HVAC & PLUMBING SYMBOL SCHEDULE

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
(#)	REFER TO PLAN NOTES	111	ROOM CALLOUT
(E)	EXISTING EQUIPMENT OR MATERIAL DESIGNATION	\triangle	REVISION NUMBER
	EXISTING COMPONENT PEN WEIGHT	•	CONNECT NEW TO EXISTING. VERIFY EXACT LOCATION.
	DEMOLITION PEN WEIGHT - COMPONENT MAY ALSO BE SHADED	•	DISCONNECT FROM EXISTING. VERIFY EXACT LOCATION.
T.C.C.	TEMPERATURE CONTROL CONTRACTOR	G.C.	GENERAL CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR	M.C.	MECHANICAL CONTRACTOR
P.C.	PLUMBING CONTRACTOR	TYP.	TYPICAL ALL INSTANCES
≥ 24x12	(UP)DUCT SEC., POSITIVE PRESSURE-FIRST SIZE IS TOP DIM.(TYP.)	l.	BALANCING DAMPER W/ MANUAL LOCKING QUADRANT
24x12	(DOWN) DUCT SECTION, POSITIVE PRESSURE		RECTANGULAR - OPPOSED BLADE / ROUND - BUTTERFLY
24x12	(UP) DUCT SECTION, NEGATIVE PRESSURE	P	BALANCING DAMPER W/ MOTORIZED LOCKING QUADRANT
24x12	(DOWN) DUCT SECTION, NEGATIVE PRESSURE		RECTANGULAR - OPPOSED BLADE / ROUND - BUTTERFLY
	SUPPLY DUCT DROP	18x12 }	DUCT SIZE, FIRST FIGURE IS SIDE SHOWN-CLEAR INSIDE DIM.
	SUPPLY DUCT RISER	 	DUCT CHANGE OF ELEVATION RISE(R) DROP(D)
	RETURN DUCT DROP		FLEXIBLE CONNECTION
	RETURN DUCT RISER	 	SIDE WALL SUPPLY REGISTER
		RTU	ROOFTOP UNIT
	TURNING VANES	AHU	AIR HANDLING UNIT
<u>'_</u> SA	SUPPLY AIR	VAV	VARIABLE AIR VOLUME UNIT
OA OA	OUTSIDE AIR	FTU	FAN POWERED TERMINAL UNIT
RA	RETURN AIR	FCU	FAN COIL UNIT
EA	EXHAUST AIR	MAU	MAKE-UP AIR UNIT
OBD	OPPOSED BLADE DAMPER	SF	SUPPLY AIR FAN
BOD	BOTTOM OF DUCT ELEVATION ABOVE FLOOR	EF	
BOS		SR	EXHAUST FAN
TOD	TOP OF DUCT FLEVATION ABOVE FLOOR		SUPPLY REGISTER
DP	TOP OF DUCT ELEVATION ABOVE FLOOR	RG F	RETURN GRILLE
CVR	DIFFERENTIAL PRESSURE	UH	FURNACE
V V R	CONSTANT VOLUME REHEAT UNIT VARIABLE VOLUME REHEAT UNIT	UH H	UNIT HEATER HUMIDIFIER
		1	
V V T	VARIABLE VOLUME VARIABLE TEMPERATURE	VFD	VARIABLE FREQUENCY DRIVE
<u> </u>	TEMPERATURE SENSOR	(T)	ELECTRIC OR DDC THERMOSTAT (TSTAT)
П	HUMIDITY SENSOR	(H)	ELECTRIC OR DDC HUMIDISTAT (HSTAT)
—CWS——	CHILLED WATER SUPPLY LINE (CWS)	——HWS——	HOT WATER SUPPLY LINE (HWS)
——CWR——	CHILLED WATER RETURN LINE (CWR)	——HWR——	HOT WATER RETURN LINE (HWR)
—CHWS——	CHILLED HOT WATER SUPPLY	——HWRR——	HOT WATER REVERSE RETURN LINE (HWRR)
——CHWR——	CHILLED HOT WATER RETURN	cs	COOLING TOWER WATER SUPPLY (CS)
CWPP	CHILLED WATER PRIMARY PUMP	——CR——	COOLING TOWER WATER RETURN (CR)
CWSP	CHILLED WATER SECONDARY PUMP	CWP	CHILLED WATER PUMP
HWPP	HOT WATER PRIMARY PUMP	HWP	HOT WATER PUMP
HWSP	HOT WATER SECONDARY PUMP	CHWP	CHILLED/HOT WATER PUMP
		, 	
<u> </u>	DOUBLE CHECK BACKFLOW ASSEMBLY	— δ — — —	BALL VALVE
	REDUCED PRESSURE ZONE BACKFLOW ASSEMBLY	— <u>— — — — — — — — — — — — — — — — — —</u>	CALIBRATED BALANCE VALVE - CIRCUIT SETTER
<u> </u>	GAS COCK		BUTTERFLY VALVE
—————————————————————————————————————	VALVE IN DROP	<u> </u>	2-WAY CONTROL VALVE (PNEUMATIC)
	VALVE IN RISER	<u> </u>	3-WAY CONTROL VALVE (PNEUMATIC)
\bowtie	GATE VALVE / SHUT OFF VALVE	<u> </u>	2-WAY CONTROL VALVE (ELECTRIC)
	GLOBE VALVE	<u> </u>	3-WAY CONTROL VALVE (ELECTRIC)
імі	3 PIECE BALL VALVE	N N	CHECK VALVE
<u> </u>	HYDRAULIC VALVE	————————————————————————————————————	PRESSURE REDUCING VALVE (PRV)
<u> </u>	EMERGENCY VALVE WITH FIRE LINK		WAFER CHECK VALVE
<u> </u>	STRAINER	+04	AUTOMATIC FLOW CONTROL VALVE
 ▼ •	PLUG VALVE		CALIBRATED ORIFICE PLATE FLOW METER
	SPRING HANGER		THERMOMETER
<u> </u>	PIPE HANGER	<u> </u>	PRESSURE GAUGE
	CAP		CONCENTRIC REDUCER OR INCREASER
ю	PIPE RISE	<u> </u>	ECCENTRIC REDUCER
	PIPE DROP	φ	TOP CONNECTION, 45° OR 90°
——————————————————————————————————————	UNION OR FLANGE CONNECTION		BOTTOM CONNECTION, 45° OR 90°
	DIRECTION OF FLOW		SIDE CONNECTION
X	ANCHOR	Ţ	CAPPED OUTLET
O2	MEDICAL OVYCEN LINE (O2)	N2O	NITPOUS OVIDE LINE (N2O)
<u> </u>	MEDICAL VACUUM LINE (VAC)	+	NITROUS OXIDE LINE (N2O)
VAC	MEDICAL COMPRESSED AIR LINE (MA)	N2 ——	NITROGEN LINE (N2)
	MEDICAL COMPRESSED AIR LINE (MA)	<u> </u>	
MA	LOW DDECCUDE (<20paig) STEAM (LDC)	нрs	HIGH PRESSURE (>150psig) STEAM (HPS)
NA	LOW PRESSURE (<30psig) STEAM (LPS)		
	LOW PRESSURE (<30psig) STEAM (LPS) LOW PRESSURE (<30psig) CONDENSATE RETURN (LPR)	——HPR——	HIGH PRESSURE (>150psig) CONDENSATE RETURN (HPR)
LPS			HIGH PRESSURE (>150psig) CONDENSATE RETURN (HPR) STEAM TRAP

GENERAL NOTES

- VERIFY JOB SITE CONDITIONS AND DIMENSIONS BEFORE BEGINNING WORK. PLANS ARE SCHEMATIC IN NATURE. LAYOUT IS BASED ON BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS.
- 2. NO PIPING, DUCTWORK, ETC. SHALL PENETRATE STRUCTURAL MEMBERS.
- 3. PROVIDE MISCELLANEOUS CUTTING, PATCHING AND REPAIRING OF FINISHES, ROOF, WALLS, ETC., AS REQUIRED TO ACCOMMODATE THE NEW WORK.
- 4. G.C. IS TO PATCH ANY OPENINGS IN CORRIDORS REQUIRED TO BE CONSTRUCTED TO LIMIT THE TRANSFER OF SMOKE AND IN SMOKE BARRIERS AS REQUIRED TO MEET CODE REQUIREMENTS. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS.
- 5. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY EXACT LOCATION, CONFIGURATION AND ROUTING OF EXISTING SYSTEMS REQUIRED TO REMAIN IN OPERATION DURING THE PROJECT TO PREVENT DAMAGE DURING DEMOLITION AND PHASING.
- 6. REMOVE ALL EXISTING EQUIPMENT, DUCTWORK AND PIPING THAT IS NOT REQUIRED FOR A WORKING INSTALLATION.
- 7. COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO INSTALLATION.
- 8. UNLESS OTHERWISE INDICATED, INSTALL ALL SPACE THERMOSTATS AND OTHER OCCUPANT ADJUSTABLE CONTROL DEVICES SAME HEIGHT AS ADJACENT LIGHT SWITCHES, BUT IN NO CASE HIGHER THAN 48 INCHES ABOVE FINISHED FLOOR PER ADA REQUIREMENTS. COORDINATE EXACT HEIGHT WITH ARCHITECT PRIOR TO INSTALLATION.
- 9. ALL CUTTING AND PATCHING SHALL BE CLOSELY COORDINATED WITH THE G.C.
- 10. COORDINATE ROUTING OF PLUMBING, AND HVAC PIPING WITH DUCTWORK, LIGHTS, ARCHITECTURAL CEILING AND STRUCTURAL ELEMENTS. PIPING SHALL RISE AND DROP, JOG OR OFFSET AS REQUIRED TO AVOID CONFLICTS. DUCTWORK SHALL TAKE PRECEDENCE OVER ALL PIPING, EXCEPT WHERE GRADE MUST BE MAINTAINED FOR DRAINAGE. REWORK OF INSTALLED WORK TO RESOLVE CONFLICTS RISING FROM LACK OF COORDINATION SHALL NOT JUSTIFY AN INCREASE IN THE CONTRACT AMOUNT.
- 11. ALL DIFFUSERS ARE 4-WAY BLOW UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
- 12. FLEXIBLE DUCTWORK IS ALLOWED ON RUNOUTS TO SUPPLY DIFFUSERS ONLY. UTILIZE ONLY ABOVE LAY-IN ACCESSIBLE CEILINGS. DO NOT INSTALL FLEX DUCT ABOVE HARD CEILINGS OR WHERE EXPOSED. A MAXIMUM LENGTH OF 6'-0" MAY BE USED AT EACH CONNECTION.
- 13. SEAL DUCTWORK AS CALLED OUT BELOW USING HARDCAST DT TAPE AND FTA-20 ADHESIVE OR HARDCAST AFG-1402 "FOIL GRIP" PER MANUFACTURERS INSTRUCTIONS. SEAL TO SMACNA SEAL CLASS A:

TYPE OF DUCT

EXHAUST DUCT (ROUND OR RECT)

MEDIUM VELOCITY (ROUND)

MEDIUM VELOCITY (RECTANGULAR)

LOW VELOCITY SUPPLY AND RETURN (RECT)

LOW VELOCITY SUPPLY (ROUND)

TRANSVERSE AND LONGITUDINAL

TRANSVERSE AND LONGITUDINAL

TRANSVERSE AND LONGITUDINAL

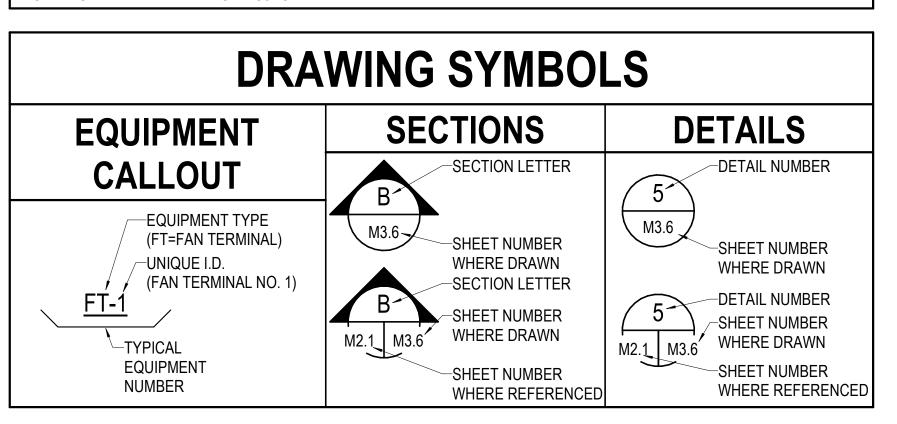
TRANSVERSE AND LONGITUDINAL

- 14. INSTALL BALANCE DAMPER WITH STANDOFF AND LOCKING QUADRANT IN AN ACCESSIBLE LOCATION AT EACH RUNOUT TO SUPPLY DIFFUSERS, EXHAUST GRILLES, AND RETURN GRILLES WHERE AIRFLOW IS INDICATED, OR AS INDICATED OTHERWISE.
- 15. ALL PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL BE FIRE STOPPED BY THE TRADE MAKING THE PENETRATION. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR REQUIREMENTS.
- 16. DO NOT ROUTE PIPING OR DUCTWORK OVER ELECTRICAL PANELS OR EQUIPMENT. PIPING OR DUCTWORK SHALL NOT BE ROUTED THROUGH ELECTRICAL ROOMS, TELECOM ROOMS OR ELEVATOR EQUIPMENT ROOMS UNLESS SPECIFICALLY SERVING THAT ROOM. COORDINATE WITH E.C. PROVIDE WATERTIGHT DRIP PAN WITH DRAIN TO NEAREST APPROVED RECEPTOR WHERE REQUIRED.
- 17. COORDINATE SIZE AND LOCATION OF ACCESS DOORS IN CONSTRUCTION REQUIRED FOR ACCESS TO MECHANICAL EQUIPMENT WITH G.C.
- 18. COORDINATE SIZE AND LOCATION OF MECHANICAL EQUIPMENT PADS WITH G.C.
- 19. ALL WORK IS TO CONFORM WITH APPLICABLE CODES AND STANDARDS.
- 20. DUCT SIZES SHOWN ARE OUTSIDE SHEET METAL DIMENSIONS.
- 21. ALL EQUIPMENT SUPPORT STANDS SHALL BE PRIMED AND PAINTED WITH EPOXY ENAMEL.
- 22. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED AIR DISTRIBUTION DEVICES.
- 23. PAINT INSIDE OF DUCTWORK BLACK ANYWHERE VISIBLE THROUGH FACE OF GRILLE OR DIFFUSER.
- 24. WHERE HYDRONIC RUNOUT SIZES ARE NOT INDICATED, SIZE PER THE FOLLOWING:
 UP TO 1 GPM 1/2"; UP TO 3 GPM 3/4"; UP TO 6 GPM 1"; UP TO 10 GPM 1-1/4"; UP TO 17 GPM 1-1/2"
- 25. HYDRONIC PIPING SHALL BE MAINTAINED FULL SIZE UP TO COIL CONNECTIONS. SHUT-OFF VALVES, STRAINERS, BALANCE VALVES, ETC. WILL NOT BE ALLOWED TO REDUCE FROM LINE/RUNOUT SIZE. CONTROL VALVES MAY BE DOWN SIZED FOR FLOW RATE, NOT TO EXCEED 4 PSIG PRESSURE DROP AT DESIGN FLOW.
- 26. TEMPERATURE CONTROLS CONTRACTOR (TCC) SHALL FURNISH AND INSTALL ALL LOW VOLTAGE WIRING AND ASSOCIATED CONDUIT REQUIRED FOR MECHANICAL CONTROL SYSTEM. WIRING SHALL BE IN CONDUIT INSIDE WALLS, IN ROOMS WITH EXPOSED CEILINGS, AND ABOVE HARD CEILINGS. LINE VOLTAGE WIRING AND ASSOCIATED CONDUIT SHALL BE PROVIDED AND INSTALLED BY E.C. CONTROL SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH SPECIFICATIONS.
- 27. ALL CONTROL DAMPERS SHALL BE FURNISHED BY TCC AND INSTALLED BY THE MC. MOTOR OPERATORS SHALL BE FURNISHED AND INSTALLED BY THE TCC.
- 28. COORDINATE ACCESS TO EQUIPMENT AND VALVES INSTALLED ABOVE 'HARD' CEILINGS AND IN MASONRY CHASES WITH GENERAL CONTRACTOR. PROVIDE LOCKING ACCESS DOORS FOR INSTALLATION BY CONTRACTOR AS REQUIRED TO SERVICE CONCEALED DAMPERS, VALVES AND EQUIPMENT. CEILING ACCESS DOORS FOR FIRE DAMPERS, SMOKE DAMPERS AND FIRE SMOKE DAMPERS FURNISHED AND INSTALLED BY CONTRACTOR.
- 29. CONTRACTOR TO INSTALL TEMPORARY FILTERS OVER ALL RETURN AND EXHAUST GRILLES IN WORK AREA DURING CONSTRUCTION.
- 30. THESE DRAWINGS ARE ACCOMPANIED BY SPECIFICATIONS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION.
- 31. EQUIPMENT THAT REQUIRES MAINTENANCE SHALL BE LOCATED A MINIMUM OF 10'-0" FROM THE BUILDING ROOF EDGE WHERE REQUIRED BY CODE.
- 32. REFER TO ARCHTIECTURAL DRAWINGS FOR LOCATIONS OF TEMPORARY PARTITIONS.
- NOTE: NOT ALL MAY APPLY ON PROJECT.

GENERAL DEMOLITION NOTES

- 1. VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK. BRING ANY DISCREPANCIES FROM THE DRAWINGS AND NOTES TO THE ARCHITECT IMMEDIATELY. MINOR CHANGES IN THE SCOPE OF THE DEMOLITION WORK SHALL NOT JUSTIFY AN ADDITIONAL COST.
- 2. REMOVAL OF EXISTING FIXTURES AND EQUIPMENT WILL REQUIRE ISOLATING THE PIPING RISERS OR MAINS VIA SHUT-OFF VALVES. INSTALL NEW ISOLATION VALVES WHERE REQUIRED FOR COMPLETION OF WORK.
- 3. REMOVAL OF EXISTING PLUMBING FIXTURES AND EQUIPMENT, ETC. WILL REQUIRE CAPPING AND SEALING EXISTING MAINS OR BRANCHES AS NECESSARY AND REQUIRED TO ALLOW THE REMAINING SYSTEMS TO FULLY OPERATE WITHOUT DEGRADATION.
- 4. CONTRACTOR SHALL PROVIDE PROTECTIVE PLASTIC DROP CLOTHS TO PROTECT THE EXISTING OCCUPIED AREAS AND EQUIPMENT FROM DUST AND DEBRIS DURING THE CONSTRUCTION WORK, AND SHALL CLEAN THE AREAS OF ALL CONSTRUCTION DIRT DAILY, AND UPON COMPLETION OF THE WORK.
- 5. ALL DRAINED PIPING RISERS AND MAINS SHALL BE REFILLED WITH PROPER FLUID AND PROPERLY VENTED BY THIS CONTRACTOR, ONCE NEW WORK HAS BEEN INSTALLED.
- 6. COORDINATE WITH GENERAL CONTRACTOR THE REMOVAL AND REPLACEMENT OF ALL EXISTING CEILINGS, WALLS, ETC. AS REQUIRED FOR MECHANICAL DEMOLITION WORK.
- 7. EXISTING PIPING AND EQUIPMENT, ETC., NOT TO BE UTILIZED IN THE COMPLETED BUILDING SHALL BE DISCONTINUED OR REMOVED AS REQUIRED. ALL ENDS OF DISCONTINUED PIPING SHALL BE CAPPED IN THE NEAREST WALL, CEILING OR FLOOR SO THAT THEY ARE COMPLETELY CONCEALED. OPENINGS LEFT IN WALLS, CEILINGS, ETC., WHERE EQUIPMENT AND PIPE, ETC., ARE REMOVED AND NOT REPLACED, SHALL BE PATCHED NEATLY WITH SIMILAR MATERIAL TO ADJACENT CONSTRUCTION. REFER TO DRAWINGS DELINEATING NEW WORK FOR ADDITIONAL INFORMATION REGARDING SYSTEMS OR PORTIONS OF SYSTEMS WHERE USE IS TO BE DISCONTINUED.
- EXISTING PIPING, FIXTURES AND EQUIPMENT THAT ARE NOT TO BE REUSED SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE OWNER IF THEY WISH TO RETAIN OWNERSHIP OF SAME. IF NOT, EQUIPMENT SHALL BECOME THE PROPERTY OF THIS CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AS SOON AS PRACTICAL AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.
- 9. ALL CUTTING AND CHANNELING OF EXISTING BUILDING SHALL BE ACCOMPLISHED IN A NEAT AND WORKMANLIKE MANNER WITHOUT REMOVAL OF EXCESS MATERIALS. THIS CONTRACTOR SHALL PATCH AND REPLACE WITH MATERIAL SIMILAR TO ADJACENT CONSTRUCTION.
- 10. WHERE EXISTING PIPING AND EQUIPMENT, ETC., THAT ARE TO BE UTILIZED IN THE COMPLETED PROGRAM CONFLICT WITH NEW CONSTRUCTION AND THE REQUIRED DEMOLITION, THEY SHALL BE RELOCATED AND RECONNECTED TO MAINTAIN THE DESIRED SERVICE.
- 11. PORTIONS OF EXISTING SYSTEMS MAY BE SHOWN FOR CLARITY EVEN THOUGH IT MAY NOT BE NECESSARY TO MODIFY OR REVISE THEM. ALL EXISTING SYSTEMS ARE SHOWN BASED ON ORIGINAL OR REMODEL BUILDING DRAWINGS. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS.
- 12. ALL WORK MUST BE COORDINATED AND SCHEDULED WITH THE OWNER AND OCCUPANTS OF THIS BUILDING SO AS TO PROVIDE THE LEAST AMOUNT OF DISRUPTION OF BUILDING ACTIVITIES AS POSSIBLE. MAINTAIN CONDITIONED SPACE FOR ALL OWNER OCCUPIED AREAS DURING CONSTRUCTION.
- 13. ALL ACCESSIBLE ABANDONED PIPING AND DUCTWORK SHALL BE REMOVED AND PROPERLY DISPOSED OF.

NOTE: NOT ALL MAY APPLY TO PROJECT



SHEET LIST

M0.0 MECHANICAL COVER SHEET
 M0.1 SPECIFICATIONS
 M0.2 SPECIFICATIONS
 M0.3 DETAILS AND SCHEDULES
 M1.1 HVAC FLOOR PLANS





SHEET CONTENTS

MECHANICAL COVER SHEET

LP MIDDLE SCHO 3515 Co Rd 54G Laporte, CO 80535

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IO. BY DESCRIPTION DATE

CRS
CHECKED
CWH
DATE
12-17-2019

SECTION 200500 - COMMON WORK RESULTS FOR FIRE PROTECTION, PLUMBING, AND

1.2 EXAMINATION OF SITE

A. Visit the site, inspect the existing conditions and check the drawings and specifications so as to be fully informed of the requirements for completion of the work. Lack of such information shall not justify an extra to the contract price.

1.3 SCOPE

- A. The Mechanical Work shall include labor, materials, and equipment to install systems as shown on plans and hereinafter specified. The installation shall include all labor, materials, tools, transportation, equipment, services and facilities, required for the complete, proper and substantial installation of all mechanical work shown on the plans, and/or outlined in these specifications. The installation shall include all materials, appliances, and apparatus not specifically mentioned herein or noted on the drawings but which are necessary to make a complete working installation of all mechanical systems.
- B. Show on prints in red ink all changes from original plans made during the installation. Return these prints to the Architect upon completion of the project.
- C. By bidding, this contractor acknowledges his understanding of the work to be done and agrees to install complete and workable systems.

1.4 CODES

- A. Execute work in compliance with all applicable Federal, State and Municipal laws, codes, ordinances, and local customs regarding the trade to perform the work.
- B. Codes shall govern in case of any direct conflict between codes and plans and specifications; except when plans and specifications require higher standards than those required by code. Variance from the plan and specifications made to comply with code must be approved by the Architect. If approved they shall be made with no increased cost to the Owner.
- C. In addition, the following published Standards and Regulations shall be adhered to as applicable to the work involved:
 - Latest issue of the Local, State, and National Plumbing Codes
 - Latest issue of the ASHRAE Guide Latest issue of the SMACNA Handbook
 - Applicable NFPA Pamphlets
- Applicable ANSI Standards
- American Society of Mechanical Engineers Boiler Code
- American Society of Mechanical Engineers Unfired Pressure Vessel Code
- American Standards Association Code for Mechanical Occupational Safety and Health Act
- Current Editions of Uniform Building Code
- Latest issue of the State Air Pollution Control Regulations
- Rules of the State Boiler Inspection Department
- Americans with Disabilities Act

1.5 DEFINITIONS

- A. It shall be understood that the drawings and specifications complement one another and items specified shall also meet the criteria set forth on the drawings.
- B. Where any device or item is referred to in the singular sense (such as "the unit"), such reference applies to as many devices as are required to complete the installation as shown on
- C. The term "work" shall mean all obligations imposed upon the Contractor by the Contract Documents.

1.6 ABBREVIATIONS

- ADA Americans with Disabilities Act
- AGA American Gas Association
- AISI American Iron and Steel Institute
- AMCA Air Moving and Conditioning Association, Inc. ANSI - American National Standards Institute
- ASHRAE American Society of Heating, Refrigeration & Air-Conditioning Engineers, Inc. ASME - American Society of Mechanical Engineers
- ASTM American Society for Testing and Materials
- AWWA American Water Works Association BPVC - Boiler and Pressure Vessel Code of ASME
- CISPI Cast Iron Soil Pipe Institute
- NFPA National Fire Protection Association
- SMACNA Sheet Metal and Air-Conditioning Contractors National Association, Inc.
- UL Underwriters' Laboratories, Inc. ETL - ETL Testing Laboratories, Inc.
- OSHA Occupational Safety and Health Administration

1.7 PERMITS

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- A. Obtain and pay for all licenses and permits, fees, inspection and certificates required for the
- execution of this work.
- B. Pay fees and charges for connection to outside services and use of property. C. Deliver permits and certificates to the Architect for transmittal to the Owner.

1.8 RESPONSIBILITY

- A. This contractor will be held responsible for any and all damage to any part of the building or to the work of other contractors, as may be caused through his operation.
- B. The operation and maintenance of the New Mechanical Equipment during construction shall be 1.17
- the responsibility of this contractor until the acceptance of the building by the Owner. C. The General Contractor shall pay for all fuel cost for operation of the equipment, unless
- indicated otherwise in the specifications
- D. This Contractor shall make all provisions for entry of equipment, installed under this Contract, to the installed location. This Contractor shall provide openings in existing construction if necessary. This Contractor shall do all repair necessary to restore the building to the original condition. During the period of entry of equipment and removal of trash, no disruption of the Owner's normal business shall occur.

1.9 WORK TO BE DONE BY GENERAL CONTRACTOR

- A. Build in all openings, sleeves, chases, etc., for piping, as established, furnished and set by this
- B. Mechanical Contractor shall furnish bolts, brackets, hangers, etc., required for work established and arrange for General Contractor to build into concrete structure. General Contractor shall install all factory sleeved fire dampers, furnished by Mechanical Contractor, in walls and floors.
- C. Frame around and provide openings for ductwork, louvers, roof drains, etc.
- D. Build curb or install factory curb and provide flashing for roof mounted mechanical equipment. Provide heavy steel angle support under entire perimeter of roof curb for rooftop equipment. Metal deck and roof insulation shall be installed within the roof curb area of rooftop equipment for acoustical considerations.
- E. Provide lintels over wall openings.
- F. Build concrete base for equipment furnished and set by this contractor.
- G. Provide concrete housing for sewage ejector and sump pump basins. H. Paint all mechanical equipment so specified. Use paint which is specified by the Architect.
- I. Do excavation, provide moisture barrier, sand and/or gravel, tie down wire, and a minimum thickness of 3" of lightweight concrete for installation of duct below grade. Mechanical Contractor shall furnish duct and set in place in preparation for concrete pour.

1.10 WORK TO BE DONE BY ELECTRICAL CONTRACTOR

- A. The Electrical Contractor shall provide all motor starters complete with auxiliary contacts where required for the function of this system unless specifically noted otherwise on the plans or in these
- B. All required line voltage wiring for the mechanical control system shall be furnished and installed by
- the Electrical Contractor under supervision of the Control Manufacturer's representative. C. Check mechanical specifications to verify wiring requirements for motor driven equipment. Provide complete wiring for the equipment including all required interlocking. Provide complete wiring for power factor correction capacitors.
- D. The Electrical Contractor shall install the power factor correction capacitors furnished by the Mechanical Contractor for equipment so specified.

1.11 ELECTRICAL REQUIREMENTS BY MECHANICAL CONTRACTOR

- A. Mechanical Contractor shall furnish all motors, motor interlocking control devices, certain magnetic starters, etc.
- B. Submittals shall include complete equipment wiring diagrams and temperature control drawings for all
- C. Submittals shall show all wiring connections, starters, auxiliary contactors, interlocking selector switches, separate control voltage power supplies, for each and every item of equipment, etc.,
- D. Provide one copy of Engineer approved shop drawings showing all wiring and temperature control requirements of all mechanical equipment to the Electrical Contractor.

WORKMANSHIP AND COORDINATION

- A. Make installation substantially as shown on the plans.
- B. Pipe and duct routing and equipment location shown on the drawings are schematic in nature. Make alterations in location of apparatus or piping as may be required to conform to building construction without extra charge.
- C. Equipment service clearances, per equipment manufacturers' specifications, shall be maintained from general construction. No pipe or ductwork shall be installed within these clearances. No piping, coils, or ductwork shall be installed above electrical panels, starters or switch gear, or in elevator equipment
- D. Cooperate with other contractors in their installation of work.
- E. The ductwork shall take precedence over all pipe work except where it is necessary to maintain an
- even grade or specific slope on the piping. F. Use only experienced mechanics.

1.13 MATERIALS

A. Material and equipment shall be new, of best quality and design and free from defects. A manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment stating manufacturer's name, address and catalog number.

1.14 MATERIALS OF APPROVED EQUAL

- A. Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model or catalog number, only such specific items may be used in the base bid, except as hereinafter provided.
- B. Unless requests for changes in base bid specifications are received and approved and noted by addendum prior to the opening of bids, the successful contractor will be held to furnish specified item.
- C. After contract is awarded, changes in specifications shall be made only as defined under "Substitution of Equipment".

1.15 SUBSTITUTION OF EQUIPMENT

- A. After execution of the contract, substitution of equipment of makes other than those specifically named in the contract documents will be approved by the Engineer only if the equipment named in the specifications cannot be delivered to the job in time to complete the work in proper sequence to work of other contractors, due to conditions beyond control of the contractor.
- B. Requests for substitutions must be accompanied by documentary proof of equality or difference in price and delivery, if any, in form of certified quotations from suppliers of both specified and proposed equipment.
- C. The Owner shall receive all benefits of the difference in cost involved in any substitution, and the contract altered by change order to credit Owner with any savings so obtained.

1.16 SUBMITTALS

- A. Contractor shall send to the Architect for approval submittals on all equipment, accessories, and
- B. Where catalog cuts are used, mark them to indicate equipment, capacities, controls, fittings, valves,
- C. Reference each item to applicable specification paragraph number and plan sheet number. Reference items not appearing in base specification to applicable alternate numbers, change order numbers, letters of authorization, etc.
- D. All shop drawings shall be checked and signed by the mechanical contractor prior to submittal to the
- E. Shop drawings submitted without contractor's signature or approval and verification will not be approved. Quantities will not be checked or verified. It is the contractor's responsibility to provide the proper quantities required to complete the job.
- F. Portions of the work requiring a shop drawing submittal shall not begin until the shop drawing has been approved by the Engineer.
- G. Submit wiring diagrams for all mechanical equipment requiring field wiring clearly showing all required connections.
- H. Engineer's acceptance of Compliance Submittals will not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any acceptance by Engineer relieve Contractor from responsibility for errors or omissions in Compliance Submittals.

CUTTING AND PATCHING

- A. Notify the General Contractor in ample time, of the location of all chases, sleeves, and any other openings required in connection with the work of this contract.
- B. Cutting and patching made necessary because of failure to comply with the above shall be done by the General Contractor at the expense of the Mechanical Contractor.

1.18. MUTILATION

A. All mutilation of finishing initiated by installation of plumbing pipes, fixtures, etc., shall be properly pointed up by the respective finishing contractor and paid for by the Mechanical Contractor.

1.19 EXCAVATION AND BACKFILLING

- A. Do all excavation required for water, gas, sewer, drainage, etc.
- B. Contractor shall do all shoring and bracing necessary per OSHA requirements to perform the work and as required for safety.
- C. Backfill and tamp the earth around pipes and bring to required level.
- D. Fill carefully to prevent future settlement.
- E. Backfill trenches under concrete floor, drive, or walks, with sand, crushed rock, or gravel, in manner to prevent future settlement. Backfilling of trenches shall be in conformance with requirements for earthwork in the Architectural Specifications.
- F. Street and alley pavement surfaces damaged must be repaired to the satisfaction of the local authorities.

- A. Furnish testing equipment and test all piping systems under methods and conditions as specified.
- B. Test for a period of not less than 12 hours in the presence of the Architect. C. Make all necessary replacements and repair and repeat tests until the entire system is approved and
- D. Test under pressure with liquid or gas as directed or specified.

1.21 PAINTING

A. All painting shall be done by the General Contractor. B. Painting shall be for the following items: all piping, ductwork, frame work, and all equipment not furnished with factory finish, etc., in all exposed areas of the building and/or as noted on the drawings. Omit painting of piping in tunnels and in concealed areas.

1.22 LABELING

- A. Install mechanically engraved metal or plastic label at equipment, not less than 2-1/2 inches wide by 3/4 inch tall with letters between 1/4 inch and 1/2 inch tall. Utilize labels with pre-drilled holes and stainless steel rivets or self-tapping screws, or labels with contact-type permanent adhesive.
- B. Identify all service piping which is accessible for maintenance operation with semi rigid plastic markers complete with direction of flow arrows. Each marker must show approved color-coded background, proper color of legend, approved legend letter size and approved marker length. Use snap on or Type SNA markers on diameters 3/4" thru 5". Use strap-on or Type STR on diameter 6" and larger. Locate pipe markers at each valve, each branch and riser takeoff, each passage through wall or floor construction, each passage to underground and at 25 foot intervals on all horizontal pipe runs.

1.23 OPERATING INSTRUCTIONS

A. Prepare and submit to the Engineer for approval three (3) copies of operating instructions made in conjunction with Equipment Manufacturer's representative. Instruction shall contain equipment starting sequence, interlocks, controls, switches, etc. which affect the equipment operation. Place copies in maintenance instructions brochure.

1.24 MAINTENANCE INSTRUCTIONS

- A. Prepare a brochure in triplicate covering all systems and equipment furnished and installed under this contract. Each brochure shall include certified equipment drawings and/or catalog data as submitted, complete maintenance instructions, parts lists for each item of equipment, any special emergency operating instructions, all equipment warranties with starting dates identified, and a list of service organizations including addresses and telephone numbers.
- B. Brochures shall be bound in hard backed, three-ring binders with an index, sub-dividers and reinforced sheets.
- C. Label cover with the following:
- Project name and address Section of work covered by brochure, i.e., "Plumbing Heating, Ventilation, Air Conditioning", etc. Name and address of Architect, Engineer, Contractor.
- Telephone number of Contractor including night and emergency numbers. D. Brochures shall be submitted to the Engineer for approval and delivery to the Owner.

1.25 LOOSE EQUIPMENT

A. All keys and special wrenches furnished with the equipment shall be kept in a safe place during construction and presented to the Owner at the completion of the project.

1.26 FINAL INSPECTION

- A. Final inspection will be made upon written request from the Mechanical Contractor after the
- B. Furnish a workman familiar with this project to accompany the Engineer on final inspection and have available ladders, drop cords, and other equipment as required to gain access to any
- person of authority responsible to demonstrate to the Engineer that his work conforms to the intent of the plans and specifications. D. Extra inspections made necessary by the Mechanical Contractor's failure to comply with the

conditions as set forth above shall be charged to the contractor at the inspector's time both on

C. This contractor and his principal sub-contractors shall be represented at the inspection by a

- 1.27 GUARANTEE A. Guarantee all work, material and equipment for a period of one year after date of final certificate
 - of acceptance by the Architect. B. During the year guarantee period the mechanical contractor shall be responsible for any defects which develop in the mechanical systems. Upon notification of a defect by the Architect, (s)he shall make immediate effort to correct it and shall notify the Architect when this work is
 - completed. C. Repairs and/or replacements shall be made with no cost to Owner.

the job and spent in travel between the office and the project site.

SECTION 200600 – MATERIALS AND METHODS COMMON TO FIRE PROTECTION, PLUMBING, AND MECHANICAL.

1.1 PIPING SYSTEMS - GENERAL

- A. Pipe for piping systems shall be cut accurately to measurements taken on the job. B. Install offset connections for alignment of vertical to horizontal piping wherever required to make
- C. Make branch connections with offsets to provide for movement with the expansion of the piping

larger than equipment tappings, reduce pipe size immediately prior to entry.

- D. Install horizontal piping parallel to the building walls and partitions.
- E. Do not run piping through elevator equipment rooms, transformer vaults or other electrical equipment spaces or above electrical gear or panels. F. Valves, strainers, control valves, check valves and fittings shall be full size of the line they serve. Make change in pipe size noted on plans after last fitting on larger pipe. When supply pipes are

1.2 PIPE AND FITTINGS

- A. Each piece of pipe must be clearly labeled or stenciled with manufacturer's name, type of pipe and length, in accordance with ASTM standards. All pipe must be new. Re-processed pipe which has been cleaned and re-finished due to extended yard storage will not be accepted. All pipe must be corrosion free. Submit shop drawings on piping along with certified mill specifications.
- B. Mechanically Formed Tee Connections: (Optional)

insure proper tolerance and complete uniformity of the joint.

- 1. Mechanically extracted collars shall be formed in a continuous operation consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. The collaring device shall be fully adjustable as to
- 2. The branch shall be notched to conform with the inner curve of the run tube and dimpled to insure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube.

3. All joints shall be brazed in accordance with the Copper Development Association Copper

4. Note: Soft Soldered joints will not be permitted. 5. All mechanically formed branch collars shall be listed by the National Standard Plumbing Code, B.O.C.A., I.A.M.P.O., S.B.C.C., HUD, U. S. Army Corps of Engineers, and

Tube Handbook using B-cup series filler metal.

the insignia of the Cast Iron Soil Pipe Institute.

- Underwriters Laboratory. C. Polyvinyl Chloride Pipe and Fittings conform to ASTM D2665. D. Cast Iron Soil Pipe and Fittings: weight in compliance with Specification; ASTM A-74 carrying
- . Cast Iron No-hub Pipe and Fittings: conform to Standard 301 of the Cast Iron Soil Pipe Institute F. Copper tubing: seamless copper water tube conforming to ASTM Standard Specification B88.

1.3 VALVES

- A. Provide all valves required for operation, service, and maintenance of systems and equipment, i.e. shut off valves both sides of equipment, coils, etc.
- B. Cut off valves in general shall be ball or butterfly valves. All shut-off valves on domestic water
 - lines 2" and smaller shall be ball valves.
- C. Valves in air lines and throttling valves shall be globe valves.
- D. Flow control valves shall be plug valves. E. Standard valves shall have 125 psi. working steam pressure or 200 psi. for water, oil and gas.
- F. Sweat joint valves shall be used on all copper pipe.
- G. Ball valves two inches and smaller shall have a forged brass body with screwed pipe ends for steel pipe and sweat ends for copper pipe. Body shall be two piece for valve assembly access to allow performance of all maintenance operations. One piece hard chrome plated brass ball or stainless steel ball with <u>full</u> port flow, self-aligning and free floating between two Viton seats (300 psi) to provide positive seal in either direction. Stem shall be brass or stainless steel and extended 1 1/4" above the valve to clear insulation and to receive molded packing brass packing nut and handle nut. Handle shall be constructed of zinc plated steel with partial plastic coating. Valve shall be rated for 150 psig at 180°F.
- H. Insofar as possible, all valves of the same type shall be of the same manufacturer. Before purchasing any valve, contractor shall submit for approval the name of the manufacturer, the figure number which he proposes to furnish, and engineering data on each figure number, if not using those specified. The intent of this requirement is to obtain the most suitable valve for each service. Nonstandard valves will not be considered.

1.4 UNIONS

1.5 SLEEVES AND COVER PLATES

- A. Unions 2" and Smaller (150 WSP 200 WOG): Standard Weight brass to iron seat malleable iron body with screwed ends - Walworth #7712 or #7762 - equivalent Crane or Stockham. B. Unions 2 1/2" and Larger: (125 PSI WSP) Standard cast iron body with flanged ends - Walworth
- #1137 or #1537 equivalent Crane or Stockham. C. Install wherever necessary for repair, replacement, or service of the equipment or system.

metal with plaster bead set flush with the wall finish.

- A. Install for all pipes passing through floors, walls, or partitions. Size sleeves large enough to allow for free movement of the pipes with expansion.
- B. Floor sleeves: 20 gauge galvanized sheet metal flanged at the bottom and attached to the forms before concrete is poured (straighten sleeve after floor is poured). C. Sleeves for insulated pipe passing through walls or partitions: 24 gauge galvanized sheet
- D. Sleeves for uncovered pipe passing through walls or partitions: Galvanized steel pipe sleeves, extending outside of the wall finish as required to attach the cover plates.

E. Sleeves for basement walls or floors: Provide "Link-Seal" as manufactured by Thunderline

- Corp. or silicone pressure sealants as manufactured by General Electric or Dow Chemical Co., field applied under the direction of the local Manufacturer's Representative. F. Provide chrome plated brass cover plates attached to the sleeves independent of the pipe on all pipes which pass through floors, walls, ceilings, and partitions in finished rooms. Beaton
- Corbin Co. Style 2-BC for copper tube and 13-BC for standard pipe. G. Manufacturer: Subject to compliance with requirements, provide pipe escutcheons of one of
- the following: a. Chicago Specialty Mfg. Co.
- Producers Specialty & Mfg. Corp. c. Sanitary-Dash Mfg. Co. H. Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied
- areas, escutcheons not required for unoccupied areas. I. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons,
- solid or split or split hinged. J. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.
- K. Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe

or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

SECTION 200700 - INSULATION

- 1.1 INSULATION AND PIPE COVERING A. Manufacturers: Johns Manville - Owens Corning - CertainTeed - Knauf.
 - B. Features: All completed insulation of pipe and fittings shall have the following Underwriters Laboratories Fire Hazard Classification: a. Flame spread not to exceed - 25.

equal. Vapor seal all joints with Childers CP-30 or equal.

Fuel contributed not to exceed - 50.

maximum "K" factor of .23 at 75° F. mean temperature.

- Smoke developed not to exceed 50. C. Four (4 lb.) density glass fiber insulation used for all pipe covering in this section shall have a
- D. All pipe insulation to be covered with factory applied flame retardant vapor barrier jacket. Manville Micro-Lok 850 fiberglass AP-T Plus jacket or equal. 1. Interior concealed fittings and pipe hangers shall be insulated with flexible glass fiber to a

thickness equal to the adjoining pipe insulation. Finish by spiral wrapping with white vinyl

and apply a brush coat of vapor barrier mastic. Childers CP-30 or equal. 2. Interior exposed fittings shall be insulated with PVC fitting covers installed over flexible glass fiber inserts to a thickness equal to the adjoining pipe insulation. Manville Zeston or

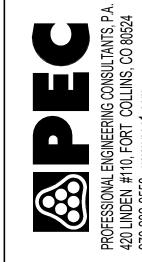
3. In finished rooms or areas where insulated pipes are subject to abuse, additionally finish

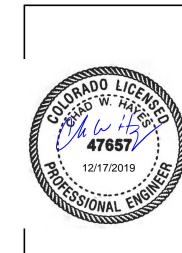
with .032 embossed aluminum jacketing or 30 mil PVC jacketing for a distance of not less than 9 ft. up from finished floor or to finished ceiling level. 4. Insulate refrigerant suction lines with 1" thick and condensate drain lines with 1/2" thick Armstrong AP Armaflex, applied in strict accordance with manufacturer's instruction. Finish all exposed piping with two coats of white Armstrong Armaflex finish. Manville

1.2 EQUIPMENT A. Insulate roof drain sumps, with Armstrong Armaflex II sheet insulation 1/2" thick. Apply in

Aerotube or Owens-Corning O.C. flexible tubing approved equal.

accordance with manufacturers recommendations B. Prepare all exposed insulated covering for painting. Apply insulation over clean dry surface. Butt all longitudinal joints tightly together.





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A. CONTROLS NOTES:

- 1. THE SYSTEM CONSISTS OF AN EXISTING VERTICAL UNIT VENTILATOR WITH EXISTING HOT WATER COIL AND SUPPLY FAN NEW DX COIL AND ASSOCIATED CONDENSING UNIT TO BE ADDED FOR COOLING.
- 2. SEE BELOW FOR COMPLETE VUV SEQUENCE OF OPERATION. SOME OF THE ITEMS LISTED BELOW ARE EXISTING, UNIT CURRENTLY OPERATES AS A HEATING ONLY UNIT CONTRACTOR SHALL ENSURE UNIT OPERATES AS NOTED BELOW ONCE COOLING IS ADDED.
- B. THE EXISTING HONEYWELL SPYDER DIRECT DIGITAL CONTROLLER (DDC) PROVIDES CONTROL OF THE UNIT AS FOLLOWS.

A USER ADJUSTABLE OCCUPIED/UNOCCUPIED TIME SCHEDULE PER AREA (WEST AND EAST) CONTROLS THE UNIT MODE OF OPERATION.

DAMPER NORMAL POSITION:

OUTSIDE AIR DAMPER NORMALLY CLOSED. RETURN AIR DAMPER NORMALLY OPEN.

OCCUPIED MODE:

THE DDC ENABLES THE SUPPLY FAN TO RUN CONTINUOUSLY (SEE SPEED CHART) AND THE OUTSIDE AIR DAMPER OPEN TO ITS MINIMUM VENTILATION POSITION. THE DDC MONITORS THE STATUS OF THE FAN VIA A CURRENT SWITCH. IF THE FAN FAILS TO PROVIDE RUN STATUS WHILE COMMANDED "ON" THE DDC RETURNS THE DAMPERS TO THEIR NORMAL POSITIONS AND AN ALARM IS GENERATED AT THE DDC CENTRAL WORKSTATION.

THE DDC MODULATES THE HEATING COIL CONTROL VALVE, MIXED AIR DAMPERS, AND CYCLES THE DX COOLING SECTION IN SEQUENCE TO MAINTAIN THE SPACE TEMPERATURE AT SET POINT.

HEATING MODE:

IF THE SPACE TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SET POINT 70°F (ADJ.) THE DDC MODULATES THE HEATING COIL CONTROL VALVE TO MAINTAIN THE ZONE TEMPERATURE SET POINT. THE DISCHARGE AIR TEMPERATURE WILL BE LIMITED TO 90°F (ADJ.).

COOLING MODE (ECONOMIZER):

WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW THE OUTSIDE AIR DX LOCKOUT SET POINT OF 65°F (ADJ.) THE DDC MODULATES THE OUTSIDE AIR DAMPER TO MAINTAIN THE SPACE OCCUPIED COOLING SET POINT 75°F (ADJ.). THE OUTSIDE AIR DAMPERS WILL BE LIMITED TO A DISCHARGE AIR LOW LIMIT OF 55°F (ADJ.).

COOLING MODE (DX):

WHEN THE OUTSIDE AIR TEMPERATURE IS GREATER THAN THE OUTSIDE AIR DX LOCKOUT SET POINT. THE DDC POSITIONS THE OUTSIDE AIR DAMPER TO ITS MINIMUM VENTILATION POSITION (MINIMUM OUTSIDE AIR POSITION IS COORDINATED WITH THE TAB CONTRACTOR.). IF THE SPACE TEMPERATURE RISES ABOVE THE OCCUPIED SPACE COOLING SET POINT THE DDC STAGES THE DX (DXC-# AS 1ST STAGE AND CAPACITY CONTROL SOLENOID AS 2ND STAGE), TO MAINTAIN THE SPACE TEMPERATURE SET POINT.

EXHAUST FAN / CONDENSER FAN:

THE EXHAUST FAN/CONDENSER FAN WILL FOLLOW THE SPEED AS DESCRIBED ON THE FAN SPEED CHART (SEE SPEED CHART)

UNOCCUPIED MODE:

THE SUPPLY FAN AND EXHAUST FAN/CONDENSER FAN ARE OFF, THE OUTSIDE AIR DAMPER IS CLOSED, AND DX COOLING SECTION IS OFF. THE HEATING COIL CONTROL VALVE MODULATES TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT OF 45°F (ADJ.).

UNOCCUPIED MODE (HEATING):

IF THE SPACE TEMPERATURE FALLS BELOW THE SPACE UNOCCUPIED HEATING SET POINT 65°F (ADJ.), THE DDC ENABLES THE SUPPLY FAN AND THE EXHAUST FAN/CONDENSER FAN REMAINS OFF. THE HEATING COIL CONTROL VALVE WILL OPERATE IN OCCUPIED MODE TO MAINTAIN THE OCCUPIED HEATING SET POINT. THE OUTSIDE AIR DAMPER REMAINS CLOSED AND THE DX COOLING SECTION REMAINS OFF. ONCE THE SPACE REACHES THE UNOCCUPIED HEATING SET POINT PLUS A 2 DEG F DEADBAND, THE SUPPLY FAN IS DISABLED.

UNOCCUPIED MODE (COOLING):

IF THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED COOLING SET POINT 85°F (ADJ.), THE DDC ENABLE THE SUPPLY FAN AND EXHAUST FAN/CONDENSER FAN (IF REQUIRED). THE MIXED AIR DAMPERS, DX, EXHAUST/CONDENSER FAN AND SUPPLY FAN WILL OPERATE IN OCCUPIED MODE TO MAINTAIN THE OCCUPIED COOLING SET POINT. ONCE THE SPACE REACHES THE UNOCCUPIED COOLING SET POINT PLUS A 2°F DEADBAND, THE DAMPER IS CLOSED OR THE COOLING IS DISABLED AND THE SUPPLY FAN IS DISABLED. IN DX OPERATION THE OUTSIDE AIR DAMPER SHALL BE CLOSED.

AN OPTIMAL START PROGRAM PER AREA WILL ENABLE THE UNITS AT THE LATEST POSSIBLE TIME TO INSURE THE SPACES ARE WITHIN THE SPACE SET POINTS AT THE TIME OF OCCUPANCY. THERE WILL BE AN OWNER ADJUSTABLE TIME LIMIT PROVIDED THROUGH THE GRAPHICS TO SCHEDULE HOW MANY HOURS PRIOR TO OCCUPANCY THE UNIT CAN BE ENERGIZED. TIME WILL BE ADJUSTABLE FROM 0 MINUTES TO 8 HOURS. INITIALLY SET TO 30 MINUTES.

WARM-UP:

IF THE AVERAGE OF THE AREAS ZONE TEMPERATURES FALLS BELOW THE MORNING WARM-UP TARGET SET POINT (70°F) THE DDC ENABLES THE SUPPLY FAN AND THE EXHAUST FAN/CONDENSER FAN REMAINS OFF. THE HEATING COIL CONTROL VALVE WILL OPERATE IN OCCUPIED MODE TO MAINTAIN THE OCCUPIED HEATING SET POINT. THE OUTSIDE AIR DAMPER REMAINS CLOSED AND THE DX COOLING SECTION REMAINS OFF. IF THE AVERAGE OF THE AREAS SPACE TEMPERATURES REACHES THE TARGET SET POINT PRIOR TO OCCUPANCY TIME THE UNITS ENTER OCCUPIED MODE.

COOL-DOWN:

IF THE AVERAGE OF THE AREAS ZONE TEMPERATURES RISES ABOVE THE MORNING COOL-DOWN TARGET SET POINT (75°F) THE UNIT IS ENABLED IN THE MORNING COOL-DOWN MODE. THE DDC ENABLE THE SUPPLY FAN AND EXHAUST FAN/ CONDENSER FAN (IF REQUIRED). THE MIXED AIR DAMPERS, DX, EXHAUST/CONDENSER FAN AND SUPPLY FAN WILL OPERATE IN OCCUPIED MODE TO MAINTAIN THE OCCUPIED COOLING SET POINT. IF AVERAGE OF THE AREAS ZONE TEMPERATURES REACHES THE TARGET SET POINT PRIOR TO OCCUPANCY TIME THE UNITS ENTER OCCUPIED MODE. IN DX OPERATION THE OUTSIDE AIR DAMPER SHALL BE CLOSED.

UNIT SAFETIES:

A HARDWIRED LOW LIMIT THERMOSTAT (MFG.) MOUNTED DOWNSTREAM OF THE HEATING COIL, UPON SENSING A TEMPERATURE LESS THAN 38°F (FACTORY SET), STOPS THE SUPPLY FAN, CLOSES THE OUTSIDE AIR DAMPER. OPENS THE HEATING COIL CONTROL VALVE. AND GENERATES AN ALARM AT THE DDC CENTRAL WORKSTATION. THE DDC WILL TRY TO RESTART AFTER A 15 MIN. (ADJ.) DELAY ONCE THE TEMPERATURE RETURNS ABOVE LOW LIMIT THERMOSTAT SET POINT. IF THERE ARE 3 (ADJ.) LOW LIMIT TRIPS WITHIN 60 MIN. (ADJ.), THE DDC WILL SHUT DOWN THE UNIT AND A MANUAL RESET THROUGH THE DDC CENTRAL STATION WILL BE REQUIRED.

SECTION 220400 - PLUMBING

1.1 CONDENSATE DRAIN PIPING (COOLING COIL DRIP)

- A. Type M copper pipe with sweat drainage fittings, galvanized steel pipe with screwed drainage fittings or Schedule 40 PVC plastic pipe with solvent welded fittings.
- B. Pitch all horizontal lines to drain at a minimum fall of 1" per 10 feet of run.
- C. Provide air trap at each equipment connection.

SECTION 230593 - AIR TEST AND BALANCE

1.1 SCOPE

- A. The Mechanical Contractor shall procure the services of Lawrence H Finn & Associates, Jedi Balancing or another independent firm, fully certified with the National Environmental Balancing Bureau (NEEB). The firm shall test air moving equipment and air distribution and exhaust systems and to supervise the balance and adjustment of these systems. All work shall be done under direct supervision of a qualified and licensed Heating and Ventilating Engineer. The mechanical contractor shall provide workmen of the proper trade to make adjustments to the systems as determined by the Engineer. The Contractor shall provide access as required, including any necessary scaffolding, and shall cooperate with testing laboratory personnel. All instruments used in this work shall be accurately calibrated and maintained in good working order. If requested the tests shall be conducted in the presence of the Mechanical Engineer responsible for the project and/or his representative. Air balance and testing shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation 24 hours prior to the onset of testing and balancing and shall continue the operation of same during each working day until the completion of all test and balance work. The Contractor shall award the test and balance contract upon receipt of his contract to proceed with the air conditioning installation, to allow the Air Balance and Testing Engineer to schedule his work in cooperation with other trades involved and comply with completion date. Upon completion of the air conditioning system installation, the Air Balance and Testing Engineer shall perform the following tests, supervise adjustments and system modifications, and compile the test data as required for evaluation and approval.
- B. In addition to procuring the services of an air balancing engineer as hereinafter specified the mechanical contractor shall:
- a. Clean air filters, ductwork, coils, fans, etc. in the air system to remove all construction dust and debris
- b. Start, lubricate and balance all fans. Change and/or adjust drive pulleys on fans to give
- c. Supply and install all balancing dampers as required for final balancing as determined
- by the balancing engineer. d. Furnish workmen familiar with this project and of the proper trade to assist the balancing engineer in the air and water balancing. Also make available subject to request by the balancing engineer trained servicemen of the control and equipment
- suppliers to assist as needed during the testing of their portion of the project. e. Furnish plans, operating manuals, and shop drawings of all equipment installed for use by the Air and Water Balancing Agency.
- f. Have all systems in full operation a minimum of 24 hours before Balancing Engineer arrives on job.

1.2 AIR SYSTEM TEST AND BALANCE PROCEDURE

- A. Procedure:
- a. Existing VUV's shall operate as they currently do, except with cooling added. A full test and balance is not expected, but manufactures shall provide start up and ensure unit fan speed is set as it previously was.

SECTION 230800 - AIR DISTRIBUTION

1.1 DEFINITIONS

- Low Velocity Ductwork: Supply, return, make-up, and exhaust ductwork systems that are sized at 2,000 FPM or lower.
- Medium Velocity Ductwork: Supply ductwork systems sized at greater than 2,000 FPM to 3.000 FPM
- Low Pressure Ductwork: Ductwork connected to fan systems with a 2" w.c. or less
- deadhead rating. • Medium Pressure Ductwork: Ductwork connected to fan systems with greater than 2" w.c. and less than 6" w.c. deadhead rating.

1.2 PERFORMANCE REQUIREMENTS

- A. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. All work shall comply with the Mechanical Codes.
- C. Structural Performance: Duct hangers and supports[and seismic restraints] shall withstand the effects of gravity[and seismic] loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" [and] [ASCE/SEI 7].
- D. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 DX COOLING COIL AND AIR COOLED CONDENSING UNIT

- A. Coil and associated condensing unit must be by Engineered Air. Coil shall be specifically manufactured for use in the existing unit ventilator. Manufacture must visit site, take measurements and ensure the coil and condensing unit used will provide a complete working system providing heating and cooling once complete.
- B. Refrigerant Piping: Contractor to provide Type "L" hard drawn pre-dehydrated and sealed copper pipe equal to "ACR". Fittings to be forged or wrought copper sweat with "SIL-FOS" or equivalent silver bearing solder. Use long radius ells except for traps. Test system at 300 PSI with Nitrogen. Support piping with "Hydrazorb", "Cush-A-Clamp" or equal vibration absorbing clamps. Equipment supplier to size piping for the indicated installation, and provide all required refrigerant specialties. Contractor's option to utilize pre-charged and insulated line sets.

SECTION 230923 - TEMPERATURE CONTROL SYSTEMS

1.1 SYSTEM SUMMARY

A. The intent of this specification is to provide control strategies for expanding the existing BAS system, and utilizing the same software license agreement for the applications. All equipment as listed on the mechanical drawings/control drawings shown to be controlled by the BAS system shall adhere to this specification. Temperature controls shall match existing, with necessary modifications to allow for the addition of cooling to existing heating only units.

1.2 CLOSEOUT PROCEDURES

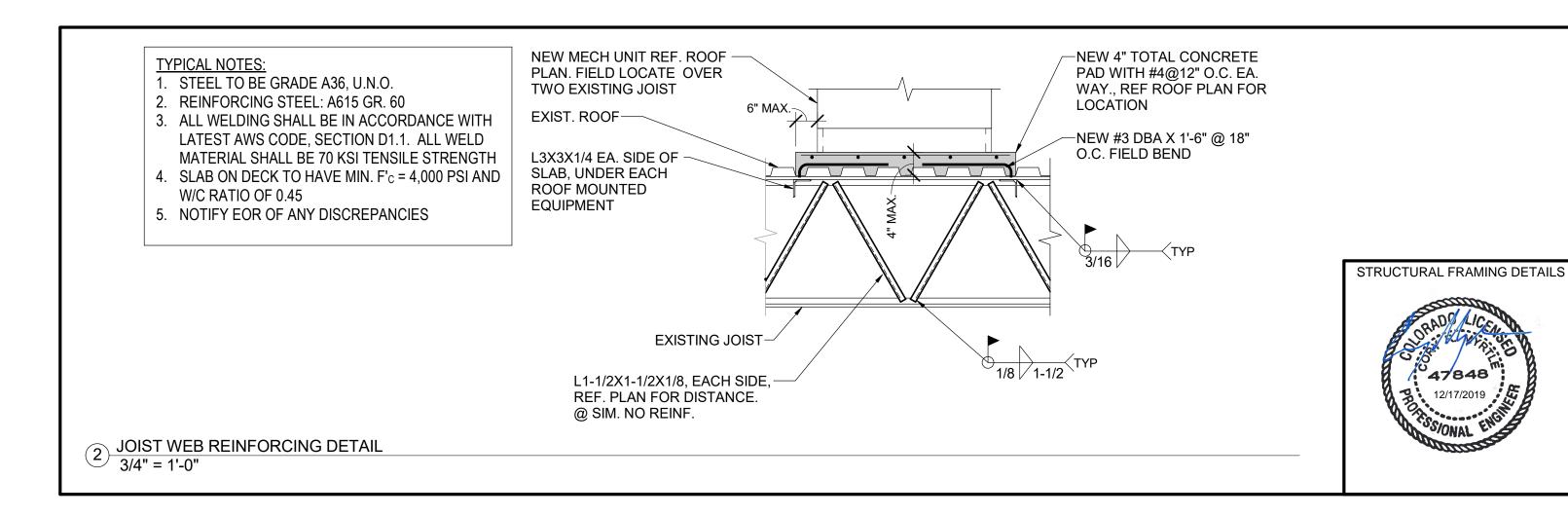
A. Owner's Instructions: Provide services of manufacturer's technical representative to instruct Owner's personnel in operation and maintenance of control systems.

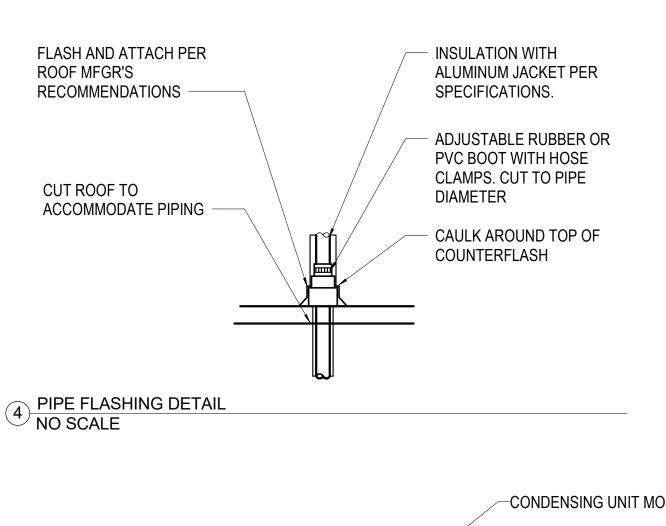




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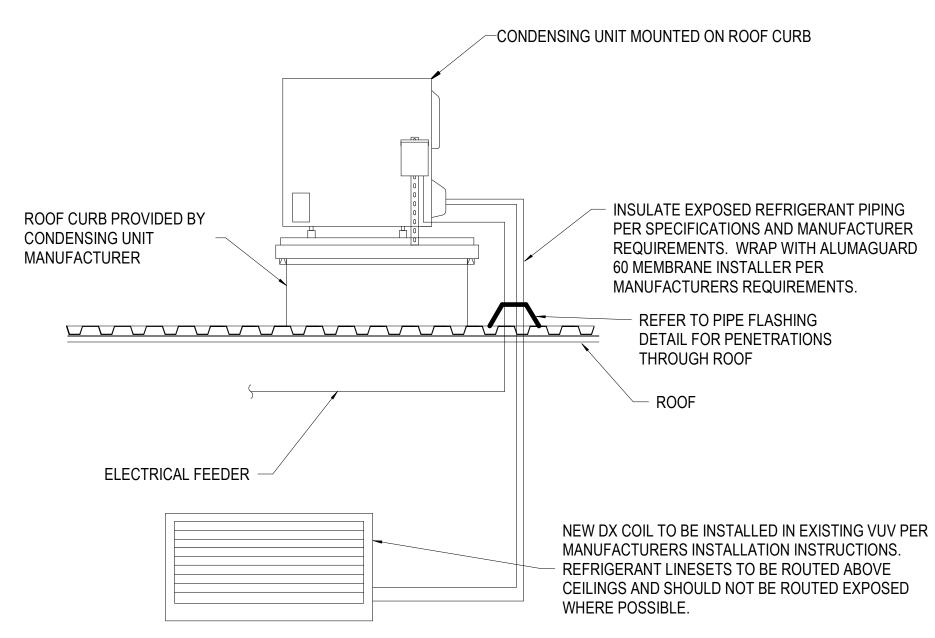
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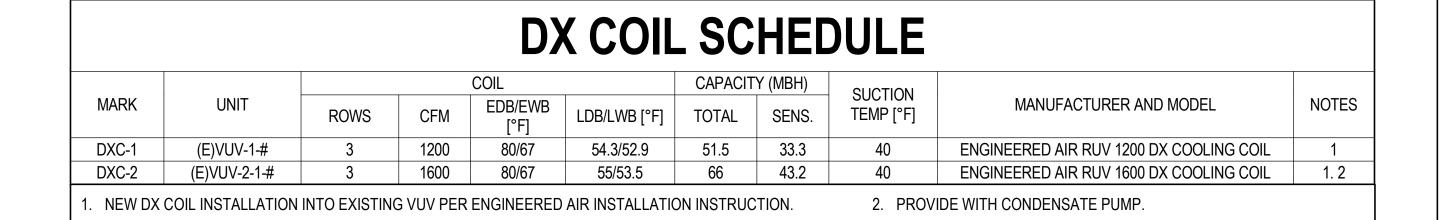




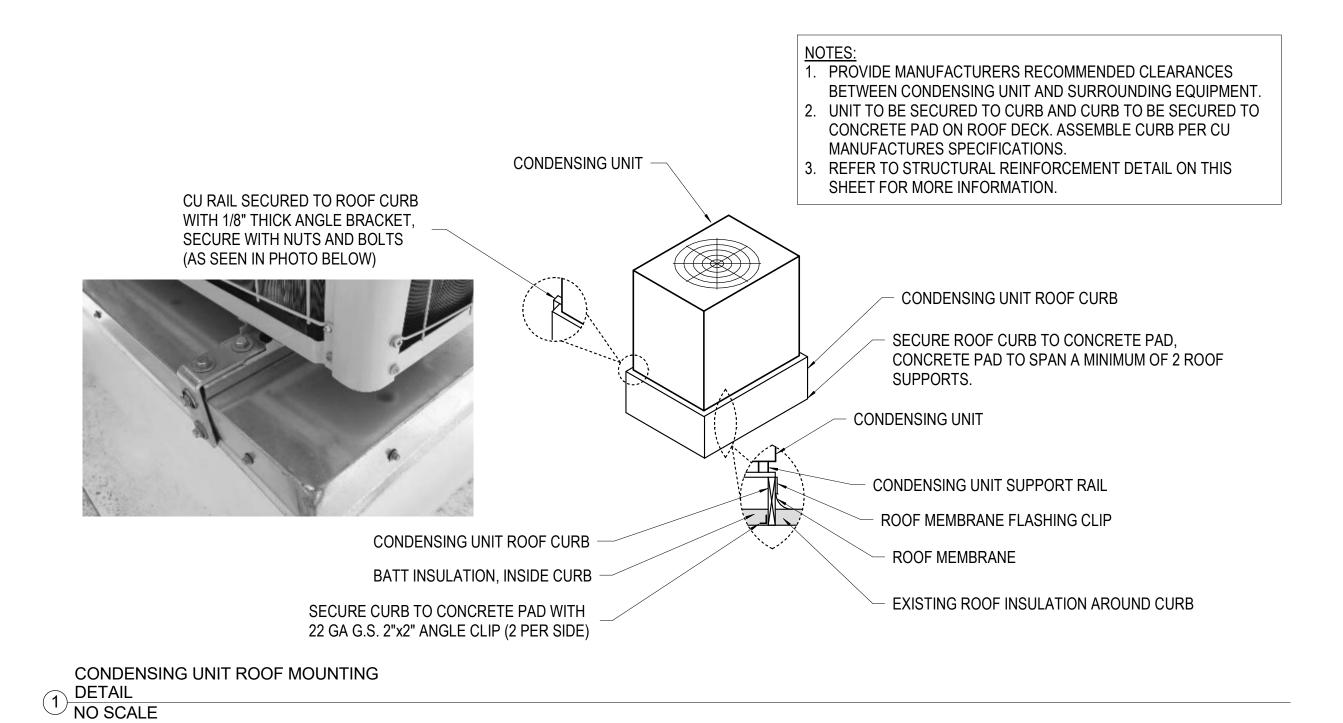
REFRIGERANT LINE ROUTING DETAIL

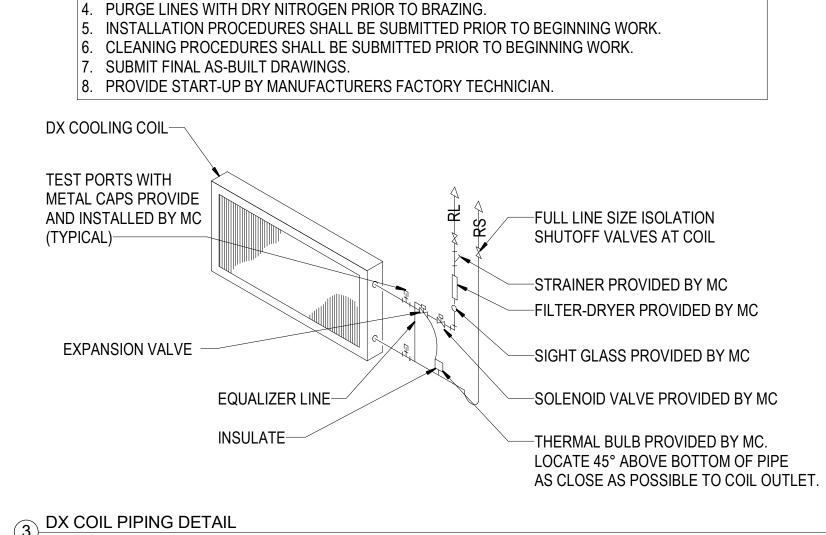
5 NO SCALE





CONDENSING UNIT SCHEDULE										
MARK	COOLING		RLA REFRIGE	REFRIGERANT		ELECTRICAL		REMARKS	SERVES	WEIGHT
	AMBIENT DB [°F]	TOT CLG [MBH]	I NLA	ILLINGLIANI	VOLT	MCA	MOP	KLIVIAIKKO	JEINVES	[LBS]
CU-1	95	46	-	R-410A	208/3	24.5	40	ENGINEERED AIR CU41	DXC-1	590
CU-2	95	62	-	R-410	208/3	32.5	50	ENGINEERED AIR CU61	DXC-2	660





2. PIPING ROUTING AND COORDINATION DRAWINGS SHALL BE SUBMITTED AND APPROVED PRIOR

3. PIPING INSTALLATION SHALL BE INSPECTED BY MANUFACTURERS FACTORY TECHNICIAN.

1. CONFIRM FINAL INSTALLATION REQUIREMENTS WITH MANUFACTURER.

1. PROVIDE WITH DISCONNECT SWITCH AND 12" ROOF CURB.

3 DX COIL PIPING DETAIL NO SCALE

NOTES:

TO BEGINNING WORK.

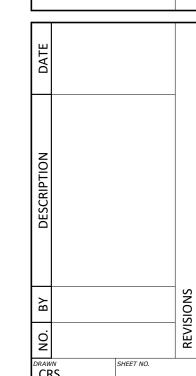




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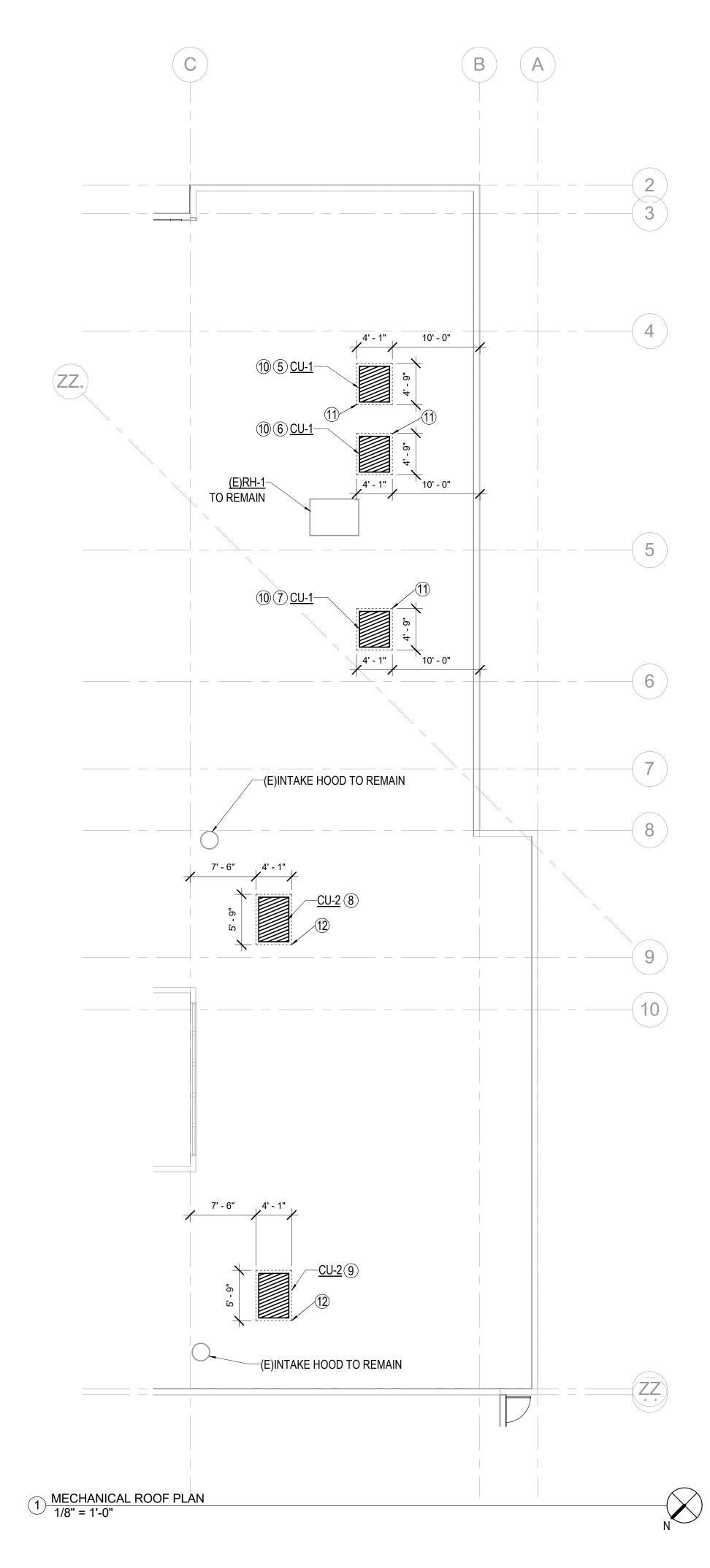
0 0 **SCH**(46)535 **MIDDLE** 315 Co Rd 54 **LP MIC** 3515 Cc Laporte,

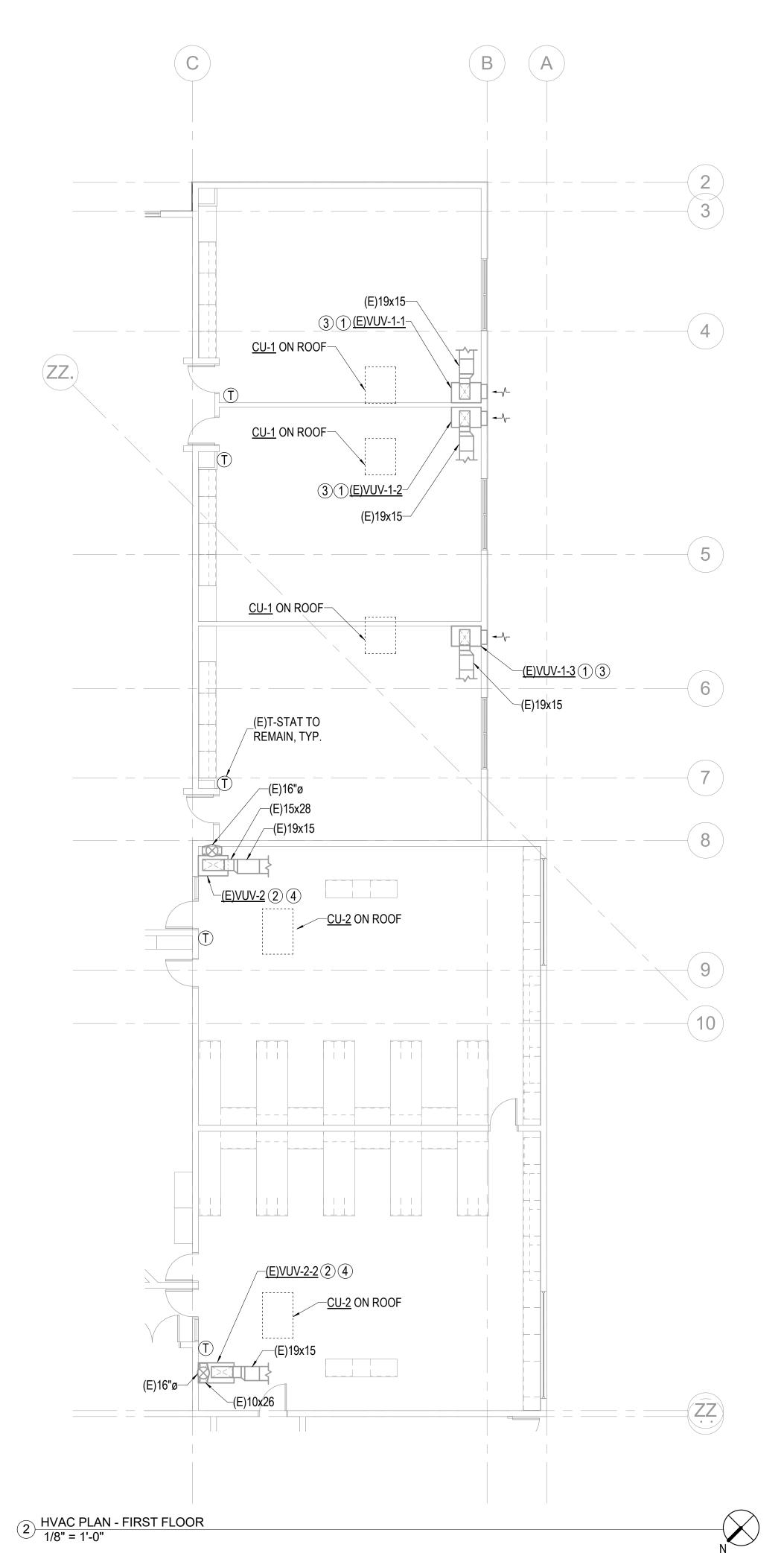




M0.3 CWH

12-17-2019





- A. DUCT SIZES SHOWN ARE OUTSIDE SHEET METAL DIMENSIONS INCLUDING INTERNAL DUCT LINERS.
- B. REFER TO COVER SHEET FOR GENERAL CONSTRUCTION NOTES.

PLAN NOTES

- 1. NEW DXC-1 TO BE INSTALLED IN (E) VUV-1-#. REFRIGERANT LINES TO BE ROUTED BACK TO CU-1 MOUNTED ON ROOF. REFRIGERANT LINES PROVIDED AND INSTALLED BY CONTRACTOR, NOT DX COIL OR CONDENSING UNIT MANUFACTURE.
- 2. NEW DXC-2 TO BE INSTALLED IN (E)VUV-2. REFRIGERANT LINES TO BE ROUTED BACK TO CU-2 MOUNTED ON ROOF. REFRIGERANT LINES PROVIDED AND INSTALLED BY CONTRACTOR, NOT DX COIL OR CONDENSING UNIT MANUFACTURE.
- 3. ROUTE CONDENSATE LINE FROM DXC-1 OUT EXTERIOR WALL.
- 4. ROUTE CONDENSATE LINE FROM DXC-2 CONDENSATE PUMP UP TO CEILING AND CONNECT TO NEAREST VERTICAL PLUMBING VENT.
- 5. ROUTE REFRIGERANT LINES TO NEW DX COIL IN (E)VUV-1-1 IN CLASSROOM 109.
- 6. ROUTE REFRIGERANT LINES TO NEW DX COIL IN (E)VUV-1-2 IN CLASSROOM 110.
- 7. ROUTE REFRIGERANT LINES TO NEW DX
- COIL IN (E)VUV-1-3 IN CLASSROOM 111. 8. ROUTE REFRIGERANT LINES TO NEW DX
- COIL IN (E)VUV-2-1 IN CLASSROOM 112.
- 9. ROUTE REFRIGERANT LINES TO NEW DX COIL IN (E)VUV-2-2 IN CLASSROOM 113. 10. REFER TO STRUCTURAL REINFORCEMENT DETAIL ON SHEET M0.3 FOR HOW TO

REINFORCE ROOF STRUCTURE UNDER

CONDENSING UNITS. 11. EDGE OF CONCRETE PAD UNDER UNIT TO BE MOUNTED 10'-0' FROM ROOF EDGE. REINFORCE JOIST WEB W/ STEEL ANGLE FOR 14 FEET FROM GRID B PER DETAIL

2/M0.3.

12. EDGE OF CONCRETE PAD UNDER UNIT TO BE MOUNTED 7'-6' FROM GRID C. REFERENCE DETAIL 2/M0.3 SIM. FOR CONCRETE SLAB CONNECTION.



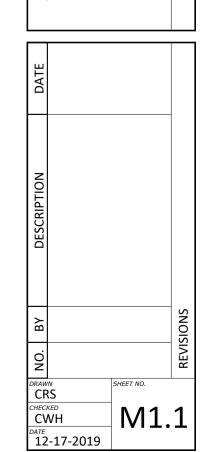




CONTENTS SHEET

CLP MIDDLE SCHOOL 3515 Co Rd 54G Laporte, CO 80535





PSD