GENERAL DRAWING SYMBOLS LEGEND

1 / H101	SECTION "1" - SECTION NUMBER "H-1" - DRAWING LOCATION
	BREAK
	PIPE BREAK
	POINT OF DISCONNECTION
	POINT OF CONNECTION TO EXISTING
X	KEYED NOTE

HVAC PIPE FITTINGS LEGEND

	ELBOW TURNED UP
	ELBOW TURNED DOWN
	TEE TURNED UP
	TEE TURNED DOWN
	TEE
	RISE OR DROP IN PIPE
	UNION
	FLANGE
	PIPE CAP
CO	CLEANOUT
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
UP	PIPE PITCH UP
DN	PIPE PITCH DOWN

HVAC PIPE LEGEND

TAG	PIPE TO BE REMOVED (TAG IDENTIFIES TYPE OF PIPE)
ETAG	EXISTING PIPE NOTED WITH PREFIX LETTER E
BF	BOILER FEEDWATER
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
	DOMESTIC COLD WATER
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
D	CONDENSATE DRAIN
FOG	FUEL OIL GAUGE
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
G	GAS
HCR	HOT/CHILLED WATER RETURN
HCS	HOT/CHILLED WATER SUPPLY
HPC	HIGH PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM
HTPR	HEAT PUMP WATER RETURN
HTPS	HEAT PUMP WATER SUPPLY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
LPC	LOW PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
MPC	MEDIUM PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
PC	PUMPED CONDENSATE
RG	REFRIGERANT GAS
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
	ATMOSPHERIC VENT

CONTROLS SYMBOLS LEGEND

T	REMOVE TEMPERATURE SENSOR
T	TEMPERATURE SENSOR
T S	TEMPERATURE SENSOR WITH CAST ALUMINUM SECURITY COVER
TH	THERMOSTAT
H	HUMIDISTAT
E	EXISTING DEVICE NOTED WITH LETTER E
F	FLOW SWITCH
$ M	MOTOR RATED SWITCH

HVAC EQUIPMENT SYMBOLS LEGEND

TAG	REMOVE EXISTING EQUIPMENT (TAG IDENTIFIES TYPE OF EQUIPMENT)
FTR-1 10'-0"	FINNED TUBE RADIATION FTR-1 = TAG 10'-0" = ACTIVE LENGTH
FP | CS | OS	VERTICAL TYPE UNIT VENTILATOR CABINETRY FP = FILLER PIECE CS = CLOSED SHELVING UNIT OS = OPEN SHELVING UNIT
EF-X	ROOF EXHAUST FAN WITH DAMPER/ACTUATOR
GRV-X	GRAVITY ROOF VENTILATOR WITH DAMPER/ACTUATOR
	COMBINATION MOTOR STARTER (FURNISHED BY MECHANICAL CONTRACT INSTALLED BY ELECTRIC CONTRACT)
VFD	VARIABLE FREQUENCY DRIVE (FURNISHED BY MECHANICAL CONTRACT INSTALLED BY ELECTRIC CONTRACT)
ETAG	EXISTING EQUIPMENT NOTED WITH PREFIX LETTER E (TAG IDENTIFIES TYPE OF EQUIPMENT)

HVAC VALVE AND SPECIALTIES LEGEND

	GATE VALVE
	GLOBE VALVE
	CHECK VALVE
	BUTTERFLY VALVE
	BALL VALVE
	BALANCE VALVE
	RELIEF VALVE
	PRESSURE REDUCING VALVE
	STRAINER
	STRAINER WITH BLOWDOWN BALL VALVE
	SOLENOID VALVE
	2-WAY CONTROL VALVE
	3-WAY CONTROL VALVE
	FUSIBLE FIRE VALVE
	PUMP DISCHARGE VALVE
	BACKFLOW PREVENTER
	DRAIN VALVE WITH HOSE END CONNECTION
	UNION
	MANUAL AIR VENT
AV	AUTOMATIC AIR VENT
	PRESSURE GAUGE WITH SHUT OFF
	THERMOMETER
	PRESSURE AND TEMPERATURE READOUT PORT
	EXPANSION JOINT
	PREFABRICATED EXPANSION LOOP
	FLEXIBLE PIPE CONNECTOR
G	PIPE ALIGNMENT GUIDE
	PIPE ANCHOR
	INLINE PUMP
AS	TANGENTIAL AIR SEPARATOR
AS	INLINE AIR SEPARATOR
ESD	END SUCTION DIFFUSER
ET	EXPANSION TANK
C	CHEMICAL POT FEEDER
F	FUEL OIL FILTER

DUCTWORK & ACCESSORIES SYMBOLS LEGEND

SINGLE LINE DUCT	DOUBLE LINE DUCT	
20/8	20/8	RIGID DUCT TO BE REMOVED 20 = WIDTH (IN), 8 =HEIGHT (IN)
E20/8	E20/8	EXISTING DUCT 20 = WIDTH (IN), 8 =HEIGHT (IN)
20/8	20/8	RIGID DUCT 20 = WIDTH (IN), 8 =HEIGHT (IN)
20/8	20/8	OVAL DUCT 20 = WIDTH (IN), 8 =HEIGHT (IN)
20ø	20ø	ROUND DUCT 20ø = 20 INCH DIAMETER
		ACOUSTICAL LINING (SIZE INDICATES INSIDE DIMENSION)
		SUPPLY DUCT SECTION
		RETURN OR EXHAUST DUCT SECTION
		SUPPLY DUCT ELBOW DOWN
		RETURN OR EXHAUST DUCT ELBOW DOWN
		SQUARE ELBOW WITH TURNING VANES
R W	R W	SMOOTH RADIUS ELBOW $R = \frac{3(W)}{2}$
		DUCT TRANSITION ON CENTER
		DUCT TRANSITION WITH FLAT SIDE
		DUCT TRANSITION SQUARE TO ROUND
		BRANCH DUCT WITH 45° TAKE OFF FOR RECTANGULAR AND ROUND TAKEOFFS
R	R	CHANGE OF ELEVATION R = RISE, D = DROP ARROW IN DIRECTION OF AIRFLOW
AD	AD	HORIZONTAL ACCESS DOOR 12/12 MINIMUM UNLESS OTHERWISE NOTED (FULL WIDTH OF DUCT < 12 WIDTH)
S1-6 / 100	S1-6 / 100	DIFFUSER/GRILLE NOMENCLATURE S = SUPPLY DIFFUSER/GRILLE TAG R = RETURN GRILLE TAG E = EXHAUST GRILLE TAG
S1-14/8 / 100	S1-14/8 / 100	6 = ROUND NECK SIZE (IN) 14/8 = RECTANGULAR NECK SIZE (IN) 100 = AIRFLOW (CFM)
C	C	CABLE DAMPER

SINGLE LINE DUCT	DOUBLE LINE DUCT	
AD	AD	VERTICAL ACCESS DOOR 12/12 MINIMUM UNLESS OTHERWISE NOTED (FULL HEIGHT OF DUCT < 12 HEIGHT)
		24"x24" CEILING SUPPLY DIFFUSER WITH FLEX DUCT ROUND NECK, 4-WAY SUPPLY, EQUAL SIZED BRANCH DUCT
		24"x24" CEILING RETURN OR EXHAUST GRILLE WITH FLEX DUCT ROUND NECK, PERFORATED FACE, EQUAL SIZED BRANCH DUCT
		24"x24" DUCTED CEILING RETURN OR EXHAUST GRILLE SQUARE NECK, PERFORATED FACE
		ROUND CEILING SUPPLY DIFFUSER WITH FLEX DUCT
		RECTANGULAR SUPPLY GRILLE/REGISTER
		RECTANGULAR RETURN OR EXHAUST GRILLE/REGISTER
		LINEAR CEILING SUPPLY DIFFUSER WITH FLEX DUCT ROUND NECK, ADJUSTABLE SUPPLY, EQUAL SIZED BRANCH DUCT
		LINEAR CEILING RETURN OR EXHAUST WITH FLEX DUCT ROUND NECK, EQUAL SIZED BRANCH DUCT
		HEAVY DUTY LINEAR BAR SUPPLY GRILLE
		HEAVY DUTY LINEAR BAR RETURN OR EXHAUST GRILLE
		WALL MOUNTED SUPPLY, RETURN OR EXHAUST GRILLE
OS	OS	DUCT SILENCER
		PARALLEL BLADE DAMPER WITH ACTUATOR
		OPPOSED BLADE DAMPER WITH ACTUATOR
		VOLUME DAMPER
		AIR FLOW DIRECTION
S	S	DUCT SMOKE DETECTOR FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR INSTALLED BY HVAC CONTRACTOR
		VERTICAL SMOKE DAMPER
		HORIZONTAL SMOKE DAMPER
		VERTICAL FIRE/SMOKE DAMPER
		HORIZONTAL FIRE/SMOKE DAMPER
		VERTICAL FIRE DAMPER
		HORIZONTAL FIRE DAMPER

ABBREVIATIONS

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
ACC	AIR-COOLED CONDENSER	EF	EXHAUST FAN	L	LOUVER	RP	RETURN PANEL
ACCU	AIR-COOLED CONDENSING UNIT	EG	EXHAUST GRILLE OR REGISTER	LAT	LEAVING AIR TEMPERATURE	RPM	REVOLUTIONS PER MINUTE
AD	ACCESS DOOR	EH	ELECTRIC HEATER	LBS/HR	POUNDS PER HOUR	RTU	ROOFTOP UNIT
AF	AIR FILTER	EHC	ELECTRIC HEATING COIL	LF	LINEAR FOOT		
AFF	ABOVE FINISHED FLOOR	ERC	ENERGY RECOVERY COIL	LPC	LOW PRESSURE CONDENSATE RETURN	S	DUCT SMOKE DETECTOR
AFM	AIRFLOW MEASURING DEVICE	ET	EXPANSION TANK	LPS	LOW PRESSURE STEAM (15 PSIG AND BELOW)	SA	SUPPLY AIR
AHU	AIR HANDLING UNIT	EWT	ENTERING WATER TEMPERATURE	LWT	LEAVING WATER TEMPERATURE	SD	SUPPLY DIFFUSER
APD	AIR PRESSURE DROP					SKD	SMOKE DAMPER
AS	AIR SEPARATOR	FC	FAN COIL UNIT	MAX	MAXIMUM	SF	SUPPLY AIR FAN
AT	AIR TERMINAL UNIT	FD	FIRE DAMPER	MBH	ONE THOUSAND BRITISH THERMAL UNITS PER HOUR	SG	SUPPLY GRILLE OR REGISTER
AV	AIR VENT	FD/SD	COMBINATION FIRE/SMOKE DAMPER	MCA	MINIMUM CURRENT AMPACITY	SP	STATIC PRESSURE
		FF	FINAL FILTER	MIN	MINIMUM	SPS	STATIC PRESSURE SENSOR
B	BOILER	FM	FLOW MEASURING STATION	M	DAMPER ACTUATOR	SPG	SPECIFIC GRAVITY
BTUH	BRITISH THERMAL UNITS PER HOUR	FP	FILLER PIECE	MOCP	MAXIMUM OVERCURRENT PROTECTION		
		FPM	FEET PER MINUTE	MPC	MEDIUM PRESSURE CONDENSATE RETURN	TAG	EQUIPMENT IDENTIFICATION
C	CONVECTOR	FT	FEET	MPS	MEDIUM PRESSURE STEAM (16-59 PSIG)	TG	TOP GRILLE OR REGISTER (WALL TYPE)
CC	COOLING COIL	FTR	FINNED TUBE RADIATION	MV	MANUAL VENT	TO	TRANSFER OPENING
CHLR	CHILLER					TWU	THRU-THE-WALL UNIT
CFM	CUBIC FEET PER MINUTE	GAL	GALLONS	NIC	NOT IN CONTRACT	TYP	TYPICAL
CH	CABINET HEATER	GC	GENERAL CONTRACTOR	NOM	NOMINAL		
CO	CLEAN OUT	GPM	GALLONS PER MINUTE			UH	UNIT HEATER
CONT.	CONTINUED	GRV	GRAVITY ROOF VENTILATOR	OA	OUTSIDE AIR	UNO	UNLESS NOTED OTHERWISE
CS	CLOSED SHELVING UNIT			OS	OPEN SHELVING UNIT	UV	UNIT VENTILATOR
CT	COOLING TOWER	H	HUMIDIFIER				
		HC	HEATING COIL	P	PUMP	VD	VOLUME DAMPER (MANUAL OPPOSED BLADE)
DB	DECIBELS	HE	HEAT EXCHANGER	PC	PUMPED CONDENSATE	VFD	VARIABLE FREQUENCY DRIVE
DBT	DRY BULB TEMPERATURE	HGT	HEIGHT	PD	PRESSURE DROP	VP	VACUUM PUMP
DIA	DIAMETER	HP	HORSEPOWER	PF	PREFILTER	VR	VACUUM STEAM CONDENSATE RETURN
DPT	DEW POINT TEMPERATURE	HTP	HEAT PUMP	PRV	PRESSURE REDUCING VALVE		
DS	DUCT SILENCER	HRU	HEAT RECOVERY UNIT	PSIG	POUNDS PER SQUARE INCH WATER GAUGE	WBT	WET BULB TEMPERATURE (°F)
DX	DIRECT EXPANSION					WEF	WALL TYPE EXHAUST FAN
		IN	INCH	RA	RETURN AIR	WG	WATER GAUGE
E"TAG"	EXISTING EQUIPMENT			RF	RETURN AIR FAN	WPD	WATER PRESSURE DROP
EA	EXHAUST AIR	KW	KILOWATT	RG	RETURN GRILLE OR REGISTER		
EAT	ENTERING AIR TEMPERATURE			RM	ROOM	ZD	ZONE DAMPER

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SHEET NUMBER:

MES-M001

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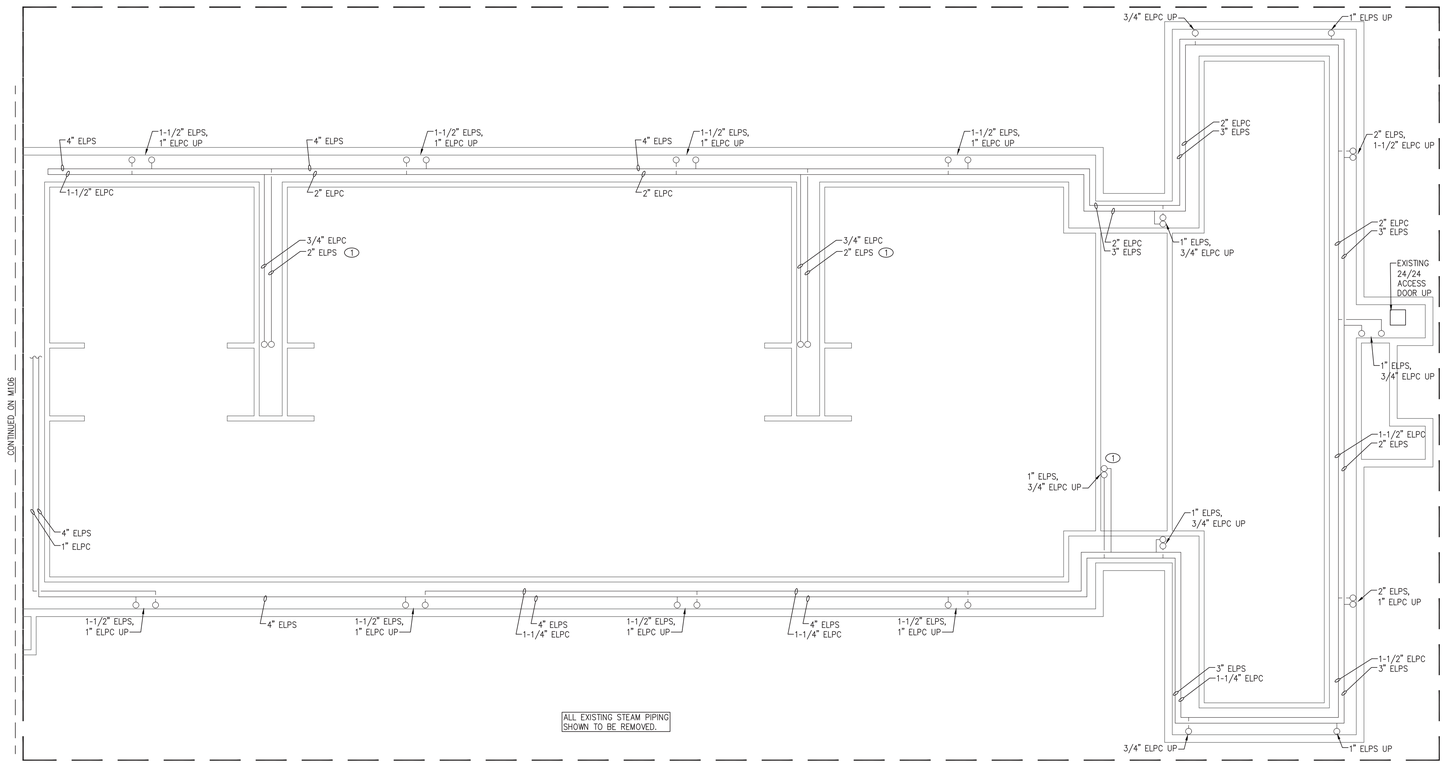
KEYED REMOVAL NOTES

1. STEAM BRANCH IN EXISTING TILE PIPE.



1 MES-M107 HVAC PIPE TRENCH REMOVALS PLAN

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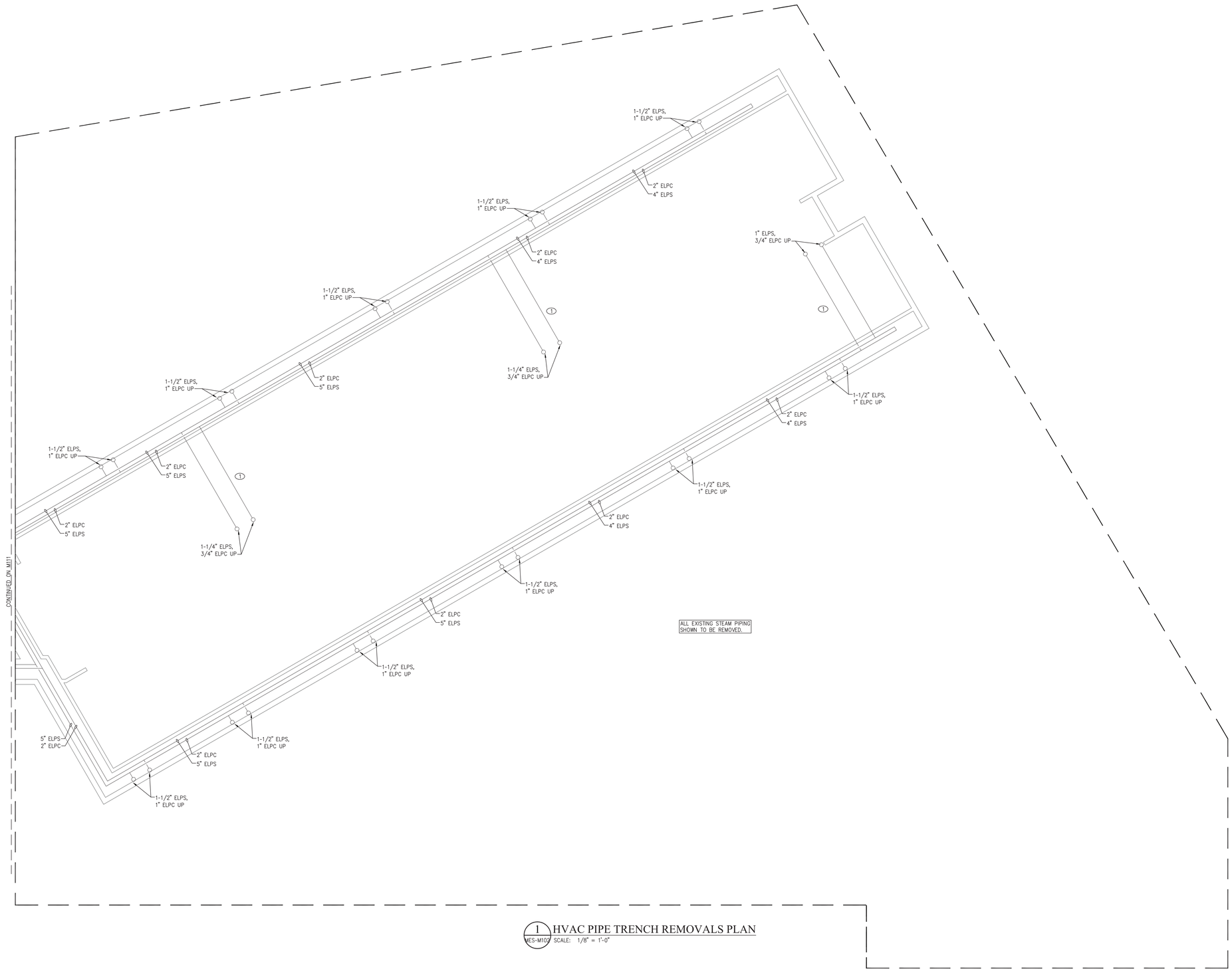

1 HVAC PIPE TRENCH REMOVALS PLAN
MES-M102 SCALE: 1/8" = 1'-0"

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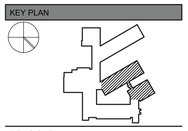

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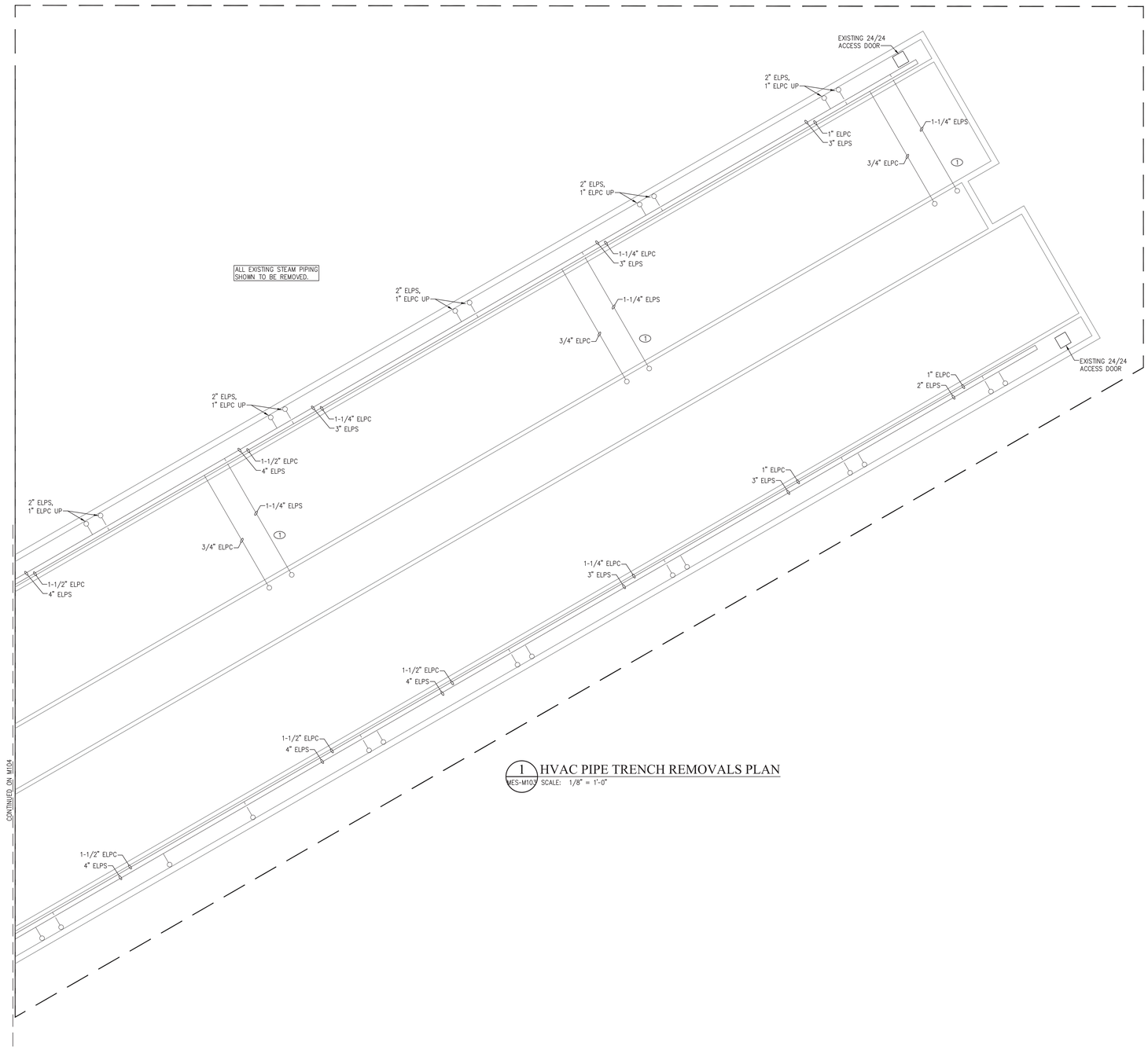

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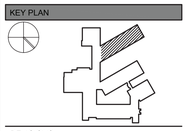

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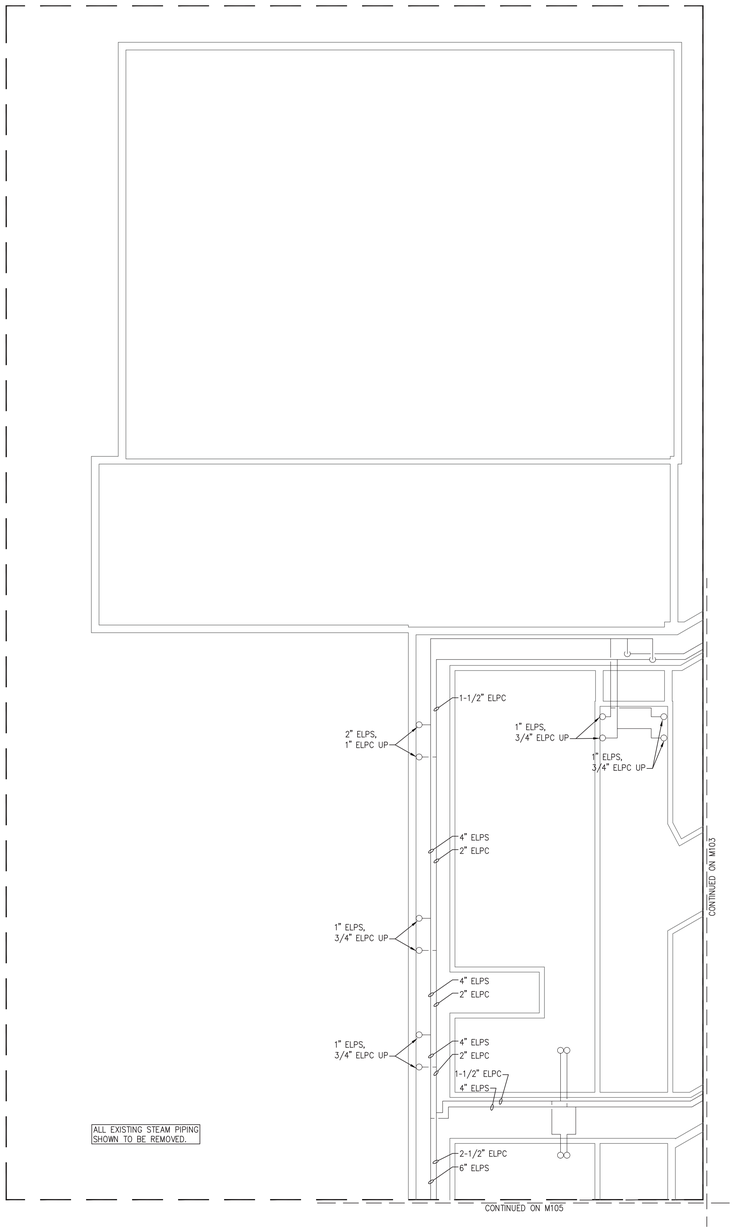

1 HVAC PIPE TRENCH REMOVALS PLAN
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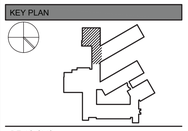

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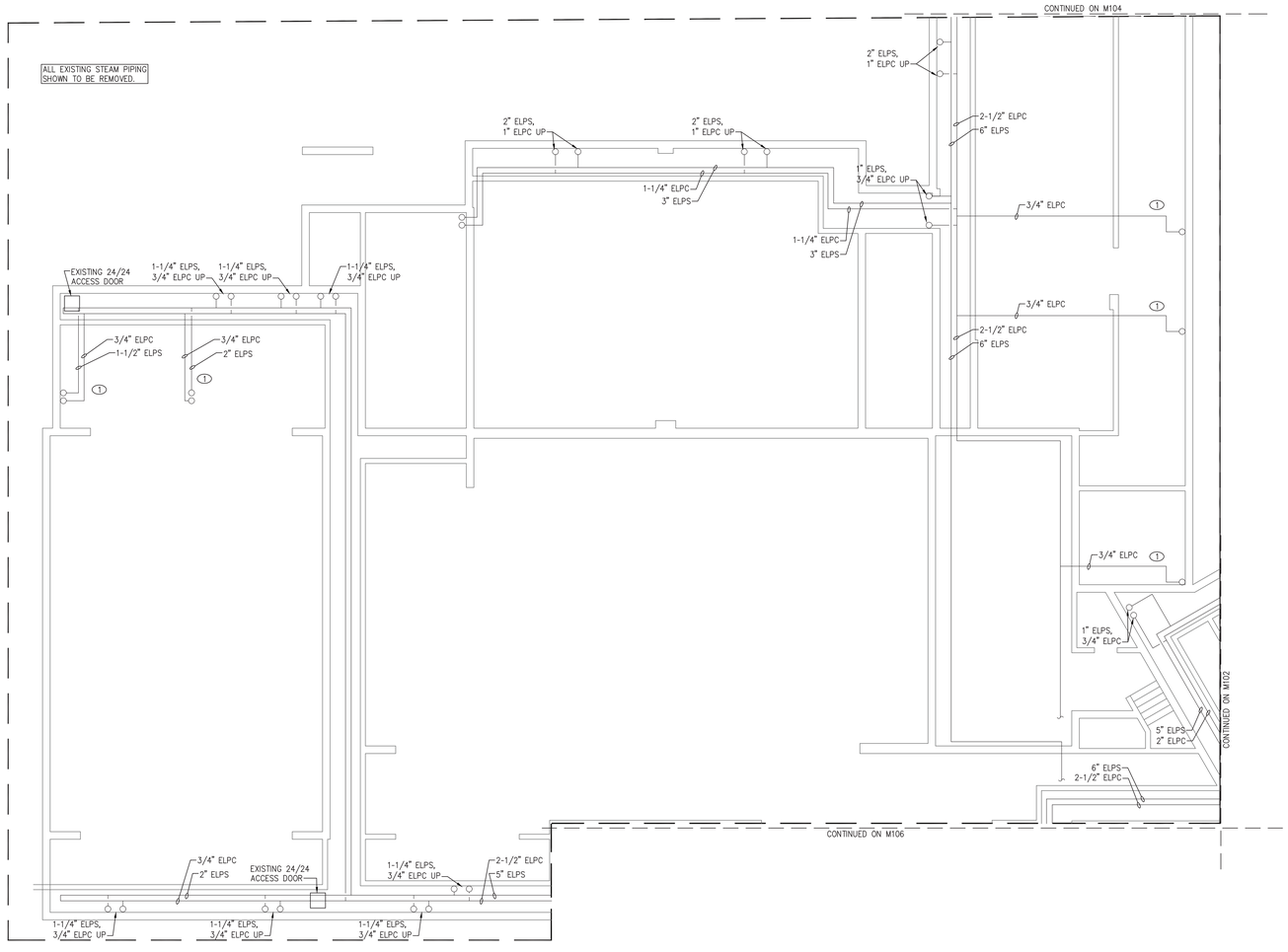

1 HVAC PIPE TRENCH REMOVALS PLAN
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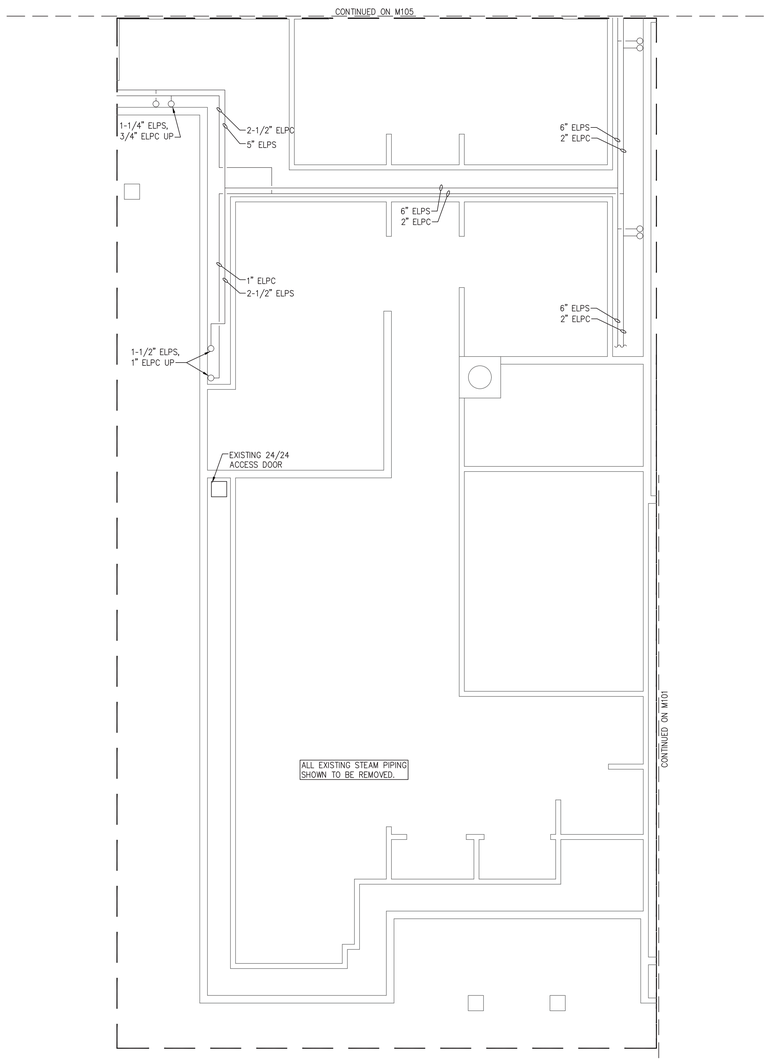

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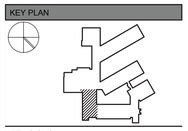

REVISIONS

No.	Description	Date

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SHEET NAME: HVAC PIPE TRENCH REMOVALS PLAN
SHEET NUMBER: MES-M106

ISSUE FOR BID SET

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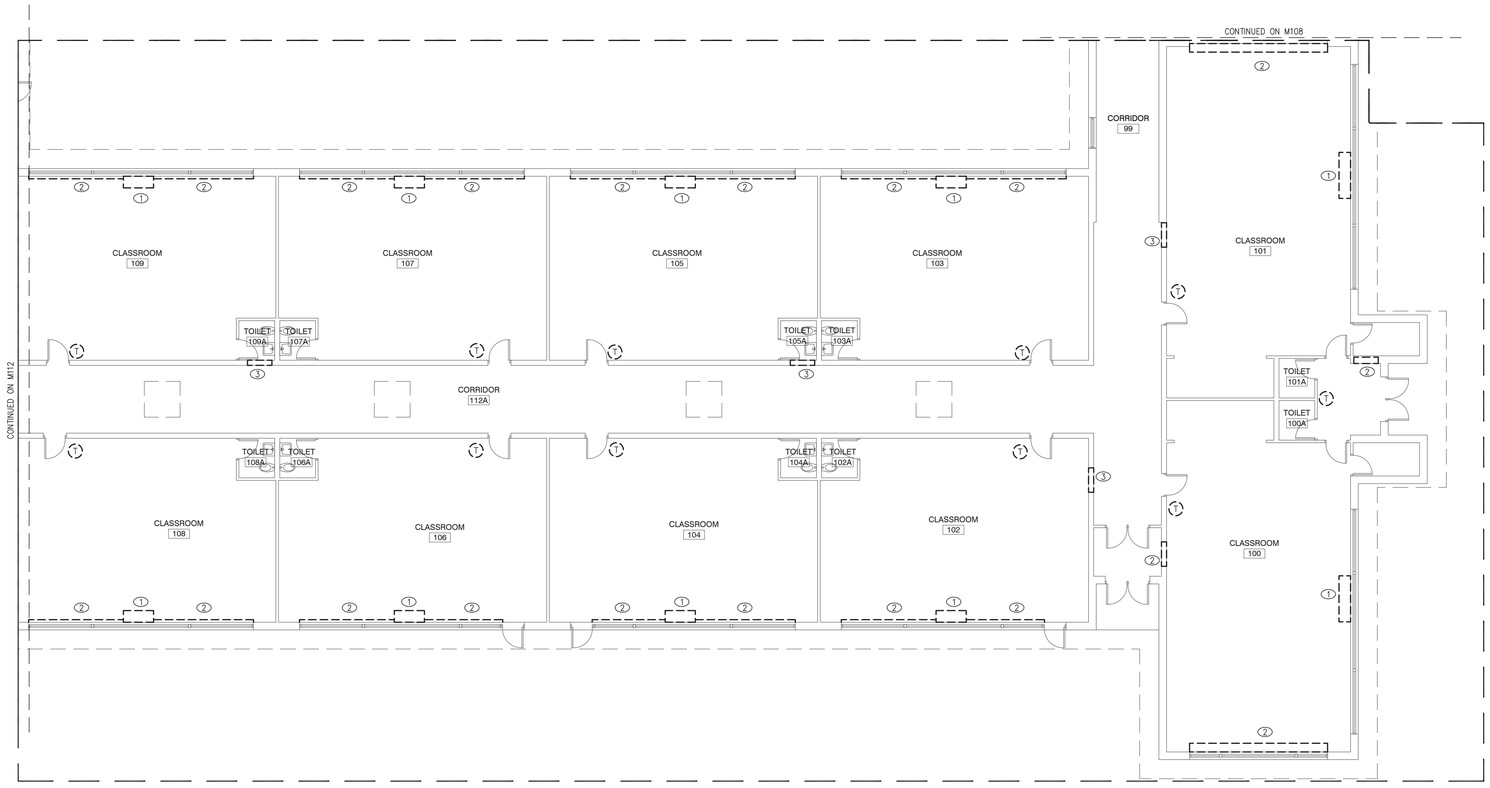
KEYED REMOVAL NOTES

1. REMOVE EXISTING UNIT HEATER AND ALL ASSOCIATED STEAM VALVES AND PIPING.
2. CUT AND REMOVE RADIATION ELEMENT AND ASSOCIATED STEAM/CONDENSATE PIPING. PREPARE PENETRATIONS FOR REUSE.
3. REMOVE EXISTING STEAM PIPING TO RADIATOR. CAP RADIATOR.



1 HVAC PIPE TRENCH REMOVALS PLAN
MES-M107 SCALE: 1/8" = 1'-0"

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KEY PLAN

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HVAC PIPE TRENCH REMOVALS PLAN
SHEET NUMBER:
MES-M107

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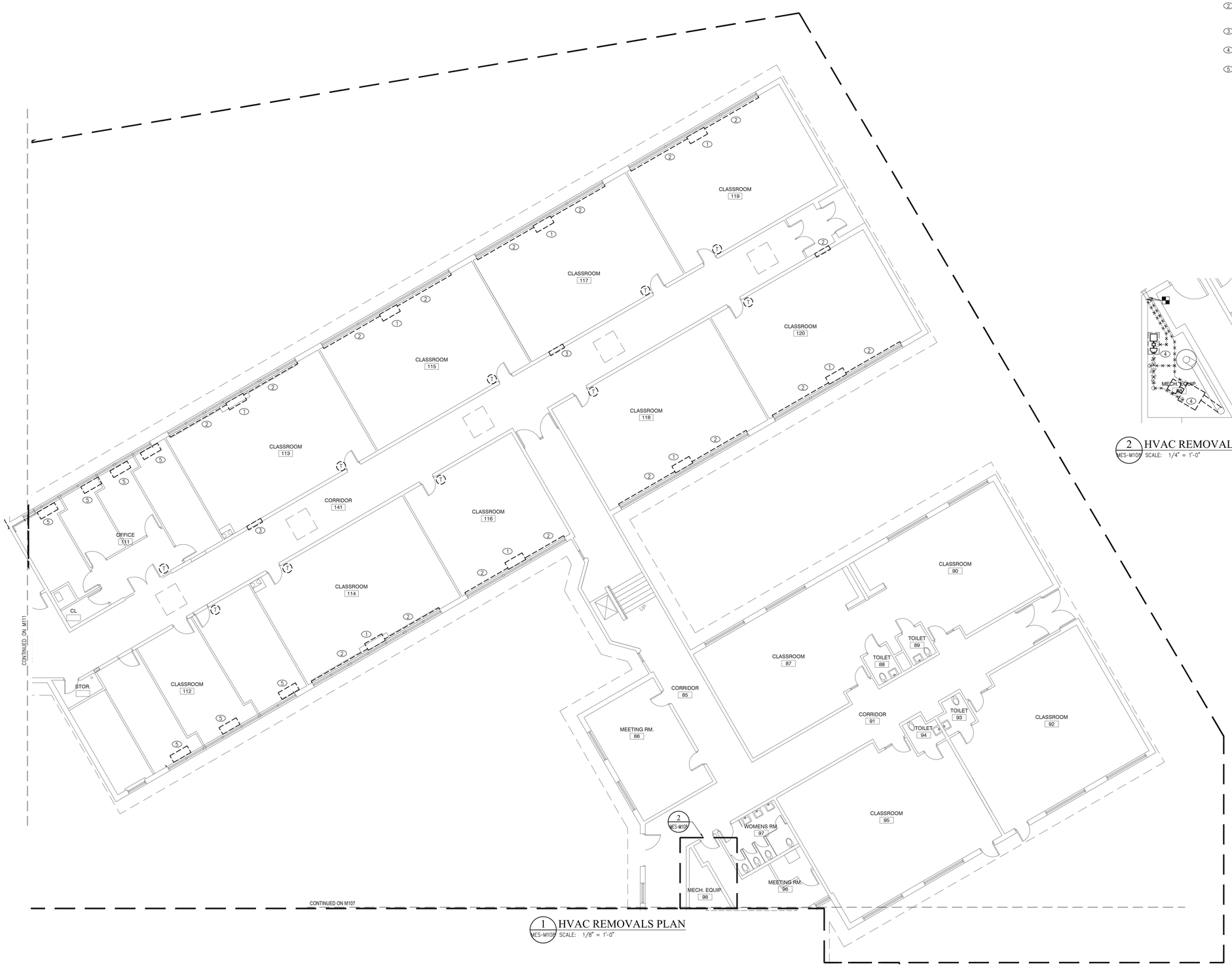
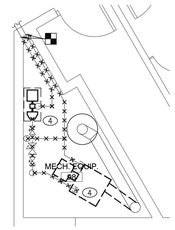
KEYED REMOVAL NOTES

1. REMOVE EXISTING UNIT HEATER AND ALL ASSOCIATED STEAM VALVES AND PIPING.
2. CUT AND REMOVE RADIATION ELEMENT, COVER AND ASSOCIATED STEAM/CONDENSATE PIPING. PREPARE PENETRATIONS FOR REUSE.
3. REMOVE EXISTING STEAM PIPING TO RADIATOR. CAP RADIATOR.
4. REMOVE EXISTING BOILER AND PUMPS AND DELIVER TO OWNER.
5. EXISTING PTAC TO REMAIN. REMOVE EXISTING STEAM COIL AND ALL ASSOCIATED PIPING. PREPARE TO ACCEPT NEW HW COIL.



1 HVAC REMOVALS PLAN
MES-M108 SCALE: 1/8" = 1'-0"



2 HVAC REMOVALS PLAN
MES-M108 SCALE: 1/4" = 1'-0"

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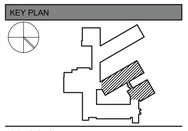

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HVAC REMOVALS PLAN
SHEET NUMBER:
MES-M108

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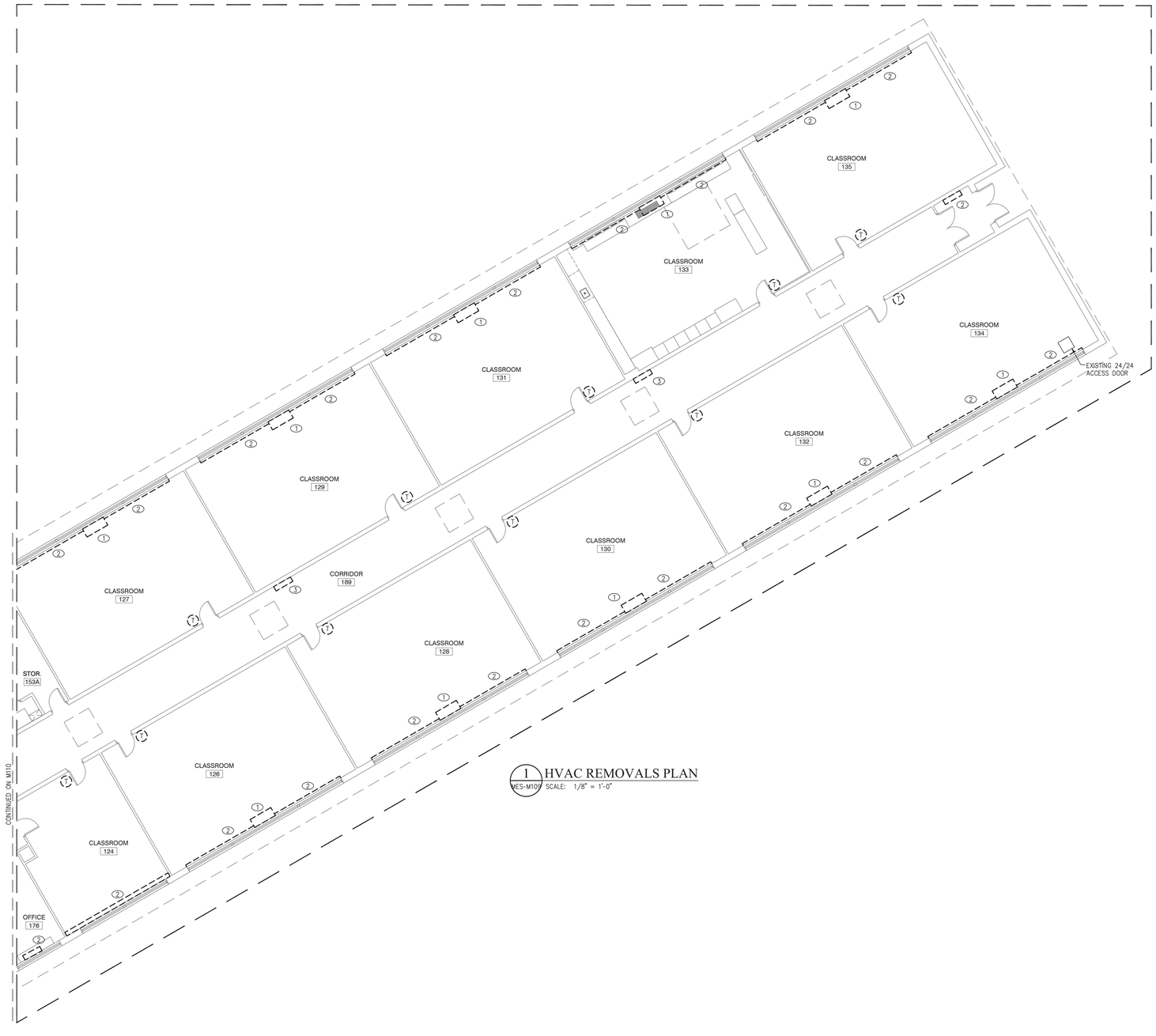
KEYED REMOVAL NOTES

1. REMOVE EXISTING UNIT HEATER AND ALL ASSOCIATED STEAM VALVES AND PIPING.
2. CUT AND REMOVE RADIATION ELEMENT AND ASSOCIATED STEAM/CONDENSATE PIPING. PREPARE PENETRATIONS FOR REUSE.
3. REMOVE EXISTING STEAM PIPING TO RADIATOR. CAP RADIATOR.



1 HVAC REMOVALS PLAN
MES-M109 SCALE: 1/8" = 1'-0"

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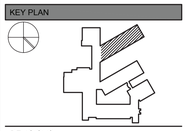

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SHEET NUMBER: MES-M109

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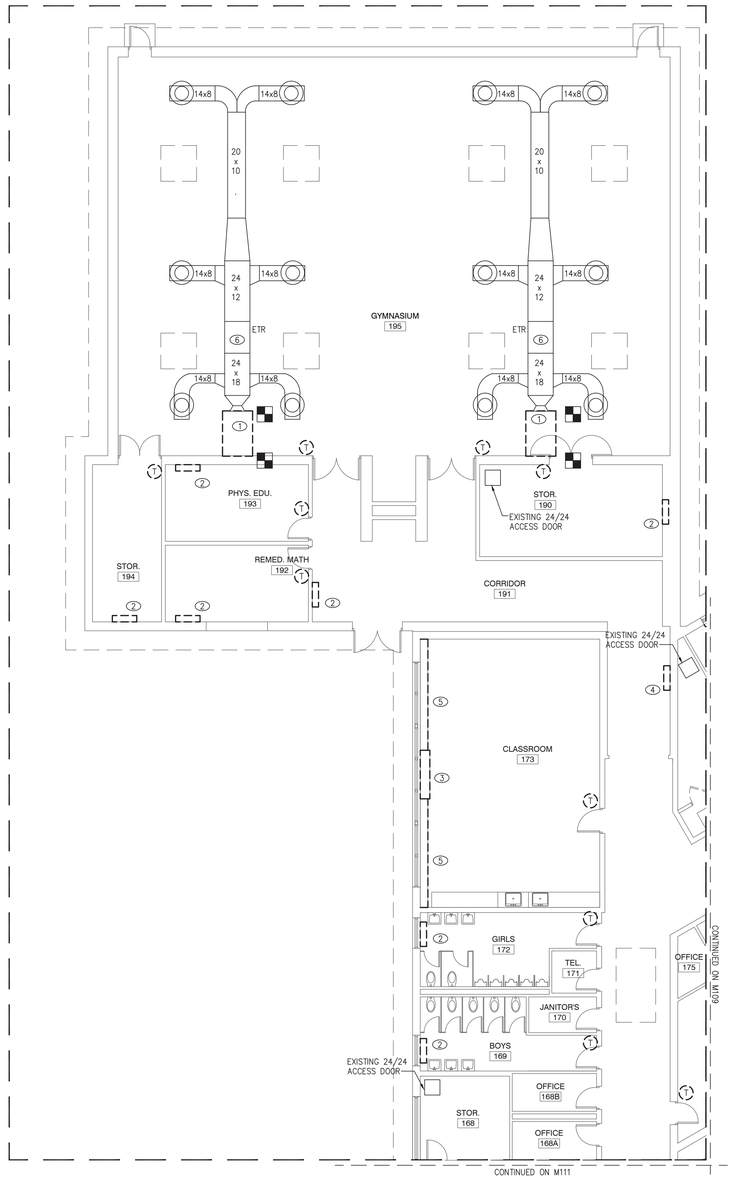
KEYED REMOVAL NOTES

1. REMOVE EXISTING AHU. REMOVE ASSOCIATED STEAM PIPING AND VALVES. RETAIN OA LOUVER AND SUPPLY FOR DUCTWORK REUSE.
2. REMOVE EXISTING CONVECTOR. REMOVE ALL ASSOCIATED STEAM PIPING AND VALVES.
3. REMOVE EXISTING UNIT VENTILATOR AND ALL ASSOCIATED STEAM VALVES AND PIPING.
4. ABANDON CONVECTOR IN PLACE. CUT STEAM PIPING AT FLOOR.
5. CUT AND REMOVE RADIATION ELEMENT, COVER AND ASSOCIATED STEAM/CONDENSATE PIPING. PREPARE PENETRATIONS FOR REUSE.
6. CLEAN INTERIOR OF EXISTING DUCTWORK TO REMAIN PRIOR TO INSTALLATION OF AHU.



1 HVAC REMOVALS PLAN
MES-M110 SCALE: 1/8" = 1'-0"

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MES-M110

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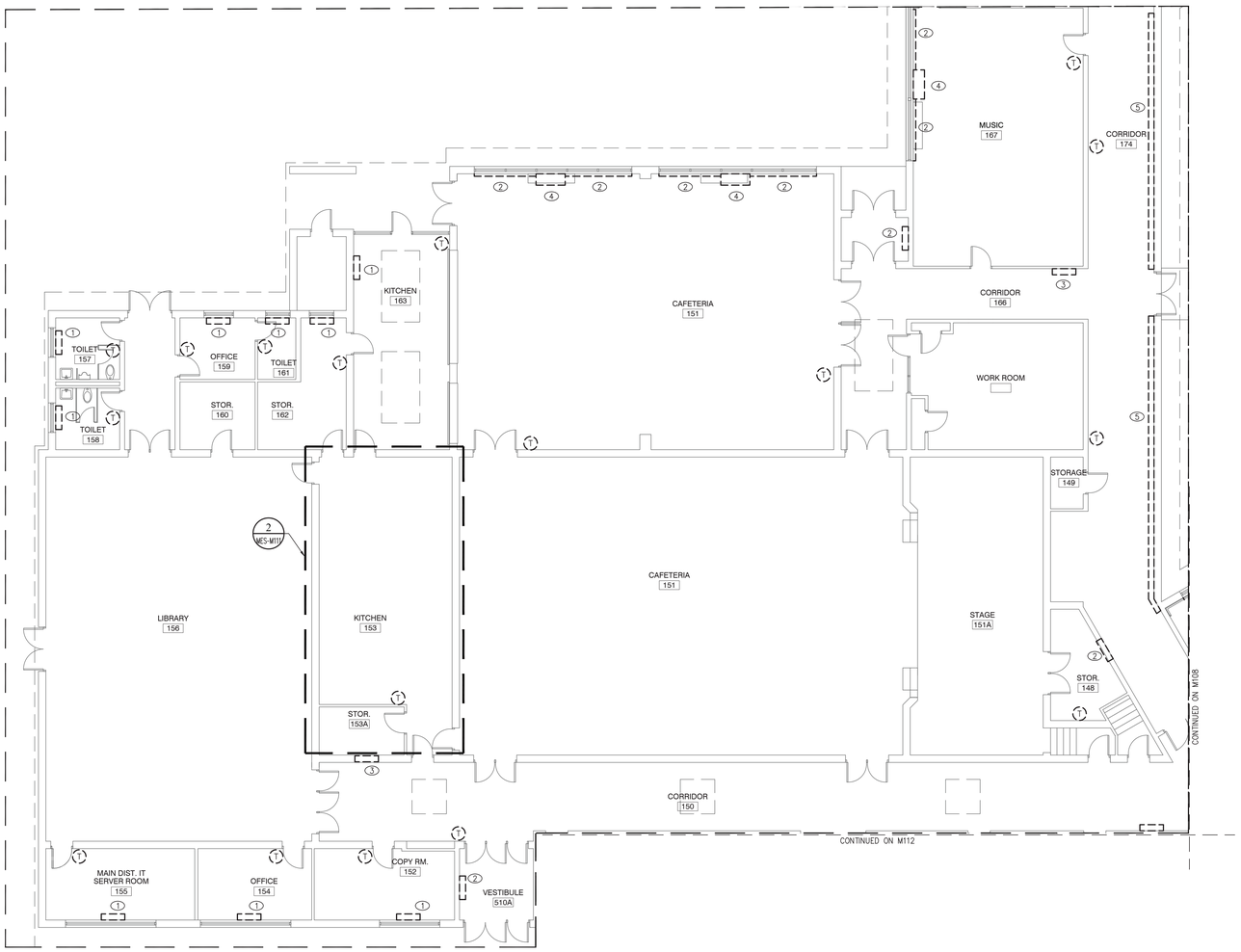
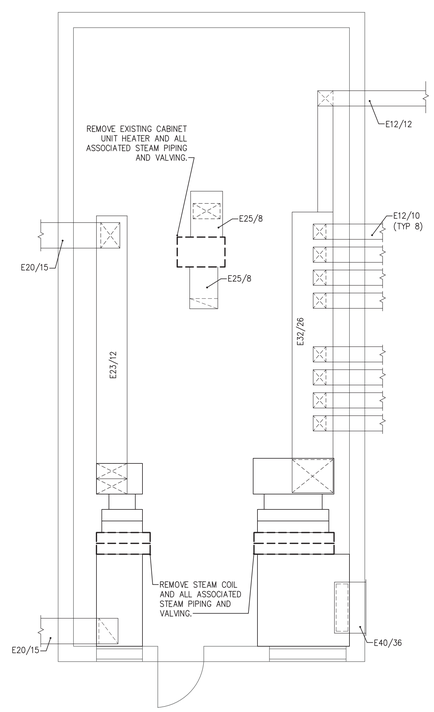
KEYED REMOVAL NOTES

1. REMOVE EXISTING CONVECTOR AND ALL ASSOCIATED STEAM PIPING.
2. REMOVE EXISTING STEAM PIPING, COVER AND VALVES TO EXISTING FIXTURE.
3. REMOVE ALL ASSOCIATED STEAM PIPING AND VALVES TO EXISTING CONVECTOR. CAP CONVECTOR AND ABANDON IN PLACE.
4. REMOVE EXISTING UNIT VENTILATOR AND ALL ASSOCIATED STEAM PIPING AND VALVES.
5. CUT AND REMOVE RADIATION ELEMENT AND ASSOCIATED STEAM/CONDENSATE PIPING. PREPARE PENETRATIONS FOR REUSE.



1 MES-M111 HVAC REMOVALS PLAN
SCALE: 1/8" = 1'-0"



2 MES-M111 HVAC PENTHOUSE REMOVALS PLAN
SCALE: 1/8" = 1'-0"

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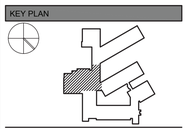

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HVAC REMOVALS PLAN
SHEET NUMBER:
MES-M111

ISSUE FOR BID SET

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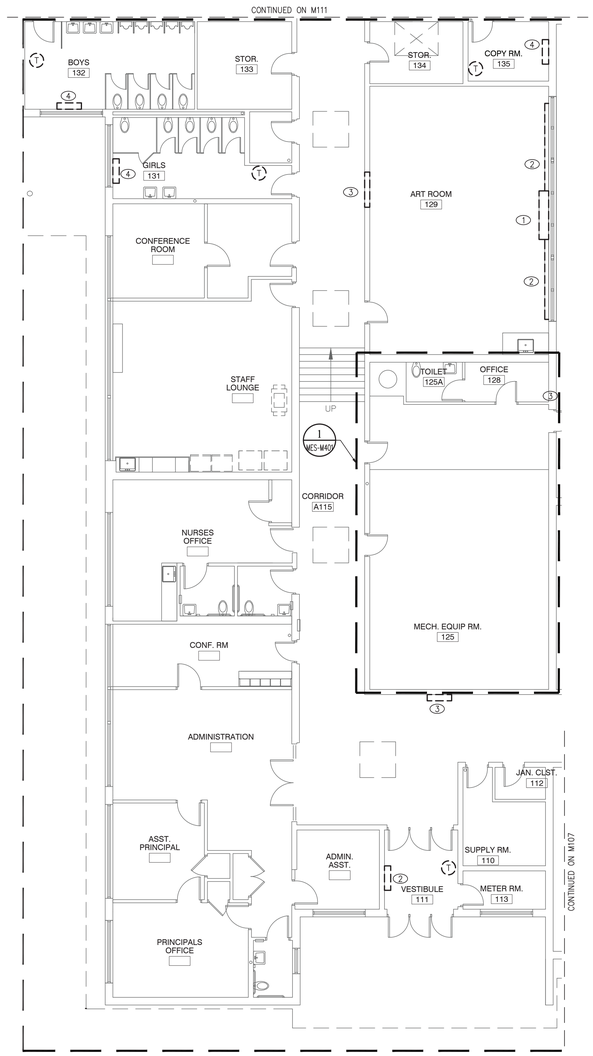
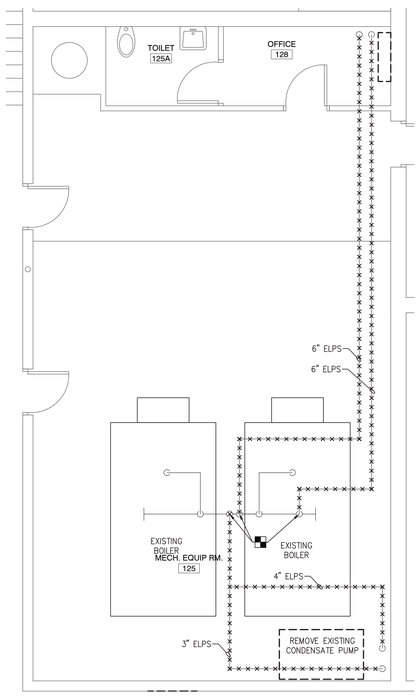
KEYED REMOVAL NOTES

1. REMOVE EXISTING UNIT VENTILATOR AND ALL ASSOCIATED STEAM VALVES AND PIPING.
2. REMOVE ALL ASSOCIATED STEAM PIPING, COVER AND VALVES BACK TO FIXTURES.
3. REMOVE ALL ASSOCIATED STEAM PIPING AND VALVES BACK TO FIXTURE AND CAP. ABANDON FIXTURE IN PLACE.
4. REMOVE EXISTING CONVECTOR AND ALL ASSOCIATED STEAM PIPING AND VALVES.



1 HVAC REMOVALS PLAN
MES-M112 SCALE: 1/8" = 1'-0"



2 HVAC MECH. EQUIP RM. REMOVALS PLAN
MES-M112 SCALE: 1/4" = 1'-0"

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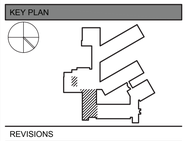

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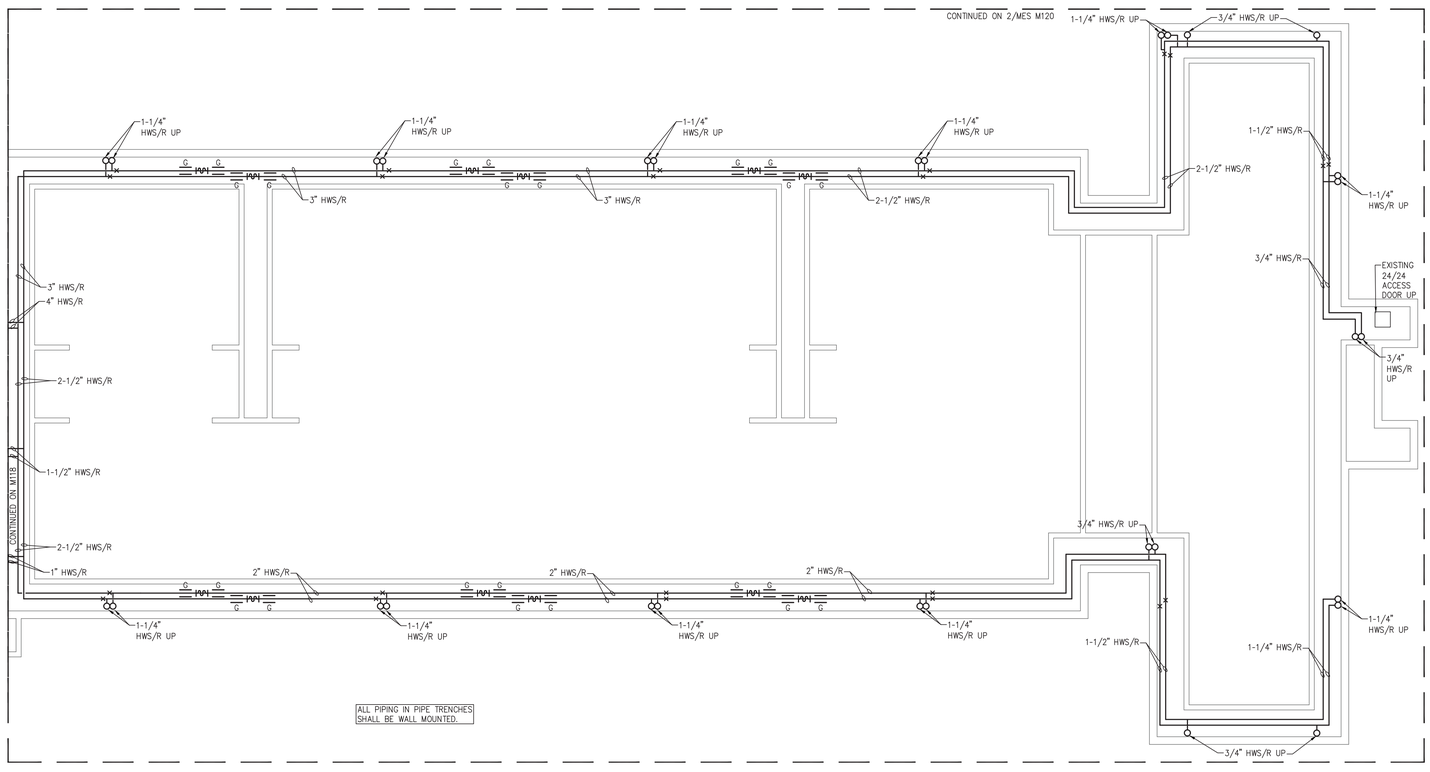
GENERAL NOTES

1. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
2. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.



1 HVAC PIPE TRENCH PLAN
MES-M113 SCALE: 1/8" = 1'-0"

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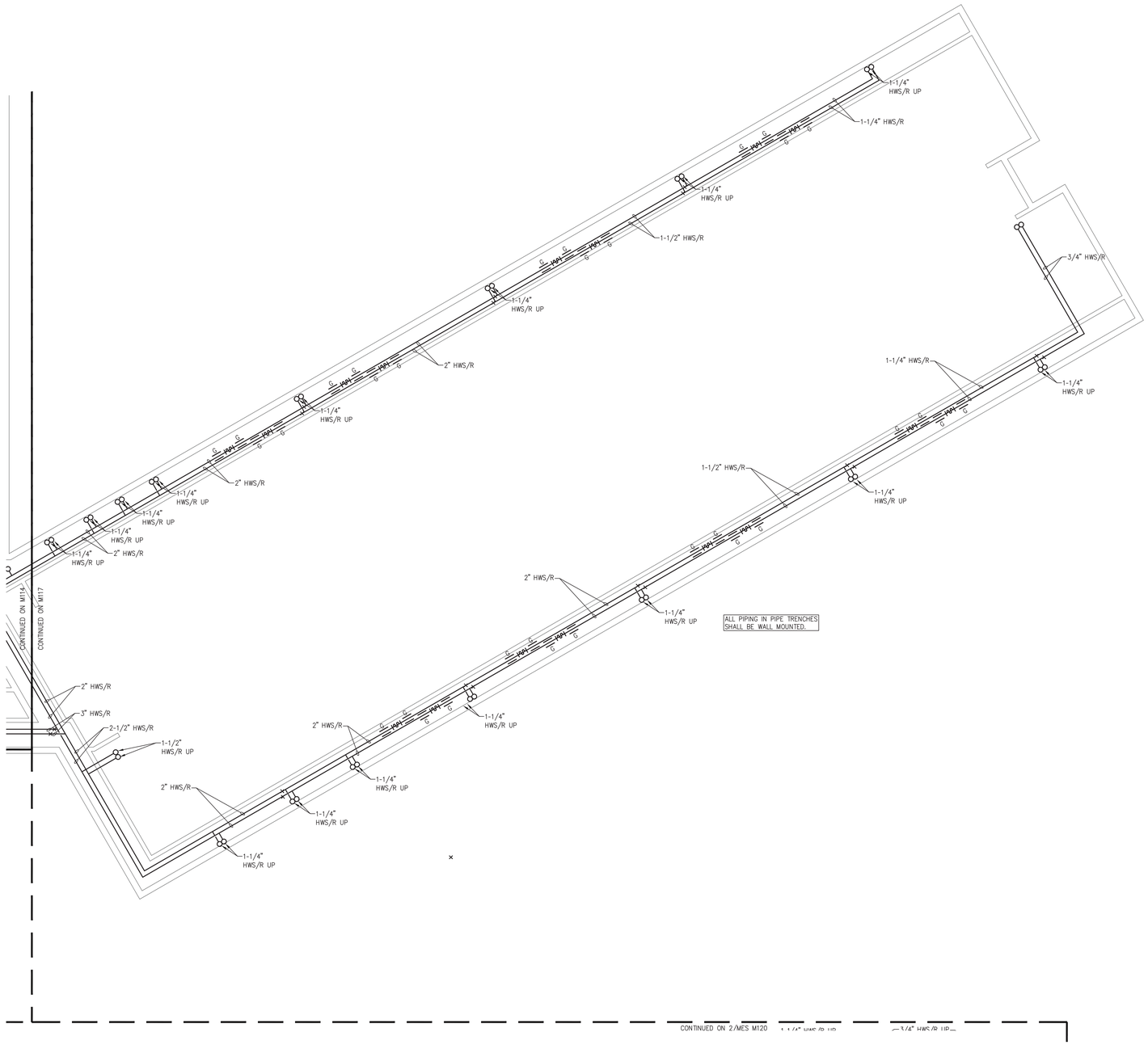

1 HVAC PIPE TRENCH PLAN
MES-M114 SCALE: 1/8" = 1'-0"

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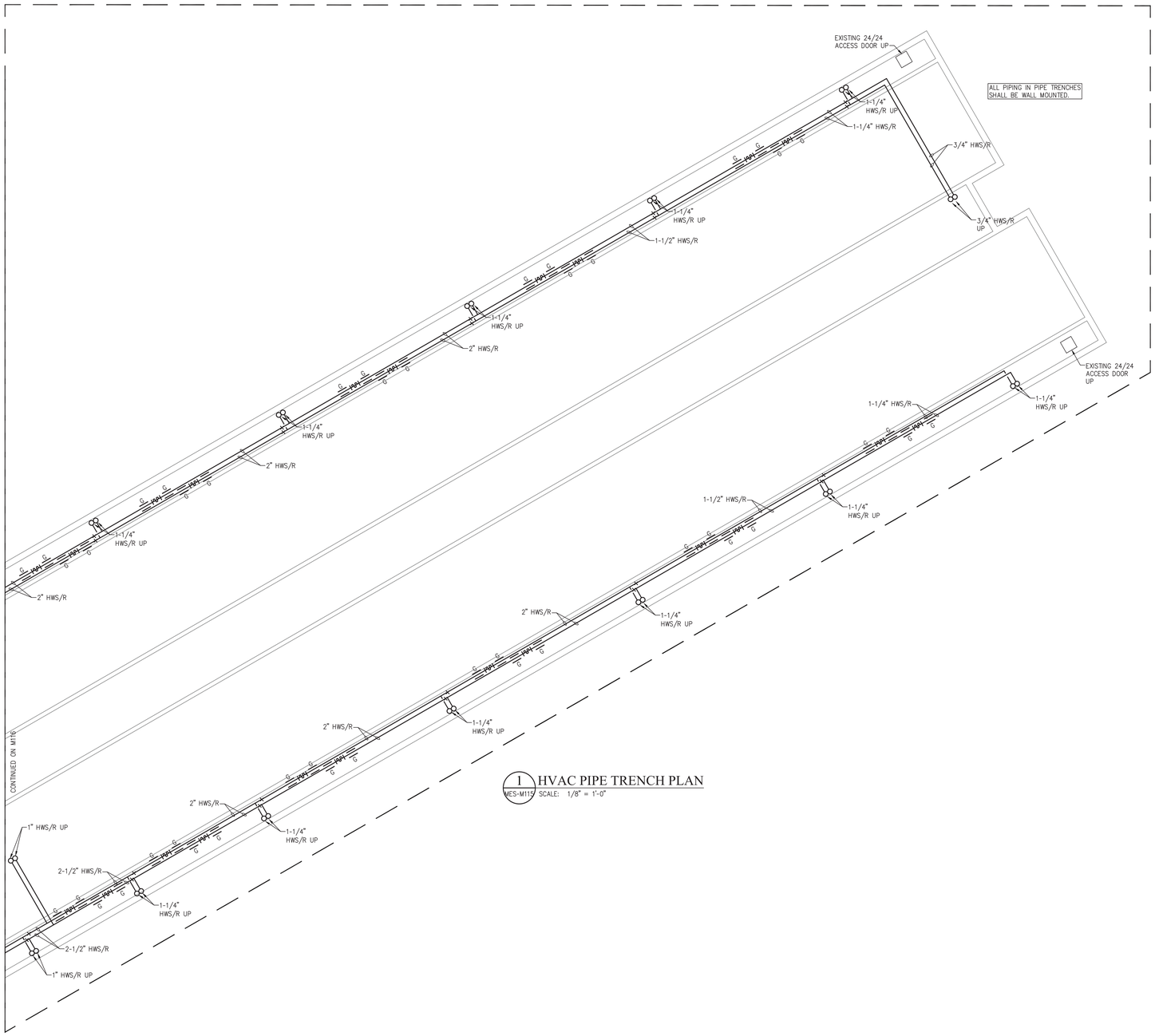

1 HVAC PIPE TRENCH PLAN
MES-M115 SCALE: 1/8" = 1'-0"

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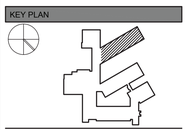

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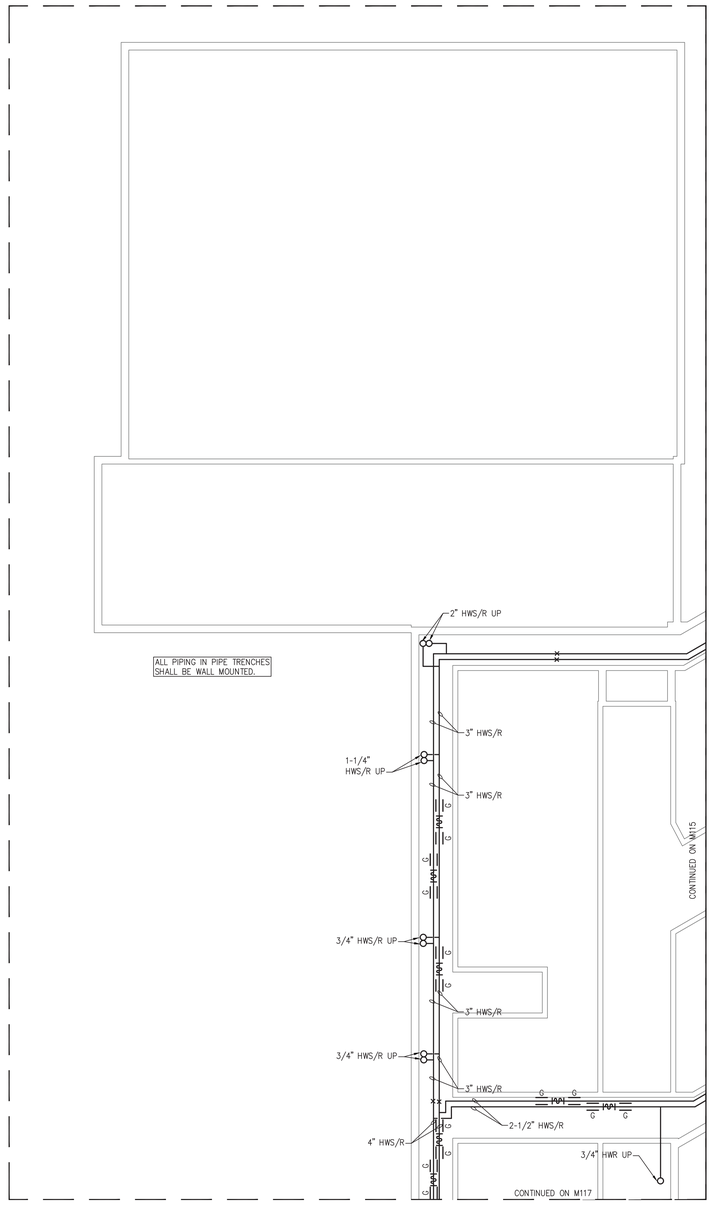
GENERAL NOTES

1. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
2. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.



1 HVAC PIPE TRENCH PLAN
MES-M116 SCALE: 1/8" = 1'-0"

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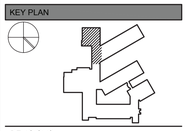

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SHEET NUMBER: MES-M116

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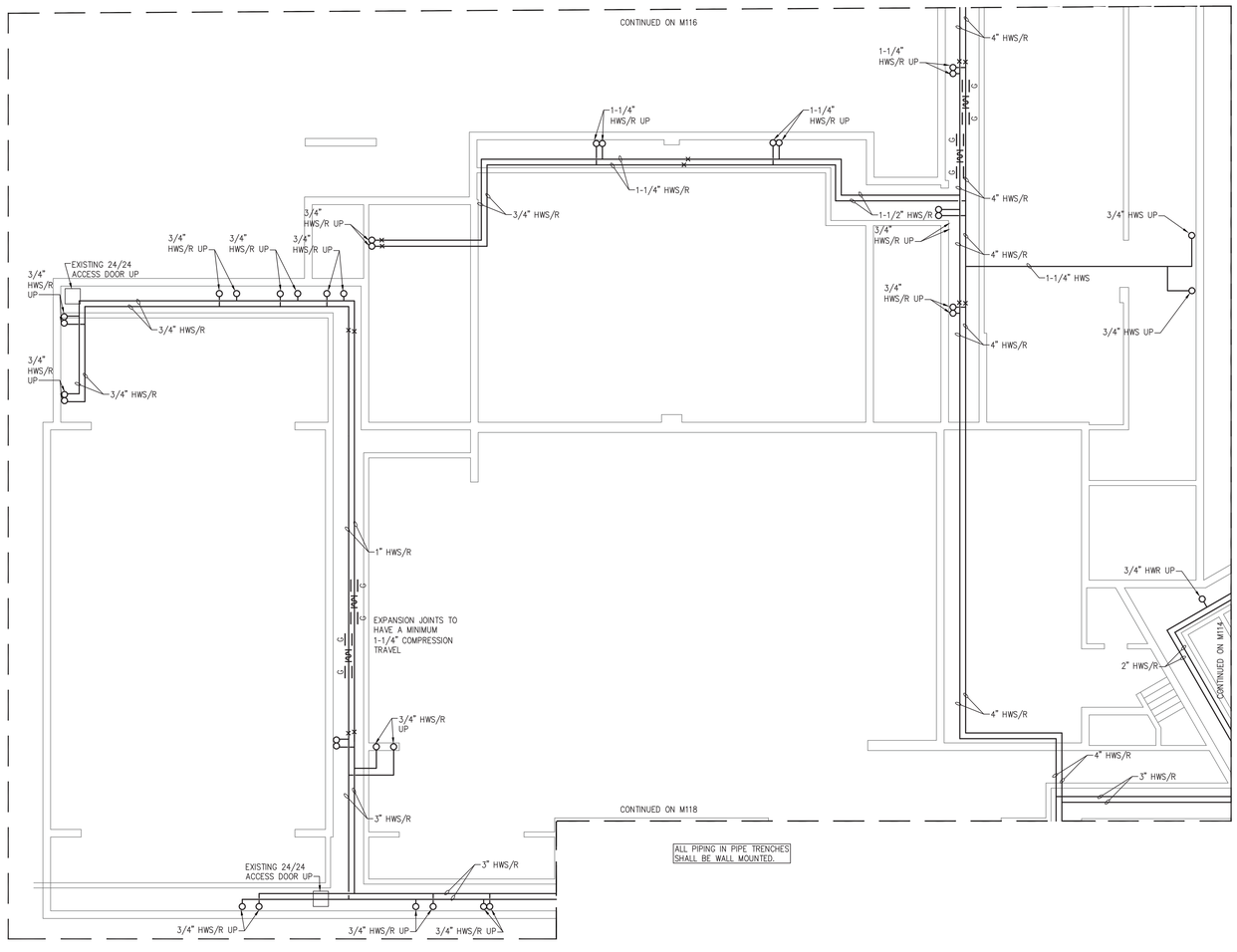

1 MES-M117 HVAC PIPE TRENCH PLAN
SCALE: 1/8" = 1'-0"

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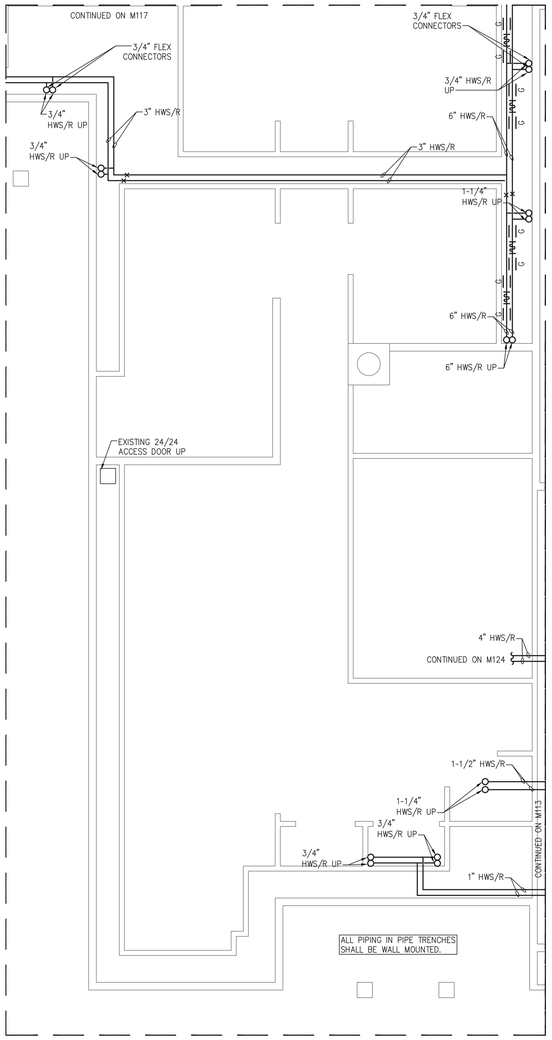

1 HVAC PIPE TRENCH PLAN
MES-M118 SCALE: 1/8" = 1'-0"

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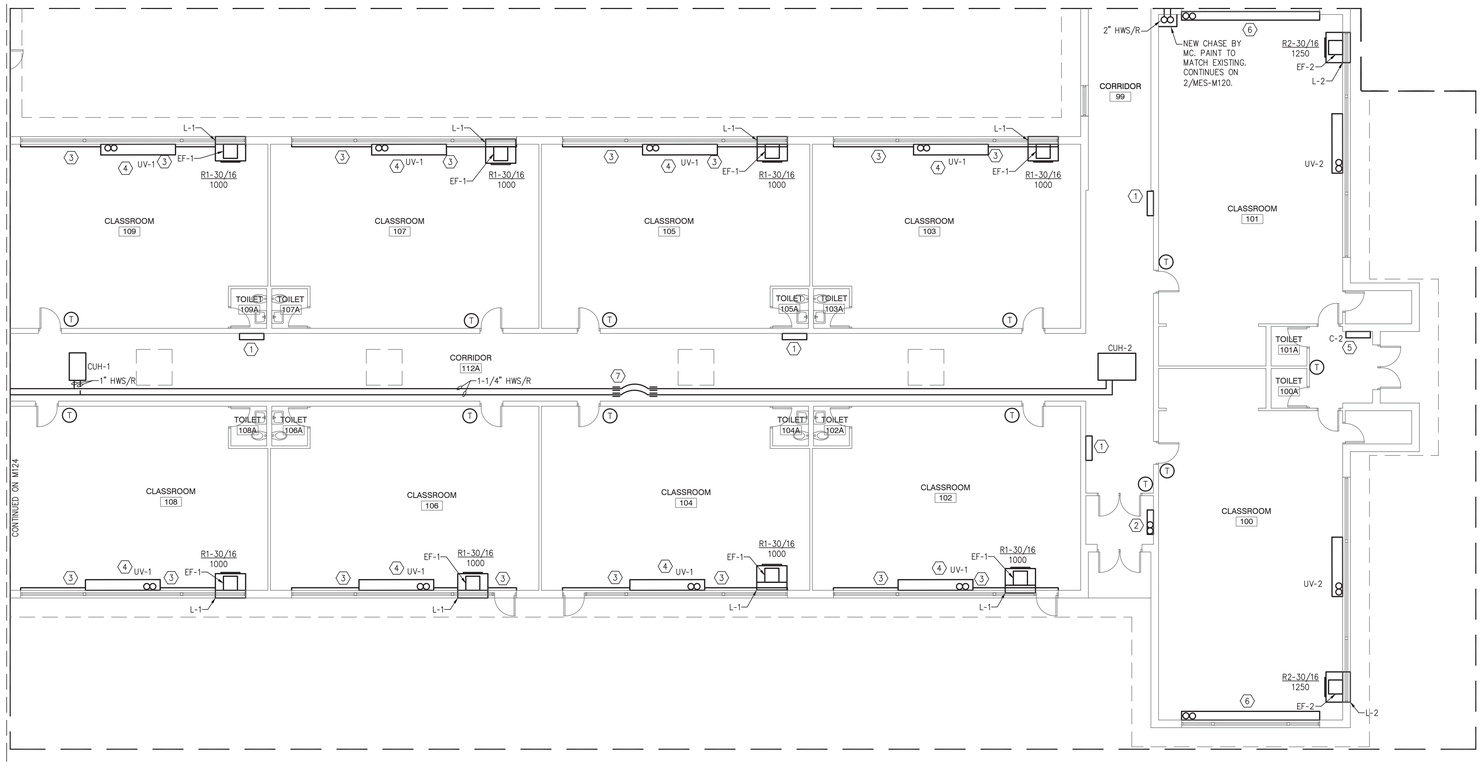

1 HVAC PLAN
MES-M119 SCALE: 1/8" = 1'-0"

KEYED NOTES

1. EXISTING CONVECTOR TO REMAIN ABANDONED IN PLACE.
2. EXISTING CONVECTOR HOUSING TO REMAIN. REPLACE ALL STEAM PIPING AND HEATING ELEMENTS WITH HYDRONIC. PROVIDE LINE SIZE MODULATING THERMOSTATIC VALVE WITH DDC ACTUATOR.
3. PROVIDE FINNED TUBE RADIATION (FTR-1) AND 24" HIGH ENCLOSURE. SEE DETAIL 6/MES-M501.ENCLOSURE TO GO FROM UV TO WALL. ACTIVE FIN TO COME WITHIN 12 INCHES OF EACH END. FIELD VERIFY DIMENSIONS.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER.
5. PROVIDE CONVECTOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW.
6. INSTALL NEW FTR-3 BEHIND EXISTING CASEWORK. CONTROL VALVE SHALL BE A SLAVE TO THE UNIT VENTILATOR.
7. 2.75" MINIMUM EXPANSION/COMPRESSION.

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
2. EXISTING FLOOR TILES CONTAIN ASBESTOS MATERIALS. IF THE ACM MUST BE DISTURBED TO PENETRATE FLOOR OR ANY OTHER REASON, COORDINATE WORK WITH OWNER AND ENGINEER. OWNER SHALL PROVIDE THE ABATEMENT BY CERTIFIED PERSONNEL.
3. WHEN SETTING UV'S OR CASEWORK LEVEL FLOOR AS NECESSARY WITH NON ACM FLOOR TILES.
4. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
5. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.

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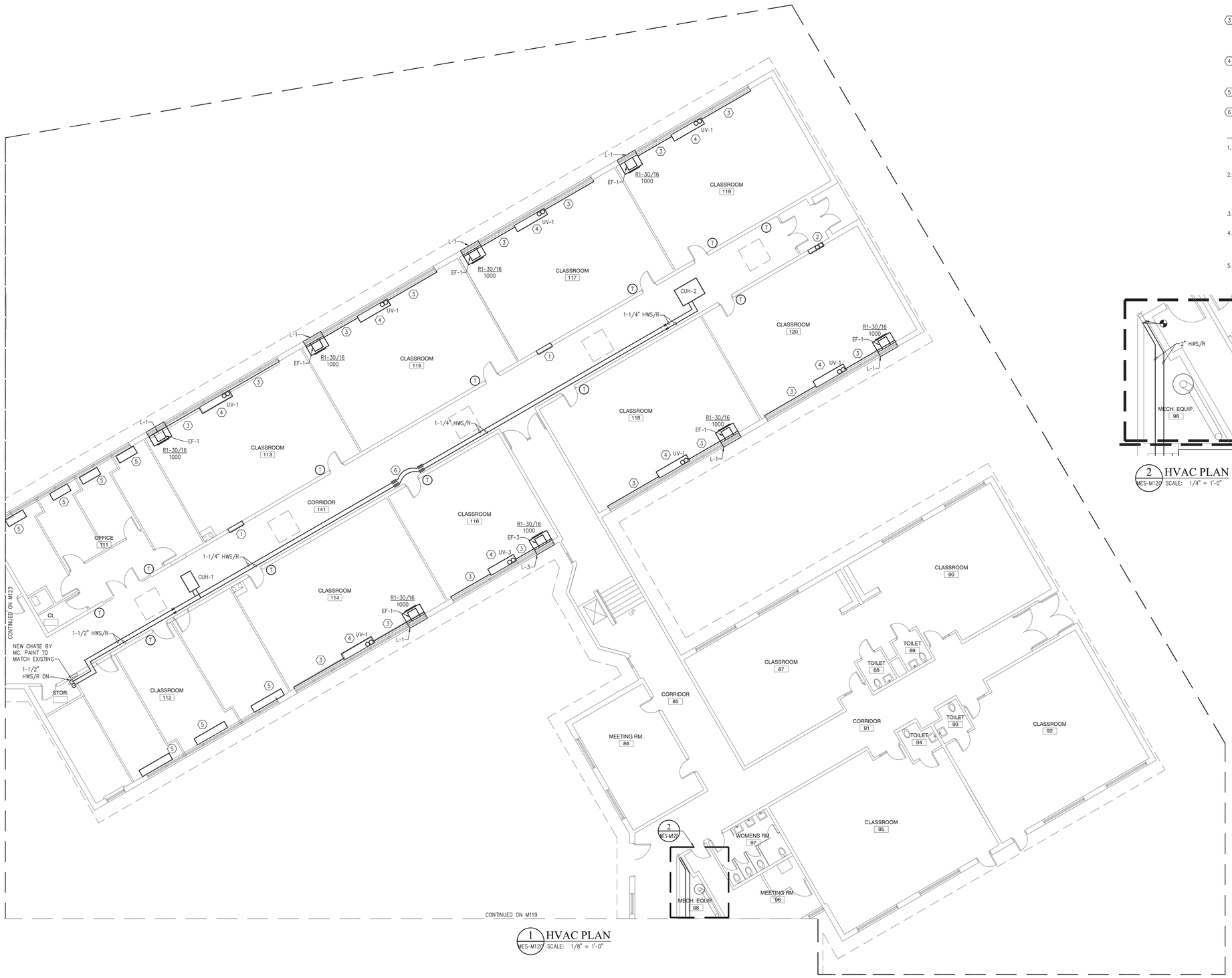
KEYED NOTES

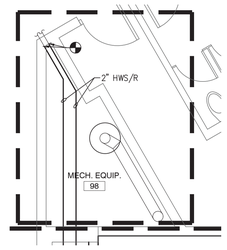
1. EXISTING CONVECTOR TO REMAIN ABANDONED IN PLACE.
2. EXISTING CONVECTOR HOUSING TO REMAIN. REPLACE ALL STEAM PIPING AND HEATING ELEMENTS WITH HYDRONIC. PROVIDE LINE SIZE MODULATING THERMOSTATIC VALVE WITH DDC ACTUATOR.
3. PROVIDE FINNED TUBE RADIATION (FTR-1) AND ENCLOSURE. SEE DETAIL 9/MES-M501. ENCLOSURE TO GO FROM UV TO WALL. ACTIVE FIN TO COME WITHIN 12" OF EACH END. FIELD VERIFY DIMENSION.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER. PROVIDE UNIT VENTILATOR WITH FALSE BACK AND INSULATED PIPE ENCLOSURE.
5. PROVIDE HW COIL IN EXISTING PTAC. PROVIDE CONTROLLER AND NEW 2-WAY VALVE.
6. 2.75" MINIMUM EXPANSION/COMPRESSION

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
2. EXISTING FLOOR TILES CONTAIN ASBESTOS MATERIALS. IF THE ACM MUST BE DISTURBED TO PENETRATE FLOOR OR ANY OTHER REASON, COORDINATE WORK WITH OWNER AND ENGINEER. OWNER SHALL PROVIDE THE ABATEMENT BY CERTIFIED PERSONNEL.
3. WHEN SETTING UV'S OR CASEWORK LEVEL FLOOR AS NECESSARY WITH NON ACM FLOOR TILES.
4. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
5. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.



1 HVAC PLAN
MES-M120 SCALE: 1/8" = 1'-0"



2 HVAC PLAN
MES-M120 SCALE: 1/4" = 1'-0"

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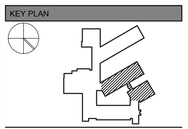

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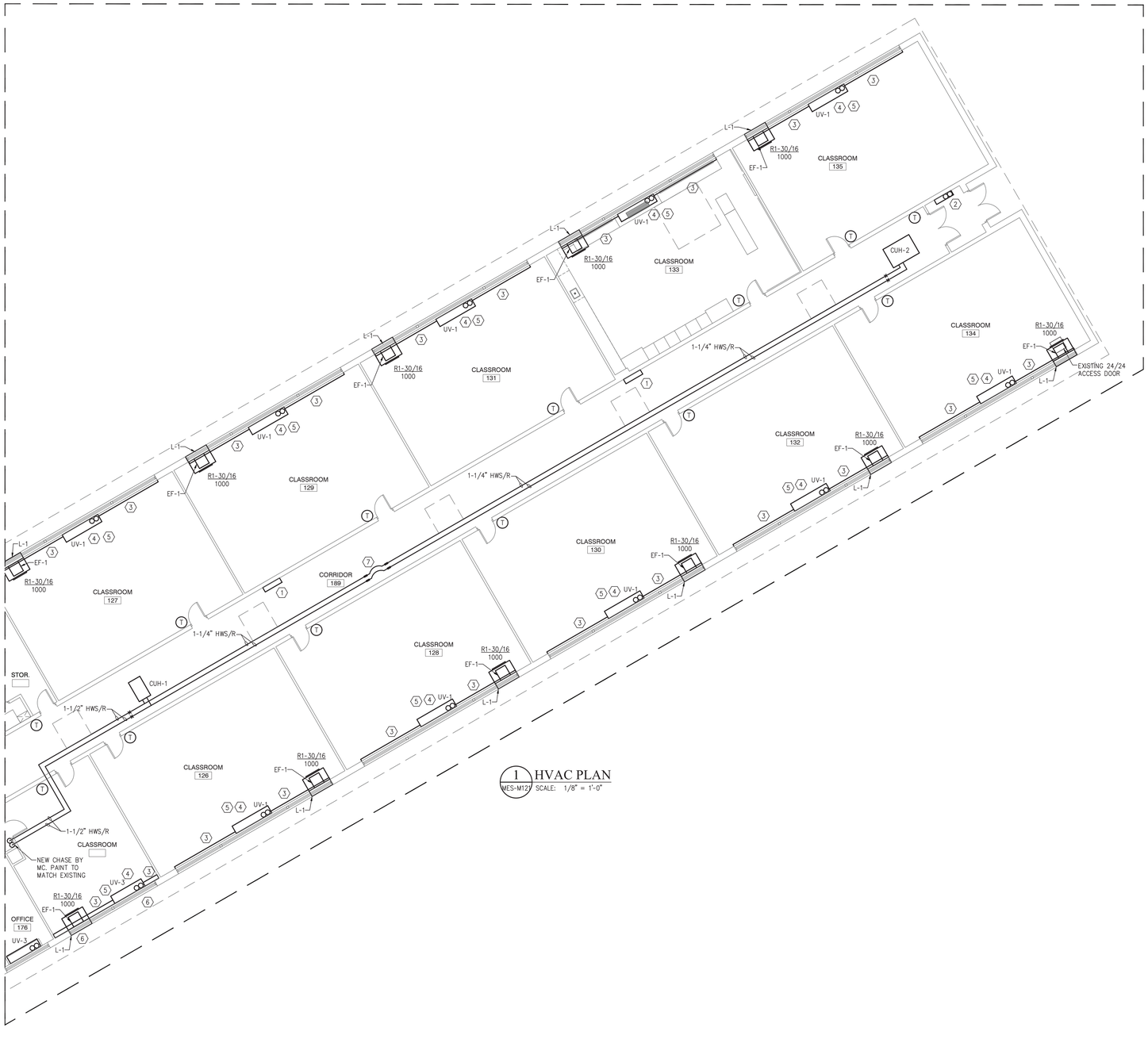

1 HVAC PLAN
MES-M121 SCALE: 1/8" = 1'-0"

KEYED NOTES

1. EXISTING CONVECTOR TO REMAIN ABANDONED IN PLACE.
2. EXISTING CONVECTOR HOUSING TO REMAIN. REPLACE ALL STEAM PIPING AND HEATING ELEMENTS WITH HYDRONIC. PROVIDE LINE SIZE MODULATING THERMOSTATIC VALVE WITH DDC ACTUATOR.
3. PROVIDE FINNED TUBE RADIATION (FTR-2) WITHOUT ENCLOSURE. TO BE INSTALLED BEHIND EXISTING CASEWORK. SEE DETAIL 9/MES-M501. FIELD VERIFY DIMENSION TO RUN LENGTH OF THE CASEWORK LESS U BEND AND VALVING.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER.
5. REMOVE EXISTING CASEWORK AS REQUIRED TO INSTALL NEW UNIT VENTILATOR, COORDINATE WORK WITH GC AND ABATEMENT CONTRACTORS.
6. PROVIDE LOUVER AND OPENING.
7. 2.75" MINIMUM EXPANSION/COMPRESSION

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
2. EXISTING FLOOR TILES CONTAIN ASBESTOS MATERIALS. IF THE ACM MUST BE DISTURBED TO PENETRATE FLOOR OR ANY OTHER REASON, COORDINATE WORK WITH OWNER AND ENGINEER. OWNER SHALL PROVIDE THE ABATEMENT BY CERTIFIED PERSONNEL.
3. WHEN SETTING UV'S OR CASEWORK LEVEL FLOOR AS NECESSARY WITH NON ACM FLOOR TILES.
4. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
5. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.

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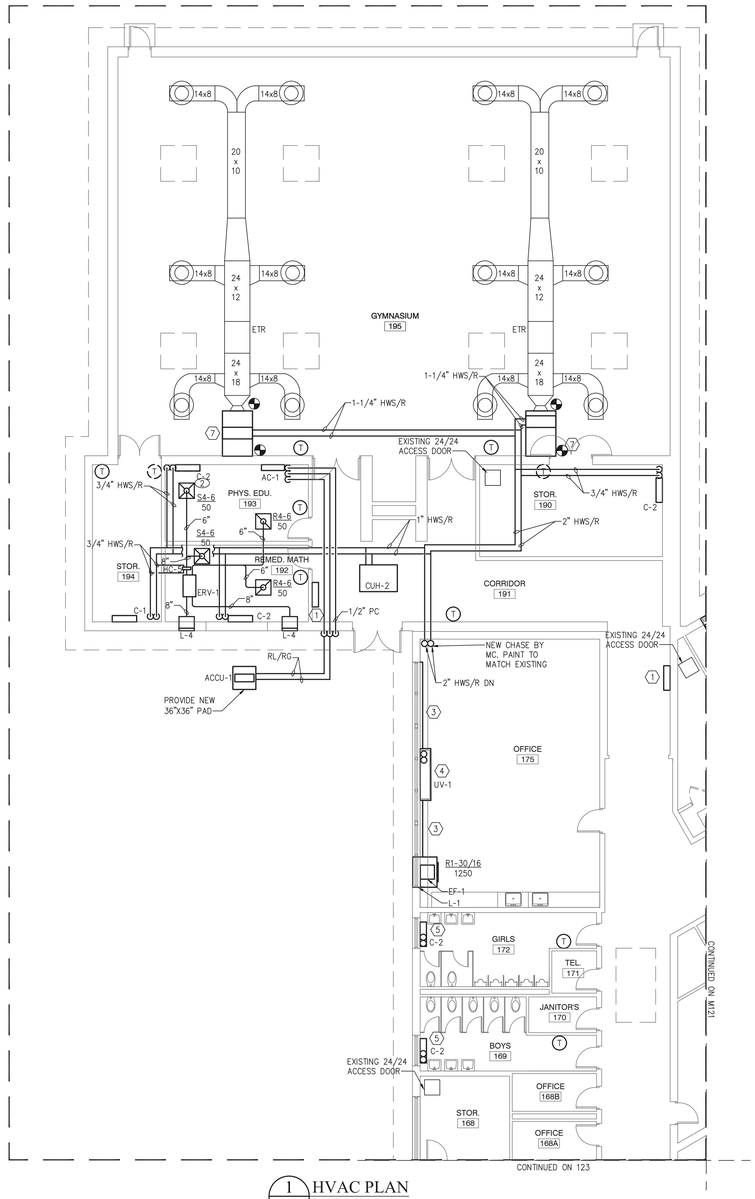

1 HVAC PLAN
MES-M122 SCALE: 1/8" = 1'-0"

KEYED NOTES

1. EXISTING CONVECTOR TO REMAIN ABANDONED IN PLACE.
2. NOT USED.
3. PROVIDE FINNED TUBE RADIATION (FTR-2) W/O ENCLOSURE. TO BE INSTALLED BEHIND EXISTING CASEWORK. SEE DETAIL 9/MES M501. FIELD VERIFY DIMENSION TO RUN THE LENGTH OF THE ENCLOSURE LESS U BEND AND VALVING.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER. PROVIDE UNIT VENTILATOR WITH FALSE BACK AND INSULATED PIPE ENCLOSURE.
5. PROVIDE CONVECTOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW.
6. REMOVE EXISTING WOODEN CASEWORK AS REQUIRED TO INSTALLED THE NEW UNIT VENTILATOR. COORDINATE WORK WITH GC AND ABATEMENT CONTRACTOR.
7. INSTALL NEW AHU ABOVE BASKETBALL BACKBOARD SUPPORT. POSITION UNIT TO INSURE ADEQUATE ACCESS TO CHANGE FILTERS AND PROVIDE OTHER ROUTINE MAINTENANCE.

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
2. EXISTING FLOOR TILES CONTAIN ASBESTOS MATERIALS. IF THE ACM MUST BE DISTURBED TO PENETRATE FLOOR OR ANY OTHER REASON, COORDINATE WORK WITH OWNER AND ENGINEER. OWNER SHALL PROVIDE THE ABATEMENT BY CERTIFIED PERSONNEL.
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3. PROVIDE FINNED TUBE RADIATION (FTR-1) AND ENCLOSURE. SEE DETAIL 9/MES-M501. ENCLOSURE TO GO FROM UV TO WALL. ACTIVE FIN TO COME WITHIN 12" OF EACH END. FIELD VERIFY DIMENSION.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER. PROVIDE UNIT VENTILATOR WITH FALSE BACK AND INSULATED PIPE ENCLOSURE.
5. PROVIDE CONVECTOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW.
6. PROVIDE FINNED TUBE RADIATION (FTR-1) AND ENCLOSURE. SEE DETAIL 6/MES-M501.

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
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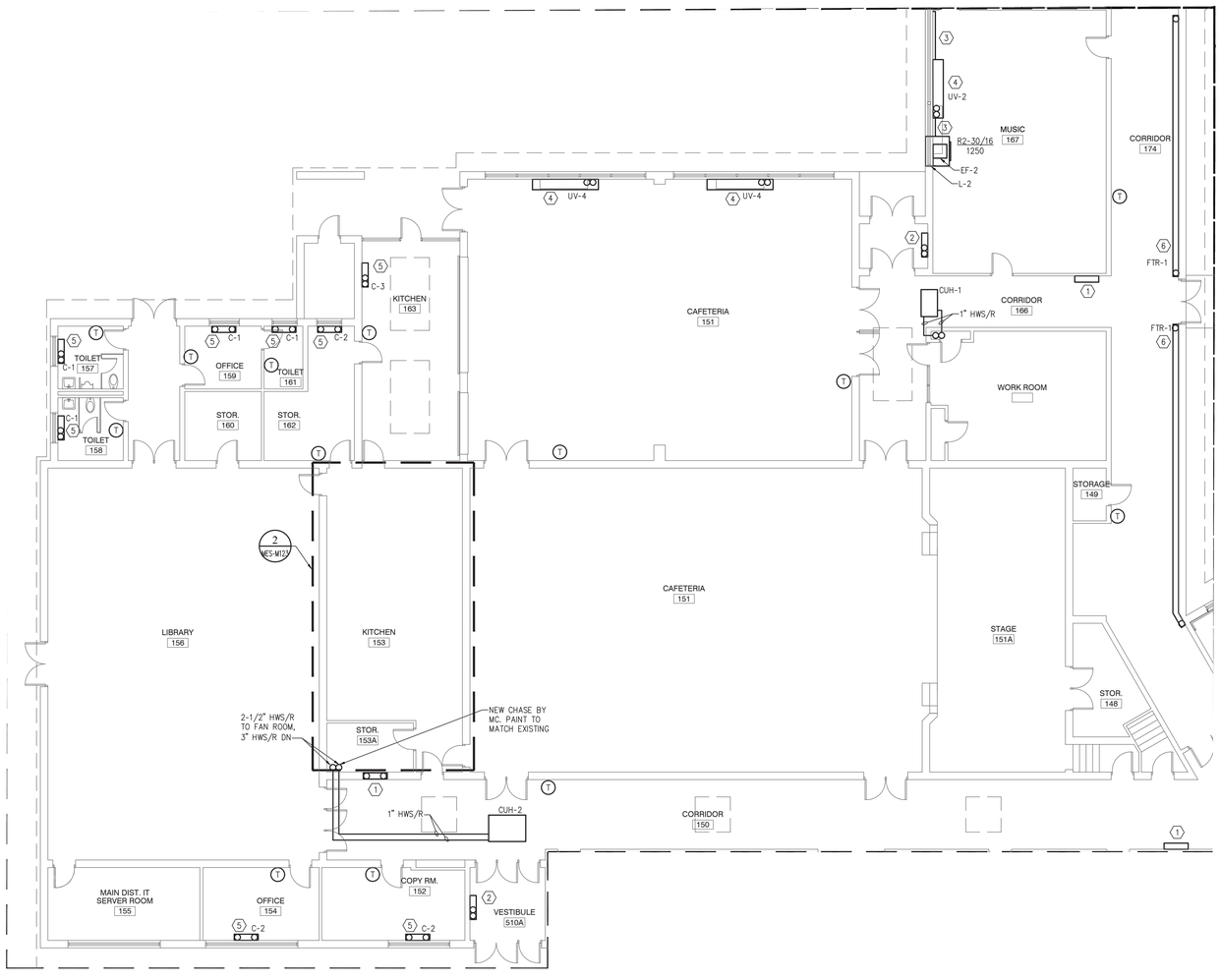
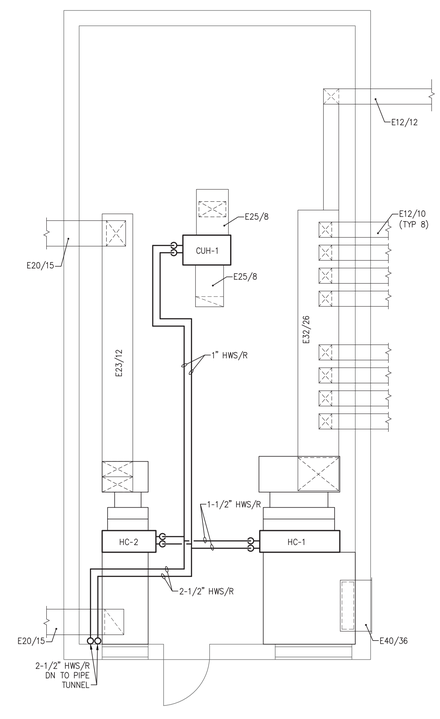


1 HVAC PLAN
MES-M123 SCALE: 1/8" = 1'-0"



1 HVAC PENTHOUSE PLAN
MES-M123 SCALE: 1/8" = 1'-0"

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SED CONTROL NUMBERS
MILLER ES #: 50-01-08-03-0-001-022

STATE OF NEW YORK · ROBERT P. LEWIS · 072097 · LICENSED PROFESSIONAL ENGINEER

NANUET MILLER ES HYDRONIC CONVERSION 2020

103 Church St, Nanuet, NY 10954

KEY PLAN

REVISIONS

No.	Description	Date

ISSUED: ISSUE FOR BID
DATE: MARCH 15, 2021
SCALE: As indicated
SHEET NAME: HVAC PLAN
SHEET NUMBER: MES-M123

ISSUE FOR BID SET

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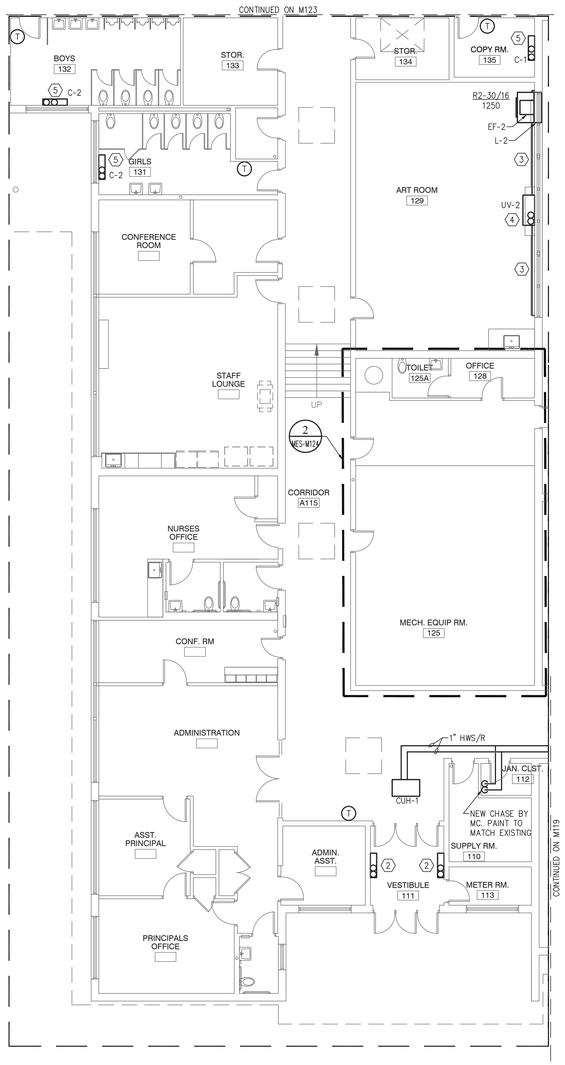
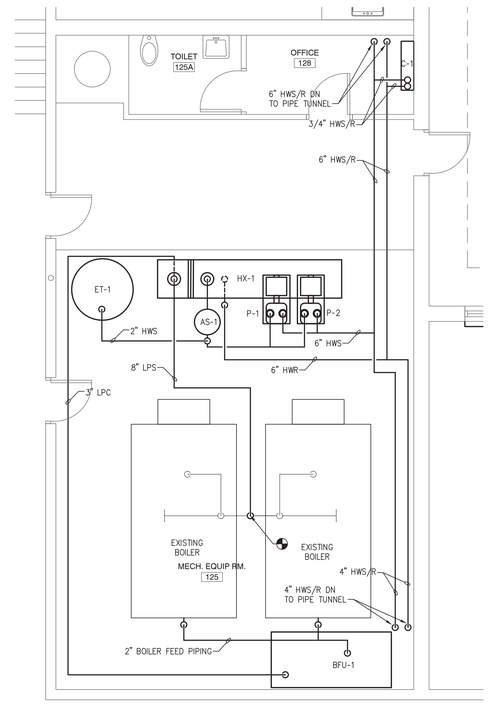


1 HVAC PLAN
MES-M124 SCALE: 1/8" = 1'-0"



2 HVAC MECH. EQUIP RM. PLAN
MES-M124 SCALE: 1/4" = 1'-0"

KEYED NOTES

1. NOT USED.
2. EXISTING CONVECTOR HOUSING TO REMAIN. REPLACE ALL STEAM PIPING AND HEATING ELEMENTS WITH HYDRONIC. PROVIDE LINE SIZE MODULATING THERMOSTATIC VALVE WITH DDC ACTUATOR.
3. PROVIDE FINNED TUBE RADIATION (FTR-1) AND ENCLOSURE. SEE DETAIL 9/MES-M501. ENCLOSURE TO GO FROM UV TO WALL. ACTIVE FIN TO COME WITHIN 12 INCHES OF EACH END. FIELD VERIFY DIMENSIONS.
4. PROVIDE WITH UNIT VENTILATOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW. CONNECT TO EXISTING LOUVER. PROVIDE UNIT VENTILATOR WITH FALSE BACK AND INSULATED PIPE ENCLOSURE.
5. PROVIDE CONVECTOR. PIPING TO BE SUPPLIED FROM PIPE TUNNEL BELOW.

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, UV'S SHALL REUSE EXISTING OA LOUVER/GRILLE. PROVIDE AN AIRTIGHT ADAPTER TO FIT THE UV'S OA INLET.
2. EXISTING FLOOR TILES CONTAIN ASBESTOS MATERIALS. IF THE ACM MUST BE DISTURBED TO PENETRATE FLOOR OR ANY OTHER REASON, COORDINATE WORK WITH OWNER AND ENGINEER. OWNER SHALL PROVIDE THE ABATEMENT BY CERTIFIED PERSONNEL.
3. WHEN SETTING UV'S OR CASEWORK LEVEL FLOOR AS NECESSARY WITH NON ACM FLOOR TILES.
4. CONTRACTOR SHALL VERIFY CONDITIONS IN FIELD TO PROVIDE MATERIAL AND LABOR NECESSARY FOR EACH APPLICABLE CONDITION. EXISTING CONDITIONS MAY VARY FROM TYPICAL DETAILS.
5. EXPANSION JOINTS SHALL HAVE A MINIMUM 1" COMPRESSION AND 1/3" TENSION CAPACITY UNLESS OTHERWISE NOTED.

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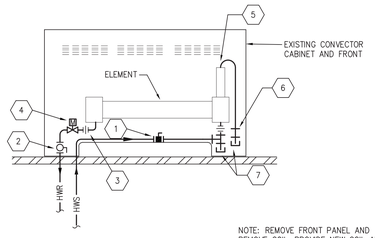
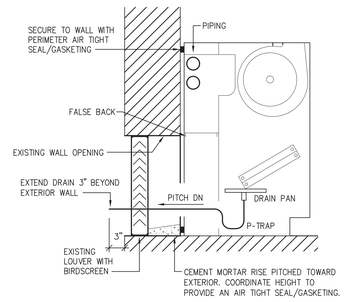
1. BALANCING VALVE
2. BALL VALVE
3. UNION
4. TWO-WAY CONTROL VALVE WITH ACTUATOR
5. AIR VENT CHAMBER
6. VENT VALVE
7. REMOVABLE CAP



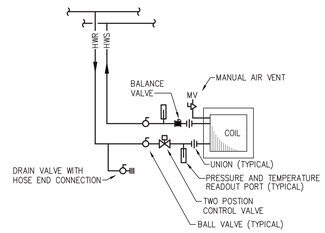
NOTE: REMOVE FRONT PANEL AND REMOVE COIL. PROVIDE NEW COIL AND SUPPORTS. STRIP PAINT FROM EXISTING FRONT PANEL, PRIME AND PAINT. VACUUM AND CLEAN INTERIOR OF CABINET AND REINSTALL FRONT PANEL. PROVIDE TAMPER PROOF FASTENERS.

RUNOUT SCHEDULE	
GPM	PIPE & VALVE SIZE
0 - 3.5	3/4"
3.6 - 7	1"
7.1 - 12	1-1/4"
13 - 20	1-1/2"
20.1 - 40	2"

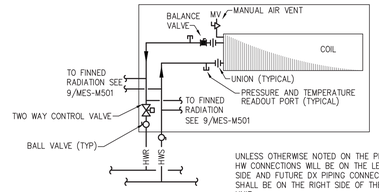
1 HOT WATER CONVECTOR PIPING DETAIL
MES-M501 SCALE: NOT TO SCALE



2 UNIT VENTILATOR DETAIL
MES-M501 SCALE: NTS

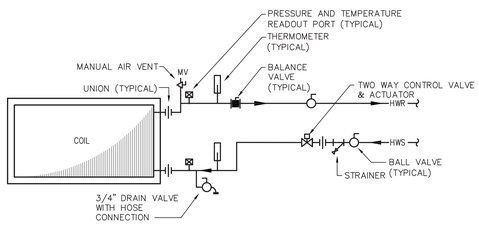


3 CABINET UNIT HEATER PIPING DETAIL
MES-M501 SCALE: NTS

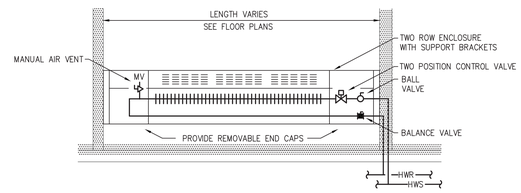


UNLESS OTHERWISE NOTED ON THE PLANS HW CONNECTIONS WILL BE ON THE LEFT SIDE AND FUTURE DX PIPING CONNECTIONS SHALL BE ON THE RIGHT SIDE OF THE UNIT.

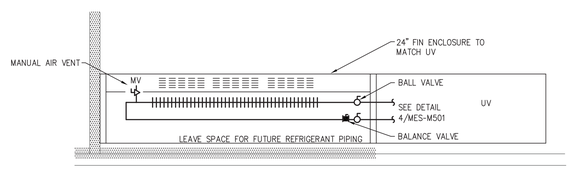
4 UNIT VENTILATOR PIPING DETAIL
MES-M501 SCALE: NTS



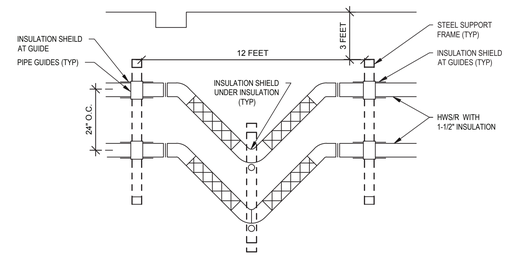
5 HOT WATER COIL DETAIL
MES-M501 SCALE: NTS



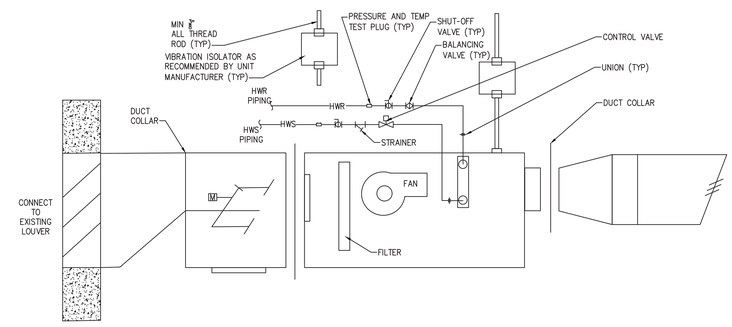
6 FINNED TUBE PIPING DETAIL
MES-M501 SCALE: NTS



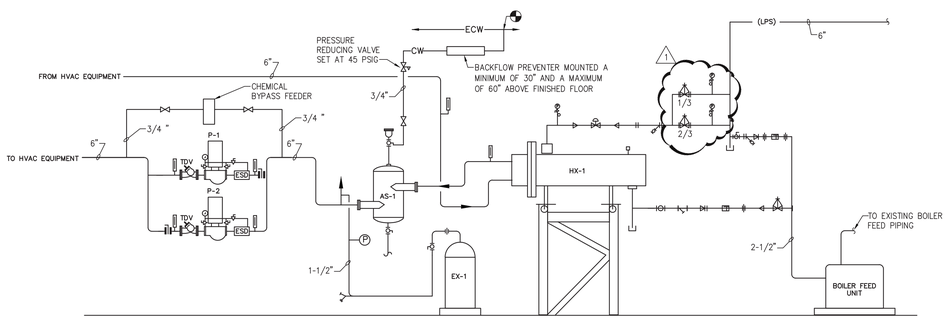
7 FINNED RADIATION WITH UNIT VENTILATOR PIPING DETAIL
MES-M501 SCALE: NTS



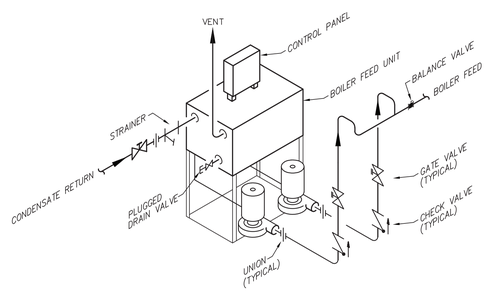
8 HWS & R PIPE EXPANSION LOOP
MES-M501 SCALE: NTS



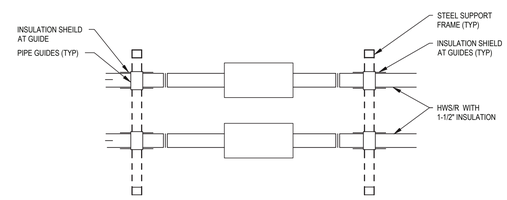
9 HVAC_TWO PIPE FAN COIL UNIT HANGING DETAIL
MES-M501 SCALE: NTS



10 STEAM TO HOT WATER HEAT EXCHANGER DETAIL
MES-M501 SCALE: NTS



11 BOILER FEED UNIT DETAIL
MES-M501 SCALE: NTS



12 BELLOWS STYLE EXPANSION COMPENSATOR
MES-M501 SCALE: NTS

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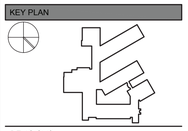

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No.	Description	Date
1	BID ADDENDUM NO. 02	03/06/2020

ISSUED: ISSUE FOR BID
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SCALE: As indicated
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SHEET NUMBER: MES-M501

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SHELL AND TUBE HEAT EXCHANGER SCHEDULE

MARK	SERVICE	LOCATION	TUBE SIDE PRESSURE	TUBE SIDE LBS CONDENSATE	SHELL SIDE EWT (°F)	SHELL SIDE LWT (°F)	SHELL SIDE GPM	SHELL SIDE WPD (PSI)	NUMBER PASSES	FOULING	REMARKS
HX-1	HW EQUIPMENT	MECH ROOM	7	7642	140	180	380	2.15	2	.003	

CABINET UNIT HEATER SCHEDULE

MARK	CONFIGURATION	CFM	HEATING AIR EAT	HEATING AIR LAT	HEATING WATER EWT	HEATING WATER LWT	HEATING WATER PD (FT)	HEATING WATER GPM	HEATING WATER MBH	FAN MOTOR HP	FAN MOTOR V/PH/HZ	REMARKS
CUH-1	CEILING MOUNTED	335	65	125	180	160	0.8	2.28	22	1/15	120/1/60	
CUH-2	CEILING MOUNTED	630	65	125	180	160	1.2	4.8	48	1/12	120/1/60	-

AIR SEPARATOR SCHEDULE

MARK	SERVICE	TYPE	MEDIUM	GPM	LINE SIZE	REMARKS
AS-1	HOT WATER	INLINE	HOT WATER	380	6	TACO AC06-125

CEILING DIFFUSER SCHEDULE

MARK	USE	TYPE	PERFORMANCE CFM	PERFORMANCE MAX. NC	MOUNTING	MATERIAL	FINISH	ACCESSORIES	MAKE/MODEL PRICE
R-1	EXHAUST	AIRFOIL RETURN GRILLE	1000	35	30/16	STEEL	WHITE		MODEL 60
R-2	EXHAUST	AIRFOIL RETURN GRILLE	1250	35	36/16	STEEL	WHITE		MODEL 60
R-3	EXHAUST	AIRFOIL RETURN GRILLE	750	35	24/16	STEEL	WHITE		MODEL 60
R-4	EXHAUST	SQUARE DIFFUSER	100	35	24/24	STEEL	WHITE	PROVIDE WITH MANUAL DAMPER	MODEL PDR
S-4	SUPPLY	SQUARE DIFFUSER	100	35	24/24	STEEL	WHITE	PROVIDE WITH MANUAL DAMPER	MODEL SPD

LOUVER SCHEDULE

MARK	LOCATION	FUNCTION	BLADE STYLE	WIDTH/HEIGHT (IN.)	FRAME DEPTH (IN.)	CFM	FREE AREA (SQFT)	PRESS. DROP (IN. WC)	MATERIAL	FINISH	ACCESSORIES
L-1	CLASSROOM	EXHASUT	LOUVER DAMPER	22/22	4	1000	1.4	.1	ALUMINUM	BRUSHED	BIRDSCREEN, ACTUATOR
L-2	CLASSROOM	EXHAUST	LOUVER DAMPER	26/22	4	1250	1.4	.1	ALUMINUM	BRUSHED	BIRDSCREEN, ACTUATOR
L-3	CLASSROOM	EXHAUST	LOUVER DAMPER	18/22	4	750	1.4	.1	ALUMINUM	BRUSHED	BIRDSCREEN, ACTUATOR
L-4	OFFICES	OUTDOOR AIR	LOUVER DAMPER	6/24	4	100	.6	.1	ALUMINUM	BRUSHED	BIRDSCREEN, ACTUATOR
L-5	OFFICES	EXHAUST	LOUVER DAMPER	6/24	4	100	.6	.1	ALUMINUM	BRUSHED	BIRDSCREEN, ACTUATOR

ENERGY RECOVERY VENTILATOR SCHEDULE

MARK	SERVICE	TYPE	AIR FLOW RANGE (CFM)	STATIC PRESSURE	ELECTRICAL DATA V/PH/HZ	ELECTRICAL DATA HP	ELECTRICAL DATA MCA	ELECTRICAL DATA MOCP	BASIS OF DESIGN/MODEL
ERV-1	OFFICES	BOX	100	0.5	120/1/60	.6	9	15	RENEWAIRE EV130

EXHAUST FAN SCHEDULE

MARK	TYPE	CFM	STATIC PRESSURE (IN. WG)	FAN RPM	SONES (MAX)	DRIVE	ELECTRICAL HP	ELECTRICAL VOLTS/PH/HZ	MANUFACTURER/MODEL NUMBER	NOTES
EF-1	INLINE	1000	.125	638	3	DIRECT	3/4	120/1/60	GREENHECK SQ-140-VG	-
EF-2	INLINE	1250	.125	750	4.4	DIRECT	3/4	120/1/60	GREENHECK SQ-140-VG	-
EF-3	INLINE	750	.125	790	3	DIRECT	1/2	120/1/60	GREENHECK SQ-120-VG	-

AIR HANDLING UNIT SCHEDULE

		AIR SIDE CUBIC FEET/MINUTE						WATER SIDE									FAN								
									TEMPERATURE		CAPACITY		WPD				MOTOR	ELECTRICAL			BASIS OF DESIGN		
TAG	SERVICE	TOTAL	O.A.	EAT	LAT	TSP	ESP	FLUID	EWT	LWT	GPM	MBH	FT H20	TYPE	DRIVE	HP	BHP	VOLT	PH	HZ	MANUFACTURER	MODEL	COMMENTS
AHU-1	GYM	3600	750	53	102.3	1.7	1	WATER	180	146.4	12	196.6	1.76	CENTR	BELT	3	2.17	208	3	60	MAGIC AIRE	HBB40	1,2
AHU-2	GYM	3600	750	53	102.3	1.7	1	WATER	180	146.4	12	196.6	1.76	CENTR	BELT	3	2.17	208	3	60	MAGIC AIRE	HBB40	1,3

COMMENTS
1. 2" MERV 8 + 4" MERV 13 FILTERS
2. Left Hand Coil Connections
3. Right Hand Coil Connections

VENTILATION REQUIREMENTS

SPACE DESIGNATION	AREA AREA SF	OCCUPANTS /1000 SF	OCCUPANTS TOTAL	VENTILATION REQUIRED PER OCCUP.	VENTILATION REQUIRED PER SF	UNCORRECTED VENTILATION	EFFICIENCY FACTOR	CORRECTED CFM
GYMNASIUM	3,744	7	26	20.00	0.18	1,200	80%	1,500
NEW CAFETERIA	1,869	70	131	7.50	0.18	1,320	80%	1,650
OLD CAFETERIA	2,400	70	168	7.50	0.18	1,690	80%	2,110
STANDARD CLSRM	805	25	20	10.00	0.12	300	80%	380
RESOURCE	575	25	14	10.00	0.12	210	80%	260
KINDERGARTEN	1,104	25	28	10.00	0.12	410	80%	510
TOTAL	10,497		387			5,130	80%	6,410

DUCTLESS SPLIT SCHEDULE

MARK	SERVICE	SYSTEM TYPE	NOMINAL TONS	RATED COOING CAPACITY (BTU/HR)	OUTDOOR RATED CLG. CONDITIONS (DB/WB DEG. F)	RATED HEATING CAPACITY (BTU/HR)	OUTDOOR RATED HTG. CONDITIONS (DB/WB DEG. F)	INDOOR FAN COIL UNIT TYPE	INDOOR FAN COIL UNIT CFM	INDOOR FAN COIL UNIT POWER (V/PH/HZ)	INDOOR FAN COIL UNIT MCA	DESIGN STANDARD (MANUFACTURER & MODEL)
AC-1/ACCU-1	OFFICE	HEAT PUMP	0.75	9,000	95/75	11,000	47/43	WALL CASSETTE	318	208-230/1/60	9	SMARTFLEX DHX09NWB21S & DHX09CSB21S

PUMP SCHEDULE

TAG	SERVICE	TYPE	FLUID	GPM	HEAD	RPM	IMPELLER SIZE	MINIMUM PUMP EFFICIENCY	ELECTRICAL HP	ELECTRICAL VOLTS/PH/HZ	MOTOR CONTROLLER TYPE	MOTOR CONTROLLER FURNISHED BY	MOTOR CONTROLLER INSTALLED BY
P-1	HOT WATER	VERTICAL SPLIT CASE	WATER	375	70	1160	8.4	70	10	208/3/60	VFD	MECHANICAL	ELECTRICAL
P-2	HOT WATER	VERTICAL SPLIT CASE	WATER	375	70	1160	8.4	70	10	208/3/60	VFD	MECHANICAL	ELECTRICAL

HOT WATER COIL SCHEDULE

MARK	SERVICE	TYPE	MBH	CFM	APD	EAT DB/WB (°F)	LAT DB (°F)	FLUID SIDE FLUID	FLUID SIDE GPM	FLUID SIDE EWT (°F)	FLUID SIDE LWT (°F)	FLUID SIDE WPD (FT.)	REMARKS
HC-1	KITCHEN	DUCT MOUNTED	670	7000	.25	40	125	HOT WATER	32	180	140	5	1, 3
HC-2	CAFETERIA	DUCT MOUNTED	350	3700	.25	40	125	HOT WATER	16	180	140	5	
HC-3	PTAC	IN UNIT	1	290	0.2	55	95	HOT WATER	10	180	160	5	3, 4
HC-4	ERV-1	DUCT MOUNTED	195	3600	.25	61	90	HOT WATER	10	180	140	5	2

1. CONTRACTOR TO FIELD VERIFY REQUIRED DIMENSIONS
2. PROIDE NECESSARY ADAPTORS TO FIT WITH ERV DISCHARGE
3. FIELD VERIFY UNIT DIMENSIONS AND CFM
4. SEVEN REQUIRED

UNIT VENTILATOR SCHEDULE

MARK	SERVICE	CONFIGURATION	OA CFM	CFM	HEATING AIR EAT	HEATING AIR LAT	HEATING WATER EWT	HEATING WATER LWT	HEATING WATER PD (FT)	HEATING WATER GPM	HEATING WATER MBH	FAN MOTOR HP	FAN MOTOR V/PH/HZ	REMARKS
UV-1	CLASSROOM	VERTICAL	330	1000	42	120	180	140	4	4.0	78	1/3	120/1/60	
UV-2	CLASSROOM	VERTICAL	420	1250	42	120	180	140	4	5.0	97	1/3	120/1/60	-
UV-3	CLASSROOM	VERTICAL	250	750	42	120	180	140	4	3.0	58	1/3	120/1/60	
UV-4	CAFETERIA	VERTICAL	625	1500	35	120	180	140	6	7.1	138	1/3	120/1/60	FACE AND BYPASS DAMPER

EXPANSION TANK SCHEDULE

MARK	SERVICE	TYPE	MEDIUM	FILL PRESS. (PSIG)	MAX. PRESS. (PSIG)	TANK VOLUME (GALLONS)	ACCEPT. VOLUME (GALLONS)	SIZE LENGTH (IN)	SIZE DIAM. (IN)	REMARKS
EX-1	HEATING	BLADDER (ASME)	WATER	27	45	475	475	84	40	TACO CA1800-125

BOILER FEED UNIT SCHEDULE

MARK	BOILER CAPACITY BHP	PUMP GPM	PUMP DISCHARGE PRESSURE (PSIG)	DISCHARGE SIZE (IN)	RECEIVER CAPACITY (GAL)	INLET SIZE (IN)	TANK (GAL)	ELECTRICAL MOTOR HP	ELECTRICAL V/PH/HZ	REMARKS
BFU-1	150	21	50	1-1/2	125	4	260	2	208/3/60	SHIPCO 21 PMC-50

CONVECTOR SCHEDULE

MARK	CONFIGURATION	HEATING EWT	HEATING LWT	HEATING GPM	HEATING MBH	REMARKS
C-1	SLOPE TOP	180	140	.4	7.5	36"L x 32"H
C-2	SLOPE TOP	180	140	.6	11.5	52"L x 32"H
C-3	SLOPE TOP	180	140	.8	14.5	64"L x 32"H

FINTUBE RADIATION SCHEDULE

TAG	FLUID	OUTPUT BTU/FT	AVE. WATER TEMP.	ACTIVE ELEMENT	TUBE SIZE	FINS/ FT	CABINET HEIGHT	CABINET DEPTH	MTG. HEIGHT	MANUFACTURER	MODEL	COMMENTS
FTR-1	WATER	940	160	4-1/4"X3-5/8"	3/4	50	24	5/5/16	18	STERLING	VERSA-LINE JVB	1
FTR-2	WATER	850	160	4-1/4"X3-5/8"	3/4	50	NO ENCLOSURE		18	STERLING	BARE STYLE B	1
FTR-3	WATER	1420	160	4-1/4"X3-5/8"	3/4	50	NO ENCLOSURE		18	STERLING	BARE STYLE B	2

COMMENTS
1. MOUNT HW FIN HIGH IN ENCLOSURE TO ALLOW FUTURE REFRIGERANT PIPING TO RUN BELOW.
2. TWO TIER

UNIT VENTILATOR SCHEDULE

TAG	SERVICE	CUBIC FEET/MINUTE AIR CONFIGURATION	NOMINAL	OPERATION	OUTSIDE	HEATING AIR SIDE EAT	HEATING AIR SIDE LAT	HEATING WATER SIDE EWT	HEATING WATER SIDE LWT	HEATING WATER SIDE GPM	HEATING WATER SIDE PD (FT)	HEATING MBH	COOLING TYPE	COOLING ENTERING AIR DBT	COOLING ENTERING AIR WBT	COOLING LEAVING AIR DBT	COOLING LEAVING AIR WBT	COOLING MBH TOTAL	COOLING MBH SENSIBLE	APD	FAN MOTOR TYPE	FAN MOTOR HP	FAN MOTOR V/PH/HZ	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN MODEL	Notes
UV-1	CLASSROOMS	VERTICAL	1250	1000	380	45	100	180	138	3.30	1.39	67.19	VRF	78.8	66.7	59	57	32.40	20.70		ECM	1/2	120/1/60	MAGIC AIR	MAUVF4	1,3,4,5
UV-2	CLASSROOMS	VERTICAL	1500	1250	510	43	101	180	140	4.15	2.3	83.00	VRF	79.3	67.0	59	56	42.20	26.70		ECM	1/2	120/1/60	MAGIC AIR	MAUVF5	1,3,4,5
UV-3	CLASSROOMS	VERTICAL	1000	750	260	47	103	180	145	3.10	4.18	53.00	VRF	78.2	66.4	58	55	28.60	18.00		ECM	1/3	120/1/60	MAGIC AIR	MAUVF3	1,3,4,5
UV-4	CAFETERIA	VERTICAL	1500	1500	675	40	112	180	137	5.30	4	110.00	VRF	80.1	67.3	59	55	44.00	28.60		ECM	1/2	120/1/60	MAGIC AIR	MAUVF5	2,3,4,5

COMMENTS
1. 2 ROW HOT WATER COIL
2. 3 ROW HOT WATER COIL
3. 4 ROW R410-A COOLING COIL FOR FUTURE CONNECTION TO VRF ACCU.
4. 2" MERV 10 FILTER
5. PROVIDE 24" EXTENSION/UTILITY CABINET ON THE RIGHT SIDE FOR FUTURE AC CONTROL PANEL AND EXPANSION VALVE.

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SED CONTROL NUMBERS
MILLER ES #: 50-01-08-03-0-001-022

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NANUET MILLER ES HYDRONIC CONVERSION 2020

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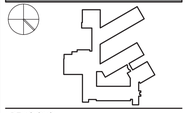
KEY PLAN



REVISIONS

No.	Description	Date

ISSUED: ISSUE FOR BID
DATE: MARCH 15, 2021
SCALE: As indicated
SHEET NAME: HVAC SCHEDULES
SHEET NUMBER: MES-M601

ISSUE FOR BID SET

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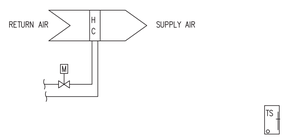
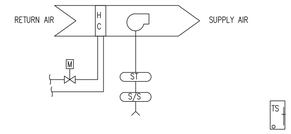


A. PROVIDE FIELD MOUNTED DIRECT DIGITAL CONTROL (DDC) WITH LOW VOLTAGE ACTUATION.
B. LOCAL SPACE TEMPERATURE SENSOR SHALL BE CAPABLE OF SETPOINT ADJUSTMENT WITHIN A EMS DEFINED ADJUSTABLE RANGE. THE LOCAL SESNOR SHALL ALSO BE CAPABLE OF OVERRIDING THE EMS UNOCCUPIED SCHEDULE TO ALLOW THE UNIT TO OPERATE TEMPORARILY IN THE OCCUPIED MODE FOR A EMS DEFINED ADJUSTABLE PERIOD (0.5 TO 12 HOURS).
C. OCCUPIED MODE:
1. THE ENERGY MANAGEMENT SYSTEM (EMS) SHALL INITIATE THE OCCUPIED / UNOCCUPIED MODE BASED ON TIME OF DAY SCHEDULE OR PROGRAMMED START.
2. UPON A CALL FOR HEAT AS SENSED BY ROOM TEMPERATURE SENSOR, MODULATE HEATING COIL 2-WAY VALVE TO MAINTAIN SPACE TEMP SETPOINT (70F ADJ)

3 FINNED TUBE, CONVECTOR SEQUENCE OF OPERATION
MES-M701 SCALE: NTS



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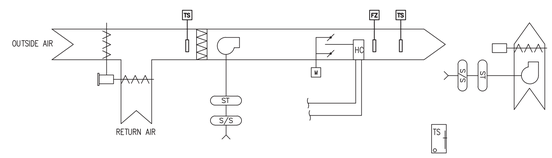
D. EMERGENCY SHUT-DOWN
1. UPON ACTIVATION OF THE BUILDING FIRE DETECTION SYSTEM, DISABLE FAN.

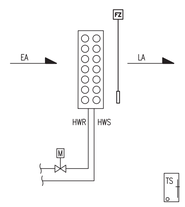
2 CABINET UNIT HEATER SEQUENCE OF OPERATION
MES-M701 SCALE: NTS



UNIT VENTILATOR SEQUENCE OF OPERATION

1. PROVIDE FIELD MOUNTED DIRECT DIGITAL CONTROL (DDC) WITH LOW VOLTAGE ACTUATION.
2. THE ENERGY MANAGEMENT SYSTEM (EMS) SHALL DEFINE THE OCCUPIED / UNOCCUPIED SCHEDULE.
   A. ALL EMS SETPOINTS ARE ADJUSTABLE.
3. LOCAL SPACE TEMPERATURE SENSOR SHALL BE CAPABLE OF SETPOINT ADJUSTMENT WITHIN AN EMS DEFINED RANGE. LOCAL SENSOR SHALL ALSO BE CAPABLE OF 2 HOUR OVERRIDE OF THE EMS DEFINED UNOCCUPIED SCHEDULE.
4. WARM UP MODE: 30 MINUTES BEFORE THE START OF THE OCCUPIED SCHEDULE THE UNIT VENTILATOR SHALL START WITH THE FOLLOWING PARAMETERS:
   A. THE SPACE SETPOINT TEMPERATURE SHALL GO TO THE OCCUPIED VALUE.
   B. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED
   C. THE FACE AND BYPASS DAMPERS SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
5. OCCUPIED MODE:
   A. THE UNIT VENTILATOR FAN SHALL RUN CONTINUOUSLY.
   B. THE ASSOCIATED EXHAUST FAN DAMPER SHALL OPEN AND UPON PROOF THE EXHAUST FAN SHALL RUN CONTINUOUSLY.
   C. THE SETPOINT TEMPERATURE SHALL RESET TO THE OCCUPIED VALUE.
   D. THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM POSITION.
   E. THE FACE AND BYPASS DAMPERS SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
   F. IF THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 65° BUT LESS THAN THE SPACE TEMPERATURE AND THE SPACE TEMPERATURE IS GREATER THAN THE SETPOINT THE OUTSIDE AIR DAMPER SHALL MODULATE TO FULL OPEN.
6. UNOCCUPIED CYCLE:
   A. POST OCCUPANCY PURGE:
      i. THE SETPOINT TEMPERATURE SHALL REVERT TO THE UNOCCUPIED VALUE.
      ii. FOR 30 MINUTES THE EXHAUST FAN AND UNIT VENTILATOR FAN SHALL CONTINUE TO RUN.
      iii. THE FACE AND BYPASS DAMPERS SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
   B. AT THE END OF THE POST OCCUPANCY PURGE:
      i. THE OUTSIDE AIR DAMPER SHALL CLOSE, AND THE UNIT VENTILATOR FAN SHUT DOWN.
      ii. THE EXHAUST FAN SHALL SHUT DOWN AND THE ASSOCIATED DAMPER CLOSE.
      iii. IF THE OA TEMPERATURE IS ABOVE 40°F., THE HEATING CONTROL VALVE SHALL CLOSE.
      iv. IF THE OA TEMPERATURE IS LESS THAN 40° F. THE HEATING CONTROL VALVE SHALL OPEN.
      v. IF THE SPACE TEMPERATURE DROPS BELOW THE SETPOINT FOR 10 MINUTES THE UNIT VENTILATOR FAN SHALL START, AND THE FACE AND BYPASS DAMPERS SHALL DIVERT THE ENTIRE AIRSTREAM ACROSS THE COIL. THE UNIT VENTILATOR FAN SHALL SHUT DOWN ONCE THE SPACE TEMPERATURE IS ACHIEVED.
7. SAFETIES AND ALARMS:
   A. THE FOLLOWING SAFETIES, EACH WITH INDIVIDUAL RESETS, SHALL INITIATE AN ALARM AT THE EMS:
      i. IF THE FAN FAILS TO START OR RUN UPON COMMAND AN ALARM SHALL BE GENERATED.
      ii. IF THE ASSOCIATED EXHAUST FAN FAILS TO START OR RUN UPON COMMAND AN ALARM SHALL BE GENERATED.
      iii. FREEZESTAT – IF ANY POINT ON THE FREEZE STAT IS LOWER THAN 36° F AN ALARM SHALL BE GENERATED. THE OUTSIDE AIR DAMPER SHALL CLOSE, THE FACE AND BYPASS DAMPER SHALL GO TO FULL HEAT POSITION, THE UNIT VENTILATOR AND EXHAUST FANS SHALL SHUT DOWN UNTIL THE ALARM IS CLEARED.
      iv. HIGH SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE RISES 5° F ABOVE THE SETPOINT FOR A PERIOD OF FIVE MINUTES OR LONGER WHILE HOT WATER IS CIRCULATING AN ALARM SHALL BE GENERATED.
      v. LOW SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE DROPS 3° F BELOW THE SETPOINT FOR A PERIOD OF FIVE MINUTES OR LONGER AND ALARM SHALL BE GENERATED.
      vi. THE FIRE ALARM SYSTEM SHALL DISABLE ALL FANS AND SHUT DOWN THE UNIT VENTILATOR. THE UNIT VENTILATOR SHALL REMAIN DISABLED UNIT VENTILATOR THE FIRE ALARM IS CLEARED AND RESET.

5 UNIT VENTILATOR WITH SEQUENCE OF OPERATION
MES-M701 SCALE: NTS



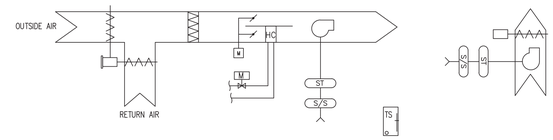
HOT WATER COIL SEQUENCE OF OPERATION

A. THE HOT WATER COIL IS TO OPERATE AS PART OF AN EXISTING H&V UNIT. THE CONTROL SEQUENCE OF THE EXISTING UNIT IS TO REMAIN ESSENTIALLY UNCHANGED.
B. LOCAL SPACE TEMPERATURE SENSOR SHALL BE CAPABLE OF SETPOINT ADJUSTMENT WITH AN EMS DEFINED ADJUSTABLE RANGE.
C. UPON A CALL FOR HEAT THE 2-WAY CONTROL VALVE SHALL MODULATE OPEN.
   A. UNOCCUPIED SETPOINT 62°F (ADJUSTABLE)
   B. OCCUPIED SETPOINT 68°F (ADJUSTABLE)
D. FREEZE PROTECTION IF THE OA TEMPERATURE IS LESS THAN 38°F (ADJUSTABLE) THE CONTROL VALVE SHALL OPEN TO A MINIMUM OF 10% REGARDLESS OF THE SPACE TEMPERATURE.
E. SAFETIES AND ALARMS:
   A. THE FOLLOWING SAFETIES, EACH WITH INDIVIDUAL RESETS, SHALL SHUTDOWN THE UV AND I INITIATE A SPECIFIC ALARM AT THE EMS:
      1. FREEZESTAT - IF ANY POINT ON THE FREEZESTAT SENSOR IS AT 36°F OR LOWER AND ALARM SHALL BE GENERATED.
      2. HIGH SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE RISES 5 DEGREES ABOVE THE SETPOINT (ADJUSTABLE) FOR FIVE MINUTES OR LONGER WHILE HOT WATER IS CIRCULATING AN ALARM SHALL BE GENERATED.
      3. LOW SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE DROPS 3 DEGREES BELOW THE SETPOINT (ADJUSTABLE) FOR FIVE MINUTES OR LONGER WHILE HOT WATER IS CIRCULATING AN ALARM SHALL BE GENERATED.
      4. UPON ACTIVATION OF THE BUILDING FIRE DETECTION SYSTEM, DISABLE FANS AND OUTSIDE AIR DAMPERS SHALL CLOSE.

6 HOT WATER COIL SEQUENCE OF OPERATION
MES-M701 SCALE: NTS

GENERAL NOTES

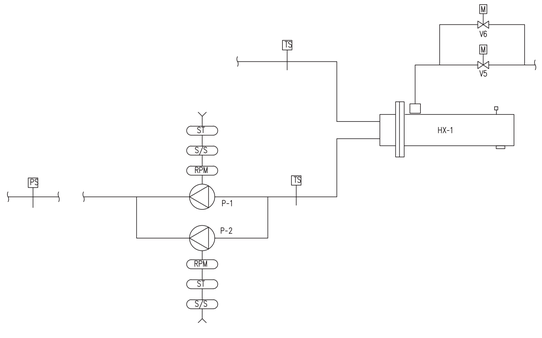
ALL NEW CONTROLS SHALL BE DDC AND COMMUNICATE EITHER DIRECTLY OR VIA BACNET TO THE EXISTING SIEMENS HEAD END. PROVIDE FULL GRAPHICS INTERFACE.



AIR HANDLING UNIT SEQUENCE OF OPERATION

1. PROVIDE FIELD MOUNTED DIRECT DIGITAL CONTROL (DDC) WITH LOW VOLTAGE ACTUATION.
2. THE ENERGY MANAGEMENT SYSTEM (EMS) SHALL DEFINE THE OCCUPIED / UNOCCUPIED SCHEDULE.
   A. ALL EMS SETPOINTS ARE ADJUSTABLE.
   B. THE EMS OPERATOR SHALL BE ABLE TO SCHEDULE SPEC IAL EVENTS IN ADVANCE. EVENTS MAY BE SINGLE OR MULTIPLE OCCURANCE. ONCE DEFINED THE AHU SHALL RUN THROUGH ITS NORMAL OCCUPIED CYLCE FOR THE DATE AND TIME SCHEDULED.
3. LOCAL SPACE TEMPERATURE SENSOR SHALL BE CAPABLE OF SETPOINT ADJUSTMENT WITHIN AN EMS DEFINED RANGE. LOCAL SENSOR SHALL ALSO BE CAPABLE OF 2 HOUR OVERRIDE OF THE EMS DEFINED UNOCCUPIED SCHEDULE.
4. WARM UP MODE: 30 MINUTES BEFORE THE START OF THE OCCUPIED SCHEDULE THE AIR HANDLING UNIT (AHU) SHALL START WITH THE FOLLOWING PARAMETERS:
   A. THE SPACE SETPOINT TEMPERATURE SHALL GO TO THE OCCUPIED VALUE.
   B. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED
   C. THE 2-WAY CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
5. OCCUPIED MODE:
   A. THE AHU FAN SHALL RUN CONTINUOUSLY.
   B. THE ASSOCIATED EXHAUST FAN DAMPER SHALL OPEN AND UPON PROOF THE EXHAUST FAN SHALL RUN CONTINUOUSLY.
   C. THE SETPOINT TEMPERATURE SHALL RESET TO THE OCCUPIED VALUE.
   D. THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM POSITION.
   E. THE 2-WAY CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
   F. IF THE OUTSIDE AIR TEMPERATURE IS GREATER THAN 65° BUT LESS THAN THE SPACE TEMPERATURE AND THE SPACE TEMPERATURE IS GREATER THAN THE SETPOINT THE OUTSIDE AIR DAMPER SHALL MODULATE TO FULL OPEN.
6. UNOCCUPIED CYCLE:
   A. POST OCCUPANCY PURGE:
      i. THE SETPOINT TEMPERATURE SHALL REVERT TO THE UNOCCUPIED VALUE.
      ii. FOR 30 MINUTES THE EXHAUST FAN AND AHU FAN SHALL CONTINUE TO RUN.
      iii. THE 2-WAY CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE.
   B. AT THE END OF THE POST OCCUPANCY PURGE:
      i. THE OUTSIDE AIR DAMPER SHALL CLOSE, AND THE AHU FAN SHUT DOWN.
      ii. THE EXHAUST FAN SHALL SHUT DOWN AND THE ASSOCIATED DAMPER CLOSE.
      iii. IF THE OA TEMPERATURE IS ABOVE 40°F., THE HEATING CONTROL VALVE SHALL CLOSE.
      iv. IF THE OA TEMPERATURE IS LESS THAN 40° F. THE HEATING CONTROL VALVE SHALL OPEN.
      v. IF THE SPACE TEMPERATURE DROPS BELOW THE SETPOINT FOR 10 MINUTES THE AHU FAN SHALL START, AND THE FACE AND BYPASS DAMPERS SHALL DIVERT THE ENTIRE AIRSTREAM ACROSS THE COIL. THE AHU FAN SHALL SHUT DOWN ONCE THE SPACE TEMPERATURE IS ACHIEVED.
7. SAFETIES AND ALARMS:
   A. THE FOLLOWING SAFETIES, EACH WITH INDIVIDUAL RESETS, SHALL INITIATE AN ALARM AT THE EMS:
      i. IF THE FAN FAILS TO START OR RUN UPON COMMAND AN ALARM SHALL BE GENERATED.
      ii. IF THE ASSOCIATED EXHAUST FAN FAILS TO START OR RUN UPON COMMAND AN ALARM SHALL BE GENERATED.
      iii. FREEZESTAT – IF ANY POINT ON THE FREEZE STAT IS LOWER THAN 36° F AN ALARM SHALL BE GENERATED. THE OUTSIDE AIR DAMPER SHALL CLOSE, THE 2-WAY CONTROL VALVE SHALL GO TO FULL HEAT POSITION, THE AHU AND EXHAUST FANS SHALL SHUT DOWN UNTIL THE ALARM IS CLEARED.
      iv. HIGH SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE RISES 5° F ABOVE THE SETPOINT FOR A PERIOD OF FIVE MINUTES OR LONGER WHILE HOT WATER IS CIRCULATING AN ALARM SHALL BE GENERATED.
      v. LOW SPACE TEMPERATURE ALARM - IF THE SPACE TEMPERATURE DROPS 3° F BELOW THE SETPOINT FOR A PERIOD OF FIVE MINUTES OR LONGER AND ALARM SHALL BE GENERATED.
      vi. THE FIRE ALARM SYSTEM SHALL DISABLE ALL FANS AND SHUT DOWN THE AHU. THE AHU SHALL REMAIN DISABLED AHU THE FIRE ALARM IS CLEARED AND RESET.

1 AIR HANDLING UNIT SEQUENCE OF OPERATION
MES-M701 SCALE: NTS



CONTROLS

1. THE HEAT EXCHANGER (HX-1) CONTROL VALVE OPERATION SHALL BE SCHEDULED. THE CONTROL VALVES 5 & 6 SHALL MODULE TO MAINTAIN THE HOT WATER SUPPLY TEMPERATURE SETPOINT BASED ON THE FOLLOWING RESET SCHEDULE. VALVE 5 SHALL BE RATED FOR 1/3 OF FULL LOAD AND 6 FOR 2/3. THE VALVES SHALL BE OPERATED SEQUENTIALLY AS THE DEMAND INCREASES. IF THE DEMAND IS GREATER THAN 2/3 FULL LOAD THEN VALVE 6 SHALL BE FULL OPEN AND VALVE 5 SHALL MODULATE TO MEET THE LOAD.

OUTSIDE AIR TEMPERATURE	BOILER SUPPLY TEMPERATURE
35F AND ABOVE	160F
OF AND BELOW	180F

2. WHENEVER THE OUTSIDE AIR TEMPERATURE DROPS BELOW 65F(ADJ) THE LEAD DISTRIBUTION PUMP(P-1) SHALL START AND RUN CONTINUOUSLY. IF THE LEAD PUMP FAILS TO PROVE OPERATION, THE STANDBY PUMP(P-2) SHALL BECOME THE LEAD PUMP AND AN ALARM SHALL BE GENERATED. THE LEAD AND STANDBY PUMPS SHALL BE ALTERNATED WEEKLY TO EQUALIZE RUN TIME.
3. THE LEAD DISTRIBUTION PUMP SHALL BE MODULATED BY THE RESPECTIVE VARIABLE FREQUENCY DRIVE TO MAINTAIN THE DISTRIBUTION SYSTEM DIFFERENTIAL PRESSURE SETPOINT(ADJ). THE DIFFERENTIAL PRESSURE SETPOINT SHALL BE RESET BY THE BALANCING CONTRACTOR TO MAINTAIN SETPOINT AT ANY CRITICAL ZONES.
4. THE DISTRIBUTION SYSTEM HOT WATER SUPPLY TEMPERATURE VARIES BY MORE THAN 10F (ADJ), FROM ITS SCHEDULED SETPOINT, AND ALARM SHALL BE GENERATED.

4 HEAT EXCHANGER SEQUENCE OF OPERATION
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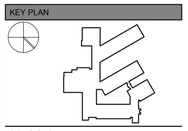

REVISIONS

No.	Description	Date

ISSUED: ISSUE FOR BID
DATE: MARCH 15, 2021
SCALE: As indicated
SHEET NAME: HVAC SEQUENCES OF OPERATION
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ISSUE FOR BID SET

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