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CONTROLS GENERAL NOTES	
1. GENERAL	
A.	SEQUENCES OUTLINED SHALL BE PERFORMED BY DIRECT DIGITAL CONTROL FIELD PANELS (DDCPFS) AND LOCALLY MOUNTED DIRECT DIGITAL UNIT CONTROLLERS CONNECTED TO A CENTRAL BUILDING AUTOMATION SYSTEM, UNLESS OTHERWISE SPECIFIED. SYSTEM ARCHITECTURE SHALL BE BASED ON A PEER-TO-PEER DISTRIBUTED CONTROL SYSTEM NETWORK. SYSTEM SHALL INTEGRATE OPEN COMMUNICATION PROTOCOL CONTROLLERS. ALL DDCP AND LOCAL CONTROLLERS SHALL BE CAPABLE OF INDEPENDENT OPERATION REGARDLESS OF THE STATUS OF THE BAS WORKSTATION.
B.	BMS (BUILDING MANAGEMENT SYSTEM), BAS (BUILDING AUTOMATION SYSTEM) AND DDC (DIRECT DIGITAL CONTROL) MAY BE USED INTERCHANGEABLY AND SHARE THE SAME MEANING.
C.	ADDRESS IDENTIFIERS FOR ALL POINTS AND VARIABLES SHALL BE COORDINATED WITH OWNER AND EXISTING CONTROLS AND SHALL BE APPROVED BY THE FACILITY OWNER.
D.	ABILITY TO REVIEW ALL MEASURED DATA, CONTROL SETPOINTS AND FUNCTIONS SHALL BE PROVIDED AT BAS WORKSTATION AND ON LAPTOP SERVICE TOOL.
E.	COORDINATE SENSOR LOCATIONS WITH DUCTWORK AND PIPING SHOP DRAWINGS AND INDICATE PROPOSED LOCATIONS ON SUBMITTALS. PROVIDE MANUFACTURERS' RECOMMENDED UPSTREAM AND DOWNSTREAM PIPE OR DUCT DIAMETERS FOR FLOW SENSING ELEMENTS.
F.	PROVIDE COMMUNICATIONS INTERFACE INCLUDING SOFTWARE BETWEEN THE BAS AND EACH EQUIPMENT MANUFACTURER SUPPLIED CONTROL PANEL. BAS SHALL BE CAPABLE OF READING AND DISPLAYING ALL DATA USED BY THE EQUIPMENT MANUFACTURER CONTROL PANEL. SOFTWARE INTERFACE SHALL BE THROUGH LONMARK OR BACNET COMPLIANT PROTOCOL WHERE THE BAS IS REQUIRED TO CONTROL THE OPERATION OF THE EQUIPMENT. PROVIDE COMPLETE INPUT AND OUTPUT INTERFACE.
G.	FAIL SAFE POSITIONS INDICATED ARE POSITIONS THAT DEVICES WILL GO TO WHEN THE ASSOCIATED EQUIPMENT IS DE-ENERGIZED.
H.	PROVIDE ADEQUATE DAMPING OF ALL MODULATING CONTROL LOOPS TO PREVENT HUNTING. MAXIMUM RESPONSE TIME SHALL BE 30 SECONDS. ALL CONTROL LOOPS SHALL BE TUNED TO PROVIDE FOR STABLE OPERATION OF THE CONTROL DEVICE. LOOP TUNING MAY BE REQUIRED TO BE PERFORMED MULTIPLE TIMES DURING MULTIPLE CONTROL SCENARIOS.
I.	ALL INSTALLED CONTROL DEVICES SHALL BE INSTALLED IN SUCH A WAY TO BE ACCESSIBLE FOR MAINTENANCE AND REPAIR.
J.	DAMPER END SWITCHES SHALL BE INTERLOCKED VIA HARDWIRE TO THE START/STOP FUNCTION OF ITS ASSOCIATED FAN.
2. WIRING	
A.	PROVIDE ALL CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE POINTS (ANALOG IN, ANALOG OUT, BINARY IN, BINARY OUT) AND ACCESSORIES AS REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED. ADDITIONALLY, PROVIDE HARDWARE POINTS INDICATED REGARDLESS THAT SUCH POINTS MAY NOT BE REQUIRED TO PERFORM THE CONTROL SEQUENCES INDICATED.
B.	POWER WIRING SHALL COMPLY WITH REQUIREMENTS OF DIVISION 26 SECTIONS.
C.	PROVIDE NORMAL [AND STANDBY] [AND EMERGENCY POWER] WIRING TO ALL CONTROL DEVICES, INCLUDING CONTROL PANELS, WORKSTATION AND HOST COMPUTERS.
D.	ELECTRICAL CIRCUITS FOR ALL CONTROLS SHALL BE DEDICATED ONLY TO THE BUILDING AUTOMATION CONTROL SYSTEM AND COMPONENTS. ALL WIRING FROM AND INCLUDING DEDICATED CIRCUIT BREAKERS TO THE POINT OF USE SHALL BE PROVIDED.
3. SAFETIES:	
A.	SAFETY DEVICES SUCH AS FREEZE/STATS, SMOKE DETECTION, AND HIGH STATIC PRESSURE SWITCHES SHALL BE MANUAL RESET AND SHALL PERFORM ALL ASSOCIATED SHUTDOWNS/SAFE ACTIONS VIA HARDWIRING WITHOUT RELYING ON ANY SOFTWARE DEVICES. FOR EXAMPLE, FREEZE/STATS SHALL SHUT OFF FAN, FULLY OPEN COIL VALVE, AND CLOSE OUTSIDE AIR DAMPER VIA HARDWIRING WITHOUT RELYING ON ANY SOFTWARE FUNCTIONS. SOFTWARE SHUTDOWNS/FAILSAFE SHALL BE PROVIDED AS A REDUNDANT BACKUP TO THE REQUIRED HARDWIRED SHUTDOWNS.
B.	DEVICES SUCH AS CHW AND DH SHALL OPERATE ON A SOFT PERMISSIVE, ONLY ALLOWING FANS TO START AND CONTROL VALVES TO OPEN WHEN SYSTEM IS IN HEATING MODE. USE OF AQUASTATS IS NOT ACCEPTABLE.
C.	SAFETY DEVICES SHALL FUNCTION AND SHUT DOWN THE ASSOCIATED EQUIPMENT WHEN THE MANUAL SWITCHES ARE IN BOTH THE HAND AND AUTO POSITIONS.
4. ALARMS:	
A.	REFER TO SEQUENCES FOR ALARM FUNCTIONS. WHENEVER AN ALARM IS INITIATED, THE BAS SHALL RETAIN IN MEMORY THE READING AND SETPOINT OF EACH ASSOCIATED DEVICE TO HELP THE OPERATOR IN ISOLATING THE CAUSE OF THE ALARM.
B.	IF ANY DDCP OR EQUIPMENT MANUFACTURER'S CONTROL PANEL LOSES COMMUNICATION WITH THE BAS AND RESTARTS, AN ALARM SHALL BE INITIATED AT THE BAS INDICATING THE LOCATION OF THE FAULT.
C.	WHENEVER A PIECE OF EQUIPMENT IS TAKEN OFFLINE FOR MAINTENANCE, ALARMS RELATED TO THIS PIECE OF EQUIPMENT SHALL BE TEMPORARILY DISABLED.
5. ROOM SENSORS	
A.	FOR REGULARLY OCCUPIED SPACES, PROVIDE WALL MOUNTED ROOM SENSORS WITH INTEGRAL LCD DISPLAY AND USER INTERFACE TO DISPLAY AND ADJUST SETPOINT, MODE AND STATUS.
B.	FOR CORRIDORS, RESTROOMS, VESTIBULES, STORAGE ROOMS, JANITOR CLOSETS, ELECTRICAL CLOSETS, DATA CLOSETS/ROOMS, AND MECHANICAL ROOMS, PROVIDE WALL MOUNTED, BRUSHED CHROME, WALL PLATE TYPE SENSORS.
6. HISTORIES, TRENDS AND REPORTS	
A.	THE BAS SHALL RETAIN IN MEMORY AT ALL TIMES 5 MINUTES OF TREND DATA (OR LAST 5 READINGS WHICHEVER IS LONGER) FOR EACH POINT OF THE CONTRACTOR AND BE REMOVED RESOLUTION OF THIS SHALL NOT EXCEED ONE READING PER 15 SECOND INTERVAL.
B.	BAS SHALL RETAIN ONE YEAR (ROLLING) OF DATA FOR ALL CONTROL POINTS IN TEN MINUTE INTERVALS.
C.	USER SHALL BE ABLE TO SELECT TABULAR OR GRAPHICAL OUTPUT OF DATA. GRAPHIC DATA SHALL BE AVAILABLE IN USER SELECTABLE COLOR OR OR BLACK AND WHITE VERSIONS.
D.	TABULAR DATA SHALL BE MADE AVAILABLE IN COMMA SEPARATED VALUES OR IN FORMAT COMPATIBLE WITH MICROSOFT EXCEL SOFTWARE.
E.	WHENEVER A UNIT IS SHUT DOWN BECAUSE OF ONE OF IT'S SAFETIES, THE BAS SHALL RETAIN IN MEMORY THE READING AND SETPOINT OF EACH ASSOCIATED DEVICE TO HELP THE OPERATOR IN ISOLATING THE CAUSE OF THE SHUT DOWN.

DEMOLITION NOTES

DEMOLITION NOTES	
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1.	SITE VISIT: THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. BEFORE SUBMITTING BID, VISIT AND CAREFULLY EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. NO EXTRA PAYMENT WILL BE ALLOWED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUCTED BY EXPERIENCED OBSERVER.
2.	PREPARATORY WORK: BEFORE STARTING WORK IN A PARTICULAR AREA OF THE PROJECT, VISIT SITE AND EXAMINE CONDITIONS UNDER WHICH WORK MUST BE PERFORMED INCLUDING PREPARATORY WORK DONE UNDER OTHER SECTIONS OR CONTRACTS BY OWNER. REPORT CONDITIONS THAT MIGHT AFFECT WORK ADVERSELY IN WRITING TO ARCHITECT AND OWNER. DO NOT PROCEED WITH WORK UNTIL DEFECTS HAVE BEEN CORRECTED AND CONDITIONS ARE SATISFACTORY. COMMENCEMENT OF WORK SHALL BE CONSTRUED AS COMPLETE ACCEPTANCE OF EXISTING CONDITIONS AND PREPARATORY WORK.
3.	PHASING: DEMOLITION WORK SHALL COMPLY WITH THE PHASING REQUIREMENTS OF THE PROJECT AND BE COORDINATED WITH THE OWNER, ARCHITECT, CM AND ENGINEER. NO REMOVALS SHALL BE IMPLEMENTED WITHOUT A THOROUGH UNDERSTANDING OF THE PHASING REQUIREMENTS.
4.	ABANDONING OF DUCTWORK, PIPING OR EQUIPMENT IN PLACE WITHIN SCOPE AREA IS PROHIBITED.
5.	PROVIDE 2 WEEKS NOTICE TO OWNER FOR SHUT DOWN OF ANY SERVICES AND/OR SYSTEMS.
6.	COORDINATE EXISTING EQUIPMENT AND MATERIALS THAT SHALL REMAIN THE PROPERTY OF THE OWNER. ITEMS OF VALUE WHICH ARE NOT DIRECTED TO BE RETURNED TO THE OWNER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF. STORAGE OR SALE OF ITEMS ON THE PROJECT SITE IS PROHIBITED.
7.	PROTECTION: ENSURE THE SAFE PASSAGE OF PERSONS IN AND AROUND THE BUILDING DURING DEMOLITION. PREVENT INJURY TO PERSONS AND DAMAGE TO PROPERTY. PROVIDE ADEQUATE SHORING AND BRACING TO PREVENT COLLAPSE. IMMEDIATELY REPAIR DAMAGED PROPERTY TO THE CONDITION BEFORE BEING DAMAGED. TAKE EFFECTIVE MEASURES TO PREVENT WINDBLOWN DUST.
8.	UTILITIES: MAINTAIN ALL UTILITIES EXCEPT THOSE REQUIRING REMOVAL OR RELOCATION. KEEP UTILITIES IN SERVICE AND PROTECT FROM DAMAGE. DO NOT INTERRUPT UTILITIES SERVING OCCUPIED AREAS WITHOUT FIRST OBTAINING PERMISSION FROM THE OWNER IN WRITING. PROVIDE TEMPORARY SERVICES AS REQUIRED.
9.	INFORMATION CONTAINED ON THESE DRAWINGS WAS OBTAINED FROM ARCHIVED DRAWINGS AND SITE VISITS. DRAWINGS ARE DIAGNOSTIC ONLY AND REFLECT OVERALL SYSTEM REMOVAL. NOT EVERY ITEM OR COMPONENT OF A SYSTEM IS SHOWN. PROVIDE COMPLETE REMOVAL OF ASSOCIATED ANCLINARY PIPES, HANGERS, VALVES AND ACCESSORIES SERVING SYSTEM SHOWN.
10.	DEMOLITION WORK SHALL COMPLY WITH OSHA, EPA AND APPLICABLE STATE AND LOCAL CODES. COMPLY WITH HAULING AND DISPOSAL REGULATIONS.
11.	REFER TO SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS AND PROCEDURES.
PRE-DEMO TESTING, ADJUSTING AND BALANCING (TAB)	
1.	CONFIRM SUPPLY, RETURN AND EXHAUST SYSTEM AIRFLOW CAPACITY THROUGH PRE-CONSTRUCTION TESTING AND BALANCING OF SYSTEMS AFFECTED BY THE WORK. REPORTS SHALL INCLUDE PIPE SIZE, FLOW RATE, SUPPLY PRESSURE AND RETURN PRESSURE, AMPS AND VFD SPEEDS.
2.	CONFIRM HYDRONIC SYSTEM CAPACITY THROUGH PRE-CONSTRUCTION TESTING AND BALANCING REPORTS OF SYSTEMS AFFECTED BY THE WORK. REPORTS SHALL INCLUDE PIPE SIZE, FLOW RATE, SUPPLY PRESSURE AND RETURN PRESSURE.
3.	CONFIRM STEAM PIPING CAPACITY THROUGH PRE-CONSTRUCTION TESTING AND BALANCING REPORTS OF SYSTEMS AFFECTED BY THE WORK. REPORTS SHALL INCLUDE PIPE SIZE AND STEAM PRESSURE (PSIG).

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GENERAL NOTES	
GENERAL	
1.	GENERAL NOTES, SYMBOLS AND DETAILS ARE APPLICABLE TO ALL DRAWINGS WITHIN DIVISION 23.
2.	DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
3.	COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
4.	RUN DUCTS AND PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE OR AS APPROVED BY THE ARCHITECT.
5.	INSTALL SENSORS (TEMPERATURE, HUMIDITY, CO2, THERMOSTATS) AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ARCHITECT. MOUNTING HEIGHT AFF SHALL COMPLY WITH ADA AND SHALL BE MOUNTED LEVEL WITH ADJACENT SWITCHES (IE LIGHT SWITCHES).
6.	COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS.
7.	NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS FOR CLARITY. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED IN EXPOSED LOCATIONS OR ABOVE LAY-IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE EXACT QUANTITY, SIZE, AND LOCATIONS AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILINGS AND BUILDING ASSEMBLIES. OBTAIN APPROVAL FOR ALL PANEL LOCATIONS FROM ARCHITECT.
8.	AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: HVAC CONTROL BOXES, JUNCTION BOXES, VALVES, DDC CONTROL BOXES, ELECTRICAL PANELS, FILTERS, BELTS, WATER COILS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. FULLY AND REASONABLY ACCESSIBLE SHALL BE DEFINED AS NATIONAL ELECTRIC CODE REQUIRED CLEARANCE FOR POWERED EQUIPMENT CAPABLE OF BEING ACCESS OR SERVICED WITHOUT REMOVING, MODIFYING OR DISTORTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
9.	SUPPORT EQUIPMENT, PIPING AND DUCTWORK FROM BUILDING STRUCTURE OR WITH STEEL SUPPORTS AND PLATFORMS AS REQUIRED. PROVIDE VIBRATION ISOLATION FOR ROTATING EQUIPMENT, DUCTWORK AND PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
10.	ROOF CURB AND RAIL HEIGHTS INDICATED ARE THE DIMENSIONS BETWEEN THE ROOF SURFACE AND THE TOPS OF THE CURBS AND RAILS. WHERE THE ROOF IS PITCHED, CONSTRUCT CURBS AND RAILS SUCH THAT THE BOTTOM PITCHES WITH THE ROOF AND THE TOP IS LEVEL.
11.	CONTROL WIRING METHODS SHALL COMPLY WITH NEC, AND DIVISION 26 SPECIFICATIONS.
12.	VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
13.	PERFORM PRESSURE AND LEAKAGE TESTS BEFORE INSULATING DUCTWORK AND PIPING
AIR SYSTEM SPECIFIC NOTES:	
1.	REFER TO SPECIFICATIONS FOR DUCTWORK CONSTRUCTION CLASSES, SEAL, AND LEAKAGE CLASSES.
2.	EXTERIOR LOUVERS ARE INDICATED FOR LOCATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
3.	SMOKE DETECTORS SHALL BE FURNISHED AND WIRED TO THE FIRE ALARM SYSTEM. MOUNT THE DETECTORS IN DUCTWORK, WHERE REQUIRED BY CODE AND DIVISION 23. ASSOCIATED FAN SYSTEM SHALL SHUT DOWN UPON DETECTION OF SMOKE.
4.	PROVIDE UL FIRE DAMPERS OR SMOKE/FIRE DAMPERS AND ASSOCIATED ACCESS PANELS WHERE SHOWN ON DRAWINGS IN COMPLIANCE WITH NFPA 90A. FOR DUCTS THAT PENETRATE FIRE WALLS, FLOORS AND PARTITIONS PROVIDE SLEEVES WHERE PENETRATIONS ARE NOT PERPENDICULAR TO SURFACE PENETRATED.
5.	REFER TO REFLECTED CEILING PLANS FOR LOCATIONS OF AIR TERMINAL DEVICES.
6.	INTERNAL AIR FLOW DIMENSIONS ARE SHOWN FOR DUCTS. CONTRACTOR SHALL INCREASE SHEETMETAL SIZE FOR LINER IF APPLICABLE.
7.	DIFFUSER SIZES SHOWN ARE NECK SIZES; REGISTER AND GRILLE SIZE ARE NOMINAL. ALL ROUND RUN OUTS TO DIFFUSERS SHALL BE THE SAME NOMINAL SIZE AS THE SCHEDULED SIZE. UNLESS NOTED AS LARGER, DUCT TRANSITIONS SHALL BE PROVIDED AS NECESSARY AT INLET TO DIFFUSER.
8.	PROVIDE FLEXIBLE CONNECTIONS ON ALL DUCTS CONNECTING TO FANS AND AIR HANDLING UNITS UNLESS INTERNALLY ISOLATED.
9.	THE INSIDE OF DUCTWORK VISIBLE THROUGH A GRILLE OR DIFFUSER SHALL BE PAINTED FLAT BLACK.
10.	ALL RETURN AIR OPENINGS ABOVE CEILING SHALL BE PROVIDED WITH A 1/4" MESH ALUMINUM OR GALVANIZED IRON (80% FREE AREA MINIMUM).
11.	ELBOWS IN DUCT SYSTEMS SHALL BE FULL RADIUS (CENTERLINE RADIUS + 1.5 DUCT WIDTH) WHERE SPACE PERMITS. WHERE LIMITED CLEARANCE OCCURS, PROVIDE SHORT RADIUS ELBOW WITH FULL LENGTH SPLITTER VANES PER SMACNA, OR MITERED ELBOW WITH TURNING VANES PER SMACNA.
12.	NOT ALL MANUAL DAMPERS ARE SHOWN ON THE DRAWINGS IN ORDER FOR DRAWING CLARITY. PROVIDE MANUAL ADJUSTABLE DAMPERS ON EACH LOW PRESSURE SUPPLY, RETURN AND EXHAUST DUCT AND EACH TAKE OFF TO REGISTERS, GRILLES, DIFFUSERS, AND OED; AS REQUIRED FOR PROPER BALANCE OF SYSTEM. PROVIDE CABLE OPERATED DAMPERS WHERE MANUAL DAMPER IS INACCESSIBLE.
13.	WHERE DUCTS PENETRATE WALLS WITH SOUND ISOLATION PERFORMANCE RATINGS, PROVIDE DUCT SLEEVE SIZED TO PROVIDE 1/4" GAP BETWEEN THE SLEEVE AND DUCT. FILL THE GAP WITH FIBEROUS MATERIAL AND SEAL AIRTIGHT WITH NON-HARDENING ACOUSTIC SEALANT.
PIPING SYSTEM SPECIFIC NOTES:	
1.	PIPE CONDENSATE DRAIN LINES FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP CONNECTED TO BUILDING DRAINAGE SYSTEMS WITH AIR GAP. SIZE DEPTH OF TRAP FOR ASSOCIATED AIR PRESSURE DIFFERENTIAL.
2.	PROVIDE HANGERS, CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING EXCEEDING ASME ALLOWABLE STRESS ON PIPING MATERIALS.
3.	PROVIDE PIPE EXPANSION JOINTS WHERE PIPES PASS THROUGH BUILDING EXPANSION JOINTS. REVIEW ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR LOCATIONS AND DIMENSIONS.
4.	PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.
5.	THOUGH SOME ISOLATION VALVES ARE SHOWN ON THE DRAWINGS, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL ISOLATION VALVES. PROVIDE ISOLATION VALVES AT CONNECTIONS TO EQUIPMENT AND AS REQUIRED BY SPECIFICATIONS AND DETAILS.
FIRESTOPPING NOTES:	
1.	PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE OR SMOKE WALLS, BARRIERS AND PARTITIONS AS REQUIRED TO MAINTAIN RATING. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

EQUIPMENT ABBREVIATIONS

AC	AIR CONDITIONING UNIT
ACCU	AIR COOLED CONDENSING UNIT
AH	AIR HANDLER
AHU	AIR HANDLING UNIT
ASHP	AIR SOURCE HEAT PUMP
B	BOILER
CUH	CABINET UNIT HEATER
CRAC	COMPUTER ROOM AC UNIT
CP	CONDENSATE PUMP
CU	CONDENSING UNIT
CV	CONVECTOR
DAC	DUCTLESS AIR CONDITIONING UNIT
DHP	DUCTLESS HEAT PUMP
DOS	DEDICATED OUTDOOR AIR SYSTEM
ERV	ENERGY RECOVERY UNIT
ERV	ENERGY RECOVERY VENTILATOR
EG	EXHAUST FAN
EP	EXHAUST GRILLE
F	FAN
HP	HEAT PUMP UNIT
HWP	HOT WATER PUMP
LS	LINEAR BAR GRILLE
P	PIPE
RHC	REHEAT COIL
RF	RETURN FAN OR RELIEF FAN
SA	SOUND ATTENUATOR
SD	SUPPLY DIFFUSER
SG	SUPPLY GRILLE
UH	UNIT HEATER

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PIPING LEGEND	
SYMBOL - DOUBLE LINE	DESCRIPTION
	SUPPLY PIPING
	RETURN PIPING
	PIPE RISE
	PIPE DROP
	BLIND FLANGE
	BLIND FLANGE WITH TAP
	END CAP
	REDUCER (ECCENTRIC-FLAT ON BOTTOM OR FLAT ON TOP)
	REDUCER (CONCENTRIC)
	UNION
SYMBOL - SINGLE LINE	DESCRIPTION
	SUPPLY PIPING
	RETURN PIPING
	ELBOW UP
	ELBOW DOWN
	TEE TOWARDS (UP IN PLAN)
	TEE AWAY (DOWN IN PLAN)
	DROP AND RUN
	DIRECTION OF FLOW
	DIRT LEG
	CLEANOUT
	BLIND FLANGE
	END CAP
	REDUCER (ECCENTRIC-FLAT ON BOTTOM OR FLAT ON TOP)
	REDUCER (CONCENTRIC)
	HEATING HOT WATER SUPPLY
	HEATING HOT WATER RETURN
	CONDENSATE DRAIN
	REFRIGERANT SUCTION
	REFRIGERANT LIQUID
	REFRIGERANT GAS

GENERAL ABBREVIATIONS

AC	AIR CONDITIONING UNIT
AD	ACCESS DOOR
ADJ	ADJUSTABLE
AFP	ABOVE FINISHED FLOOR
ALT	ALTERNATE
AHJ	AUTHORITY HAVING JURISDICTION
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
AWT	AVERAGE WATER TEMPERATURE
BAS	BUILDING AUTOMATION SYSTEM
BHP	BREAK HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BTU	BRITISH THERMAL UNIT
BTU/H	BTU/HOUR
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
CAP	CAPACITY
COP	COEFFICIENT OF PERFORMANCE
CPH	CUBIC FEET PER MINUTE
CUFT	CUBIC FEET
DB	DRY BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROL
DA	DIAMETER
DN	DOWN
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EDB	ENTERING AIR TEMPERATURE (DRY BULB)
EDR	ENTERING DRY BULB
EER	ENERGY EFFICIENCY RATIO
ELEC	ELECTRICAL
ESP	EXISTING TO BE RELOCATED
ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB
EWV	ENTERING WATER TEMPERATURE
FD	FEET
FEET	FEET
FT	FEET
FLA	FULL LOAD AMPS
FLM	FEET PER MINUTE
FSD	COMBINATION FIRE SMOKE DAMPER
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRD	GRILLE, REGISTER, DIFFUSER
HD	HEAD
HP	HORSEPOWER
HSFP	HEATING SEASON PERFORMANCE FACTOR
HZ	HERTZ
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
IN	INCHES
IN WG	INCHES WATER GAUGE
PLY	INTEGRATED PART LOAD VALUE
KW	KILOWATTS
L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MECH	MECHANICAL
MBH	THOUSANDS OF BTU / HOUR
MCA	MINIMUM CROUCH AMPACITY
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OAT	OUTSIDE AIR TEMPERATURE
OD	OUTER DIAMETER
OED	OPEN ENDED DUCT
PH	PHASE
PLBG	PLUMBING
PSIG	POUNDS PER SQUARE INCH GAUGE
QTY	QUANTITY
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SG	SIGHT GLASS
SP	STATIC PRESSURE
SPD	STATIC PRESSURE DROP
STP	SATURATED SUCTION PRESSURE
SQFT / SF	SQUARE FEET
TEMP	TEMPERATURE
TSP	TOTAL STATIC PRESSURE
TSAT	THERMOSTAT
TYP	TYPICAL
UIO	UNLESS OTHERWISE INDICED
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THRU ROOF
W	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WG	WATER GAUGE
WMS	WIRE MESH SCREEN
WPD	WATER PRESSURE DROP
X	EXCISE















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DUCTWORK LEGEND	
SYMBOL	DESCRIPTION
	RECTANGULAR DUCTWORK
	ROUND DUCTWORK
	OVAL DUCTWORK
	DUCTWORK SHOWN SINGLE LINE
	ACOUSTICALLY LINED DUCTWORK
	ACOUSTICALLY LINED DUCTWORK (SINGLE LINE)
	RECTANGULAR SUPPLY DUCTWORK TOWARDS (UP IN PLAN)
	ROUND SUPPLY DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR SUPPLY DUCTWORK AWAY (DOWN IN PLAN)
	ROUND SUPPLY DUCTWORK AWAY (DOWN IN PLAN)
	RECTANGULAR RETURN DUCTWORK TOWARDS (UP IN PLAN)
	ROUND RETURN DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR RETURN DUCTWORK AWAY (DOWN IN PLAN)
	ROUND RETURN DUCTWORK AWAY (DOWN IN PLAN)
	RECTANGULAR EXHAUST DUCTWORK TOWARDS (UP IN PLAN)
	ROUND EXHAUST DUCTWORK TOWARDS (UP IN PLAN)
	RECTANGULAR EXHAUST DUCTWORK AWAY (DOWN IN PLAN)
	ROUND EXHAUST DUCTWORK AWAY (DOWN IN PLAN)
	FLEXIBLE DUCT
	OPEN ENDED DUCT WITH WIRE MESH SCREEN
	CAPPED DUCT
	DUCT TRANSITION

AIR DEVICE LEGEND	
SYMBOL	DESCRIPTION
	SUPPLY DIFFUSER
	RETURN GRILLE OR REGISTER
	EXHAUST GRILLE OR REGISTER
	SIDEWALL SUPPLY GRILLE
	SIDEWALL RETURN OR EXHAUST GRILLE OR REGISTER
	SUPPLY DIFFUSER (BLOW INDICATED)
	LINEAR DIFFUSER
	AIR DEVICE TAG (TAG NO. (AIRFLOW))

DAMPER LEGEND	
SYMBOL	DESCRIPTION
	MANUAL VOLUME DAMPER
	FIRE DAMPER W/ACCESS DOOR
	MOTORIZED CONTROL DAMPER W/ACCESS DOOR
	SMOKE DAMPER W/SMOKE DETECTOR AND ACCESS DOOR
	COMBINATION FIRE/SMOKE DAMPER W/SMOKE DETECTOR AND ACCESS DOOR
	RADIATION DAMPER
	BACKDRAFT DAMPER
	AUTOMATIC VOLUME DAMPER (PRESSURE INDEPENDENT)

DIAGRAM SYMBOLS	
SYMBOL	DESCRIPTION
	COOLING COIL
	HEATING COIL
	PREHEAT COIL
	REHEAT COIL
	FILTER BANK
	OPPOSED BLADE MOTORIZED DAMPER
	PARALLEL BLADE MOTORIZED DAMPER
	BACKDRAFT DAMPER
	CENTRIFUGAL FAN
	PLENUM / PLUG FAN

DRAWING SYMBOLS	
SYMBOL	DESCRIPTION
	CALLOUT
	CENTERLINE
	CONNECT TO EXISTING
	DISCONNECT FROM EXISTING
 OR 	KEYNOTE TAG
	REVISION NUMBER
	EQUIPMENT TAG
	ELEVATION MARK
	LINE BREAK
	EXISTING LINETYPE
	NEW WORK LINETYPE
	FUTURE WORK LINETYPE
	DEMO WORK LINETYPE

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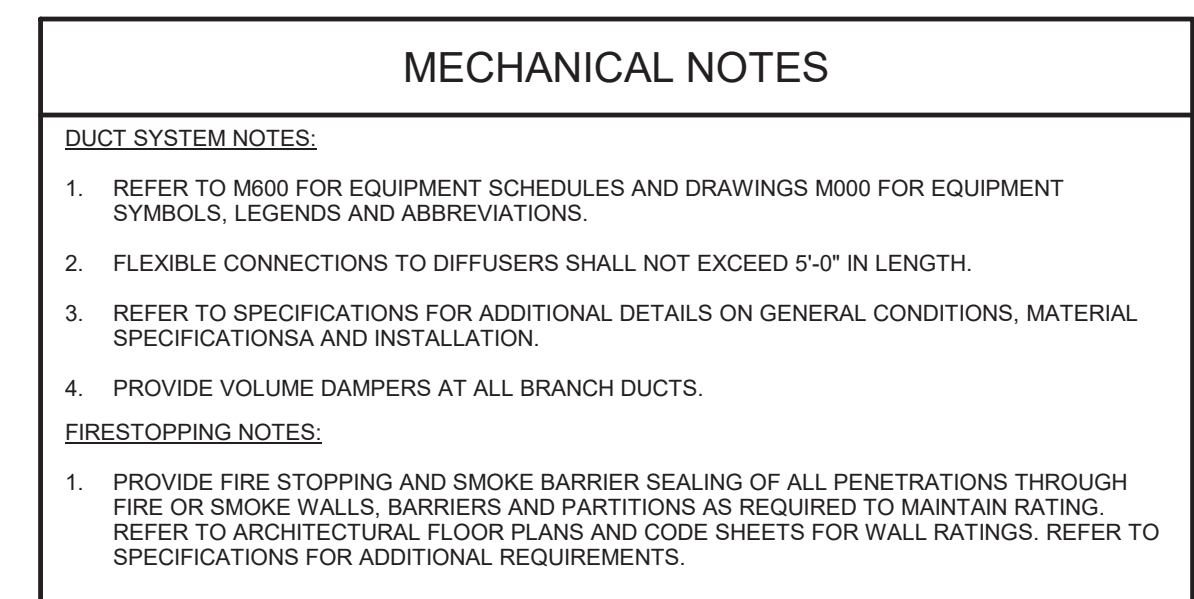
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Number	Date	Issued For

Date 04/07/2022 Scale As indicated Proj. Number 20287.10	Drawing Number M101
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2 MECHANICAL DUCTWORK FIRST LEVEL FLOOR PLAN
1/8" = 1'-0"



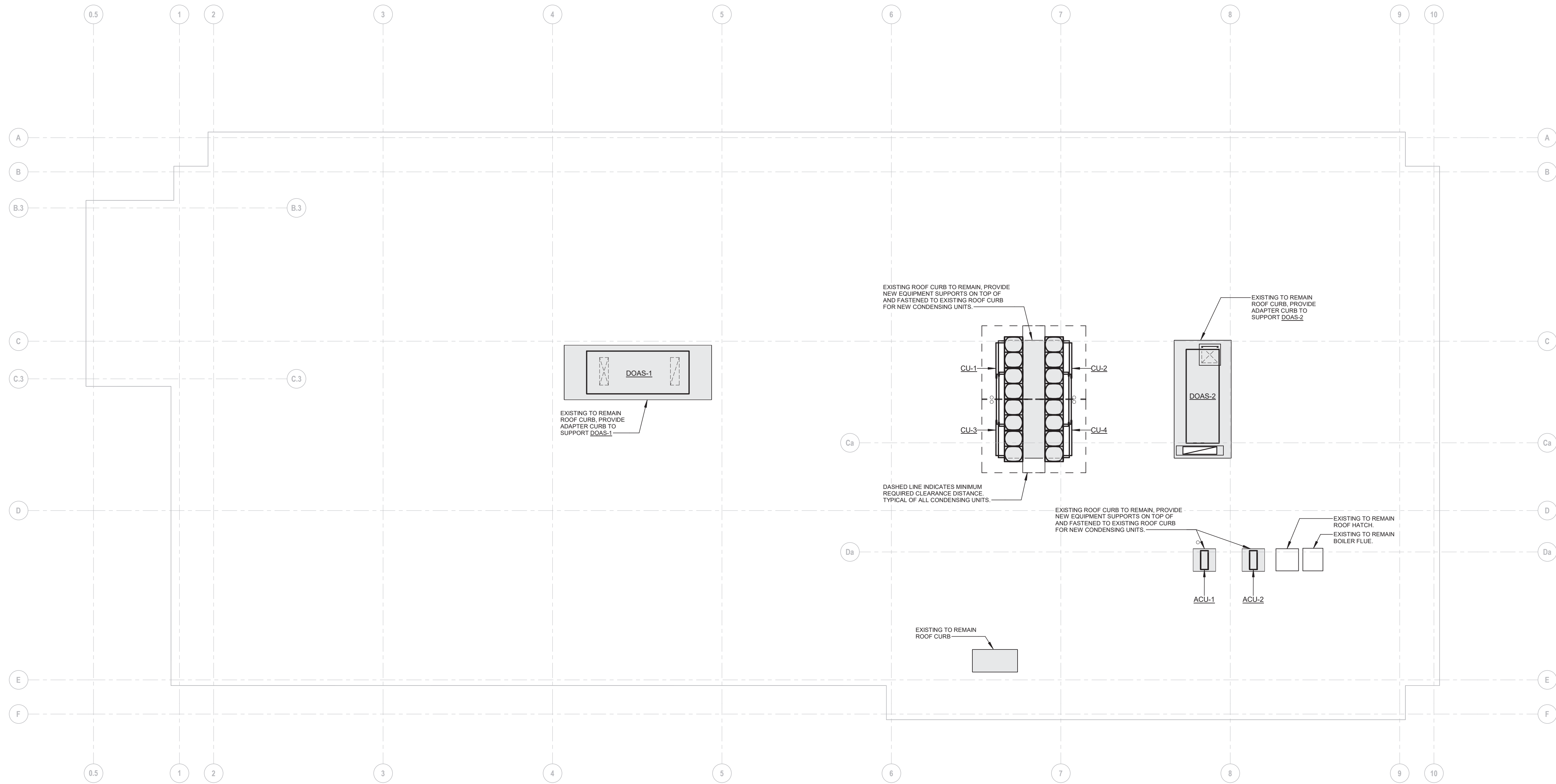
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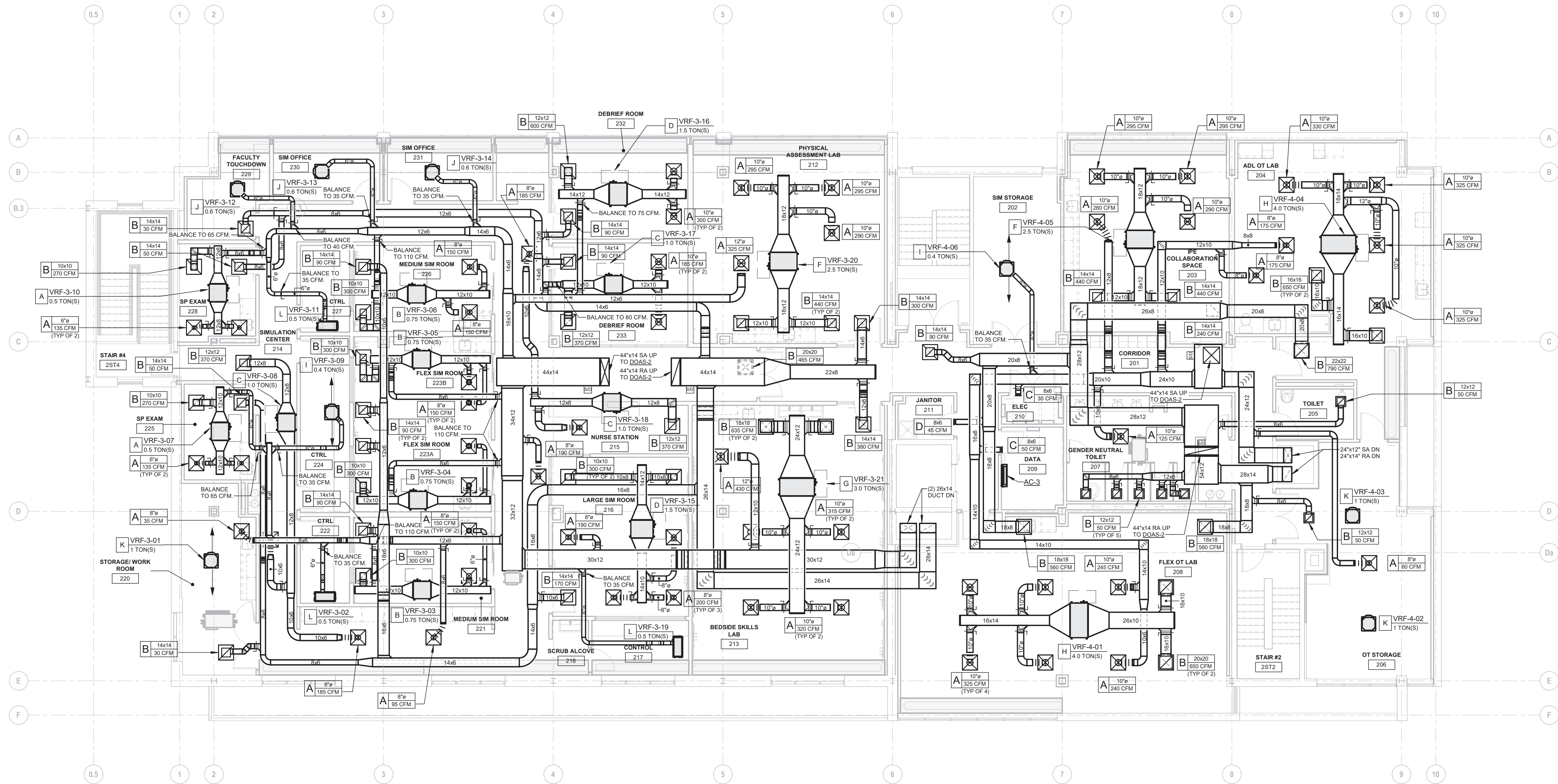
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2 MECHANICAL ROOF LEVEL DUCTWORK AND PIPING FLOOR PLAN
1/8" = 1'-0"



1 MECHANICAL DUCTWORK SECOND LEVEL FLOOR PLAN
1/8" = 1'-0"

MECHANICAL NOTES

DUCT SYSTEM NOTES:

1. REFER TO M800 FOR EQUIPMENT SCHEDULES AND DRAWINGS M000 FOR EQUIPMENT SYMBOLS, LEGENDS AND ABBREVIATIONS.
2. FLEXIBLE CONNECTIONS TO DIFFUSERS SHALL NOT EXCEED 5'-0" IN LENGTH.
3. REFER TO SPECIFICATIONS FOR ADDITIONAL DETAILS ON GENERAL CONDITIONS, MATERIAL SPECIFICATIONS AND INSTALLATION.
4. PROVIDE VOLUME DAMPERS AT ALL BRANCH DUCTS.

FIRESTOPPING NOTES:

1. PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE OR SMOKE WALLS, BARRIERS AND PARTITIONS AS REQUIRED TO MAINTAIN RATING. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



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KEYPLAN

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Number	Date	Issued For

MECHANICAL SECOND
FLOOR DUCTWORK AND
ROOF DUCTWORK AND
PIPING PLANS

Date

04/07/2022

Scale

As indicated

Proj. Number

20287.10

Drawing Number

M102

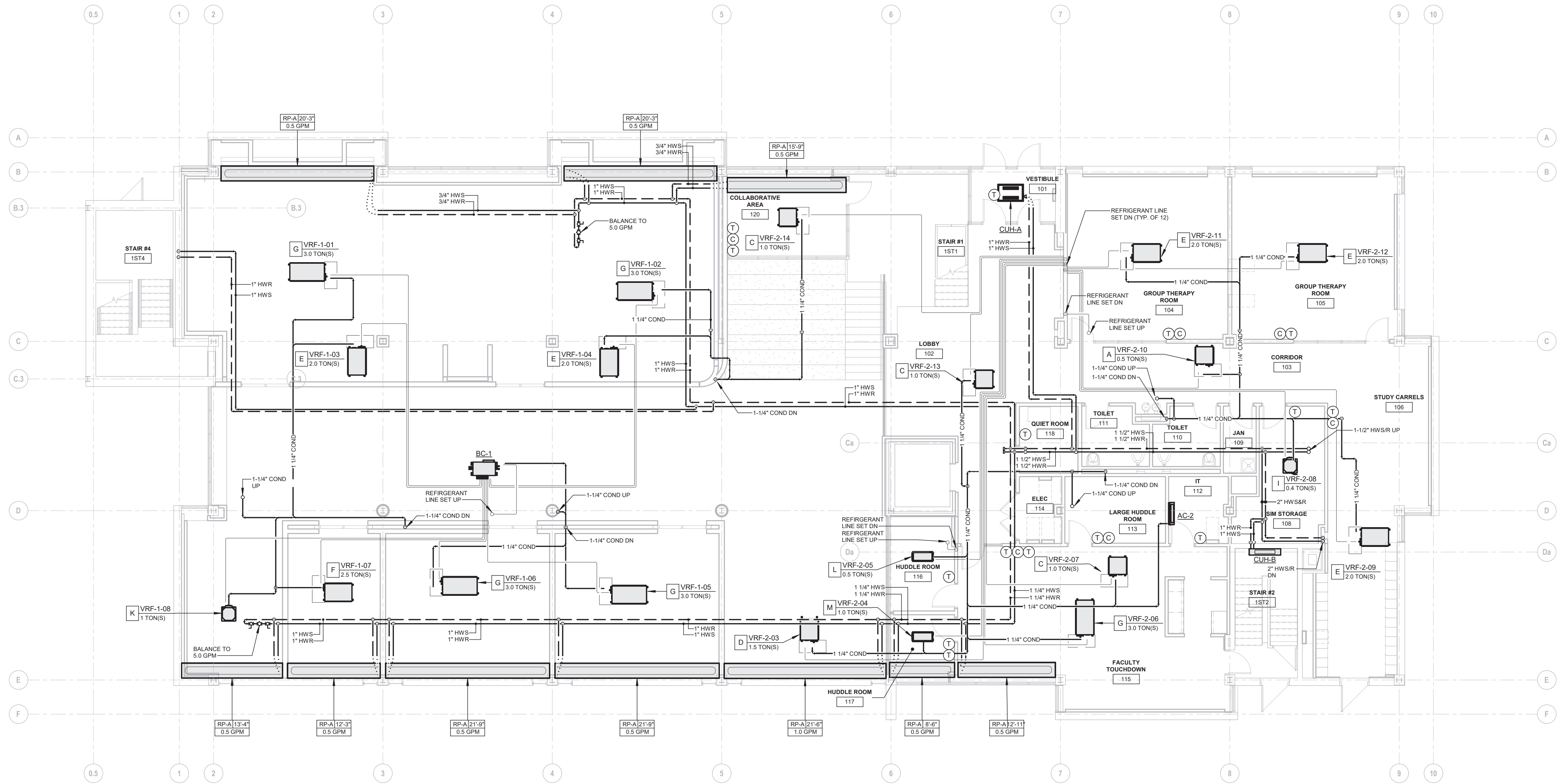
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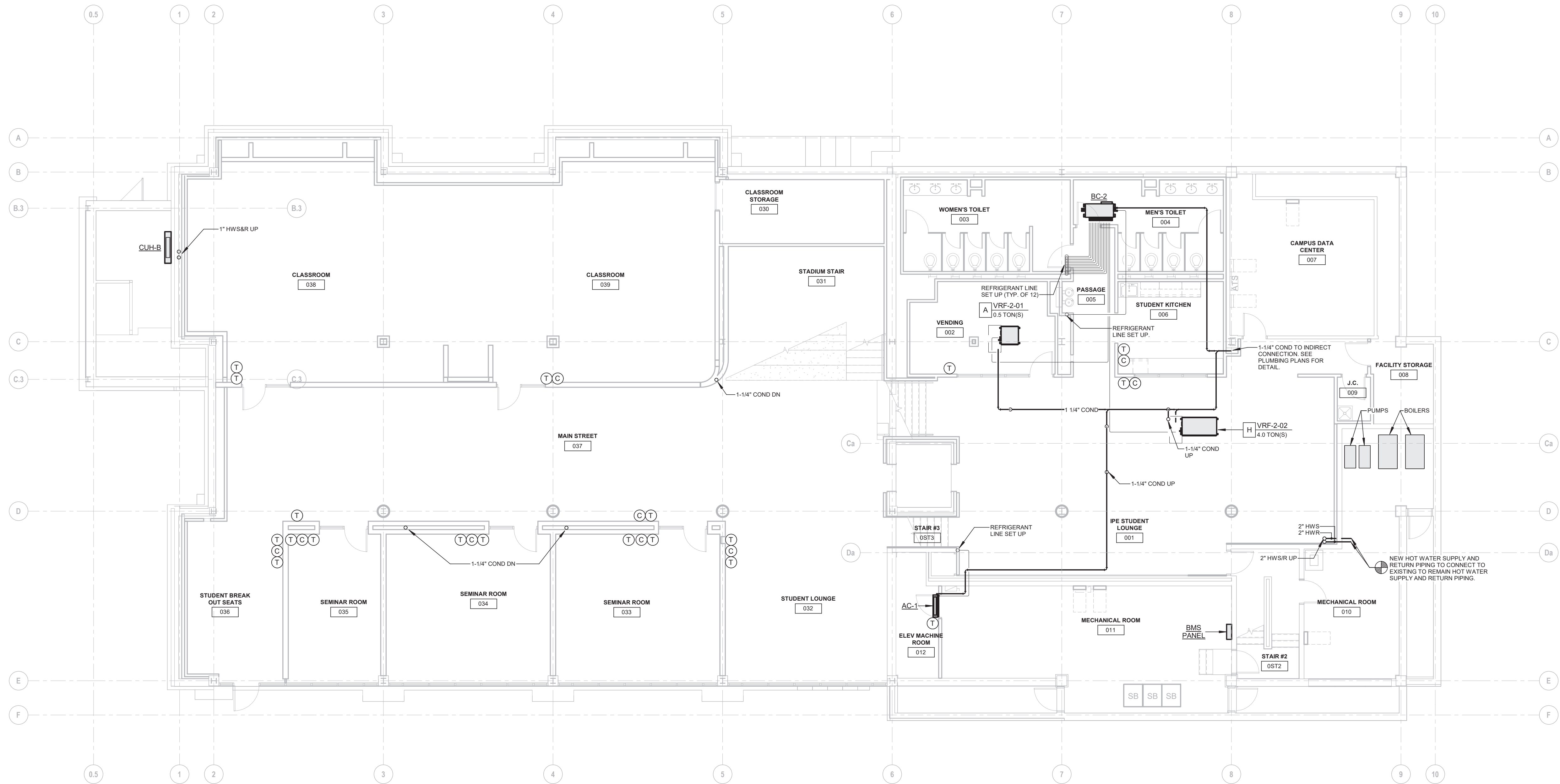
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2 MECHANICAL PIPING FIRST LEVEL FLOOR PLAN
1/8" = 1'-0"



1 MECHANICAL PIPING BASEMENT LEVEL FLOOR PLAN
1/8" = 1'-0"

MECHANICAL PIPING NOTES

- PIPING SYSTEM NOTES:
- REFER TO M000 FOR EQUIPMENT SCHEDULES AND DRAWINGS M000 FOR EQUIPMENT SYMBOLS, LEGENDS AND ABBREVIATIONS.
 - FIELD CUT RADIANT PANELS TO ACCOMMODATE COLUMN ENCLOSURES. PROVIDE "AROUND COLUMN" INTERCONNECTS AT EACH COLUMN. REFER TO MANUFACTURERS INSTRUCTIONS/REQUIREMENTS.
 - PIPE CONDENSATE DRAIN LINES FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP. CONNECTED TO BUILDING DRAINAGE SYSTEMS WITH AIR GAP. SIZE DEPTH OF TRAP FOR ASSOCIATED AIR PRESSURE DIFFERENTIAL. MINIMUM CONDENSATE PIPE SIZE SHALL BE 1".
 - PIPE BRANCHES TO RADIANT PANELS, CABINET UNIT HEATERS AND OTHER RADIATION SHALL BE MINIMUM 3/4" UNLESS OTHERWISE NOTED.
 - TEMPERATURE SENSORS INSTALLED ON BLOCK WALL AND/OR EXTERIOR WALLS SHALL HAVE INSULATED BACKING.
- FIRESTOPPING NOTES:
- PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE OR SMOKE WALLS, BARRIERS AND PARTITIONS AS REQUIRED TO MAINTAIN RATING. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



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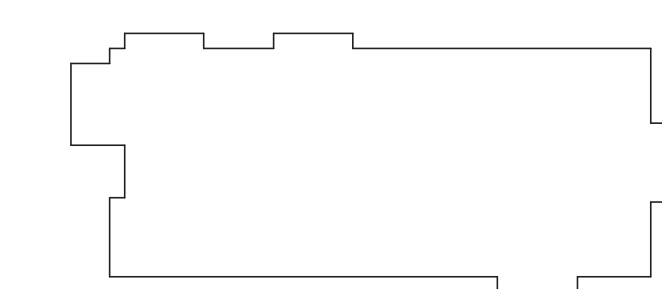
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KEYPLAN

Number	Date	Issued For

MECHANICAL PIPING
BASEMENT/ LOWER LEVEL
AND FIRST FLOOR PLANS

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Scale
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Proj. Number
20287.10
Drawing Number
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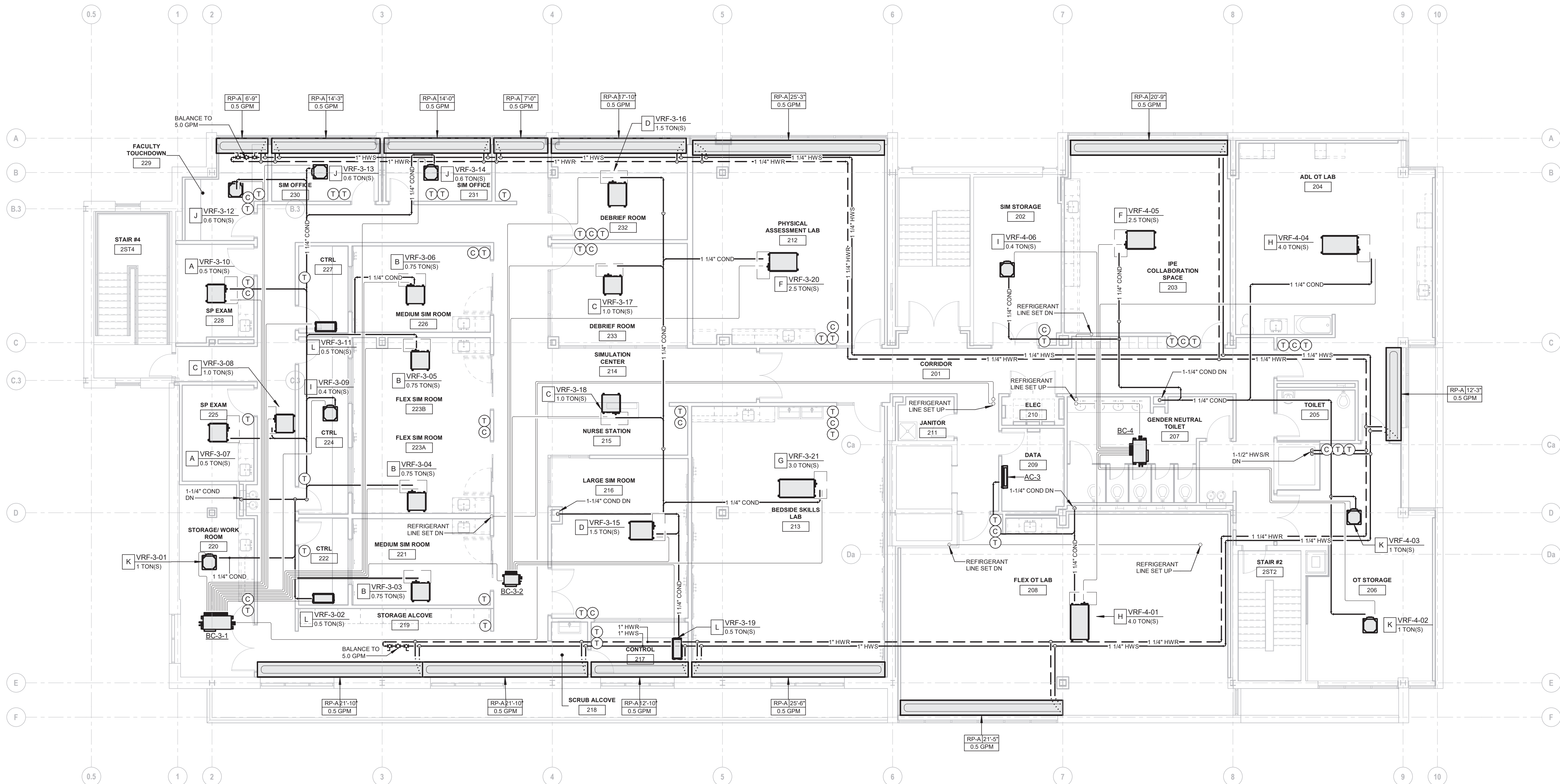
Number	Date	Issued For

MECHANICAL PIPING
SECOND FLOOR PLAN

Date 04/07/2022	Drawing Number MP102
Scale As indicated	
Proj. Number 20287.10	

MECHANICAL PIPING NOTES

- PIPING SYSTEM NOTES:
- REFER TO M000 FOR EQUIPMENT SCHEDULES AND DRAWINGS M000 FOR EQUIPMENT SYMBOLS, LEGENDS AND ABBREVIATIONS.
 - FIELD CUT RADIANT PANELS TO ACCOMMODATE COLUMN ENCLOSURES. PROVIDE "AROUND COLUMN" INTERCONNECTS AT EACH COLUMN. REFER TO MANUFACTURERS INSTRUCTIONS/REQUIREMENTS.
 - PIPE CONDENSATE DRAIN LINES FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, CONNECTED TO BUILDING DRAINAGE SYSTEMS WITH AIR GAP. SIZE DEPTH OF TRAP FOR ASSOCIATED AIR PRESSURE DIFFERENTIAL. MINIMUM CONDENSATE PIPE SIZE SHALL BE 1".
 - PIPE BRANCHES TO RADIANT PANELS, CABINET UNIT HEATERS AND OTHER RADIATION SHALL BE MINIMUM 3/4" UNLESS OTHERWISE NOTED.
 - TEMPERATURE SENSORS INSTALLED ON BLOCK WALL AND/OR EXTERIOR WALLS SHALL HAVE INSULATED BACKING.
- FIRESTOPPING NOTES:
- PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE OR SMOKE WALLS, BARRIERS AND PARTITIONS AS REQUIRED TO MAINTAIN RATING. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.



1 MECHANICAL PIPING SECOND LEVEL FLOOR PLAN
1/8" = 1'-0"

1

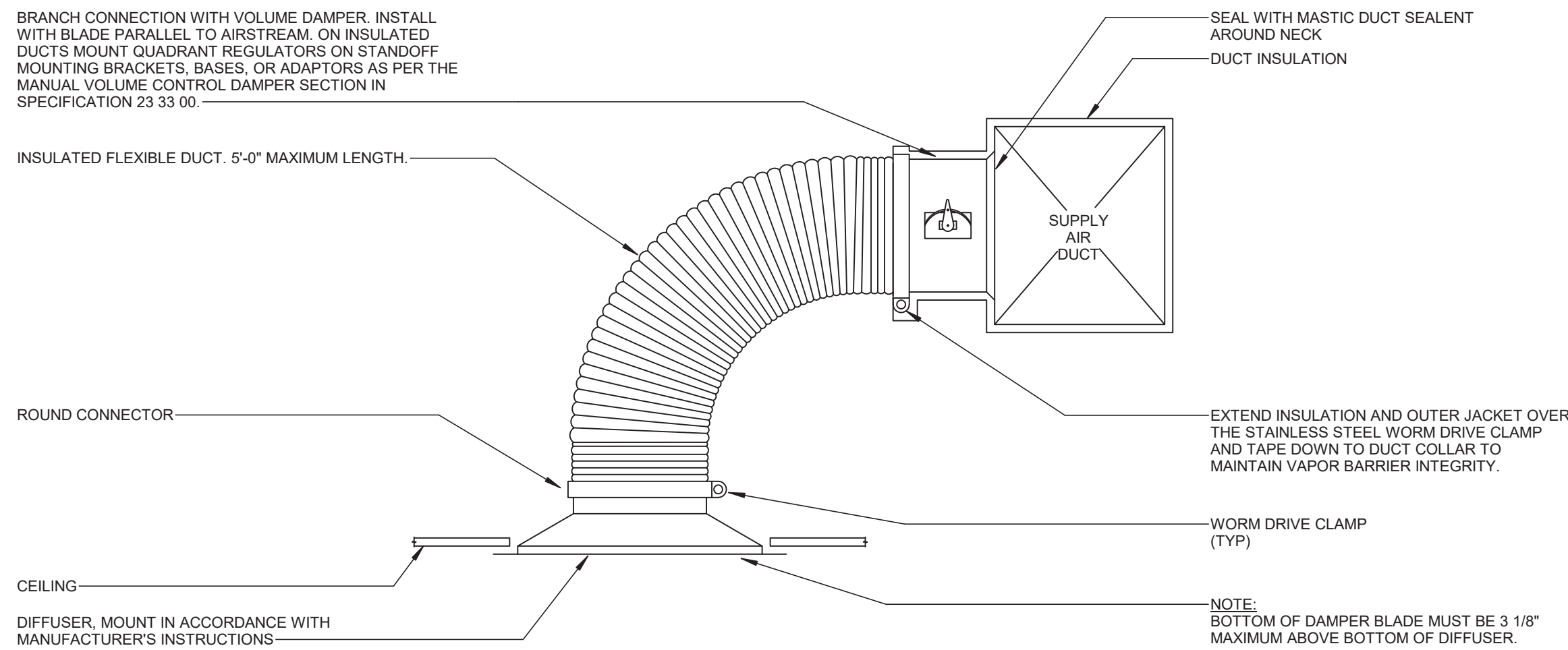
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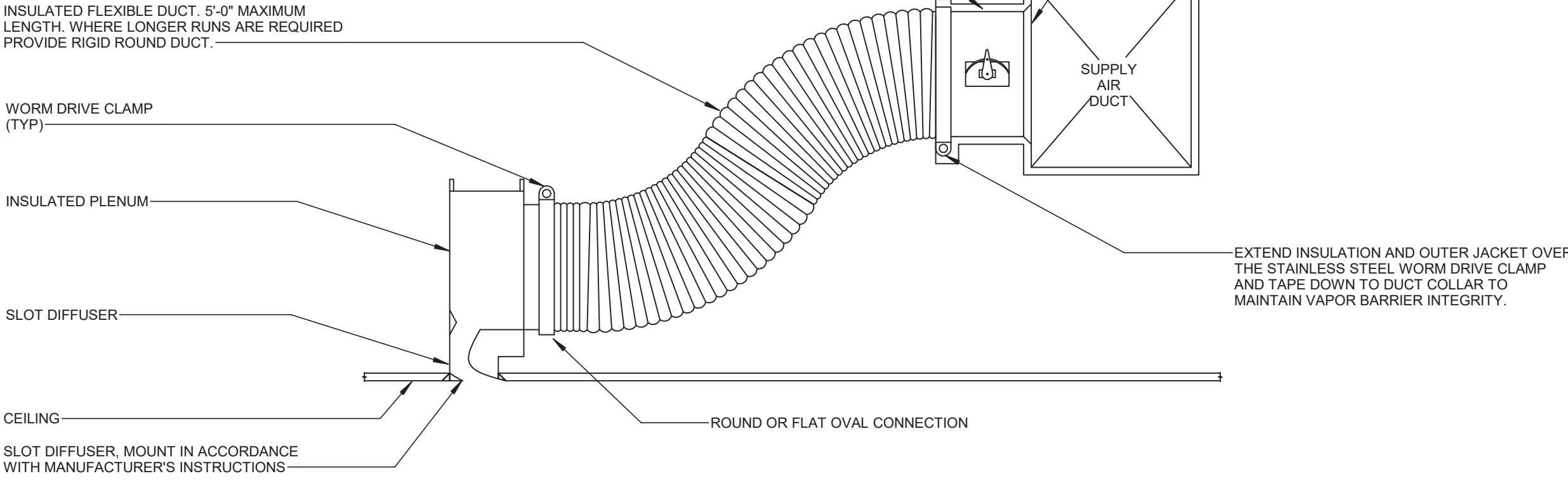
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NOTES:

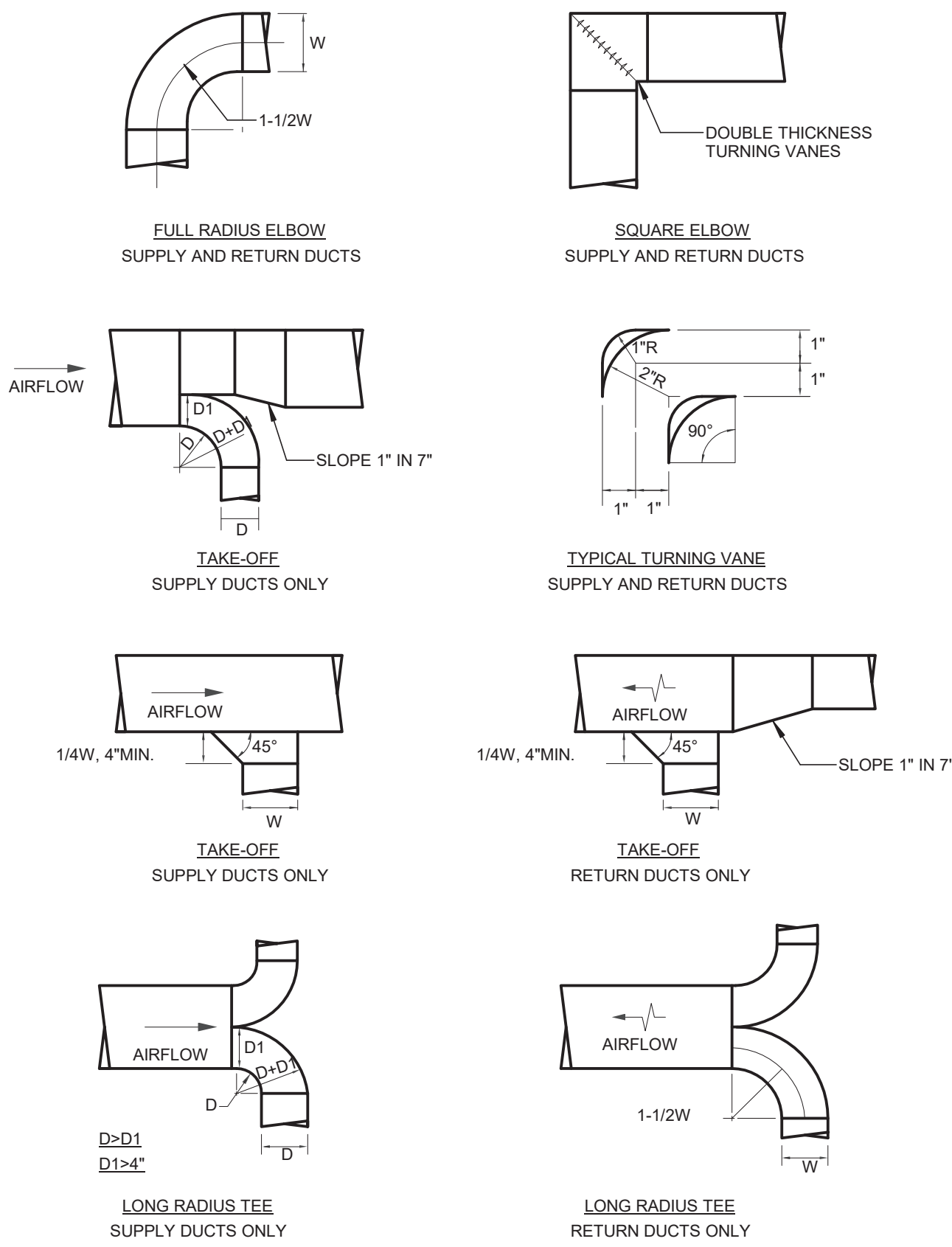
1. SUPPORT FLEXIBLE DUCT FROM STRUCTURE AS SPECIFIED. DUCT SHALL NOT KINK, SAG OR REST ON LIGHT FIXTURES, CEILING SUPPORT TEES OR TILE.
2. PROVIDE REGULATORS WHERE VOLUME DAMPER IS ACCESSIBLE.
3. IN UNCONDITIONED CEILING PLENUMS, INSULATE BACK OF DIFFUSER WITH 1\"/>

BRANCH CONNECTION WITH VOLUME DAMPER. INSTALL WITH BLADE PARALLEL TO AIRSTREAM. ON INSULATED DUCTS MOUNT QUADRANT REGULATORS ON STANDOFF MOUNTING BRACKETS, BASES, OR ADAPTORS AS PER THE MANUAL VOLUME CONTROL DAMPER SECTION IN SPECIFICATION 23 33 00.



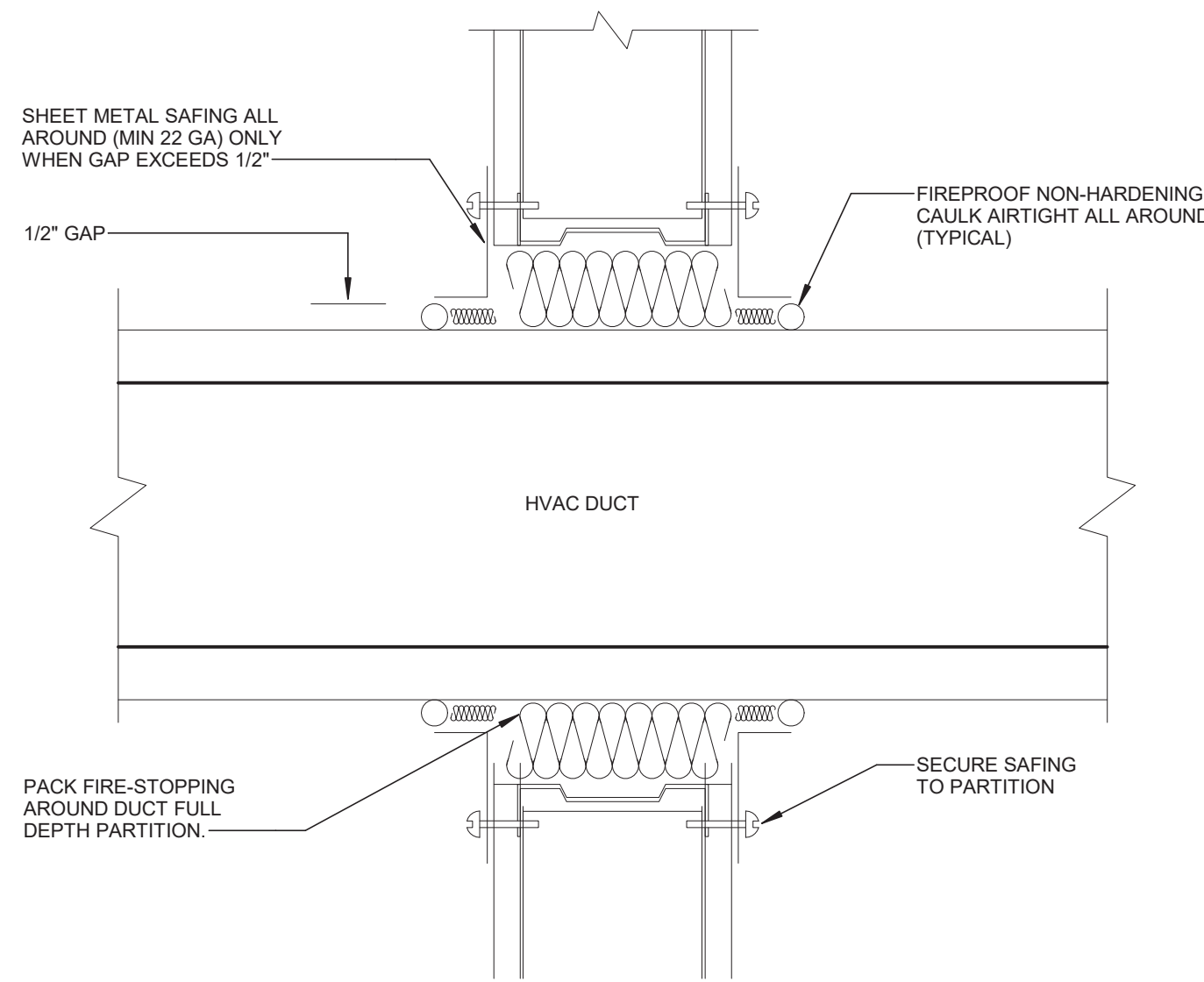
NOTES:

1. ALL INTERIOR EXPOSED SURFACES OF SLOT DIFFUSER/PLENUM ARE TO BE PAINTED FLAT BLACK.
2. SUPPORT FLEXIBLE DUCT FROM STRUCTURE AS SPECIFIED. DUCT SHALL NOT KINK, SAG OR REST ON LIGHT FIXTURES, CEILING SUPPORT TEES OR TILE.
3. PROVIDE REMOTELY ACTIVATED VOLUME DAMPER WHERE VOLUME DAMPER IS INACCESSIBLE. VOLUME DAMPER IS TO BE ADJUSTED THROUGH FACE OF THE DIFFUSER.

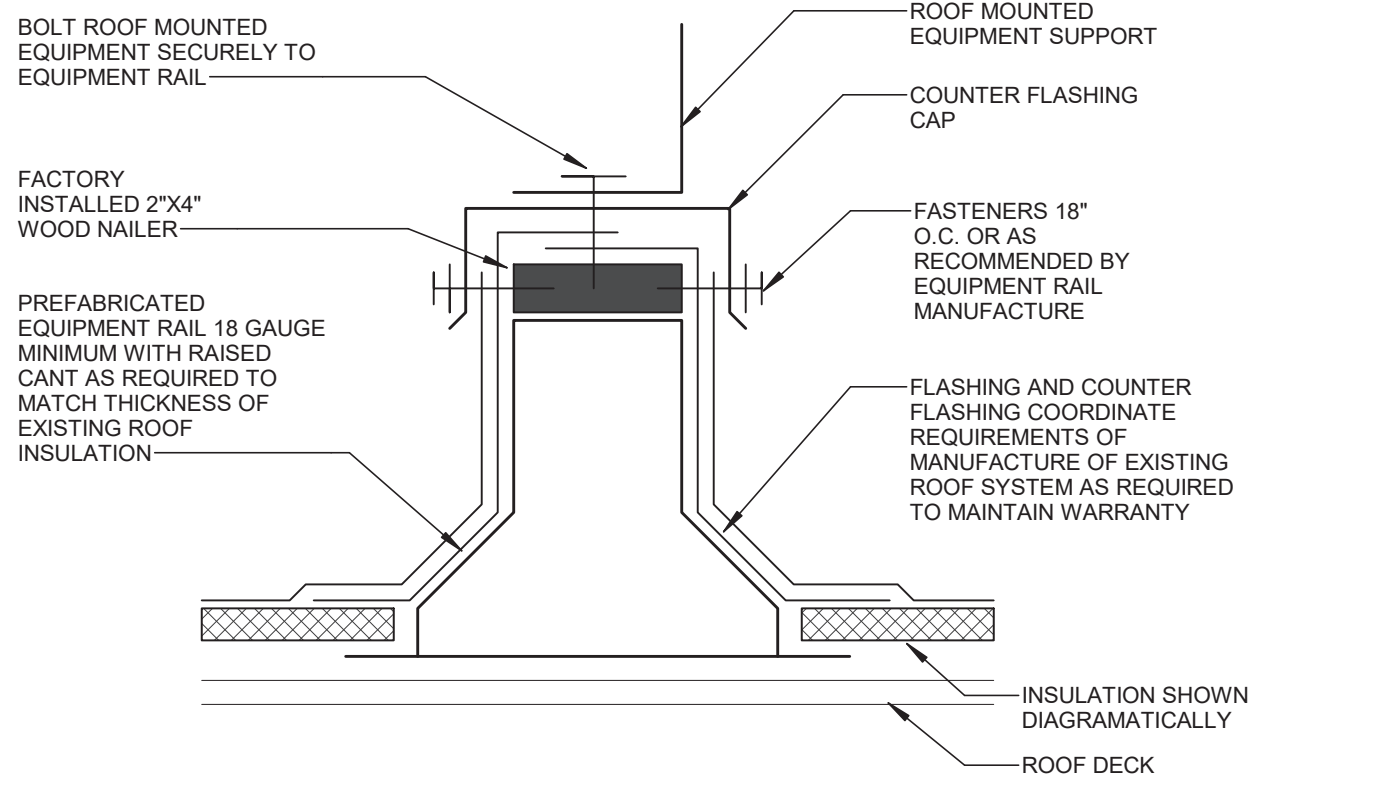


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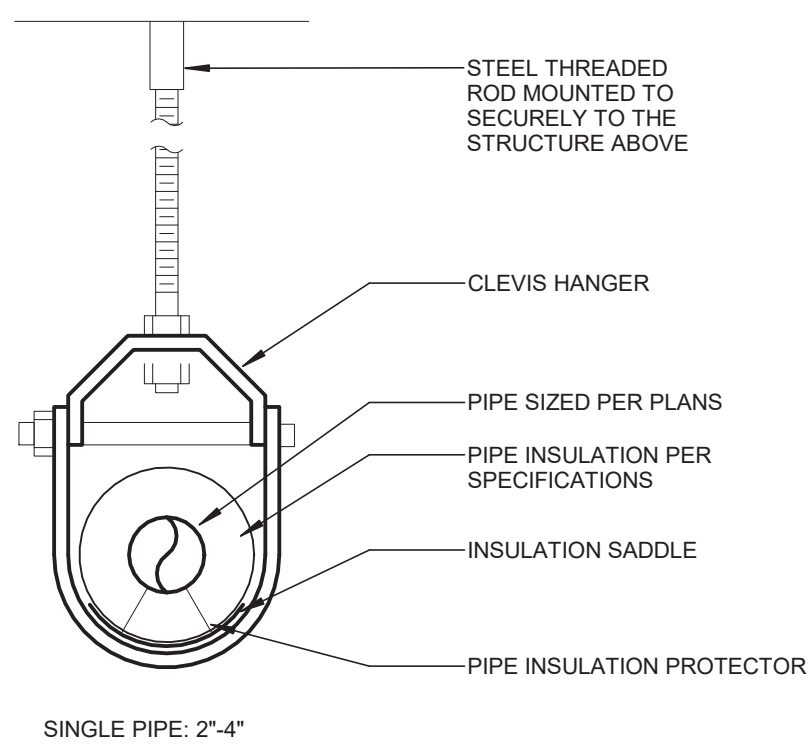
1 DIFFUSER WITH FLEX DUCT DETAIL
NTS



2 DIFFUSER WITH FLEX DUCT DETAIL
NTS

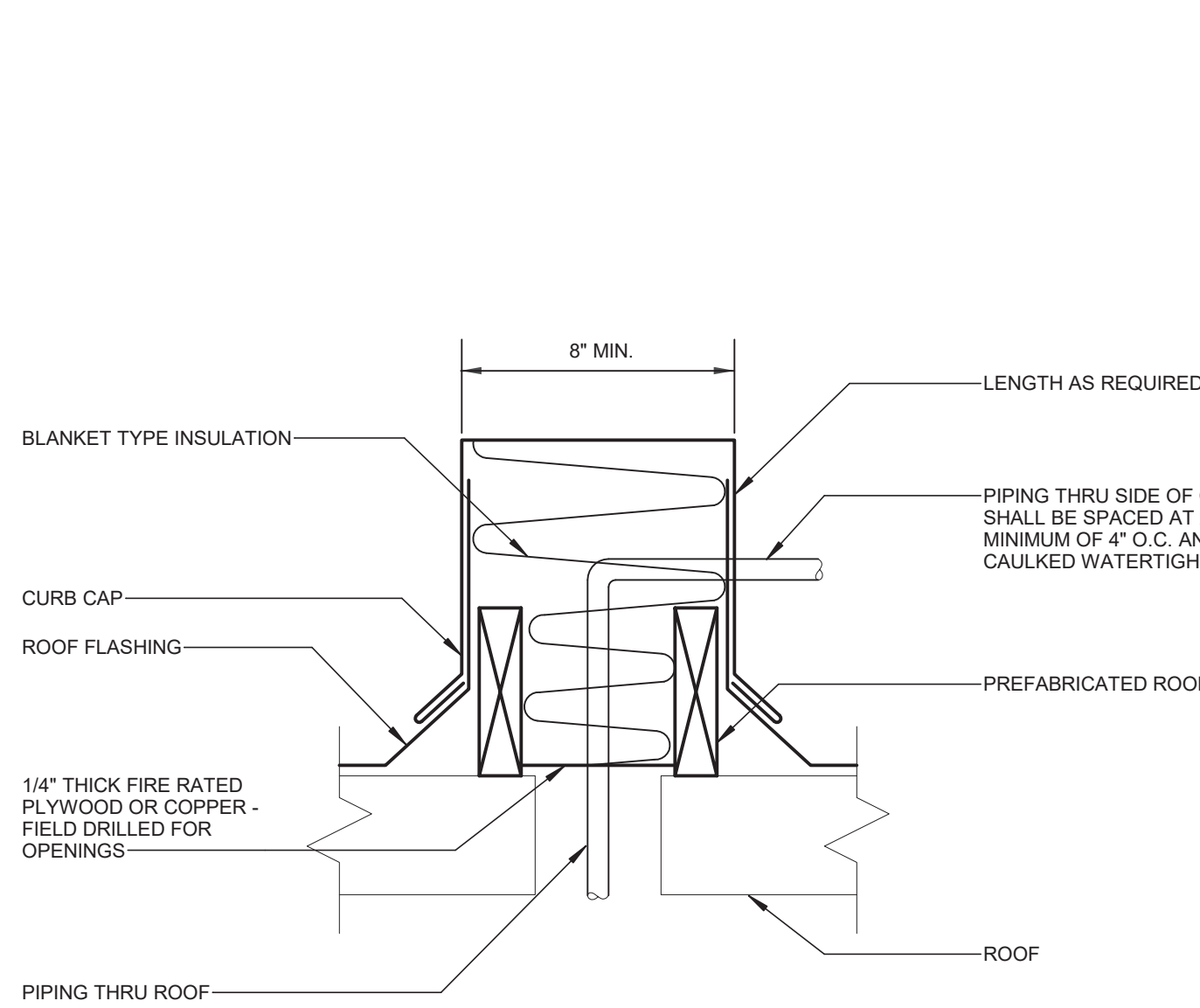


3 TYPICAL DUCT DETAILS
NTS

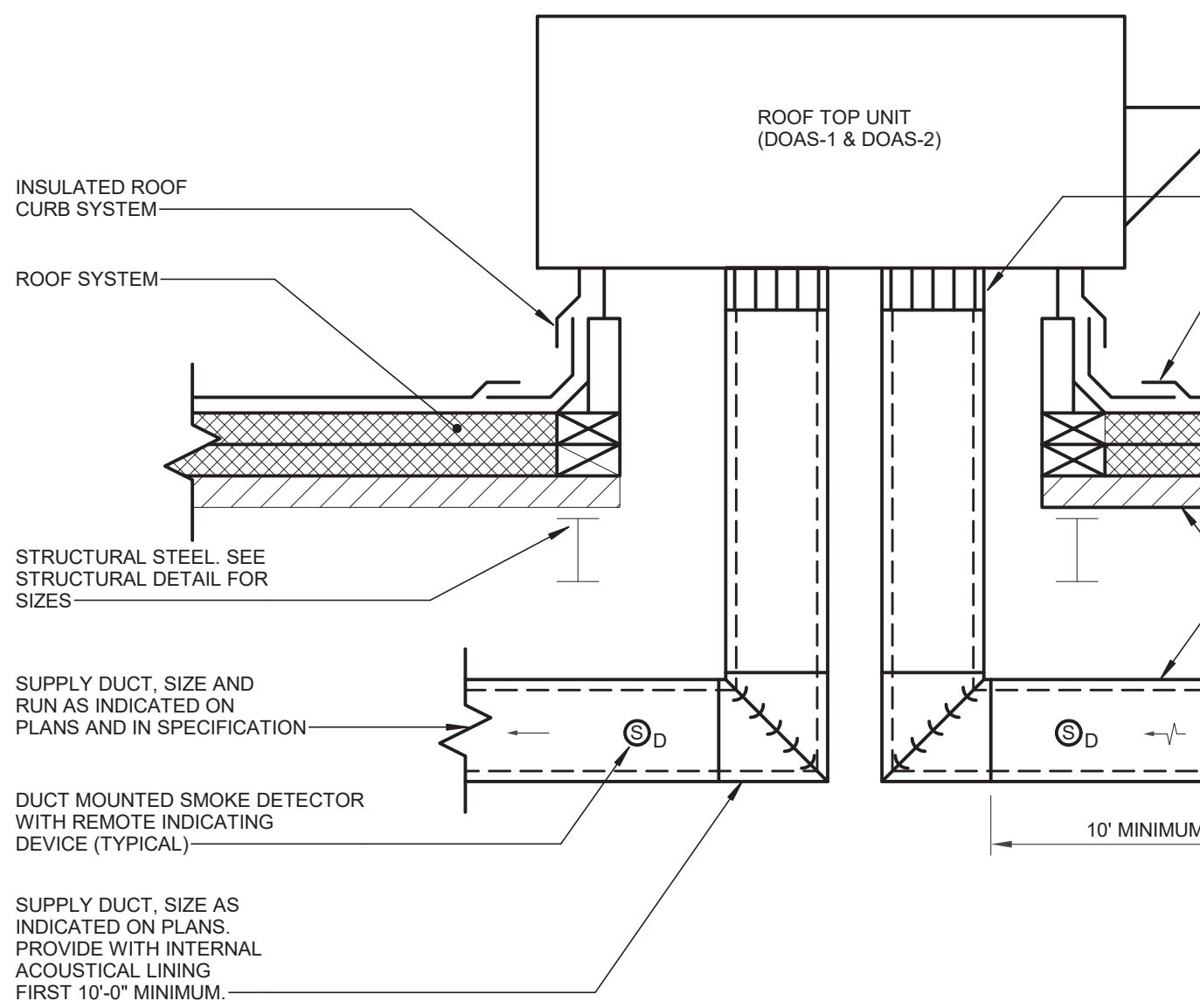


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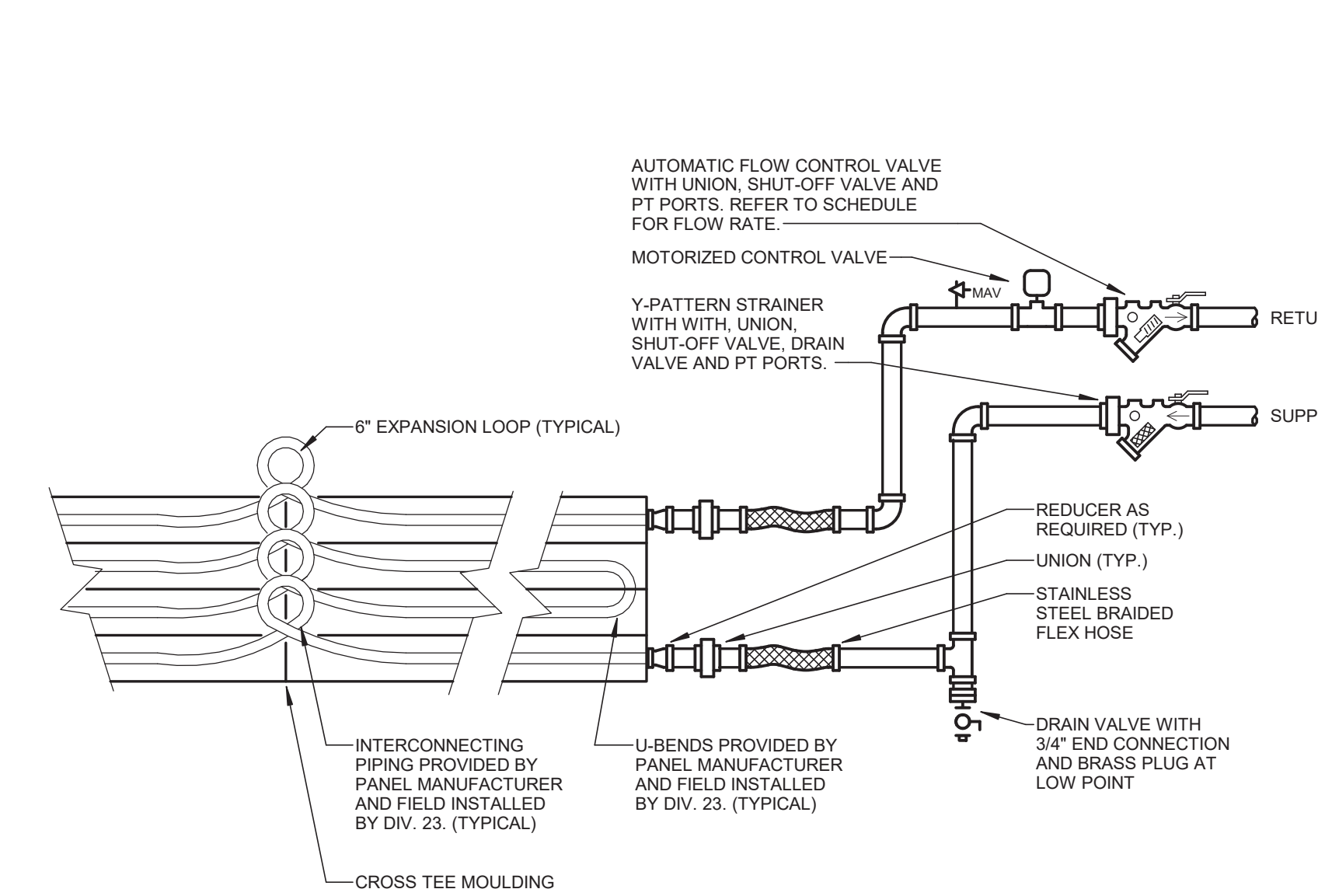
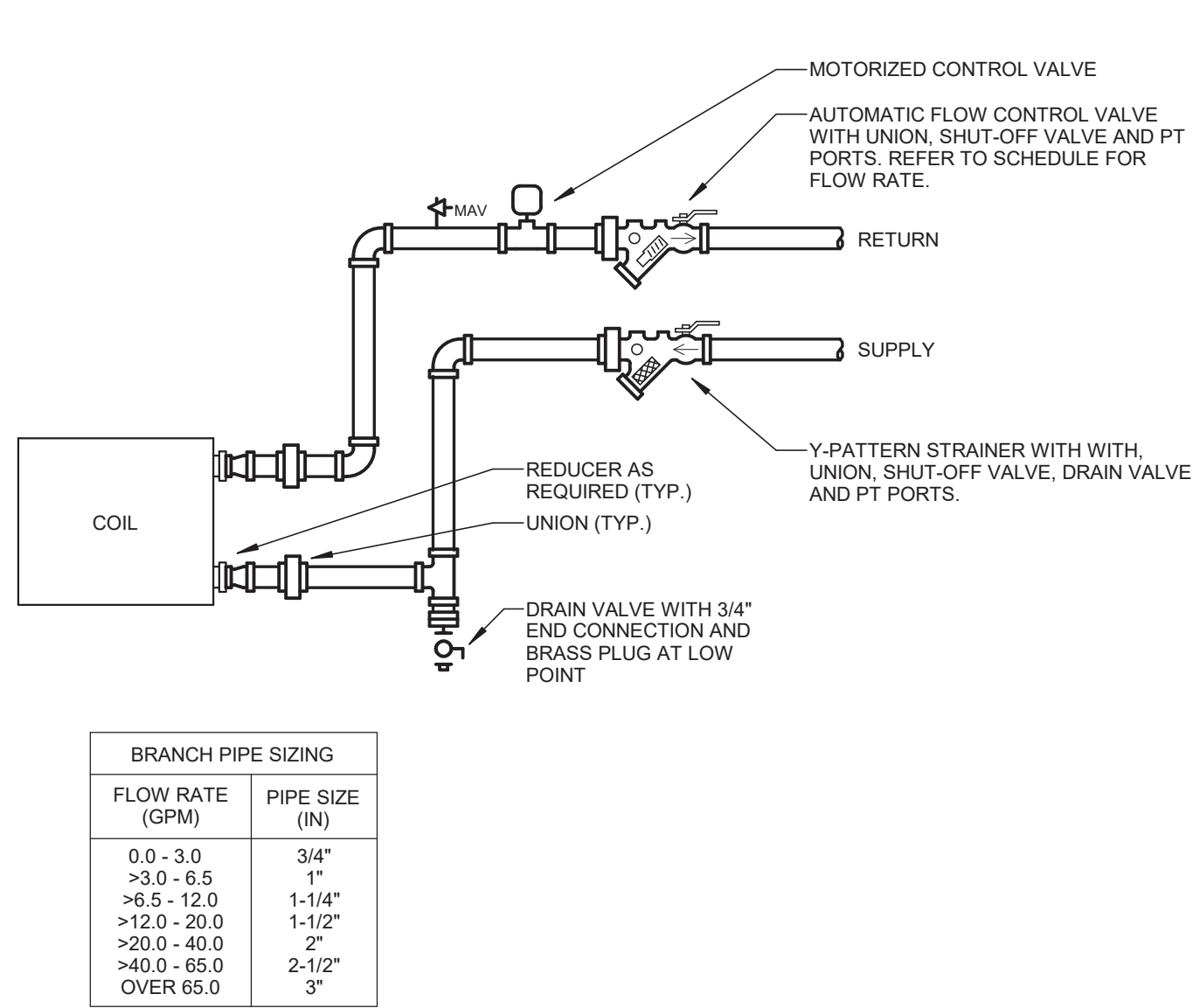
4 DUCT PENETRATION OF WALL/SLAB DETAIL
NTS



5 EQUIPMENT RAIL DETAIL
NTS

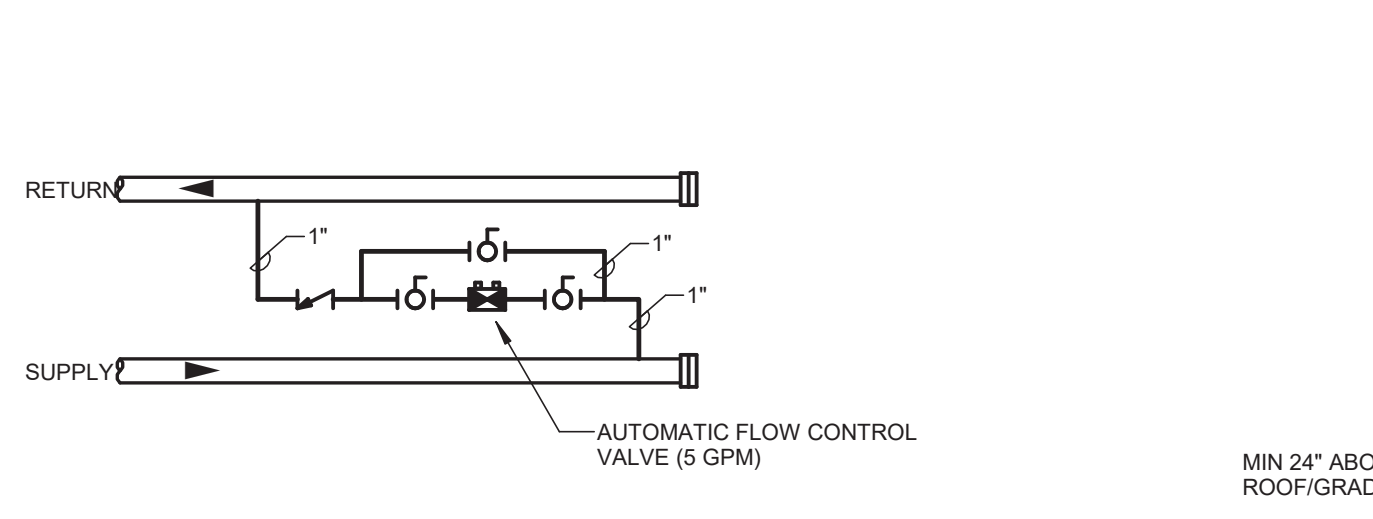


6 PIPE HANGER DETAIL
NTS

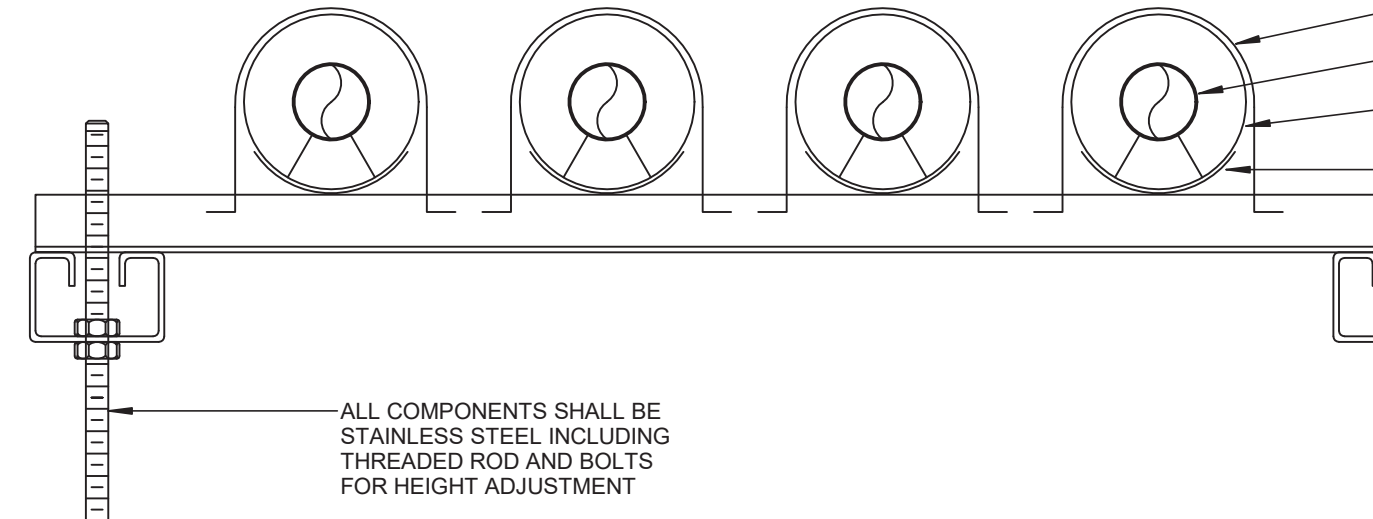


D

7 PIPING THRU ROOF DETAIL
NTS



8 ROOF TOP UNIT DETAIL
NTS



9 COIL HOOKUP - CABINET HEATER
NTS



10 COIL HOOKUP - RADIANT CEILING PANEL
12\"/>

E

11 END OF MAIN BYPASS
NTS



12 PIPE SUPPORTS
NTS



1

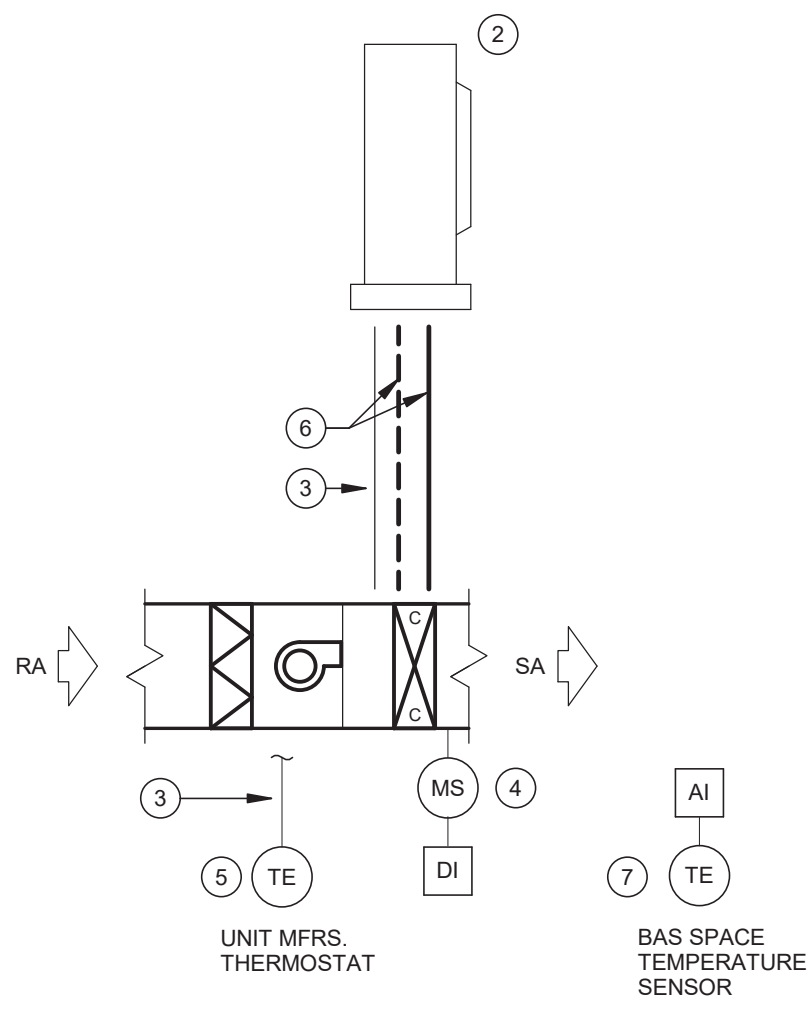
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- KEYNOTES**
- 1 PACKAGED INDOOR EVAPORATOR UNIT
 - 2 OUTDOOR CONDENSING UNIT
 - 3 PROVIDE WIRING IN ACCORDANCE WITH UNIT MANUFACTURER'S INSTALLATION GUIDELINES
 - 4 PLENUM RATED, UL508 CONDENSATE OVERFLOW SWITCH MOUNTED IN PRIMARY DRAIN PAN. SWITCH SHALL BE WIRED TO DE-ENERGIZE UNIT UPON DETECTION OF OF RISING WATER (BLOCKED DRAIN) AND GENERATE (A LOCAL BUZZER ALARM) [AN ALARM THROUGH THE BAS]
 - 5 LOCAL WALL-MOUNTED THERMOSTAT
 - 6 REFRIGERANT LIQUID AND SUCTION LINES SIZED PER MANUFACTURER
 - 7 PROVIDE BAS SPACE TEMPERATURE SENSOR FOR MONITORING

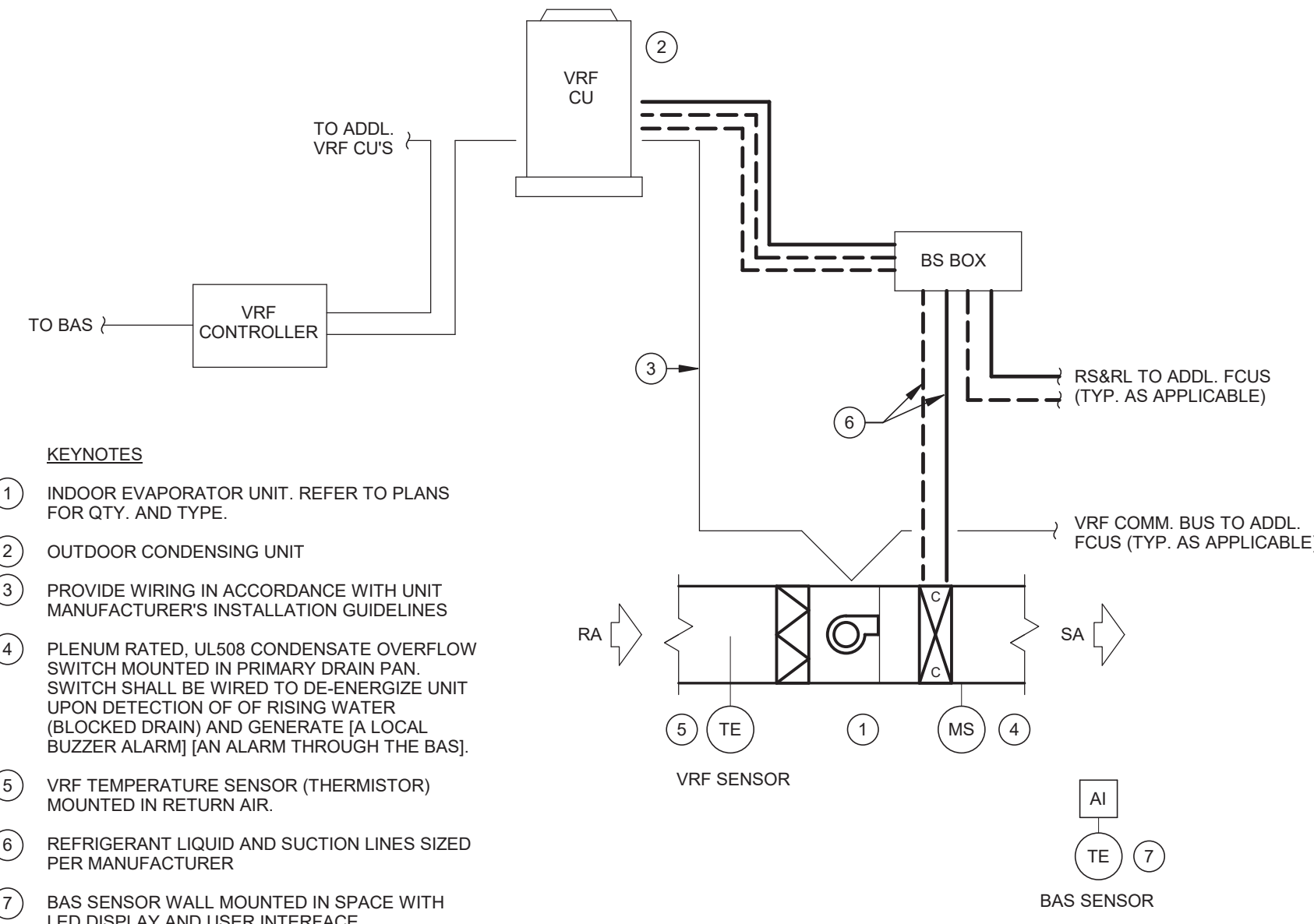
SEQUENCE OF OPERATION

- GENERAL**
1. PROVIDE AC UNIT WITH MANUFACTURER'S STANDARD STAND-ALONE CONTROLS AND THERMOSTAT.
 2. PROVIDE SPACE TEMPERATURE SENSOR FOR BAS MONITORING.
- SAFETIES AND ALARMS**
1. IF UL508 CONDENSATE OVERFLOW SWITCH SENSES RISING WATER (BLOCKED DRAIN), THE UNIT SHALL DEACTIVATE.
 2. IF SPACE TEMPERATURE RISES ABOVE 80 DEG. F (ADJUSTABLE) AN ALARM SHALL BE GENERATED THROUGH THE BAS.
- OPERATION**
1. IF SPACE TEMPERATURE RISES ABOVE SETPOINT, THE UNIT'S PACKAGED CONTROLS SHALL ACTIVATE UNIT IN COOLING TO MAINTAIN SETPOINT.
 2. IF SPACE TEMPERATURE DROPS BELOW SETPOINT, THE UNIT'S PACKAGED CONTROLS SHALL ACTIVATE UNIT IN HEATING TO MAINTAIN SETPOINT.

1 AC SPLIT SYSTEM
NTS

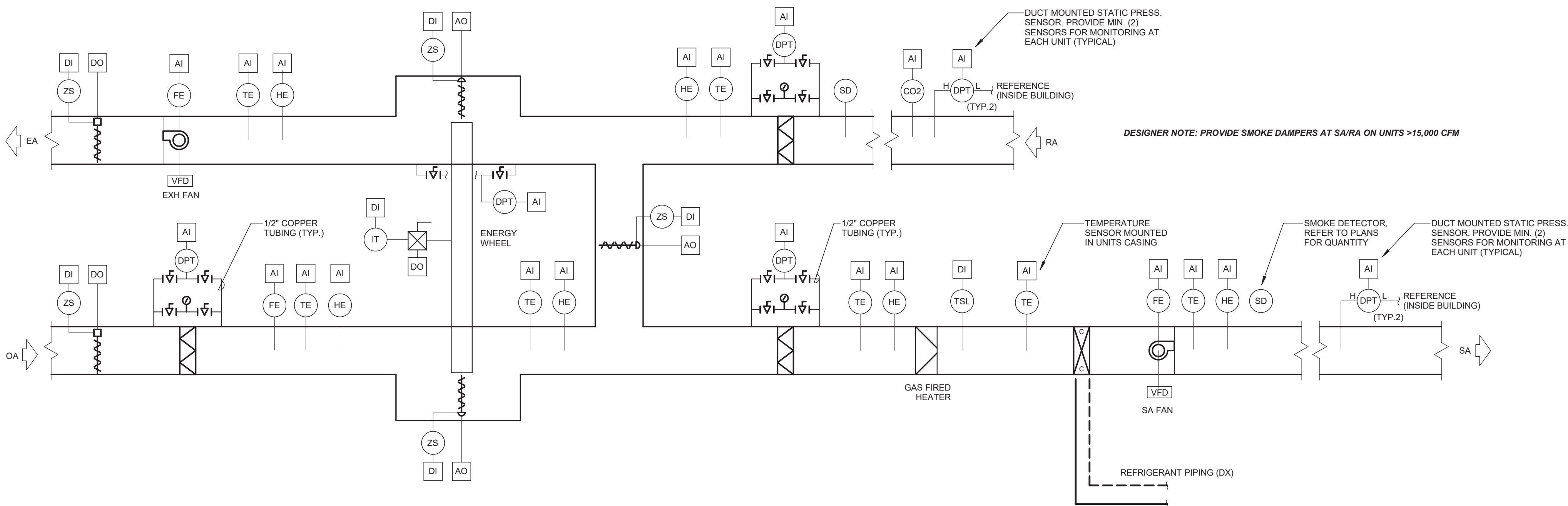
2 PERIMETER RADIATION
NTS

3 VRF SYSTEMS
NTS



- KEYNOTES**
- 1 INDOOR EVAPORATOR UNIT. REFER TO PLANS FOR QTY. AND TYPE.
 - 2 OUTDOOR CONDENSING UNIT
 - 3 PROVIDE WIRING IN ACCORDANCE WITH UNIT MANUFACTURER'S INSTALLATION GUIDELINES
 - 4 PLENUM RATED, UL508 CONDENSATE OVERFLOW SWITCH MOUNTED IN PRIMARY DRAIN PAN. SWITCH SHALL BE WIRED TO DE-ENERGIZE UNIT UPON DETECTION OF OF RISING WATER (BLOCKED DRAIN) AND GENERATE (A LOCAL BUZZER ALARM) [AN ALARM THROUGH THE BAS]
 - 5 VRF TEMPERATURE SENSOR (THERMISTOR) MOUNTED IN RETURN AIR.
 - 6 REFRIGERANT LIQUID AND SUCTION LINES SIZED PER MANUFACTURER
 - 7 BAS SENSOR WALL MOUNTED IN SPACE WITH LED DISPLAY AND USER INTERFACE.

ENERGY RECOVERY UNIT - ENERGY WHEEL



4 ENERGY RECOVERY UNIT - WHEEL TYPE
NTS

E



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MECHANICAL DETAILS

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20287.10

Drawing Number

M501



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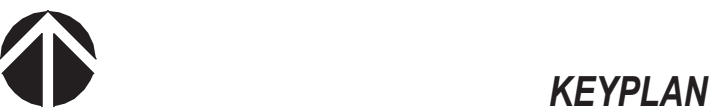
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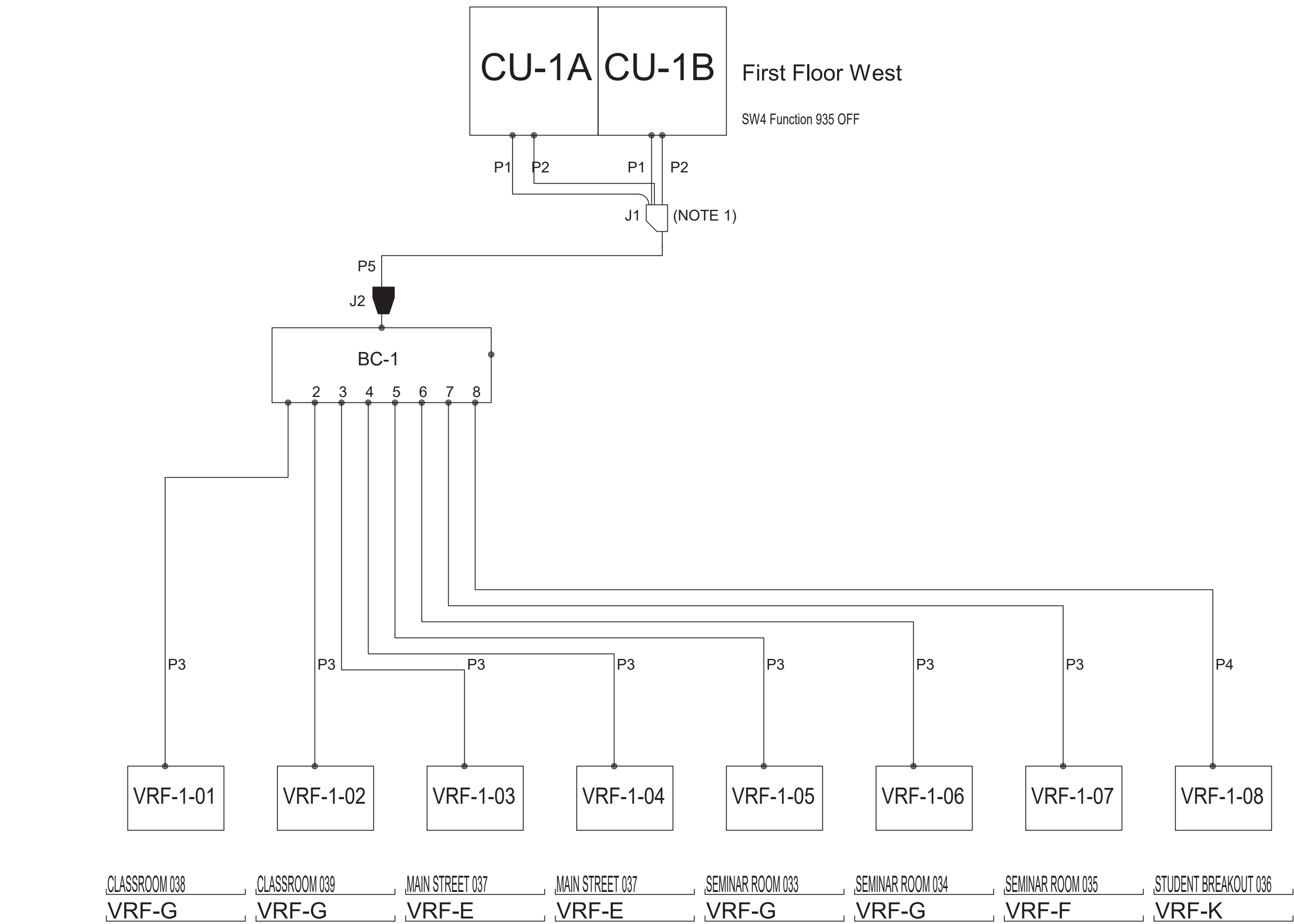
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VRF PIPING DIAGRAMS

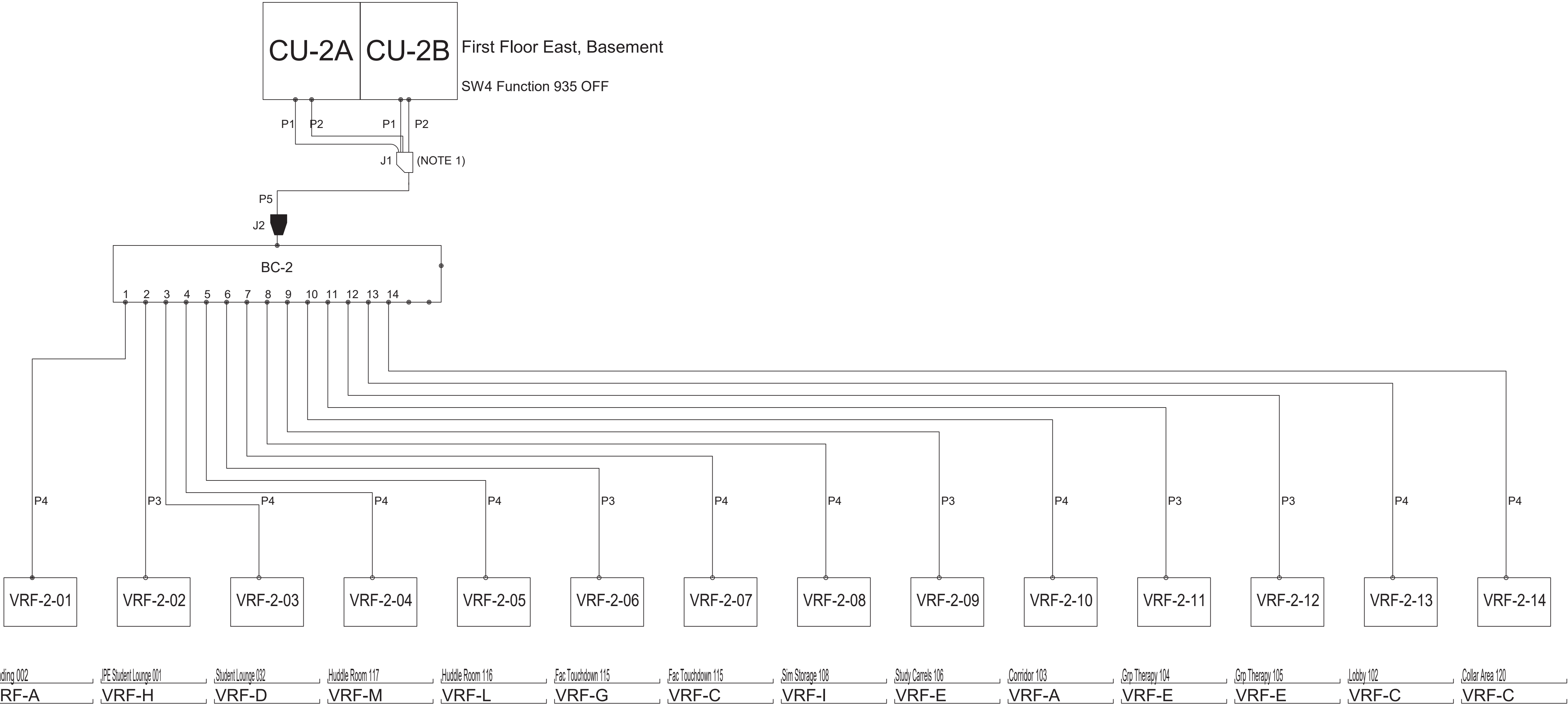
Date	04/07/2022	Drawing Number
Scale	NTS	
Proj. Number	20287.10	

M502



1 CU-1 PIPING DIAGRAM
NTS

PIPING AND CONTROLS	
SYMBOL BRANCH PIPE MODEL NAME	
J1	CMY-R200NCBK
J2	CMY-R302S-G1
J3	CMY-R303S-G1
J4	CMY-R306S-G
J5	CMY-R100NCBK
SYMBOL LIQUID PIPE/GAS PIPE SIZE	
P1	3/4 /
P2	/ 1-1/8
P3	3/8 / 5/8
P4	1/4 / 1/2
P5	/ 7/8 / 1-3/8
P6	1/2 / 3/4 / 1-1/8
P7	5/8 /
P8	/ 3/4
P9	/ 7/8 / 1-1/8



2 CU-2 PIPING DIAGRAM
NTS

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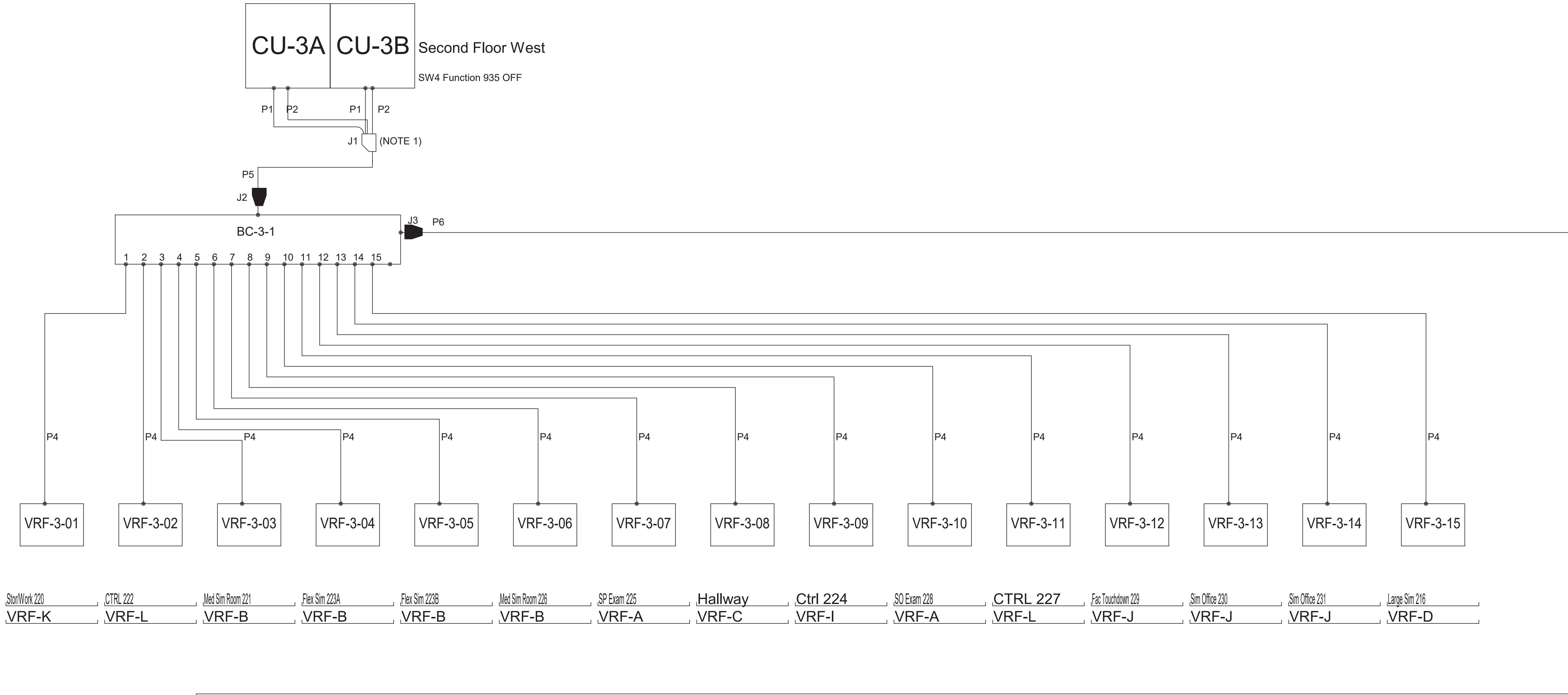
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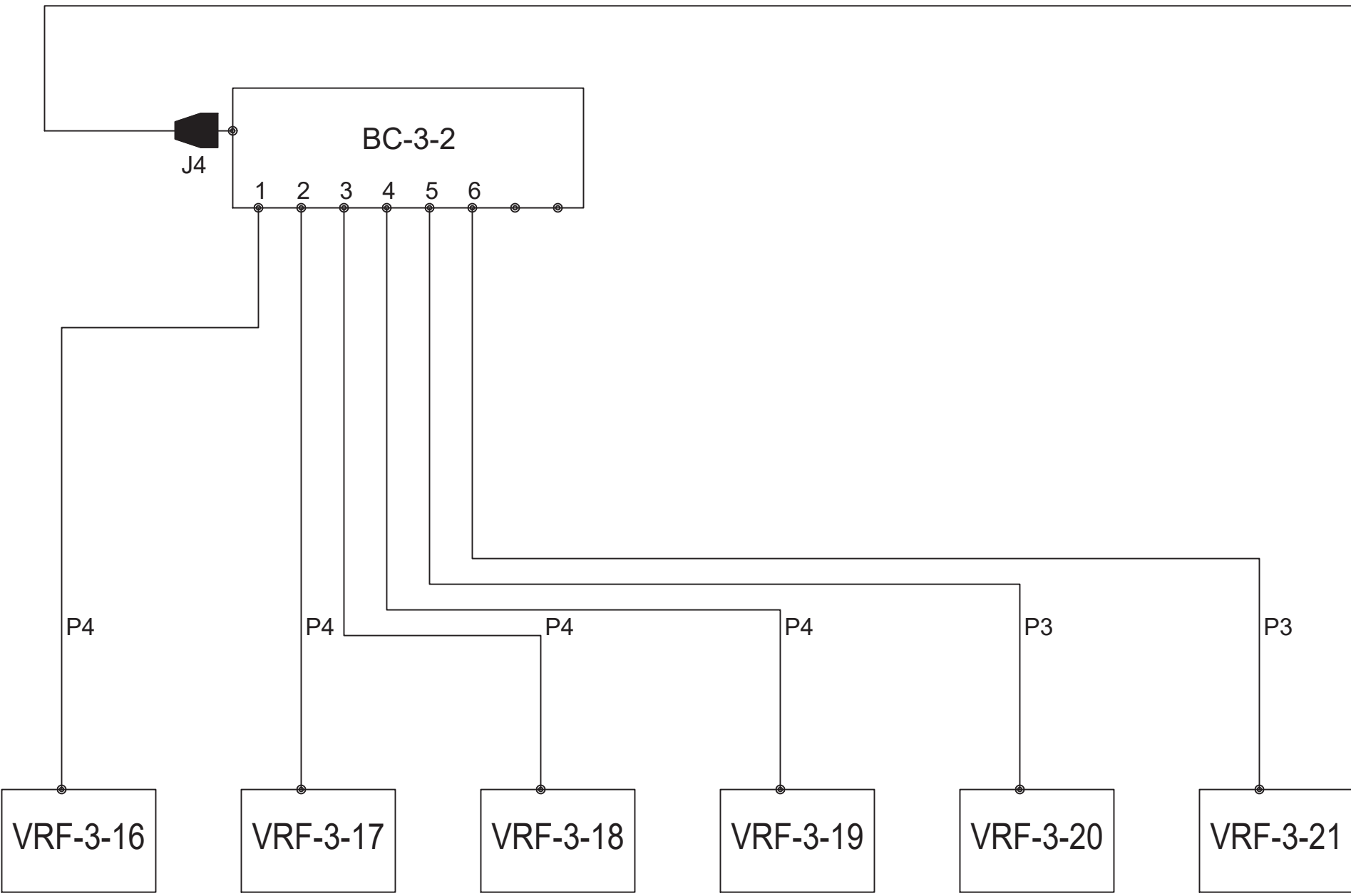
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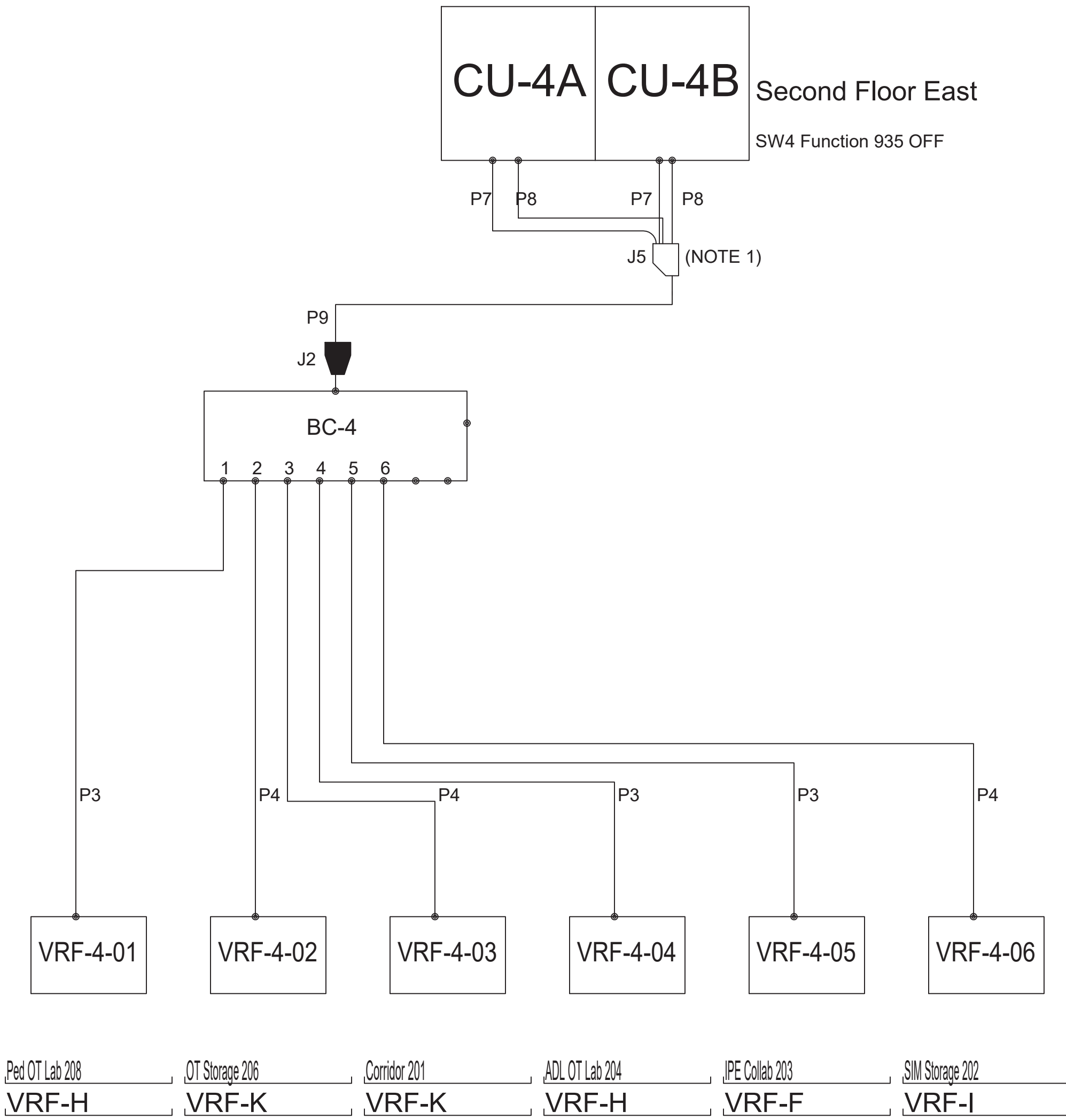


Start/Work 220 VRF-K, CTRL 222 VRF-L, Med Sim Room 221 VRF-B, Flex Sim 223A VRF-B, Flex Sim 223B VRF-B, Med Sim Room 226 VRF-B, SP Exam 225 VRF-A, Hallway VRF-C, Ctrl 224 VRF-I, SO Exam 228 VRF-A, CTRL 227 VRF-L, Fac Touchdown 229 VRF-J, Sim Office 230 VRF-J, Sim Office 231 VRF-J, Large Sim 216 VRF-D



Debrief 232 VRF-D, Debrief 233 VRF-C, Nurse 215 VRF-C, CTRL 217 VRF-L, Phys Assess 212 VRF-F, Beside Suite 213 VRF-G

1 CU-3 PIPING DIAGRAM
NTS



Per OT Lab 208 VRF-H, OT Storage 206 VRF-K, Corridor 201 VRF-K, ADL OT Lab 204 VRF-H, IPE Collab 203 VRF-F, SIM Storage 202 VRF-I

2 CU-4 PIPING DIAGRAM
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VRF PIPING DIAGRAMS

Date	04/07/2022	Drawing Number	M503
Scale	NTS		
Proj. Number	20287.10		

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DEDICATED OUTDOOR AIR UNIT WITH ENERGY RECOVERY SCHEDULE (PART 1)																																														
GENERAL			PHYSICAL		OUTSIDE AIR		SUPPLY FAN ARRAY										EXHAUST FAN ARRAY										DX COOLING COIL				INDIRECT GAS FURNACE															
TAG	MANUFACTURER	MODEL	WEIGHT (LBS)	L x W x H (IN.)	CFM	%	TOTAL AIRFLOW (CFM)	STATIC PRESS (IN.WG)				PHYSICAL				RPM	BHP EACH FAN	MOTOR HP EACH FAN	TOTAL AIRFLOW (CFM)	STATIC PRESS (IN.WG)				PHYSICAL				RPM	BHP EACH FAN	MOTOR HP EACH FAN	TOTAL MBH	SENS. MBH	FACE VELOC. (FPM)	AIR DATA				FUEL		PERFORMANCE DATA						# OF BURNERS
								EXTERNAL	TOTAL W/DIRTY FILTERS	FAN QTY.	ROWS	COLUMNS	WHEEL DIA. (IN)	EXTERNAL	TOTAL W/DIRTY FILTERS					FAN QTY.	ROWS	COLUMNS	WHEEL DIA. (IN)	EAT (°F)	LAT (°F)		P.D. (IN.WG)							GAS	INLET PRESS. (IN.WG.)	INPUT (MBH)	OUTPUT (MBH)	EAT (°F)	LAT (°F)	AFUE (%)	TURN-DOWN					
																									DB	WB																				
DOAS-1	VALENT	VXE-212-92-39L-17.5D-J	4,769	190.3"x88.3"x73.1"	5,000	100	5,000	1.75	3.922	1	-	-	-	-	1,665	4.84	7-1/2	5,000	1.75	2.917	1	-	-	-	-	1,544	3.93	5	224.9	147.7	247	79.2	66.8	52.4	52.0	0.225	NG	6.0	300.0	240.0	52.8	97.2	-	12:1	-	
DOAS-2	VALENT	VXE-112-41-39H-15D	3,622	171.6"x66.4"x65.9"	4,000	100	4,000	1.75	4.924	1	-	-	-	-	2,444	5.00	7-1/2	4,000	1.75	3.307	1	-	-	-	-	2,256	4.22	5	204.1	126.9	323	81.3	68.6	52.4	52.2	0.421	NG	6.0	300.0	240.0	43.7	99.3	-	12:1	-	
REMARKS - TYPE			REMARKS - RATINGS					REMARKS - FEATURES										REMARKS - INSTALL																												
1. 100% OUTSIDE AIR UNIT WITH ROTARY TYPE TOTAL ENERGY RECOVERY WHEEL (ENTHALPY).			1. AIR HANDLING PERFORMANCE DATA IN ACCORDANCE WITH ARI 430 2. SEE AIR HANDLER HOT WATER COIL SCHEDULE AND AIR HANDLER DX EVAPORATOR COIL SCHEDULE FOR COIL PERFORMANCE. 3. SEE ENERGY RECOVERY WHEEL SCHEDULE THIS SHEET FOR ENERGY RECOVERY WHEEL PERFORMANCE.					1. MODULATING LOW LEAKAGE BYPASS DAMPERS WITH ACTUATORS. 2. PREMIUM EFFICIENCY MOTOR, DIRECT DRIVE PLENUM SUPPLY AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS (PROVIDED BY UNIT MANUFACTURERS). 3. PREMIUM EFFICIENCY MOTOR, DIRECT DRIVE PLENUM EXHAUST AIR BLOWER WITH VARIABLE FREQUENCY DRIVE WITH BYPASS (PROVIDED BY UNIT MANUFACTURERS). 4. 2" SPRING VIBRATION ISOLATED BASES FOR SUPPLY AIR AND EXHAUST BLOWERS. 5. 2" THICK PLEATED DISPOSABLE MERV 8 PRE-FILTER WITH 4" MERV 13 FINAL FILTERS ON OUTDOOR AIR. 6. 2" THICK PLEATED DISPOSABLE MERV 8 FILTER ON EXHAUST AIR PRIOR TO ENERGY WHEEL. 7. PROVIDE CURB ADAPTOR (SEE INSTALL NOTE AND SPECIFICATIONS).										1. PROVIDE WITH SEISMIC AND WIND LOAD RATED CURB. 2. PROVIDE CURB ADAPTOR TO PROVIDE TRANSITION FROM EXISTING CURB TO FOOTPRINT OF EXISTING DOAS-1 AND DOAS-2. 3. PROVIDE WITH FACTORY MOUNTED SMOKE DETECTORS AT SUPPLY AND EXHAUST DISCHARGE AND INTAKE.																												
SEE PART 2																																														

SEE PART 2

SEE PART 1

DEDICATED OUTDOOR AIR UNIT WITH ENERGY RECOVERY SCHEDULE (PART 2)																											
TYPE	ENERGY RECOVERY																ELECTRICAL				REMARKS						
	SUPPLY AIR DATA - WINTER				RETURN AIR DATA - WINTER				SUPPLY AIR DATA - SUMMER				RETURN AIR DATA - SUMMER				MAX PD (IN WC)	% EFFICIENCY		MCA	MOP	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL
	EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)		EAT(°F)		LAT(°F)												
	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB											
WHEEL	3.1	1.3	52.8	43.9	72.0	55.8	20.9	20.3	91.5	76.3	79.2	66.8	75.0	62.5	87.0	72.8	1.03	72.4	70.8	110.7	125.0	208	3	ALL	ALL	ALL	ALL
WHEEL	3.1	1.3	43.7	37.7	72.0	55.8	29.5	27.7	91.5	76.3	81.3	68.6	75.0	62.5	85.0	71.1	1.02	59.9	56.6	100.4	110.0	208	3	ALL	ALL	ALL	ALL

AC SYSTEM - INDOOR / OUTDOOR UNIT SCHEDULE																			
SYMBOL	MANUFACTURER	SYSTEM MODEL	INDOOR MODEL	OUTDOOR MODEL	TYPE	LOCATION	NOM. TONS	FAN	CAPACITIES		REFRIGERANT PIPING FROM CONDENSING UNIT TO AIR HANDLER				ELECTRICAL			SOUND (DBA)	REMARKS
								CFM (LOW-HIGH)	COOLING (BTU/H)	HEATING (BTU/H)	LIQUID		GAS	MCA	VOLTS	PHASE			
AC-1/ACU-1	mitsubishi	-	PKA-A12LA	PUZ-A12NKA7	A	ELEVATOR MACHINE ROOM 012	1.0	265-455	12,000	18,000	1/4	1/2	11.0	208	1	48		1-5,7,8	
AC-2/ACU-2	mitsubishi	-	PKA-A12LA	PUZ-HA24NHA	A	IT 112 DATA 209	1.0	265-455	12,000	14,000	3/8	5/8	17.0	208	1	48		1-5,7,8	
AC-3							1.0	265-455	12,000	14,000	3/8	5/8							
TYPE: A. HIGH WALL REMARKS: 1. COOLING CAPACITY AT 80°F EDB, 67°F EWB, & 86°F ODB. HEATING CAPACITY AT 70°F EDB, 47°F ODB & 43°F OWB. 2. FURNISH AND INSTALL MANUFACTURERS WIRE REMOTE TEMPERATURE SENSOR. 3. FURNISH AND INSTALL ALL CONTROL WIRING NECESSARY FROM OUTDOOR UNIT, INDOOR UNIT, AND ALL OTHER CONTROLS ASSOCIATED WITH SYSTEM. 4. PROVIDED WITH INTERNAL CONDENSATE PLE PUMP. 5. PROVIDE WITH RETURN AIR THERMISTOR. 6. PROVIDE AC-3 WITH LITTLE GIANT VCC-20ULS CONDENSATE PUMP. PUMP SHALL BE CAPABLE OF 45 GALLONS PER HOUR AT 10 FEET OF HEAD. PROVIDE ELECTRICAL CONNECTIONS FOR OPERATIONAL SYSTEM. 7. INDOOR UNIT SHALL BE POWERED OFF OF CORRESPONDING OUTSIDE CONDENSING UNIT. REFER TO MANUFACTURERS INSTRUCTIONS FOR ELECTRICAL CONNECTIONS TO PROVIDE AN OPERATIONAL SYSTEM. 8. CONFIRM REFRIGERANT LINE SIZING WITH THE FACTORY PRIOR TO INSTALLATION BASED ON THE TOTAL LENGTH OF RUN.																			

CABINET UNIT HEATER & UNIT HEATER SCHEDULE														
SYMBOL	MANUFACTURER MODEL NUMBER	TYPE	DIMENSIONS (LxWxH)	CFM	HOT WATER HEATING PERFORMANCE					ELECTRICAL				REMARKS
					HEATING CAP (MBH)	FLOW RATE (GPM)	WATER PD (FT)	HWS (°F)	HWR (°F)	VOLTS	PHASE	HP	FLA	
CUH-A	RITTLING RFR-420-04	RFR	50"x10"x26.5"	420	23.6	4.9	3.6	180	160	120	1	1/25	0.68	1,2,5,6
CUH-B	RITTLING RF-200-04	FL	50"x10"x26.5"	420	23.6	4.9	3.6	180	160	120	1	1/25	0.68	1,2,4,5
TYPE: FL = FLOOR MOUNTED TOP SUPPLY BOTTOM RETURN RFR = FULLY RECESSED CEILING MOUNT - FACE SUPPLY AND RETURN														
REMARKS: 1. PROVIDE CONTROL INTERFACE WITH BMS. COORDINATE CONTROLS WITH ATC. 2. ALL VALVES AND PIPING SHALL BE MOUNTED IN CABINET. 3. UNIT HEATER SHALL BE SET TO TURN ON AT 40° 4. PROVIDE DISCONNECT SWITCH, WALL MOUNTED THERMOSTAT. 5. PROVIDE 2-ROW HEATING COIL. 6. PROVIDE INTERNAL THERMOSTAT.														

HYDRONIC RADIANT CEILING PANEL SCHEDULE									
GENERAL		PHYSICAL		PERF.		REMARKS			
MANUFACTURER	MODEL	WIDTH (IN)	TUBES	AWT (°F)	BTUH PER LINEAL FOOT	TYPE	RATINGS	FEATURES	INSTALL
AIRITE	AR-X	24	4	150	291	1	1	1	1
REMARKS-TYPE 1. 1/2" I.D. COPPER TUBING MECHANICALLY ATTACHED TO EXTRUDED ALUMINUM LINEAR PANEL(S). COLOR SELECTED BY ARCHITECT.									
REMARKS-RATINGS 1. WIDTH, NUMBER OF TUBES, AND BTUH PER LINEAL FOOT DATA IN THIS SCHEDULE ARE FOR NOMINAL RATING PURPOSES ONLY. SEE PLANS FOR SIZING INFORMATION, AS INDICATED BY THE SYMBOL AT T BOTTOM OF THIS SCHEDULE.									
REMARKS-FEATURES 1. PROVIDE MOUNTING ACCESSORIES INCLUDING OVERLAPPING FINISH TRIM AT ENDS (AND SIDES IF NECESSARY) THAT ALLOWS FOR EXPANSION AND CONTRACTION OF THE CEILING PANEL WITHOUT ADVERSE AFFECT ON THE ADJACENT ARCHITECTURAL FINISHES OR ON ADJACENT PANELS, AND THAT DOES NOT SHOW ANY GAPS IN THE CEILING WHEN THE PANELS ARE INSTALLED									
REMARKS-INSTALL 1. SEE DETAILS ON DWG M500									
FLOWRATE (gpm)= (TOTAL BTUH) / (500 x ΔT)									

DIFFUSER AND REGISTER SCHEDULE								
SYMBOL	MANUFACTURER/ MODEL NUMBER	DUTY	TYPE	BORDER TYPE	CONSTRUCTION			REMARKS
					OBD	FRAME	BLADES	
A	KRUEGER SPLQ	SUPPLY	PLQ	LAY IN	NONE	STEEL	STEEL	
B	KRUEGER SB5	RETURN	LF	LAY IN	NONE	STEEL	STEEL	
C	KRUEGER 880	SUPPLY	LF	SURFACE MOUNT	NONE	STEEL	STEEL	
D	KRUEGER SB5	RETURN/ EXHAUST	LF	SURFACE MOUNT	NONE	STEEL	STEEL	
E	KRUEGER DFL	SUPPLY	LS	LAY IN	NONE	STEEL	STEEL	
F	KRUEGER DFL	RETURN/ EXHAUST	LS	LAY IN	NONE	STEEL	STEEL	

TYPES:
DO - DIRECTIONAL DIFFUSER
LB - LINEAR BAR
LF - LOUVERED FACE
LS - LINEAR SLOT
SW - SIDEWALL REGISTER
PERF - PERFORATED / EGG-CRATE
PLQ - PLAQUE DIFFUSER
R - ROUND DIFFUSER

INDICATES
UNIT TYPE

A

12x12
350

INDICATES NECK
SIZE

INDICATES UNIT
CFM CAPACITY

REMARKS:

- MECHANICAL CONTRACTOR SHALL FABRICATE A 4'-0" x 10' x 5" DEEP INSULATED PLENUM
- MECHANICAL CONTRACTOR SHALL FIELD INSTALL REMOTE CABLE OPERATED VOLUME CONTROL DAMPER.
- PROVIDE ROUND NECK SUPPLY DIFFUSER WITHOUT ANY ADJUSTABLE BLADES FOR KITCHEN USE
- PROVIDE BLANKING STRIPS FOR INACTIVE SCTIONS. PROVIDE CUSTOM CURVING AS NECESSARY. COORDINATE WITH ARCHITECT.