE FIELD AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
- 6) DURING THE PROGRESS OF THE WORK, THE CONTRACTOR SHALL MAINTAIN AN ACCURATE RECORD OF ALL CHANGES MADE IN THE HVAC INSTALLATION FROM THE LAYOUT AND MATERIALS CONTAINED IN THE APPROVED DRAWINGS AND SPECIFICATIONS.
- 7) DRAWINGS AND CATALOG CUTS, SHOWING ALL HVAC EQUIPMENT AND SYSTEM COMPONENTS, SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. FIELD MEASURE AND COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DRAWINGS AND ALL OTHER TRADES THE PROPOSED LOCATIONS FOR NEW EQUIPMENT AND COMPONENTS BEFORE PRODUCING SUBMITTALS. NO ITEMS SHALL BE PURCHASED OR ORDERED BEFORE APPROVAL IS GIVEN BY THE ENGINEER IN WRITING.
- 8) THE CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES.

C) RELATED DOCUMENTS:

- 1)THE GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTAL GENERAL CONDITIONS OF THE CONTRACT AND DIVISION 1 SPECIFICATION SECTIONS PROVIDED BY THE ARCHITECT, AND ALL OTHER DRAWINGS AND SPECIFICATIONS PROVIDED AS A PART OF THIS PROJECT, APPLY TO THIS DIVISION 15 AND TO ALL CONTRACTORS, SUBCONTRACTORS, OR OTHER PERSONS SUPPLYING MATERIALS AND/OR LABOR, ENTERING INTO THE PROJECT SITE AND/OR PREMISES,
- 2) THE SPECIFICATIONS AND DRAWINGS ARE INTENDED TO BE COMPLEMENTARY. A PARTICULAR SECTION, PARAGRAPH OR HEADING IN A DIVISION MAY NOT DESCRIBE EACH AND EVERY DETAIL CONCERNING WORK TO BE DONE AND MATERIALS TO BE FURNISHED. THE DRAWINGS ARE DIAGRAMMATIC AND MAY NOT SHOW ALL OF THE WORK REQUIRED OR ALL CONSTRUCTION DETAILS. DIMENSIONS ARE SHOWN FOR CRITICAL AREAS ONLY AS AN AID TO THE CONTRACTOR; ALL DIMENSIONS AND ACTUAL PLACEMENTS ARE TO BE VERIFIED IN THE FIELD. IT IS TO BE UNDERSTOOD THAT THE BEST TRADE PRACTICES OF THE DIVISION WILL PREVAIL.
- 3) ALL TRADE SUBCONTRACTORS ARE TO NOTE THAT THE ORGANIZATION OF SPECIFICATIONS INTO DIVISIONS, AND LIKEWISE THE ARRANGEMENT OF THE DRAWINGS, IS SET UP FOR THE CONVENIENCE OF UNDERSTANDING THE SCOPE OF THE WORK ONLY. THIS STRUCTURING SHALL NOT CONTROL THE GENERAL CONTRACTOR IN DIVIDING THE WORK AMONG TRADE SUBCONTRACTORS OR IN ESTABLISHING THE EXTENT OF THE WORK TO BE PERFORMED BY ANY TRADE. REFER TO GENERAL CONDITIONS.

II)PRODUCTS A) GENERAL MECHANICAL MATERIALS:

- 1)ESCUTCHEONS: AT ALL FINISHED WALL PENETRATIONS, PROVIDE CHROME—PLATED SPLIT—RING ESCUTCHEON. INSIDE DIAMETER SHALL CLOSELY FIT PIPE OUTSIDE DIAMETER OR OUTSIDE OF PIPE INSULATION WHERE PIPE IS INSULATED. OUTSIDE DIAMETER SHALL COMPLETELY COVER THE OPENING
- IN FLOORS, WALLS, OR CEILINGS. 2) UNIONS: MALLEABLE-IRON, CLASS 150 FOR LOW PRESSURE SERVICE AND CLASS 250 FOR HIGH PRESSURE SERVICE: HEXAGONAL STOCK, WITH BALL-AND-SOCKET JOINTS, METAL-TO- METAL BRONZE SEATING SURFACES; FEMALE THREADED ENDS.
- 3) DIELECTRIC UNIONS: PROVIDE DIELECTRIC UNIONS WITH APPROPRIATE END CONNECTIONS FOR THE PIPE MATERIALS IN WHICH INSTALLED (SCREWED, SOLDERED, OR FLANGED), WHICH EFFECTIVELY

- ISOLATE DISSIMILAR METALS, TO PREVENT GALVANIC ACTION, AND STOP CORROSION.
- 4) SLEEVES: GALVANIZED STEELMETAL OR SCHEDULE 40 STEEL PIPE AS APPROPRIATE FOR THE WALL CONSTRUCTION.
- 5) SLEEVE SEALS: MODULAR TYPE, CONSISTING OF INTERLOCKING SYNTHETIC RUBBER LINKS SHAPED TO CONTINUOUSLY FILL ANNULAR SPACE BETWEEN PIPE AND SLEEVE, CONNECTED WITH BOLTS AND PRESSURE PLATES WHICH CAUSE RUBBER SEALING ELEMENTS TO EXPAND WHEN TIGHTENED, PROVIDING WATERTIGHT SEAL AND ELECTRICAL INSULATION.
- 6) DRIP PANS: WHERE REQUIRED, PROVIDE DRIP PANS FABRICATED FROM CORROSION-RESISTANT SHEET METAL WITH WATERTIGHT JOINTS, AND WITH EDGES TURNED UP A MINIMUM OF 2-1/2". REINFORCE TOP, EITHER BY STRUCTURAL ANGLES OR BY ROLLING TOP OVER 1/4" STEEL ROD. PROVIDE HOLE, GASKET, AND FLANGE AT LOW POINT FOR WATERTIGHT JOINT AND 1" DRAIN LINE
- 7) FIRESTOPPING/FIRE-RESISTANT SEALANT: WHERE REQUIRED, PROVIDE A FIRESTOP SYSTEM APPROPRIATE FOR THE ASSEMBLY PENETRATED AND THE PENETRATING ELEMENT. USE ONLY FIRESTOP PRODUCTS THAT HAVE BEEN UL 1479 OR ASTM E 814 TESTED FOR SPECIFIC FIRE-RATED CONDITIONS CONFORMING TO CONSTRUCTION ASSEMBLY TYPE, PENETRATING ITEM TYPE, ANNULAR SPACE REQUIREMENT AND FIRE-RATING INVOLVED FOR EACH SEPARATE INSTANCE. SUBMIT MANUFACTUER'S SPECIFIC DETAIL FOR EACH TYPE OF PENETRATION.
- 8) ACCESS DOORS: WHERE REQUIRED FOR PROPER SERVICE AND MAINTENANCE OF ALL MECHANICAL COMPONENTS, PROVIDE STEEL ACCESS DOORS AND FRAMES, FACTORY-FABRICATED AND ASSEMBLED UNITS, COMPLETE WITH ATTACHMENT DEVICES AND FASTENERS SUITABLE FOR THE
- 9) VALVES PRESSURE AND TEMPERATURE RATED AS REQUIRED TO SUIT SYSTEM PRESSURES AND TEMPERATURES. UNLESS OTHERWISE INDICATED, PROVIDE VALVES OF SAME SIZE AS UPSTREAM PIPE SIZE.
- 10) THERMOMETERS: PROVIDE DIRECT MOUNT THERMOMETERS 9" ADJUSTABLE ANGLE TYPE, ALUMINUM CASE, ACRYLIC LENS, ORGANIC SPIRIT FILL OR SOLAR TYPE, SUITABLE FOR SERVICE REQUIRED. SELECT RANGE SUCH THAT NORMAL FLUID TEMPERATURES FALL WIITHIN THE MIDDLE THIRD OF THE DISPLAY. ACCURACY OF THERMOMETERS SHALL BE PLUS OR MINUS 1 PERCENT FULL SCALE. PROVIDE THERMOMETER WELLS, BRASS OR STAINLESS STEEL, PRESSURE RATED TO MATCH PIPING SYSTEM DESIGN PRESSURE.
- 11) PRESSURE GAUGES: PRESSURE GAUGES SHALL BE PHOSPHOR BRONZE BOURDON-TUBE TYPE, ALUMINUM OR BRASS CASE, GLASS LENS, SUITABLE FOR SERVICE REQUIRED. SELECT RANGE SUCH THAT NORMAL FLUID PRESSURES FALL WIITHIN THE MIDDLE THIRD OF THE DISPLAY. ACCURACY OF PRESSURE GAUGES SHALL BE PLUS OR MINUS 1 PERCENT FULL SCALE. PROVIDE PRESSURE GAUGE COCKS BETWEEN PRESSURE GAUGES AND GAUGE TEES, CONSTRUCTED OF BRASS WITH 1/4" FEMALE NPT ON EACH END, AND "T" HANDLE BRASS PLUG, WITH 1/4" BRASS BUSHING SNUBBER WITH CORROSION RESISTANT POROUS METAL DISC, THROUGH WHICH PRESSURE FLUID IS FILTERED. SELECT DISC MATERIAL FOR FLUID SERVED AND PRESSURE RATING.
- 12) SUPPORTS AND ANCHORS: HANGERS FOR PIPE UP TO AND INCLUDING 4" SHALL BE SWIVEL RING, SPLIT RING, WROUGHT PIPE CLAMP, BAND, ADJUSTABLE WROUGHT CLEVIS TYPE OR TRAPEZE. HANGERS FOR PIPES ABOVE 4" SHALL BE STANDARD CLEVIS, ROLLER OR TRAPEZE.
- 13) SADDLES AND SHIELDS: PROVIDE SADDLES AND SHIELDS UNDER PIPING HANGERS AND SUPPORTS, FACTORY-FABRICATED, FOR ALL INSULATED PIPING. SIZE SADDLES AND SHIELDS FOR EXACT FIT TO MATE WITH PIPE INSULATION.

B) ELECTRICAL REQUIREMENTS OF MECHANICAL WORK:

- 1)BASIC ELECTRICAL COMPONENTS INCLUDE, BUT ARE NOT LIMITED TO ALL REQUIRED STARTERS, DISCONNECT SWITCHES, CONTROL DEVICES, AND MOTORS. IT INCLUDES MOTORS THAT ARE FACTORY—INSTALLED AS PART OF EQUIPMENT AND APPLIANCES AS WELL AS FIELD—INSTALLED
- 2) STARTERS AND DISCONNECTS: WHERE AVAILABLE, PROVIDE FACTORY MOUNTED DISCONNECTS AND STARTERS, OR, WHEN FACTORY MOUNTED STARTERS AND DISCONNECTS ARE NOT AVAILABLE PROVIDE COMBINATION STARTERS AND DISCONNECT SWITCHES, OR, WHERE COMBINATION STARTERS AND DISCONNECT SWITCHES ARE NOT SUITABLE OR AVAILABLE, PROVIDE SEPARATE STARTERS AND DISCONNECTS FOR ALL HVAC EQUIPMENT, AS REQUIRED FOR PROPER INSTALLATION AND OPERATION OF EQUIPMENT.

C) MECHANICAL IDENTIFICATION:

- 1)PROVIDE PIPE MARKERS, LINE MARKERS, VALVE TAGS, VALVE SCHEDULE FRAMES, AND EQUIPMENT MARKERS COMPLYING WITH ANSI A13.1 FOR LETTERING SIZE, LENGTH OF COLOR FIELD, COLORS, AND INSTALLED VIEWING ANGLES OF IDENTIFICATION DEVICES.
- 2) SCHEDULES: SUBMIT VALVE SCHEDULE FOR EACH PIPING SYSTEM, TYPEWRITTEN AND REPRODUCED ON 8-1/2" X 11" BOND PAPER. TABULATE VALVE NUMBER, PIPING SYSTEM, SYSTEM ABBREVIATION (AS SHOWN ON TAG), LOCATION OF VALVE (ROOM OR SPACE), AND VARIATIONS FOR IDENTIFICATION (IF ANY). MARK VALVES WHICH ARE INTENDED FOR EMERGENCY SHUT-OFF AND SIMILAR SPECIAL USES, BY SPECIAL "FLAGS", IN MARGIN OF SCHEDULE.
- PIPE MARKERS
- (a) SNAP-ON TYPE: PROVIDE MANUFACTURER'S STANDARD PRE-PRINTED, SEMI-RIGID, SNAP- ON, COLOR-CODED, PIPE MARKERS.
- (b) PRESSURE-SENSITIVE TYPE: PROVIDE MANUFACTURER'S STANDARD PRE-PRINTED, PERMANENT ADHESIVE, COLOR-CODED, PRESSURE-SENSITIVE VINYL PIPE MARKERS.

(c) INSTALL EVERY 40 FEET AND AT EACH CHANGE IN DIRECTION.

TAGS TO VALVES, AND MANUFACTURED SPECIFICALLY FOR THAT PURPOSE.

- 4) LINE MARKERS UNDERGROUND TYPE: MANUFACTURER'S STANDARD PERMANENT, BRIGHT-COLORED, CONTINUOUS-PRINTED PLASTIC TYPE, INTENDED FOR DIRECT-BURIAL SERVICE; NOT LESS THAN 6" WIDE X 4 MILS THICK. PROVIDE TAPE WITH PRINTING WHICH MOST ACCURATELY INDICATES TYPE OF SERVICE OF BURIED PIPE.
- 5) VALVE TAGS: PROVIDE MANUFACTURER'S STANDARD BRASS OR PLASTIC VALVE TAGS WITH PRINTED ENAMEL LETTERING, WITH PIPING SYSTEM ABBREVIATION IN APPROXIMATELY 3/16" HIGH LETTERS AND SEQUENCED VALVE NUMBERS APPROXIMATELY 3/8" HIGH, AND WITH 5/32" HOLE FOR
- 6) VALVE TAG FASTENERS: MANUFACTURER'S STANDARD SOLID BRASS CHAIN (WIRE LINK OR BEADED TYPE), OR SOLID BRASS S-HOOKS OF THE SIZES REQUIRED FOR PROPER ATTACHMENT OF
- 7) VALVE SCHEDULES: PROVIDE VALVE SCHEDULES IN EITHER A 3-RING BINDER OR IN DISPLAY FRAMES, DISPLAY FRAME, WITH SCREWS FOR REMOVABLE MOUNTING ON MASONRY WALLS. PROVIDE FRAMES OF EXTRUDED ALUMINUM OR PLASTIC WITH SSB-GRADE SHEET GLASS OR PLASTIC.
- 8) PLASTIC EQUIPMENT MARKERS: PROVIDE MANUFACTURER'S STANDARD LAMINATED PLASTIC, COLOR CODED EQUIPMENT MARKERS.
- 9) LETTERING AND GRAPHICS: COORDINATE NAMES, ABBREVIATIONS AND OTHER DESIGNATIONS USED IN MECHANICAL IDENTIFICATION WORK, WITH CORRESPONDING DESIGNATIONS SHOWN, SPECIFIED OR SCHEDULED. PROVIDE NUMBERS, LETTERING AND WORDING AS INDICATED OR, IF NOT OTHERWISE INDICATED, AS RECOMMENDED BY MANUFACTURERS OR AS REQUIRED FOR PROPER IDENTIFICATION AND OPERATION/MAINTENANCE OF MECHANICAL SYSTEMS AND EQUIPMENT.

D) VIBRATION CONTROL AND SEISMIC RESTRAINTS:

- 1)FIBERGLASS PADS AND SHAPES, NEOPRENE PADS, VIBRATION ISOLATION SPRINGS, PAD-TYPE ISOLATORS, PLATE-TYPE ISOLATORS, DOUBLE-PLATE-TYPE ISOLATORS, THREADED DOUBLE-PLATE-TYPE ISOLATORS, ALL-DIRECTIONAL ANCHORS, NEOPRENE MOUNTINGS, FREE STANDING SPRING ISOLATORS, HOUSED SPRING ISOLATORS, VERTICALLY—RESTRAINED SPRING ISOLATORS, EARTHQUAKE-RESISTANT SPRING ISOLATORS, SEISMIC SNUBBERS, THRUST RESTRAINTS, EQUIPMENT RAILS, FABRICATED EQUIPMENT BASES, INERTIA BASE FRAMES, ROOF—CURB ISOLATORS, ISOLATION HANGERS, RISER ISOLATORS, FLEXIBLE PIPE CONNECTORS SHALL BE PROVIDED AS REQUIRED AND AS SUITABLE FOR USE AND SERVICE.
- 2) WHERE SEISMIC RESTRAINTS ARE REQUIRED, THE CONTRACTOR SHALL PROVIDE CALCULATIONS, DETAILS AND LOCATIONS THAT ARE STAMPED BY A PROFESSIONAL ENGINEER.

E) HYDRONIC AND CONDENSATE PIPING:

- 1)HYDRONIC PIPING (HOT WATER AND CHILLED WATER) SHALL BE SCHEDULE 40 ASTM A53, GRADE B, TYPE E (ERW) STEEL OR ASTM B88, TYPE L COPPER TUBE (COPPER THROUGH 2"ONLY) WITH THE FOLLOWING JOINING METHODS:
- (a) THROUGH 2"SHALL USE CAST IRON CLASS 150 THREADED FITTINGS PER ASME B16.3 FOR STEEL PIPE OR COPPER SOLDERED OR PRESSED FITTINGS FOR COPPER TUBE.
- (b) 2-1/2"AND UP SHALL USE STEEL WELDED (ASME B16.9, STD WEIGHT), GROOVED OR FLANGED (ASME B16.5, CLASS 150, RAISED FACE) FITTINGS.
- (c) UPONOR ASTM F876/F877 SDR9 CROSSLINKED POLYETHYLENE (PEX-a) PIPING WITH ASTM F1960 COLD EXPANSION FITTINGS AND PEX REINFORCING RINGS INSTALLED PER MANUFACTURER'S INSTRUCTIONS IS ALSO ALLOWED

- (a) THROUGH 2" BRONZE BALL VALVES EQUAL TO APOLLO 70 SERIES.
- (b) 2-1/2" AND UP DUCTILE IRON LUG STYLE BUTTERFLY VALVE WITH LEVER EQUAL TO CENTERLINE 200 SERIES.
- 3) CONDENSATE PIPING SHALL BE SCHEDULE 40 PVC.
- (a) INDOOR UNITS SHALL DRAIN CONDENSATE TO SANITARY OR STORM VIA INDIRECT CONNECTION.
- 4) PROVIDE AND INSTALL ISOLATION VALVES, UNIONS/FLANGES, MANUAL AIR VENTS, AND DRAIN VALVES AT ALL PIECES OF EQUIPMENT.
- 5) PITCH WATER PIPING UP IN THE DIRECTION OF FLOW, 1 INCH PER 40 FEET MINIMUM. PROVIDE AN AIR VENT AT ALL HIGH POINTS AND A DRAIN VALVE AT ALL LOW POINTS. 6) CUT ALL HOLES OF SUFFICIENT SIZE AND HANG ALL PIPE SO THAT THERE WILL BE NO COPPER
- OR STEEL TO METAL CONTACT AND RESULTANT NOISE DURING PIPE EXPANSION AND CONTRACTION. PROVIDE EXPANSION LOOPS WITH ROLLERS, GUIDES AND ANCHORS WHERE STRAIGHT RUNS OF PIPE EXCEED 100 FEET. 7) BEFORE SYSTEM OPERATION, CLEAN AND FLUSH ALL PIPING SYSTEMS TO REMOVE GREASE, OIL,
- SCALE, ETC. OPERATE SYSTEM FOR A MINIMUM OF 24 HOURS WITH STARTUP STRAINERS TO REMOVE DEBRIS, THEN REMOVE AND DISPOSE OF STARTUP STRAINER. 8) PROVIDE CHEMICAL WATER TREATMENT CHEMICALS TO PROHIBIT CORROSION FOR WATER SYSTEMS. PROPYLENE GLYCOL (CONCENTRATION SHALL PROVIDE FREEZE PROTECTION TO 5'F BELOW

THE LOWEST ANTICIPATED AMBIENT TEMPERATURE) IS SUFFICIENT FOR WATER TREATMENT FOR

SYSTEMS NEEDING FREEZE PROTECTION.

1)ALL INSULATION SHALL BE UL APPROVED FOR A FLAME SPREAD RATING OF NOT OVER 25 AND A

SMOKE DEVELOPED RATING OF NOT OVER 50.

- 2) ALL INSULATION SHALL CONFORM TO THE REQUIREMENTS IECC 2009.
- 3) HYDRONIC PIPING: ALL HYDRONIC PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED WITH FIBERGLASS INSULATION IN ACCORDANCE WITH THE THICKNESS LISTED BELOW, BASED ON THE PIPE INSULATION HAVING A CONDUCTIVITY NOT EXCEEDING 0.27 BTU PER INCH/H*FT2*F. PROVIDE ASJ OR OTHER JACKET TO PROTECT INSULATION. SIMILAR TO JOHNS
- (a) FITTINGS SHALL HAVE PVC COVERS WITH FIBERGLASS INSERTS.
 - (b) NOTE THAT ALL PIPES CONTAINING FLUIDS AT TEMPERATURES LESS THAN LOCAL DEWPOINT MUST BE INSULATED FOR CONDENSATION CONTROL.
 - (c) HOT WATER PIPE INSULATION THICKNESS (105-140F OPERATING TEMPERATURE)
 - (1) 1" THICK INSULATION FOR 1-1/4" & SMALLER PIPE SIZES.

(2) 1-1/2" THICK INSULATION FOR 1-1/2" & LARGER PIPE SIZES.

- A) THE CONTRACTOR SHALL PROVIDE ALL SUPERVISION, LABOR, EQUIPMENT, MATERIAL, MACHINERY, PLANS, RIGGING, AND ANY AND ALL OTHER ITEMS NECESSARY TO COMPLETE THE MECHANICAL SYSTEM. SMALL DETAILS NOT USUALLY INDICATED ON THE DRAWINGS OR SPECIFIED, BUT WHICH ARE NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE MECHANICAL SYSTEM SHALL BE INCLUDED IN THE WORK AND IN THE CONTRACTOR'S ESTIMATE THE SAME AS IF HEREIN SPECIFIED OR SHOWN ON THE DRAWINGS.
- B) THE CONTRACTOR SHALL INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. THIS INCLUDES CHECKING THE MANUFACTURER'S INSTRUCTIONS TO DETERMINE WHAT TYPE OF GLYCOL SYSTEM MAY BE USED WITHI EQUIPMENT SO AS NOT TO VOID THE WARRANTY OR IMPAIR THE OPERATION OF THE EQUIPMENT. WHERE THE DRAWINGS AND SPECIFICATIONS CONFLICT WITH THE MANUFACTURER'S RECOMMENDATIONS, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO BRING THIS TO THE ATTENTION OF THE ENGINEER.
- C) THE HVAC EQUIPMENT MAY NOT BE USED FOR TEMPORARY HEAT DURING CONSTRUCTION. THE HVAC EQUIPMENT SHALL NOT BE STARTED AND TESTED UNTIL ALL CONSTRUCTION ACTIVITY THAT HAS THE POTENTIAL OF CREATING AIR BORNE PARTICULATES THAT COULD BE DRAWN INTO THE HVAC EQUIPMENT AND DUCTWORK SYSTEMS HAS BEEN COMPLETED. IN ADDITION, ALL DUCTWORK OPENINGS SHALL BE SEALED UNTIL THE TIME WHEN THE HVAC EQUIPMENT IS TO BE STARTED AND TESTED.
- D) DUCTWORK AND FITTINGS SHALL HAVE ENDS COVERED WITH PLASTIC AT ALL TIMES.
- E) UPON COMPLETION OF WORK, THE CONTRACTOR SHALL CLEAN, OIL AND GREASE (UNLESS FACTORY LUBRICATED) ALL FANS, PUMPS, MOTORS, ALL OTHER RUNNING EQUIPMENT AND APPARATUS AND MAKE CERTAIN THAT ALL SUCH APPARATUS AND MECHANISMS ARE IN PROPER WORKING ORDER AND MADE READY FOR TESTING.
- F) REPLACE ALL FILTERS USED DURING CONSTRUCTION.
- G) EQUIPMENT SHALL BE STARTED, TESTED, ADJUSTED AND PLACED IN SATISFACTORY OPERATING CONDITION BY THE CONTRACTOR.
- H) THE CONTRACTOR SHALL INSTRUCT OWNER IN THE PROPER OPERATION OF EQUIPMENT, EXPLAIN THE PROPER OPERATING AND MAINTENANCE PROCEDURES AND SHALL FURNISH THE OWNER WITH ALL INSTRUCTION PAMPHLETS, BOOKS AND OTHER MATERIAL FURNISHED BY THE VARIOUS MANUFACTURERS I) ALL VIBRATING EQUIPMENT NOT MOUNTED ON THE GROUND FLOOR SHALL BE MOUNTED ON OR
- SUSPENDED FROM VIBRATION ISOLATORS. J)EQUIPMENT SHALL BE INSTALLED WITH CLEARANCE FOR PROPER MAINTENANCE. FILTERS, COILS, DRIVES,
- VALVES, AND CONTROLS SHALL BE ACCESSIBLE FOR SERVICING AND/OR REPLACEMENT. K) EQUIPMENT SHALL BE COVERED FOR ONE YEAR FROM THE REVIEWING ENGINEER'S DATE OF
- ACCEPTANCE AND/OR THE DURATION OF THE MANUFACTURER'S GUARANTEE OR WARRANTY, WHICH EVER IS LONGER. THE CONTRACTOR SHALL FURNISH THE OWNER WITH ALL MANUFACTURER'S GUARANTEES OR
- L)THE WATER AND AIR SYSTEMS SHALL BE BALANCED FROM -5% TO + 10% OF THE GPM AND CFM VALUES SHOWN ON THE APPROVED HVAC PLANS. BALANCING SHALL BE DONE IN ACCORDANCE WITH STANDARDS ESTABLISHED BY THE AABC OR NEBB USING REPORT SHEETS DEVELOPED BY THE AABC OR NEBB. SUBMIT REPORTS TO THE ENGINEER.

LEGEND OF PIPING SYMBOLS

SYMBOL

DESCRIPTION

DESCRIPTION

	PIPE ELBOW UP	<u> </u>	BALL VALVE		
—— <u>—</u>	PIPE ELBOW DOWN		BUTTERFLY VALVE		
<u> </u>	PIPE TEE UP	\longrightarrow	GATE VALVE		
	PIPE TEE DOWN	— — ——————————————————————————————————	OS&Y GATE VALVE		
	PIPE CROSS OVER	>	CHECK VALVE		
———	UNION	₽BFP	BACK FLOW PREVENTER		
	FLEXIBLE PIPE CONNECTOR	Į.	TRIPLE-DUTY VALVE		
	END CAP	*	TRIPLE-DUTY VALVE WITH MEASUREMENT PORTS		
Y	PETE'S PLUG	X	2-WAY MOTORIZED VALVE		
工,,	HOSE THREAD DRAIN VALVE WITH CAP AND CHAIN		3-WAY MOTORIZED VALVE		
	CIRCUIT SETTER		TEMPERING VALVE		
├	STRAINER	Z	PRESSURE REDUCING VALVE		
A I	STRAINER WITH BLOWDOWN	Ž ⁱ	TEMPERATURE & PRESSURE RELIEF VALVE		
	CIRCULATOR PUMP	XB	DIFFERENTIAL PRESSURE BYPASS VALVE		
MV \$H	MANUAL AIR VENT	Š	SOLENOID VALVE		
AV P	AUTOMATIC AIR VENT	4	GAS COCK		
AS	AIR SCOOP	_	DIRECTION OF FLOW		
Q (AS)	AIR SCOOP WITH VENT	<u>)</u>	DIRECTION OF PITCH		
			CONNECT TO EXISTING		
	AIR SEPARATOR WITH VENT		PIPE CONTINUES		
AS		#	THERMOMETER		
MARK FEET FIN TUBE IDENTIFICATION TAG	FIN TURE IDENTIFICATION TAG	િ જ્	PRESSURE GAUGE WITH SHUTOFF & PIGTAIL		
	Ŷ	VACUUM BREAKER			
C-HHHH-D	FIN TUBE RADIATION WITH COVER		ELECTRIC HEAT TRACING		
LEGEND	LEGEND OF DUCT SYMBOLS				

LEGEND OF DUCL SIMBULS

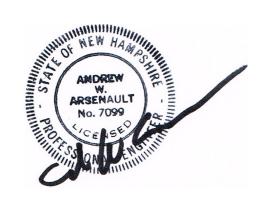
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	
<u>L</u>	MANUAL BALANCING DAMPER		RECTANGULAR RETURN OR EXHAUST DUCT UP	
FD 	FIRE DAMPER		ROUND RETURN OR EXHAUST DUCT UP	
SD	SMOKE DAMPER		RECTANGULAR RETURN OR EXHAUST DUCT DOWN	
SFD	SMOKE & FIRE DAMPER		ROUND RETURN OR EXHAUST DUCT DOWN	
	CABLE OPERATED DAMPER		RECTANGULAR SUPPLY DUCT U	
	BACK DRAFT DAMPER		ROUND SUPPLY DUCT UP	
MH	MOTORIZED DAMPER	X	RECTANGULAR SUPPLY DUCT DOWN	
-	SUPPLY AIRFLOW		ROUND SUPPLY DUCT DOWN	
─	RETURN / EXHAUST AIRFLOW	MARK SIZE	REGISTER, GRILLE AND	
•	CONNECT TO EXISTING	CFM	DIFFUSER IDENTIFICATION TAG	
LEGEND OF CONTROL SYMBOLS				

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
T	THERMOSTAT	Н	HUMIDISTAT
TS	TEMPERATURE SENSOR	P	PRESSURE SENSOR
©	CARBON MONOXIDE SENSOR	(SD)	SMOKE DETECTOR
<u>(0)</u>	CARBON DIOXIDE SENSOR	\(\bar{\pi}\)	INDICATOR LAMP
		•	

TEMPERATURE

VENTILATOR

BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER. <u>HVAC PROJECT MANAGER:</u> DAVID C. MAGNUSON EMAIL: DAVEM@DESIGNDAYMECH.COM PHONE: (603) 463-1086 ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037



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SHEET 2 OF 2

SECTION 15900 - HVAC CONTROLS AND SEQUENCES OF OPERATION

INCLUDED, QUALITY ASSURANCE AND RELATED DOCUMENTS.

I) GENERAL A) REFER TO SPECIFICATION SECTION 15500 - HVAC SPECIFICATIONS, ESPECIALLY GENERAL FOR WORK

B) PROVIDE A COMPLETE ELECTRIC/ELECTRONIC CONTROL SYSTEM TO ACCOMPLISH ALL CONTROL SEQUENCES AS DESCRIBED BELOW. C) ALL LINE AND LOW VOLTAGE CONTROL WIRING, TRANSFORMERS, DISCONNECTS, ETC REQUIRED FOR THE

CONTROL SYSTEMS THAT IS NOT SHOWN ON THE ELECTRICAL DRAWINGS SHALL BE PROVIDED BY THE

CONTROLS CONTRACTOR (HENCEFORTH CALLED "THE CONTRACTOR"). 1)LINE VOLTAGE POWER FROM CIRCUIT BREAKERS IN ELECTRICAL PANELS TO CONTROL TRANSFORMERS

OR CONTROL DEVICES SHALL BE INSTALLED BY THE CONTRACTOR. 2) COMPLY WITH DIVISION 16 REQUIREMENTS.

III) EXECUTION

- 3) CONNECT VARIABLE FREQUENCY DRIVES (VFD) AND DUCT & AREA SMOKE DETECTORS (FURNISHED BY OTHERS) INTO CONTROL CIRCUITS TO ACCOMPLISH THE SEQUENCES OF OPERATION II)PRODUCTS
- A) PROVIDE CONTROL PRODUCTS (IF NOT FACTORY PROVIDED BY HVAC EQUIPMENT MANUFACTURER) INCLUDING, BUT NOT LIMITED TO, CONTROL DAMPERS & VALVES, THERMOSTATS, TIMECLOCKS, SENSORS, RELAYS, CONTROLLERS, AND OTHER COMPONENTS AS REQUIRED FOR A COMPLETE INSTALLATION.
- LEAKAGE OF LESS THAN 3 CFM/SQFT AT 1.0"W.G. C) CONTROL VALVES SHALL BE SELECTED FOR FLUID TYPE, TEMPERATURE AND PRESSURE CLASS WHICH

MATCH PIPING MATERIALS AND END CONNECTIONS. CONTROL VALVES MUST CLOSE OFF AGAINST MAXIMUM

B) CONTROL DAMPERS SHALL BE LOW LEAKAGE DAMPERS WITH BLADE AND EDGE SEALS. CLASS 1A WITH

- D) DAMPER AND VALVE ACTUATORS SHALL BE ELECTRIC, SIZED TO SMOOTHLY OPERATE DAMPER OR VALVE WITH ADEQUATE TORQUE FOR TIGHT SHUTOFF AGAINST MAXIMUM SYSTEM PRESSURE.
- E) ROOM THERMOSTATS SHALL BE 7 DAY PROGRAMMABLE WITH A 5°F DEADBAND BETWEEN HEATING & COOLING AND SETBACK CAPABILITY (55°F HEATING & 85°F COOLING). 1)USER ADJUSTABLE SETPOINTS SHALL BE PROVIDED UNLESS NOTED OTHERWISE ON THE DRAWINGS.

1)ACTUATION REQUIREMENTS SHALL BE PER THE SEQUENCES OF OPERATION.

A) INSTALL SYSTEMS AND MATERIALS IN ACCORDANCE WITH MANUFACTURER INSTRUCITONS AND ROUGHING-IN DRAWINGS AND DETAILS ON THE DRAWINGS. INSTALL ELECTRICAL COMPONENTS AND USE ELECTRICAL PRODUCTS COMPLYING WITH REQUIREMENTS OF APPLICABLE DIVISION 16 SECTIONS.

- COORDINATE THE INSTALLATION IN ACCORDANCE WITH FINAL SHOP DRAWINGS, FIELD MEASUREMENTS, MANUFACTURER'S DATA AND AS SPECIFIED HEREIN.
- C) PROVIDE REMOTE CONTROL OF MANUAL RESET CONTROLLERS AS REQUIRED FOR USER ACCESSIBILITY.

B) MOUNT CONTROLLERS AT CONVENIENT LOCATIONS AND HEIGHTS. COORDINATE WITH ARCHITECT AND

- COORDINATE WITH OWNER. D) THE TERM "CONTROL WIRING" IS DEFINED TO INCLUDE PROVIDING OF WIRE, CONDUIT AND MISCELLANEOUS MATERIALS AS REQUIRED FOR MOUNTING AND CONNECTING ELECTRIC CONTROL DEVICES.
- E) INSTALL COMPLETE CONTROL WIRING SYSTEM FOR CONTROL SYSTEMS. CONCEAL WIRING, EXCEPT IN MECHANICAL ROOMS AND AREAS WHERE OTHER CONDUIT AND PIPING ARE EXPOSED. PROVIDE MULTI-CONDUCTOR INSTRUMENT HARNESS (BUNDLE) IN PLACE OF SINGLE CONDUCTORS WHERE A NUMBER OF CONDUCTORS CAN BE RUN ALONG A COMMON PATH. FASTEN FLEXIBLE CONDUCTORS BRIDGING CABINETS AND DOORS NEATLY ALONG HINGE SIDE AND PROTECT AGAINST ABRASION. TIE AND SUPPORT CONDUCTORS NEATLY.
- F) INSTALL CIRCUITS OVER 25-VOLT WITH COLOR-CODED THWN/THHN WIRE IN EMT OR MC CABLE AS WHIPS TO EQUIPMENT CONNECTIONS. USE LIQUID-TITE CONDUIT IN EXTERIOR OR HAZARDOUS LOCATIONS.
- G) INSTALL CIRCUITS UNDER 25-VOLT WITH COLOR-CODED NO. 18 WIRE WITH INSULATION ON EACH CONDUCTOR AND PLASTIC SHEATH OVER ALL. PROVIDE PLENUM RATED CABLE IN PLENUM CEILINGS. H) INSTALL LOW VOLTAGE CIRCUITS WHICH ARE LOCATED IN CONCRETE SLABS OR IN MASONRY WALLS IN
- I) WHERE CONTROL WIRING MUST BE SURFACE MOUNTED IN OCCUPIED ROOMS AND IT IS NOT POSSIBLE TO CONCEAL WIRING, RUN WIRING IN WIREMOLD RACEWAY (COLOR BY ARCHITECT).
- J)NUMBER-CODE OR COLOR-CODE CONDUCTORS APPROPRIATELY FOR IDENTIFICATION AND SERVICING OF THE CONTROL SYSTEM. K) DEMONSTRATE CONTROL SYSTEM TO AND TRAIN OWNER'S PERSONNEL IN OPERATION AND
- MAINTENANCE OF CONTROL SYSTEM. IV) SEQUENCES OF OPERATION
- A) BOILERS (B) AND ASSOCIATED CIRCULATOR PUMPS (CP)
- 1) THE MAIN LOOP SUPPLY WATER TEMPERATURE SHALL BE MAINTAINED AT A MAXIMUM OF 180°F. (a) PROVIDE OUTDOOR TEMPERATURE RESET TO REDUCE SYSTEM TEMPERATURE INVERSELY TO OUTSIDE AIR TEMPERATURE
- 2) WHENEVER A BOILER IS CALLED TO OPERATE, IT'S ASSOCIATED INJECTION PUMP SHALL OPERATE. 3) BOILERS SHALL OPERATE IN LEAD-LAG CONFIGURATION VIA ON-BAORD "CASCADE LINK"

- (a) PROVIDE AUTO-CHANGEOVER OF LEAD BOILER EVERY 24 HOURS
- (b) PROVIDE AUTO-CHANGEOVER IN EVENT OF BOILER FAILURE
- END OF SECTION 15900

4) THE MAIN LOOP PUMPS (P-1 AND P-2) CONTROLS SHALL REMAIN AS-IS, AND ARE NOT IN

MECHANICAL ABBREVIATIONS

NA NOT APPLICABLE AMP AMPACITY HW HOT WATER CONTRACTOR APD AIR PRESSURE DROP EFFICIENCY RATIO HWUH ATC AUTOMATIC TEMP. HWCUH HOT WATER
CABINET HEATER NO NORMALLY OPEN TEMPERATURE BTU/H BRITISH THERMAL ERV ENERGY RECOVERY HWR VENTILATOR OA OUTSIDE AIR EXTERNAL STATIC HWS HOT WATER SUPPLY CAP CAPACITY DIAMETER ET EXPANSION TANK HX HEAT EXCHANGER PD PRESSURE DROF ID INSIDE DIAMETER CHW CHILLED WATER POUNDS PER C/HWR WATER RETURN FAHRENHEIT SQUARE INCH C/HWS CHILLED & HOT WATER SUPPLY FRESH AIR KW KILOWATTS PH/Ø PHASE CHWR CHILLED WATER RETURN FPD FLUID PRESSURE DROP LEAVING AIR CHWS CHILLED WATER SUPPLY FPM FEET PER MINUTE LB/# POUNDS RA RETURN AIR LEAVING FLUID TEMPERATURE RTU ROOFTOP UNIT COND CONDENSATE CONN CONNECT OR CONNECTION LPS STEAM T HD FEET HEAD SF SQUARE FEET FTR RADIATION CONV CONVECTOR SQ IN SQUARE INCHES

CIRCULATOR FW FRESH WATER M MINUTES SA SUPPLY AIR CW COLD WATER CONTRACTOR GLYCOL & WATER MBH THOUSANDS OF CWR WATER RETURN TEMP TEMPERATURE

GHWR GLYCOL & WATER RETURN CONDENSER CWS WATER SUPPLY CONTRACTOR GPM GALLONS PER MINUTE MINIMUM CIRCUIT DB DRY BULB MINUTE OR HP HORSEPOWER MINIMUM

W WATTS DX EXPANSION MOCP WB WET BULB PROTECTION EA EXHAUST AIR WC WATER COLUMN PRESSURE STEAM