

MECHANICAL LEGEND

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	CHILLED WATER SUPPLY
	CHILLED WATER RETURN
	CONDENSATE DRAIN
	HEATING WATER SUPPLY
	HEATING WATER RETURN
	REFRIGERANT LIQUID
	REFRIGERANT SUCTION
	REFRIGERANT VENT

PIPING COMPONENTS AND SPECIALTIES

SYMBOL	DESCRIPTION
	PIPE GUIDE
	PIPE HANGER
	PIPE SLIDE
	PIPE ANCHOR
	VENTURI FLOW METER
	QUICK OPENING VALVE
	BELLOWS EXPANSION JOINT
	COMPRESSION /EXPANSION JOINT
	ELECTRICAL HEAT TRACE
	DUPLEX STRAINER
	FLEXIBLE PIPE
	FLOW METER
	FLOW METER (WITH POSITIVE DISPLACEMENT)
	FLOW METER (PROBE STYLE)
	GOOSENECK VENT
	ORIFICE FITTING
	POSITIVE DISPLACEMENT FLOW INDICATOR
	SUCTION DIFFUSER
	PUMP

DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
	HUMIDISTAT
	THERMOSTAT
	AIR FLOW
	TRANSFER AIR FLOW (INDICATE CFM)
	DOOR LOUVER
	UNDERCUT DOOR
	SUPPLY AIR DIFFUSER
	RETURN AIR GRILLE
	EXHAUST AIR GRILLE
	CIRCULAR AIR DIFFUSER
	AIRFLOW MONITORING DEVICE
	STATIC PRESSURE SENSING STATION
	FIRE DAMPER
	COMBINATION FIRE/SMOKE DAMPER
	VOLUME DAMPER
	BACK DRAFT DAMPER
	SMOKE DAMPER
	SMOKE DETECTOR
	FLEXIBLE CONNECTION
	HORIZONTAL ACCESS DOOR
	VERTICAL ACCESS DOOR
	ELBOW WITH DOUBLE THICKNESS TURNING VANES
	RECTANGULAR BRANCH TAKE-OFF
	BELL MOUTH BRANCH TAKE-OFF

DUCTWORK SYMBOLS (CONTINUE)

SYMBOL	DESCRIPTION
	ROUND BRANCH TAKE-OFF
	ROUND DUCT DROP OFF BOTTOM
	DUCT TRANSITION
	SQUARE TO ROUND TRANSITION
	DUCTWORK CHANGE IN ELEVATION (UP OR DOWN)
	SUPPLY/OUTSIDE AIR DUCT RISER
	RETURN AIR DUCT RISER
	EXHAUST/RELIEF AIR DUCT RISER
	ROUND DUCT RISER (SMALLER THAN 12")
	ROUND DUCT RISER (12" AND LARGER)
	TERMINAL UNIT
	TERMINAL UNIT WITH REHEAT COIL
	SUPPLY AIR VOLUME TERMINAL UNIT IDENTIFIER
	AIR DEVICE IDENTIFIER
	POINT OF CONNECTION TO EXISTING
	POINT OF DISCONNECTION

EQUIPMENT DESIGNATIONS

SYMBOL	DESCRIPTION
ACC-X	AIR COOLED CHILLER DESIGNATION
ACCU-X	AIR COOLED CONDENSING UNIT DESIGNATION
AHU-X	AIR HANDLING UNIT DESIGNATION
AMF-X	AIRFLOW MONITORING DEVICE DESIGNATION
AS-X	AIR SEPARATOR DESIGNATION
AW-X	AIR WALL DESIGNATION
B-X	BOILER DESIGNATION
CC-X	COOLING COIL DESIGNATION
CHP-X	CHILLED WATER PUMP DESIGNATION
DSS-X	DUCTLESS SPLIT SYSTEM DESIGNATION
EF-X	EXHAUST FAN DESIGNATION
ET-X	EXPANSION TANK DESIGNATION
F-X	FILTER DESIGNATION
FCU-X	FAN COIL UNIT DESIGNATION
GV-X	GRAVITY VENTILATOR DESIGNATION
HWP-X	HEATING WATER PUMP DESIGNATION
LGE-X	LOUVERED GRAVITY EXHAUST DESIGNATION
PCHP-X	PRIMARY CHILLED WATER PUMP DESIGNATION
RF-X	RETURN FAN DESIGNATION
RL-X	RELIEF LOUVER DESIGNATION
SCHP-X	SECONDARY CHILLED WATER PUMP DESIGNATION
SF-X	SUPPLY FAN DESIGNATION
SPSS-X	STATIC PRESSURE SENSING STATION DESIGNATION
SS-X	SIDESTREAM SEPERATOR
V-X	VALVE DESIGNATION
VF-X	VENTILATION FAN DESIGNATION

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	PIPE DROP
	PIPE RISE
	PIPE CAP
	BRANCH TAKE OFF
	PIPE DROP TEE
	PIPE RISE TEE
	SHUTOFF VALVE (REFER TO SPECIFICATIONS FOR TYPE)
	AUTOMATIC CONTROL VALVE (TWO-WAY)
	AUTOMATIC CONTROL VALVE (THREE-WAY)
	BUTTERFLY VALVE
	AUTOMATIC BUTTERFLY VALVE
	BALANCING VALVE (WITH MEMORY STOP)
	AUTOFLOW CONTROL VALVE
	CHECK VALVE
	OUTSIDE STEM AND YOKE VALVE
	SAFETY RELIEF VALVE
	STRAINER
	STRAINER WITH BLOWDOWN VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	BALL VALVE
	SHUTOFF VALVE COCK
	GLOBE VALVE
	SOLENOID VALVE
	WEDGE PLUG VALVE
	ANGLE VALVE (ELEVATION)
	ANGLE VALVE (PLAN VIEW)
	UNION
	PIPE FLANGE
	ECCENTRIC REDUCER (FLAT ON BOTTOM)
	ECCENTRIC REDUCER (FLAT ON TOP)
	CONCENTRIC REDUCER
	FLOWMETER FITTING
	FLOWMETER
	HOSE END DRAIN VALVE
	PRESSURE SENSOR
	TEMPERATURE SENSOR
	SIGHT GLASS
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
	PRESSURE GAUGE WITH BALL VALVE
	THERMOMETER
	PRESSURE/TEMPERATURE PLUG
	FLOW ARROW

GENERAL SYMBOLS

LINETYPE SYMBOLS

DESIGNATION	DESCRIPTION
	DEMOLITION WORK (SHOWN ON DEMOLITION PLANS)
	EXISTING WORK
	FUTURE WORK
	NEW WORK
	MATCHLINE
	PART PLAN DESIGNATION

REFERENCE SYMBOLS

DESIGNATION	DESCRIPTION
	FLOOR PLAN NUMBER
	PARTIAL FLOOR PLAN NUMBER
	ELEVATION = LETTER
	DETAIL = NUMBER
	SHEET NUMBER ON WHICH THE PARTIAL PLAN, ELEVATION OR DETAIL IS DRAWN
	SHEET NUMBER WHERE PARTIAL PLAN, ELEVATION OR DETAIL IS TAKEN FROM
	SECTION LETTER
	SHEET NUMBER ON WHICH THE SECTION IS DRAWN
	SHEET NUMBER WHERE THE SECTION IS TAKEN FROM
	PIPE CONTINUATION DESIGNATION
	SHEET FOR CONTINUATION, SHEET COORDINATES OR PIPE CONTINUATION DESIGNATION LETTER
	SYSTEM CONTINUATION NOTES
	NORTH ARROW
	POINT OF CONNECTION TO EXISTING
	POINT OF DISCONNECTION

TEXT SYMBOLS

SYMBOL	DESCRIPTION
&	AND
@	AT
'F	DEGREE(S) FAHRENHEIT
'C	DEGREE(S) CELSIUS
Ø	DIAMETER, PHASE
/	DIVIDE BY, PER
\$	DOLLAR
=	EQUALS, EQUAL TO
>	FEET, FOOT
>	GREATER THAN
≥	GREATER THAN OR EQUAL TO
x"	INCH(ES)
<	LESS THAN
≤	LESS THAN OR EQUAL TO
-	MINUS
x	MULTIPLY BY, BY
#	NUMBER, POUND
%	PERCENT
+	PLUS
±	PLUS OR MINUS

GENERAL ABBREVIATIONS

NOTE: THIS IS A STANDARD ABBREVIATION LIST. SOME ABBREVIATIONS MAY NOT APPEAR ON THE ACCOMPANYING DRAWINGS.

A	COMPRESSED AIR
AAV	AUTOMATIC AIR VENT
ACV	AUTOMATIC CONTROL VALVE
AD	ACCESS DOOR, AREA DRAIN
AF	ANTIFREEZE
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AR	ARGON GAS
ATC	AUTOMATIC TEMPERATURE CONTROL
BAS	BUILDING AUTOMATION SYSTEM
BBD	BOILER BLOWDOWN
BCWR	BEARING COOLING WATER RETURN
BCWS	BEARING COOLING WATER SUPPLY
BDD	BACKDRAFT DAMPER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BO	BLOW OFF
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
°C	DEGREE(S) CELSIUS
CA	CONTROL AIR
CBD	CONTINUOUS BLOWDOWN
CC	CAMPUS CONDENSATE
CCMS	CENTRAL CONTROL AND MONITORING SYSTEM
CD	CONDENSATE DRAIN
CF	CHEMICAL FEED
CFM	CUBIC FEET PER MINUTE
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CHW	CHILLED WATER
CO	CLEANOUT
CO2	CARBON DIOXIDE
CS	CLEAN STEAM
CW	COLD WATER, CITY WATER
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
D	DEEP, DRAIN WATER
DB	DECIBEL, DRY BULB
DDC	DIRECT DIGITAL CONTROL
DHR	DISTRIBUTION HEATING WATER RETURN
DHS	DISTRIBUTION HEATING WATER SUPPLY
DIR	DEIONIZED WATER RETURN
DIS	DEIONIZED WATER SUPPLY
DL	DOOR LOUVER
DN	DOWN
DSP	DRY SPRINKLER PIPE
DTR	DUAL TEMPERATURE RETURN
DTS	DUAL TEMPERATURE SUPPLY
DW	DISTILLED WATER
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EJ	EXPANSION JOINT
EMS	ENERGY MANAGEMENT SYSTEM
ESP	EXTERNAL STATIC PRESSURE
ETC	ETCETERA
EVAC	GAS EVACUATION
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
°F	DEGREE(S) FAHRENHEIT
F	FIRE LINE
FC	FLEXIBLE CONNECTION
FD	FIRE DAMPER, FOUNDATION DRAIN
FDV	FIRE DEPARTMENT VALVE
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FIN/FT	FINS PER FEET
FIN/INCH	FINS PER INCH
FM	FLOWMETER
FMF	FLOWMETER FITTING
FOF	FUEL OIL FILL
FOO	FUEL OIL OVERFLOW
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY

FOT	FUEL OIL TRANSFER
FOV	FUEL OIL VENT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOW SWITCH
FT	FOOT, FEET
FWR	FEED WATER RETURN
FWS	FEED WATER SUPPLY
G	NATURAL GAS
GHR	GLYCOL HEATING RETURN
GHS	GLYCOL HEATING SUPPLY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	AUTOMOTIVE LUBRICATION PIPING
H	HIGH
HB	HOSE BIBB
HED	HOSE END DRAIN VALVE
HP	HORSEPOWER
HPR	HIGH PRESSURE STEAM RETURN
HPS	HIGH PRESSURE STEAM SUPPLY
HR	HEATING WATER RETURN
HRR	HEAT RECOVERY RETURN
HRS	HEAT RECOVERY SUPPLY
HS	HEATING WATER SUPPLY
HT	HEIGHT
HTHR	HIGH TEMPERATURE HEATING WATER RETURN
HTHS	HIGH TEMPERATURE HEATING WATER SUPPLY
HW	HOT WATER (PLUMBING)/HEATING WATER (MECHANICAL)
HWR	HOT WATER RECIRCULATION
HZ	HERTZ
IA	INSTRUMENT AIR
ICW	INDUSTRIAL COLD WATER
IHW	INDUSTRIAL HOT WATER
IHR	INDUSTRIAL HOT WATER RECIRCULATION
IN	INCH, INCHES
INV EL	INVERT ELEVATION
KW	KILOWATTS
L	LONG, LENGTH
LA	LABORATORY AIR
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LBS/HR	POUNDS PER HOUR
LN	LIQUID NITROGEN
LP	LIQUID PROPANE
LPG	LIQUID PETROLEUM GAS
LPR	LOW PRESSURE STEAM RETURN
LPS	LOW PRESSURE STEAM SUPPLY
LV	LABORATORY VENT, LABORATORY VACUUM
LW	LABORATORY WASTE
LWT	LEAVING WATER TEMPERATURE
MA	MEDICAL AIR
MAV	MANUAL AIR VENT
MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
MCC	MOTOR CONTROL CENTER
MO	MOTOR OIL PIPING
MOD	MOTOR OPERATED DAMPER
MPR	MEDIUM PRESSURE STEAM RETURN
MPS	MEDIUM PRESSURE STEAM SUPPLY
MV	MEDICAL VACUUM
N	NITROGEN
NA	NOT APPLICABLE
NC	NOISE CRITERIA, NORMALLY CLOSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NO	NORMALLY OPEN, NITROUS OXIDE
NPSH	NET POSITIVE SUCTION HEAD
O	OXYGEN
OA	OUTSIDE AIR
OD	OVERFLOW DRAIN
OED	OPEN ENDED DUCT
OS&Y	OUTSIDE STEM AND YOKE
P&ID	PROCESS AND INSTRUMENTATION DIAGRAM
PA	PLANT AIR
PC	PUMPED CONDENSATE
PCR	PUMPED CONDENSATE RECIRCULATION
PCHR	PRIMARY CHILLED WATER RETURN
PCHS	PRIMARY CHILLED WATER SUPPLY
PCWR	PROCESS COOLING WATER RETURN
PCWS	PROCESS COOLING WATER SUPPLY
PD	PRESSURE DROP, PUMP DISCHARGE
PGR	PROCESS GLYCOL WATER RETURN
PGS	PROCESS GLYCOL WATER SUPPLY
PH	PHASE
PHR	PRIMARY HEATING RETURN
PHS	PRIMARY HEATING SUPPLY
PIV	POST INDICATING VALVE
PPH	POUNDS PER HOUR
PRV	PRESSURE REDUCING VALVE, PRESSURE REGULATING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
RA	RETURN AIR, RELIEF AIR
RD	REFRIGERANT DISCHARGE
RH	RELATIVE HUMIDITY
RHR	REHEAT WATER RETURN
RHS	REHEAT WATER SUPPLY
RL	REFRIGERANT LIQUID
ROR	REVERSE OSMOSIS WATER RETURN
ROS	REVERSE OSMOSIS WATER SUPPLY
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RV	RELIEF VENT, REFRIGERANT VENT
RX	REMOVE EXISTING
SA	SUPPLY AIR
SAN	SANITARY, SOIL, WASTE
SCHR	SECONDARY CHILLED WATER RETURN
SCHS	SECONDARY CHILLED WATER SUPPLY
SD	STORM DRAIN, SMOKE DETECTOR
SF	SQUARE FOOT
SHR	SECONDARY HEATING WATER RETURN
SHS	SECONDARY HEATING WATER SUPPLY
SL	SOUND LINING
SP	STATIC PRESSURE
SPR	SPRINKLER LINE
SS	STAINLESS STEEL
SQ FT	SQUARE FOOT
SW	SOFT WATER
ΔT	TEMPERATURE DIFFERENCE
TS	TAMPER SWITCH
TSP	TOTAL STATIC PRESSURE
TWR	TEMPERED WATER RETURN
TWS	TEMPERED WATER SUPPLY
TW	TREATED WATER
TYP	TYPICAL
UCD	UNDERCUT DOOR
UL	UNDERWRITERS LABORATORIES
V	VACUUM, VOLTS
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VPD	VACUUM PUMP DISCHARGE
VSD	VARIABLE SPEED DRIVE
VTR	VENT THROUGH ROOF
W	WATTS, WIDE
WB	WET BULB
WC	WATER COLUMN
WG	WATER GAUGE
WH	WALL HYDRANT
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH

GORDON
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Fayetteville Regional Airport – Airline Terminal Improvements Part 2

MECHANICAL ABBREVIATIONS

400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: EDD

REVIEWED BY: ALM

DATE: 07-18-19

PROJECT NO.: 1808

REVISIONS

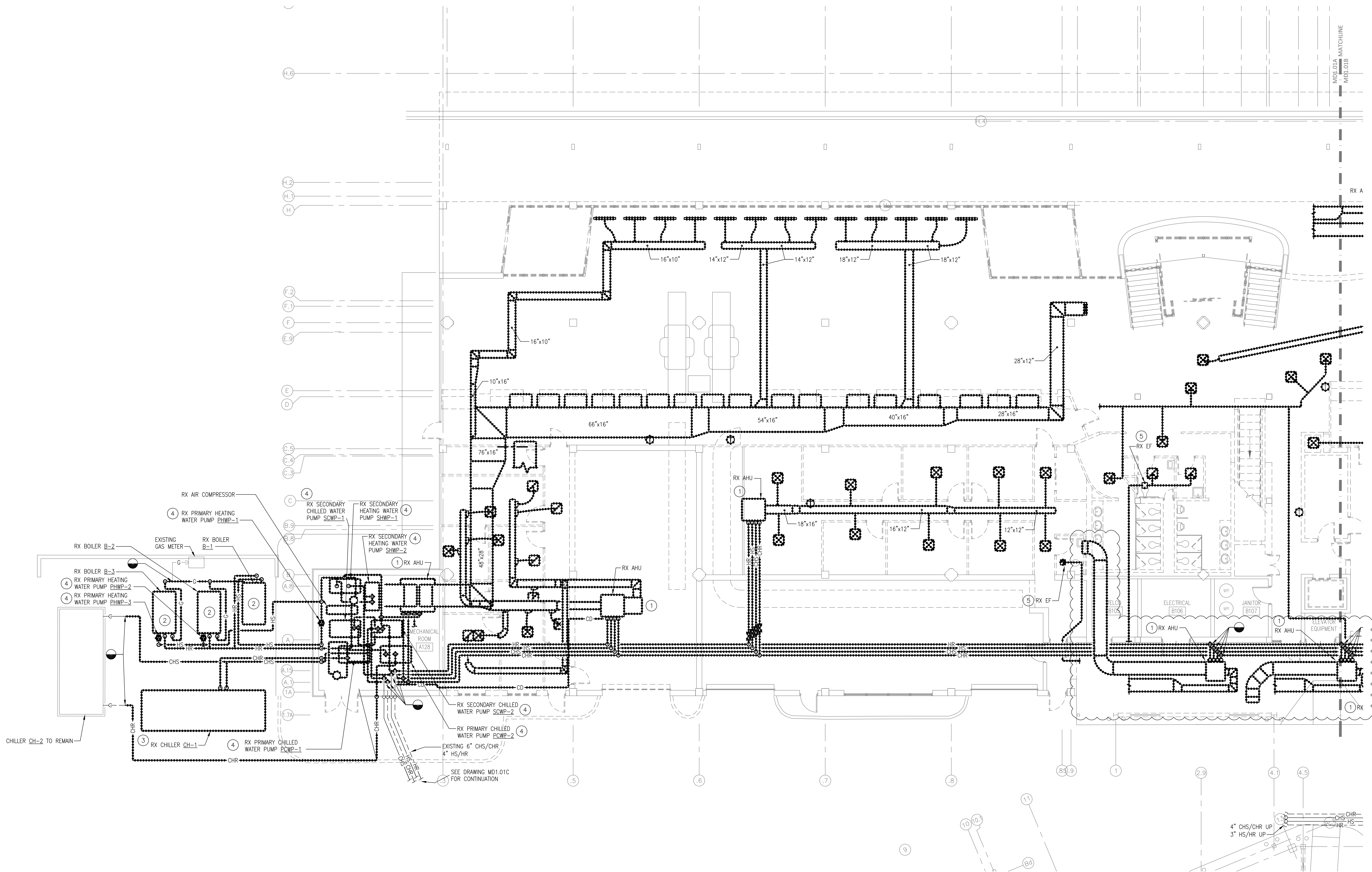
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SHEET NUMBER

M0.02



GENERAL NOTES:

- NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
- WHEN WORKING IN AND AROUND THE EXISTING BUILDING, EXTREME CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF THE EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH WILL REMAIN. REPAIR, REPLACE, OR RESTORE TO THE SATISFACTION OF THE OWNER ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
- ALL EXISTING WIRING, EQUIPMENT, CONDUITS, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE REMOVED AND ARE DESIRED BY THE OWNER, OR ARE INDICATED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES BY THE CONTRACTOR WHERE DIRECTED BY THE ENGINEER. ALL OTHER MATERIALS AND EQUIPMENT WHICH ARE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
- EXISTING CONDITIONS, I.E., PRESENCE AND LOCATION OF PANEL BOARDS, LIGHTING FIXTURES, RECEPTACLES, EQUIPMENT, AND MATERIALS, INDICATED ARE BASED ON INFORMATION OBTAINED FROM AVAILABLE RECORD DRAWINGS AND FIELD SURVEYS AND ARE NOT WARRANTED TO BE COMPLETE OR CORRECT. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF ALL CONDUITS, EQUIPMENT, AND MATERIALS IN THE FIELD PRIOR TO STARTING ALL WORK.
- EXISTING EQUIPMENT SIZES NOTED ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY AND ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL VERIFY ALL SIZES IN THE FIELD IF THEY EFFECT HIS WORK.
- WHEN EXISTING MECHANICAL AND ELECTRICAL WORK IS REMOVED, ALL CONDUITS, WIRING AND MATERIALS SHALL BE REMOVED TO A POINT BELOW THE FINISHED FLOORS OR BEHIND FINISHED WALLS AND CAPPED. SUCH POINTS SHALL BE FAR ENOUGH BEHIND FINISHED SURFACES TO ALLOW FOR THE INSTALLATION OF THE NORMAL THICKNESS OF FINISHED MATERIAL.
- EXISTING WIRING & CONDUIT NO LONGER REQUIRED TO REMAIN IN SERVICE (SHOWN OR OTHERWISE) SHALL BE DISCONNECTED AND REMOVED BACK TO PANEL BOARD UNLESS OTHERWISE INDICATED OR NOTED ON THE PLANS. REMOVE EXISTING PIPE HANGERS, SUPPORTS, CONDUIT, ETC. UNDERGROUND CONDUIT TO BE REMOVED SHALL BE LIMITED TO PIPING IN THE AREAS OCCUPIED BY THE NEW CONSTRUCTION AND FIVE FEET (5') BEYOND THE NEW CONSTRUCTION. EXISTING CONDUIT INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED, OTHERWISE SEALED. NO EXISTING CONDUIT SHALL BE LEFT OPEN END.
- EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, CONDUIT, WIRING, DEVICES, AND MATERIALS AFFECTED BY DEMOLITION OR NEW WORK INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE REINSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW WORK SPECIFICATION. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND AT NO ADDITIONAL CONTRACT COST.
- PATCH TO MATCH EXISTING ALL NEW AND EXISTING OPENINGS AND WALLS, CEILINGS, ROOF, AND FLOOR SURFACES DAMAGED OR CREATED BY DEMOLITION WORK. PATCHING WHERE POSSIBLE SHALL MATCH EXISTING ADJACENT SURFACES AS TO THICKNESS, TEXTURES MATERIALS, AND COLOR. ALL PATCHING SHALL BE PERFORMED TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL CONTRACT COST.
- IN GENERAL ALL EQUIPMENT AND MATERIALS SHOWN "LIGHT" IS EXISTING TO REMAIN. ALL EQUIPMENT AND MATERIALS SHOWN "HEAVY AND HATCHED" IS EXISTING AND SHALL BE DEMOLISHED.
- COORDINATE REMOVAL OF THE CHILLERS, BOILERS AND ALL ASSOCIATED PIPING AND EQUIPMENT WITH THE BUILDING'S DEMAND. BOILERS SHOULD BE REMOVED DURING THE SUMMER MONTHS WHEN HEATING IS NOT NEEDED. CHILLERS SHOULD BE REMOVED DURING THE WINTER MONTHS WHEN COOLING IS NOT NEEDED.

DRAWING NOTES:

- REMOVE EXISTING AIR HANDLING UNIT ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.
- REPLACE EXISTING GAS FIRED BOILER AND ASSOCIATED PIPING AND CONTROLS AS INDICATED.
- REPLACE EXISTING AIR COOLED CHILLER AND ASSOCIATED PIPING AND CONTROLS AS INDICATED.
- REPLACE EXISTING PUMP AND ASSOCIATED PIPING AND CONTROLS AS INDICATED.
- REMOVE EXISTING EXHAUST FAN ALONG WITH ASSOCIATED DUCTWORK AND CONTROLS AS INDICATED.

FIRE RATED WALL LEGEND

--- 1 HOUR FIRE PARTITION
--- 1 HOUR FIRE BARRIER

MAIN TERMINAL

TICKETING BAGGAGE

CONCOURSE B **CONCOURSE A**

KEY PLAN

GRAPHIC SCALE

8 0 8 16

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

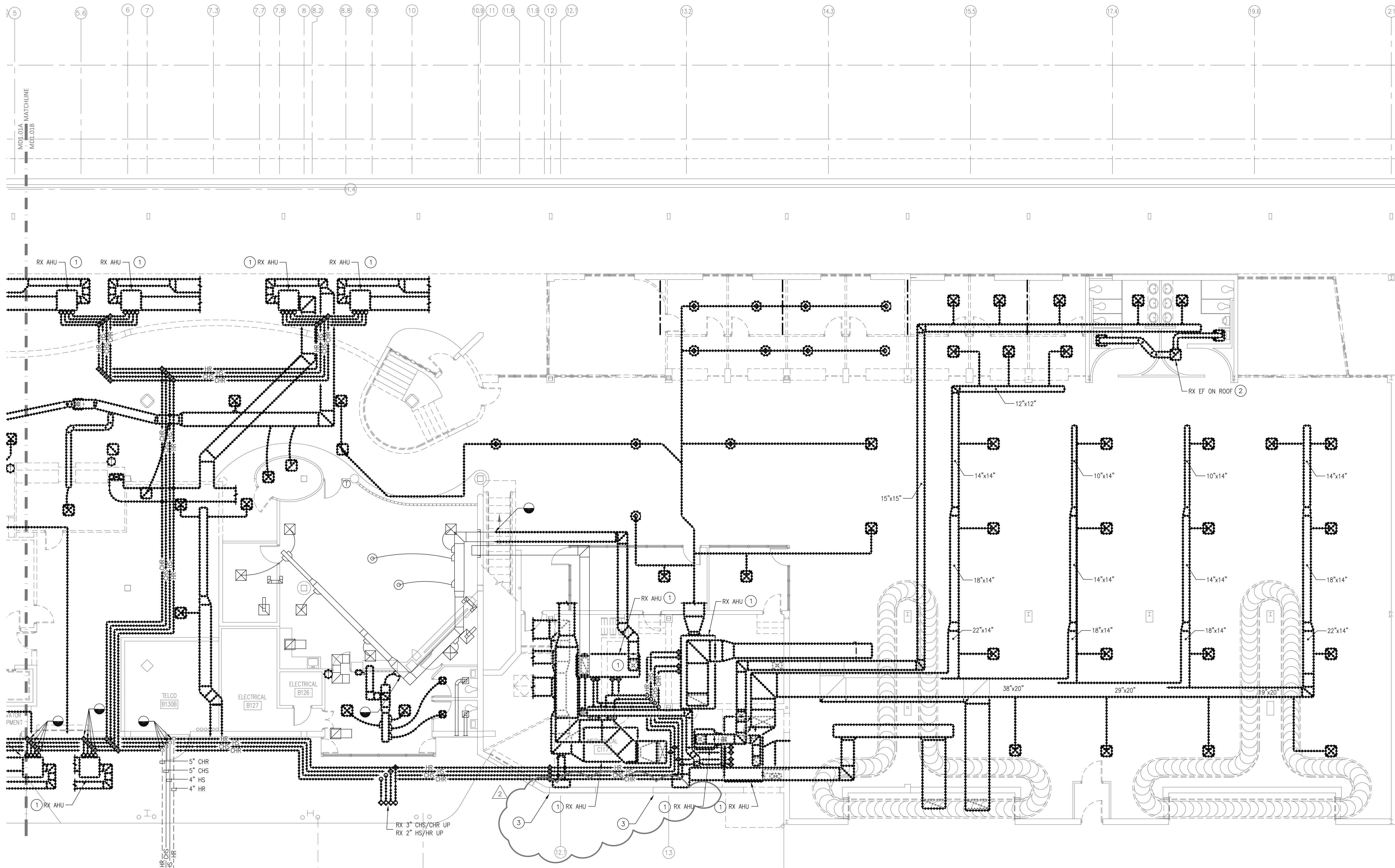
UNIT OF MEASURE: FEET

REVISIONS

1	ADDENDUM 3	08/14/19
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SHEET NUMBER

MD1.01A



GENERAL NOTES:

- A. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
- B. WHEN WORKING IN AND AROUND THE EXISTING BUILDING, EXTREME CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF THE EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH WILL REMAIN. REPAIR, REPLACE, OR RESTORE TO THE SATISFACTION OF THE OWNER ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
- C. ALL EXISTING WIRING, EQUIPMENT, CONDUITS, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE REMOVED AND ARE DESIRED BY THE OWNER, OR ARE INDICATED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES BY THE CONTRACTOR WHERE DIRECTED BY THE ENGINEER. ALL OTHER MATERIALS AND EQUIPMENT WHICH ARE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
- D. EXISTING CONDITIONS, I.E., PRESENCE AND LOCATION OF PANEL BOARDS, LIGHTING FIXTURES, RECEPTACLES, EQUIPMENT, AND MATERIALS, INDICATED ARE BASED ON INFORMATION OBTAINED FROM AVAILABLE RECORD DRAWINGS AND FIELD SURVEYS AND ARE NOT WARRANTED TO BE COMPLETE OR CORRECT. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF ALL CONDUITS, EQUIPMENT, AND MATERIALS IN THE FIELD PRIOR TO STARTING ALL WORK.
- E. EXISTING EQUIPMENT SIZES NOTED ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY AND ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL VERIFY ALL SIZES IN THE FIELD IF THEY EFFECT HIS WORK.
- F. WHEN EXISTING MECHANICAL AND ELECTRICAL WORK IS REMOVED, ALL CONDUITS, WIRING AND MATERIALS SHALL BE REMOVED TO A POINT BELOW THE FINISHED FLOORS OR BEHIND FINISHED WALLS AND CAPPED. SUCH POINTS SHALL BE FAR ENOUGH BEHIND FINISHED SURFACES TO ALLOW FOR THE INSTALLATION OF THE NORMAL THICKNESS OF FINISHED MATERIAL.
- G. EXISTING WIRING & CONDUIT NO LONGER REQUIRED TO REMAIN IN SERVICE (SHOWN OR OTHERWISE) SHALL BE DISCONNECTED AND REMOVED BACK TO PANEL BOARD UNLESS OTHERWISE INDICATED OR NOTED ON THE PLANS. REMOVE EXISTING PIPE HANGERS, SUPPORTS, CONDUIT, ETC.. UNDERGROUND CONDUIT TO BE REMOVED SHALL BE LIMITED TO PIPING IN THE AREAS OCCUPIED BY THE NEW CONSTRUCTION AND FIVE FEET (5') BEYOND THE NEW CONSTRUCTION. EXISTING CONDUIT INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED, OTHERWISE SEALED. NO EXISTING CONDUIT SHALL BE LEFT OPEN END.
- H. EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, CONDUIT, WIRING, DEVICES, AND MATERIALS AFFECTED BY DEMOLITION OR NEW WORK INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE REINSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW WORK SPECIFICATION. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND AT NO ADDITIONAL CONTRACT COST.
- I. PATCH TO MATCH EXISTING ALL NEW AND EXISTING OPENINGS AND WALLS, CEILINGS, ROOF, AND FLOOR SURFACES DAMAGED OR CREATED BY DEMOLITION WORK. PATCHING WHERE POSSIBLE SHALL MATCH EXISTING ADJACENT SURFACES AS TO THICKNESS, TEXTURES MATERIALS, AND COLOR. ALL PATCHING SHALL BE PERFORMED TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL CONTRACT COST.
- J. IN GENERAL ALL EQUIPMENT AND MATERIALS SHOWN "LIGHT" IS EXISTING TO REMAIN. ALL EQUIPMENT AND MATERIALS SHOWN "HEAVY AND HATCHED" IS EXISTING AND SHALL BE DEMOLISHED.

DRAWING NOTES:

- 1 REMOVE EXISTING AIR HANDLING UNIT ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.
- 2 REMOVE EXISTING EXHAUST FAN ALONG WITH ASSOCIATED DUCTWORK AND CONTROLS AS INDICATED.
- 3 EXISTING LOUVER TO REMAIN. REMOVE ANY PLENUM, DUCTWORK AND BLANK-OFFS ASSOCIATED WITH THE LOUVER.

FIRE RATED WALL LEGEND

--- 1 HOUR FIRE PARTITION
--- 1 HOUR FIRE BARRIER

KEY PLAN

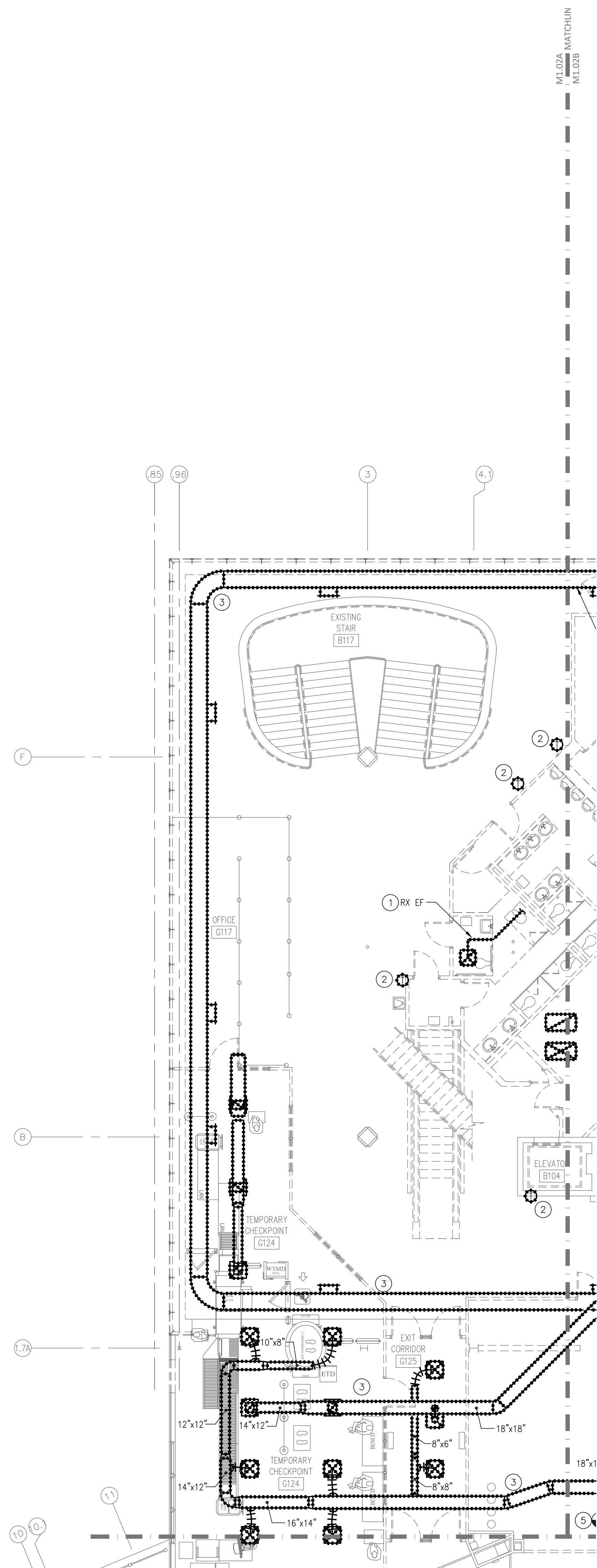
GRAPHIC SCALE
SCALE: 1/8"=1'-0"
UNIT OF MEASURE: FEET

REVISIONS

NO.	DESCRIPTION	DATE
1	ADDENDUM 3	08/14/19
2	RFT-17	08/04/20

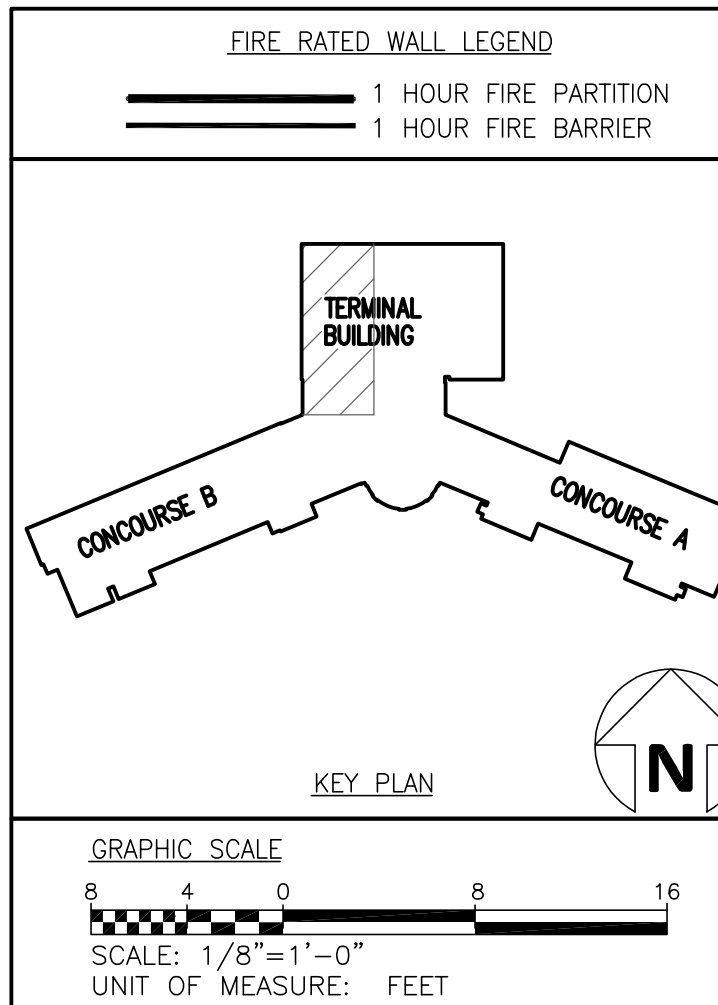
SHEET NUMBER

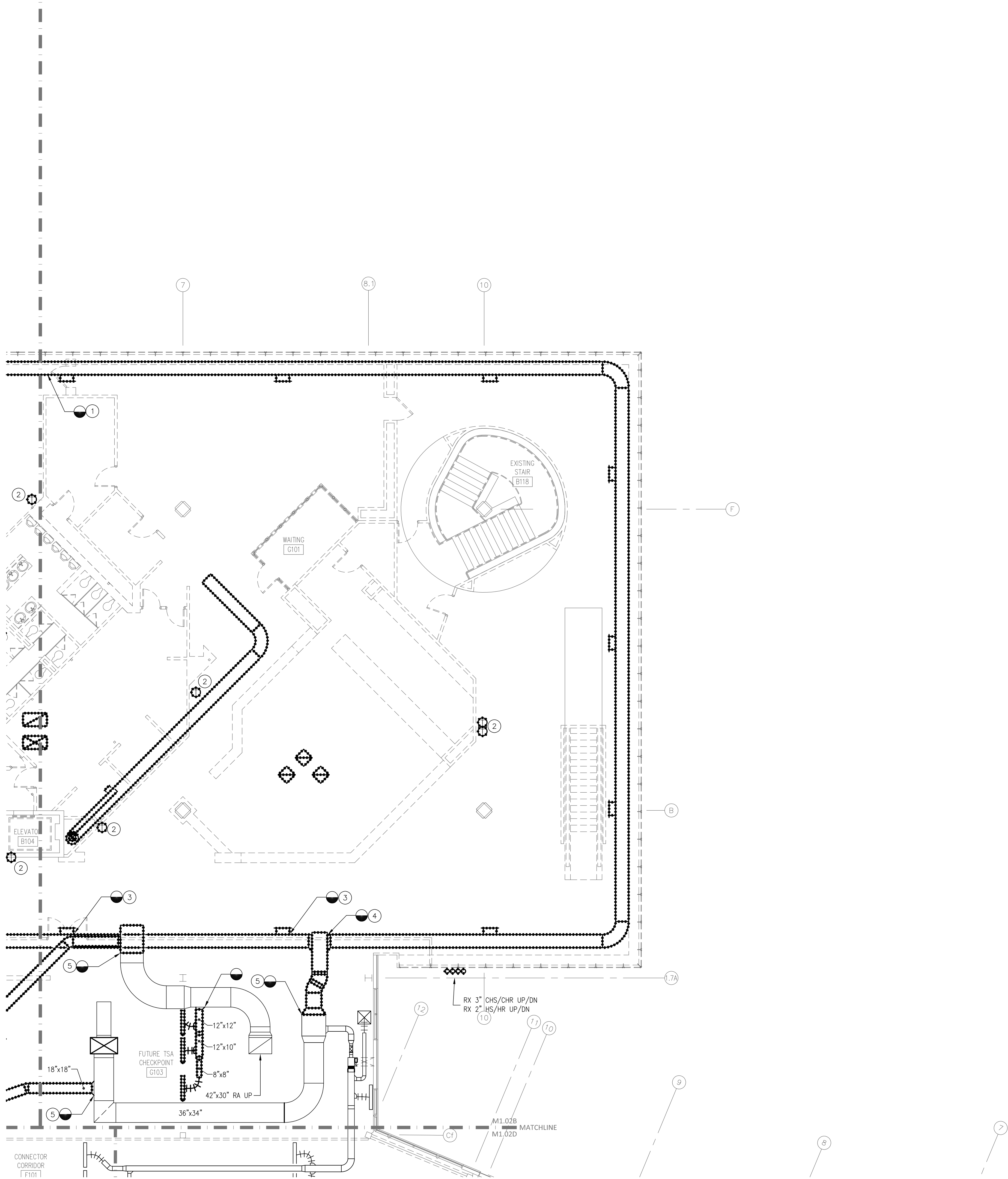
MD1.01B



- NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER MAINTENANCE, REPAIR, OR REMOVAL OF EQUIPMENT OR MATERIALS. SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACTOR COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
- B. WHEN WORKING IN AND AROUND THE EXISTING BUILDING, EXTREME CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF THE EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH WILL REMAIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE OWNER ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
- C. ALL EXISTING WIRING, EQUIPMENT, CONDUCITS, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE NOT REQUIRED FOR RE-USE OR RE-INSTALLATION SHALL BE REMOVED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES OF THE CONTRACTOR WHERE DIRECTED BY THE OWNER. ALL OTHER MATERIALS AND EQUIPMENT NOT REQUIRED TO REMAIN SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
- D. EXISTING CONDITIONS, I.E. PRESENCE AND LOCATION OF PANEL BOARDS, LIGHTING FIXTURES, RECEPTACLES, EQUIPMENT, AND MATERIALS, SHALL BE BASED ON INFORMATION PROVIDED BY THE OWNER. UNLESS NOTED RECORD DRAWINGS AND FIELD SURVEYS AND ARE NOT WARRANTED TO BE COMPLETE OR CORRECT, CONTRACTOR SHALL VERIFY EXISTING CONDITIONS BY VISUAL INSPECTION AND SHALL BE COMPLETED TO THE FIELD PRIOR TO STARTING ALL WORK.
- E. EXISTING EQUIPMENT SIZES NOTED ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY AND ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL VERIFY ALL SIZES IN THE FIELD IF THEY EFFECT WORK.
- F. WHEN EXISTING MECHANICAL AND ELECTRICAL WORK IS REMOVED, ALL CONDUCITS, WIRING AND MATERIALS SHALL BE REMOVED TO A POINT BELOW THE FINISHED FLOORS OR BEHIND FINISHED WALLS AND CAPPED SUCH POINTS SHALL BE FAR ENOUGH BEHIND FINISHED SURFACES TO NOT AFFECT THE THICKNESS OF THE FINISHED MATERIAL.
- G. EXISTING WIRING & CONDUIT NO LONGER REQUIRED TO REMAIN IN SERVICE (SHOWN OR OTHERWISE) SHALL BE DISCONNECTED AND REMOVED BACK TO PANEL BOARD UNLESS OTHERWISE INDICATED OR OTHERWISE NOTED ON PLANS. UNDERGROUND CONDUIT TO REMAIN IN SERVICE, ETC. UNDERGROUND CONDUIT TO BE REMOVED SHALL BE LIMITED TO PIPING IN THE AREAS OCCUPIED BY THE NEW CONSTRUCTION TO FIVE FEET (5') BEYOND THE NEW CONSTRUCTION. EXISTING CONDUIT INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED, OTHERWISE SEALED. NO EXISTING CONDUIT SHALL BE LEFT OPEN.
- H. EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, CONDUIT, WIRING, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE REINSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW REQUIREMENTS. ALL MATERIALS AND EQUIPMENT TO REMAIN SHALL BE TO THE SATISFACTION OF THE ENGINEER AND AT NO ADDITIONAL CONTRACTOR COST.
- I. PATCH TO MATCH EXISTING ALL NEW AND EXISTING OPENINGS AND WALLS, CEILINGS, ROOF, AND FLOOR SURFACES DAMAGED OR CREATED BY DEMOLITION WORK. PATCHING WHERE POSSIBLE SHALL MATCH EXISTING SURFACES. PATCHING SHALL BE DONE WITH MATCHING MATERIALS, AND COLOR. ALL PATCHING SHALL BE PERFORMED TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL CONTRACTOR COST.
- J. IN GENERAL ALL EQUIPMENT AND MATERIALS SHOWN "LIGHT" IS EXISTING TO BE REMOVED. EQUIPMENT AND MATERIALS SHOWN "HEAVY" AND "HATCHED" IS EXISTING AND SHALL BE DEMOLISHED.

- ① REMOVE EXISTING EXHAUST FAN ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.
- ② REMOVE EXISTING THERMOSTAT.
- ③ EXISTING DUCTWORK IN AREA A AND THE TEMPORARY TSA CHECKPOINT IS TO REMAIN WHILE CONSTRUCTION IS TAKING PLACE IN AREA B. ONCE AREA B CONSTRUCTION IS FINISHED, THE DUCTWORK WILL BE REMOVED AS SHOWN. REFER TO ARCHITECTURAL DRAWINGS FOR A DETAILED PROJECT PHASING PLAN.



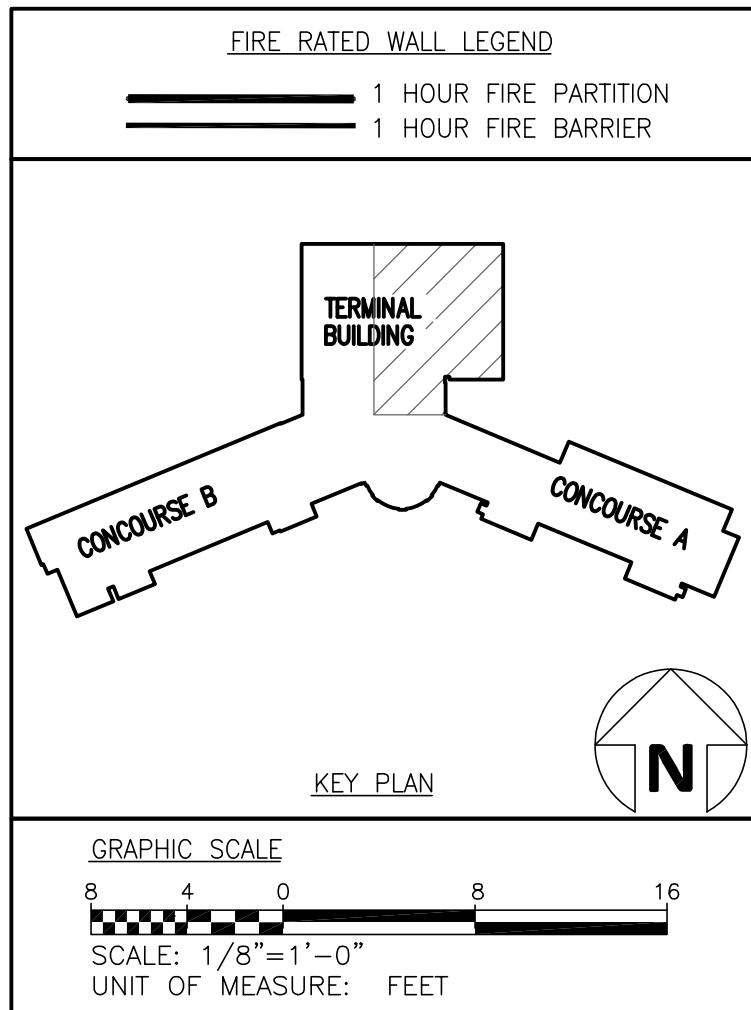


GENERAL NOTES:

- A. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
- B. WHEN WORKING IN AND AROUND THE EXISTING BUILDING, EXTREME CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF THE EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH WILL REMAIN. REPAIR, REPLACE, OR RESTORE TO THE SATISFACTION OF THE OWNER ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
- C. ALL EXISTING WIRING, EQUIPMENT, CONDUITS, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE REMOVED AND ARE DESIRED BY THE OWNER, OR ARE INDICATED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES BY THE CONTRACTOR WHERE DIRECTED BY THE ENGINEER. ALL OTHER MATERIALS AND EQUIPMENT WHICH ARE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
- D. EXISTING CONDITIONS, I.E., PRESENCE AND LOCATION OF PANEL BOARDS, LIGHTING FIXTURES, RECEPTACLES, EQUIPMENT, AND MATERIALS, INDICATED ARE BASED ON INFORMATION OBTAINED FROM AVAILABLE RECORD DRAWINGS AND FIELD SURVEYS AND ARE NOT WARRANTED TO BE COMPLETE OR CORRECT. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF ALL CONDUITS, EQUIPMENT, AND MATERIALS IN THE FIELD PRIOR TO STARTING ALL WORK.
- E. EXISTING EQUIPMENT SIZES NOTED ARE FOR THE CONVENIENCE OF THE CONTRACTOR ONLY AND ARE NOT WARRANTED TO BE CORRECT. CONTRACTOR SHALL VERIFY ALL SIZES IN THE FIELD IF THEY EFFECT HIS WORK.
- F. WHEN EXISTING MECHANICAL AND ELECTRICAL WORK IS REMOVED, ALL CONDUITS, WIRING AND MATERIALS SHALL BE REMOVED TO A POINT BELOW THE FINISHED FLOORS OR BEHIND FINISHED WALLS AND CAPPED. SUCH POINTS SHALL BE FAR ENOUGH BEHIND FINISHED SURFACES TO ALLOW FOR THE INSTALLATION OF THE NORMAL THICKNESS OF FINISHED MATERIAL.
- G. EXISTING WIRING & CONDUIT NO LONGER REQUIRED TO REMAIN IN SERVICE (SHOWN OR OTHERWISE) SHALL BE DISCONNECTED AND REMOVED BACK TO PANEL BOARD UNLESS OTHERWISE INDICATED OR NOTED ON THE PLANS. REMOVE EXISTING PIPE, HANGERS, SUPPORTS, CONDUIT, ETC. UNDERGROUND CONDUIT TO BE REMOVED SHALL BE LIMITED TO PIPING IN THE AREAS OCCUPIED BY THE NEW CONSTRUCTION AND FIVE FEET (5') BEYOND THE NEW CONSTRUCTION. EXISTING CONDUIT INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED, OTHERWISE SEALED. NO EXISTING CONDUIT SHALL BE LEFT OPEN END.
- H. EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, CONDUIT, WIRING, DEVICES, AND MATERIALS AFFECTED BY DEMOLITION OR NEW WORK INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE REINSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW WORK SPECIFICATION. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND AT NO ADDITIONAL CONTRACT COST.
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- J. IN GENERAL ALL EQUIPMENT AND MATERIALS SHOWN "LIGHT" IS EXISTING TO REMAIN. ALL EQUIPMENT AND MATERIALS SHOWN "HEAVY AND HATCHED" IS EXISTING AND SHALL BE DEMOLISHED.

DRAWING NOTE:

- ① FOR PHASE ONE CONSTRUCTION, DISCONNECT AND CAP SUPPLY DUCTWORK IN APPROXIMATELY THIS LOCATION SO THAT ALL DUCTWORK IN AREA-B IS REMOVED BACK TO THE MAIN TAP.
- ② REMOVE EXISTING THERMOSTAT
- ③ FOR PHASE ONE CONSTRUCTION, REMOVE SUPPLY GRILLE AND PATCH DUCTWORK
- ④ FOR PHASE ONE CONSTRUCTION, SUPPLY DUCT SHOULD BE REMOVED TO THIS POINT. SUPPLY DUCT RUNNING PLAN WEST INTO AREA-A WILL REMAIN TO SERVE THE TEMPORARY TSA CHECKPOINT UNTIL CONSTRUCTION IN AREA-B IS COMPLETE. AT THAT POINT, THE REMAINING DUCTWORK WILL BE REMOVED AS SHOWN. REFER TO ARCHITECTURAL DRAWINGS FOR A DETAILED PHASING PLAN.
- ⑤ SUPPLY/RETURN DUCT IS TO REMAIN UNTIL CONSTRUCTION IN AREA-B IS COMPLETE.



Fayetteville Regional Airport – Airline Terminal Improvements Part 2

SECOND FLOOR PLAN – AREA B – MECHANICAL

DEMOLITION

400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS

1	
2	
3	
4	
5	

SHEET NUMBER

MD1.02B



- GENERAL NOTES:
- NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER UTILITIES, UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER. SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
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 - ALL EXISTING WIRING, EQUIPMENT, CONDUITS, AND MATERIALS NOT REQUIRED FOR RE-USE OR RE-INSTALLATION (SHOWN OR OTHERWISE) SHALL BE REMOVED. ALL EXISTING MATERIALS AND EQUIPMENT WHICH ARE REMOVED AND ARE DESIRED BY THE OWNER, OR ARE INDICATED TO REMAIN THE PROPERTY OF THE OWNER, SHALL BE DELIVERED TO HIM ON THE PREMISES BY THE CONTRACTOR WHERE DIRECTED BY THE ENGINEER. ALL OTHER MATERIALS AND EQUIPMENT WHICH ARE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED BY THE CONTRACTOR FROM THE PREMISES.
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DRAWING NOTE:

- REMOVE EXISTING EXHAUST FAN ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.

FIRE RATED WALL LEGEND

- 1 HOUR FIRE PARTITION
- 1 HOUR FIRE BARRIER

TERMINAL BUILDING

CONCOURSE B

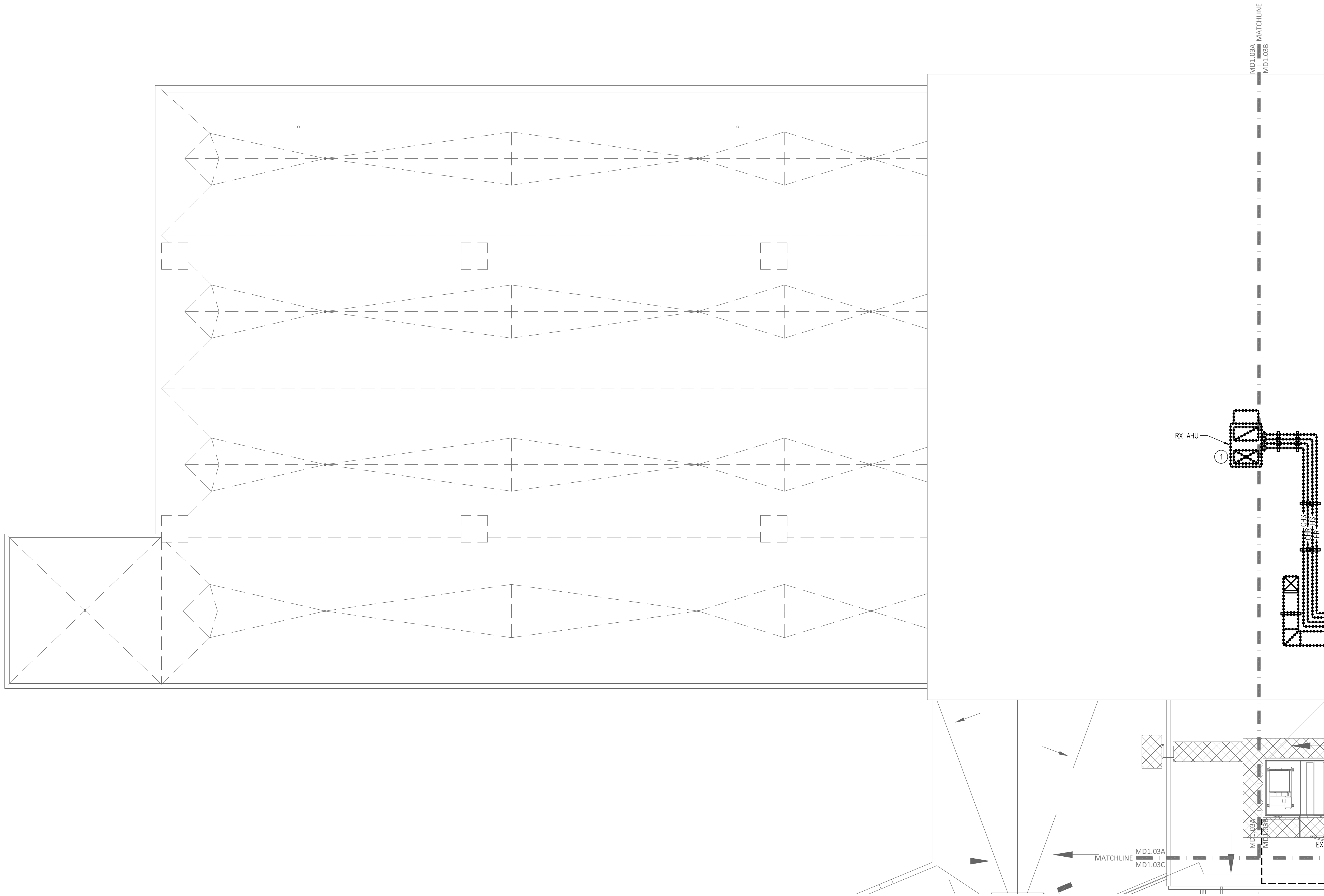
CONCOURSE A

KEY PLAN

GRAPHIC SCALE

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

UNIT OF MEASURE: FEET



GENERAL NOTES:

- A. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICES, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWNS SHALL BE PERFORMED DURING HOURS AS DIRECTED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.
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- H. EXISTING MECHANICAL AND ELECTRICAL EQUIPMENT, CONDUIT, WIRING, DEVICES, AND MATERIALS AFFECTED BY DEMOLITION OR NEW WORK INSTALLATION AND REQUIRED TO REMAIN IN SERVICE SHALL BE REINSTALLED OR SUPPORTED AS REQUIRED IN ACCORDANCE WITH NEW WORK SPECIFICATION. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE ENGINEER AND AT NO ADDITIONAL CONTRACT COST.
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- J. IN GENERAL ALL EQUIPMENT AND MATERIALS SHOWN "LIGHT" IS EXISTING TO REMAIN. ALL EQUIPMENT AND MATERIALS SHOWN "HEAVY AND HATCHED" IS EXISTING AND SHALL BE DEMOLISHED.

DRAWING NOTES:

- 1 REMOVE EXISTING AIR HANDLING UNIT ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.

FIRE RATED WALL LEGEND

--- 1 HOUR FIRE PARTITION
--- 1 HOUR FIRE BARRIER

KEY PLAN

MAIN TERMINAL
BAGGAGE
TICKETING
CONCOURSE B
CONCOURSE A

GRAPHIC SCALE

8 4 0 8 16
SCALE: 1/8"=1'-0"
UNIT OF MEASURE: FEET

REVISIONS

1	
2	
3	

SHEET NUMBER

MD1.03A

Fayetteville Regional Airport – Airline Terminal Improvements Part 2

ROOF PLAN – AREA A – MECHANICAL DEMOLITION

400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS

1	
2	
3	

SHEET NUMBER

MD1.03A

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Architecture

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Fayetteville, NC 28103
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or architect before making any decisions or actions.

rmi
RMP ENGINEERING, INC.
8720 Red Oak Blvd., Suite 370
Charlotte, NC 28217
P: 704.909.8812
NO license No. C-1126
RMP Project No. 2153223.FD

A. NOTIFY THE OWNER, IN WRITING, AT LEAST SEVEN (7) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF ELECTRICAL SERVICE, OR OTHER UTILITIES, UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER. SHUTDOWNS WILL BE PERFORMED AT THE TIME AND PLACE SPECIFIED BY THE OWNER AND SHALL BE ACCOMPLISHED AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH SHUT DOWN ALL SERVICES SHALL BE RESTORED.

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1 REMOVE EXISTING EXHAUST FAN ALONG WITH ASSOCIATED DUCTWORK, PIPING, AND CONTROLS AS INDICATED.

GRAPHIC SCALE

8 4 0 8 16

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

UNIT OF MEASURE: FEET

KEY PLAN

The key plan shows the layout of the terminal building. It includes a north arrow pointing towards the top right. The terminal is divided into several sections: CONCOURSE B (on the left), CONCOURSE A (on the right), and a central section containing TICKETING, MAIN TERMINAL, and BAGGAGE. A legend at the top indicates that a solid line represents a 1 HOUR FIRE PARTITION and a dashed line represents a 1 HOUR FIRE BARRIER.

Fayetteville Regional Airport – Airline Terminal Improvements Part 2	400 Airport Road Fayetteville, North Carolina 28306	ROOF PLAN – AREA C – MECHANICAL DEMOLITION
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DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-19-19
PROJECT NO.: 1808

REVISIONS	
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△	
△	

SHEET NUMBER
MD1 03C

DRAWING NOTES:

- 1 TERMINATE DUCTWORK WITH A 45 DEGREE ELBOW DOWN OUTSIDE EXTERIOR WALL. PROVIDE BIRD SCREEN AT OPENING.

**GORDON
JOHNSON**
Architecture

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gordonjohnsonarchitecture.com
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RNF Project No. 2153223.FD

Fayetteville Regional Airport – Airline Terminal Improvements Part 2

FIRST FLOOR PLAN – AREA A – HVAC DUCTWORK

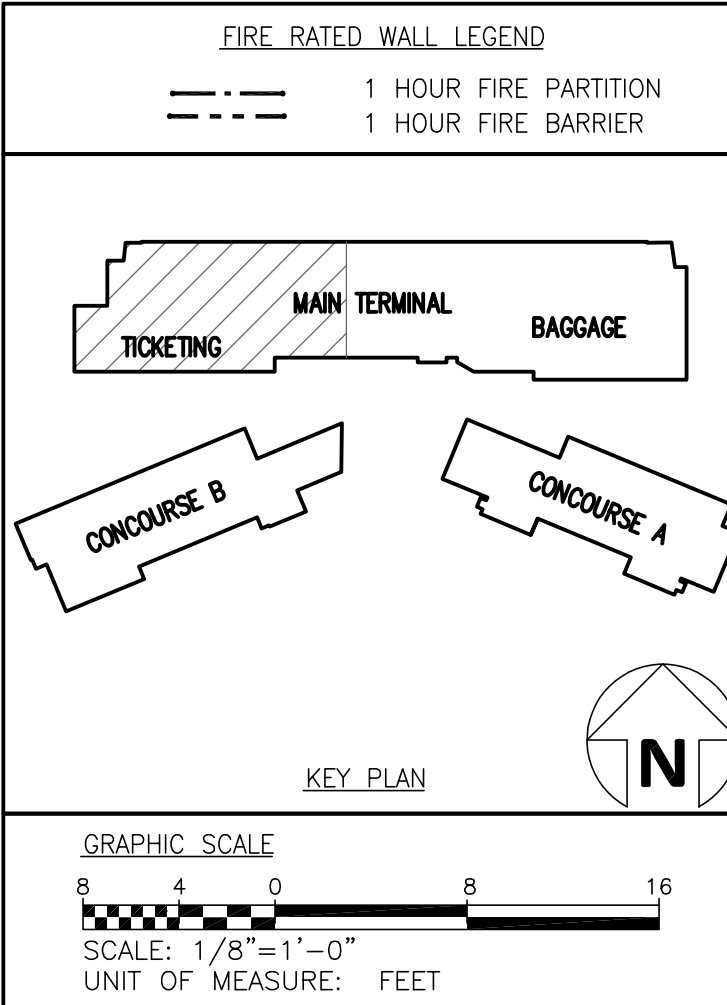
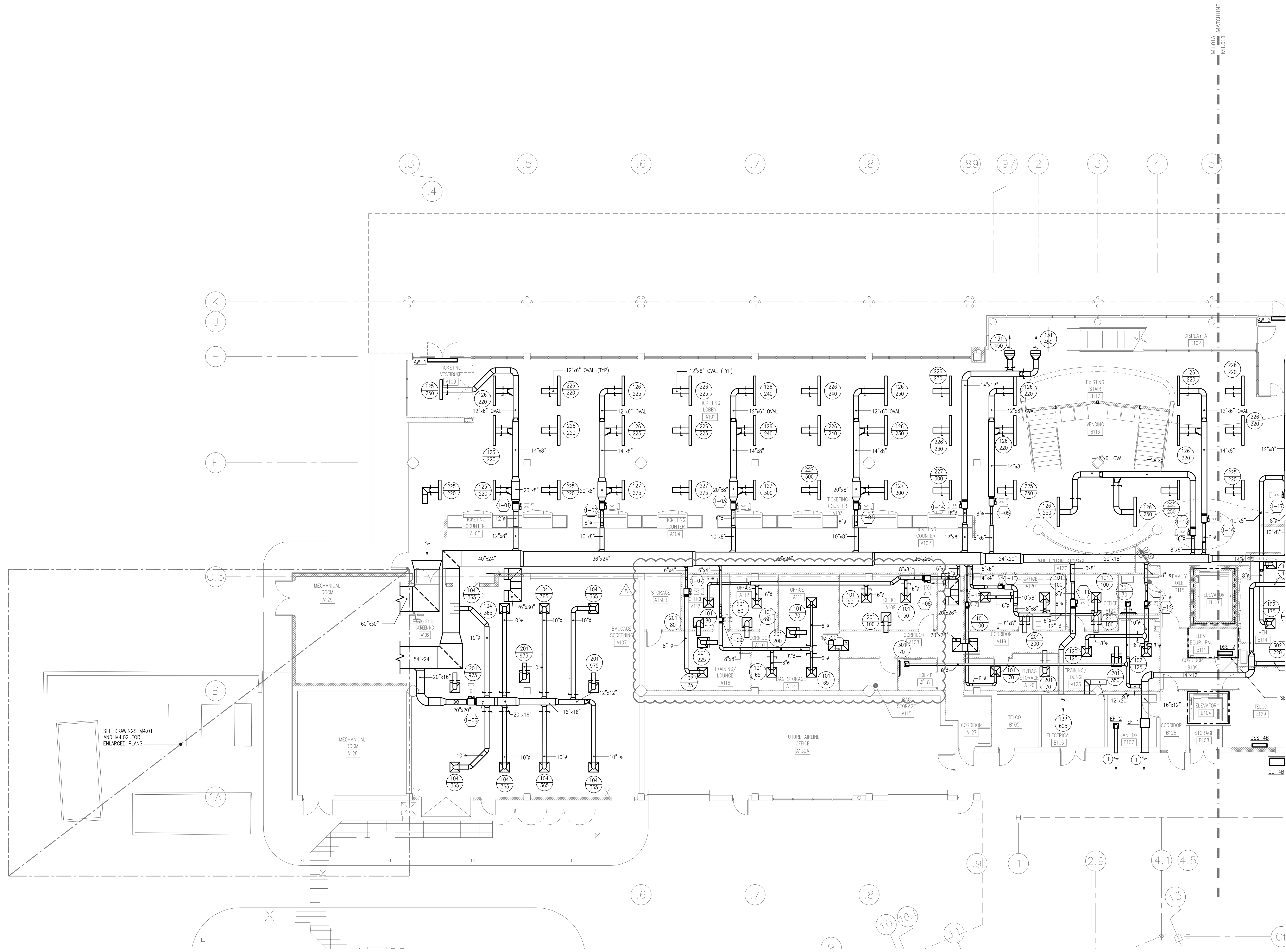
400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
1. CSM3 10/02/20
2. CSM5 02/01/21
3. CSM7 01/28/22

SHEET NUMBER

M1.01A



DRAWING NOTES:

- 1 PROVIDE ACCESS PANEL FOR TERMINAL UNIT.
- 2 PROVIDE EXHAUST AIR LOUVER WITH A FACE AREA NO SMALLER THAN 1 SQUARE FOOT.

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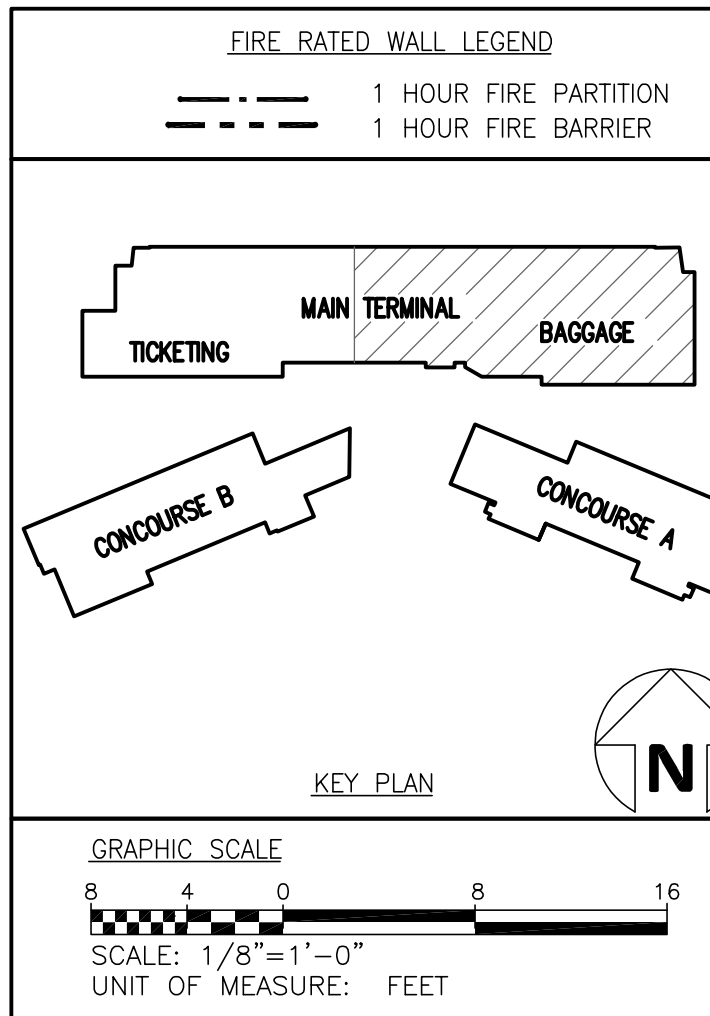
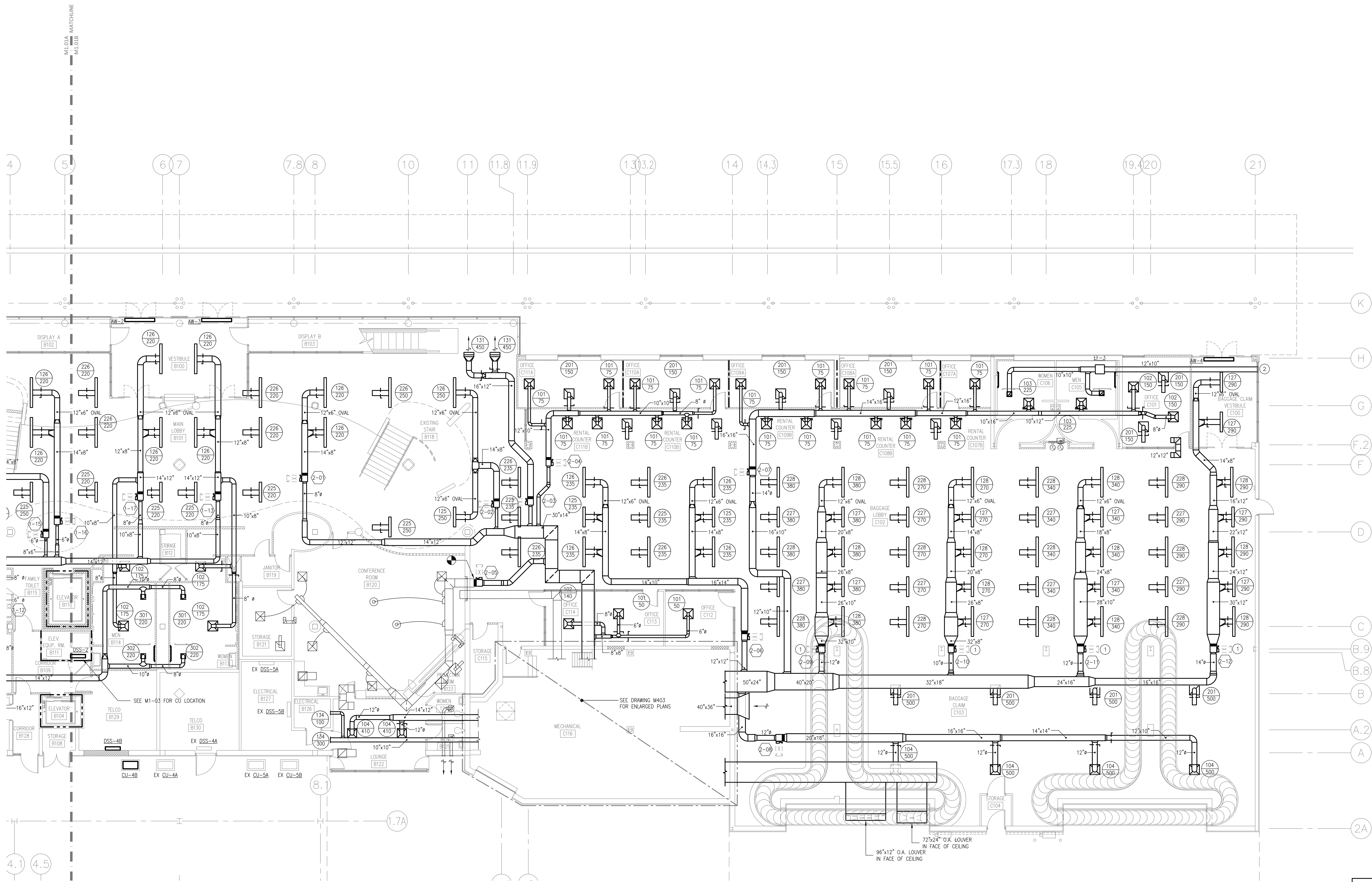
FIRST FLOOR PLAN – AREA B – HVAC DUCTWORK

400 Airport Road
Fayetteville, North Carolina 28306

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REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
ADDENDUM 3 08/14/19
R1-17 06/04/20
R2-05 02/01/21
SHEET NUMBER

M1.01B



DRAWING NOTES:

1. CONNECT NEW CEILING DIFFUSER TO EXISTING DUCTWORK. COORDINATE LOCATION WITH NEW CEILING GRID TO HAVE THE NEW DIFFUSER INSTALLED IN APPROXIMATELY THE SAME LOCATION AS THE DEMOLISHED DIFFUSER. EXTEND DUCTWORK AS NEEDED. FLEXIBLE DUCTWORK SHOULD NOT EXCEED 5'-0". BALANCE NEW DIFFUSERS TO THE CDM SHOWN.
2. PROVIDE INDOCO TYPE QUA SLIP-IN DUCT HEATER. HEATER SHALL BE RATED FOR 3.5KW AND BE 208V/1Ø/60Hz. SEE SPECIFICATIONS FOR EQUIVALENT MANUFACTURES. CUT AND PATCH DUCTWORK AS NECESSARY FOR INSTALLATION. REPLACE DUCT INSULATION WITH LIKE KIND TO EXISTING INSULATION.
3. PROVIDE 12" x 12" OA PLUNGEUM WITH 1" MERV 11, 12" X 12" CARBON FILTER IN THE FACE OF THE O.A. GRILLE. PROVIDE ACCESS IN DUCTWORK TO FILTER.
4. TERMINATE DUCTWORK WITH A 45 DEGREE ELBOW DOWN OUTSIDE EXTERIOR WALL. PROVIDE BIRD SCREEN AT OPENING.

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Fayetteville Regional Airport – Airline Terminal Improvements Part 2

FIRST FLOOR PLAN – AREA C – HVAC DUCTWORK

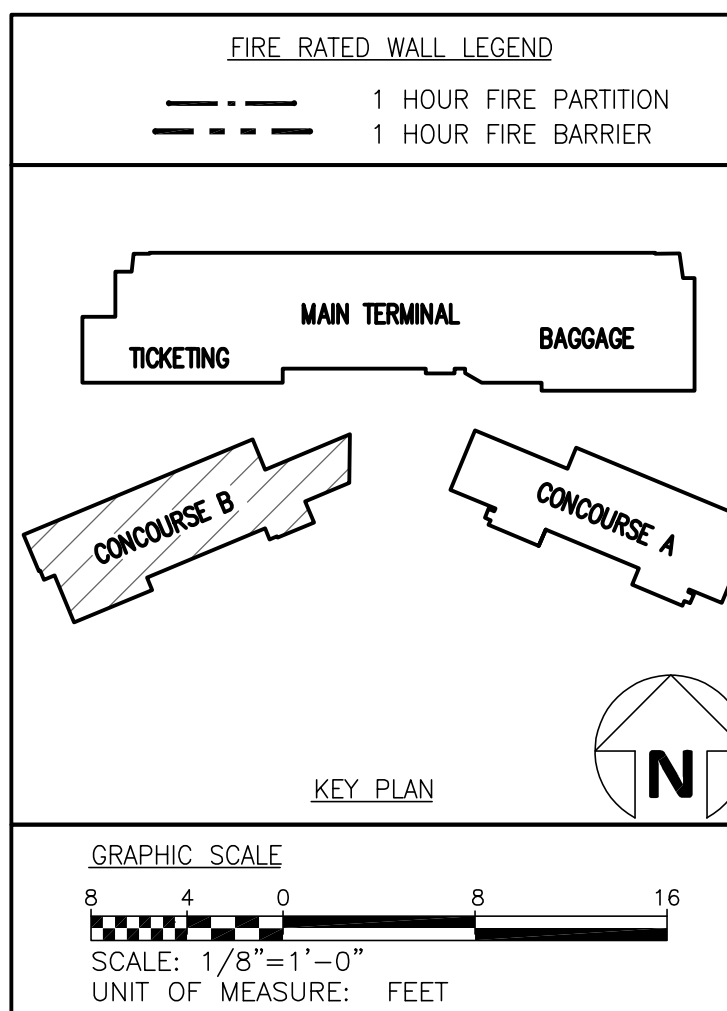
400 Airport Road
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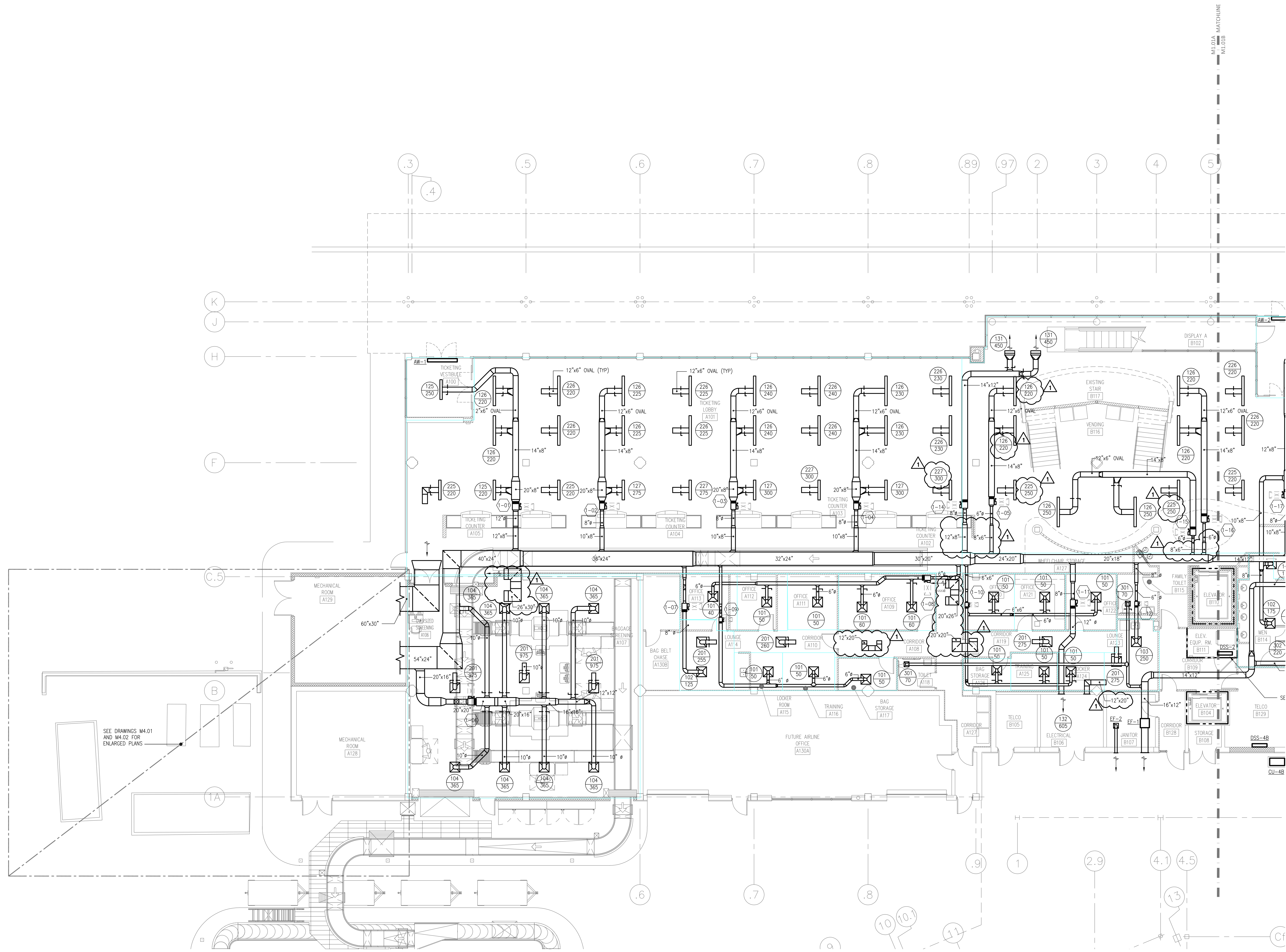
DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
1. ADDENDUM 3 08/14/19
2. CEM4 10/07/20
3. CEM5 02/01/21

SHEET NUMBER

M1.01C





SEE DRAWINGS M4.01
AND M4.02 FOR
ENLARGED PLANS

FIRE RATED WALL LEGEND

--- 1 HOUR FIRE PARTITION
--- 1 HOUR FIRE BARRIER

MAIN TERMINAL

TICKETING BAGGAGE

CONCOURSE B **CONCOURSE A**

KEY PLAN

GRAPHIC SCALE

8 4 0 8 16

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

UNIT OF MEASURE: FEET

DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS

ADDENDUM 3 08/14/19

SHEET NUMBER

M1.01A

Fayetteville Regional Airport – Airline Terminal Improvements Part 2

400 Airport Road
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FIRST FLOOR PLAN – AREA A – HVAC DUCTWORK

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DRAWING NOTES:

- 1 PROVIDE ACCESS PANEL FOR TERMINAL UNIT.

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Fayetteville Regional Airport – Airline Terminal Improvements Part 2

FIRST FLOOR PLAN – AREA B – HVAC DUCTWORK

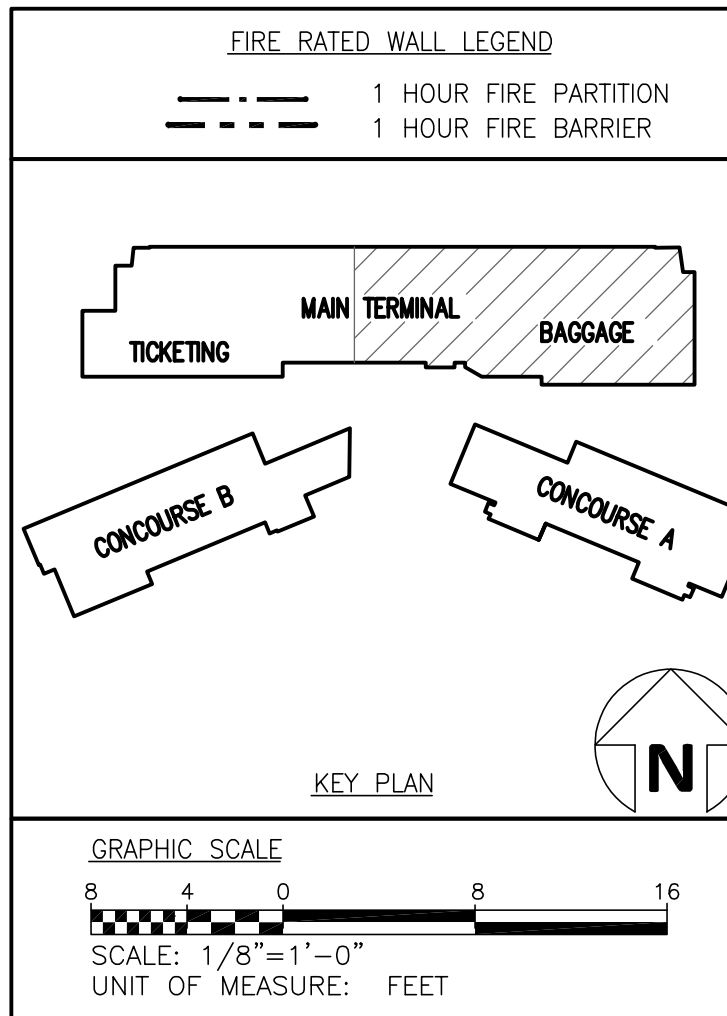
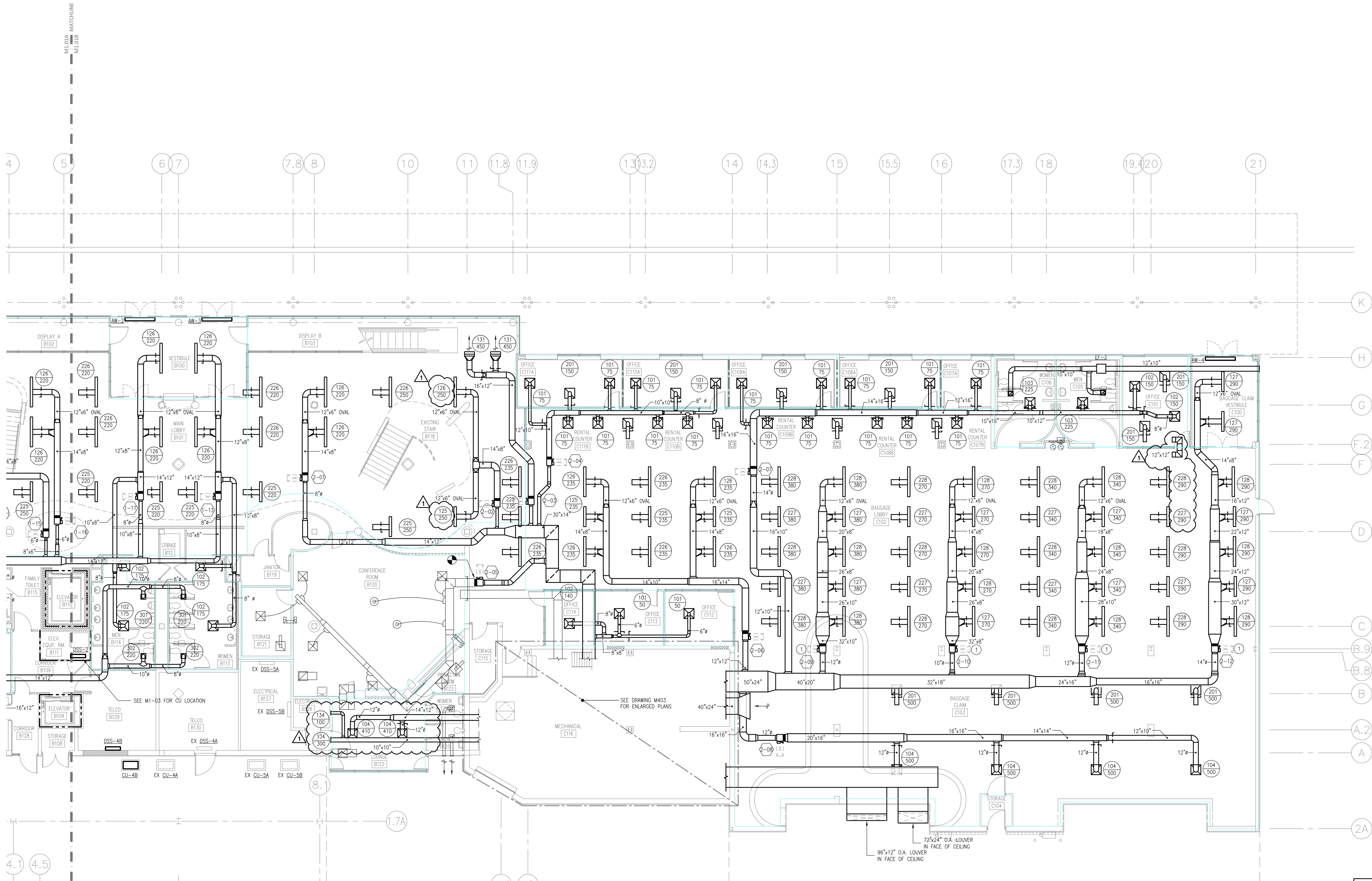
400 Airport Road
Fayetteville, North Carolina 28306

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REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
1. ADDENDUM 3 08/14/19

SHEET NUMBER

M1.01B



DRAWING NOTES:

1. CONNECT NEW CEILING DIFFUSER TO EXISTING DUCTWORK. COORDINATE LOCATION WITH NEW CEILING GRID TO HAVE THE NEW DIFFUSER INSTALLED IN APPROXIMATELY THE SAME LOCATION AS THE DEMOLISHED DIFFUSER. EXTEND DUCTWORK AS NEEDED. FLEXIBLE DUCTWORK SHOULD NOT EXCEED 5'-0". BALANCE NEW DIFFUSERS.
2. PROVIDE INDECO TYPE QUA SLIP-IN DUCT HEATER. HEATER SHALL BE RATED FOR 3.5KW AND BE 208V/1Ø/60Hz. SEE SPECIFICATIONS FOR EQUIVALENT MANUFACTURES. CUT AND PATCH DUCTWORK AS NECESSARY FOR INSTALLATION. REPLACE DUCT INSULATION WITH LIKE KIND TO EXISTING INSULATION.
3. PROVIDE A NEW OUTSIDE AIR LOUVER WITH A FACE AREA NO SMALLER THAN 1 SQUARE FOOT.

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Fayetteville Regional Airport – Airline Terminal Improvements Part 2

FIRST FLOOR PLAN – AREA C – HVAC DUCTWORK

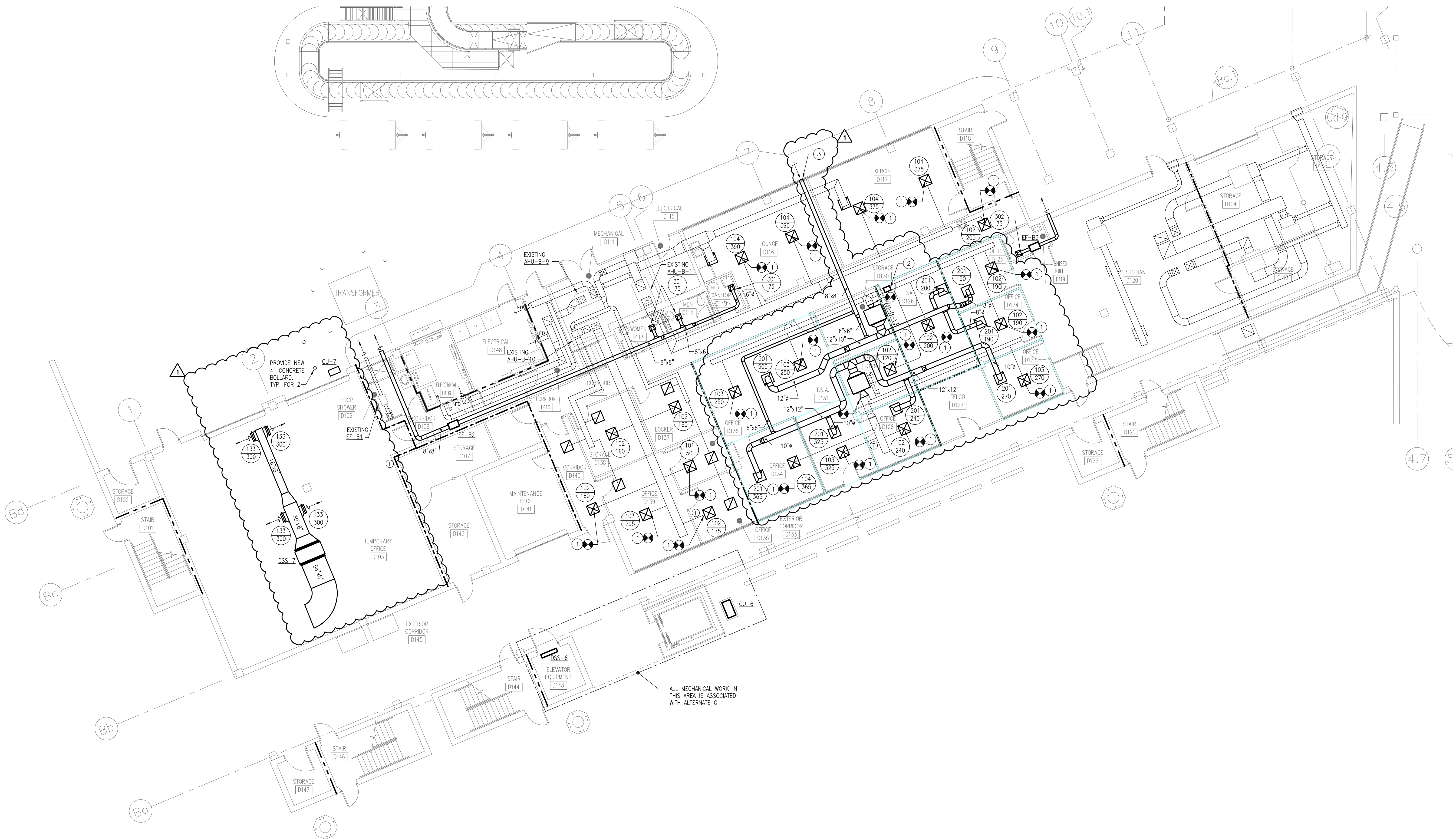
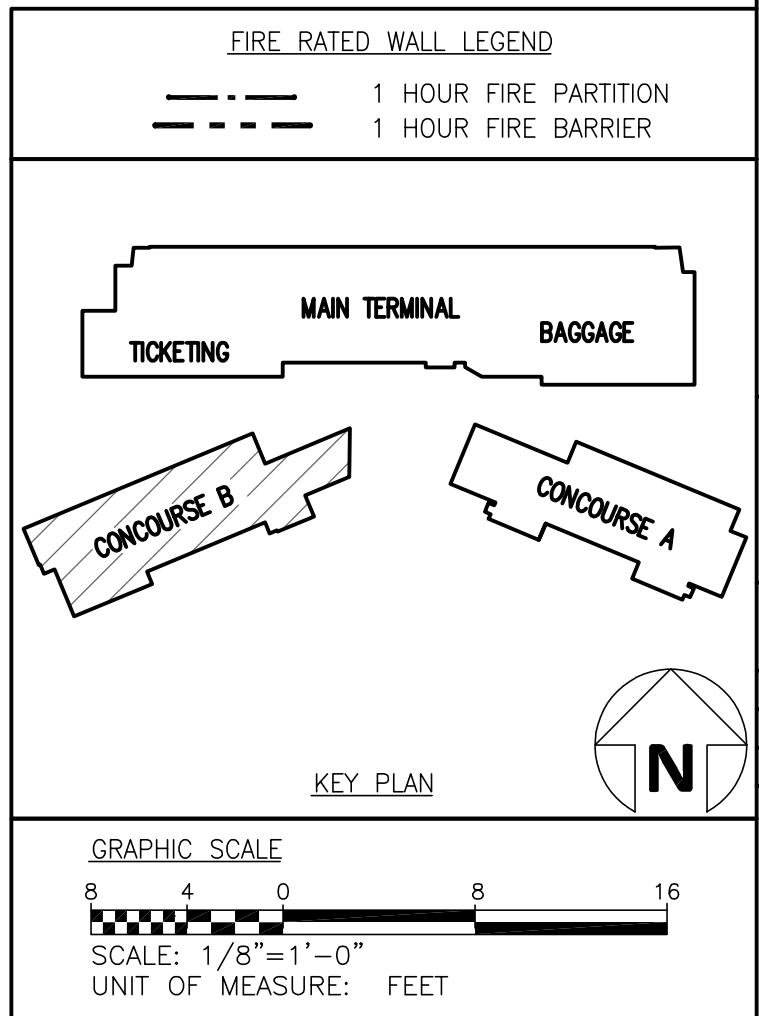
400 Airport Road
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REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
ADDENDUM 3 08/14/19

SHEET NUMBER

M1.01C



DRAWING NOTE:
1 PROVIDE WIRE MESH SCREEN AND BALANCE TO 1,850 CFM.

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Fayetteville Regional Airport – Airline Terminal Improvements Part 2
SECOND FLOOR PLAN – AREA A – HVAC
DUCTWORK

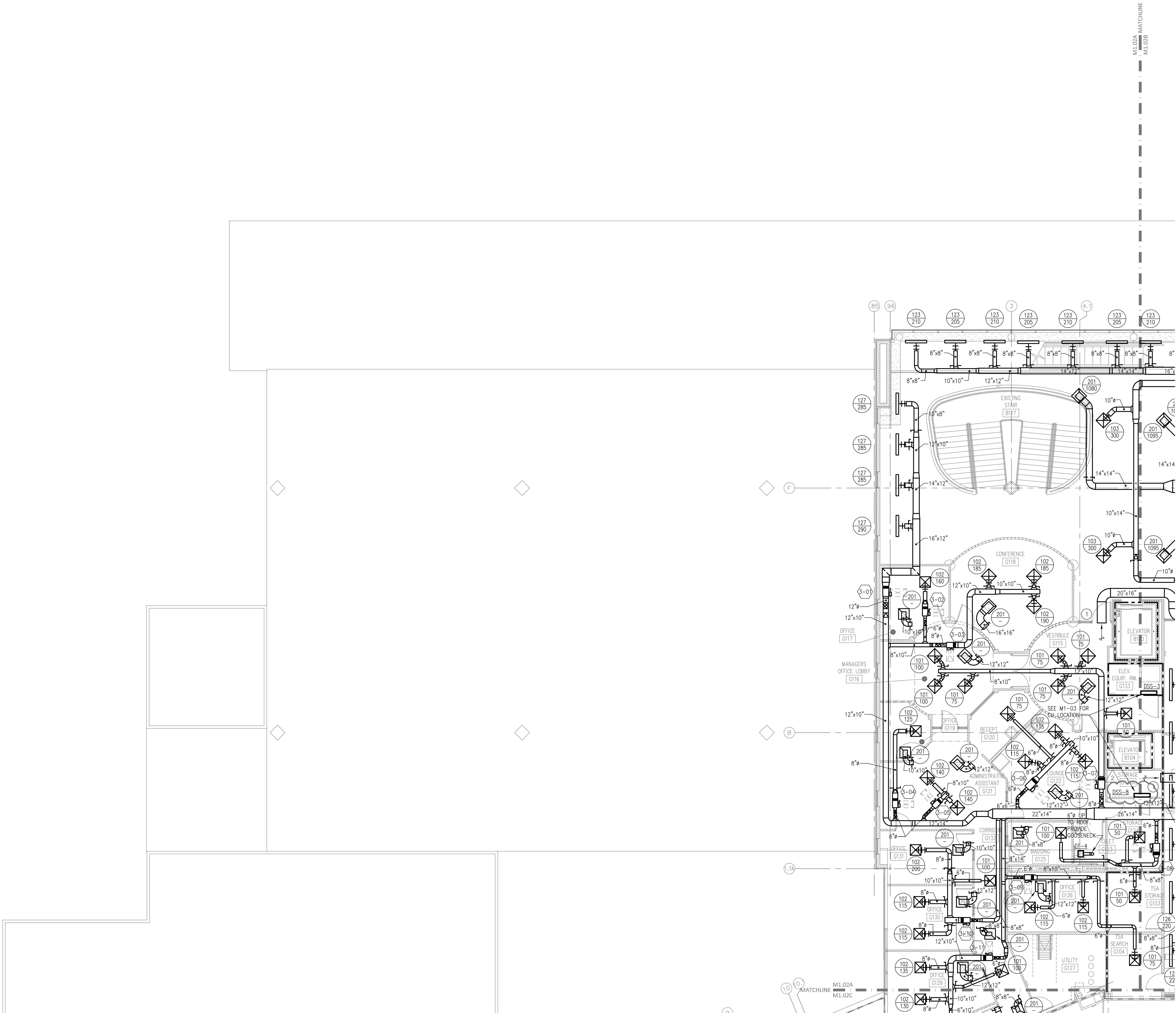
400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: MRT
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
ADDENDUM 3 08/14/19
CEM2 09/01/20

SHEET NUMBER

M1.02A



FIRE RATED WALL LEGEND

1 HOUR FIRE PARTITION

1 HOUR FIRE BARRIER

KEY PLAN

TERMINAL BUILDING

CONCOURSE B

CONCOURSE A

GRAPHIC SCALE

8 4 0 8 16

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

UNIT OF MEASURE: FEET

- DRAWING NOTE:
- 1 PROVIDE WIRE MESH SCREEN AND BALANCE TO 1,850 CFM.
 - 2 TERMINATE DUCTWORK WITH A 45 DEGREE ELBOW DOWN OUTSIDE EXTERIOR WALL. PROVIDE BIRD SCREEN AT OPENING.

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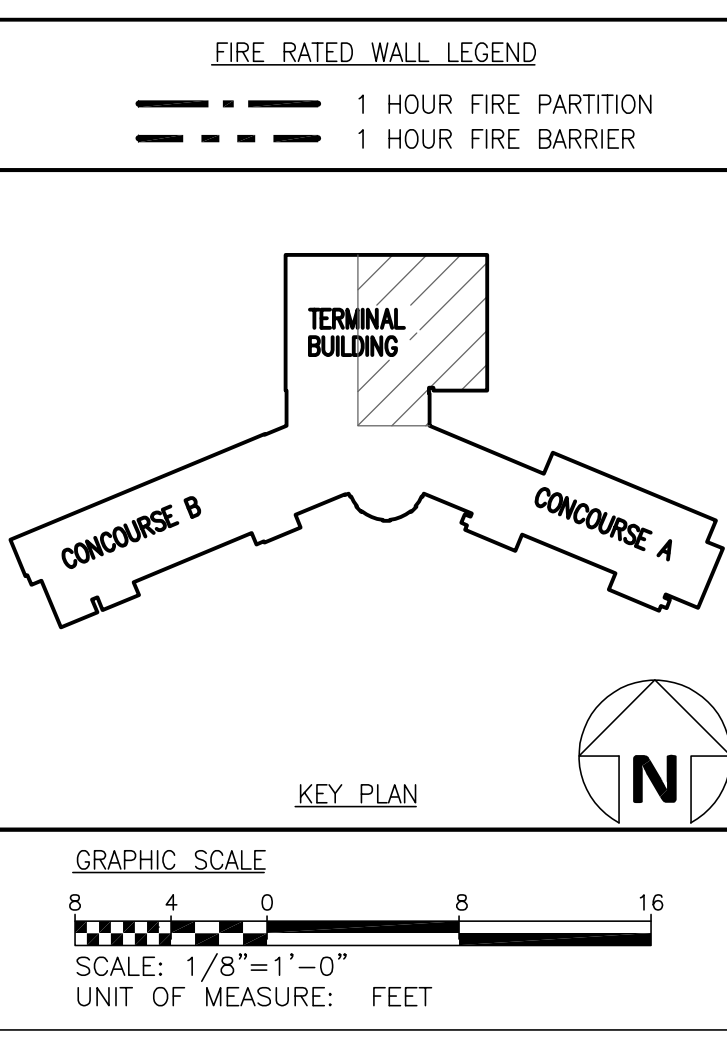
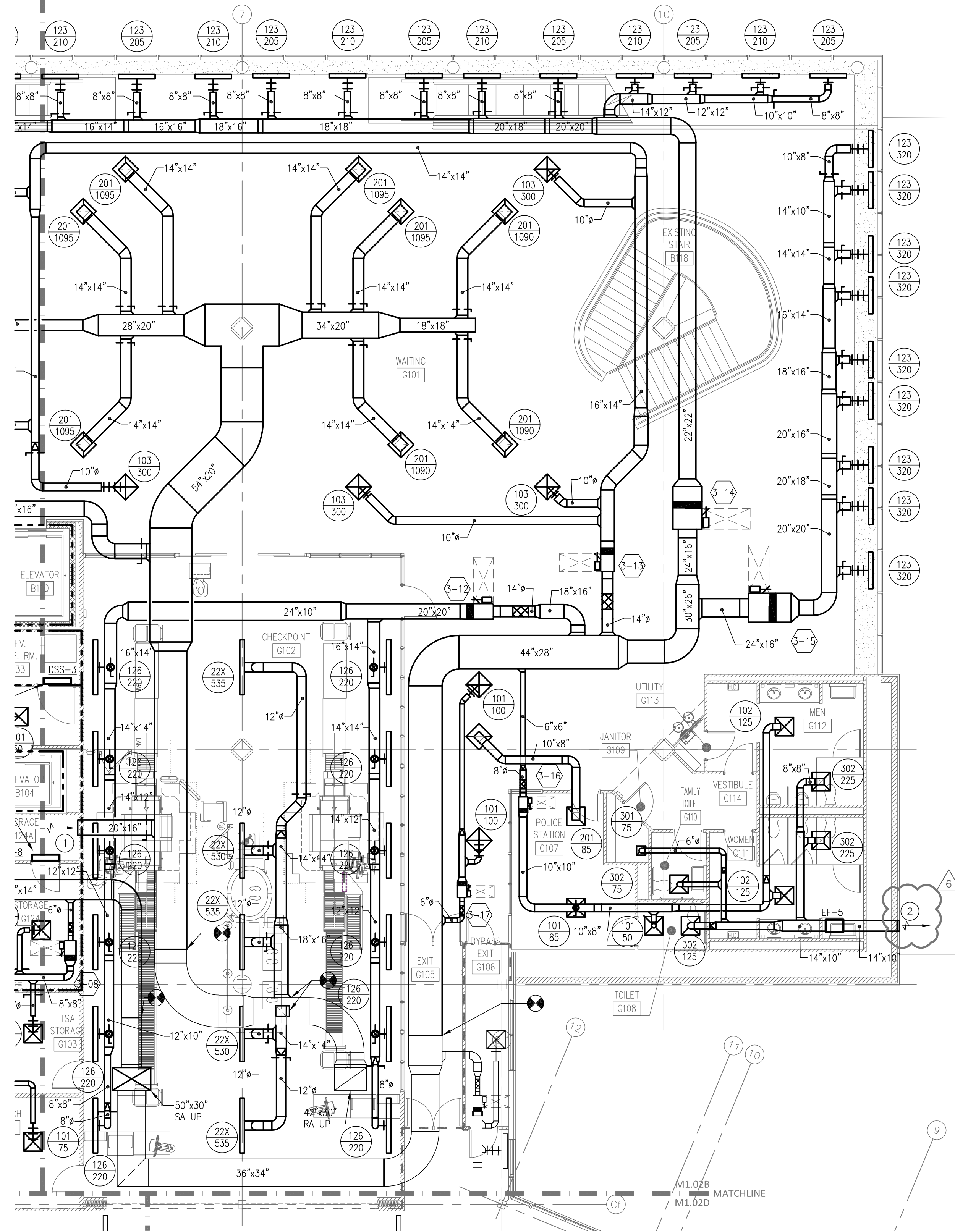
Fayetteville Regional Airport – Airline Terminal Improvements Part 2
SECOND FLOOR PLAN – AREA B – HVAC
DUCTWORK
400 Airport Road
Fayetteville, North Carolina 28306

DRAWN BY: MRL
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS
ADDENDUM 5 12/19/19
C8M5 02/01/21

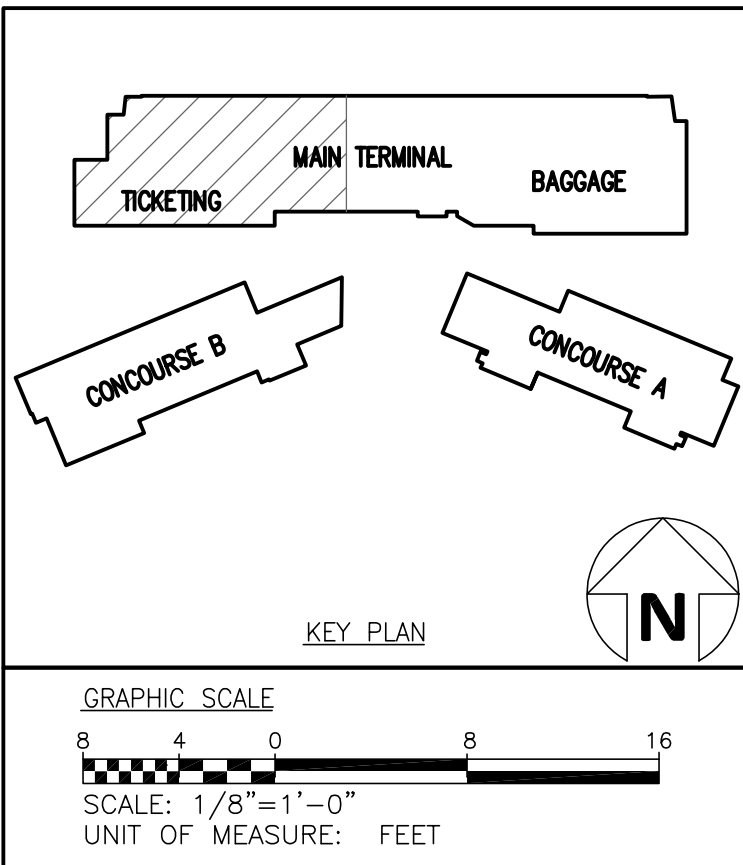
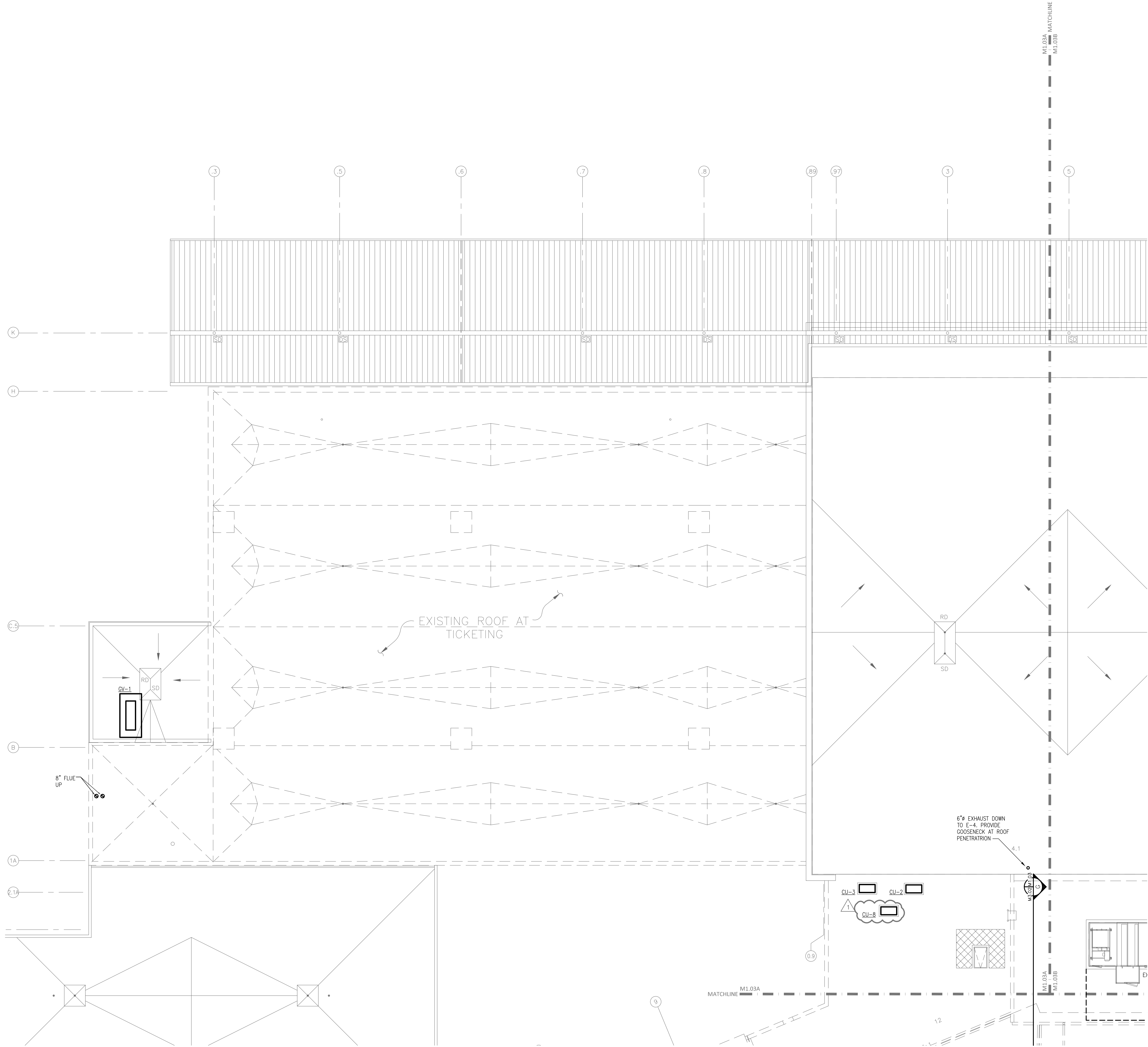
SHEET NUMBER

M1.02B



- DRAWING NOTE:
1. CONNECT NEW SUPPLY DIFFUSER TO EXISTING SUPPLY DUCT.
 2. TERMINATE DUCTWORK WITH A 45 DEGREE ELBOW DOWN OUTSIDE EXTERIOR WALL. PROVIDE BIRD SCREEN AT OPENING.





DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

REVISIONS	
1	CRM2 09/01/20

SHEET NUMBER
M1.03A

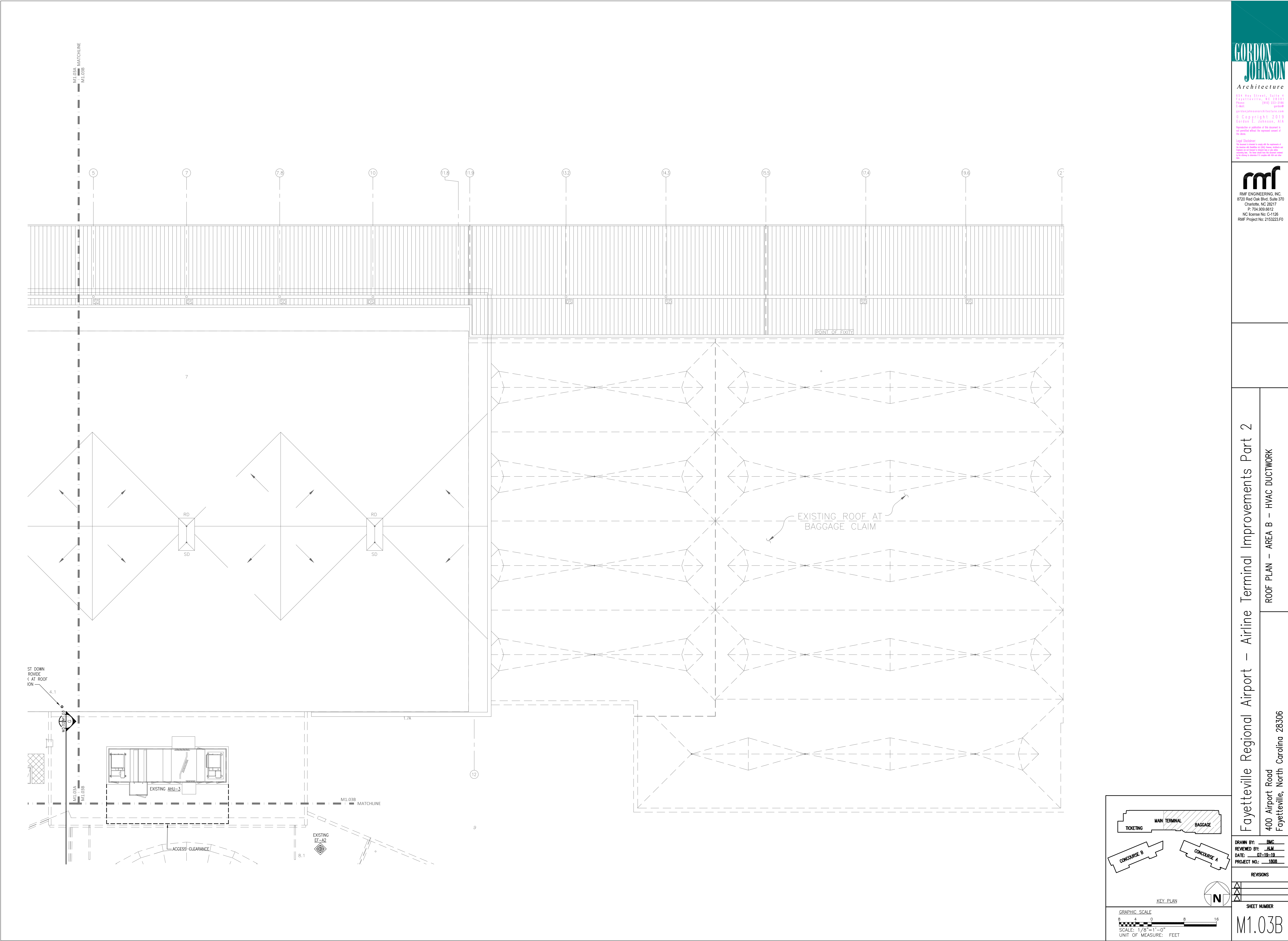
Fayetteville Regional Airport – Airline Terminal Improvements Part 2

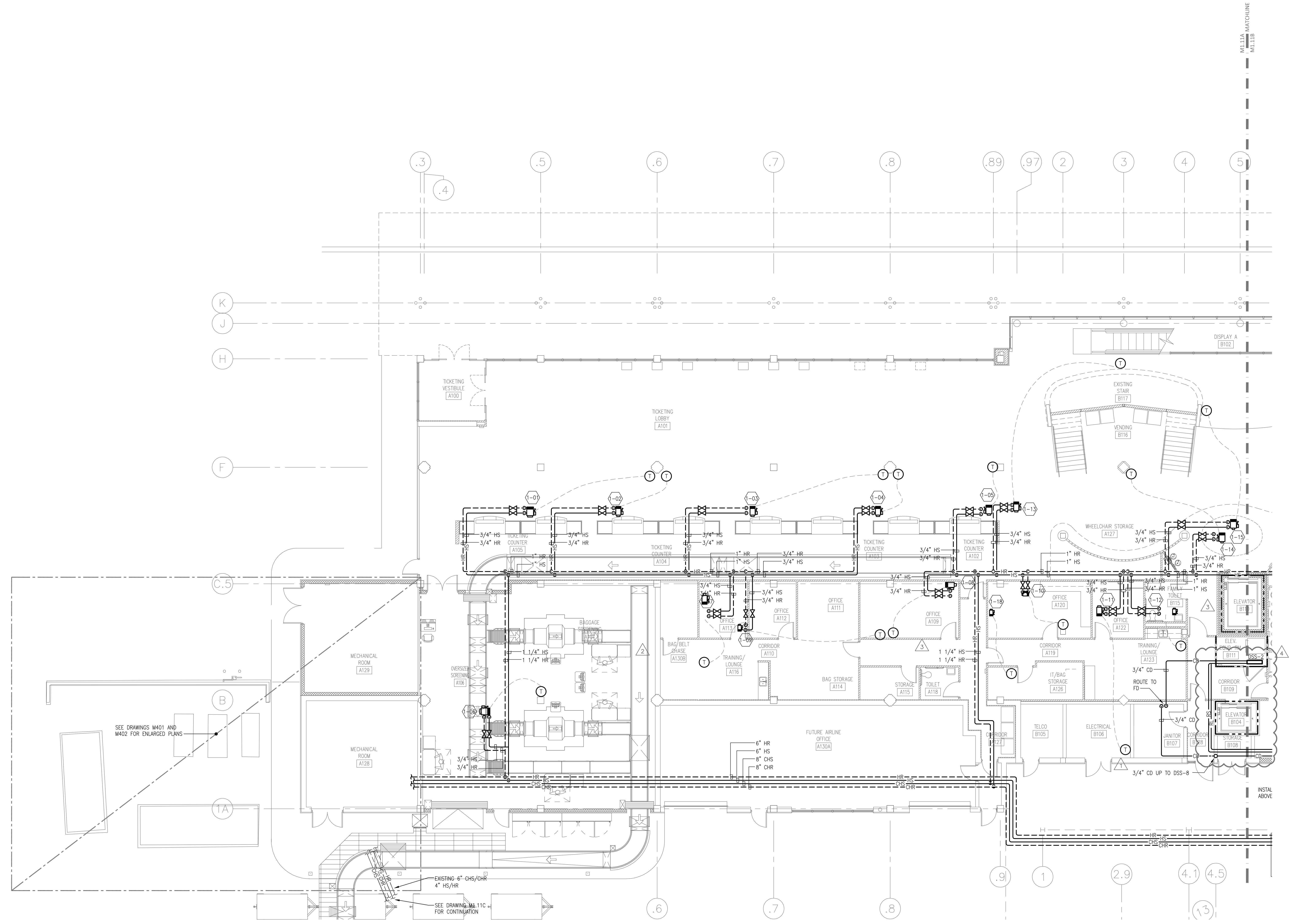
ROOF PLAN – AREA A – HVAC DUCTWORK

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FIRE RATED WALL LEGEND

1 HOUR FIRE PARTITION
1 HOUR FIRE BARRIER

MAIN TERMINAL

TICKETING BAGGAGE

CONCOURSE B

CONCOURSE A

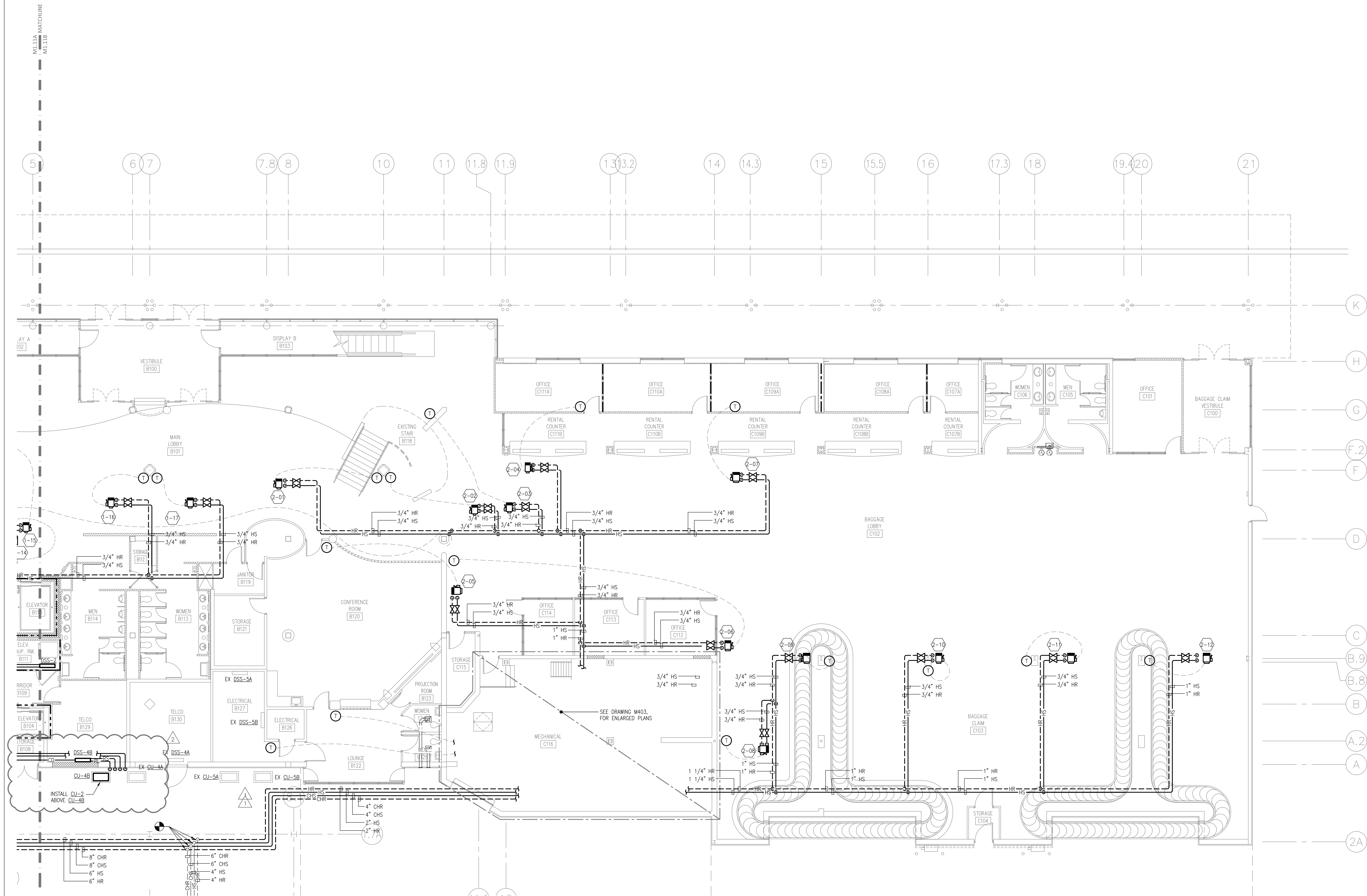
KEY PLAN

GRAPHIC SCALE

8 4 0 8 16

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

UNIT OF MEASURE: FEET



FIRE RATED WALL LEGEND

1 HOUR FIRE PARTITION
1 HOUR FIRE BARRIER

KEY PLAN

MAIN TERMINAL
TICKETING
BAGGAGE
CONCOURSE B
CONCOURSE A

GRAPHIC SCALE

8 4 0 8 16
SCALE: 1/8"=1'-0"
UNIT OF MEASURE: FEET

REVISIONS

CRM5	02/01/21
CRM6	02/24/21

SHEET NUMBER

M1.11B

DRAWING NOTES:

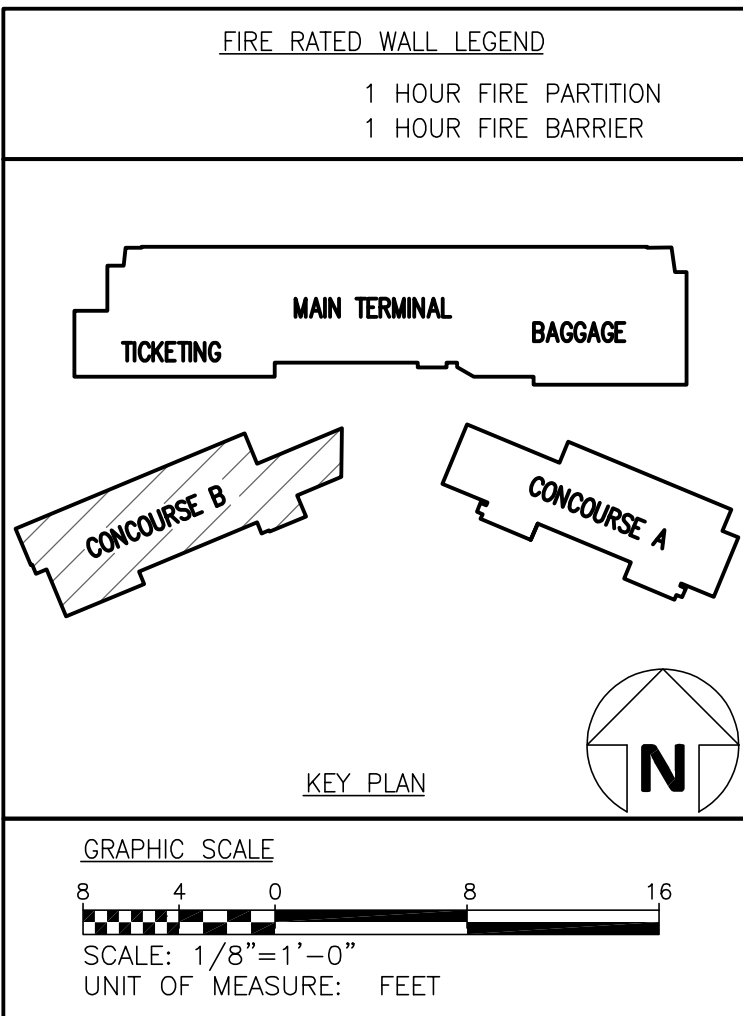
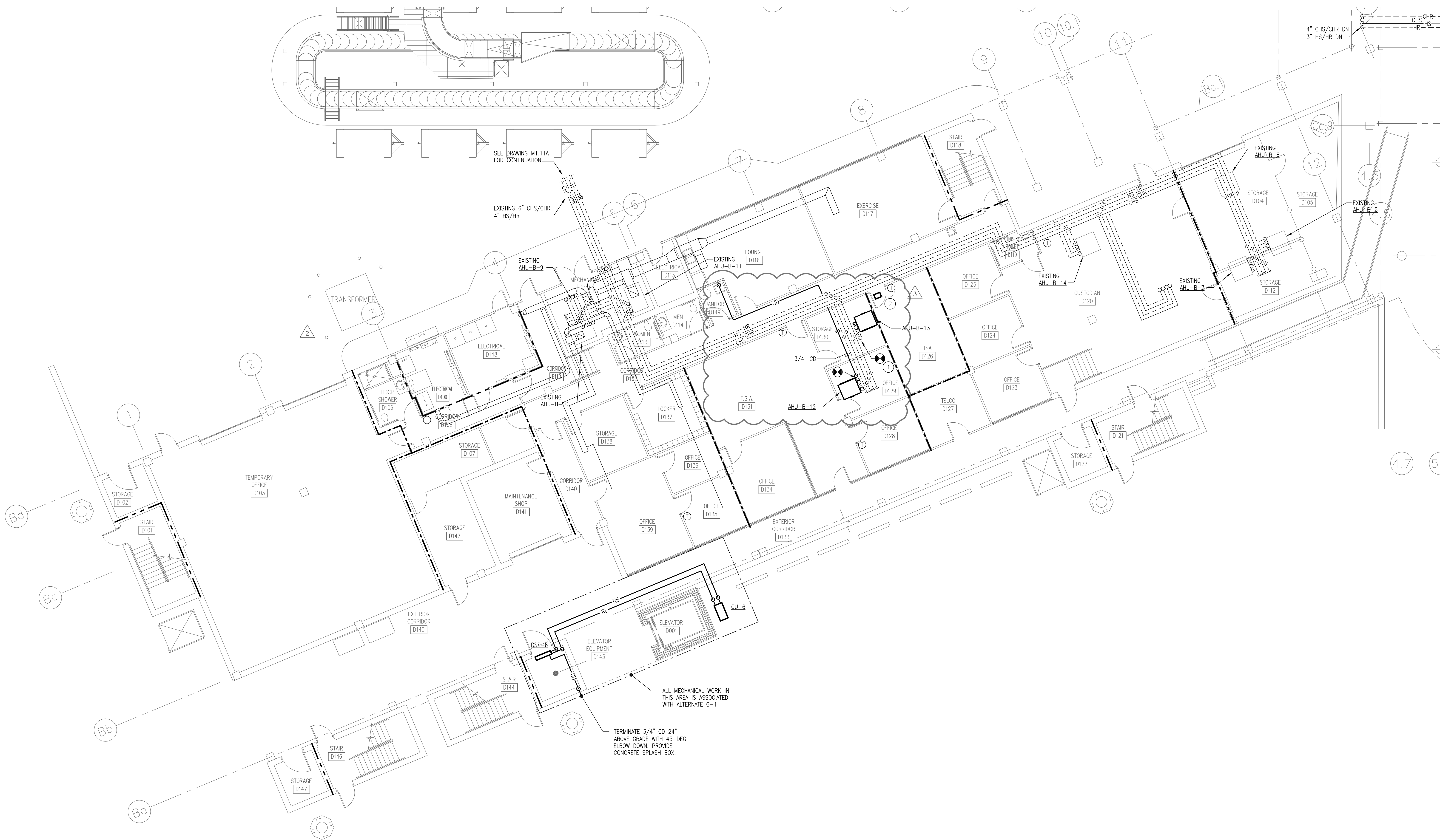
1. MODIFY EXISTING HYDRONIC PIPING AS NECESSARY TO CONNECT TO NEW ABOVE-CEILING AIR HANDLER. INSULATE ALL NEW PIPING WITH INSULATION THAT IS LIKE IN KIND TO THE EXISTING.
2. PROVIDE INDECO TYPE QUA SLIP-IN DUCT HEATER. HEATER SHALL BE RATED FOR 3.5KW AND BE 208V/19/60Hz. SEE SPECIFICATIONS FOR EQUIVALENT MANUFACTURES.

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Fayetteville Regional Airport – Airline Terminal Improvements Part 2
FIRST FLOOR PLAN – AREA C – HVAC PIPING

Fayetteville Regional Airport
400 Airport Road
Fayetteville, North Carolina 28306

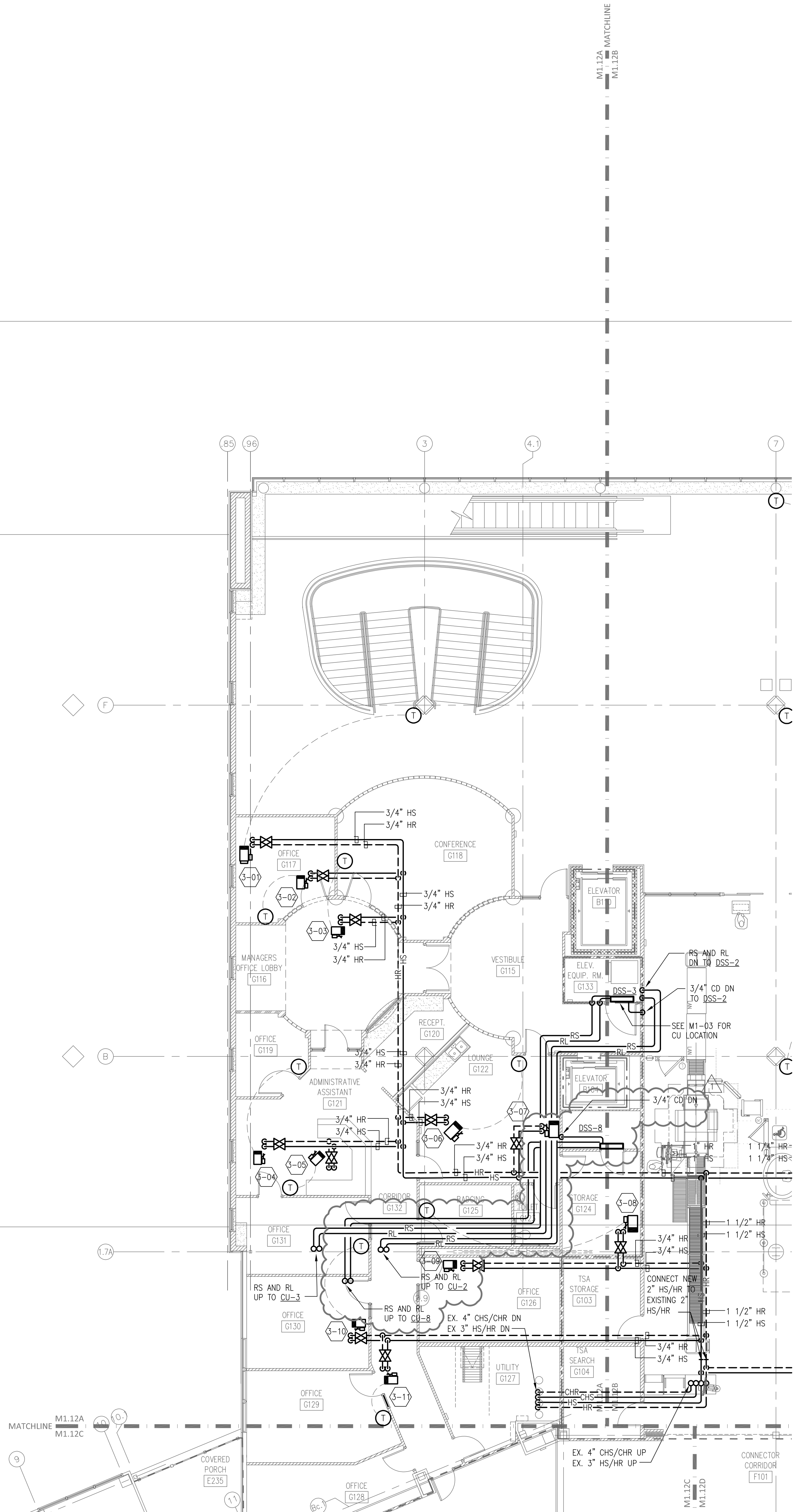
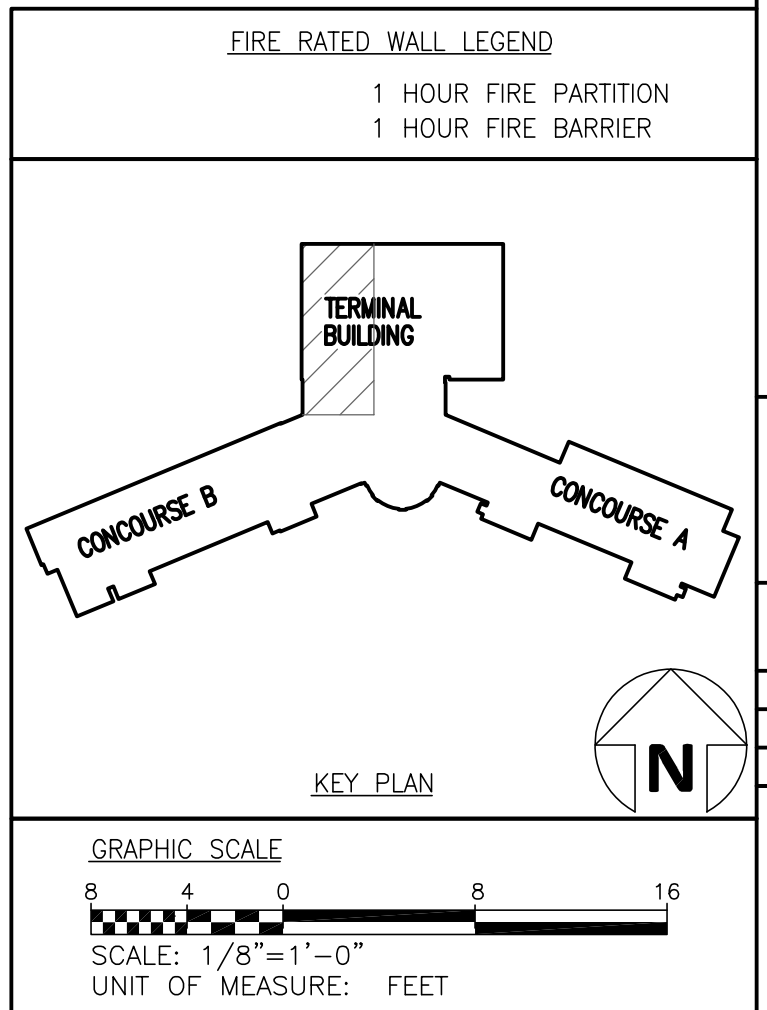
DRAWN BY: BMC
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PROJECT NO.: 1808

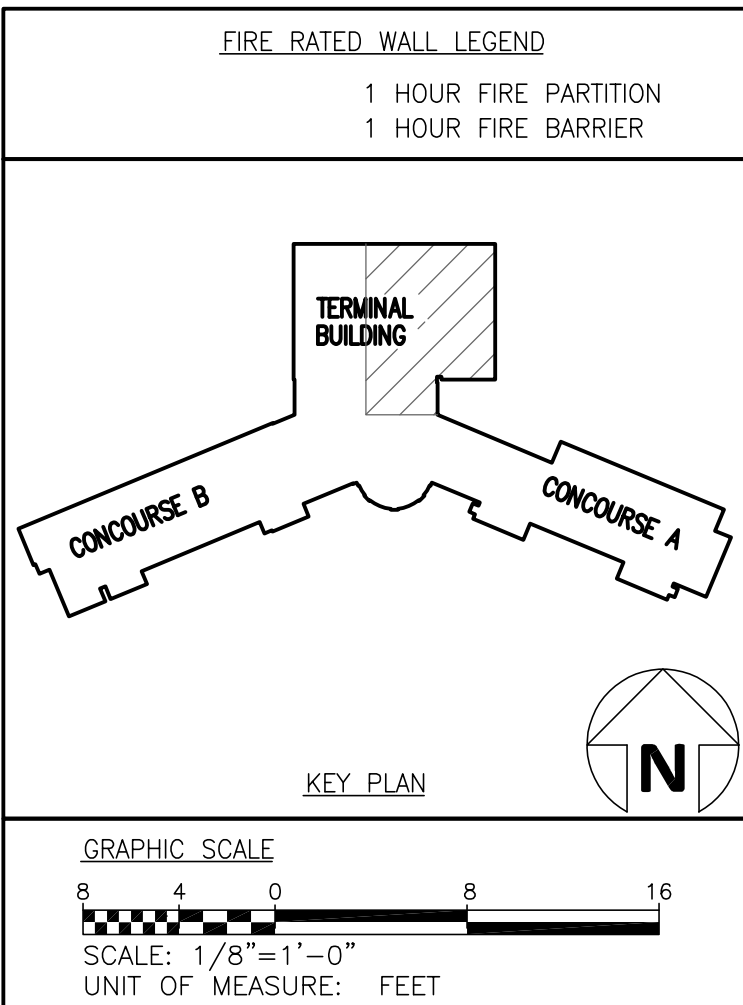
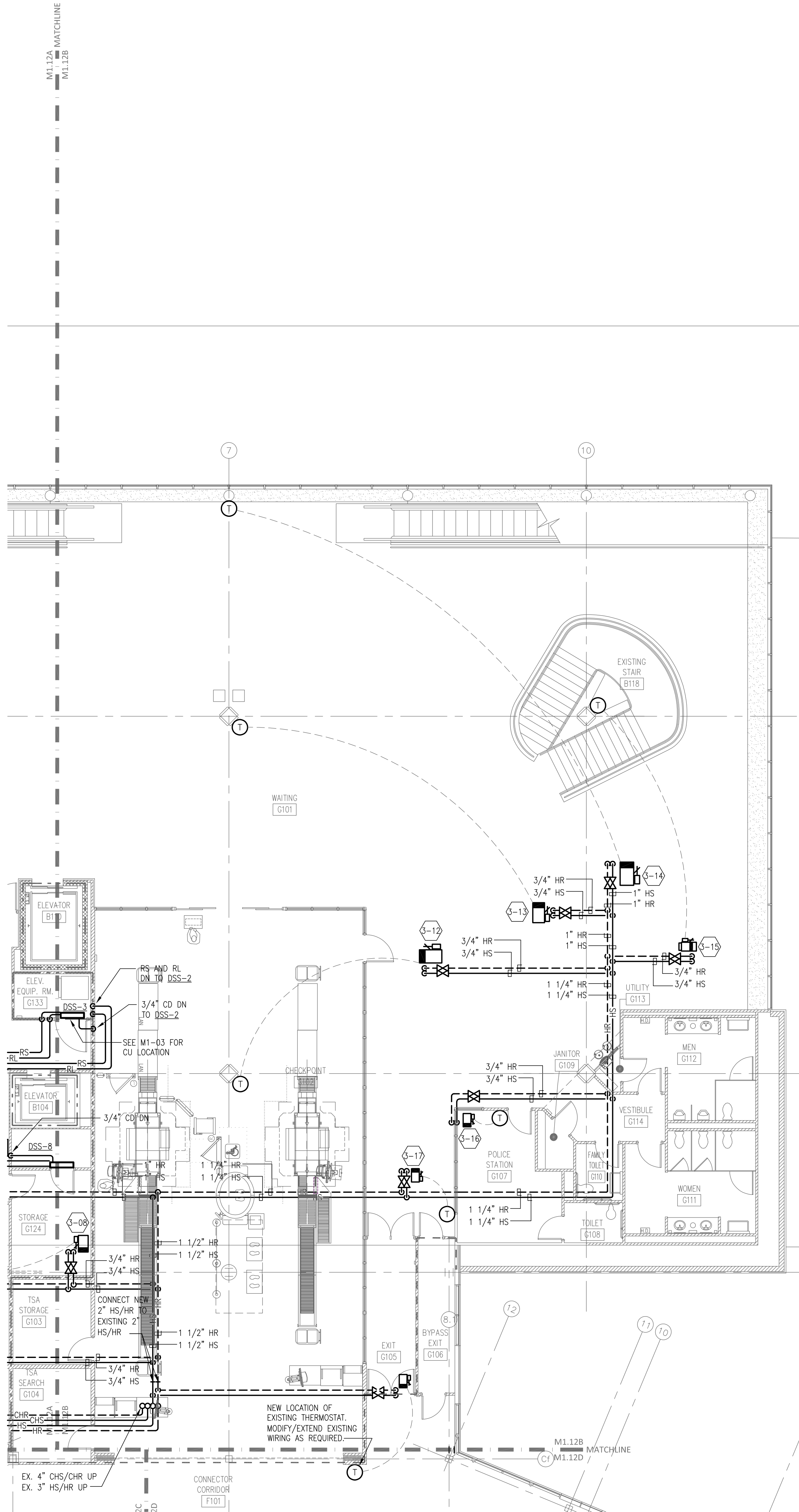
REVISIONS

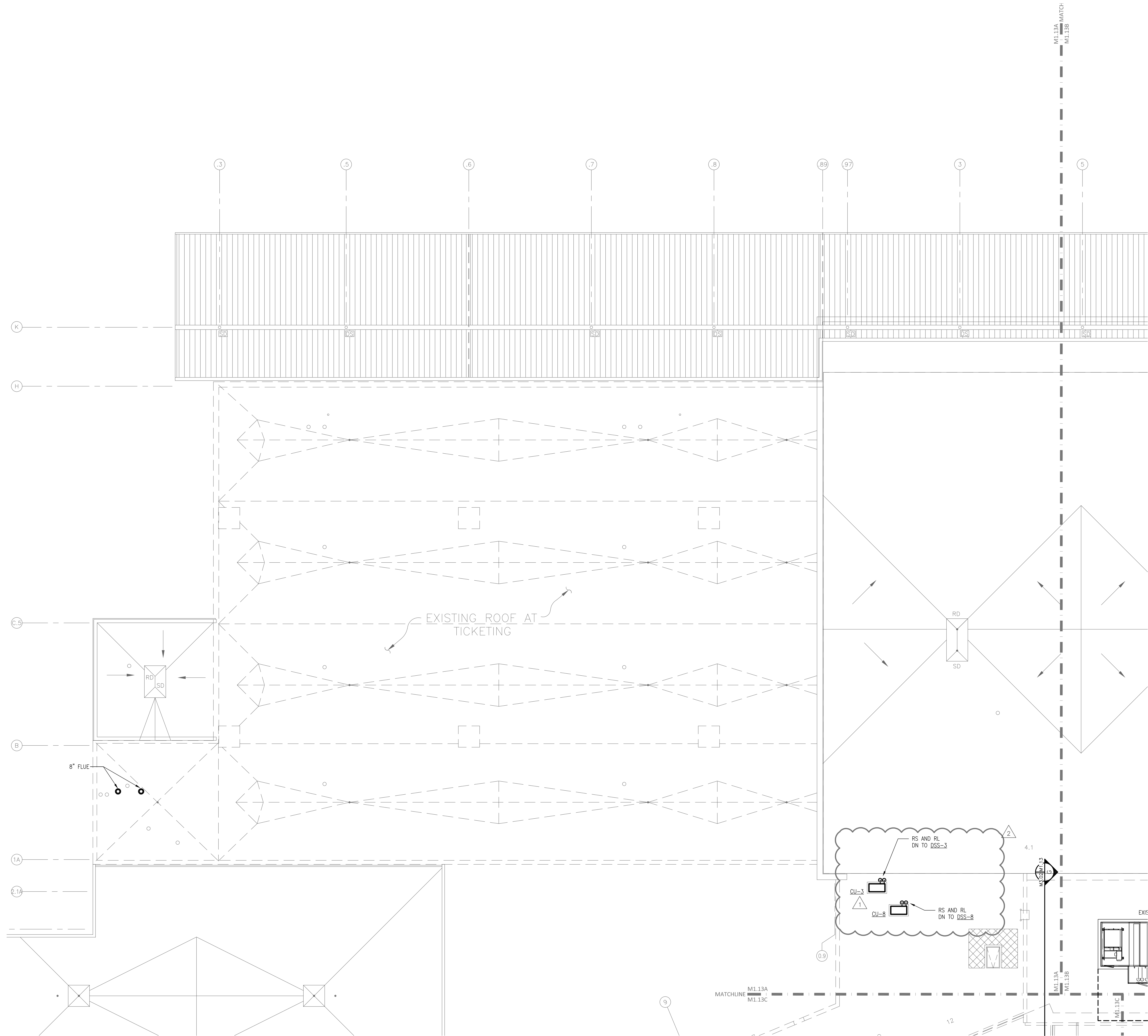
1	ADDENDUM 3	08/14/19
2	CEM4	10/07/20
3	CEM6	02/24/21

SHEET NUMBER

M1.11C







TICKETING

MAIN TERMINAL

BAGGAGE

CONCOURSE B

CONCOURSE A

KEY PLAN

GRAPHIC SCALE

8 4 0 8 16

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

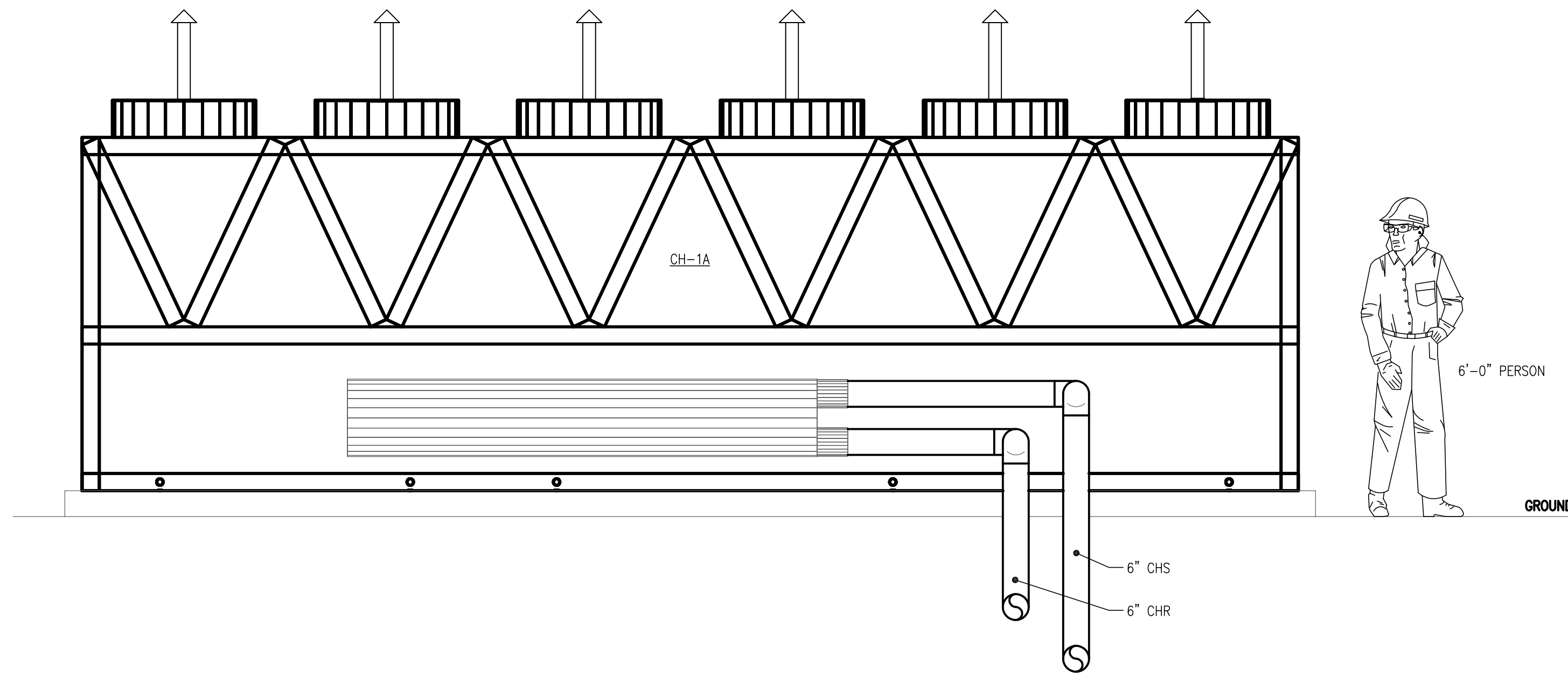
UNIT OF MEASURE: FEET

REVISIONS

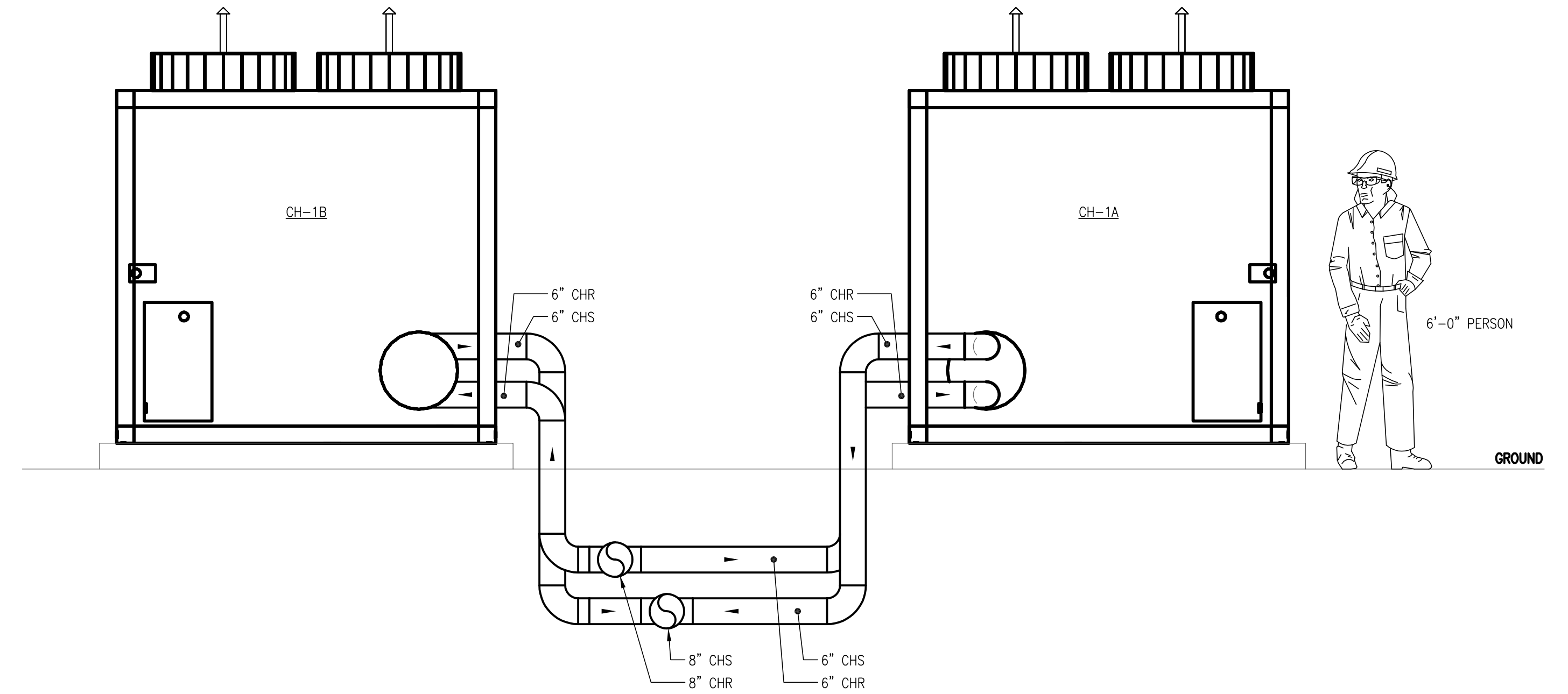
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2	CEM6	02/24/21

SHEET NUMBER

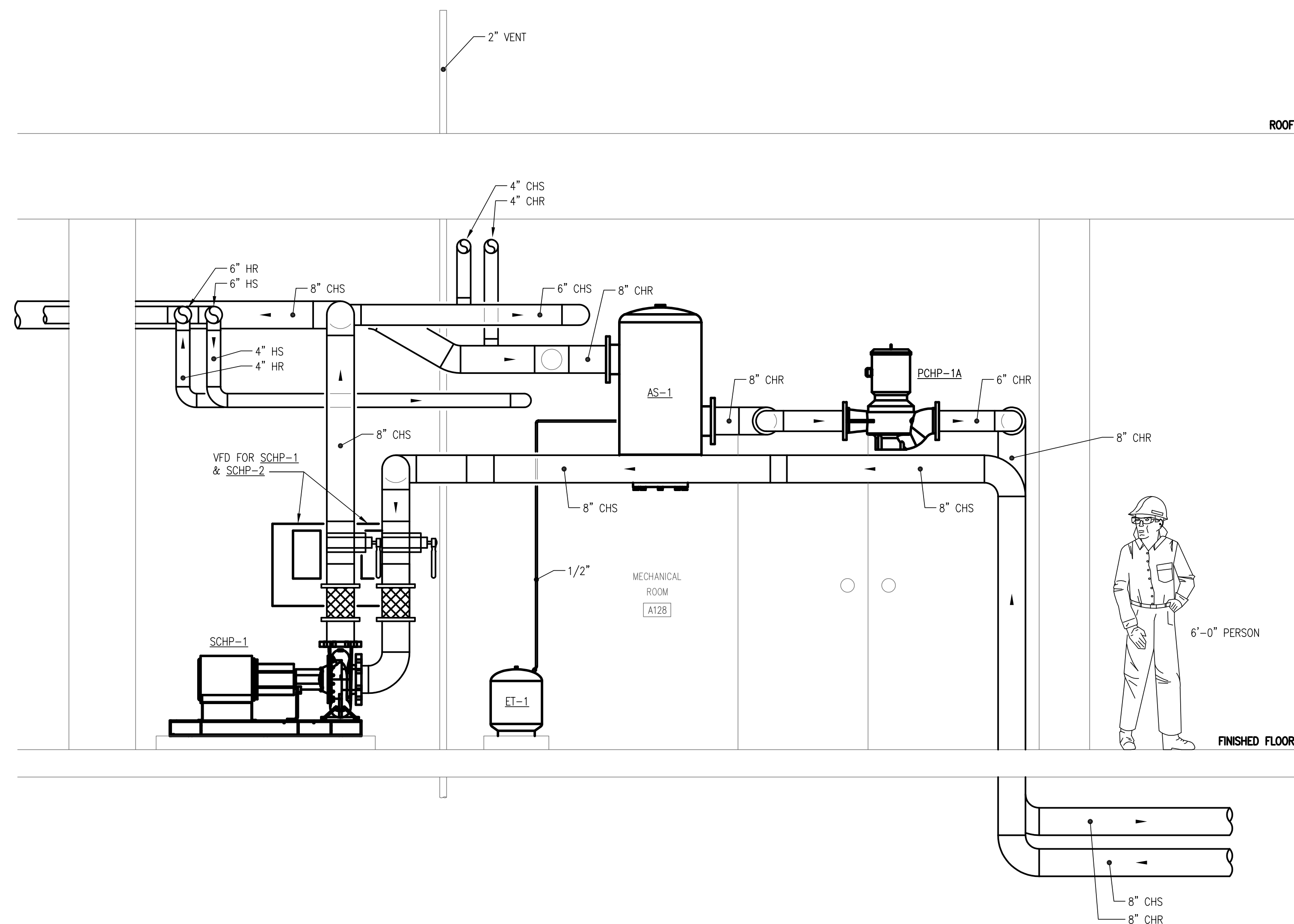
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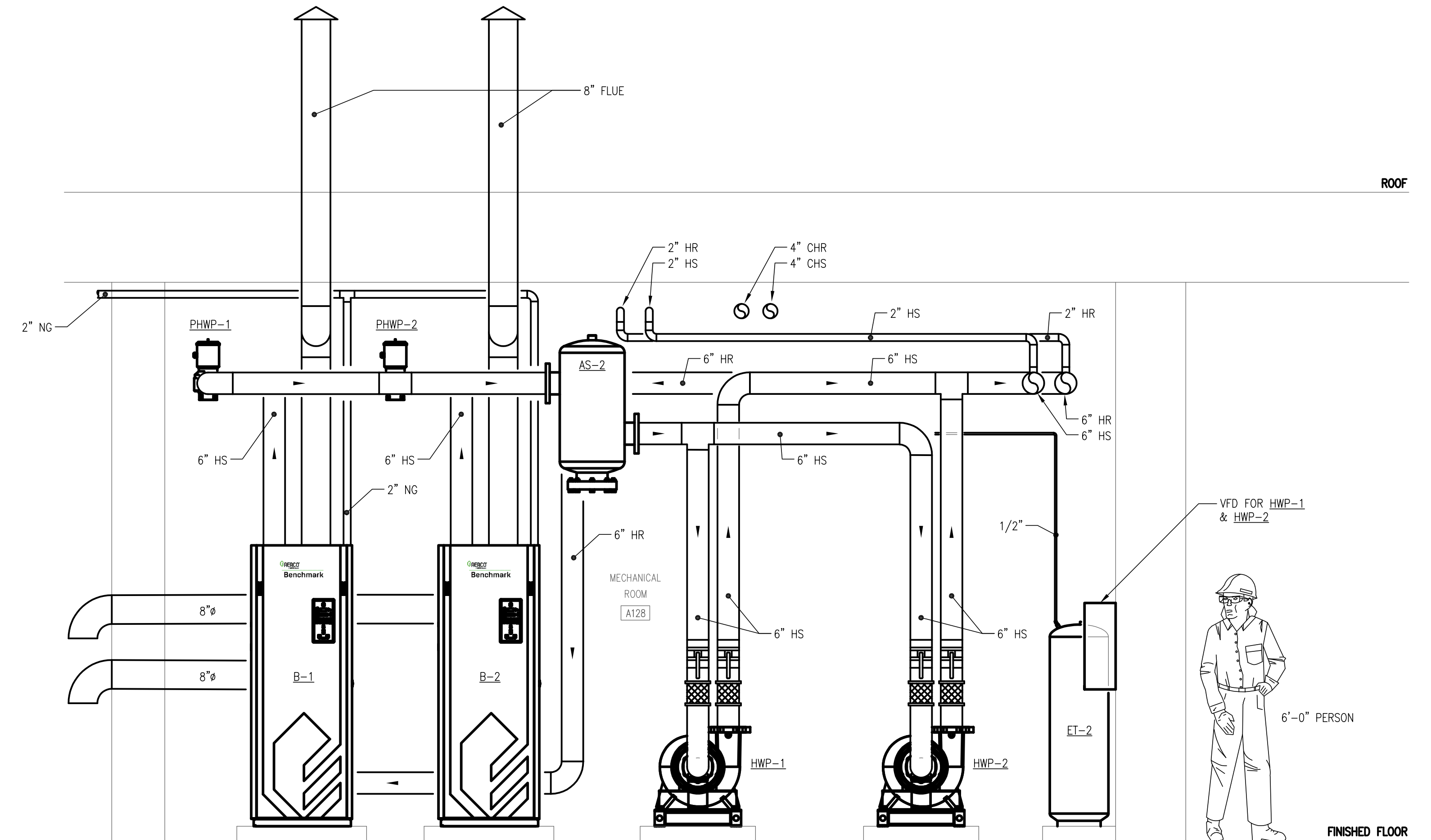
A SECTION VIEW A — CHILLER CH-1A
M4.01 M3.01



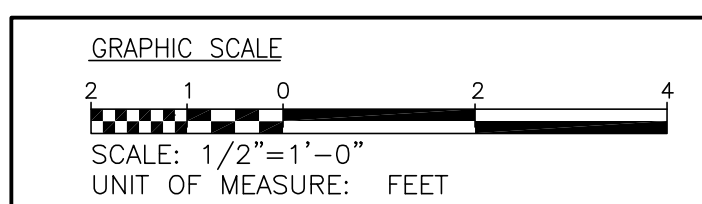
B SECTION VIEW B — CHILLERS CH-1A & CH-1B
M4.01 M3.01

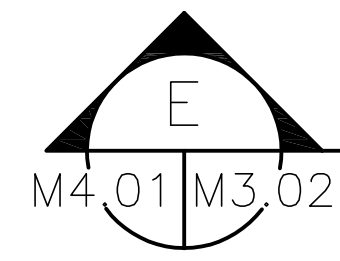
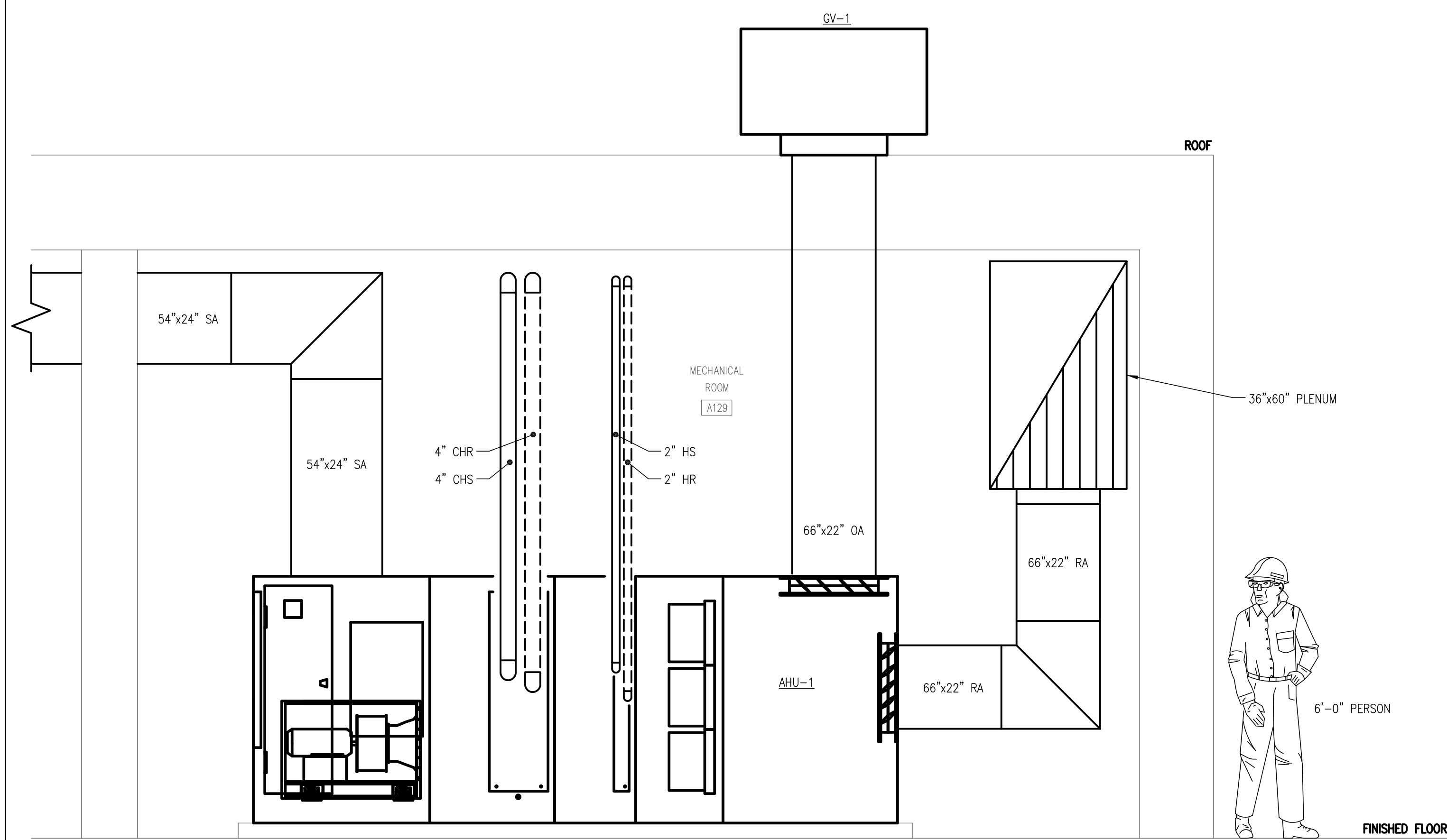


C SECTION VIEW C — MECHANICAL ROOM A128
M4.01 M3.01

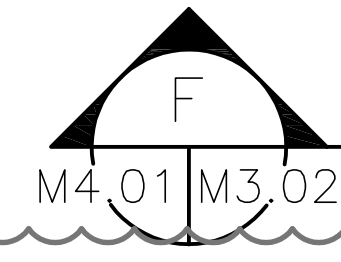
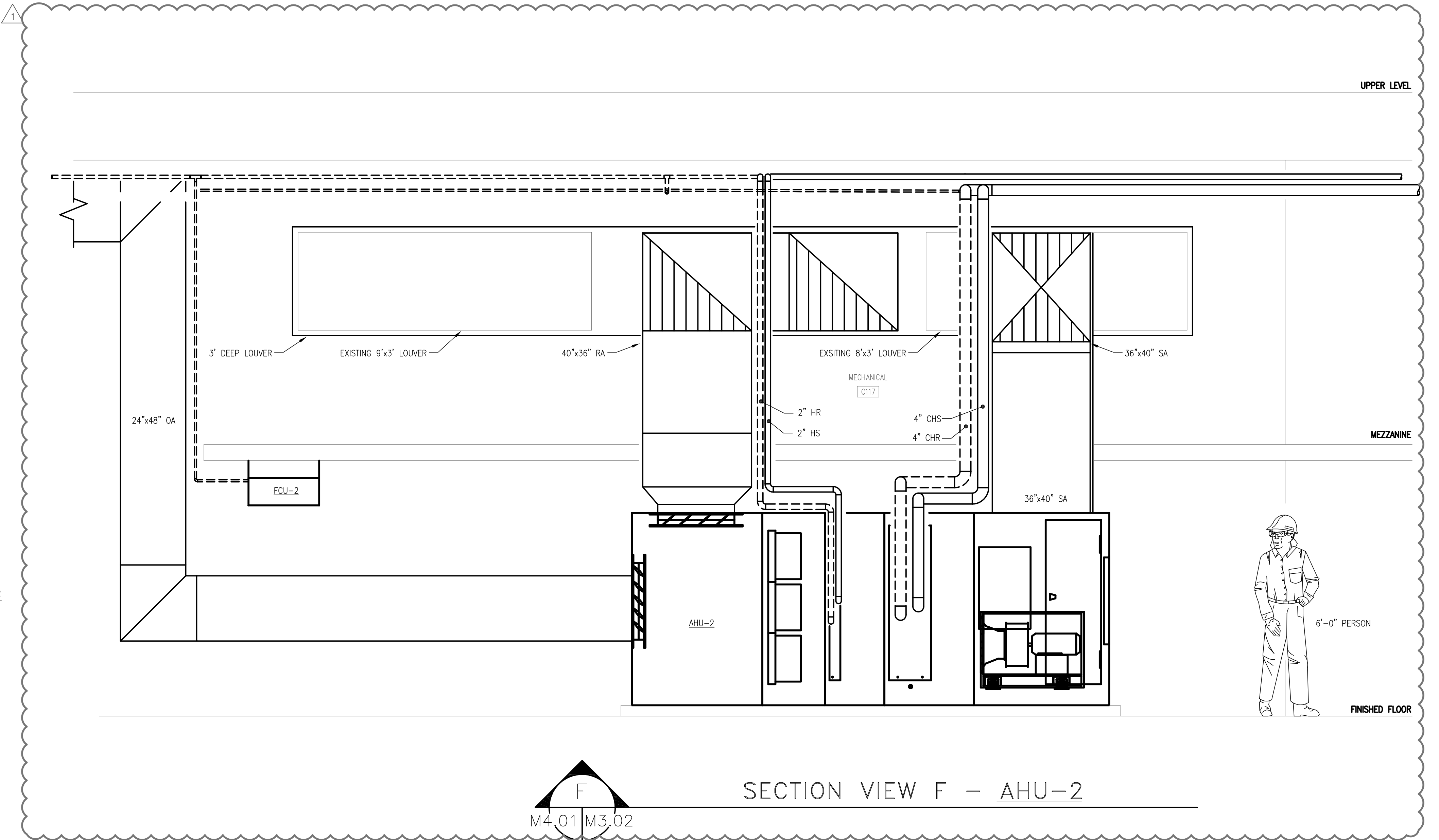


D SECTION VIEW D — MECHANICAL ROOM A128
M4.01 M3.01

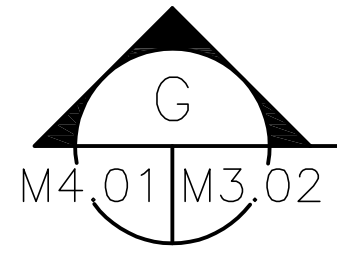
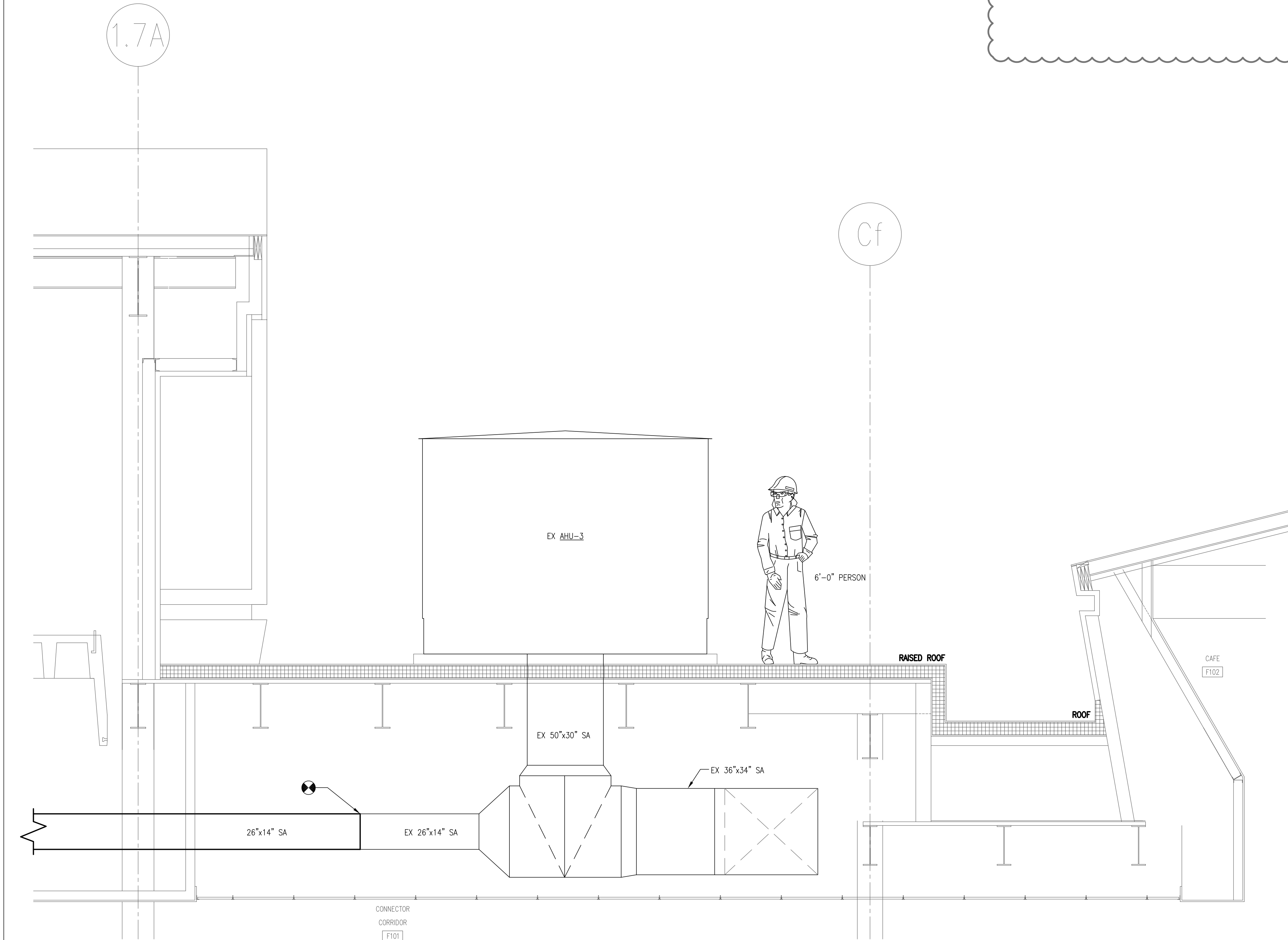




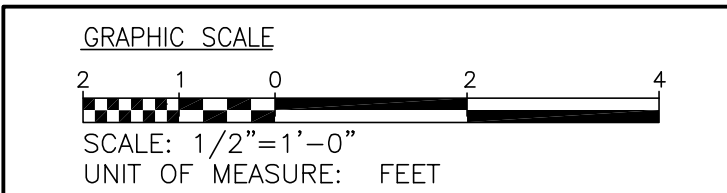
SECTION VIEW E - AHU-1

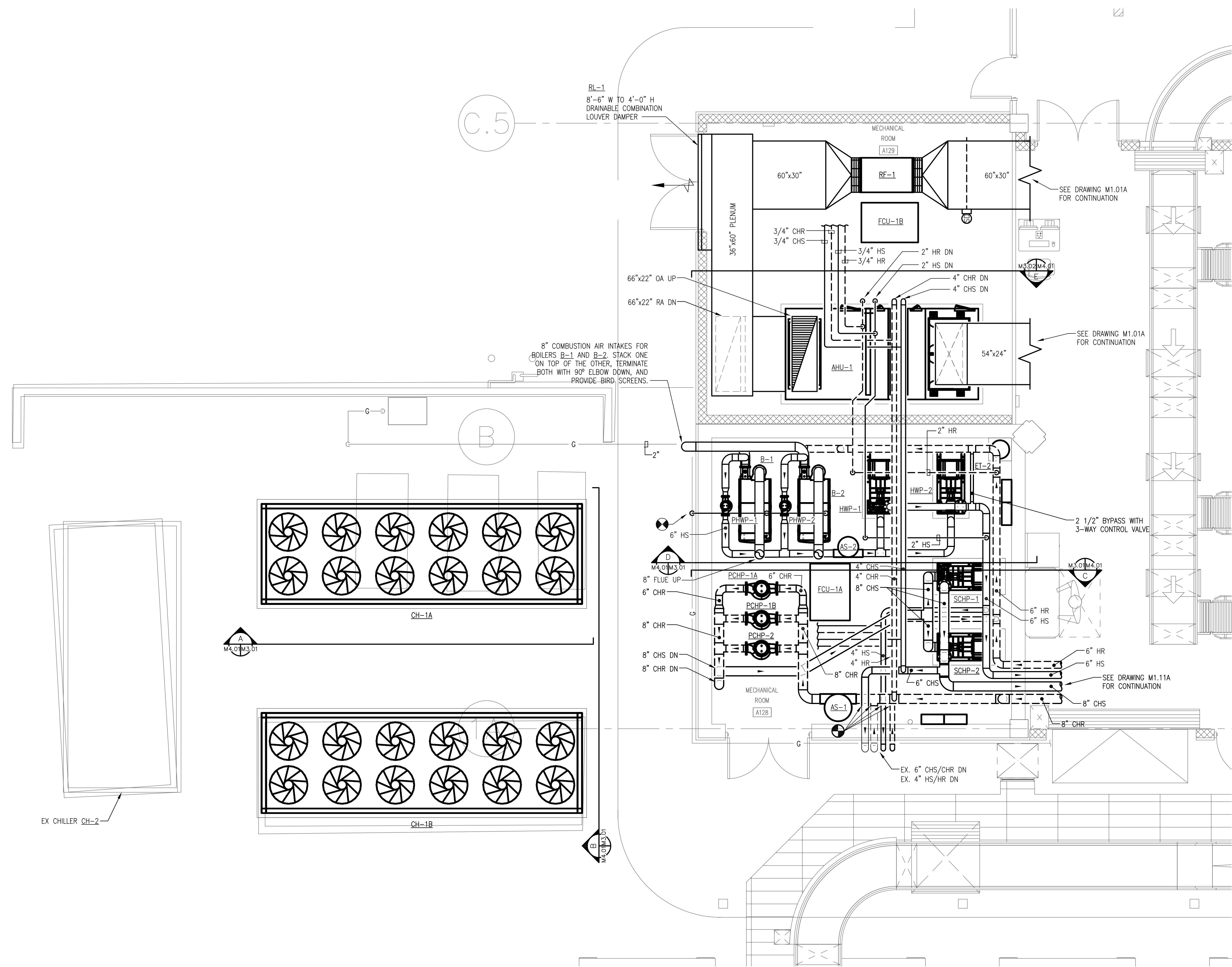


SECTION VIEW F - AHU-2



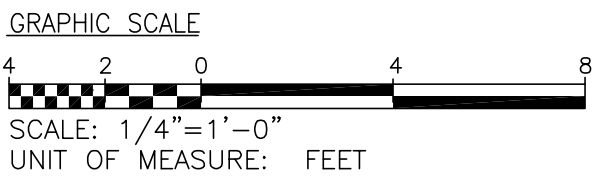
SECTION VIEW G - AHU-3

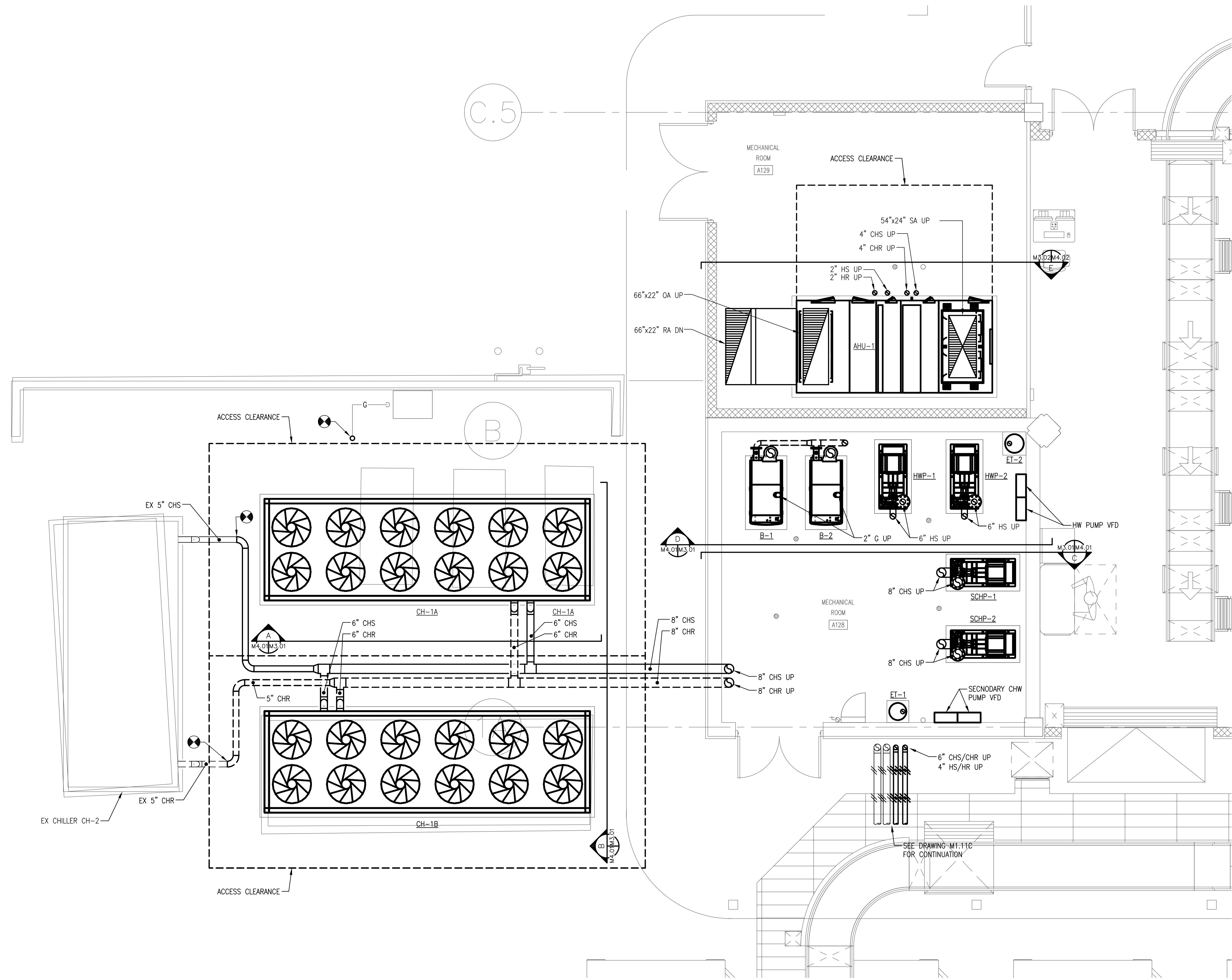




ENLARGED PLAN - UPPER LEVEL - MECHANICAL

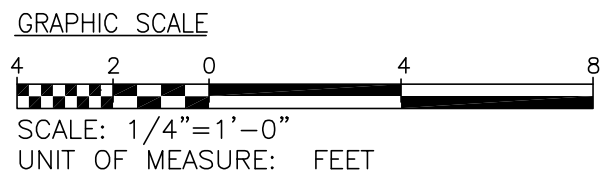
SCALE: 1/4"=1'-0" 1





ENLARGED PLAN - LOWER LEVEL - MECHANICAL

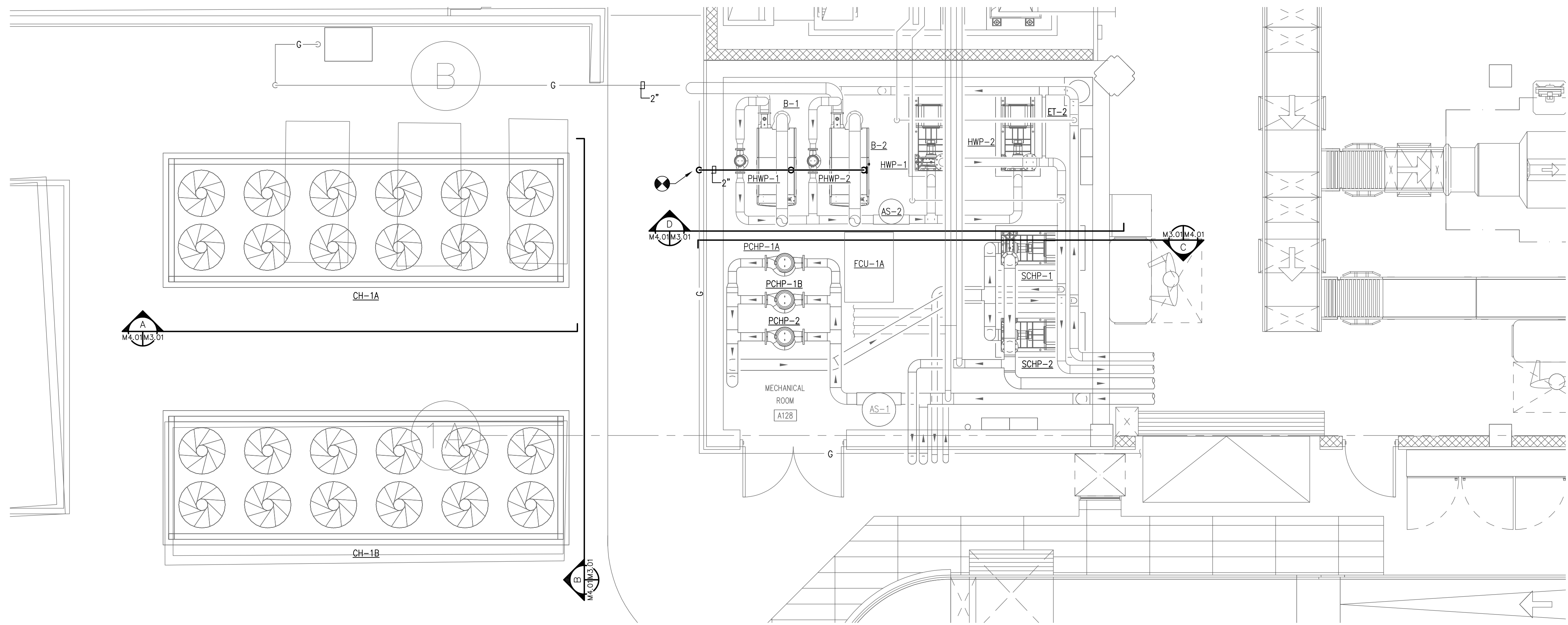
SCALE: 1/4"=1'-0"



DRAWN BY: BMC
REVIEWED BY: ALM
DATE: 07-18-19
PROJECT NO.: 1808

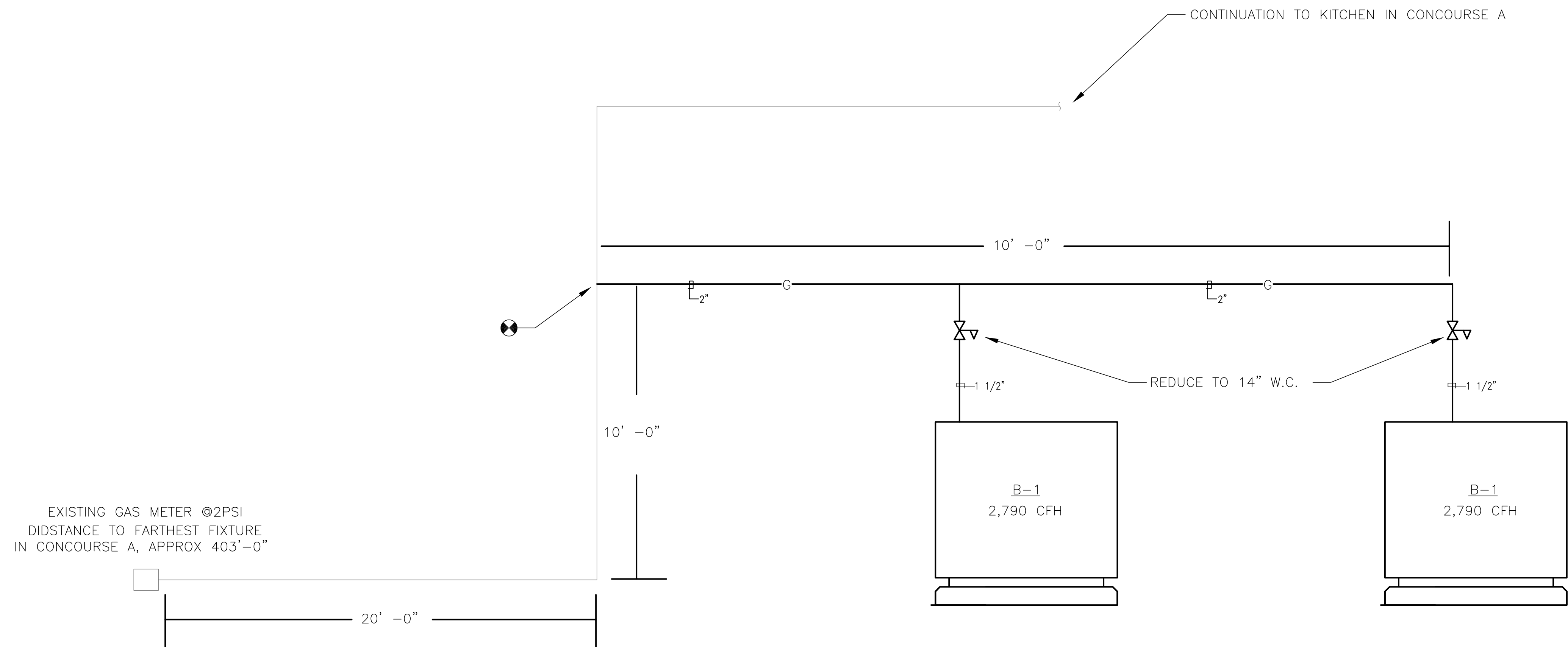
REVISIONS	
1	
2	
3	

SHEET NUMBER
M4.02



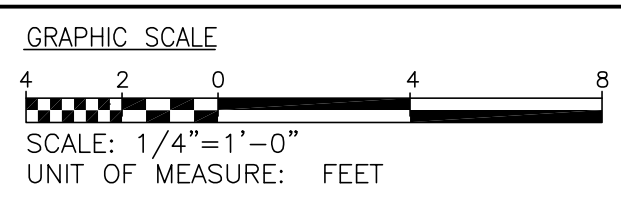
ENLARGED PLAN - UPPER LEVEL - GAS

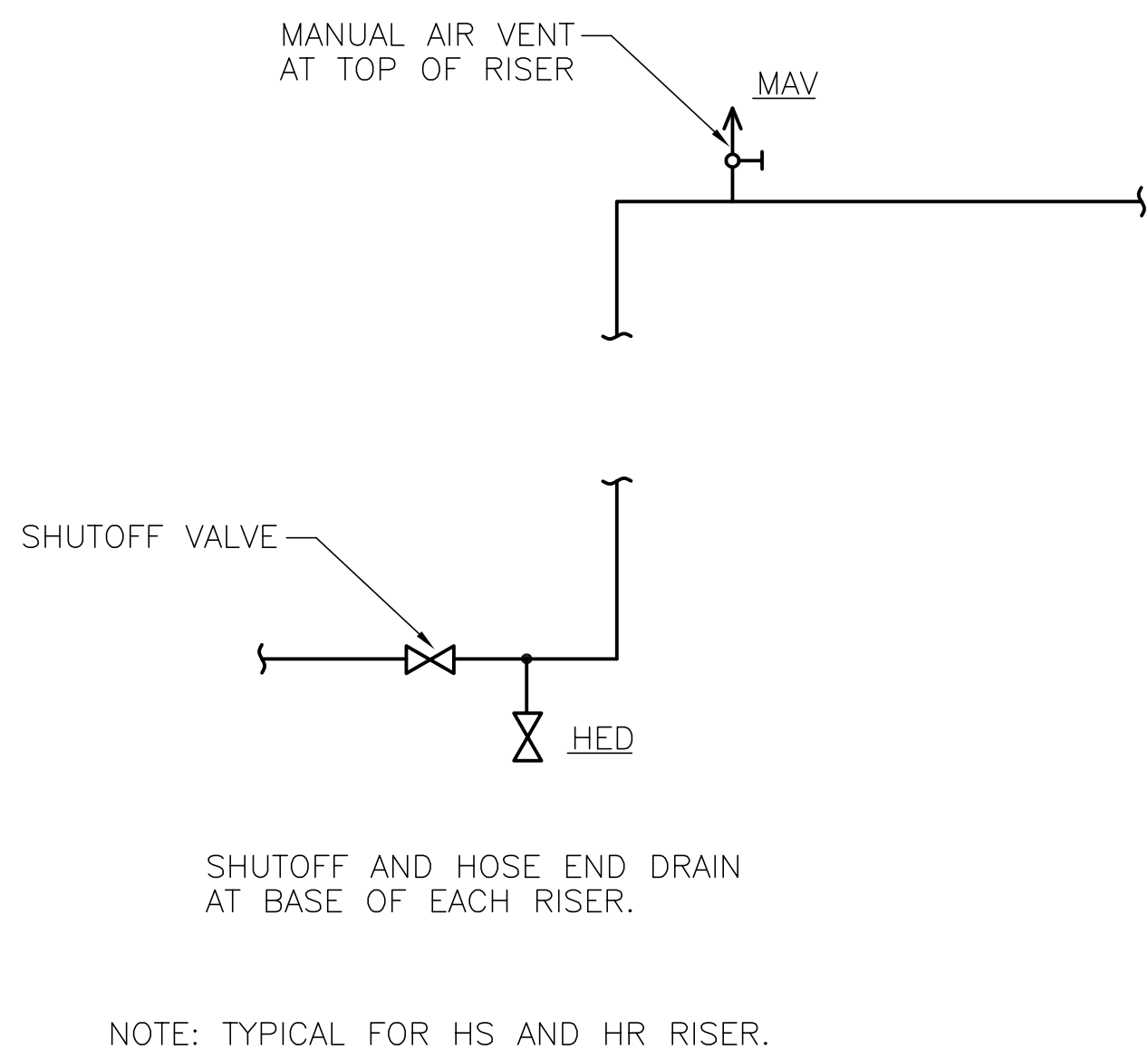
SCALE:
1/4"=1'-0" 1



GAS RISER DIAGRAM

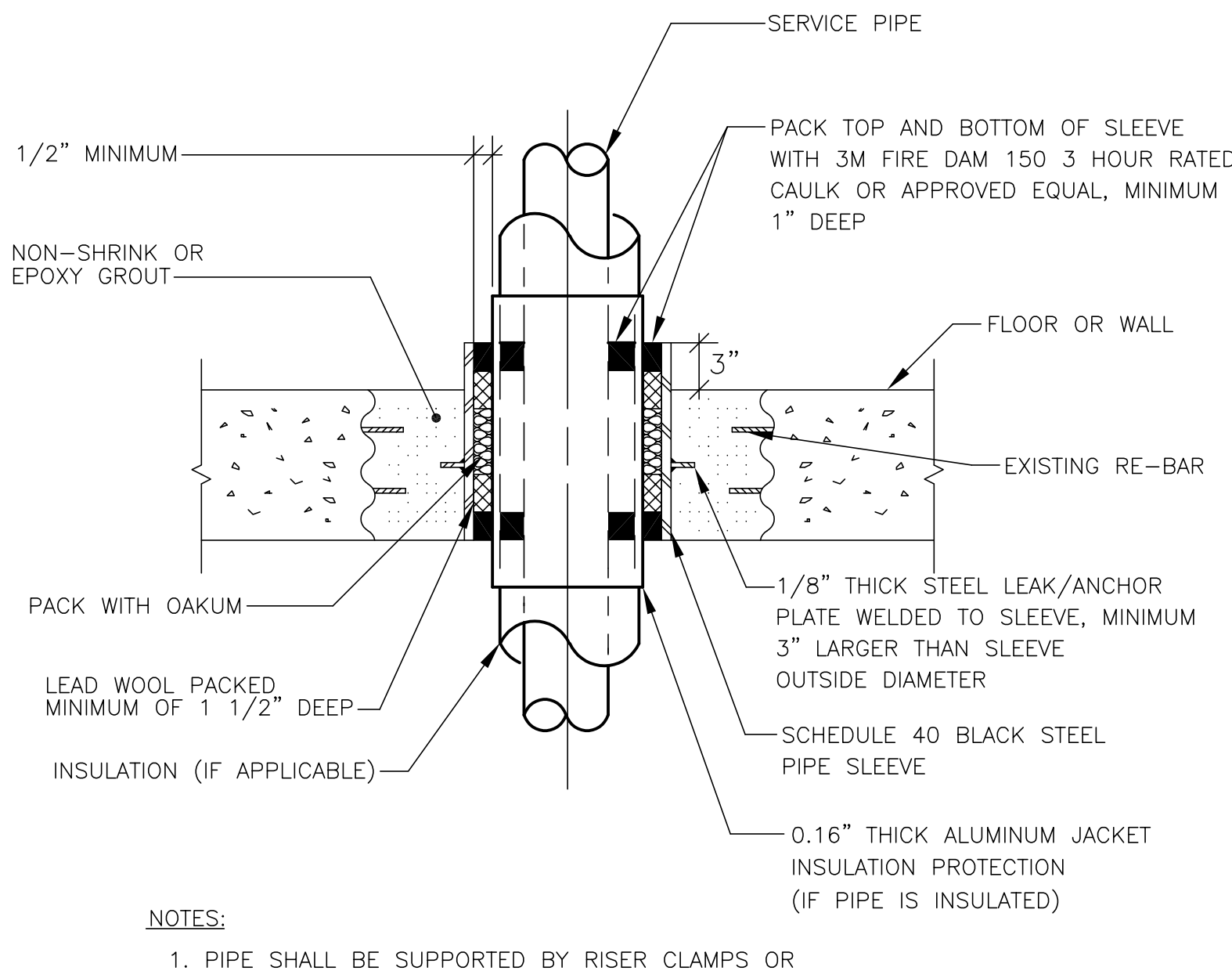
SCALE:
NONE 2





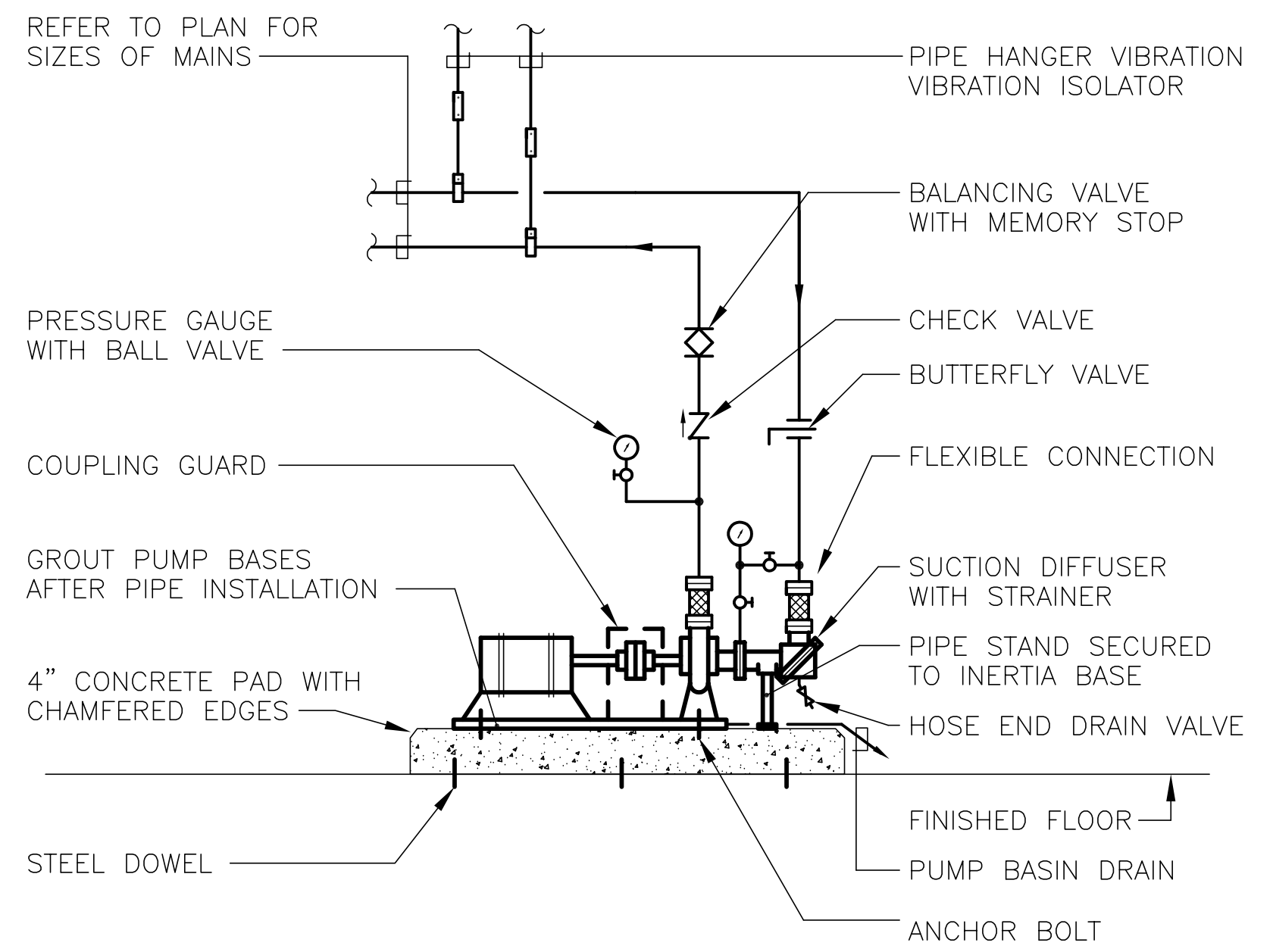
RISER DETAIL

SCALE: NONE 1



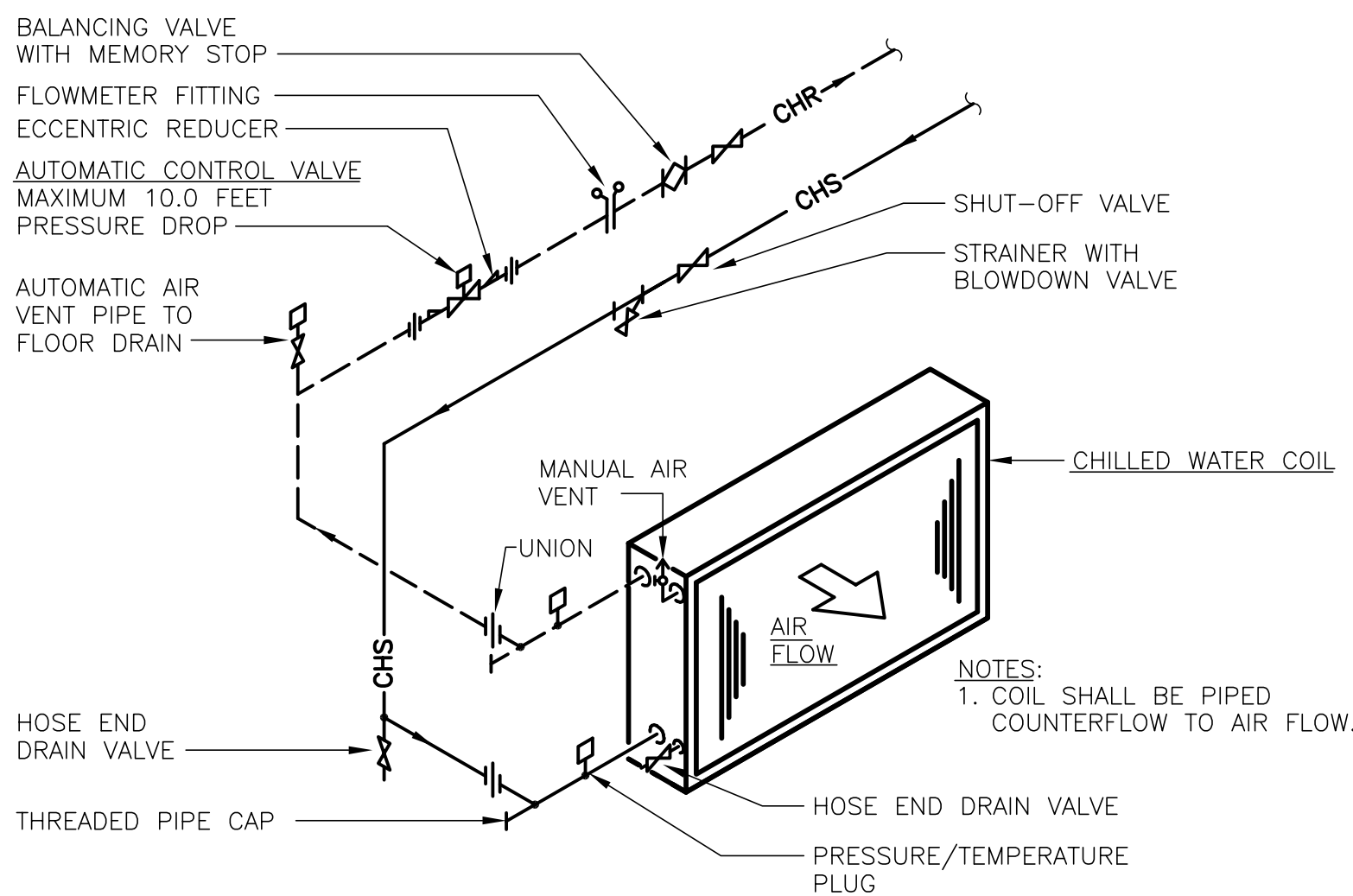
PIPE SLEEVE

SCALE: NONE 3



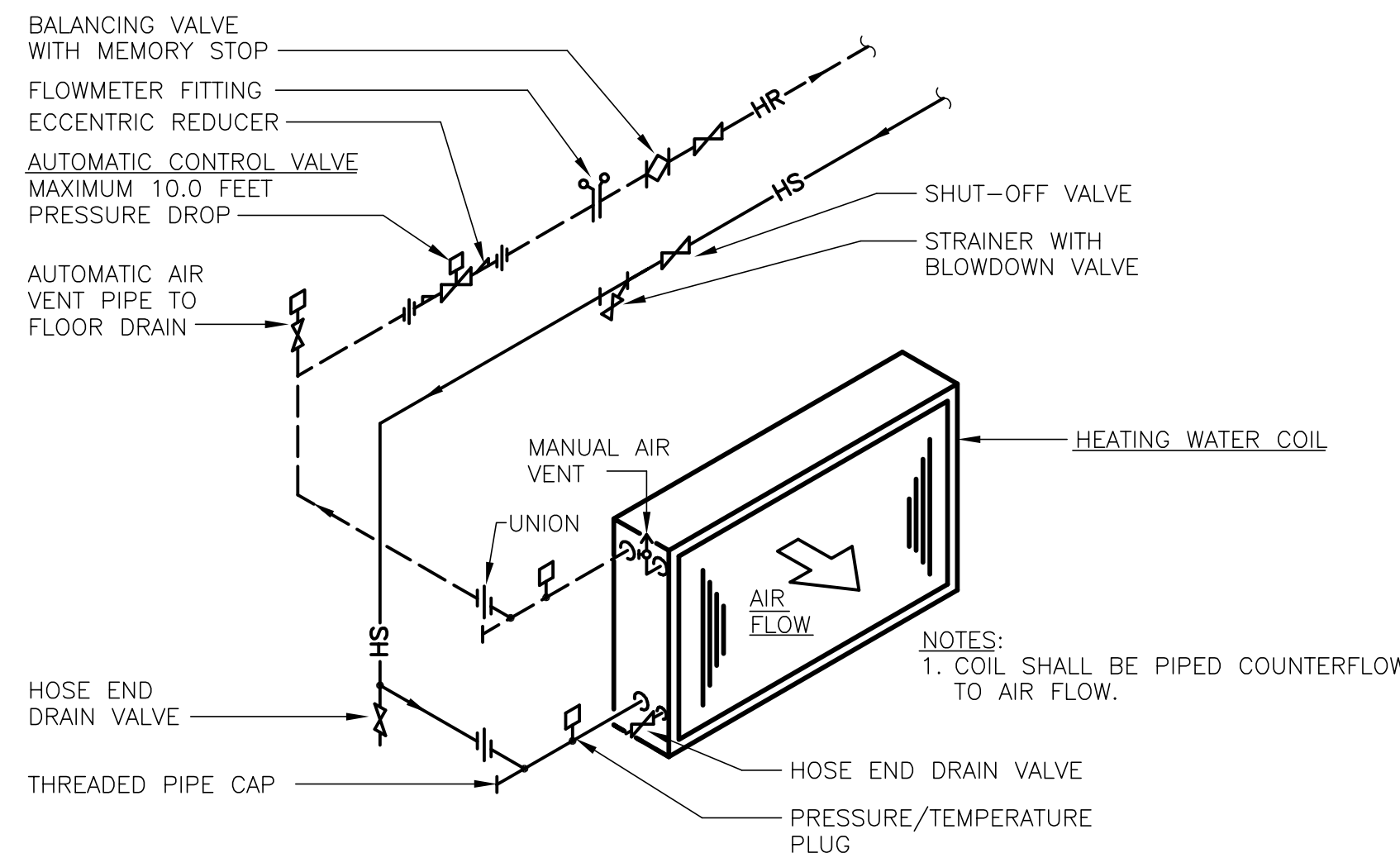
PUMP

SCALE: NONE 5



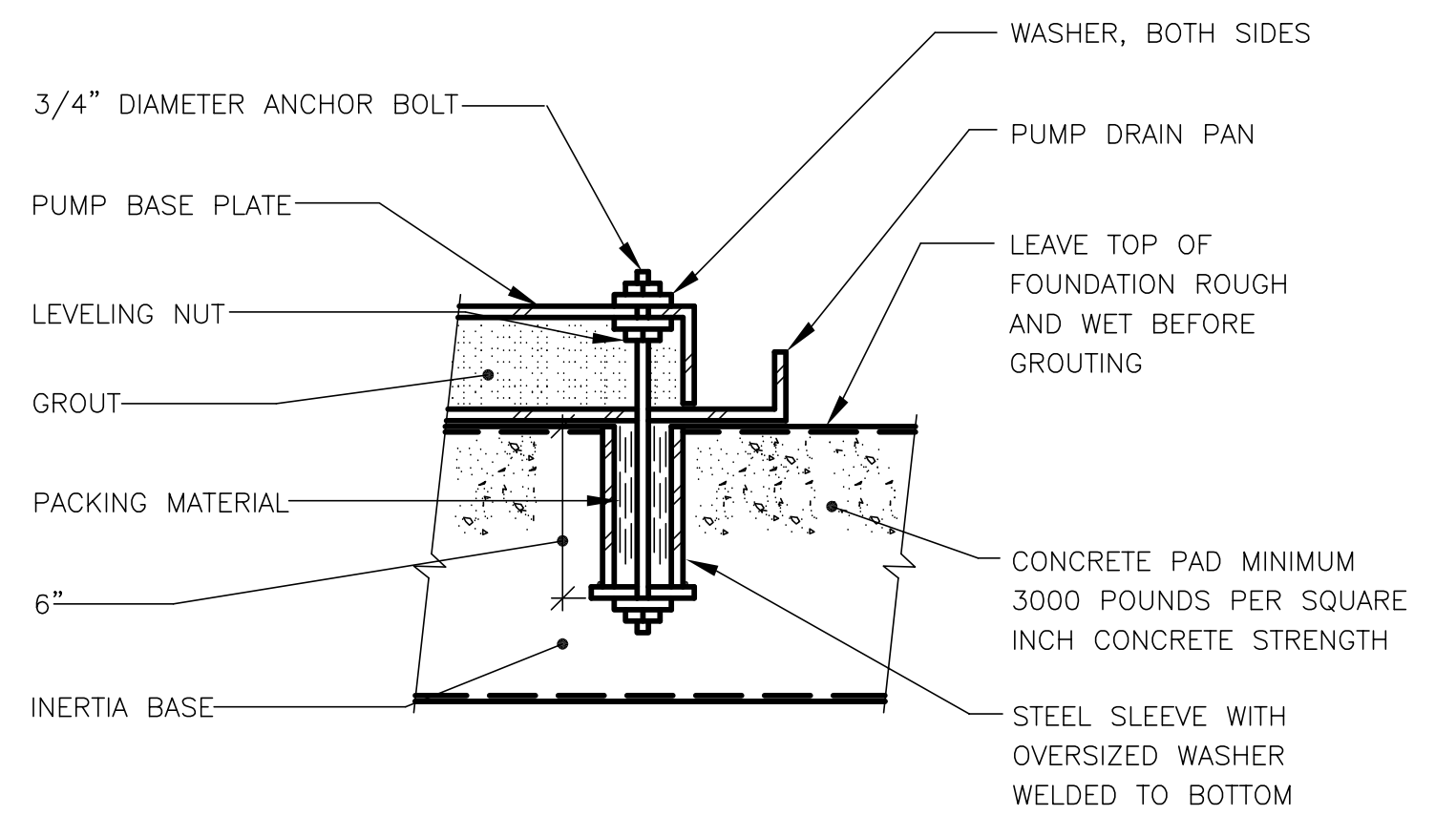
COOLING COIL (TYPICAL)

SCALE: NONE 2



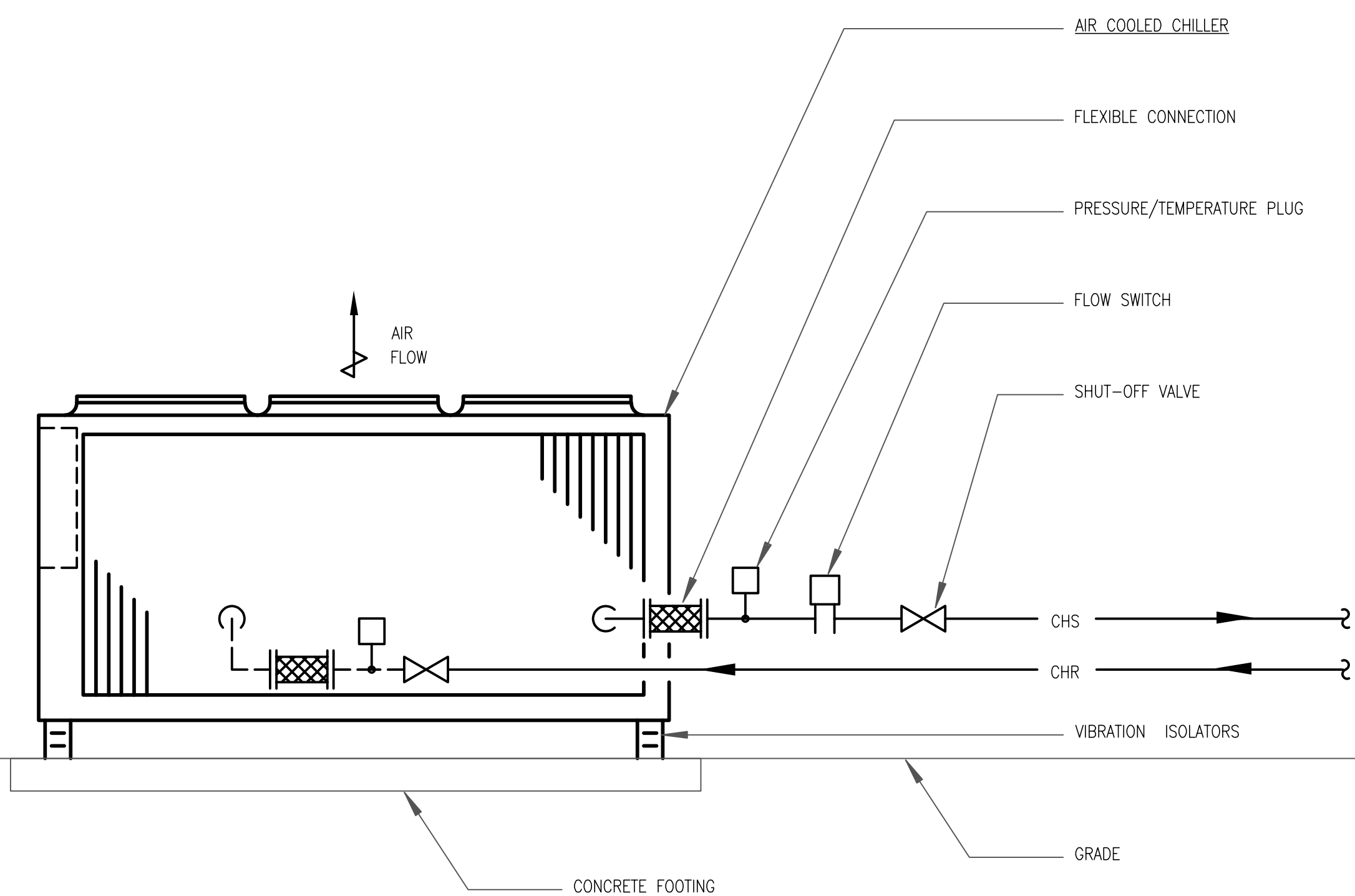
HEATING COIL (TYPICAL)

SCALE: NONE 4



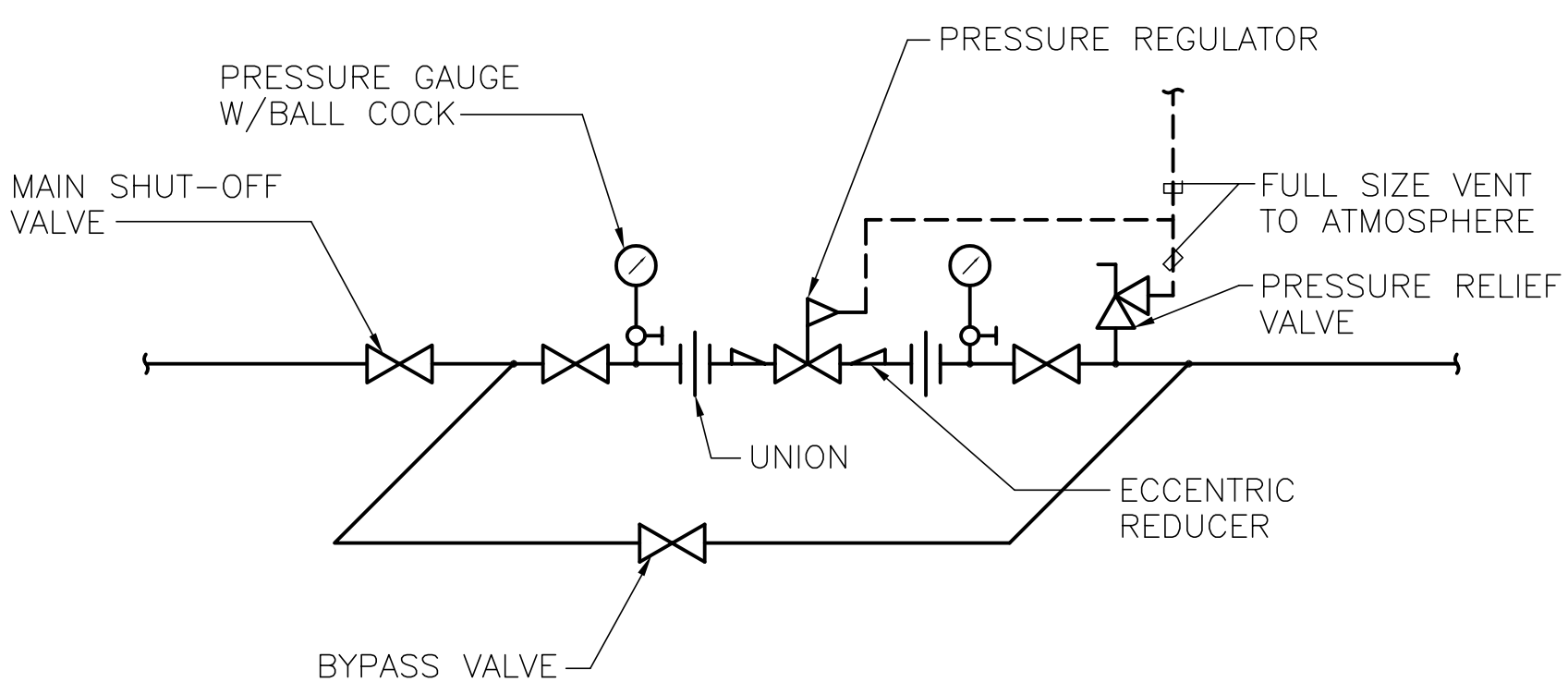
PUMP BASE ANCHOR SUPPORT

SCALE: NONE 6



AIR COOLED CHILLER

SCALE: NONE 7



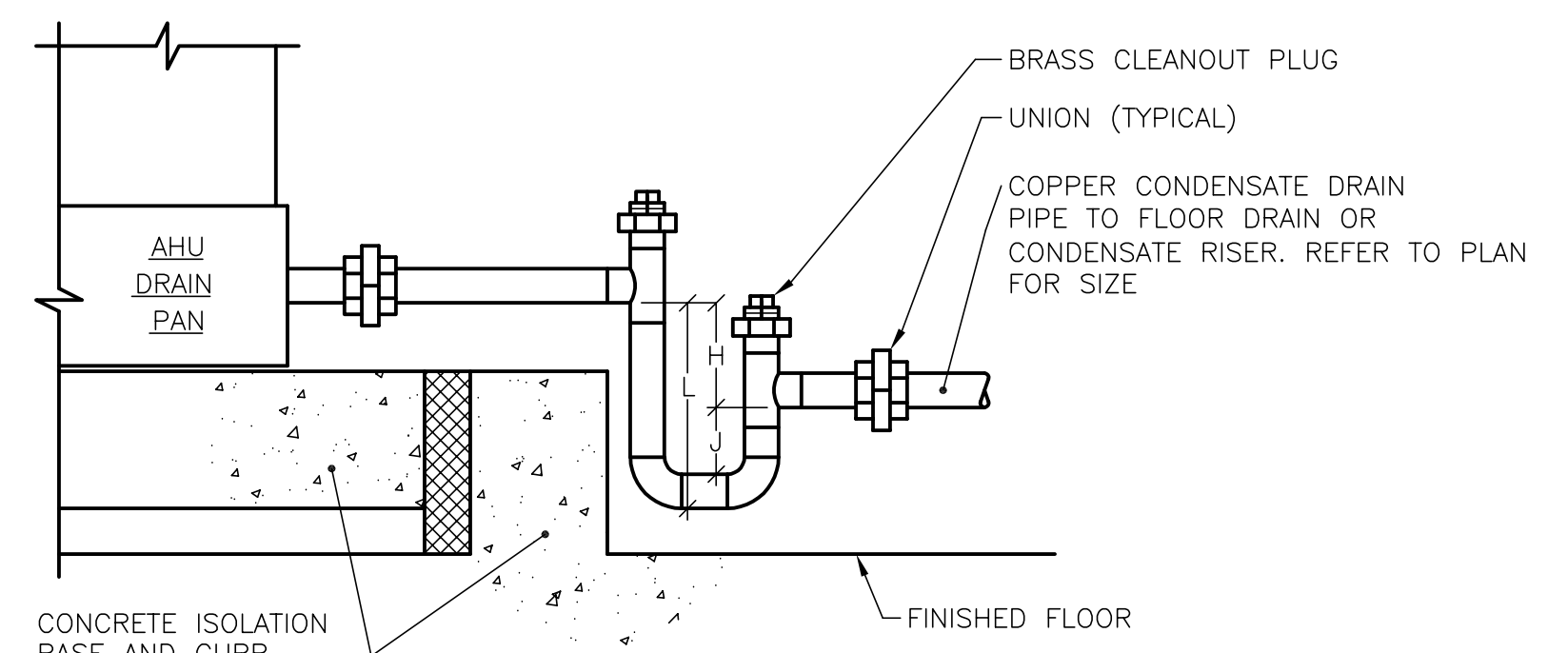
NOTES:

1. IF APPLICABLE, EXTEND VENT TO NEAREST OUTDOOR LOCATION W/TURN-DOWN ELBOW & SCREEN.

2. REGULATOR WITH VENT LIMITER MAY BY USED IN LIEU OF A VENTED REGULATOR

GAS REGULATOR PIPING

SCALE: NONE 6



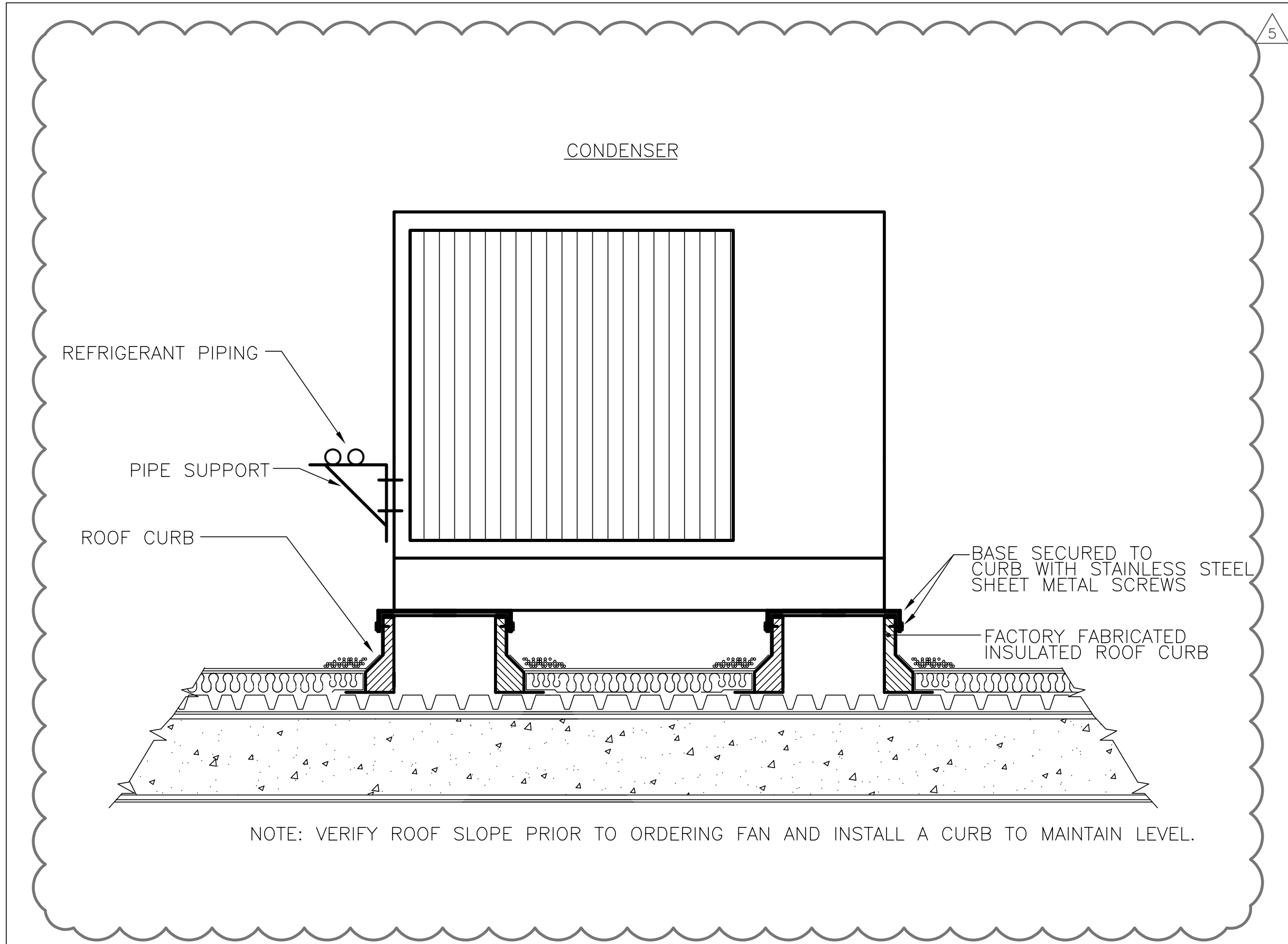
H = (1" FOR EACH 1" OF MAXIMUM NEGATIVE STATIC PRESSURE) + 1"

J = HALF OF H

L = H + J + PIPE DIAMETER + INSULATION

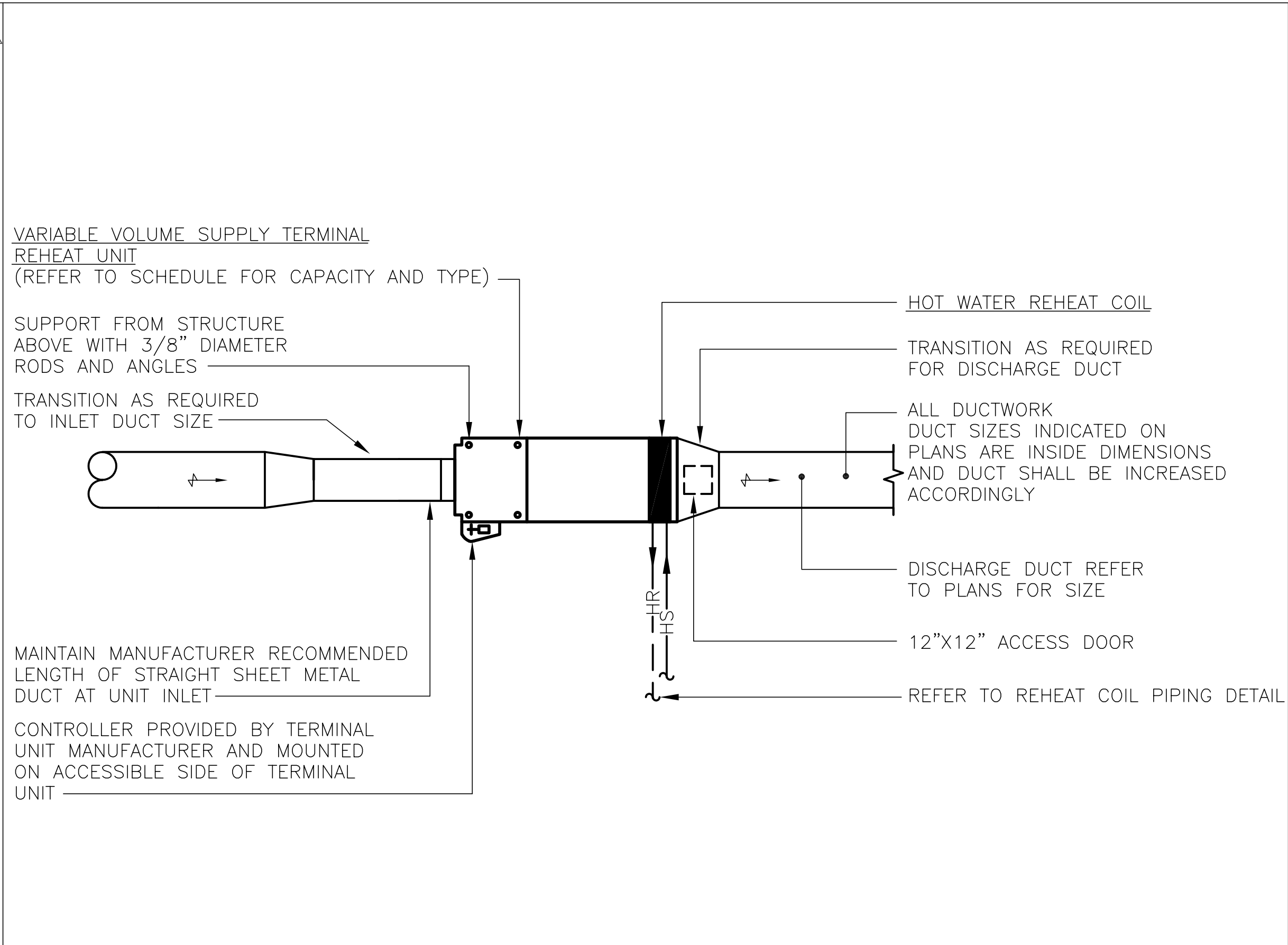
COIL CONDENSATE TRAP

SCALE: NONE 7



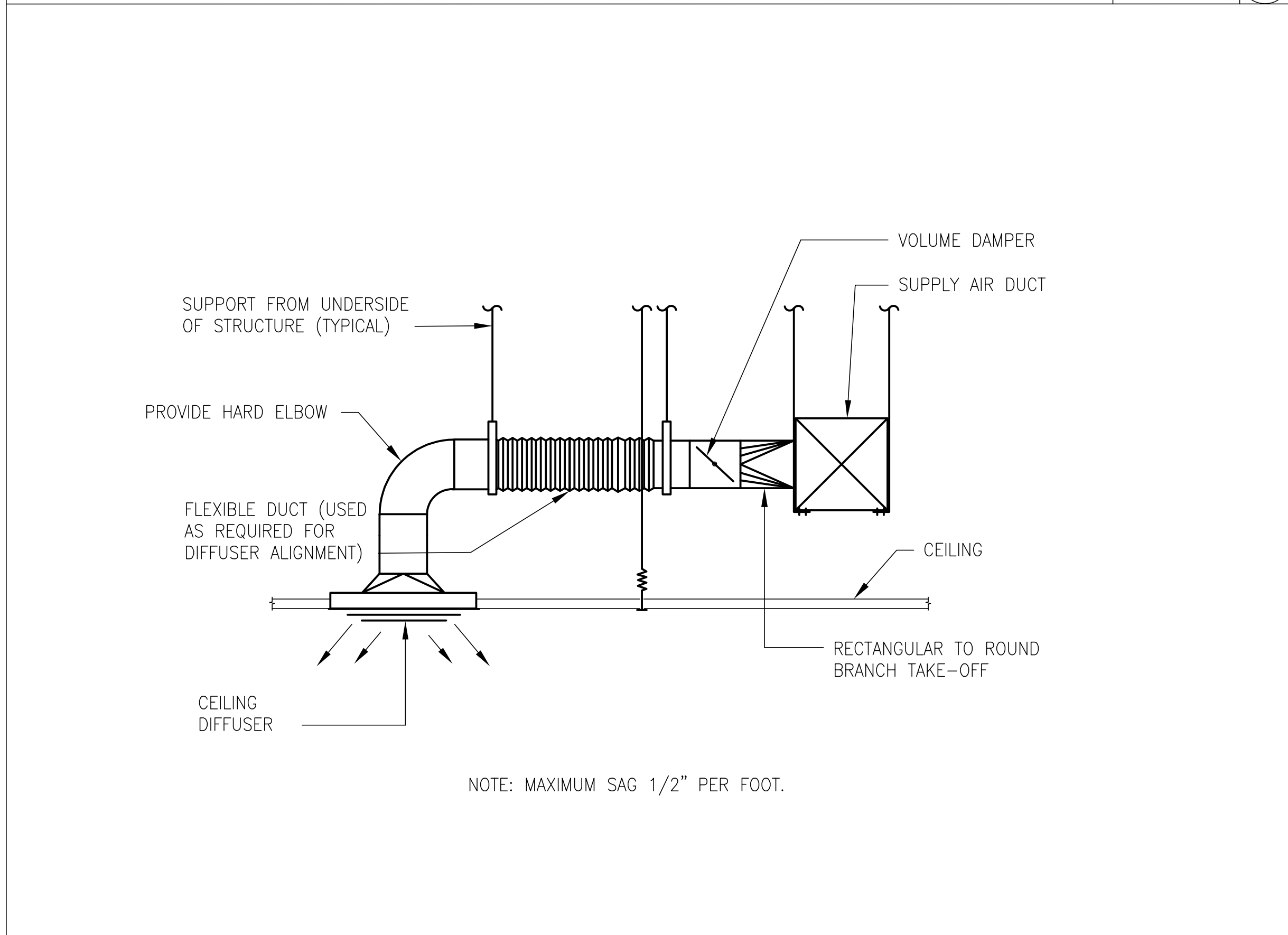
AIR-COOLED CONDENSER

SCALE: NONE 7



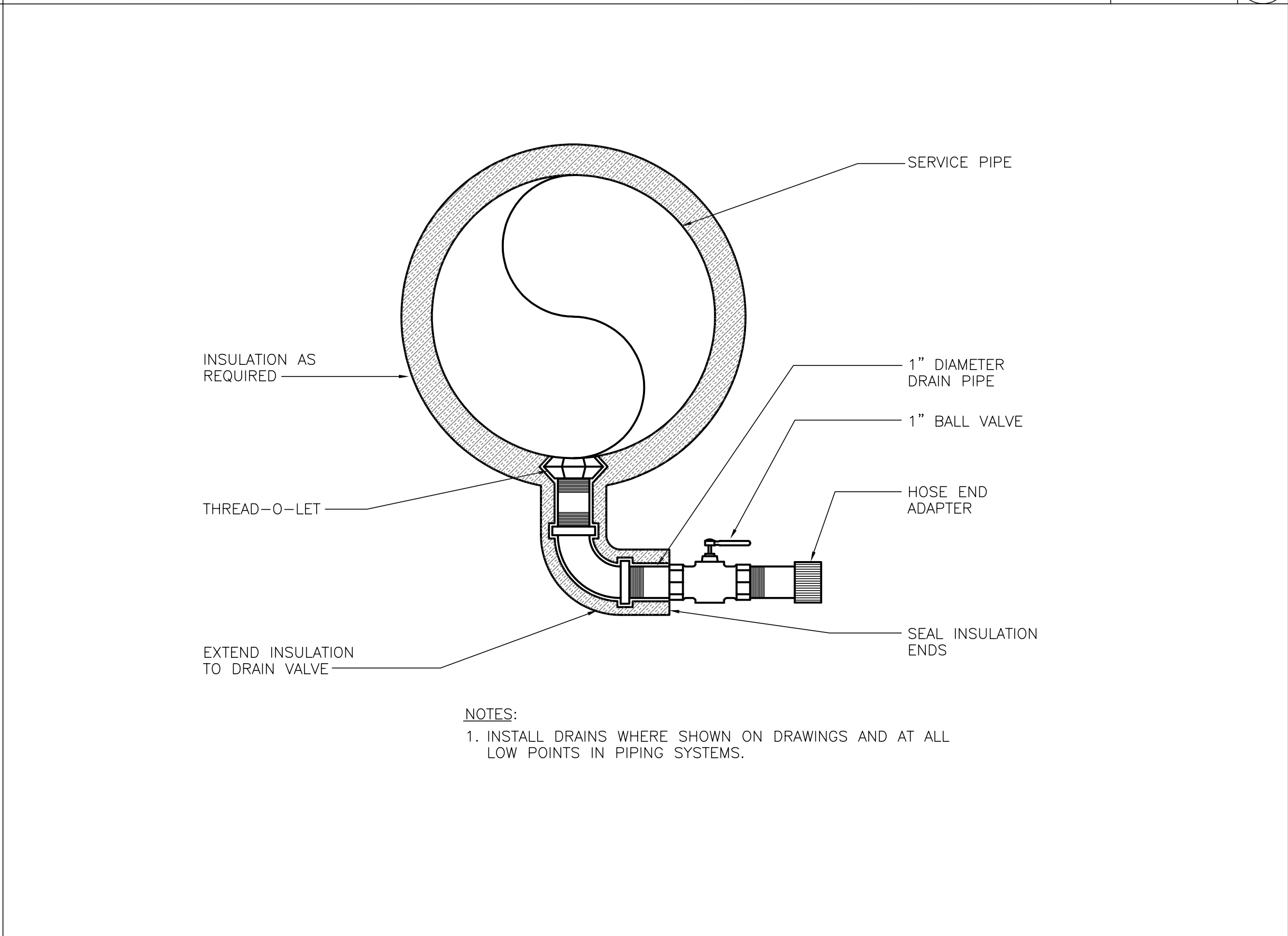
VAV REHEAT TERMINAL UNIT

SCALE: NONE 3



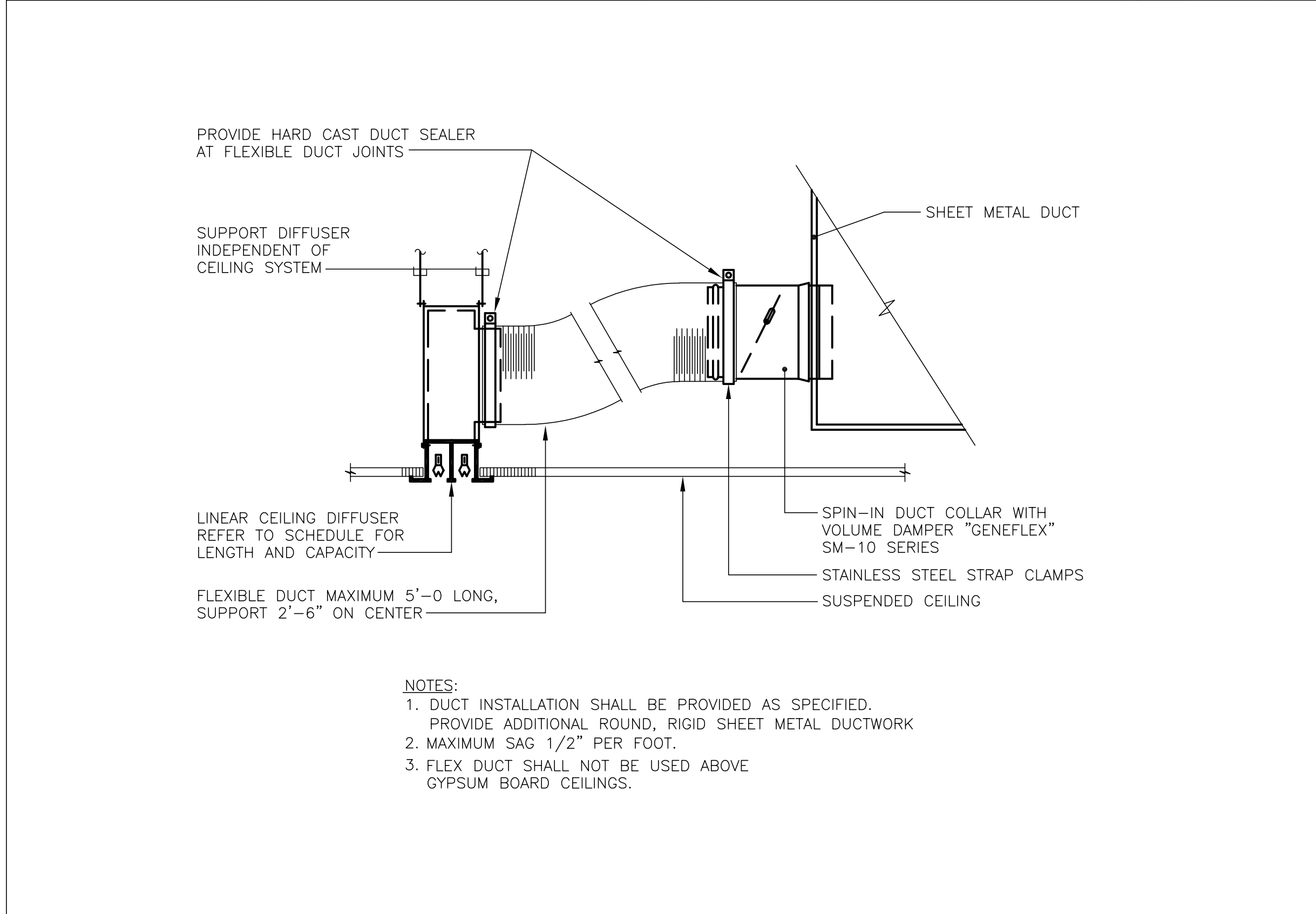
CEILING DIFFUSER INSTALLATION

SCALE: NONE 1



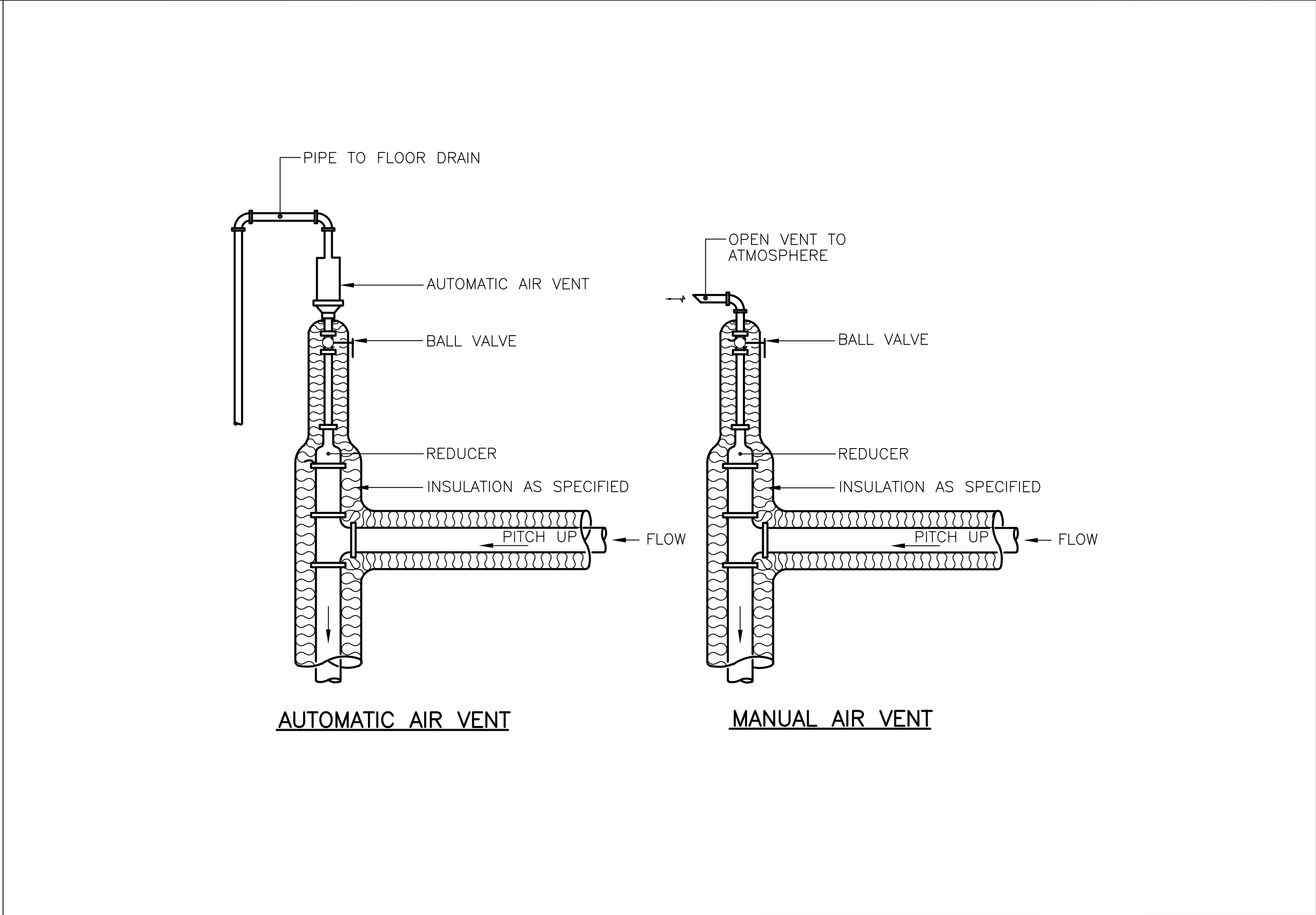
PIPE DRAIN INSTALLATION

SCALE: NONE 4



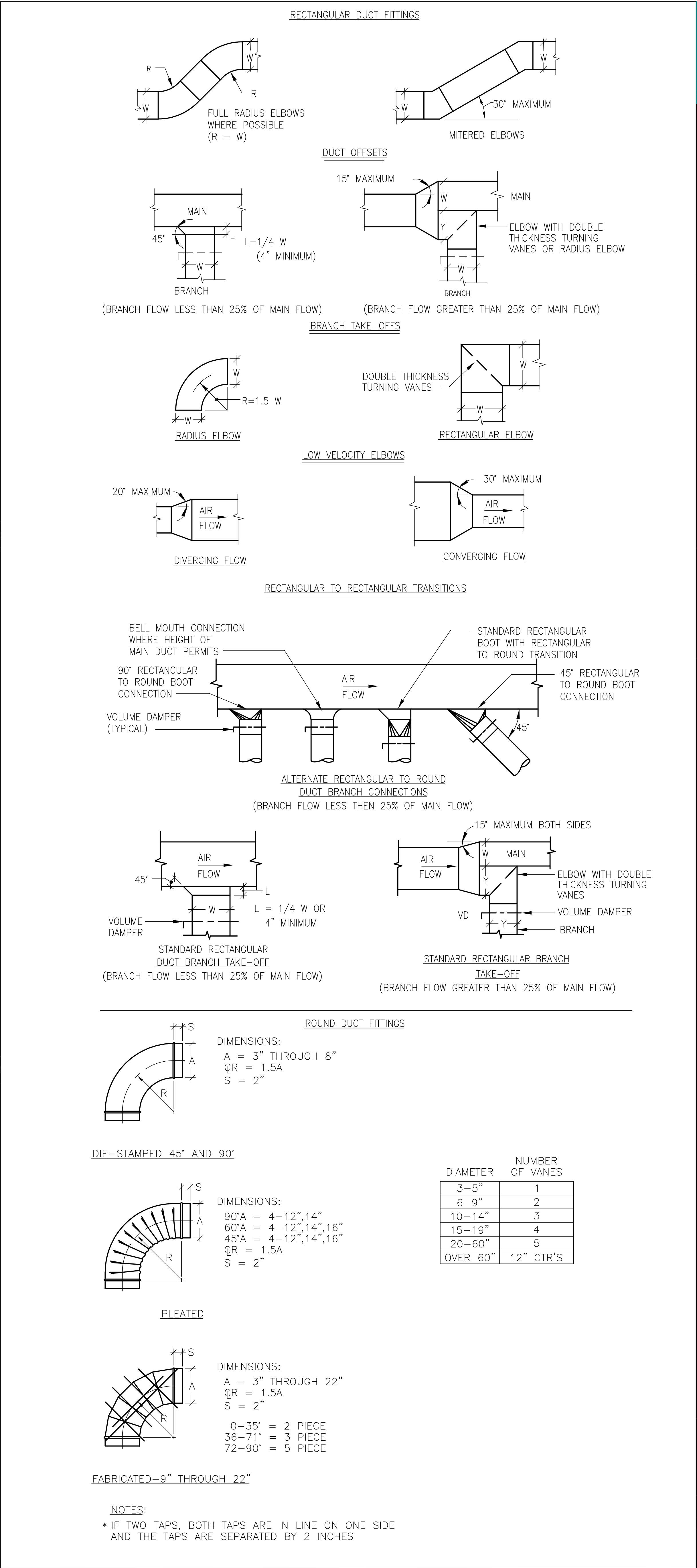
CEILING SLOT DIFFUSER INSTALLATION

SCALE: NONE 2



AIR VENT

SCALE: NONE 5



RECTANGULAR/ROUND DUCT FITTINGS

SCALE: NONE 6

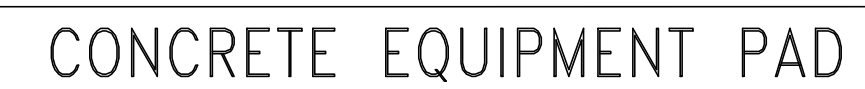


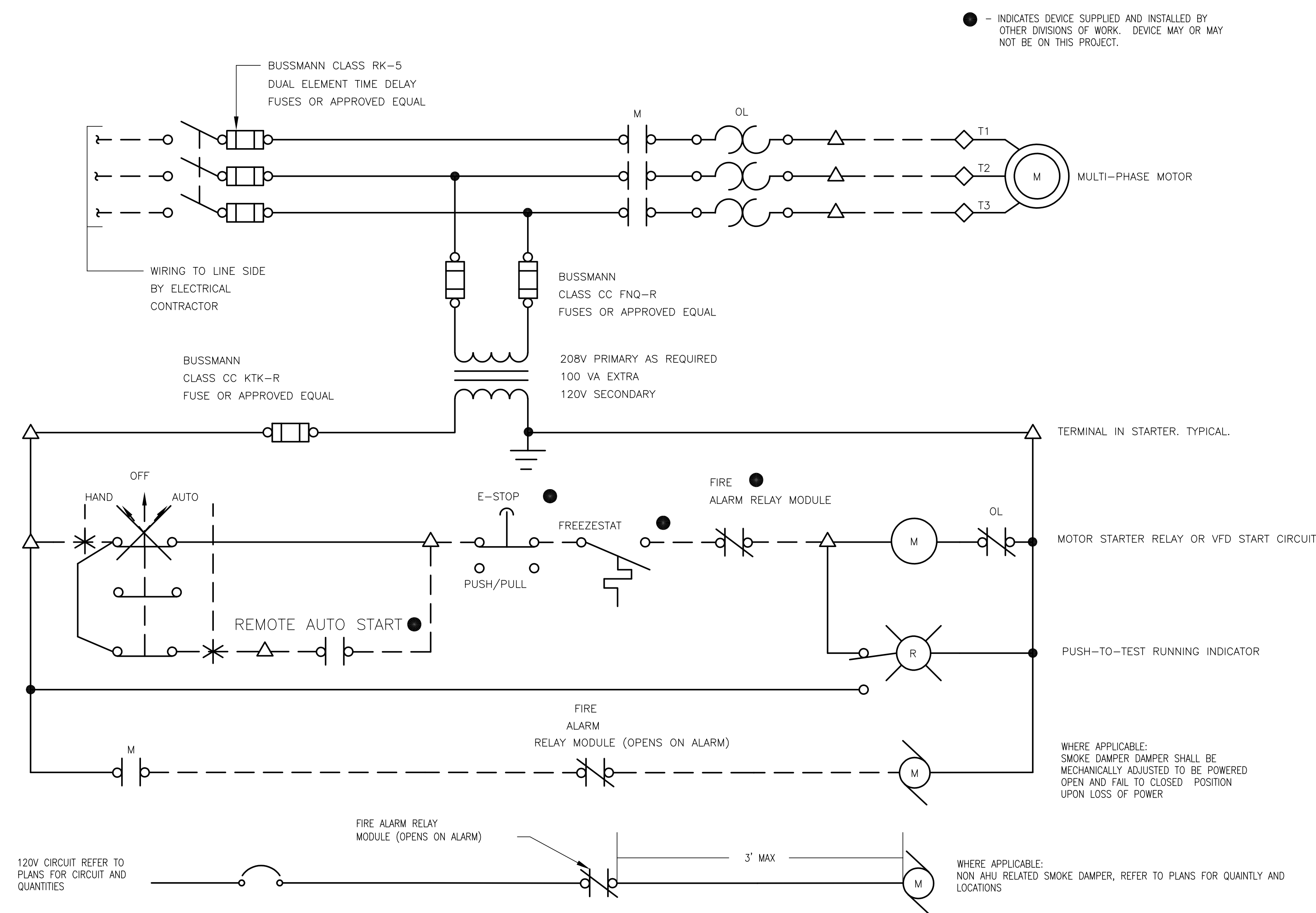
1. THE CONTRACTOR SUPPLYING THE EQUIPMENT THAT IS TO BE CONTROLLED BY THE STARTER SHALL PROVIDE ALL STARTERS, CONTROL WIRING, AND DISCONNECT SWITCHES FOR THEIR EQUIPMENT. REFER TO 'EQUIPMENT CONNECTIONS RESPONSIBILITIES DETAIL' FOR DIVISION OF RESPONSIBILITIES BETWEEN CONTRACTORS.
- 1.1. EXCEPTION 1: CONTROL WIRING FROM FIRE ALARM SYSTEMS SHALL BE PROVIDED BY THE DIVISION 16/26 CONTRACTOR. THE EQUIPMENT SUPPLIER SHALL COORDINATE WITH THE DIVISION 16/26 CONTRACTOR THE CONTROL FUNCTIONS AND APPROPRIATE TERMINAL LOCATIONS FOR THE FIRE ALARM SYSTEM WIRING. THE DIVISION 16/26 CONTRACTOR SHALL TERMINATE THE WIRING ON THE DESIGNATED TERMINALS.
2. SINGLE PHASE MOTORS AND MOTORS UTILIZING SOFT-START TECHNOLOGY SHALL BE CONTROLLED IN A SIMILAR MANNER.
3. A LISTED RELAY OR OTHER LISTED APPLIANCE CONNECTED TO THE FIRE ALARM SYSTEM USED TO INITIATE CONTROL OF PROTECTED PREMISES FIRE SAFETY FUNCTIONS SHALL BE LOCATED WITHIN 3 FT OF THE CONTROLLED CIRCUIT OR APPLIANCE. (PER NFPA/FIRE ALARM CONTRACT TO BE CONNECTED TO AHJ PERMISSIVE (SAFETY) CIRCUIT.
4. ALL DISCONNECT SWITCHES INSTALLED BETWEEN THE VFD AND THE MOTOR SHALL BE EQUIPPED WITH A HANDLE INTERLOCK CIRCUIT AND CONNECTED TO THE VFD SAFETY CIRCUIT TO BE ENERGIZED THE VFD WHENEVER THE DISCONNECT SWITCH IS IN THE OFF POSITION.

SCALE:	2
NONE	

VOLTAGE TO GROUND, NOMINAL	MINIMUM CLEAR DISTANCE (FEET)			
	CONDITION:	1	2	3
0-150		3	3	3
151-600		3	3 1/2	4

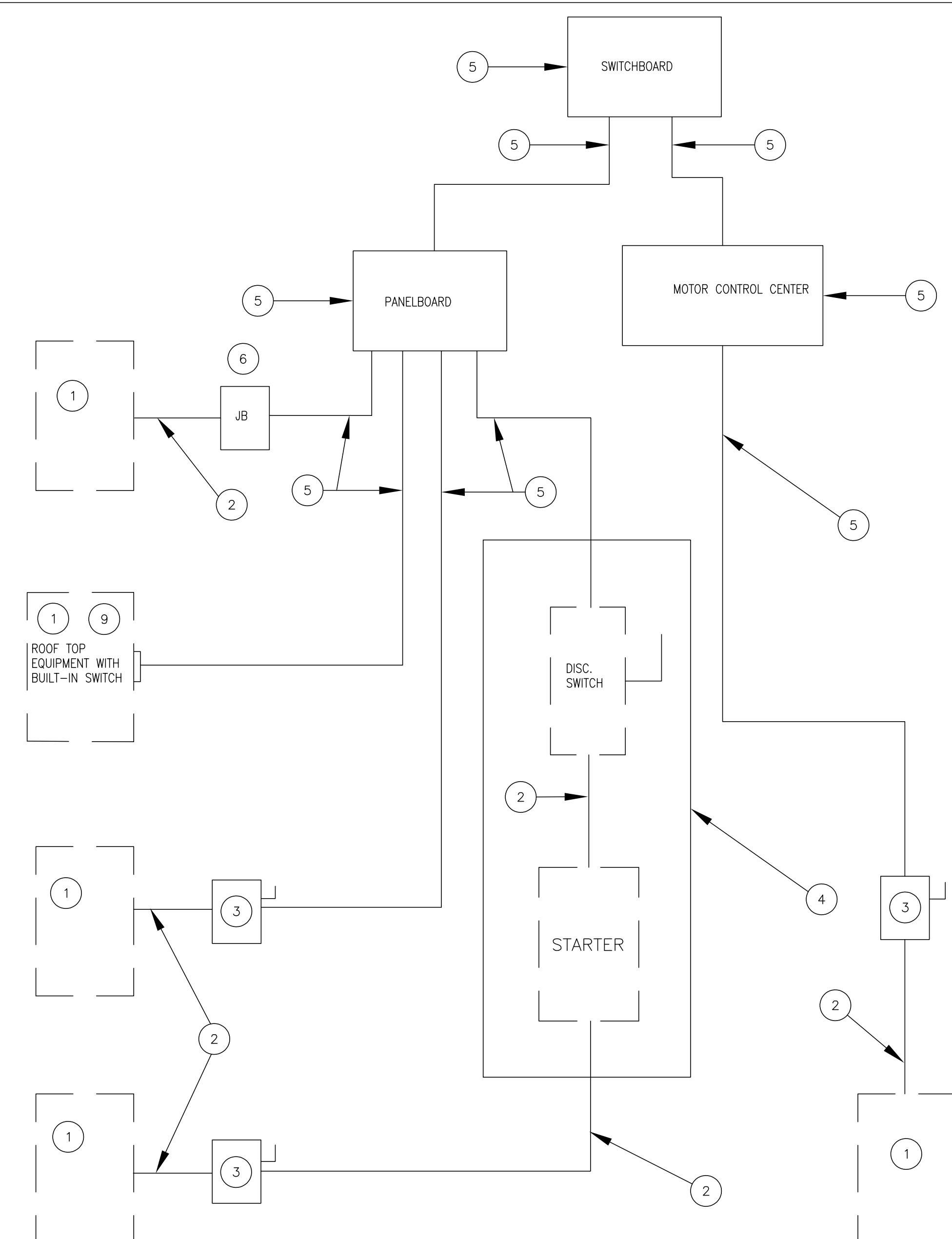
WORKING SPACES FOR EQUIPMENT

L
EL



- GENERAL NOTES:

1. THE CONTRACTOR SUPPLYING THE EQUIPMENT THAT IS TO BE CONTROLLED BY THE STARTER SHALL PROVIDE ALL STARTERS, CONTROL WIRING, AND DISCONNECT SWITCHES FOR THEIR EQUIPMENT. REFER TO "EQUIPMENT CONNECTIONS RESPONSIBILITIES" DETAIL FOR DIVISION OF RESPONSIBILITIES BETWEEN CONTRACTORS.
- 1.1. EXCEPTION 1: CONTROL WIRING FROM FIRE ALARM SYSTEMS SHALL BE PROVIDED BY THE DIVISION 16/26 CONTRACTOR. THE EQUIPMENT SUPPLIER SHALL COORDINATE WITH THE DIVISION 16/26 CONTRACTOR THE CONTROL FUNCTIONS AND APPROPRIATE TERMINAL LOCATIONS FOR THE FIRE ALARM SYSTEM WIRING. THE DIVISION 16/26 CONTRACTOR SHALL TERMINATE THE WIRING ON THE DESIGNATED TERMINALS.
2. SINGLE PHASE MOTORS AND MOTORS UTILIZING SOFT-START TECHNOLOGY SHALL BE CONTROLLED IN A SIMILAR MANNER.
3. A LISTED RELAY OR OTHER LISTED APPLIANCE CONNECTED TO THE FIRE ALARM SYSTEM USED TO INITIATE CONTROL OF PROTECTED PREMISES FIRE SAFETY FUNCTIONS SHALL BE LOCATED WITHIN 3 FT OF THE CONTROLLED CIRCUIT OR APPLIANCE. (PER NFPA)

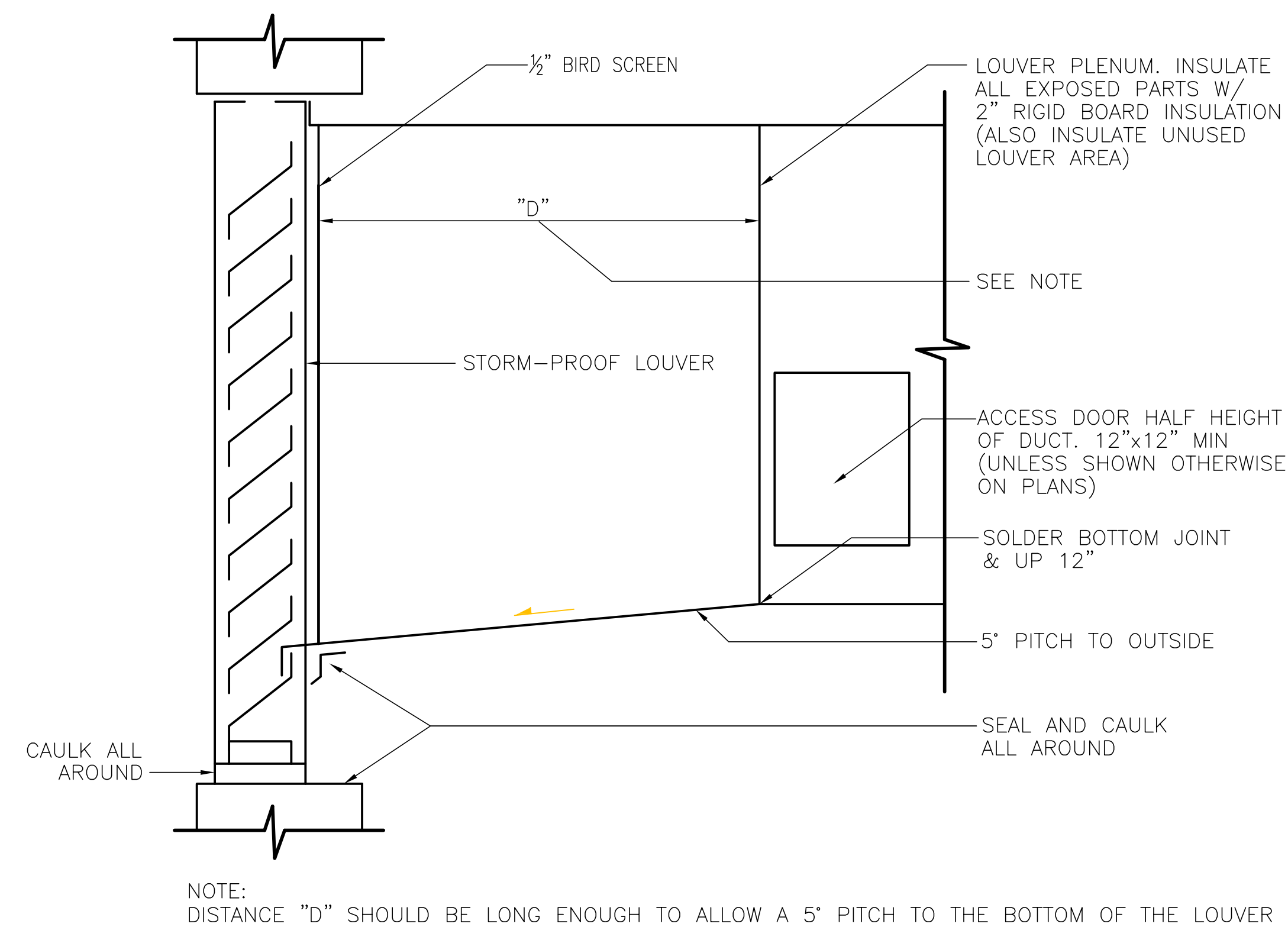


ELECTRICAL NOTES

- ① EQUIPMENT PROVIDED BY TRADES OTHER THAN ELECTRICAL.
 - ② CONDUIT & WIRING BY MECHANICAL, PLUMBING CONTRACTOR OR OTHER TRADES OTHER THAN ELECTRICAL.
 - ③ IF AN ADDITIONAL DISCONNECT IS REQUIRED BY NEC, IT SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR PROVIDING THE EQUIPMENT.
 - ④ A COMBINATION STARTER OR VFD MAY BE USED IN LIEU OF A SEPARATE DISCONNECT SWITCH AND STARTER. LOCATE ADJACENT TO EQUIPMENT. DISCONNECT SWITCH, VFD AND/OR STARTER SHALL BE PROVIDED BY THE CONTRACTOR PROVIDING THE EQUIPMENT.
 - ⑤ SWITCHBOARD, PANELBOARD, FEEDER CIRCUIT WIRING AND CONDUIT PROVIDED BY ELECTRICAL TRADE AS SHOWN ON THE ELECTRICAL DRAWINGS. SEE PANELBOARD SCHEDULES FOR WIRE AND BREAKER SIZES.
 - ⑥ JUNCTION BOX MAY BE SHOWN ON ELECTRICAL PLANS FOR SOME EQUIPMENT. IF NO STARTER OR DISCONNECT IS SUPPLIED, A JUNCTION BOX SHALL BE INSTALLED ADJACENT TO EQUIPMENT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE LINE SIDE WIRING TO THE JUNCTION BOX. LOAD SIDE WIRING WILL BE PROVIDED BY MECHANICAL, PLUMBING CONTRACTOR OR OTHER TRADES OTHER THAN ELECTRICAL.
 - ⑦ FOR PROJECTS UTILIZING AN MCC, THE STARTER, CB, AND/OR THE VFD LOCATED IN THE MCC SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
 - ⑧ IN ALL CASES THE CONTRACTOR SUPPLYING THE EQUIPMENT SHALL MAKE THE FINAL ELECTRICAL TERMINATIONS, START UP, AND TEST THE EQUIPMENT.
 - ⑨ IF THE ROOF TOP EQUIPMENT IS NOT PROVIDED WITH BUILT IN DISCONNECT SWITCH, THE ELECTRICAL CONTRACTOR SHALL PROVIDE A DISCONNECT SWITCH.

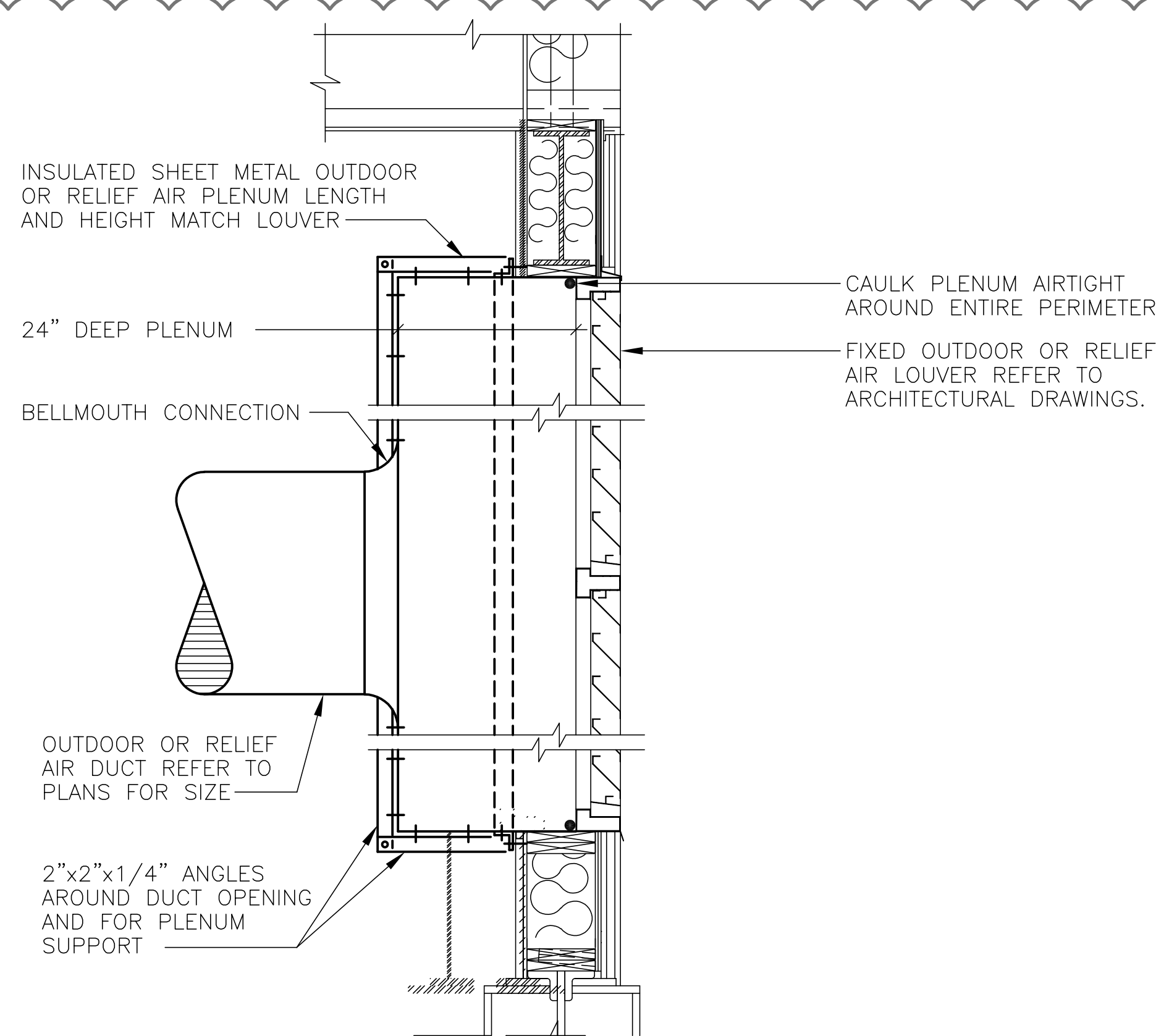
MULTI PHASE MOTOR DIAGRAM

SCALE:	1
NONE	



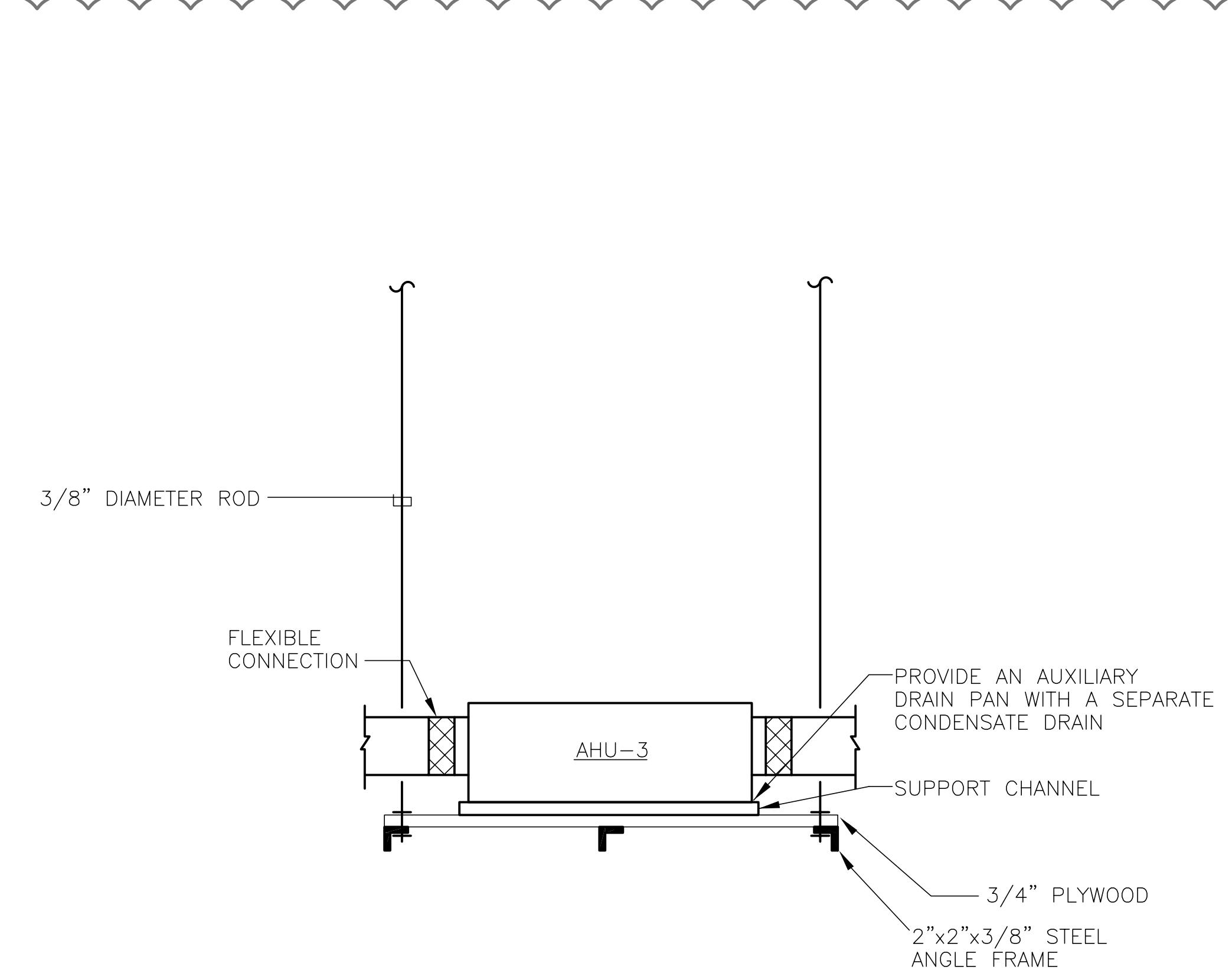
LOUVER CONNECTION

SCALE:	5
NONE	



OUTDOOR AIR / RELIEF PLENUM FOR LOUVER

SCALE:	4
NONE	



SUSPENDED AHU MOUNTING

SCALE:	3
NONE	

CHILLED WATER SYSTEM SEQUENCE OF OPERATION

A. GENERAL

1. THE SEQUENCE DESCRIBES THE GENERAL INTENT OF THE CONTROL SYSTEMS. PROVIDE ALL DEVICES, EQUIPMENT, AND WIRING AS REQUIRED TO PERFORM THE SEQUENCES DESCRIBED HEREIN.
2. UNLESS OTHERWISE NOTED, SIZE ALL AUTOMATIC CONTROL VALVES FOR MAXIMUM TEN (10) FEET WATER PRESSURE DROP AT MAXIMUM DESIGN FLOW RATE.
3. SEE PLANS FOR LOCATION OF ALL ROOM THERMOSTATS, PANELS, DAMPERS, VALVES, AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED BUT REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED AND LOCATED IN THE FIELD BY THE ENGINEER.
4. ALL PUMPS SHALL BE PROVIDED WITH DIFFERENTIAL PRESSURE SENSORS INSTALLED AROUND THE PUMP OR FAN. SWITCHES SHALL PROVIDE STATUS FOR PUMP AND FAN OPERATION.
5. ALL TEMPERATURE, PRESSURE, AND TIME SET POINTS SHALL BE FULLY ADJUSTABLE FROM THE BUILDING MANAGEMENT SYSTEM (BMS).
6. PROVIDE ALL HARDWARE, SOFTWARE, DEVICES, EQUIPMENT, AND WIRING AS REQUIRED TO INTERFACE WITH THE BMS.
7. REFER TO INPUT/OUTPUT SUMMARY SCHEDULE FOR ADDITIONAL CONTROL ITEMS NOT DESCRIBED IN THE SEQUENCES. INPUT/OUTPUT SUMMARY ARE MINIMUM REQUIREMENTS, PROVIDE ALL REQUIRED POINTS FOR COMPLETE OPERATION OF THE SYSTEM.
8. ALL VARIABLE FREQUENCY DRIVES FOR PUMPS SHALL BE SOFT STARTED AT MINIMUM SPEED AND INCREASED TO OPERATING SPEED BY THE BMS.
9. THE CHILLED WATER SYSTEM SHALL BE CONTROLLED BY AN INDEPENDENT NET WORK AREA CHILLED WATER PLANT CONTROLLER (CWPC). THE CWPC SHALL BE PROVIDED WITH THE FOLLOWING FEATURES:
 - a. OPEN PROTOCOL, LON OR BACNET OPERATOR GRAPHICAL INTERFACE.
 - b. SYSTEM START/STOP WITH MANUAL AND AUTOMATIC CONTROL.
 - c. CHILLER AND CHILLED WATER PUMP SEQUENCING INCLUDING AUTOMATIC ROTATION.
 - d. FAILURE RECOVERY DIAGNOSTICS AND PROTECTION.
 - e. SYSTEM STATUS AND TRENDED CAPABILITIES.
 - f. CHILLED WATER PLANT OPTIMIZATION.
11. THE CONTROL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL A COMPLETE COMPOSITE CONTROL AND INTERLOCK WIRING DIAGRAM DEPICTING THE CHILLED WATER SYSTEM PROVIDED. THE CONTROL CONTRACTOR SHALL BE RESPONSIBLE FOR AND SHALL PROVIDE ALL CONTROL AND INTERLOCK WIRING FOR THE ENTIRE SYSTEM INCLUDING THE CHILLER CONTROL SYSTEM AND COMMUNICATION MODULE PROVIDED BY THE CHILLER MANUFACTURER. DIAGRAMS SHALL CLEARLY SHOW HOW CHILLER CONTROLS AND OTHER DEVICES WILL BE INTERFACED WITH THE CONTROL SYSTEM.
12. THE CHILLED WATER PLANT SYSTEM SHALL HAVE TWO BASIC OPERATIONAL MODES FOR THE CHILLER PLANT: AUTOMATIC AND MANUAL. IN AUTOMATIC MODE, THE BMS VIA THE CWPC COMMUNICATION INTERFACE INFRASTRUCTURE SHALL AUTOMATICALLY START/STOP CHILLERS, PUMPS, ETC. ACCORDING TO THE SEQUENCES DESCRIBED HEREIN. IN MANUAL MODE THE PLANT OPERATOR SHALL BE RESPONSIBLE FOR MANUALLY SELECTING THE CHILLER "START" PUSH-BUTTON FOR EACH CHILLER AND CORRESPONDING PRIMARY CHILLED WATER PUMP AND SECONDARY CHILLED WATER PUMP.
13. THE CWPC AND THE BMS VIA THE CWPC COMMUNICATION INTERFACE INFRASTRUCTURE SHALL PROVIDE ALL STATUS AND ALARM MONITORING FOR EACH SYSTEM COMPONENT AND ALSO INDICATE CHILLER DIAGNOSTIC.
14. UPON START OF THE CHILLED WATER PLANT THE FOLLOWING SHALL TREND AUTOMATICALLY EVERY 5 MINUTES (ADJ):
 - a. OA DB TEMPERATURE
 - b. OA WB TEMPERATURE
 - c. SYSTEM CHILLED WATER SUPPLY TEMPERATURE SET POINT
 - d. CHILLED WATER SUPPLY TEMPERATURE
 - e. CHILLED WATER RETURN TEMPERATURE
 - f. CHILLER STATUS
 - g. CHILLED WATER PUMP STATUS'S

B. CHILLED WATER PRIMARY PUMP SEQUENCE

1. PRIMARY CHILLED WATER PUMP PCHP-1A SHALL START AND STOP WHEN AIR COOLED CHILLER CH-1A IS COMMANDED ON AND OFF RESPECTIVELY. PCHP-1B AND CH-1B AND PCHP-2 & CH-2 SHALL OPERATE SIMILAR.
2. IN AUTOMATIC OR MANUAL MODE OF OPERATION, WHEN CH-1A IS COMMANDED ON EITHER LOCALLY AT THE CWPC OR THE BMS VIA THE CWPC COMMUNICATION INTERFACE PCHP-1A SHALL START AT LOW SPEED VIA ITS VFD. ONCE CHILLED WATER FLOW IS VERIFIED VIA ITS DIFFERENTIAL PRESSURE SWITCH (DP-1) THE VFD SHALL MODULATE FLOW AS REQUIRED TO OBTAIN AND MAINTAIN DIFFERENTIAL PRESSURE SET POINT FOR CH-1A AS SENSED VIA DP-6 TO ESTABLISH CHILLED WATER FLOW RATE THROUGH THE CHILLER. ONCE FLOW RATE IS ESTABLISHED AN ENABLE SIGNAL SHALL BE SENT TO THE CHILLER CONTROL PANEL CHC-1A. WHEN CH-1A IS COMMANDED OFF EITHER LOCALLY OR VIA THE BMS PCHP-1 SHALL BE COMMANDED OFF AFTER A FIVE (5) MINUTE (ADJ) DELAY. PCHP-1B & PCHP-2 SHALL OPERATE SIMILAR WITH CH-1B & CH-2 RESPECTIVELY.
3. A FAILURE OF ANY PRIMARY CHILLED WATER PUMP SHALL GENERATE AN ALARM TO THE BMS.

C. SECONDARY CHILLED WATER PUMP SEQUENCE

1. SECONDARY CHILLED WATER PUMP SCHP-2 IS REDUNDANT AND SHALL BE PROGRAMMED FOR LEAD/LAG OPERATION WITH SCHP-1. LEAD/LAG PUMP SHALL BE ROTATED ON A 8-WEEKLY BASIS FOR EQUAL RUN TIME. IF EITHER OF THE TWO LEAD PUMPS FAIL OR FAIL TO START AS SENSED BY ITS DIFFERENTIAL PRESSURE SENSOR, THE REDUNDANT PUMP SHALL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF ANY SECONDARY CHILLED WATER PUMP SCHP-1, SCHP-2 OR SCHP-3 AS SENSED BY THEIR RESPECTIVE DIFFERENTIAL PRESSURE SENSORS SHALL BE ALARMED ON THE BMS.
2. OF THE TWO CHILLED WATER PUMPS SCHP-1 OR SCHP-2 SHALL OPERATE WITH THE SECOND PUMP BEING REDUNDANT.
3. THE LEAD PUMP SHALL START AT LOW SPEED AND VFD SHALL MODULATE PUMP SPEED TO MAINTAIN THE DOWNSTREAM DIFFERENTIAL PRESSURE SET POINT (ADJ) AS SENSED BY DIFFERENTIAL PRESSURE SENSOR DP-SCH. AN INCREASE IN DIFFERENTIAL PRESSURE SHALL CAUSE THE VFD TO SLOW DOWN AND A FALL IN DIFFERENTIAL PRESSURE SHALL CAUSE THE VFD TO SPEED UP. THE BMS SHALL MONITOR PRESSURE INDEPENDENT CHILLED WATER COIL CONTROL VALVES IN 5 MINUTE INTERVALS (ADJ) AND RESET THE DIFFERENTIAL SET POINT SUCH THAT THE CHILLED WATER CONTROL VALVE WITH THE MOST DEMAND IS OPEN BETWEEN 60% AND 65% (ADJ).
4. WHEN THE LEAD SECONDARY CHILLED WATER PUMP HAS BEEN OPERATING AT 90% (685 GPM) (ADJ) FLOW RATE AS SENSED BY FLOW METER FM-1 FOR 10 MINUTES (ADJ) THE LAG PUMP SHALL START. THE LAG PUMP SHALL START AT LOW SPEED AND SLOWLY RAMP UP WHILE THE LEAD PUMP SIMULTANEOUSLY SLOWLY RAMPS DOWN UNTIL BOTH PUMPS ARE OPERATING AT THE SAME SPEED. PUMPS IN PARALLEL SHALL MODULATE TO MAINTAIN THE SYSTEM DIFFERENTIAL SET POINT. WHEN BOTH PUMPS ARE OPERATING AT 45% (340 GPM EACH OR 680 GPM TOTAL) (ADJ) FOR 10 MINUTES (ADJ) AS SENSED BY FLOW METER FM-1 THE LAG PUMP SHALL SHUT DOWN AND THE LEAD PUMP SHALL MODULATE TO MAINTAIN SYSTEM DIFFERENTIAL SET POINT.
5. AUTOMATIC BYPASS CONTROL VALVE BCV-1 SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN A MINIMUM FLOW RATE OF 25% GPM (ADJ) AS SENSED BY FLOW METER FM-1 TO PROTECT THE SECONDARY CHILLED WATER PUMP FROM DEAD HEAD.
6. WHEN ALL CHILLED WATER AUTOMATIC COIL CONTROL VALVES HAVE BEEN CLOSED FOR 60 MINUTES (ADJ) SECONDARY CHILLED WATER PUMPS SHALL SHUT DOWN.

D. CHILLER START SEQUENCE

1. DURING AUTOMATIC OR MANUAL MODES OF OPERATION, THE BMS VIA THE CWPC COMMUNICATION INTERFACE SHALL SELECT CHILLER CH-1A, CH-1B OR CH-2 AS LEAD CHILLER BASED ON TOTAL RUN TIME. THE CHILLER WITH LOWER TOTAL RUN TIME SHALL BE SELECTED AS LEAD CHILLER. THE CORRESPONDING LEAD PRIMARY CHILLED WATER PUMP SHALL START AS DESCRIBED. IF DURING STARTING SEQUENCE, ANY LEAD EQUIPMENT FAILS TO RUN, LAG EQUIPMENT SHALL BECOME LEAD AND AN ALARM SHALL SOUND AT THE BMS AND THE LAG CHILLER AND CORRESPONDING LAG PRIMARY CHILLED WATER PUMP SHALL START.
2. THE CHILLED WATER SYSTEM SHALL BE ENABLED EITHER LOCALLY AT THE CWPC OR VIA THE BMS. ONCE ENABLED THE CHILLER START SEQUENCE SHALL BE INITIATED WHEN ANY ONE OF THE CHILLED WATER COIL AUTOMATIC FLOW CONTROL VALVES IS OPENED UPON A CALL FOR CHILLED WATER.
3. WHEN CHILLED WATER FLOWS HAVE BEEN ESTABLISHED AND CORRESPONDING ENABLE SIGNALS HAVE BEEN RECEIVED BY THE CHILLER, THE CHILLER SHALL START AND STAGE TO MAINTAIN A BMS SELECTED AND OPERATOR VERIFIED DISCHARGE TEMPERATURE OF 42F (ADJ) VIA THE CWPC COMMUNICATION INTERFACE AS SENSED BY CORRESPONDING CHILLER LEAVING WATER TEMPERATURE SENSOR TT-1, TT-2 OR TT-3.
4. CHILLER START IS INHIBITED IF A FAULT CONDITION EXISTS AND IS INDICATED ON THE BMS VIA THE CWPC. THE CONDITION SHALL BE ENUNCIATED WHEN THE UNIT RESTART INHIBIT TIMER IS ACTIVATED BY THE CWPC. THE CWPC SHALL INDICATE THE AMOUNT OF TIME REQUIRED BEFORE ANOTHER START CAN BE ATTEMPTED ON THE ASSOCIATED CHILLER. ONCE THE RESTART INHIBIT IS CLEARED, THE CHILLER MAY START.
5. ANY FAILURE TO COMPLETE A SUCCESSFUL START SHALL CAUSE THE CHILLER TO ENTER A SHUTDOWN MODE AND A DIAGNOSTIC SHALL BE DISPLAYED DESCRIBING THE REASON FOR FAILURE, TIME, AND DATE OF FAILURE. UPON FAILURE OF THE LEAD CHILLER THE LAG CHILLER SHALL BE COMMANDED ON. LEAD CHILLED WATER DISTRIBUTION PUMP AND LEAD CONDENSER WATER PUMP SHALL SHUT DOWN UNDER THEIR RESPECTIVE SEQUENCES AND LAG CHILLED WATER DISTRIBUTION PUMP AND LAG CONDENSER WATER PUMP SHALL START. ONCE CHILLED WATER FLOW TO THE CHILLER HAS BEEN PROVEN VIA ITS CHILLED WATER PRESSURE DIFFERENTIAL SWITCH (DP-1 OR DP-2) AND CONDENSER WATER FLOW HAS BEEN ESTABLISHED AS DETERMINED BY THE LAG CHILLER CONDENSER WATER FLOW DIFFERENTIAL PRESSURE SWITCH A START SIGNAL SHALL BE SENT TO THE LAG CHILLER AND THE LAG CHILLER SHALL START.
6. WITH A SUCCESSFUL UNIT START CHILLER CONTROLS SHALL MAINTAIN THE ADJUSTABLE CHILLED WATER SET POINT TEMPERATURE. THE BMS WILL DISPLAY A "UNIT RUNNING" MESSAGE.

1. DURING NORMAL OPERATION IF THE LEAD CHILLER IS OPERATING AT 85% PART LOAD (ADJ) OR MORE FOR A PERIOD OF 20 MINUTES (ADJ) THE LAG CHILLER SHALL BE ENABLED AND THE LAG PRIMARY CHILLED WATER PUMP SHALL START. ONCE CHILLED WATER FLOW IS ESTABLISHED THE LAG CHILLER SHALL START. THE LEAD AND LAG CHILLER SHALL LOAD EQUALLY TO MAINTAIN LWT SET POINT AS SENSED BY TEMPERATURE TRANSISTORS TT-1, TT-2 AND OR TT-3. WHEN BOTH CHILLERS ARE OPERATING AT 85% PART LOAD (ADJ) OR MORE FOR A PERIOD OF 20 MINUTES (ADJ) THE REMAINING THIRD LAG CHILLER SHALL BE ENABLED AND ITS CORRESPONDING PRIMARY CHILLED WATER PUMP SHALL START. ONCE CHILLED WATER FLOW IS ESTABLISHED THE REMAINING LAG CHILLER SHALL START. ALL CHILLERS SHALL LOAD EQUALLY TO MAINTAIN LWT SET POINT AS SENSED BY TEMPERATURE TRANSISTERS TT-1, TT-2 AND TT-3.
2. DURING OPERATION WHEN THE LEAD AND BOTH LAG CHILLERS ARE OPERATING AT 45% PART LOAD (ADJ) FOR A PERIOD OF 15 MINUTES (ADJ) THE THIRD LAG CHILLER SHALL BE COMMANDED TO SHUT DOWN. AFTER A 5 MINUTE DELAY (ADJ) THIRD LAG CHILLED WATER DISTRIBUTION PUMP SHALL BE DEENERGIZED. WHEN THE LEAD AND LAG CHILLERS ARE OPERATING AT 45% PART LOAD (ADJ) FOR A PERIOD OF 15 MINUTES (ADJ) THE LAG CHILLER SHALL BE COMMANDED TO SHUT DOWN.
3. THE FOLLOWING POINTS SHALL BE AVAILABLE VIA THE BMS THROUGH THE CWPC VIA COMMUNICATION INTERFACE:
 - a. START / STOP
 - b. NUMBER OF STARTS
 - c. RUN TIME
 - d. STATUS - BYPASS OR AUTOMATIC
 - e. COMPRESSOR RUNNING INDICATION
 - f. POWER - KW
 - g. POWER - AMPS
 - h. GENERAL FAULT
 - i. FAULT NO. 1 - USER SELECTED
 - j. FAULT NO. 2 - USER SELECTED
 - k. 5 ADDITIONAL USER SELECTED POINTS.

E. CHILLER LOW LOAD CYCLE SEQUENCE

1. THE BMS SHALL MONITOR CHILLED WATER SUPPLY WATER TEMPERATURE VIA TEMPERATURE SENSOR/TRANSMITTER TT-4 AND CHILLED WATER RETURN TEMPERATURE VIA TEMPERATURE SENSOR/TRANSMITTER TT-5. WHEN TT-5 FALLS TO 27F (ADJ) BELOW TT-4 FOR ONE HOUR (ADJ) THE CHILLER SHALL BE DISABLED. LEAD CHILLED WATER PUMP SHALL REMAIN ON. WHEN TT-7 RISES TO 52F (ADJ) AND A TIME DELAY OF 90 MINUTES (ADJ) HAS BEEN MET, THE LEAD CHILLER SHALL RESTART.

F. CHILLER SHUT DOWN SEQUENCE

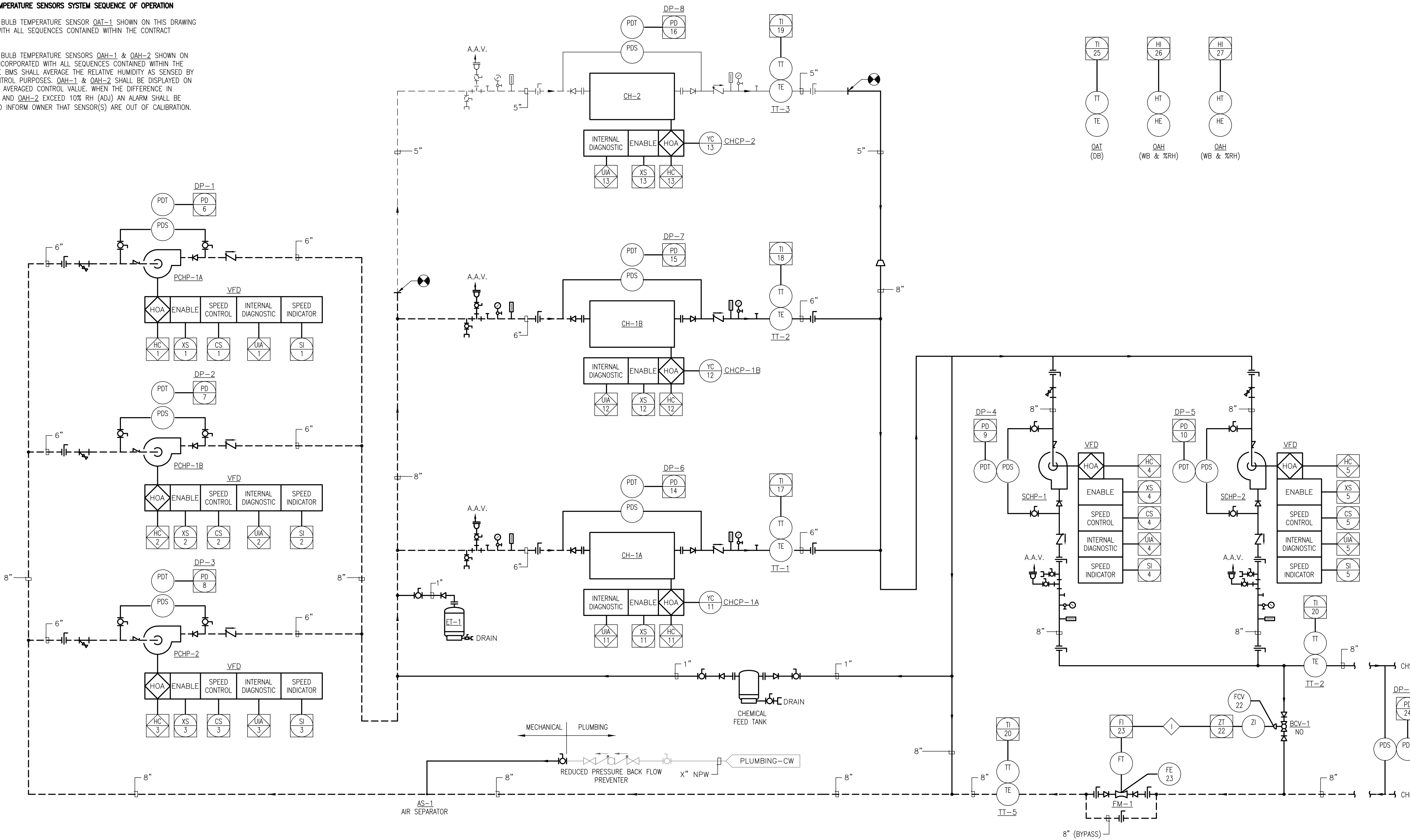
1. WHEN ALL AUTOMATIC CONTROL VALVES HAVE BEEN CLOSED FOR 120 MINUTES (ADJ) THE BMS SHALL SEND A SIGNAL TO DE-ENERGIZE THE CHILLER CONTROLS AND THE CHILLER SHALL SHUT DOWN UNDER ITS OWN SEQUENCE.
2. THE CHILLED WATER PLANT SHALL BE SHUT DOWN DURING HOURS DETERMINED BY OWNER GENERATED OPERATING SCHEDULE.
3. THE CHILLER SHALL SHUT DOWN WHEN THE REFRIGERANT LEAK DETECTION SYSTEM IS IN ALARM.
4. WHEN THE CHILLED WATER PLANT IS COMMANDED OFF BOTH LEAD/LAG CHILLERS SHALL BE POWERED OFF. AFTER A 5 MINUTE DELAY (ADJ) LEAD AND LAG CHILLED WATER PUMPS SHALL BE DE-ENERGIZED.

G. CHILLED WATER SYSTEM OPTIMIZATION

1. THE CWPC SHALL CALCULATE CURRENT CHILLED WATER SYSTEM LOAD AND DETERMINE THE MOST EFFICIENT CHILLER COMBINATION BASED ON CHILLER KW/TON AT CURRENT LOAD AND CORRESPONDING PRIMARY PUMPING KW. THE BMS SHALL INDICATE CURRENT KW/TON ON THE GRAPHICS.

H. GLOBAL DRY AND WET BULB TEMPERATURE SENSORS SYSTEM SEQUENCE OF OPERATION

1. GLOBAL OUTDOOR AIR DRY BULB TEMPERATURE SENSOR OAT-1 SHOWN ON THIS DRAWING SHALL BE INCORPORATED WITH ALL SEQUENCES CONTAINED WITHIN THE CONTRACT DOCUMENTS.
2. GLOBAL OUTDOOR AIR WET BULB TEMPERATURE SENSORS OAH-1 & OAH-2 SHOWN ON THIS DRAWING SHALL BE INCORPORATED WITH ALL SEQUENCES CONTAINED WITHIN THE CONTRACT DOCUMENTS. THE BMS SHALL AVERAGE THE RELATIVE HUMIDITY AS SENSED BY OAH-1 & OAH-2 FOR CONTROL PURPOSES. OAH-1 & OAH-2 SHALL BE DISPLAYED ON THE GRAPHICS ALONG WITH AVERAGED CONTROL VALUE. WHEN THE DIFFERENCE IN READINGS BETWEEN OAH-1 AND OAH-2 EXCEED 10% RH (ADJ) AN ALARM SHALL BE GENERATED TO THE BMS TO INFORM OWNER THAT SENSOR(S) ARE OUT OF CALIBRATION.



INPUT/OUTPUT SUMMARY

POINT NO.	SYSTEM APPARATUS OR AREA POINT DESCRIPTION	INPUTS																SYSTEM FEATURES				GENERAL			
		ANALOG								BINARY				ALARMS				PROGRAMS				GENERAL			
		MEASURED	CALC.	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)	STATUS (DIFF. PRESS.)
1, 2, 3	PRIMARY CHILLED WATER PUMPS (PCHP-1A, PCHP-1B AND PCHP-2)	X	X	X	X					X	X							X	X	X	X	X	X	X	X
4, 5	SECONDARY CHILLED WATER PUMPS (SCHP-1 AND SCHP-2)	X	X	X	X													X				X	X	X	X
6, 7, 8, 9, 10	CHILLED WATER PUMP DIFFERENTIAL PRESSURE (DP-1, DP-2, DP-3, DP-4, AND DP-5)					X				X									X			X	5	X	X
11, 12, 13	CHILLER (CH-1 AND CH-2)	X	X	X	X					X	X	X	X					X	X	X	X	X	X	X	X
14, 15, 16	CHILLER DIFFERENTIAL PRESSURE (DP-7 AND DP-8)					X													X			X	5	X	X
17, 18, 19, 20, 21	TEMPERATURE (TT-1, TT-2, TT-3, TT-4, AND TT-5)					X												X	X	X		X	5	X	
22	BYPASS AUTOMATIC CONTROL VALVE (BCV-1)					X													X			X	5	X	X
23	FLOW METER (FM-1)																					X	5	X	
24	CHILLED WATER SYSTEM DIFFERENTIAL PRESSURE (DP-SCH)					X													X			X	5	X	X
25	OUTDOOR AIR TEMPERATURE (OAT)					X													X			X	5	X	
26, 27	OUTDOOR AIR HUMIDITY/WB TEMP (OAH)					X																X	5	X	

HEATING HOT WATER SYSTEM SEQUENCE OF OPERATION:

A. GENERAL

1. THE SEQUENCE DESCRIBES THE GENERAL INTENT OF THE CONTROL SYSTEM. PROVIDE ALL DEVICES, EQUIPMENT, AND WIRING AS REQUIRED TO PERFORM THE SEQUENCES DESCRIBED HEREIN.
2. UNLESS OTHERWISE NOTED, SIZE ALL AUTOMATIC CONTROL VALVES FOR MAXIMUM TEN (10) FEET WATER PRESSURE DROP AT MAXIMUM DESIGN FLOW RATE.
3. ALL PUMPS SHALL BE PROVIDED WITH DIFFERENTIAL PRESSURE SENSOR INSTALLED AROUND THE PUMP. SENSORS SHALL PROVIDE STATUS FOR PUMP OPERATION.
4. ALL TEMPERATURE, PRESSURE, AND TIME SET POINTS SHALL BE FULLY ADJUSTABLE FROM THE BUILDING MANAGEMENT SYSTEM (BMS). PROVIDE ALL HARDWARE, SOFTWARE, DEVICES, EQUIPMENT, AND WIRING AS REQUIRED TO INTERFACE WITH THE BMS.
5. REFER TO INPUT/OUTPUT SUMMARY SCHEDULE FOR ADDITIONAL CONTROL ITEMS NOT DESCRIBED IN THE SEQUENCES. INPUT/OUTPUT SUMMARY ARE MINIMUM REQUIREMENTS, PROVIDE ALL REQUIRED POINTS FOR COMPLETE OPERATION OF THE SYSTEM.
6. THE CONTROL CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL A COMPOSITE CONTROL AND INTERLOCK WIRING DIAGRAM DEPICTING THE HEATING HOT WATER SYSTEM PROVIDED. THE CONTROL CONTRACTOR SHALL BE RESPONSIBLE FOR AND SHALL PROVIDE ALL CONTROL AND INTERLOCK WIRING FOR THE BOILER CONTROL PANEL (BCP) AND COMMUNICATION MODULE PROVIDED BY THE BOILER MANUFACTURER. DIAGRAMS SHALL CLEARLY SHOW HOW BOILER CONTROLS AND OTHER DEVICES WILL INTERFACED WITH THE CONTROL SYSTEM.
7. START/STOP CONTROL OF BOILER(S) B-1 AND B-2 AND CORRESPONDING HEATING HOT WATER PRIMARY PUMPS (PHWP-1 AND PHWP-2) SHALL BE PROVIDED THROUGH THE MULTIPLE BOILER MANAGEMENT SYSTEM (ABMS) PROVIDED BY THE BOILER MANUFACTURER VIA CORRESPONDING FACTORY BOILER LOCAL CONTROLLER (BCP-1 AND BCP-2) PROVIDED WITH EACH BOILER. THE ABMS THROUGH EACH BCP SHALL CONTROL THE BOILER AND ITS INTEGRAL START/STOP/SAFETY FUNCTIONS, STAGING AND LEAD LAG OPERATIONS. THE ABMS THROUGH THE BMS SHALL PROVIDE ALL STATUS AND ALARM MONITORING FOR EACH SYSTEM COMPONENT AND ALSO INDICATE BOILER DIAGNOSTIC. START/STOP SETTINGS FOR VARIOUS SYSTEM COMPONENTS SHALL BE PERFORMED MANUALLY THROUGH A HAND, OFF, AUTO SWITCH OR BY THE BCP AND BMS AS OUTLINED IN THE CONTRACT DOCUMENTS. HEATING HOT WATER SECONDARY PUMPS HWP-1 & HWP-2 SHALL BE CONTROLLED EITHER LOCALLY OR THROUGH THE BMS.
8. THE HEATING HOT WATER SYSTEM SHALL HAVE TWO BASIC OPERATIONAL MODES FOR THE HEATING HOT WATER PLANT: AUTOMATIC AND MANUAL. IN AUTOMATIC MODE, THE BMS SHALL AUTOMATICALLY SEND START SIGNAL TO ABMS, PUMPS, ETC. ACCORDING TO THE SEQUENCES DESCRIBED HEREIN. IN MANUAL MODE THE BMS SHALL PROMPT THE OPERATOR TO START A BOILER, PUMPS, ETC IN ACCORDANCE WITH THE SEQUENCES DESCRIBED HEREIN.

B. BOILER CONTROL:

1. THE BOILERS B-1 AND B-2 SHALL OPERATE VIA ITS FACTORY PROVIDED CONTROLLER, BCP-1 AND BCP-2. WHEN A BOILER IS COMMANDED ON THE CORRESPONDING BOILER BCP SHALL START ITS PRIMARY CIRCULATING PUMP PHWP. THE ABMS SHALL SEQUENCE BOILERS FOR LEAD-LAG OPERATION AND SHALL STAGE BOILERS FOR MAXIMUM EFFICIENCY.
2. BOILER SHALL BE CONTROLLED LOCALLY BY "START-STOP" SWITCH OR VIA THE BMS. START-STOP SWITCH SHALL ALSO BE USED AS AN EMERGENCY SHUT-OFF SWITCH AND THEREFORE SHALL BE LOCATED AT THE BOILER ROOM ENTRANCE. WHEN START-STOP SWITCH IS IN THE "STOP" POSITION ALL BOILERS AND CORRESPONDING PRIMARY CIRCULATING PUMPS SHALL BE DE-ENERGIZED AND ALL CONTROLS SHALL BE IN THEIR NORMALLY CLOSED POSITION.
3. WHEN START-STOP SWITCH IS IN THE START POSITION AND THE BMS IS CALLING FOR BOILER OPERATION THE LEAD BOILER CIRCULATION PUMP SHALL START. WHEN FLOW HAS BEEN PROVEN VIA THE BOILER PROVIDED FLOW SENSOR ASSOCIATED WITH THE CORRESPONDING BOILER THE BOILER SHALL BE FIRED THROUGH THE BOILER CONTROL SYSTEM TO MAINTAIN A SUPPLY WATER TEMPERATURE OF 140°F (ADJ) AS MEASURED FROM TEMPERATURE SENSOR TT-2. IF LEAD BOILER CIRCULATION PUMP OR LEAD BOILER FAILS TO START AN ALARM SHALL BE GENERATED AND THE LAG BOILER RECIRCULATION PUMP AND LAG BOILER SHALL START.
4. LOSS OF FLOW THROUGH THE BOILER SHALL DE-ENERGIZE THE BOILER. THE BOILER CONTROL SYSTEM SHALL PROVIDE ALL OPERATING FUNCTIONS, SAFETY PROVISIONS, CONTROL ANNUNCIATION, AND BOILER DIAGNOSTICS. THE BOILER CONTROL SYSTEM SHALL INTERFACE WITH THE BMS THROUGH A COMMUNICATION MODULE. ALL SAFETY ALARMS, CONTROL ANNUNCIATIONS, AND BOILER DIAGNOSTICS PROVIDED BY THE BOILER CONTROL SYSTEM SHALL BE INDICATED ON THE BMS.
5. TEMPERATURE SENSORS TT-1 AND TT-2 IN HVAC HEATING HOT WATER PIPING SHALL PROVIDE CONTINUOUS TEMPERATURE INDICATION ON THE BMS.
6. IF START-STOP SWITCH IS SWITCHED TO THE STOP POSITION OR THE BMS IS TERMINATING OPERATION OF THE BOILER THE BOILER CONTROL SYSTEM SHALL DE-ENERGIZE THE BOILER IN THE PROPER SEQUENCE.
7. THE ABMS SHALL DETERMINE THE MOST EFFICIENT BOILER(S) FIRING OPERATION AND SHALL ENABLE AND DISABLE BOILERS AS REQUIRED. BOILER AND CORRESPONDING HEATING HOT WATER PRIMARY PUMP STATUS SHALL BE INDICATED ON THE BMS.

C. HEATING HOT WATER SYSTEM SECONDARY DISTRIBUTION PUMP OPERATION:

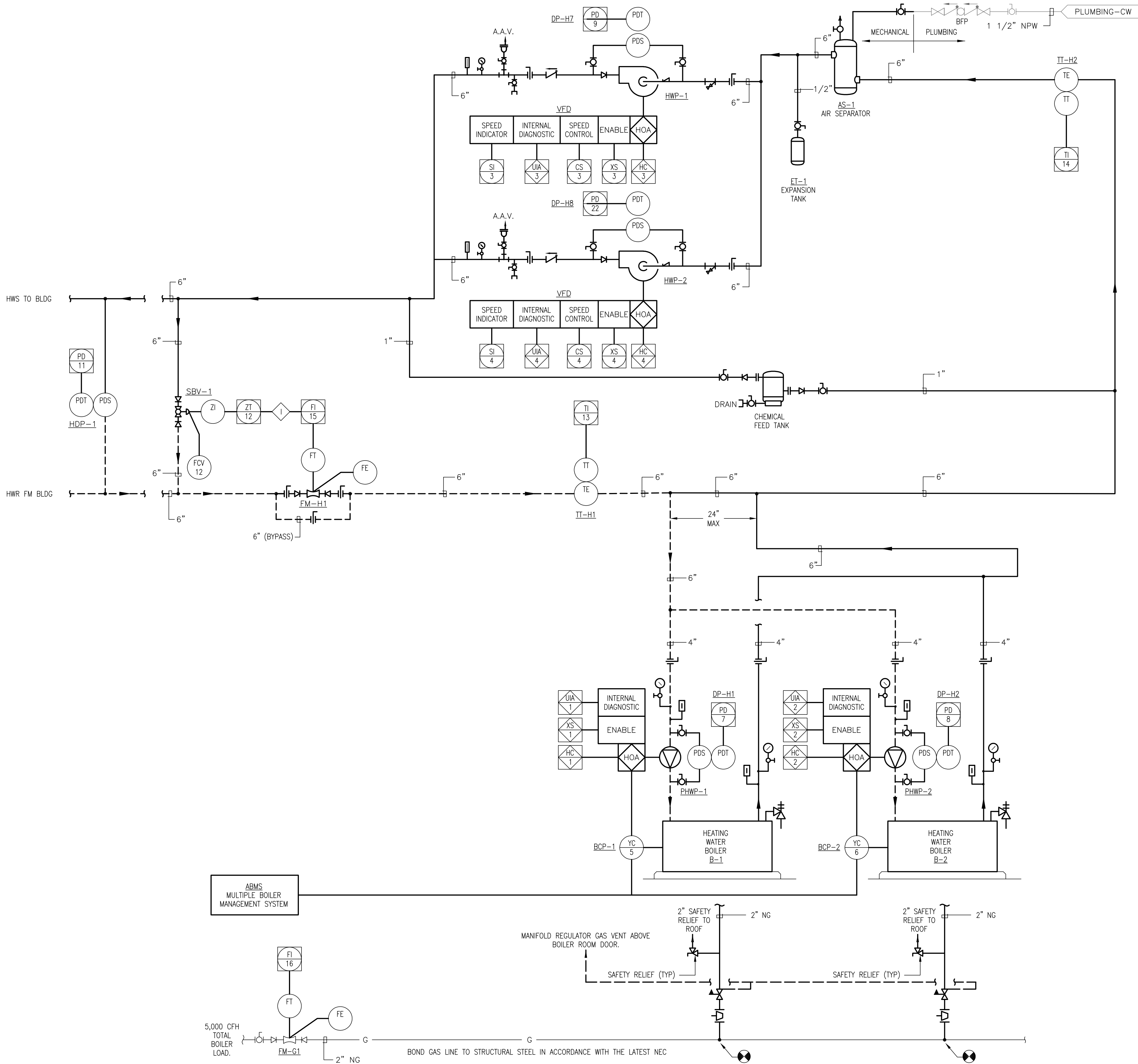
1. HVAC HEATING HOT WATER SECONDARY DISTRIBUTION PUMPS HWP-1 AND HWP-2 SHALL BE STARTED MANUALLY OR THROUGH THE BMS. HWP-1 AND HWP-2 ARE REDUNDANT AND SHALL BE PROGRAMMED FOR LEAD/LAG OPERATION. IF THE LEAD PUMP FAILS OR FAILS TO START AS SENSED BY ITS DIFFERENTIAL PRESSURE SENSOR, THE LAG PUMP SHALL AUTOMATICALLY START AND RUN CONTINUOUSLY. A FAILURE OF ANY DISTRIBUTION PUMP HWP-1 AND HWP-2 AS SENSED BY THEIR RESPECTIVE DIFFERENTIAL PRESSURE SENSORS SHALL BE ALARMED ON THE BMS.
2. THE LEAD PUMP VFD SHALL MODULATE PUMP SPEED TO MAINTAIN THE DOWNSTREAM DIFFERENTIAL PRESSURE SET POINT (ADJ) AS SENSED BY HDP-1. AN INCREASE IN DIFFERENTIAL PRESSURE SHALL CAUSE THE VFD TO SLOW DOWN AND A FALL IN DIFFERENTIAL PRESSURE SHALL CAUSE THE VFD TO SPEED UP. WHEN THE LEAD SECONDARY PUMP HAS BEEN OPERATING AT 100% FLOW RATE OF 575 GPM (ADJ) AS SENSED BY FLOW METER FM-H1 FOR 10 MINUTES (ADJ) THE LAG PUMP SHALL START. THE LAG PUMP SHALL START AT SLOW SPEED AND SLOWLY RAMP UP WHILE THE LEAD PUMP SIMULTANEOUSLY SLOWLY RAMPS DOWN UNTIL BOTH PUMPS ARE OPERATING AT THE SAME SPEED. PUMPS IN PARALLEL SHALL MODULATE TO MAINTAIN THE SYSTEM DIFFERENTIAL SET POINT AS SENSED BY HDP-1. WHEN SYSTEM FLOW RATE DROPS TO 550 GPM (ADJ) AS SENSED BY FLOW METER FM-H1 FOR A PERIOD OF 10 MINUTES (ADJ) THE LAG PUMP SHALL TURN OFF AND THE LEAD PUMP SHALL MODULATE TO MAINTAIN SYSTEM DIFFERENTIAL SET POINT.
3. THE BAS SHALL MONITOR ALL HEATING HOT WATER CONTROL VALVES IN 5 MINUTE INTERVALS (ADJ) AND RESET THE DIFFERENTIAL SET POINT SUCH THAT THE HEATING HOT WATER CONTROL VALVE WITH THE MOST DEMAND IS OPEN BETWEEN 80% AND 85% OPEN (ADJ). LOGIC SHALL ALLOW REMOVAL OF ANY HEATING CONTROL VALVE FROM THE DEMAND CALCULATION TO ACCOUNT FOR PROBLEM AREAS.
4. AUTOMATIC BYPASS VALVE SBV-1 SHALL MODULATE OPEN WHEN SYSTEM FLOW RATE AS SENSED BY FLOW METER FM-H1 FALLS BELOW 195 GPM (ADJ) AND SHALL REMAIN OPEN UNTIL FLOW RATE INCREASES TO 210 GPM (ADJ) AT WHICH TIME SBV-1 SHALL CLOSE.

D. BOILER FUEL SYSTEMS:

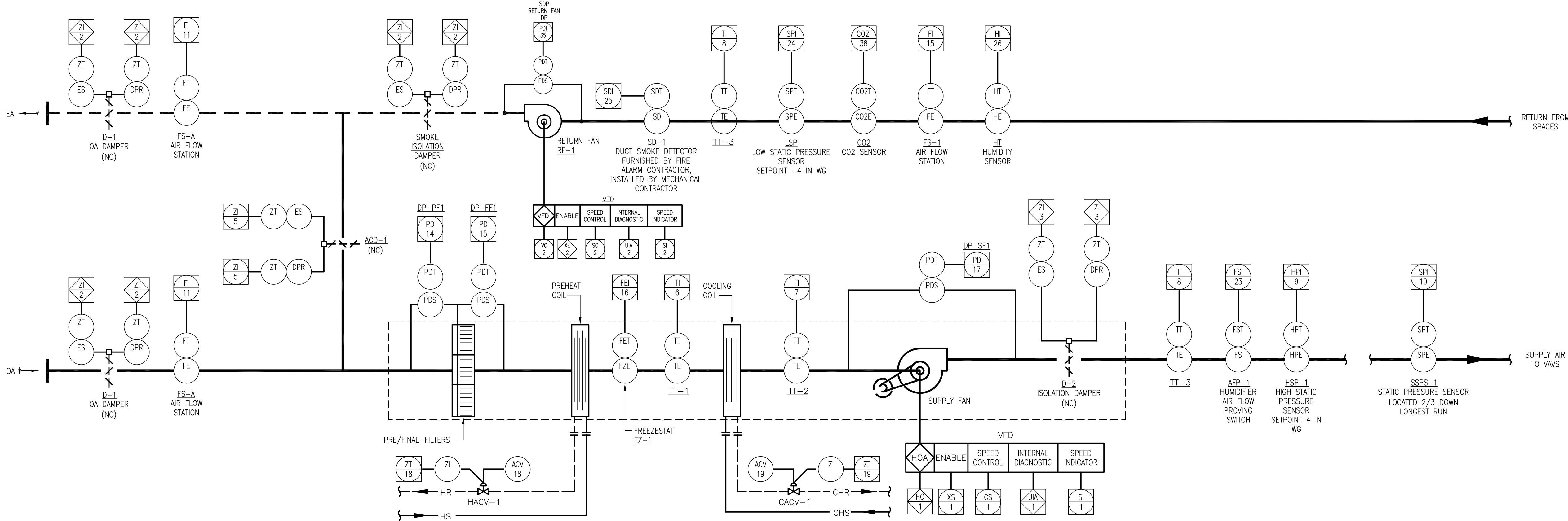
2. THE BOILERS MANAGEMENT CONTROL SYSTEM SHALL CONTROL ALL FUNCTIONS OF MANUFACTURER SUPPLIED GAS TRAIN. GAS FLOW METER FM-G1 SHALL MEASURE AND TOTALIZE GAS CONSUMPTION VIA LON OR BACNET INTERFACE TO THE BMS.

E. BOILER EMERGENCY SHUT DOWN PROVISION

1. WHEN THE EMERGENCY STOP BUTTON IS ACTIVATED, ALL BOILERS, PRIMARY PUMPS AND SECONDARY PUMPS SHALL SHUTDOWN. MANUAL RESET EITHER LOCALLY OR VIA THE BMS SHALL BE REQUIRED.



INPUT/OUTPUT SUMMARY													
POINT NO.	SYSTEM APPARATUS OR AREA POINT DESCRIPTION	INPUTS											
		ANALOG						BINARY					
		MEASURED						LOGIC					
		SPEED (FEET)	VOLTS	AMPS	KN	CHARGE POSITION	TEMPERATURE	STATUS PRESSURE	INLET TEMPERATURE	OUTLET TEMPERATURE	OUTLET TEMPERATURE	STATUS (GPM)	STATUS (GPM)
1, 2	HOT WATER PRIMARY PUMPS (PHWP-1 & PHWP-2)	X	X	X								X	X
3, 4	HOT WATER SECONDARY PUMPS (HWP-1 & HWP-2)	X	X	X	X							X	X
5, 6	BOILER CONTROL PANEL (BCP-1 & BCP-2)											X	X
7, 8, 9, 10	DIFFERENTIAL PRESSURE SENSOR (DP-H1, DP-H2, DP-H7, AND DP-H8)						X					X	X
11	SECONDARY DIFFERENTIAL PRESSURE SENSOR (HDP-1)						X					X	X
12	SECONDARY BYPASS VALVE (SBV-1)					X						X	X
13, 14	TEMPERATURE TRANSMITTER (TT-H1, TT-H2)					X						X	X
15, 16	FLOW METER (FM-H1, FM-G1)							X	X			X	X



TYPICAL AIR HANDLING UNIT SEQUENCE OF OPERATION (TYP OF 2)

A. GENERAL:

- SEE PLANS FOR LOCATIONS OF ALL ROOM THERMOSTATS, DAMPERS, VALVES, AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, BUT ARE REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED AND LOCATED IN THE FIELD BY THE ENGINEER.
- ADJUSTABLE FREEZESTAT SHALL BE PROVIDED FOR PREHEAT COIL AND SHALL DE-ENERGIZE THE AIR HANDLING SYSTEM WHEN THE ADJUSTABLE SET POINT OF THIRTY-FIVE (35) DEGREES FAHRENHEIT IS REACHED. WHEN FREEZESTAT SET POINT IS REACHED, OUTDOOR AIR DAMPERS SHALL FULLY CLOSE AND BE PROVEN CLOSED BY END SWITCH, HEATING COIL CONTROL VALVES SHALL OPEN TO 100% (ADJ), COOLING COIL CONTROL VALVE SHALL OPEN TO 50% (ADJ) OPEN, SUPPLY FANS SHALL BE DISABLED AND ALARM SHALL BE GENERATED TO THE BMS.
- ALL TEMPERATURE, HUMIDITY, PRESSURE, AND TIME SET POINTS SHALL BE FULLY ADJUSTABLE FROM THE BMS.
- THE SEQUENCES OUTLINED BELOW SHALL BE DESCRIBED AS AHU-1 AND SHALL BE APPLICABLE TO AHU-1 AND AHU-2.
- WHEN THE UNIT IS DE-ENERGIZED, SUPPLY FAN SHALL BE OFF, OUTSIDE DAMPER D-1 AND SUPPLY ISOLATION DAMPER D-2 SHALL BE CLOSED, AUTOMATIC CONTROL DAMPERS ACD-1 SHALL BE OPEN, AUTOMATIC CONTROL DAMPER ACD-2 SHALL BE CLOSED, COOLING COIL CONTROL VALVE CACV-1 SHALL BE CLOSED AND HEATING COIL CONTROL VALVE HACV-1 SHALL MODULATE AS REQUIRED TO MAINTAIN 60° F (ADJ) AS SENSED BY TEMPERATURE SENSOR TT-1.
- THE BMS SHALL AVERAGE THE RELATIVE HUMIDITY AS SENSED BY DUCT MOUNTED HUMIDITY SENSORS H-1A & H-1B FOR CONTROL PURPOSES. H-1A & H-1B SHALL BE DISPLAYED ON THE GRAPHICS ALONG WITH AVERAGED CONTROL VALUE. WHEN THE DIFFERENCE IN READINGS BETWEEN H-1A AND H-1B EXCEED 10% RH (ADJ) AN ALARM SHALL BE GENERATED TO THE BMS TO INFORM OWNER THAT SENSOR(S) ARE OUT OF CALIBRATION.

B. SUPPLY AIR TEMPERATURE RESET CONTROL:

- DISCHARGE AIR TEMPERATURE SET POINT AS SENSED BY TEMPERATURE SENSOR TT-3 SHALL BE RESET BASED ON THE OUTDOOR AIR TEMPERATURE AS SENSED THROUGH THE GLOBAL OUTSIDE AIR TEMPERATURE TRANSMITTER (SEE CHILLED WATER SCHEMATIC). WHEN THE OA TEMPERATURE IS 45°F OR LESS (ADJ) THE DISCHARGE AIR TEMPERATURE SHALL BE 60°F (ADJ). WHEN OUTDOOR AIR TEMPERATURE IS 55°F (ADJ) OR GREATER DISCHARGE AIR TEMPERATURE SET POINT SHALL BE 55°F (ADJ). DISCHARGE AIR TEMPERATURE SHALL RESET LINEAR FROM 60°F (ADJ) TO 55°F (ADJ) BETWEEN OUTDOOR AIR TEMPERATURES >45°F (ADJ) AND <55°F (ADJ). COOLING COIL AUTOMATIC CONTROL VALVE AND HEATING COIL AUTOMATIC CONTROL VALVE SHALL MODULATE AS REQUIRED TO MAINTAIN SUPPLY AIR TEMPERATURE SET POINT AS SENSED BY TEMPERATURE SENSOR TT-3.

C. OA SYSTEM VENTILATION OPTIMIZATION:

- THE AHU OUTDOOR AIR DAMPER SHALL BE CONTROLLED TO DELIVER REQUIRED OUTDOOR AIRFLOW AT ALL LOAD CONDITIONS. THE OUTDOOR AIRFLOW SET POINT SHALL BE DETERMINED PER THE OUTDOOR AIR CONTROL USING DYNAMIC RESET AND DEMAND CONTROLLED VENTILATION SEQUENCE.
 - WHEN THE SYSTEM(S) ARE IN OCCUPIED MODE AND NON-ECONOMIZER MODE THE OA SYSTEM VENTILATION OPTIMIZATION SEQUENCE SHALL BE INCORPORATED.
 - PRIOR TO FINAL SYSTEM ACCEPTANCE, A CONTRACTOR SHALL PROVIDE A TREND LOG OF ACTUAL SYSTEM OPERATION TO THE ENGINEER AND OWNER. OPERATING CONDITIONS TO BE LOGGED INCLUDE: HIGHEST ZONE OUTDOOR AIR FRACTION, TOTAL SYSTEM PRIMARY AIRFLOW, CALCULATED OUTDOOR AIRFLOW SET POINT FOR THE SYSTEM, AND THE ACTUAL MEASURED OUTDOOR AIRFLOW. THESE CONDITIONS MUST BE LOGGED AT 15-MINUTE INTERVALS OVER A TYPICAL 48-HOUR PERIOD.
- D. SUPPLY FAN CONTROL:
- WHEN AIR HANDLING UNIT IS COMMANDED ON EITHER LOCALLY OR VIA THE CCMS, ISOLATION SMOKE DAMPERS SD-1 AND SD-2 SHALL OPEN. ONCE SD-1 AND SD-2 ARE PROVEN OPEN BY THEIR RESPECTIVE END SWITCHES, RETURN FAN SHALL START AT MINIMUM SPEED (SEE RETURN FAN PARAGRAPH "E" FOR RETURN FAN OPERATION). ONCE RETURN FAN IS PROVEN ON VIA ITS DIFFERENTIAL PRESSURE SWITCH, SUPPLY FAN SHALL START AFTER A 30 SECOND DELAY (ADJ). SUPPLY FAN VFD SHALL START AT LOW SPEED AND BE MODULATED TO MAINTAIN SUPPLY DUCT STATIC PRESSURE SET POINT AS SENSED BY SSPS-1.
 - SUPPLY FAN DISCHARGE DUCT STATIC PRESSURE SETPOINT SHALL BE RESET UPWARD BY 0.1 IN. W.G. (ADJ.), AT A FREQUENCY OF 15 MINUTES (ADJ.) UNTIL NO VAV DAMPER IS MORE THAN 85% OPEN (ADJ.) OR THE STATIC PRESSURE SETPOINT HAS RESET UPWARD TO THE SYSTEM MAXIMUM DUCT STATIC PRESSURE SETPOINT OF 3.0 IN. W.G. (ADJ.) OR THE AHU VARIABLE-FREQUENCY DRIVE IS AT THE MAXIMUM SPEED SETTING.
 - THE CONTROL BANDS, SETPOINT INCREMENT VALUES, SETPOINT DECREMENT VALUES AND ADJUSTMENT FREQUENCIES SHALL BE ADJUSTED TO MAINTAIN MAXIMUM STATIC PRESSURE OPTIMIZATION WITH STABLE SYSTEM CONTROL AND MAXIMUM COMFORT CONTROL.
 - THE CCMS SHALL HAVE THE CAPABILITY TO ALLOW THE OPERATOR TO EXCLUDE "PROBLEM" ZONES THAT SHOULD NOT BE CONSIDERED WHEN DETERMINING THE OPTIMIZED SETPOINT.
 - THE CCMS SHALL ALSO READ THE STATUS OF THE SUPPLY AIR STATIC PRESSURE SENSOR AND DISPLAY THE ACTIVE DUCT STATIC PRESSURE READING ON THE STATUS SCREEN.
 - THE CCMS SHALL BE PROGRAMMED TO IDENTIFY, AND DISPLAY TO THE USER, THE VAV BOX THAT SERVES THE CRITICAL ZONE (THAT IS, THE ZONE WITH THE MOST WIDE-OPEN VAV DAMPER). THIS INFORMATION SHALL UPDATE DYNAMICALLY AS THE LOCATION OF THE CRITICAL ZONE CHANGES BASED ON BUILDING LOAD, AND DUCT STATIC PRESSURE SETPOINT OPTIMIZATION CONTROL.
 - DURING THE COMMISSIONING PROCESS, THE CONTROLS CONTRACTOR SHALL DEMONSTRATE THE PERFORMANCE OF FAN PRESSURE OPTIMIZATION.

E. RETURN FAN CONTROL:

- RETURN FAN SHALL BE STARTED AT MINIMUM SPEED WHEN THE UNIT IS COMMANDED ON EITHER LOCALLY OR VIA THE CCMS. ONCE SUPPLY FAN IS PROVEN ON IN OCCUPIED MODE, RETURN FAN VIA AIR FLOW STATION ES-1 SHALL TRACK SUPPLY FAN AIR FLOW AS MEASURED BY AIR FLOW STATION ES-4. IN UNOCCUPIED MODE, RETURN FAN VIA AIRFLOW STATION FS-1 SHALL TRACK SUPPLY FAN AIR FLOW AS MEASURED BY AIR FLOW STATION ES-4. WHEN THE UNIT IS COMMANDED OFF EITHER LOCALLY OR VIA THE CCMS SUPPLY FAN SHALL STOP AND RETURN FAN SHALL STOP AFTER A 30 SECOND DELAY (ADJ).

F. ECONOMIZER:

- WHEN OA TEMPERATURE FALLS BELOW 60°F (ADJ) AND ABOVE 55°F (ADJ) THE ECONOMIZER MODE SHALL BE ENABLED. IN ECONOMIZER MODE OA DAMPER D-1 SHALL BE OPEN TO ITS MAXIMUM PREDETERMINED POSITION. MIXED AIR DAMPER D-3 SHALL FULLY CLOSE AND RELIEF DAMPER D-2 SHALL FULLY OPEN. OTHERWISE THE UNIT SHALL OPERATE IN ITS NORMAL OPERATIONAL SEQUENCE. WHEN OA TEMPERATURE IS 55°F (ADJ) OR LESS AND GREATER THAN 45°F (ADJ) THE UNIT SHALL BE IN PARTIAL ECONOMIZER MODE. THE BMS SHALL OPEN OA DAMPER D-1 TO ITS MAXIMUM PREDETERMINED POSITION, MIXED AIR DAMPER D-3 AND RELIEF DAMPER D-2 IN UNISON TO MAINTAIN MIXED AIR TEMPERATURE OF 53°F (ADJ) AS DETERMINED BY TEMPERATURE SENSOR TT-3.

G. DEHUMIDIFICATION CONTROL:

- THE AHU SHALL BE PLACED IN DE-HUMIDIFICATION MODE WHEN THE EXHAUST AIR DEW HUMIDITY AS SENSED BY H-1A & H-1B RISES ABOVE SET POINT OF 55% RH (ADJ). THE CHILLED WATER CONTROL VALVE CACV-1 SHALL BE OVERDRIVEN TO OBTAIN 33°F SUPPLY AIR TEMPERATURE (ADJ) AS SENSED BY TT-3. ONCE THE EXHAUST AIR HUMIDITY FALLS BELOW SET POINT CACV-1 SHALL RETURN TO NORMAL CONTROL. DEHUMIDIFICATION MODE SHALL BE DISABLED WHEN H-1A & H-1B ARE IN CALIBRATION ALARM.

H. SAFETIES

- THE FOLLOWING SAFETIES SHALL DE-ENERGIZE THE SUPPLY AND RETURN FANS, CLOSE OUTSIDE AIR AND ISOLATION DAMPERS AND GENERATE AN ALARM TO THE BMS:
 - FREEZESTAT -- SETPOINT 35°F (ADJ)
 - SHUTDOWN SIGNAL FROM THE FIRE ALARM SYSTEM
 - DISCHARGE HIGH STATIC PRESSURE SWITCH @ 4" WC (ADJ).
 - RETURN AIR HIGH NEGATIVE PRESSURE SWITCH @ 4" WC NEG. (ADJ).
 - FAN FAILURE
 - OA OR ISOLATION DAMPER END SWITCHES.
- ALL SAFETIES REQUIRE MANUAL RESET EITHER LOCALLY OR VIA THE BMS.

I. ADDITIONAL ALARMS:

- A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR FILTER LOADING AND GENERATE AN ALARM UPON ACTIVATION.

INPUT/OUTPUT SUMMARY																																			
POINT NO.	SYSTEM APPARATUS OR AREA POINT DESCRIPTION	INPUTS										OUTPUTS				SYSTEM FEATURES				GENERAL															
		ANALOG					CALC.	BINARY	BINARY	ANALOG	ALARMS	PROGRAMS																							
		SPEED (RPM)	AMPS	KWH	TEMPERATURE	STATIC PRESSURE							DIFFERENTIAL PRESSURE	RELATIVE HUMIDITY (DUCT)	RELATIVE HUMIDITY (OUTDOOR AIR)	WAVE POSITION	VALVE POSITION	RUN TIME	ENTHALPY	STATUS (DIFF. PRESS.)	DAMPER POSITION	DAMPER POSITION	DAMPER POSITION	WAVE POSITION	SSR STATUS	LOW TEMP. LIMIT	HIGH/LOW HUM. LIMIT	HIGH PRESS. LIMIT	FREEZESTAT	SMOKE DETECTION	TIME SCHEDULING	ALTERNATE	TIME DELAY START	TIME DELAY STOP	ALARM(S)
1	SUPPLY FAN (VFD)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X											X	X	1	X	X	
2	OUTSIDE AIR DAMPER (D-1)																												X	X	5	X	X		
3	SUPPLY ISOLATION DAMPERS (D-2)																												X	X	5	X	X		
4, 5	AUTOMATIC CONTROL DAMPERS (ACD-1, ACD-2)																												X	X	5	X	X		
6, 7, 8	TEMPERATURE SENSOR (TT-1, TT-2, TT-3)				X																									X	X	5	X	X	
9	DUCT HIGH STATIC PRESSURE (HSP-1)						X																						X			X	1	X	X
10	SUPPLY DUCT STATIC PRESSURE (SSPS-1)						X																									1	X	X	
11, 12, 13	COMMON AIR FLOW STATION (FS-A, FS-B, FS-C))				X							X																				1	X		
14, 15	FILTER AIR DIFFERENTIAL PRESSURE (DP-PF1, DP-FF1)						X																						X			X	X		
16	FREEZESTAT (FZ-1)																												X			X	X		
17	FAN DIFFERENTIAL PRESSURE (DP-SF1)						X																						X			X	X		
18, 19	AUTOMATIC CONTROL VALVE (HACV-1, CACV-1)																																1	X	X
20, 21	RETURN AIR HUMIDITY SENSOR (H-1A, H-1B)								X										X										X		X	X	1	X	X
25	RETURN DUCT SMOKE DETECTOR (SD-1)																												X				X	X	

FAN COIL UNIT SEQUENCE OF OPERATION

GENERAL:

- A. SEE PLANS FOR LOCATIONS OF ALL DAMPERS AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, BUT ARE REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED BY THE CONTRACTOR AND LOCATED IN THE FIELD BY THE ENGINEER.
- B. FAN COIL UNIT SHALL BE PROVIDED WITH HOA SWITCH. FAN SHALL BE OPERABLE LOCALLY OR VIA THE BMS.
- C. SUPPLY AIR FAN SHALL START AND COOLING COIL CONTROL VALVE, AOV-FCU SHALL MODULATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE OF 75°F (AOV) AS SENSED BY 1-FCU. IF SPACE TEMPERATURE EXCEEDS 80°F (AOV) AN ALARM SHALL BE SENT TO THE BMS.
- D. UNIT SHALL OPERATE 24/7/365.

TYPICAL EXHAUST FAN SYSTEM SEQUENCE OF OPERATION

GENERAL:

- A. SEE PLANS FOR LOCATIONS OF ALL DEVICES AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, BUT ARE REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED BY CONTRACTOR AND LOCATED IN THE FIELD BY THE ENGINEER. EXHAUST FANS SHALL SHUT DOWN UPON FIRE ALARM.
- B. ACD-51 OPERATION: AUTOMATIC CONTROL DAMPER SHALL OPEN WHEN CORRESPONDING EXHAUST FAN(S) ARE ENABLED AND SHALL CLOSE WHEN CORRESPONDING EXHAUST FAN(S) ARE DISABLED. IF ANY AUTOMATIC OPERATING EXHAUST FAN(S) TO OPEN OR CLOSE AS DETERMINED BY THEIR RESPECTIVE END SWITCHES AN ALARM SHALL BE SENT TO THE BMS.
- C. WHEN FAN SWITCH IS IN OFF, FAN SHALL BE ON AND BMS CONTROL SHALL BE DISABLED. WHEN HOA SWITCH IS IN HAND THE FAN SHALL BE ON AND BMS CONTROL SHALL BE DISABLED. WHEN HOA SWITCH IS IN AUTO FAN SHALL OPERATE VIA BMS CONTROL.
- D. EXHAUST FAN(S) SHALL BE ENABLED DURING OCCUPIED PERIODS AND DISABLED DURING UNOCCUPIED PERIODS BY THE BMS.

SPLIT SYSTEM CU-S1/DSS-1 SEQUENCE OF OPERATION

GENERAL:

- A. SEE PLANS FOR LOCATIONS OF ALL EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, BUT ARE REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED BY THE CONTRACTOR AND LOCATED IN THE FIELD BY THE ENGINEER.
- B. UNIT SHALL SHALL BE PROVIDED WITH HOA SWITCH AND SHALL RUN CONTINUOUSLY 24/7/365. UNIT SHALL BE PROVIDED WITH FACTORY CONTROLLER (SSC-1) AND ROOM T-STAT. SYSTEM SHALL BE CONTROLLED VIA SSC-1. UNIT SHALL BE OPERABLE LOCALLY OR VIA THE BAS VIA COMMUNICATION INTERFACE WITH SSC-1.
- C. AN ALARM SHALL BE GENERATED TO THE BAS WHENEVER THE UNIT INTERNAL DIAGNOSTIC ALARMS.
- D. SPACE TEMPERATURE SHALL BE ADJUSTABLE EITHER LOCALLY OR VIA THE BMS THROUGH THE UNIT CONTROLLER SSC-1.
- E. ON COMPRESSOR CL-1 SHALL MODULATE AS REQUIRED TO SATISFY DSS-1 DEMAND. DSS-1 SHALL CYCLE ON WHEN RESPECTIVE SPACE CALLS FOR COOLING AND SHALL BE OFF WHEN RESPECTIVE SPACE TEMPERATURE SET POINT OF 75° (ADJ) IS SATISFIED. IF SPACE TEMPERATURE EXCEEDS 80° (ADJ) AT ALARM SHALL BE SENT TO THE BMS.

TYPICAL TERMINAL UNIT (VAV) SEQUENCE OF OPERATION

GENERAL:

- A. SEE PLANS FOR LOCATIONS OF ALL DAMPERS AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, BUT ARE REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED BY THE CONTRACTOR AND LOCATED IN THE FIELD BY THE ENGINEER.
- B. EACH VAV ZONE SHALL BE PROVIDED WITH INDEPENDENT OCCUPANCY SCHEDULE (OCCUPIED/UNOCCUPIED/WARMUP).
- C. EACH VAV ZONE SHALL BE PROVIDED WITH INDEPENDENT THERMOSTAT SCHEDULE FOR OCCUPIED TEMPERATURE SET POINT UNOCCUPIED (NIGHT SET BACK) TEMPERATURE SET POINT.

OCCUPIED MODE:

- A. UPON A RISE IN SPACE TEMPERATURE THE VARIABLE VOLUME TERMINAL UNIT (VAV) SHALL MODULATE OPEN TO ITS MAXIMUM AIR FLOW SET POINT AS INDICATED ON THE SCHEDULES AS REQUIRED TO MAINTAIN THE ROOM TEMPERATURE SET POINT OF 75°F (ADJ). UPON A FALL IN SPACE TEMPERATURE THE VAV SHALL MODULATE CLOSED TO ITS MINIMUM AIR FLOW SETPOINT AS INDICATED ON THE SCHEDULES. IF THE VAV IS AT ITS MINIMUM AIR FLOW SET POINT AND SPACE TEMPERATURE CONTINUES TO FALL THE HEATING COIL AUTOMATIC CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN ROOM TEMPERATURE SET POINT OF 70°F (ADJ).

UNOCCUPIED MODE:

- A. AIR HANDLING UNIT SERVING THE VAVS SHALL BE OFF DURING UNOCCUPIED MODE. IF ROOM TEMPERATURE RISES TO 80°F (ADJ.) CORRESPONDING AIR HANDLING UNIT SHALL BE COMMANDED ON AND THE VAV SHALL MODULATE OPEN AS REQUIRED TO LOWER ROOM TEMPERATURE TO 75°F (ADJ.). ONCE ROOM TEMPERATURE IS SATISFIED A SIGNAL SHALL BE SENT TO THE CORRESPONDING AIR HANDLING UNIT TO SHUT DOWN. IF ROOM TEMPERATURE FALLS TO 60°F (ADJ.) CORRESPONDING AIR HANDLING UNIT SHALL BE COMMANDED ON AND THE VAV SHALL GO TO ITS MINIMUM AIR FLOW POSITION AS INDICATED ON THE SCHEDULES AND THE HEATING COIL AUTOMATIC CONTROL VALVE SHALL MODULATE OPEN AS REQUIRED TO RAISE ROOM TEMPERATURE TO 65°F (ADJ.). ONCE ROOM TEMPERATURE IS SATISFIED A SIGNAL SHALL BE SENT TO CORRESPONDING AIR HANDLING UNIT TO SHUT DOWN.

MORNING WARM UP & COOL DOWN:

- A. VAVS SHALL OPEN TO THEIR MAXIMUM POSITION DURING MORNING WARM UP AND COOL DOWN. REHEAT CONTROL VALVE SHALL MODULATE AS REQUIRED TO MEET INDIVIDUAL ROOM OCCUPIED TEMPERATURE SET POINT.

CO2 OVERRIDE:

- A. FOR SPACES WITH WALL MOUNTED CO2 SENSORS, THE VAV AIRFLOW SHALL BE OVERRIDDEN TO MAINTAIN THE DESIGN CO2 SETPOINT.

[illegible]

AIR HANDLING UNIT SCHEDULE																																	
DESIGNATION	SERVICE	FAN SECTION				COOLING SECTION										HEATING SECTION						ELECTRICAL				APPROX WEIGHT (LBS)	BASIS OF DESIGN	REMARKS					
		CFM	MIN. OA CFM	ESP INCH H ₂ O	MOTOR NO. HP	EAT °F DB	WB	LAT °F DB	WB	TOTAL MBH	SENS MBH	GPM @ 42°F 54°F	EWL LWT	MAX H ₂ O PD FT	MIN TOTAL FACE AREA (SF)	MAXIMUM FACE VEL FPM	MIN ROWS	EAT °F	LAT °F	MBH @180°F	GPM @30°F ΔT	MAXIMUM H ₂ O PD FT	MAXIMUM AIR PD IN H ₂ O	MIN TOTAL FACE AREA (SF)	MAXIMUM FACE VEL FPM				MIN ROWS	V/PH/Hz	FLA	MCA	MOCP
AHU-1	TICKETING	11,645	3,585	2.0	2	8.0	80.6	66.8	52.35	52.25	545.0	321.7	95.90	8.0	24.08	490	8	58.9	80.0	266.0	29.44	2.0	0.1	24.08	490	1	480/3/60	22.3	27.6	45.0	3436	TRANE CSAA - SIZE 25	1, 2, 3, 4
AHU-2	BAGGAGE CLAIM	14,700	4,549	4.0	2	13.0	80.6	66.8	52.0	51.90	687.96	406.1	150.64	18.5	33.53	500	8	58.9	85.0	406.1	38.37	3.0	0.1	32.63	500	1	480/3/60	35.3	43.8	70.0	4640	TRANE CSAA - SIZE 35	1, 2, 3, 4
AHU-B-12	TSA SUITE (EXTERIOR)	1,200	140	0.8	1	0.5	77.0	64.0	55.6	54.9	77.03	56.16	9.27	10.0	4.0	500	4	69.1	103.0	49.25	3.28	5.0	5.0	4.0	500	1	208/1/60	4.26	5.33	15.0	221	TRANE BCHD - SIZE 54	1, 4, 5, 6
AHU-B-13	TSA SUITE (INTERIOR)	1,200	140	0.8	1	0.5	77.0	64.0	55.6	54.9	77.03	56.16	9.27	10.0	4.0	500	4	69.1	103.0	49.25	3.28	5.0	5.0	4.0	500	1	208/1/60	4.26	5.33	15.0	221	TRANE BCHD - SIZE 54	1, 4, 5, 6

1. PROVIDE VFD W/DISCONNECT & BYPASS W/BACNET INTERFACE.
2. 2" PLEATED 30% (MERV 8) AND 12" RIGID 95% (MERV 15) FILTERS
3. PROVIDE 6" BAC RAIL.
4. SEE SPECIFICATION 23 73 13 FOR EQUIVALENT MANUFACTURERS.
5. SUPPORT AHU FROM STRUCTURE ABOVE
6. PROVIDE 2" PLEATED MERV 13 FILTER

FAN COIL UNIT SCHEDULE																												
DESIGNATION	SERVICE	FAN SECTION						COOLING SECTION										HEATING SECTION							ELECTRICAL V/PH/Hz	APPROX WEIGHT (LBS)	BASIS OF DESIGN	REMARKS
		CFM	FLA	ESP INCH H ₂ O	MOTOR NO.	WATTS OR HP		EAT °F	WB	LAT °F	WB	TOTAL MBH	SENS MBH	GPM @34°F	ΔT	EWI LWT	MAX H ₂ O PD FT	PD H ₂ O	ROWS	EAT °F	LAT °F	MBH @180°F EWI	GPM @30°F ΔT	MAXIMUM H ₂ O PD FT				
FCU-1A	MECHANICAL	A128	560	1.6	0.00	1	1/10	80	67	55.1	54.1	16.3	11.3	2.80	4.90	4	60	110.1	30.3	2.0	2.78	0.13	2	115/1/60	192	TITUS THBE-30	1, 2, 3, 4, 5, 6	
FCU-1B	MECHANICAL	A129	560	1.6	0.00	1	1/10	80	67	55.1	54.1	16.3	11.3	2.80	4.90	4	60	110.1	30.3	2.0	2.78	0.13	2	115/1/60	192	TITUS THBE-30	1, 2, 3, 4, 5, 6	
FCU-2A	MECHANICAL	C117	560	1.6	0.00	1	1/10	80	67	55.1	54.1	16.3	11.3	2.80	4.90	4	60	110.1	30.3	2.0	2.78	0.13	2	115/1/60	192	TITUS THBE-30	1, 2, 3, 4, 5, 6	

1. HORIZONTAL EXPOSED CABINET 4-PIPE FANCOIL W/1" PLATED FILTER MERV 6, SS DRAIN PAN, 1" CLOSED CELL CABINET INSULATION AND TRACER ZN520 UNIT CONTROLLER W/DEHUMIDIFICATION CONTROL.
2. PROVIDE SINGLE POINT ELECTRICAL CONNECTION W/NEMA-3X STARTER & DISCONNECT AND TERMINAL STRIP FOR VALVE AND FAN SPEED WIRING TERMINATION.
3. PROVIDE 3 SPEED DIRECT DRIVE FAN CONTROL.
4. PROVIDE MOUNTING KIT WITH SPRING ISOLATORS.
5. SEE SPECIFICATION 23 82 19 FOR EQUIVALENT MANUFACTURERS.
6. ON EMERGENCY POWER.

DUCTLESS SPLIT SYSTEM SCHEDULE															
DESIGNATION	SERVICE	INDOOR FAN COIL UNIT							OUTDOOR CONDENSING UNIT					BASIS OF DESIGN	REMARKS
		FAN		COOLING COIL			MOUNTING	DESIG	POWER INPUT (W)	AMBIENT AIR TEMP °F	SEER	ELECTRICAL			
		NOMINAL CFM RANGE	ESP IN H2O	EAT	WF	COOLING CAPACITY									
				DB	°F	SENS (MBH)							TOTAL (MBH)		
DSS-2	EQUIPMENT B111	320-425	N/A	80	67	—	12	HIGH WALL	CU-2	1,190	95	15.2	208/1/60	PKA-A12HA & PUY-A12NHA3	1, 2, 3, 4, 5, 6
DSS-3	EQUIPMENT G133	320-425	N/A	80	67	—	12	HIGH WALL	CU-3	1,190	95	15.2	208/1/60	PKA-A12HA & PUY-A12NHA3	1, 2, 3, 4, 5, 6
DSS-4B	TELCO B129	320-425	N/A	80	67	—	12	HIGH WALL	CU-4B	1,190	95	15.2	208/1/60	PKA-A12HA & PUY-A12NHA3	1, 2, 3, 4, 5, 6
DSS-5	EQUIPMENT D143	320-425	N/A	80	67	—	12	HIGH WALL	CU-6	1,190	95	15.2	208/1/60	PKA-A12HA & PUY-A12NHA3	1, 2, 3, 4, 5, 6, 7
DSS-8	STORAGE G124X	320-425	N/A	80	67	—	18	HIGH WALL	CU-8	1,820	95	18.5	208/1/60	PKA-A18HA7 & PUY-A18NKA7-BS	1, 2, 3, 4, 5, 6

1. INDOOR UNIT RECEIVES POWER FROM OUTDOOR UNIT THROUGH CONTRACTOR SUPPLIED INTERCONNECTED WIRING. PROVIDE DISCONNECTS AND CONTROLLER.
2. R-410A REFRIGERANT. PROVIDE FACTORY REFRIGERANT PIPING.
3. PROVIDE NEMA-3R DISCONNECT FOR OUTDOOR UNIT.
5. PROVIDE WALL T-STAT/CONTROLLER.
6. SEE SPECIFICATION 23 81 26 FOR EQUIVALENT MANUFACTURERS.
7. OUTDOOR AND INDOOR UNIT ARE ASSOCIATED WITH ALTERNATE G-1.8

RELIEF LOUVER SCHEDULE							
DESIGNATION	SERVICE	TYPE	DIMENSIONS		GROSS AREA	FREE AREA	VELOCITY (FT/MIN)
			LENGTH	HEIGHT			
RL-1	AHU-1	DRAINABLE COMBINATION LOUVER DAMPER	8'-6"	4'-0"	34.0 SF	17.0 SF	500

EXPANSION TANK SCHEDULE								
DESIGNATION	SERVICE	TANK VOLUME GALLONS	MAX. ACCEPTANCE VOLUME GALLONS	TYPE	DIMENSIONS		DRY WEIGHT	REMARKS
					DIA	HEIGHT		
ET-1	CHILLED WATER	8	2.4	VERTICAL	12"	19.5"	43 LBS	PRESSURIZED DIAPHRAGM TYPE
ET-2	HEATING WATER	44.4	22.6	VERTICAL	16.25"	56"	146 LBS	PRESSURIZED DIAPHRAGM TYPE

BOILER SCHEDULE												
DESIGNATION	SERVICE	RATINGS			GAS PRESSURE		VENT STACK DIAMETER INCHES	OPERATING WEIGHT LBS	ELECTRICAL V/ø/HZ	CURRENT FLA AMPS	BASIS OF DESIGN	REMARKS
		INPUT MBH	OUTPUT MBH	OPERATING PRESSURE PSI	MIN	MAX						
B-1	AHU, VAV BOXES	3,000	2,790	160	4" WC	14" WC	8"	2,629	460/3/60	5	AERCO BENCHMARK 3000	1, 2
B-2	AHU, VAV BOXES	3,000	2,790	160	4" WC	14" WC	8"	2,629	460/3/60	5	AERCO BENCHMARK 3000	1, 2

1. SEE SPECIFICATION 23 52 23 FOR EQUIVALENT MANUFACTURERS.
2. PROVIDE CONDENSATE NEUTRALIZATION KIT, MOTORIZED VALVES, LOW WATER CUTOFF W/ MANUAL RESET & TEST, AERCO PROTONODE/GATEWAY, PIPE CONDENSATE TO CLOSEST FLOOR DRAIN.

AIR SEPARATOR DUTY		
DESIGNATION :	AS-1	AS-2
SERVICE :	CHILLED WATER	HEATING WATER
PIPE SIZE :	8"	6"
WATER FLOW (GPM) :	1,300	700
STRAINER FREE AREA (SQ IN) :	325	205
PRESSURE DROP (FT) :	—	—
CV FACTOR WITH STRAINER :	1,020	632
APPROXIMATE SHIPPING WEIGHT :	460	295
SIZE :	8"	6"
BASIS OF DESIGN (BELL & GOSSETT) :	ROLAIRTROL	ROLAIRTROL
REMARKS : NONE		

AIR COOLED CHILLER DUTY		
DESIGNATION :	<u>CH-1A</u>	<u>CH-1B</u>
SERVICE :	FAYETTEVILLE AIRPORT	FAYETTEVILLE AIRPORT
CAPACITY :	185 TONS	185 TONS
GPM :	391	391
EWT :	54' F	54' F
LWT :	42' F	42' F
MAS EVAPORATOR PRESSURE DROP :	12.0 FT	12.0 FT
REFRIGERANT :	R-134A	R-134A
AMBIENT TEMPERATURE :	95' F	95' F
FOULING FACTOR :	0.00010	0.00010
COMPRESSORS		
NUMBER :	1	1
TYPE :	SCREW	SCREW
UNLOADING :	2 STEPS	2 STEPS
CONDENSER		
NUMBER OF COILS:	1	1
COIL ROWS :	2	2
CONDENSER FANS		
NUMBER :	13	13
DIAMETER :	30"	30"
RPM :	850	850
TOTAL AIR FLOW :	111,600 CFM	111,600 CFM
FLUID :	25% GLYCOL	25% GLYCOL
ELECTRICAL :	460V/3ø/60Hz	460V/3ø/60Hz
	MCA: 378 A	MCA: 378 A
	MOCP: 500 A	MOCP: 500 A
OPERATING WEIGHT :	14,293 LBS	14,293 LBS
BASIS OF DESIGN :	TRANE RTAC	TRANE RTAC
REMARKS : FULL LOAD EFFICIENCY:	14.71 EER	14.71 EER
IPLV:	10.41 EER	10.41 EER

FAN SCHEDULE												
DESIGNATION	SERVICE	CFM	SP INCH H ₂ O	APPROX RPM	BHP	HP (MOTOR SIZE)	WHEEL DIA	DRIVE	ELECTRICAL V/PH/Hz	APPROX WEIGHT (LBS)	BASIS OF DESIGN (GREENHECK)	REMARKS
EF-1	A118, B113, B114, B115	1,020	0.548	1140	0.17	1/4	13.125	DIRECT	115/1/60	77	SQ-130-B	1, 5, 6
EF-2	JANITOR B107	110	0.305	940	----	----	7.64	DIRECT	115/1/60	12	SP-110L-VG	2, 5, 6
EF-3	C105, C106	465	0.266	1300	0.04	1/25	10.875	DIRECT	115/1/60	22	G-090-C	3, 5, 6
EF-4	G123	75	0.125	900	0.15	----	----	DIRECT	115/1/60	9	SP-B80	2, 5, 6
EF-5	G108, G109, G110, G111, G112	700	0.25	1140	0.07	1/6	11.187	DIRECT	115/1/60	56	SQ-100-B	1, 5, 6
EF-B2	D114	235	0.266	1300	0.03	1/20	10.875	DIRECT	115/1/60	41	SQ-80-G	1, 5, 6
EF-B3	D119	75	0.131	900	----	----	7.94	DIRECT	115/1/60	9	SP-B80	2, 5, 6
EF-B4	E206, E207, E210, 214	670	0.309	1550	0.1	1/8	10.875	DIRECT	115/1/60	41	SQ-95-D	1, 5, 6
EF-B5	E217	75	0.125	900	0.15	----	----	DIRECT	115/1/60	9	SP-B80	2, 5, 6
RF-1	AHU-1	11,645	1.0	1256	5.0	5	30	MULTI	460/3/60	--	TBI-FS-4L30-50	4, 6
RF-2	AHU-2	16,600	1.5	1218	8.27	7 1/2	36	MULTI	460/3/60	440	TBI-FS-5L36-75	4, 6

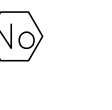
1. PROVIDE UL LISTING, DISCONNECT SWITCH, MOTORIZED BACKDRIFT DAMPER, AND HANGING SPRING ISOLATORS.
2. PROVIDE DISCONNECT SWITCH AND WALL LOUVERED DISCHARGE.
3. PROVIDE PREFABRICATED ROOF CURB WITH CURB SEAL, UL MOUNTED DISCONNECT SWITCH, MOTORIZED BACKDRIFT DAMPER, AND BIRDSCREEN
4. PROVIDE NEMA 1 DISCONNECT SWITCH, UNIVERSAL MOUNTING BRACKETS, COMPANION FLANGES, AND HANGING ISOLATORS.
5. EXHAUST FAN SHALL BE CONTROLLED BY A TIMECLOCK.
6. SEE SPECIFICATIONS FOR EQUIVALENT MANUFACTURERS.

PUMP SCHEDULE											
DESIGNATION	SERVICE	GPM	HEAD FEET H ₂ O	SUCTION X DISCHARGE	MOTOR		RPM	% EFFICIENCY	ELECTRICAL V/PH/H ₂	BASIS OF DESIGN	REMARKS
					BHP	HP					
PCHP-1A	CHILLED WATER	391	35	6" X 6"	1.18	1.5	1150	73.6	460/3/60	BELL & GOSSETT E-80	1, 4
PCHP-1B	CHILLED WATER	391	35	6" X 6"	1.18	1.5	1150	73.6	460/3/60	BELL & GOSSETT E-80	1, 4
PCHP-2	CHILLED WATER	420	35	6" X 6"	1.38	1.5	1150	77.4	460/3/60	BELL & GOSSETT E-80	1, 4
SCHP-1	CHILLED WATER	690	65	8" X 6"	12.45	15	1150	86.2	460/3/60	BELL & GOSSETT E-150 6E	2, 4
SCHP-2	CHILLED WATER	690	65	8" X 6"	12.45	15	1150	86.2	460/3/60	BELL & GOSSETT E-150 6E	2, 3, 4
PHWP-1	HEATING WATER	186	20	3" X 3"	1.35	1.5	1719	71.1	460/3/60	BELL & GOSSETT E-80	1
PHWP-2	HEATING WATER	186	20	3" X 3"	1.35	1.5	1719	71.1	460/3/60	BELL & GOSSETT E-80	1
HWP-1	HEATING WATER	372	45	3" X 3"	5.29	7.5	1643	75.4	460/3/60	BELL & GOSSETT E-150 3BD	2
HWP-2	HEATING WATER	372	45	3" X 3"	5.29	7.5	1643	75.4	460/3/60	BELL & GOSSETT E-150 3BD	2, 3

1. PROVIDE VIBRATION HANGERS, HOA STARTER DISCONNECT WITH AUXILIARY CONTRACTS IN NEMA-1 ENCLOSURE.
2. PROVIDE VIBRATION ISOLATION PAD, VFD AND DISCONNECT WITH AUXILIARY CONTRACTS IN NEMA-1 ENCLOSURE.
3. REDUNDANT, STAND BY.
4. PUMPS SIZED BASED ON 25% GLYCOL SOLUTION.

AIR DEVICE SCHEDULE							
No CFM	SERVICE	TYPE	CFM	SIZE	BLOW	BASIS OF DESIGN	REMARKS
101	SUPPLY	A	0-110	24"x24"	4-WAY	TITUS - TDCA	6"ø NECK
102	SUPPLY	A	111-210	24"x24"	4-WAY	TITUS - TDCA	8"ø NECK
103	SUPPLY	A	211-330	24"x24"	4-WAY	TITUS - TDCA	10"ø NECK
104	SUPPLY	A	331-590	24"x24"	4-WAY	TITUS - TDCA	12"ø NECK
105	SUPPLY	A	591-850	24"x24"	4-WAY	TITUS - TDCA	12"ø NECK
111	SUPPLY	D	0-110	30Wx6"H	-	TITUS 300-RL	SIDEWALL, DOUBLE DEFLECTION 22.5°, 1/2"
112	SUPPLY	D	0-110	30Wx6"H	-	TITUS 300-RL	SIDEWALL, DOUBLE DEFLECTION 22.5°, 1/2"
113	SUPPLY	D	0-110	30Wx6"H	-	TITUS 300-RL	SIDEWALL, DOUBLE DEFLECTION 22.5°, 1/2"
121	SUPPLY	-	0-180	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	6" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
122	SUPPLY	-	0-180	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	6" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
123	SUPPLY	-	181-215	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	8" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
124	SUPPLY	-	181-215	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	8" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
125	SUPPLY	-	215-250	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	12"x6" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
126	SUPPLY	-	215-250	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	12"x6" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
127	SUPPLY	-	251-380	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	14"x8" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
128	SUPPLY	-	251-380	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	14"x8" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
131	SUPPLY	-	0-525	25.75"Wx7.75"H	1-WAY	TITUS 271FL	24"X6" NECK, 3/4" BLADE SPACING
132	SUPPLY	-	0-610	15.75"Wx15.75"L	1-WAY	TITUS 271FL	14"X14" NECK, 3/4" BLADE SPACING
133	SUPPLY	-	0-315	18"Wx16"H	2-WAY	TITUS - 300 R	SIDEWALL, DOUBLE DEFLECTION 22.5°, 1/2"
134	SUPPLY	-	0-340	11.75"Wx7.75"H	1-WAY	TITUS 271FL	10"X6" NECK, 3/4" BLADE SPACING
201	RETURN	F	0-1600	24"x24"	-	TITUS - 350 R	24"x24" NECK
211	OUTSIDE AIR	F	0-270	12"Wx12"H	-	PRICE - 5300	WALL MOUNT, DOUBLE DEFLECTION 45°, 3/4"
221	RETURN	-	0-180	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	6" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
222	RETURN	-	0-180	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	6" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
223	RETURN	-	181-215	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	8" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
224	RETURN	-	181-215	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	8" ø NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
225	RETURN	-	215-250	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	12"x6" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
226	RETURN	-	215-250	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	12"x6" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
227	RETURN	-	251-380	6"Wx4'-0"L	-	TITUS MP-38/ML-38-TZ	14"x8" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
228	RETURN	-	251-380	6"Wx6'-0"L	-	TITUS MP-38/ML-38-TZ	14"x8" OVAL NECK, 3 SLOTS, 3/4" SLOT SPACING OPPOSED, TECH ZONE
301	EXHAUST	H	0-350	6"x6"	-	TITUS - 350 RL	6"ø NECK
302	EXHAUST	H	0-350	12"x12"	-	TITUS - 350 RL	8"ø NECK
303	EXHAUST	H	0-350	12"x12"	-	TITUS - 350 RL	10"ø NECK

- NOTE:
1. PROVIDE INSULATION FOR ALL DIFFUSERS AND GRILLES WITH PLENUM BOXES.
2. PROVIDE VOLUME DAMPERS FOR ALL SUPPLY DIFUSERS, RETURN, AND EXHAUST GRILLES.
3. SEE SPECIFICATION 23 37 13 FOR EQUIVALENT MANUFACTURERS.

VARIABLE AIR VOLUME TERMINAL REHEAT UNIT SCHEDULE																
DESIGNATION 	SERVICE	TYPE	CFM		INLET SIZE	OUTLET SIZE	MINIMUM INLET SP INCH WG	MAXIMUM NC VALUE @1.0 INCH WG INLET SP	HEATING COIL PERFORMANCE						BASIS OF DESIGN	REMARKS
			MAXIMUM	MINIMUM					EAT °F	LAT °F	MBH @180°F EWT	MAXIMUM WATER PD FT WG	NUMBER OF ROWS	GPM @30°F ΔT		
1-01	TICKETING/LOBBY 1	VAV	910	300	12	16x15	1	30	55	95.9	13.3	0.11	1	0.9	TITUS – DESV	1, 2
1-02	TICKETING/LOBBY 2	VAV	725	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-03	TICKETING/LOBBY 3	VAV	780	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-04	TICKETING/LOBBY 4	VAV	760	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-05	TICKETING/LOBBY 5	VAV	440	300	6	12x8	1	30	55	100.5	14.8	0.15	1	1.0	TITUS – DESV	1, 2
1-06	TSA	VAV	2920	875	16	24x18	1	30	55	88.4	31.7	0.51	1	2.1	TITUS – DESV	1, 2
1-07	LOUNGE A113	VAV	125	50	6	12x8	1	30	55	113.8	3.2	0.07	1	0.3	TITUS – DESV	1, 2
1-08	OFFICES A109, A112, A113	VAV	260	240	6	12x8	1	30	55	82.3	7.1	0.14	1	0.5	TITUS – DESV	1, 2
1-09	OFFICE-A111 BAG STORAGE-A114	VAV	200	80	6	12x8	1	30	55	83	3.3	0.5	1	0.2	TITUS – DESV	1, 2
1-10	OFFICES A120, A122	VAV	300	300	7	12x10	1	30	55	85.4	9.9	0.26	1	0.7	TITUS – DESV	1, 2
1-11	ELECTRICAL B106	VAV	605	300	8	12x10	1	30	55	85.4	9.9	0.26	1	0.7	TITUS – DESV	1, 2
1-12	BREAK ROOM A127	VAV	250	125	6	12x8	1	30	55	89.8	4.7	0.08	1	0.3	TITUS – DESV	1, 2
1-13	ESCALATOR B112	VAV	790	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-14	MAIN LOBBY 1	VAV	900	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-15	MAIN LOBBY 2	VAV	500	300	6	12x8	1	30	55	100.5	14.8	0.15	2	1.0	TITUS – DESV	1, 2
1-16	MAIN LOBBY 3	VAV	440	300	6	12x8	1	30	55	100.5	14.8	0.15	2	1.0	TITUS – DESV	1, 2
1-17	MAIN LOBBY 4	VAV	790	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
1-18	IT/BAG STORAGE 126	VAV	70	45	4	12x8	1	30	–	–	–	–	–	–	TITUS – DESV	1, 2, 3
2-01	MAIN LOBBY 5	VAV	440	300	8	12x10	1	30	55	85.4	9.9	0.26	1	0.7	TITUS – DESV	1, 2
2-02	MAIN LOBBY 6	VAV	500	125	6	12x8	1	30	55	90.5	4.8	0.08	1	0.3	TITUS – DESV	1, 2
2-03	ESCALATOR B119	VAV	900	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
2-04	RENTAL OFFICE 1 & 2	VAV	600	300	7	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
2-05	CONFERENCE B120	VAV	1050	315	10	14x12.5	1	30	55	86.9	10.9	0.09	1	0.7	TITUS – DESV	1, 2
2-06	BAGGAGE LOBBY 1	VAV	1410	420	12	16x15	1	30	55	90.4	16.1	0.16	1	1.1	TITUS – DESV	1, 2
2-07	RENTAL OFFICE 3 & 4	VAV	1500	450	14	20x17.5	1	30	55	95.0	19.7	0.19	1	1.3	TITUS – DESV	1, 2
2-08	BAGGAGE CLAIM	VAV	2000	600	12	16x15	1	30	55	111.5	36.7	0.46	2	2.4	TITUS – DESV	1, 2
2-09	BAGGAGE LOBBY 2	VAV	1900	570	12	16x15	1	30	55	85.6	18.9	0.22	1	1.3	TITUS – DESV	1, 2
2-10	BAGGAGE LOBBY 3	VAV	1350	405	10	14x12.5	1	30	55	83.7	12.6	0.11	1	0.8	TITUS – DESV	1, 2
2-11	BAGGAGE LOBBY 4	VAV	1700	510	12	16x15	1	30	55	87.3	17.9	0.20	1	1.2	TITUS – DESV	1, 2
2-12	BAGGAGE LOBBY 5	VAV	2030	710	14	20x17.5	1	30	55	90	23.3	0.26	2	1.5	TITUS – DESV	1, 2
2-13	LOUNGE B122	VAV	820	300	8	12x10	1	30	55	109.2	17.6	0.21	2	1.2	TITUS – DESV	1, 2
2-14	ELECTRICAL B126, B127	VAV	400	300	7	12x10	1	30	55	85.4	9.9	0.15	1	0.7	TITUS – DESV	1, 2
3-01	WAITING G101	VAV	1145	345	12	16x15	1	30	55	95	15.0	0.18	1	1.1	TITUS – DESV	1, 2
3-02	OFFICE G117	VAV	160	100	6	12x8	1	30	55	95	4.3	0.08	1	0.3	TITUS – DESV	1, 2
3-03	CONFERENCE G118	VAV	560	300	8	12x10	1	30	55	85	9.8	0.24	1	0.6	TITUS – DESV	1, 2
3-04	OFFICE G119	VAV	125	100	6	12x8	1	30	55	95	4.3	0.08	1	0.3	TITUS – DESV	1, 2
3-05	ADMINISTRATIVE ASSISTANT G121	VAV	280	100	6	12x8	1	30	55	95	4.3	0.08	1	0.3	TITUS – DESV	1, 2
3-06	LOUNGE G112 RECEPT. G120	VAV	345	200	6	12x8	1	30	55	85	6.5	0.13	1	0.4	TITUS – DESV	1, 2
3-07	VESTIBULE G115 MANAGERS OFFICE LOBBY G116	VAV	550	350	8	12x10	1	30	55	85	11.4	0.49	1	0.9	TITUS – DESV	1, 2
3-08	STORAGE G124 TSA STORAGE G103 BADGING G125	VAV	200	150	6	12x8	1	30	55	85.8	5.0	0.08	1	0.3	TITUS – DESV	1, 2
3-09	TSA SEARCH G104 OFFICE G126	VAV	305	150	6	12x8	1	30	55	85.8	5.0	0.08	1	0.3	TITUS – DESV	1, 2
3-10	OFFICE G131 OFFICE G130	VAV	430	300	6	12x8	1	30	55	95	13.0	0.11	2	0.7	TITUS – DESV	1, 2
3-11	OFFICE G129 OFFICE G128	VAV	495	300	6	12x8	1	30	55	95	13.0	0.11	2	0.7	TITUS – DESV	1, 2
3-12	CONFERENCE G102	VAV	2665	800	14	20x17.5	1	30	55	87.5	26.1	0.27	1	1.6	TITUS – DESV	1, 2
3-13	WAITING	VAV	1890	565	14	20x17.5	1	30	55	95	19.4	0.07	1	0.9	TITUS – DESV	1, 2
3-14	WAITING	VAV	3735	1120	24x16	38x18	1	30	55	95	48.6	1.94	1	3.7	TITUS – DESV	1, 2
3-15	WAITING	VAV	2975	890	24x16	38x18	1	30	55	95	38.7	0.61	1	2.1	TITUS – DESV	1, 2
3-16	POLICE STATION G107 TOILET G108 WOMEN G111 MEN G112	VAV	385	200	8	12x10	1	30	55	95	8.7	0.07	1	0.7	TITUS – DESV	1, 2
3-17	WAITING	VAV	200	100	6	12x8	1	30	55	95	4.3	0.02	1	0.3	TITUS – DESV	1, 2

- NOTE:
1. SEE SPECIFICATION 23 36 00 FOR EQUIVALENT MANUFACTURERS.
2. MOUNT TERMINAL UNITS NO MORE THAN 24" ABOVE CEILING.
3. TERMINAL UNIT IS COOLING ONLY.

AIR WALL SCHEDULE														
DESIG	SERVICE	MODEL	MOUNTING	NOZZLE WIDTH INCHES	MAX VELOCITY AT NOZZLE (FPM)	AVERAGE OUTLET VELOCITY (FPM)	AIR VOLUME (CFM)	OUTLET VELOCITY UNIFORMITY	NUMBER OF MOTORS	ELECTRICAL			WEIGHT (LBS)	BASIS OF DESIGN
										V/PH/Hz	POWER RATING (KW)	HORSE POWER		
AW-1	TICKETING VESTIBULE - A100	ALC08-1072A	EXPOSED ABOVE DOOR	72	3,600	2,058	2,072	95%	1	120/1/60	0.32	1/5 HP	64	BERNER
AW-2	VESTIBULE - B100	ALC08-1072A	EXPOSED ABOVE DOOR	72	3,600	2,058	2,072	95%	1	120/1/60	0.32	1/5 HP	64	BERNER
AW-3	VESTIBULE - B100	ALC08-1072A	EXPOSED ABOVE DOOR	72	3,600	2,058	2,072	95%	1	120/1/60	0.32	1/5 HP	64	BERNER
AW-4	BAGGAGE CLAIM VESTIBULE - C100	ALC08-1072A	EXPOSED ABOVE DOOR	72	3,600	2,058	2,072	95%	1	120/1/60	0.32	1/5 HP	64	BERNER

- NOTES:
1. UNITS SHALL BE UL LISTED.
2. UNITS SHALL BE UNHEATED.
3. UNITS SHALL BE MOUNTS 7'-0" AFF
4. CABINETS SHALL BE PROPERLY SUPPORTED AND SECURED TO STRUCTURE PER MANUFACTURE'S RECOMMENDATIONS.
5. COLOR SELECTION AND FINISH BY ARCHITECT.

GRA
