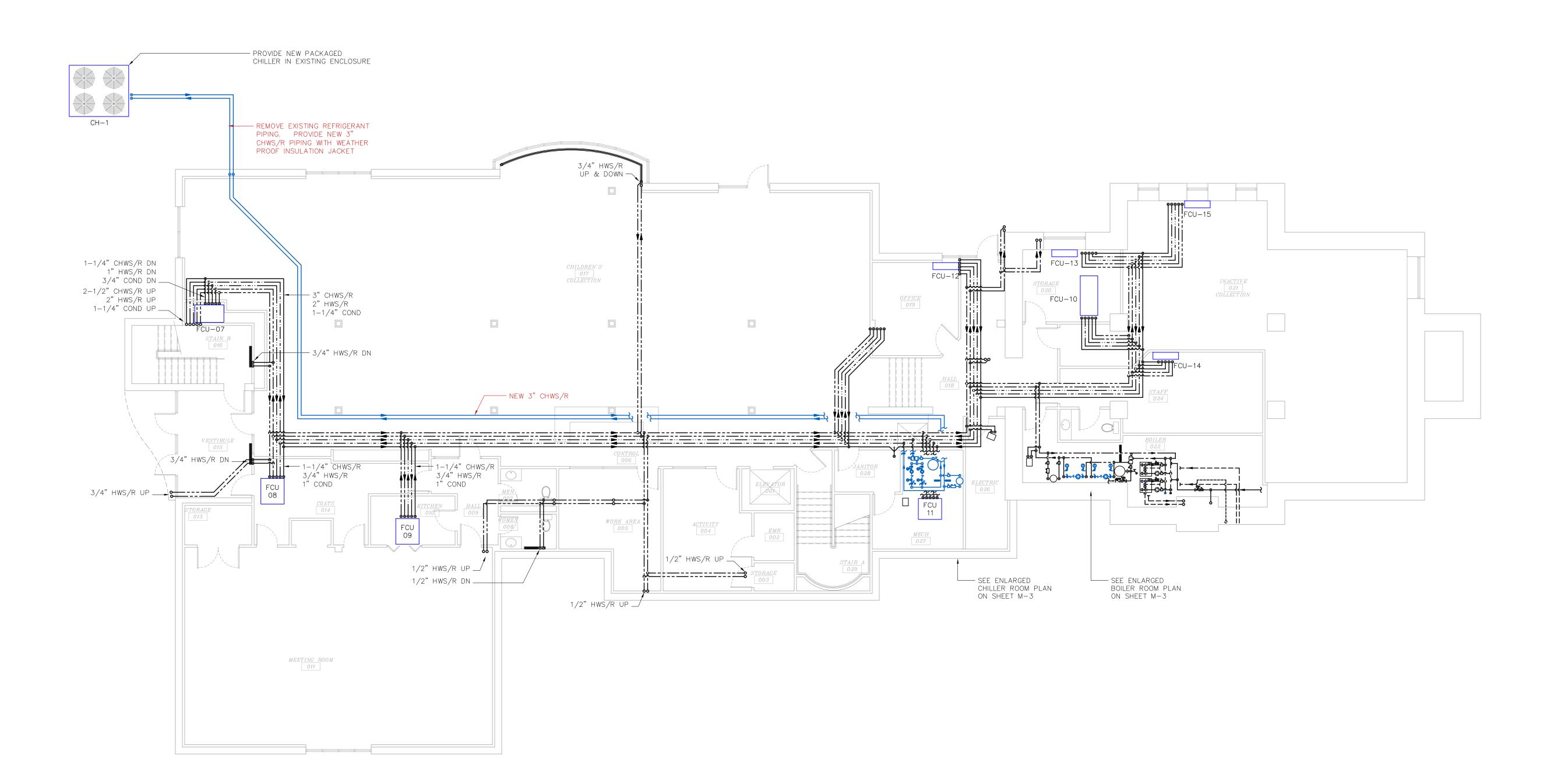
	PROJE	CT DEST	GN CO	NDITIONS:	
	ASHRAE WEATHER STATION:		LAWRENCE,	MASSACHUSETTS	
	SEASON	VALUE	UNITS	DESCRIPTION	SOURCE
	WINTER	-19.1	°F	OA TEMP	ASHRAE EXTREME ANNUAL DESIGN CONDITIONS (50 YR)
		72.0	°F	INDOOR TEMP	2015 IECC SETION 302.1
	SUMMER	90.6	°F	OA DRY-BULB TEMP	2013 ASHRAE FUNDAMENTALS, CHAPTER 14, COOLING 0.4%
		73.4	°F	OA WET-BULB TEMP	2013 ASHRAE FUNDAMENTALS, CHAPTER 14, COOLING 0.4%
		75.0	°F	INDOOR TEMP	2015 IECC SETION 302.1
1					







1/8"=1'-0"

GENERAL PROJECT NOTES:

1. PREPARATION AND WATER TREATMENT:

a.PRIOR TO COMMENCING WITH EQUIPMENT REPLACEMENT, CONTRACTOR SHALL ADD "FERNOX F3" SYSTEM CLEANER OR EQUIVALENT TO BOTH THE EXISTING HOT AND CHILLED WATER SYSTEMS.

b.INSTALL A TEMPORARY BYPASS AT THE ENDS OF EACH LOOP IF REQUIRED AND RUN PUMPS TO INSURE

PROPER MIXING / DISTRIBUTION OF FLUID THROUGHOUT ENTIRETY OF PIPING. c.DRAIN SYSTEM AND PERFORM SCHEDULED EQUIPMENT REPLACEMENT

d.REFILL, CIRCULATE, AND DRAIN EACH SYSTEM FOR THOROUGH FLUSHING.

e.FILL SYSTEMS, ADD CHEMICAL WATER TREATMENT, FERNOX F1 OR EQUIVALENT, CLEAN ALL STRAINERS AND REPLACE ALL FILTER BAGS. PROVIDE PROPYLENE GLYCOL IN CHILLED WATER SYSTEM

2.CHILLED WATER SYSTEM:

a.REPLACE EXISTING SPLIT CHILLER WITH NEW PACKAGED CHILLER.

b.REMOVE EXISTING REFRIGERANT PIPING AND REPLACE WITH NEW 3"CHILLED WATER PIPING c.REPLACE EXISTING CHILLED WATER PUMPS, EXPANSION TANK, AIR SEPARATOR.

d.REPLACE ALL VALVES ON 3"CHILLED WATER MAINS WITHIN THE CHILLER ROOM. PROVIDE NEW BUTTERFLY

e.PROVIDE NEW THERMOMETERS AND PRESSURE GAGES IN CHILLER ROOM.

f. INSTALL NEW NEPTUNE FILTER / CHEMICAL FEEDER TO MATCH EXISTING MODEL IN BOILER ROOM. g.PROVIDE SENSOR WELLS FOR ENTERING AND LEAVING WATER TEMPERATURE SENSORS FOR PHASE TWO BMS

3.HOT WATER SYSTEM a.EXISTING BOILER, EXPANSION TANK AND AIR SEPARATOR ARE NOT INCLUDED IN THIS CONTRACT

b.REPLACE EXISTING HOT WATER LOOP PUMPS

c.REPLACE ALL ISOLATION VALVES AT EXISTING PUMPS. PROVIDE NEW BUTTERFLY ISOLATION VALVES

d.PROVIDE NEW PRESSURE GAGES AT PUMPS.

e.PROVIDE SENSOR WELLS FOR ENTERING AND LEAVING WATER TEMPERATURE SENSORS FOR PHASE TWO BMS 4. ADDITIONAL WORK

a. SEVERAL FIRST FLOOR RETURN FILTER GRILLS SHALL BE ENLARGED WHERE INDICATED

b. THERE IS ONE BRANCH DUCT TO BE REPAIRED AT FCU-4

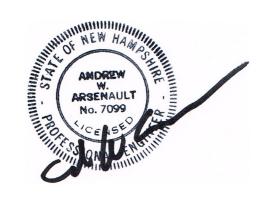
c. THE OUTSIDE AIR CONNECTION NEEDS REPAIR AT FCU-1



THE PROJECT MANAGER FOR THIS PROJECT IS NOTED BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER.

HVAC PROJECT MANAGER: DAVID C. MAGNUSON EMAIL: DAVEM@DESIGNDAYMECH.COM

PHONE: (603) 463–1086 ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037



PROJECT:

DERRY PUBLIC LIBRARY 64 EAST BROADWAY DERRY, NH

THE TOWN OF DERRY NEW HAMSHIRE

> LOWER LEVEL PIPING PLAN

REVISIONS:

DESIGNED BY: DRAWN BY: CHECKED BY: DDM JOB #: SCALE:

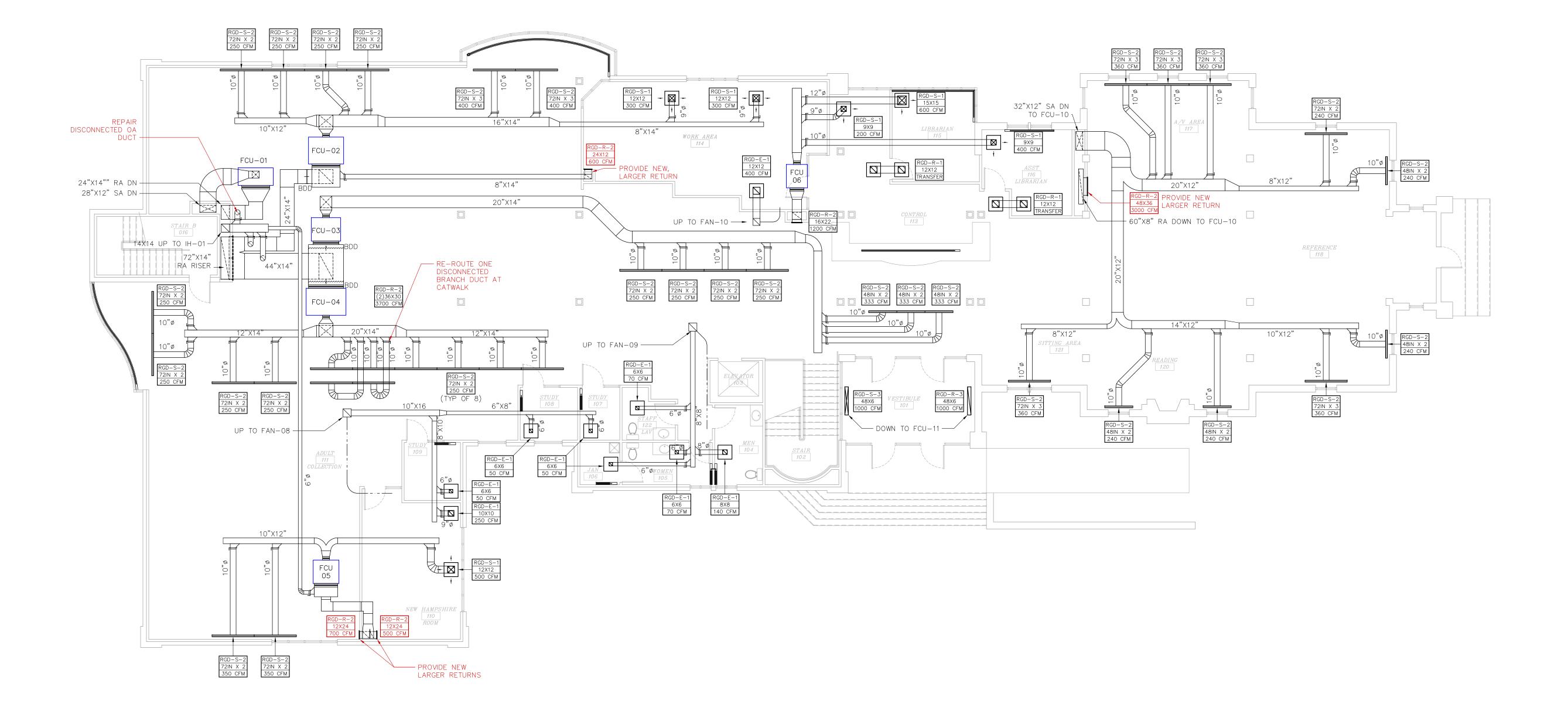
19143 AS NOTED

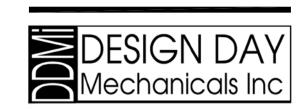
DCM DCM

 $\Delta W \Delta$ 

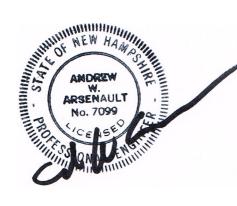
DATE: 2/11/2020

SHEET I OF 4





THE PROJECT MANAGER FOR THIS PROJECT IS NOTED BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER. HVAC PROJECT MANAGER: DAVID C. MAGNUSON
EMAIL: DAVEM®DESIGNDAYMECH.COM
PHONE: (603) 463-1086
ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037



PROJECT:

DERRY PUBLIC LIBRARY 64 EAST BROADWAY DERRY, NH

THE TOWN OF DERRY NEW HAMSHIRE

LOWER LEVEL PIPING PLAN

REVISIONS:

DESIGNED BY: DRAWN BY: CHECKED BY: DDM JOB #: SCALE:

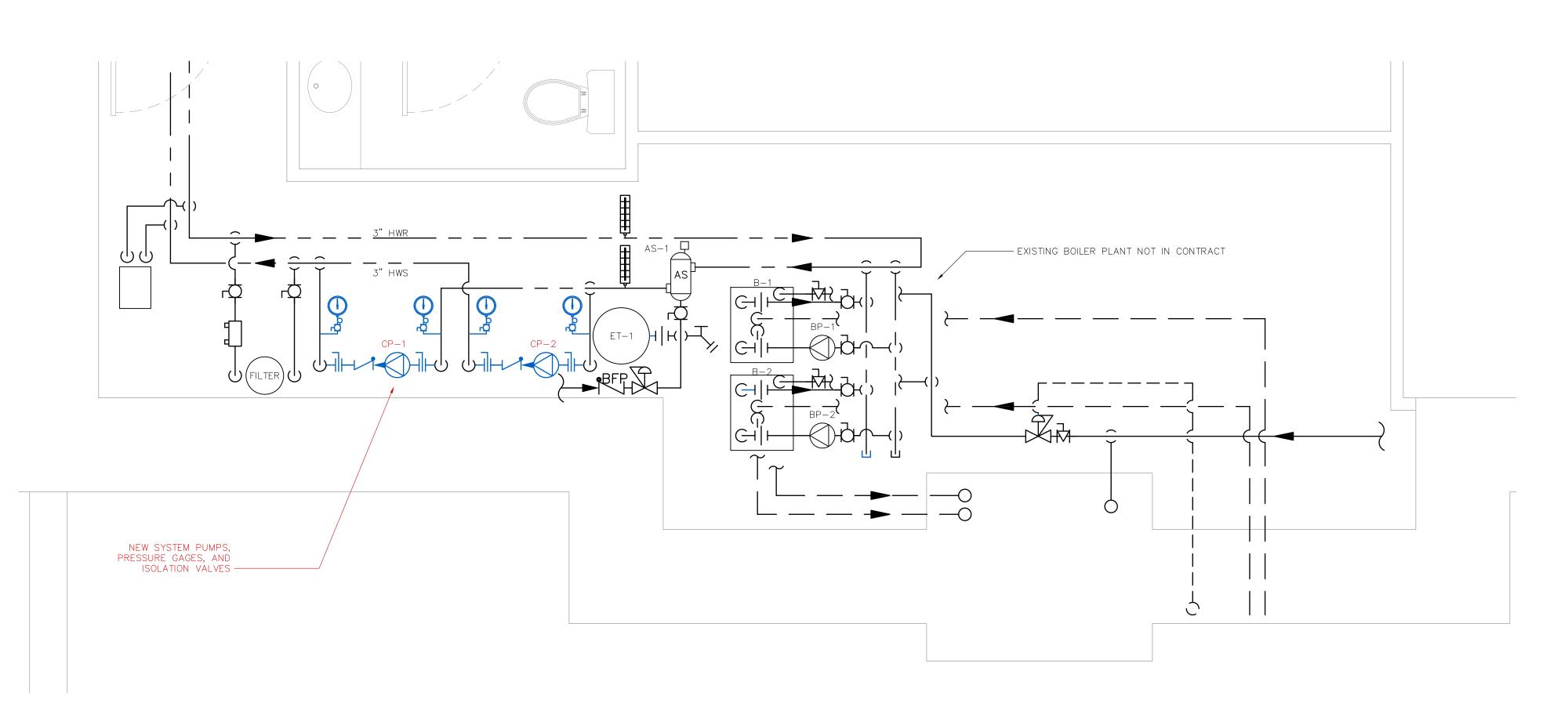
DCM DCM AWA 19143 AS NOTED

DATE: 2/II/2020

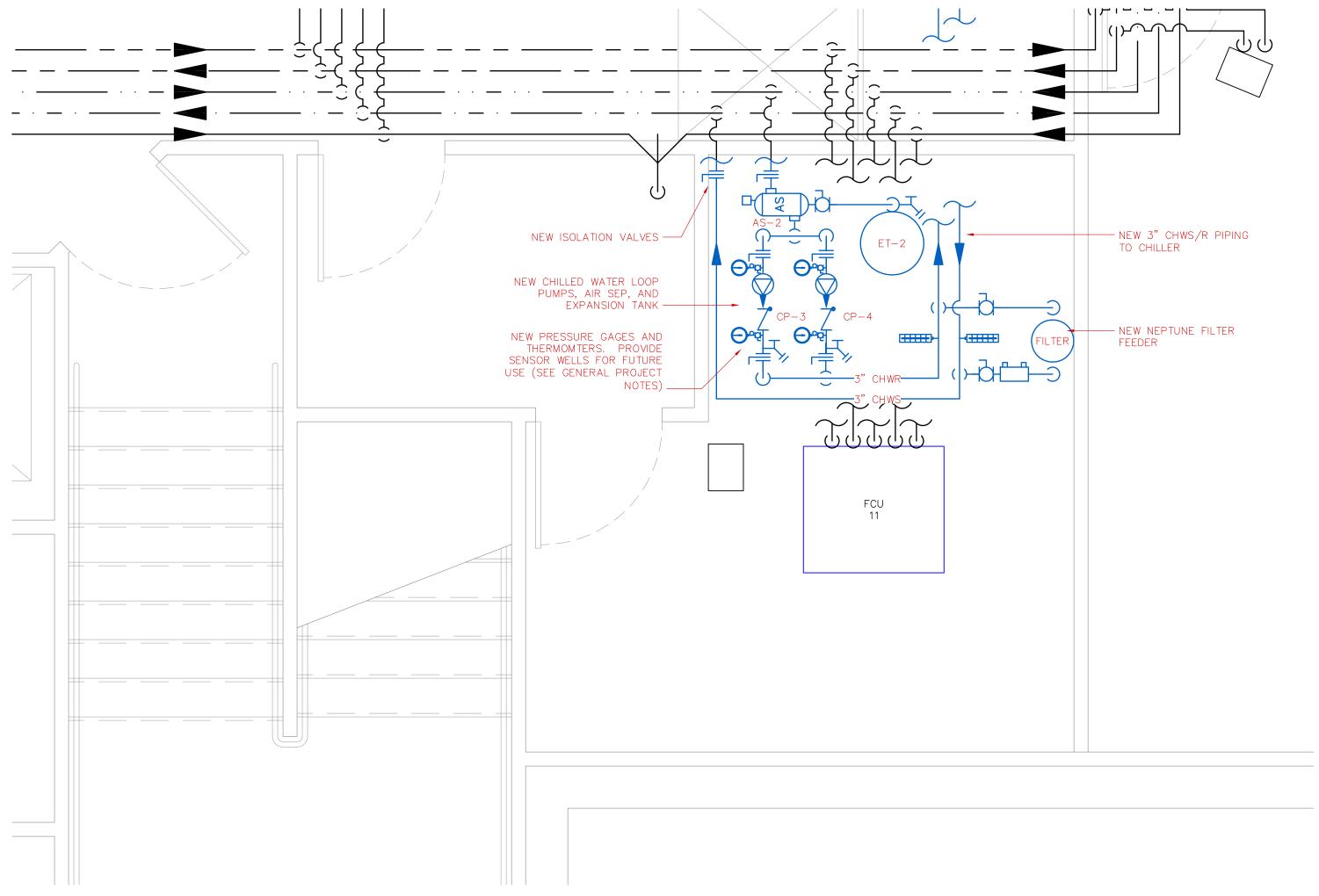
SHEET 2 OF 4



1/8"=1'-0"







ENLARGED CHILLER ROOM PLAN  $\begin{pmatrix} 2 \\ M-3 \end{pmatrix}$ 1/2"=1'-0"

ACKAGED CHILLER SCHEDULE (CH)															
MARK	MAKE	MODEL	NOMINAL TONS	COOLING EFFICIENCY	MIN FLOW (GPM)	DESIGN FLOW (GPM)	FLUID	PD (FT HD)	EWT	LWT	REFRIG	VOLT/PH	MCA	МОСР	NOTES
CH-1	YORK	YLAA0065	60	10.39 EER	61	135	35% PG	12.9	54	44	410A	208/3	306.0	350	1
NOTES:															

HEAD (FT)

32.0

55.0

GPM

45.0

MODEL

MAGNA1

40-180F

1. VARIABLE SPEED PUMP WITH INTEGRAL PRESSURE SENSOR

TPE 80-240/2 135.0

2. VFD (OR EC MOTOR) SHALL BE UPGRADABLE TO FUTURE BMS CONTROL IN PHASE 2.

PUMP SCHEDULE (P)

MAKE

GRUNDFOS

GRUNDFOS

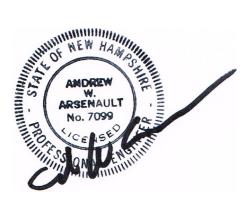
MARK

CP-1&2

CP-3&4

THE PROJECT MANAGER FOR THIS PROJECT IS NOTED BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER. HVAC PROJECT MANAGER:

DAVID C. MAGNUSON
EMAIL: DAVEM®DESIGNDAYMECH.COM
PHONE: (603) 463-1086
ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037



PROJECT:

DERRY PUBLIC LIBRARY 64 EAST BROADWAY DERRY, NH

THE TOWN OF DERRY NEW HAMSHIRE

ENLARGED PIPING PLANS

MARK	MAKE	MODEL	PIPE SIZE	GPM	WPD (FT)	NOTES
AS-1 EXISTING TO REMAIN						
AS-2	SPIROTHERM	VDT300	3"	75	1	1

WATTS

614

REVISIONS:

EXPANSION TANK SCHEDULE (ET)										
MARK	MAKE	MODEL	ACCEPTANCE (GALLONS)	VOLUME (GALLONS)	STYLE	FILL VALVE (PSIG)	RELIEF VALVE (PSIG)	FILL TEMP (F)	MAX TEMP (F)	NOTES
ET-1	EXISTING TO REMAIN									
ET-2	TACO	CAX-30	5	8	BLADDER	12	30	50	55	
NOTES:										

FLANGE SIZE

(IN) INLET / OUTLET

3/3

ARRANGEMENT

INLINE

INLINE

FLUID

WATER

WATER

DESIGNED BY: DRAWN BY: CHECKED BY: DCM DCM AWA 19143

DDM JOB #: SCALE: AS NOTED

DATE: 2/11/2020

MHP VOLT/PH NOTES

208/1

208/3

3

1,2

1,2



SHEET 3 OF 4

#### 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

#### B) QUALITY ASSURANCE

- 1)THE INTERNATIONAL MECHANICAL CODE (IMC) 2015, AND THE INTERNATIONAL ENERGY CONSERVATION CODE (IEEC) 2015 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, 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
- 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
- 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
- 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 23 AND TO ALL CONTRACTORS, SUBCONTRACTORS, OR OTHER PERSONS SUPPLYING MATERIALS AND/OR LABOR, ENTERING INTO THE PROJECT SITE AND/OR PREMISES, DIRECTLY OR INDIRECTLY.
- 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.

#### 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;
- 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 CONNECTION.
- 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
- 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 WITHIN 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
- 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 MOTORS.
- 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,
- (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.
- 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 FASTENER. 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 TAGS TO VALVES, AND MANUFACTURED SPECIFICALLY FOR THAT PURPOSE. 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
- 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 B 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) DUCTWORK

IV) SEQUENCES OF OPERATION

- 1)UNLESS OTHERWISE SPECIFIED, ALL RIGID DUCTWORK SHALL BE SHEET METAL MATERIALS AS SPECIFIED IN ASTM A700, WITH GALVANIZED SHEET STEEL: LOCK-FORMING QUALITY, ASTM A527, COATING DESIGNATION G60; MILL
- (o) PRESSURE CLASS AND SEAL CLASS (PER SMACNA): 2"PRESSURE CLASS, SEAL CLASS A (ALL TRANSVERSE ATTACHMENT DEVICES AND FASTENERS SUITABLE FOR THE SERVICE.
  - JOINTS, LONGITUDINAL SEAMS AND DUCT WALL PENETRATIONS). 2) RECTANGULAR DUCT FABRICATION: FABRICATE RECTANGULAR DUCTS WITH GALVANIZED SHEET STEEL, IN
  - ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", TABLES 1-3 THROUGH 1-19, INCLUDING THEIR ASSOCIATED DETAILS. CONFORM TO THE REQUIREMENTS IN THE REFERENCED STANDARD FOR METAL THICKNESS, REINFORCING TYPES AND INTERVALS, TIE ROD APPLICATIONS, AND JOINT TYPES AND INTERVALS.
  - 3) WHERE DUCT SUPPORTS ARE REQUIRED BETWEEN THE BUILDING STRUCTURAL FRAMING, SUITABLE INTERMEDIATE STEEL FRAMING SHALL BE PROVIDED BY THE CONTRACTOR.
  - 4) WATER BASED LIQUID RUBBER DUCT SEALANT OR FLANGED JOINT MASTICS SHALL BE ONE-PART, ACID- CURING, SILICONE ELASTOMERIC JOINT SEALANTS, COMPLYING WITH ASTM C920, TYPE S, GRADE NS, CLASS 25, USE O. 5) FLEXIBLE DUCT CONNECTORS SHALL BE INSTALLED AT POINTS AS CLOSE AS POSSIBLE TO AIR HANDLERS AND FANS. THE CONNECTOR SHALL BE AT LEAST FOUR (4") INCHES WIDE AND FABRICATED SPECIFICALLY FOR USE AS
  - 6) FLEXIBLE DUCTS: LIMITED TO 6 FEET MAXIMUM STRAIGHT AND FULLY STRETCHED. DO NOT USE FLEX AS AN

A FLEXIBLE CONNECTOR. ALL CONNECTIONS SHALL BE AIR TIGHT AND MADE SO THE CONNECTOR IS UNDAMAGED

- (a) INTERNAL FABRIC SHALL BE ACOUSTICALLY RATED BLACK RESILIENT CALENDERED FILM WITH COATED STEEL WIRE HELIX, 2"FIBERGLASS BLANKET (R-6.0), AND FIBERGLASS SCRIM REINFORCED ALUMINIZED POLYESTER FILM VAPOR BARRIER AS EXTERIOR FACING. LISTED AND LABELED AS A CLASS 1 AIR DUCT PER UL STD 181. RATED FOR PRESSURE CLASS LISTED ABOVE. EQUIVALENT TO THERMAFLEX M-KE.
- 7) BELLMOUTH OR 45 DEGREE TAKEOFFS SHALL BE USED FOR DUCT TAKEOFFS TO MINIMIZE PRESSURE DROP. 8) MANUAL VOLUME DAMPERS SHALL BE INSTALLED AT ALL DUCT TAKEOFFS AND AS NEEDED ELSEWHERE TO
- 9) FIRE, SMOKE, COMBINATION FIRE/SMOKE DAMPERS AND CEILING RADIATION DAMPERS
- (a) FIRE DAMPERS: UL 555 LISTED TYPE "B" (OUT OF AIRSTREAM) 1-1/2 HOUR RATED FOR LESS THAN 3-HOUR FIRE-RESISTANCE RATED ASSEMBLIES AND 3 HOUR RATED FOR 3-HOUR OR GREATER FIRE-RESISTANCE RATED
- (1) DYNAMIC FIRE DAMPERS SHALL BE USED IN SYSTEMS DESIGNED TO OPERATE WITH FANS ON DURING A
- (2) STATIC FIRE DAMPERS MAY BE USED IN SYSTEMS NOT OPERATIONAL DURING A FIRE.
- (b) SMOKE DAMPERS: UL 555S LISTED.
- (c) COMBINATION FIRE/SMOKE DAMPERS: UL 555 AND UL 555S LISTED
- (d) CEILING RADIATION DAMPERS: UL 555C LISTED.
- (e) REFER TO BOTH MECHANICAL AND ARCHITECTURAL DRAWINGS FOR THE LOCATION OF RATED ASSEMBLIES.
- 10) SMOKE DETECTORS IN AIR SYSTEMS GREATER THAN 2000 CFM SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR IN BOTH THE SUPPLY AND RETURN AIR DUCTWORK AS PER 2009 IMC AND NFPA 90A.
- (a) IF THERE IS A FIRE ALARM SYSTEM IN THE BUILDING, THIS CONTRACTOR SHALL NOTIFY THE FIRE ALARM CONTRACTOR TO PROVIDE DUCT SMOKE DETECTORS WHERE REQUIRED.
- F) HYDRONIC AND AIR CONDITIONING CONDENSATE PIPING:

COPPER SOLDERED OR PRESSED FITTINGS FOR COPPER TUBE.

- 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
- (b) 2-1/2" AND UP SHALL USE STEEL WELDED (ASME B16.9, STD WEIGHT), GROOVED OR FLANGED (ASME B16.5,
- (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
- HYDRONIC VALVES:

RATING OF NOT OVER 50.

- (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) AIR CONDITIONING CONDENSATE PIPING SHALL BE SCHEDULE 40 PVC.
- (a) ROOF TOP UNITS SHALL DRAIN CONDENSATE ONTO ROOF. (b) 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
- 5) PITCH WATER PIPING UP IN THE DIRECTION OF FLOW 1 INCH PER 40 FFFT 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

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

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.

#### 2) ALL INSULATION SHALL CONFORM TO THE REQUIREMENTS OF IECC 2015

- 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 MANVILLE MICRO-LOK.
- (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.
- 4) DUCTWORK: ALL INDOOR SUPPLY AND OUTDOOR AIR DUCTS AND PLENUMS (INCLUDING THOSE INSTALLED IN RETURN AIR PLENUMS) SHALL BE INSULATED WITH FIBERGLASS WITH FSK JACKET WITH AN INSTALLED MINIMUM R-6 FORMALDEHYDE-FREE INSULATION, SIMILAR TO JOHNS MANVILLE MICROLITE EQ TYPE 75, 2-1/5"THICK. INTERNALLY

- 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
- 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
- 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
- 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
- F) REPLACE ALL FILTERS USED DURING CONSTRUCTION.
- G) EQUIPMENT SHALL BE STARTED, TESTED, ADJUSTED AND PLACED IN SATISFACTORY OPERATING CONDITION BY THE
- 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
- 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
- L)THE WATER AND AIR SYSTEMS SHALL BE BALANCED FROM -10% 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.

DESCRIPTION DESCRIPTION SYMBOL PIPE ELBOW UP <u>—</u>b— BALL VALVE

()	PIPE ELBOW UP	<u> </u>	BALL VALVE
—— <u> </u>	PIPE ELBOW DOWN		BUTTERFLY VALVE
<u> </u>	PIPE TEE UP	<b>→</b> >> <b>—</b>	GATE VALVE
	PIPE TEE DOWN	_ <u></u>	OS&Y GATE VALVE
	PIPE CROSS OVER	<b>~</b>	CHECK VALVE
—-  <b>—</b>	UNION	<b>▶</b> BFP	BACK FLOW PREVENTER
	FLEXIBLE PIPE CONNECTOR	<b>.</b>	TRIPLE-DUTY VALVE
	END CAP	·N	TRIPLE-DUTY VALVE WITH MEASUREMENT PORTS
Y	PETE'S PLUG		2-WAY MOTORIZED VALVE
工,,	HOSE THREAD DRAIN VALVE WITH CAP AND CHAIN	M	3-WAY MOTORIZED VALVE
	CIRCUIT SETTER		TEMPERING VALVE
ightharpoons	STRAINER	Z	PRESSURE REDUCING VALVE
XII	STRAINER WITH BLOWDOWN	Ž <sup>†</sup>	TEMPERATURE & PRESSURE RELIEF VALVE
	CIRCULATOR PUMP		DIFFERENTIAL PRESSURE BYPASS VALVE
×× ↓	MANUAL AIR VENT	Š	SOLENOID VALVE
AV P	AUTOMATIC AIR VENT	<b>₽</b>	GAS COCK
AS	AIR SCOOP	<b></b>	DIRECTION OF FLOW
 	AIR SCOOP WITH VENT	)	DIRECTION OF PITCH
[AS]	AIR SCOOP WITH VENT	<del></del>	CONNECT TO EXISTING
	AIR SEPARATOR WITH VENT	<del></del>	PIPE CONTINUES
AS	AIR SEFARATOR WITH VENT	<del>11</del>	THERMOMETER
MARK	FIN TUBE IDENTIFICATION TAG	ф Ф	PRESSURE GAUGE WITH SHUTOFF & PIGTAIL
FEET	THE TODE IDENTIFICATION TAG	\$	VACUUM BREAKER
G-111111-D	FIN TUBE RADIATION WITH COVER		ELECTRIC HEAT TRACING
7 DO DATE		~	

LEGEND OF PIPING SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
L_	MANUAL BALANCING DAMPER		RECTANGULAR RETURN OR EXHAUST DUCT UP
FD	FIRE DAMPER		ROUND RETURN OR EXHAUST DUCT UP
SD L	SMOKE DAMPER		RECTANGULAR RETURN OR EXHAUST DUCT DOWN
SFD	SMOKE & FIRE DAMPER		ROUND RETURN OR EXHAUST DUCT DOWN
	CABLE OPERATED DAMPER		RECTANGULAR SUPPLY DUCT
	BACK DRAFT DAMPER		ROUND SUPPLY DUCT UP
M	MOTORIZED DAMPER		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
LECEN	D OF COMMING CVI	(DOIG	

*MECHANICAL ABBREVIATIONS* 

AMP AMPACITY

BTU/H UNITS/HOUR

CHW CHILLED WATER

C/HWR WATER RETURN

C/HWS CHILLED & HOT WATER SUPPLY

CHWR CHILLED WATER RETURN

CHWS CHILLED WATER SUPPLY

COND CONDENSATE

CONN CONNECTION

CONV CONVECTOR

CW COLD WATER

CWR WATER RETURN

CWS WATER SUPPLY

DB DRY BULB

DX EXPANSION

EA EXHAUST AIR

DN DOWN

CONDENSER

CIRCULATOR

CAP CAPACITY

APD DROP

AIR PRESSURE

AUTOMATIC TEMP.

BRITISH THERMAL | ERV

TEMPERATURE

EFFICIENCY RATIO HWUH

CONTRACTOR

TEMPERATURE

VENTILATOR

ET EXPANSION TANK

FAHRENHEIT

FRESH AIR

T HD FEET HEAD

RADIATION

FW FRESH WATER

CONTRACTOR

GALLONS PER

HP HORSEPOWER

GPM MINUTE

HR HOUR

GLYCOL & WATER

GLYCOL & WATER

FLUID PRESSURE DROP

FPM FEET PER MINUTE LB/# POUNDS

ENERGY RECOVERY

#### DESCRIPTION SYMBOL DESCRIPTION THERMOSTAT HUMIDISTAT TEMPERATURE SENSOR PRESSURE SENSOR

VENTILATOR

HW HOT WATER

HWCUH HOT WATER
CABINET HEATER

HX HEAT EXCHANGER

ID INSIDE DIAMETER

LEAVING AIR

**TEMPERATURE** 

LEAVING FLUID TEMPERATURE

TEMPERATURE

THOUSANDS OF

CONTRACTOR

MINUTE OR

PROTECTION

PRESSURE STEAM

MINIMUM

MINIMUM CIRCUIT

IN INCHES

LPS STEAM

M MINUTES

MBH

MOCP

KW KILOWATTS

HWR

EXTERNAL STATIC HWS HOT WATE

### REVISIONS:

NA NOT APPLICABLE

PSI

RA RFTURN AIR

RTU ROOFTOP UNIT

SF SQUARE FEET

SQ IN SQUARE INCHES

S SUPPLY

V VOLTS

W WATTS

WB WET BULB

WC WATER COLUMN

SA SUPPLY AIR

TEMP TEMPERATURE

NO NORMALLY OPEN OA OUTSIDE AIR DIAMETER PD PRESSURE DROF DESIGNED BY: DRAWN BY POUNDS PFR CHECKED BY: SQUARE INCH DDM JOB # PH/Ø PHASE SCALE: R RETURN

DATE: 2/II/2020

## DIVISION 25 - HVAC CONTROLS AND SEQUENCES OF OPERATION

ASSURANCE AND RELATED DOCUMENTS.

III) EXECUTION

# A) REFER TO SPECIFICATION DIVISION 23 - HVAC SPECIFICATIONS, ESPECIALLY GENERAL FOR WORK INCLUDED, QUALITY

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

B) PROVIDE A COMPLETE ELECTRIC/ELECTRONIC CONTROL SYSTEM TO ACCOMPLISH ALL CONTROL SEQUENCES AS

- (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 26 REQUIREMENTS.
- INTO CONTROL CIRCUITS TO ACCOMPLISH THE SEQUENCES OF OPERATION. II)PRODUCTS

3) CONNECT VARIABLE FREQUENCY DRIVES (VFD) AND DUCT & AREA SMOKE DETECTORS (FURNISHED BY OTHERS)

- 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.
- B) CONTROL DAMPERS SHALL BE LOW LEAKAGE DAMPERS WITH BLADE AND EDGE SEALS. CLASS 1 WITH LEAKAGE OF LESS THAN 4 CFM/SQFT AT 1.0"W.G. AND 8 CFM/SQFT AT 4.0"W.G. C) CONTROL VALVES SHALL BE SELECTED FOR FLUID TYPE, TEMPERATURE AND PRESSURE CLASS WHICH MATCH PIPING
- 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.
- 1)ACTUATION REQUIREMENTS SHALL BE PER THE SEQUENCES OF OPERATION.

MATERIALS AND END CONNECTIONS. CONTROL VALVES MUST CLOSE OFF 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.
- 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 26 SECTIONS. COORDINATE THE INSTALLATION IN ACCORDANCE WITH FINAL SHOP
- DRAWINGS, FIELD MEASUREMENTS, MANUFACTURER'S DATA AND AS SPECIFIED HEREIN. B) MOUNT CONTROLLERS AT CONVENIENT LOCATIONS AND HEIGHTS. COORDINATE WITH ARCHITECT AND OTHER TRADES. C) PROVIDE REMOTE CONTROL OF MANUAL RESET CONTROLLERS AS REQUIRED FOR USER ACCESSIBILITY. 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 PROTECT AGAINST ABRASION. TIE AND SUPPORT CONDUCTORS NEATLY.
- EQUIPMENT CONNECTIONS. USE LIQUID-TITE CONDUIT IN EXTERIOR OR HAZARDOUS LOCATIONS.
- H) INSTALL LOW VOLTAGE CIRCUITS WHICH ARE LOCATED IN CONCRETE SLABS OR IN MASONRY WALLS IN CONDUIT. I) WHERE CONTROL WIRING MUST BE SURFACE MOUNTED IN OCCUPIED ROOMS AND IT IS NOT POSSIBLE TO CONCEAL
- J)NUMBER—CODE OR COLOR—CODE CONDUCTORS APPROPRIATELY FOR IDENTIFICATION AND SERVICING OF THE CONTROL
- A) BOILERS (B) AND ASSOCIATED CIRCULATOR PUMPS (CP)
- AIR TEMPERATURE,
- WHENVEVER ONE OR MORE FAN COIL UNITS IS CALLING FOR HEAT.

3) WHENEVER A BOILER IS CALLED TO OPERATE, IT'S ASSOCIATED INJECTION PUMP SHALL OPERATE.

- B) SPLIT CHILLER (CU / HX) AND ASSOCIATED CIRCULATOR PUMPS (CP)
- 1)THE MAIN LOOP SUPPLY WATER TEMPERATURE SHALL BE MAINTAINED AT 45°F. 2) THE CHILLED WATER LOOP PUMP SHALL OPERATE WHENEVER OUTDOOR AIR TEMPERATURE EXCEEDS 70 F, OR IF
- ONE OR MORE FAN COIL UNITS CALLS FOR CHILLED WATER, (a) VARIABLE SPEED PUMP SHALL MODULATE AS REQUIRED TO MAINTAIN CONSTANT LOOP PRESSURE.
- (c) FACTORY CONDENSING UNIT CONTROLS SHALL STAGE COMPRESSOR AS REQUIRED TO MEET LOAD

- 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 F) INSTALL CIRCUITS OVER 25-VOLT WITH COLOR-CODED THWN/THHN WIRE IN EMT OR MC CABLE AS WHIPS TO
- WIRING, RUN WIRING IN WIREMOLD RACEWAY (COLOR BY ARCHITECT).
- (a) OUTDOOR TEMPERATURE RESET CONTROLS SHALL VARY SUPPLY WATER TEMPERATURE INVERSELY TO OUTSIDE
- (a) VARIABLE SPEED PUMP SHALL MODULATE AS REQUIRED TO MAINTAIN CONSTANT LOOP PRESSURE.

- 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.
- K) DEMONSTRATE CONTROL SYSTEM TO AND TRAIN OWNER'S PERSONNEL IN OPERATION AND MAINTENANCE OF CONTROL
- 1)THE MAIN LOOP SUPPLY WATER TEMPERATURE SHALL BE MAINTAINED AT 160'F MAX.
- 2) THE HOT WATER LOOP PUMP SHALL OPERATE WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 60'F OR
- (b) AFTER FLUID FLOW HAS BEEN VERIFIED THE OUTDOOR CONDENSING UNIT SHALL OPERATE.
- END OF DIVISION 25

LINED SUPPLY AIR DUCT DOES NOT REQUIRE EXTERNAL INSULATION. (a) ROOF MOUNTED SUPPLY, RETURN AND EXHAUST AIR DUCTS SHALL BE INSULATED WITH AN INSTALLED MINIMUM R-12 INSULATION, SIMILAR TO 2.5"THICK HUNTER H-SHIELD POLYISO OR JOHNS MANVILLE 814, 3"THICK, 3.0 PCF FIBERGLASS INSULATION BOARD WITH FSK JACKET. (1) SLOPE TOP TO SHED WATER. (2) COVER WITH VENTURECLAD 1577CW OR SIMILAR WEATHERPROOF JACKETING SYSTEM. (b) EXHAUST DUCTS SHALL BE INSULATED WITH R-6 TO TEN FEET BACK FROM BUILDING EXTERIOR. (c) ADDITIONAL DUCTWORK INSULATION REQUIREMENTS MAY BE SHOWN ON THE DRAWINGS. SAME AS IF HEREIN SPECIFIED OR SHOWN ON THE DRAWINGS. CONTRACTOR'S RESPONSIBILITY TO BRING THIS TO THE ATTENTION OF THE ENGINEER. 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.

# APPARATUS AND MECHANISMS ARE IN PROPER WORKING ORDER AND MADE READY FOR TESTING.

- H) THE CONTRACTOR SHALL INSTRUCT OWNER IN THE PROPER OPERATION OF EQUIPMENT, EXPLAIN THE PROPER
- J)EQUIPMENT SHALL BE INSTALLED WITH CLEARANCE FOR PROPER MAINTENANCE. FILTERS, COILS, DRIVES, VALVES, AND
- FURNISH THE OWNER WITH ALL MANUFACTURER'S GUARANTEES OR WARRANTIES.

LEGEND OF DUCT SYMBOLS *LEGEND OF CONTROL SYMBOLS* SYMBOL SMOKE DETECTOR CARBON MONOXIDE SENSOR CARBON DIOXIDE SENSOR INDICATOR LAMP

ARSENAULT

BELOW: PLEASE REFER ALL QUESTIONS, SUBMITTALS AND CORRESPONDENCE TO THE PROJECT MANAGER.

PHONE: (603) 463-1086 ADDRESS: 65 OLD CENTER RD, DEERFIELD, NH 03037

HVAC PROJECT MANAGER

EMAIL: DAVEM@DESIGNDAYMECH.COM

LIBRARY 64 EAST BROADWAY DERRY, NH

THE TOWN

OF DERRY

NEW HAMSHIRE

PROJECT:

DCM

DCM

AS NOTED

SHEET 4 OF 4