



SHELBY COUNTY GOVERNMENT

BOILER MODIFICATIONS

BID PACKAGE #2

201 POPLAR AVENUE - CRIMINAL JUSTICE CENTER

MEMPHIS, TN 38103

06 SEP 13

PROJECT SUMMARY

THE COUNTY IS MAKING BOILER UPGRADES TO THE SHELBY COUNTY COURTHOUSE AND THE CRIMINAL JUSTICE CENTER AND REQUIRES ADDITIONAL BUILDING AUTOMATION MONITORING. THE COUNTY IS SOLICITING PROPOSALS FROM CONTRACTORS TO PERFORM THIS WORK. THE WORK CAN BE DESCRIBED IN BRIEF AS FOLLOWS:

BID PACKAGE #1 - 140 ADAMS - COURTHOUSE

REPLACE THE BOILERS AND STEAM HEATING SYSTEM TO THE MAXIMUM EXTENT PRACTICAL USING HIGH EFFICIENCY MODULAR HYDRONIC BOILERS. REUSE RADIATORS AND ASSOCIATED STEAM PIPING. PROVIDE A SMALL HIGH EFFICIENCY BOILER TO SERVE THE RADIATORS. PROVIDE NEW BOILERS, PUMPS AND PIPING TO SERVE THE HVAC SYSTEMS THROUGHOUT THE BUILDING USING VARIABLE FLOW.

BID PACKAGE #2 - 201 POPLAR - CRIMINAL JUSTICE CENTER

PROVIDE HIGH EFFICIENCY MODULAR HYDRONIC BOILERS WITH SYSTEM MODIFICATIONS NECESSARY TO REPLACE THE EXISTING STEAM BOILERS. RETAIN STEAM BOILERS FOR OPERATION ONLY ON FUEL OIL FOR EMERGENCY USE. CONVERT THE DOMESTIC WATER HEATERS FOR HEATING OPERATION USING HVAC HEATING WATER. PROVIDE NEW BOILERS, PUMPS AND PIPING TO SERVE THE HVAC SYSTEMS THROUGHOUT THE BUILDING USING VARIABLE FLOW.

BID PACKAGE #3 - ADDITIONAL BUILDING AUTOMATION MONITORING

INTEGRATE THE BUILDING AUTOMATION SYSTEM AT THE REGIONAL FORENSICS CENTER SO THAT IT IS MONITORED AND CONTROLLED FROM THE COUNTY'S EXISTING REMOTE MONITORING LOCATIONS AT 160 N MAIN AND 201 POPLAR.

DOCUMENTS PREPARED IN ACCORDANCE WITH THE FOLLOWING CODES AND ORDINANCES:

- LOCALLY ADOPTED CODES THAT APPLY TO THIS PROJECT
- 2009 INTERNATIONAL BUILDING CODE
 - 2009 INTERNATIONAL MECHANICAL CODE
 - 2009 INTERNATIONAL PLUMBING CODE
 - 2009 INTERNATIONAL GAS CODE
 - 2009 INTERNATIONAL FIRE PREVENTION CODE
 - 2008 NFPA 70 - NATIONAL ELECTRICAL CODE
 - 2003 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
 - 2012 INTERNATIONAL EXISTING BUILDING CODE
 - 2010 NFPA 13 STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS.
- ALL OF THE ABOVE INCLUDE COMPLIANCE WITH ALL LOCALLY ADOPTED AMENDMENTS

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M1.1	MECHANICAL LEVEL EQUIPMENT RM ML-03 MECHANICAL PIPING PLAN
M1.2	MECHANICAL LEVEL EQUIPMENT RM ML-03 MECHANICAL BOILER VENTING PLAN
M1.3	LOWER LEVEL EQUIPMENT RM LL-07 & FIRST FLOOR MECHANICAL PLAN
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E2.1	DETAILS



SHELBY COUNTY GOVERNMENT
BOILER MODIFICATIONS - BID PACKAGE #2
CRIMINAL JUSTICE CENTER - 201 POPLAR AVENUE - MEMPHIS, TN 38103

BID PACKAGE #2



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PROJECT NUMBER
12077.2

DATE
06 SEP 13

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SHEET TITLE
COVER SHEET

SHEET NUMBER

C1.1



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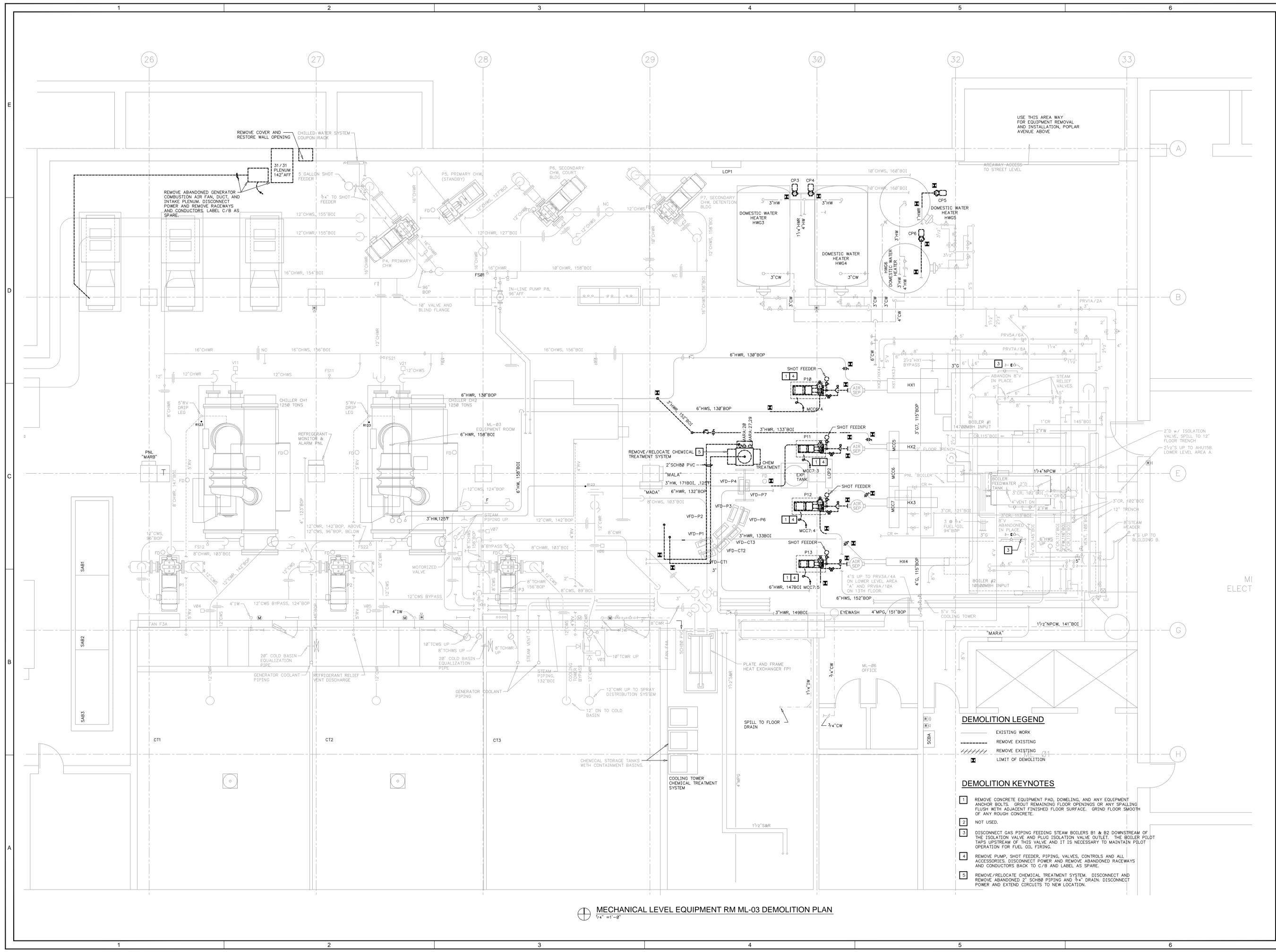
SHEET TITLE

MECHANICAL LEVEL EQUIPMENT RM ML-03

DEMOLITION PLAN

SHEET NUMBER

D1.1



MECHANICAL LEVEL EQUIPMENT RM ML-03 DEMOLITION PLAN
1/4" = 1'-0"

DEMOLITION LEGEND

- EXISTING WORK
- - - REMOVE EXISTING
- /// REMOVE EXISTING
- LIMIT OF DEMOLITION

DEMOLITION KEYNOTES

- 1 REMOVE CONCRETE EQUIPMENT PAD, DOWELING, AND ANY EQUIPMENT ANCHOR BOLTS. GROUT REMAINING FLOOR OPENINGS OR ANY SPALLING FLUSH WITH ADJACENT FINISHED FLOOR SURFACE. GRIND FLOOR SMOOTH OF ANY ROUGH CONCRETE.
- 2 NOT USED.
- 3 DISCONNECT GAS PIPING FEEDING STEAM BOILERS B1 & B2 DOWNSTREAM OF THE ISOLATION VALVE AND PLUG ISOLATION VALVE OUTLET. THE BOILER PILOT TAPS UPSTREAM OF THIS VALVE AND IT IS NECESSARY TO MAINTAIN PILOT OPERATION FOR FUEL OIL FIRING.
- 4 REMOVE PUMP, SHOT FEEDER, PIPING, VALVES, CONTROLS AND ALL ACCESSORIES. DISCONNECT POWER AND REMOVE ABANDONED RACEWAYS AND CONDUCTORS BACK TO C/B AND LABEL AS SPARE.
- 5 REMOVE/RELOCATE CHEMICAL TREATMENT SYSTEM. DISCONNECT AND REMOVE ABANDONED 2" SCH80 PIPING AND 3/4" DRAIN. DISCONNECT POWER AND EXTEND CIRCUITS TO NEW LOCATION.



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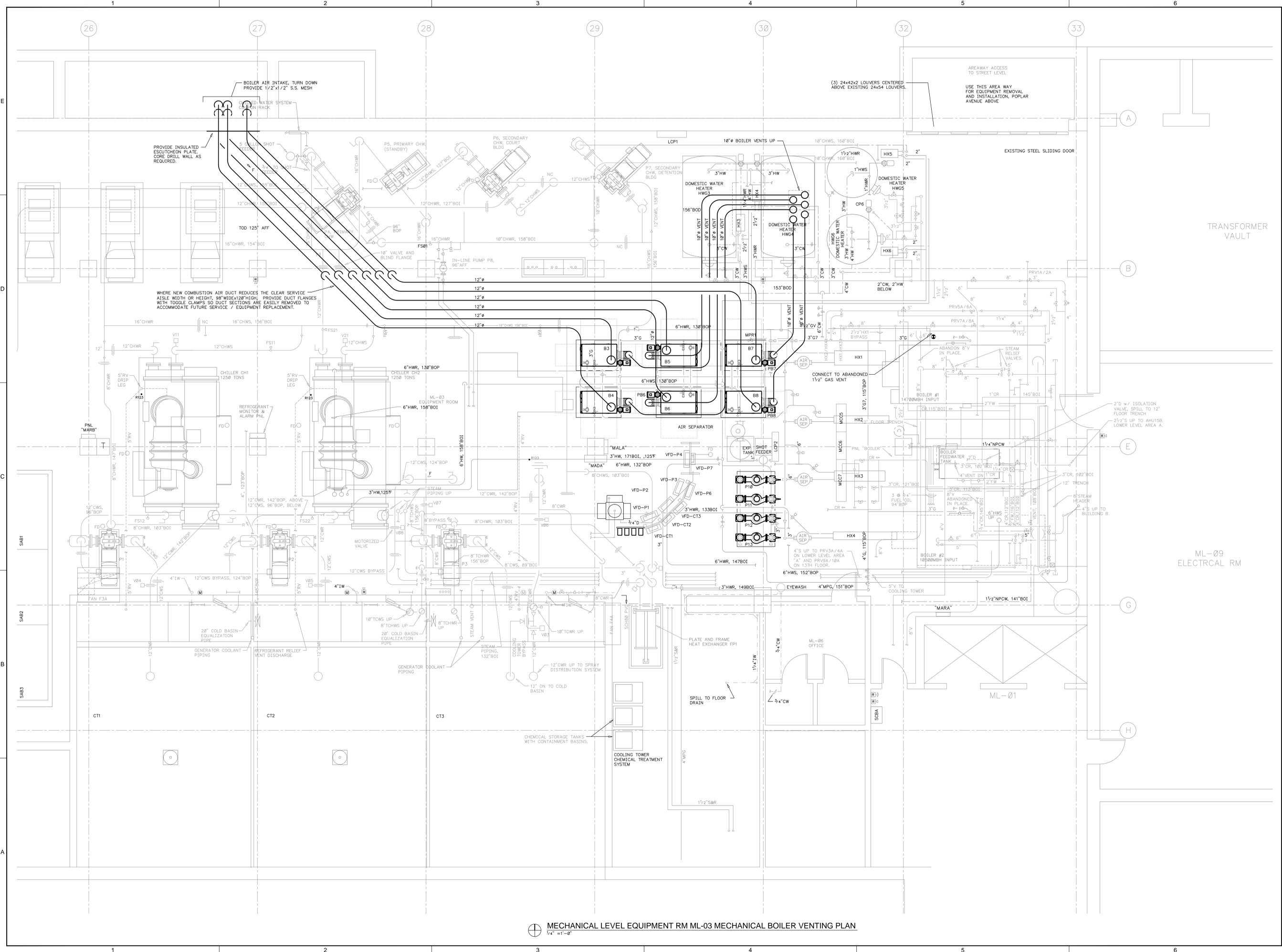
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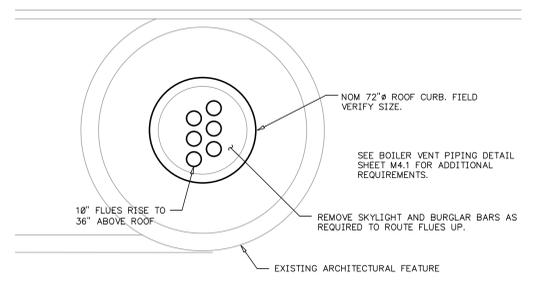
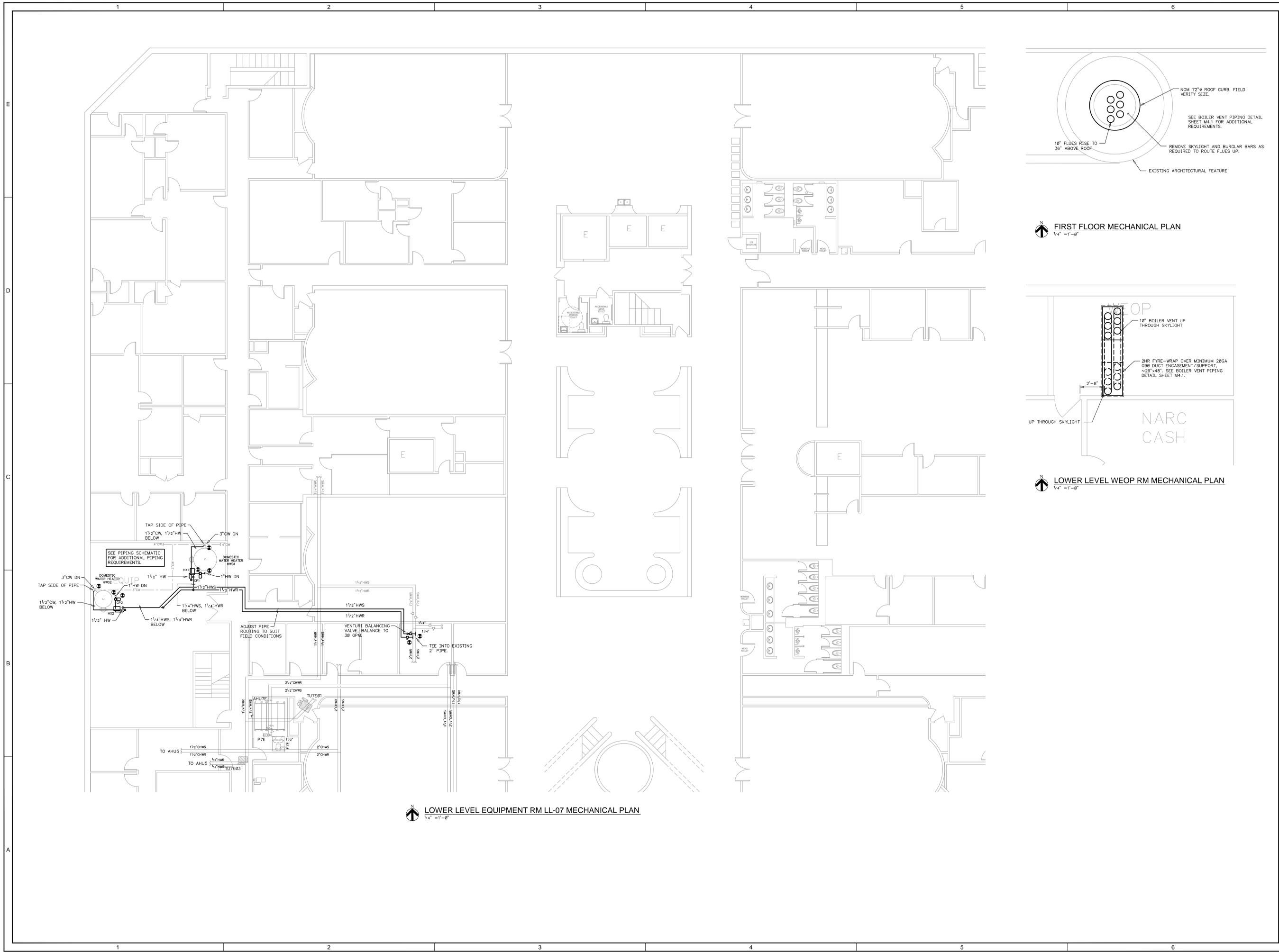
SHEET TITLE
MECHANICAL LEVEL
EQUIPMENT RM ML-03
MECHANICAL BOILER
VENTING PLAN

SHEET NUMBER

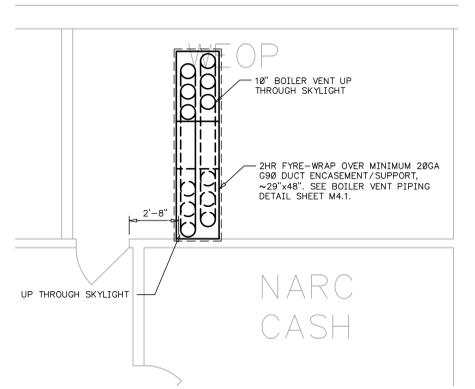
M1.2



MECHANICAL LEVEL EQUIPMENT RM ML-03 MECHANICAL BOILER VENTING PLAN
1/4" = 1'-0"



FIRST FLOOR MECHANICAL PLAN
1/4" = 1'-0"



LOWER LEVEL WEOP RM MECHANICAL PLAN
1/4" = 1'-0"

LOWER LEVEL EQUIPMENT RM LL-07 MECHANICAL PLAN
1/4" = 1'-0"



REVISIONS

NO.	DESCRIPTION

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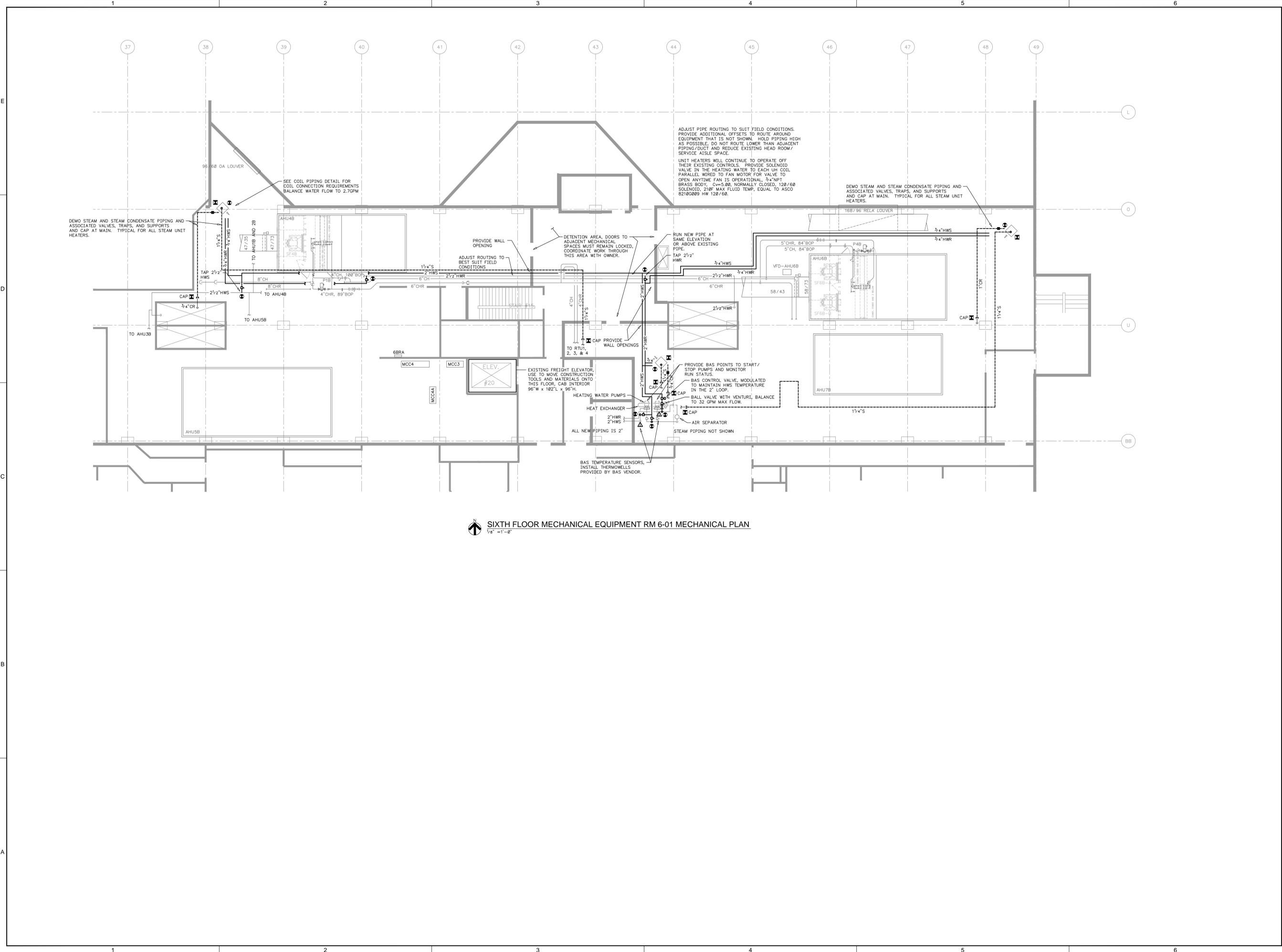
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SHEET TITLE
SIXTH FLOOR EQUIPMENT RM 6-01 MECHANICAL PLAN

SHEET NUMBER

M1.4



SIXTH FLOOR MECHANICAL EQUIPMENT RM 6-01 MECHANICAL PLAN
1/8" = 1'-0"

ADJUST PIPE ROUTING TO SUIT FIELD CONDITIONS. PROVIDE ADDITIONAL OFFSETS TO ROUTE AROUND EQUIPMENT THAT IS NOT SHOWN. HOLD PIPING HIGH AS POSSIBLE, DO NOT ROUTE LOWER THAN ADJACENT PIPING/OUT AND REDUCE EXISTING HEAD ROOM/ SERVICE AISLE SPACE.

UNIT HEATERS WILL CONTINUE TO OPERATE OFF THEIR EXISTING CONTROLS. PROVIDE SOLENOID VALVE IN THE HEATING WATER TO EACH UH COIL PARALLEL WIRED TO FAN MOTOR FOR VALVE TO OPEN ANYTIME FAN IS OPERATIONAL. 3/4" NPT BRASS BODY, Cv=5.00, NORMALLY CLOSED, 120/60 SOLENOID, 210F MAX FLUID TEMP, EQUAL TO ASCO 82160089 HW 120/60.

DEMO STEAM AND STEAM CONDENSATE PIPING AND ASSOCIATED VALVES, TRAPS, AND SUPPORTS AND CAP AT MAIN. TYPICAL FOR ALL STEAM UNIT HEATERS.

DEMO STEAM AND STEAM CONDENSATE PIPING AND ASSOCIATED VALVES, TRAPS, AND SUPPORTS AND CAP AT MAIN. TYPICAL FOR ALL STEAM UNIT HEATERS.

SEE COIL PIPING DETAIL FOR COIL CONNECTION REQUIREMENTS. BALANCE WATER FLOW TO 2.7GPM

PROVIDE WALL OPENING

DETECTION AREA, DOORS TO ADJACENT MECHANICAL SPACES MUST REMAIN LOCKED. COORDINATE WORK THROUGH THIS AREA WITH OWNER.

RUN NEW PIPE AT SAME ELEVATION OR ABOVE EXISTING PIPE.

PROVIDE BAS POINTS TO START/ STOP PUMPS AND MONITOR RUN STATUS.

BAS CONTROL VALVE, MODULATED TO MAINTAIN HWS TEMPERATURE IN THE 2' LOOP.

BALL VALVE WITH VENTURI, BALANCE TO 32 GPM MAX FLOW.

AIR SEPARATOR

STEAM PIPING NOT SHOWN

EXISTING FREIGHT ELEVATOR. USE TO MOVE CONSTRUCTION TOOLS AND MATERIALS ONTO THIS FLOOR, CAB INTERIOR 96"W x 102"L x 96"H.

HEATING WATER PUMPS

HEAT EXCHANGER

ALL NEW PIPING IS 2"

BAS TEMPERATURE SENSORS. INSTALL THERMOWELLS PROVIDED BY BAS VENDOR.

CAP PROVIDE WALL OPENINGS TO RTU1, 2, 3, & 4

PROVIDE BAS POINTS TO START/ STOP PUMPS AND MONITOR RUN STATUS.

BAS CONTROL VALVE, MODULATED TO MAINTAIN HWS TEMPERATURE IN THE 2' LOOP.

BALL VALVE WITH VENTURI, BALANCE TO 32 GPM MAX FLOW.

AIR SEPARATOR

STEAM PIPING NOT SHOWN



REVISIONS

NO.	DATE	DESCRIPTION

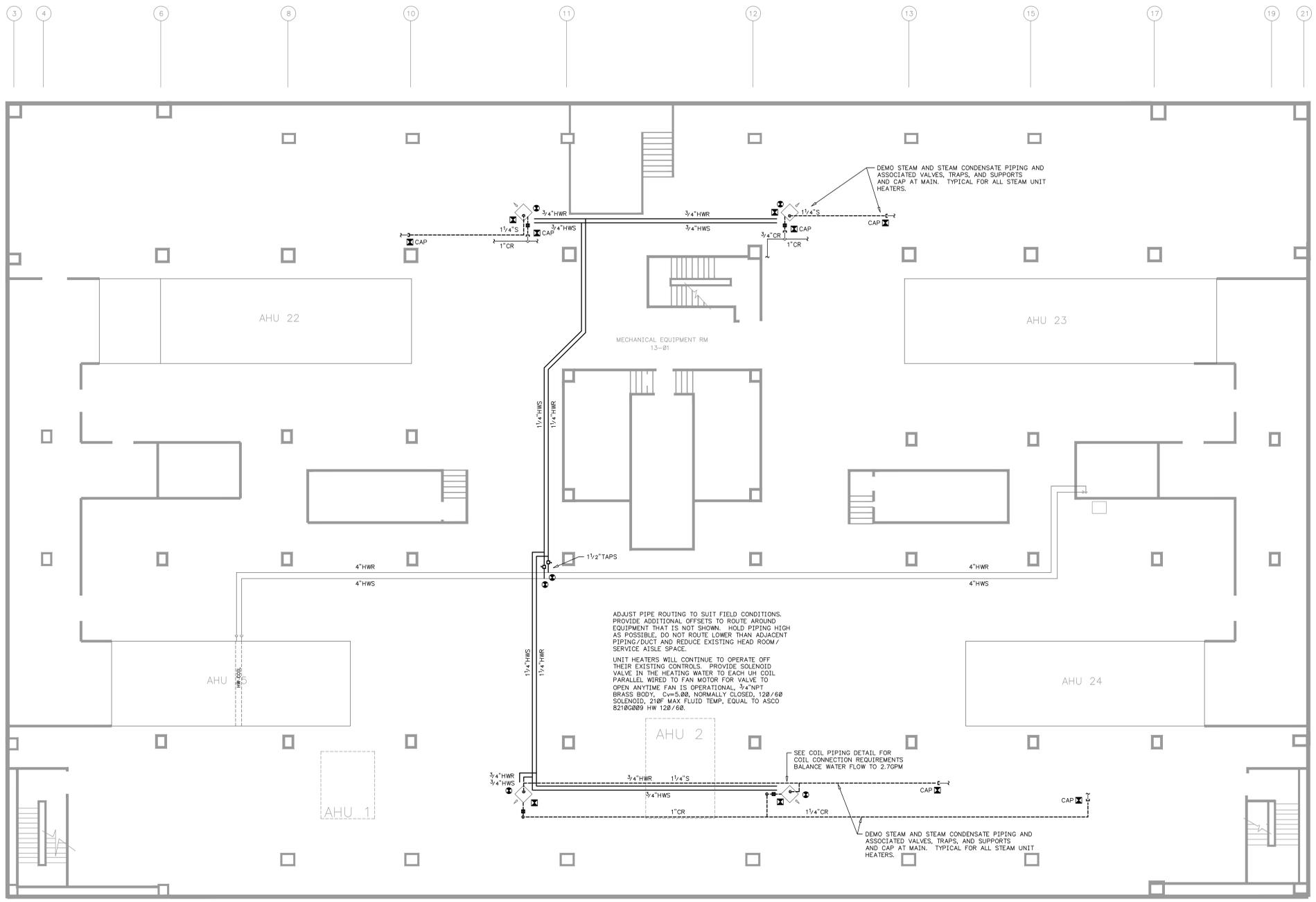
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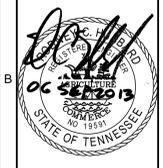
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DATE	06 SEP 13
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SHEET TITLE
THIRTEENTH FLOOR
EQUIPMENT RM 13-01
MECHANICAL PLAN

SHEET NUMBER
M1.5



THIRTEENTH FLOOR EQUIPMENT RM 13-01 MECHANICAL PLAN
1/8" = 1'-0"



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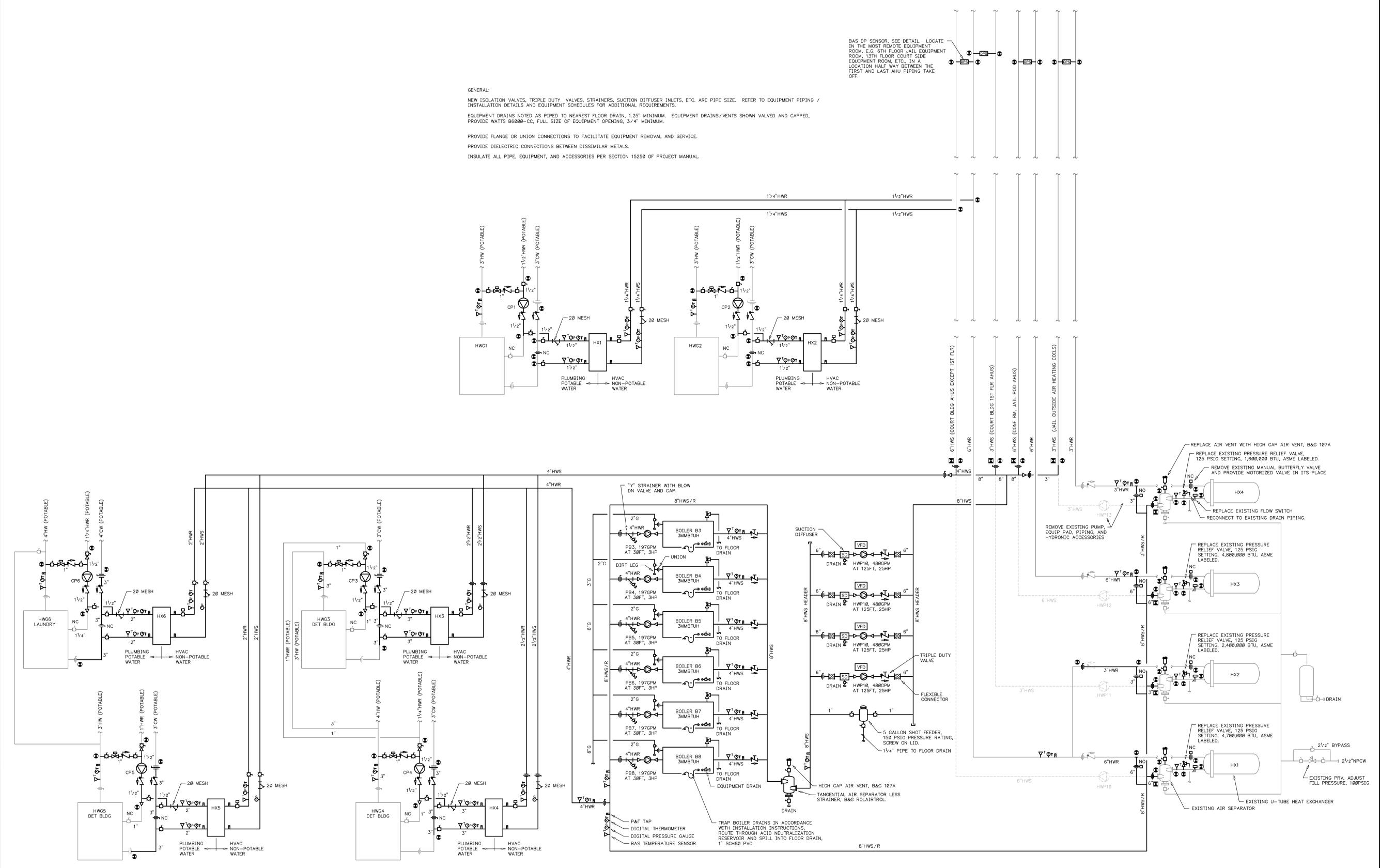
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SHEET TITLE
HEATING WATER PIPING SCHEMATIC

SHEET NUMBER
M2.1

GENERAL:
NEW ISOLATION VALVES, TRIPLE DUTY VALVES, STRAINERS, SUCTION DIFFUSER INLETS, ETC. ARE PIPE SIZE. REFER TO EQUIPMENT PIPING / INSTALLATION DETAILS AND EQUIPMENT SCHEDULES FOR ADDITIONAL REQUIREMENTS.
EQUIPMENT DRAINS NOTED AS PIPED TO NEAREST FLOOR DRAIN, 1.25" MINIMUM. EQUIPMENT DRAINS/VENTS SHOWN VALVED AND CAPPED, PROVIDE WATTS 86600-CC, FULL SIZE OF EQUIPMENT OPENING, 3/4" MINIMUM.
PROVIDE FLANGE OR UNION CONNECTIONS TO FACILITATE EQUIPMENT REMOVAL AND SERVICE.
PROVIDE DIELECTRIC CONNECTIONS BETWEEN DISSIMILAR METALS.
INSULATE ALL PIPE, EQUIPMENT, AND ACCESSORIES PER SECTION 15250 OF PROJECT MANUAL.

BAS DP SENSOR. SEE DETAIL. LOCATE IN THE MOST REMOTE EQUIPMENT ROOM, E.G. 6TH FLOOR JAIL EQUIPMENT ROOM, 13TH FLOOR COURT SIDE EQUIPMENT ROOM, ETC., IN A LOCATION HALF WAY BETWEEN THE FIRST AND LAST AHU PIPING TAKE OFF.



HEATING WATER SYSTEM PIPING SCHEMATIC
NTS

CENTRIFUGAL PUMP SCHEDULE													
DRAWING CODE	GPM	HEAD FT	NPSHR FT	PUMP EFF	MOTOR HP	PUMP RPM	VOLTAGE / PHASE	SYS PIPE SIZE		PUMP CONFIGURATION	SERVICE	MANUFACTURER MODEL NUMBER	REMARKS
								INLET	OUTLET				
HWP10	480	125	10.6	74.6	25	1780	480/3	6	6	VERTICAL SPLIT COUPLED INLINE	SECONDARY HEATING WATER	PATERSON #4413A-CC 4x4x13.5	1, 3, 4
HWP11	480	125	10.6	74.6	25	1780	480/3	6	6	VERTICAL SPLIT COUPLED INLINE	SECONDARY HEATING WATER	PATERSON #4413A-CC 4x4x13.5	1, 3, 4
HWP12	480	125	10.6	74.6	25	1780	480/3	6	6	VERTICAL SPLIT COUPLED INLINE	SECONDARY HEATING WATER	PATERSON #4413A-CC 4x4x13.5	1, 3, 4
HWP13	480	125	10.6	74.6	25	1780	480/3	6	6	VERTICAL SPLIT COUPLED INLINE	SECONDARY HEATING WATER	PATERSON #4413A-CC 4x4x13.5	1, 3, 4
CP1	20	30		60	0.5	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW01	AURORA #326A 1.25x1.25x6	2, 5
CP2	20	20		60	0.5	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW02	AURORA #326A 1.25x1.25x6	2, 5
CP3	20	30		60	0.5	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW03	AURORA #326A 1.25x1.25x6	2, 5
CP4	20	30		60	0.5	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW04	AURORA #326A 1.25x1.25x6	2, 5
CP5	15	20		69	0.33	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW05	AURORA #326A -1.25x1.25x6	2, 5
CP6	15	20		69	0.33	1750	120/1	1.5	1.5	CLOSE COUPLED INLINE	POTABLE WATER CIRC PUMP HW06	AURORA #326A -1.25x1.25x6	2, 5
PB3	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B3 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3
PB4	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B4 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3
PB5	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B5 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3
PB6	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B6 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3
PB7	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B7 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3
PB8	196.5	30	21	72.3	3	1760	208/3	4	4	CLOSE COUPLED INLINE	BOILER B8 PRIMARY HEATING WATER	PATERSON #V407A-CC 4x4x7.5	2, 3

GENERAL: PUMPS CENTRIFUGAL BRONZE FITTED WITH MECHANICAL SEALS, 175 PSIG / 225 DEGF MINIMUM WORKING PRESSURE AND TEMPERATURE, SELECT MOTOR FOR NON-OVERLOADING CONDITIONS, TABULATED HP IS MOTOR HP NOT BHP, MOTORS LESS THAN 1 HP 120 VAC / 1 PHASE INTERNALLY OVERLOAD PROTECTED, MOTORS 1 HP AND GREATER 3 PHASE ODP, MOTORS GREATER THAN 5 HP PREMIUM EFFICIENCY.

REMARKS: REFER TO RIGHT HAND COLUMN IN EQUIPMENT SCHEDULE FOR REMARK APPLICABILITY.

- 1) PROVIDE SUCTION DIFFUSER, INLET SIZE = SYSTEM PIPE SIZE, OUTLET SIZE = PUMP SUCTION SIZE.
- 2) PROVIDE SUCTION SIDE "Y" STRAINER, SIZE = SYSTEM PIPE SIZE.
- 3) PROVIDE TRIPLE DUTY VALVE, INLET SIZE = SYSTEM PIPE SIZE, OUTLET SIZE = SYSTEM PIPE SIZE.
- 4) PROVIDE INVERTER DUTY MOTOR MEETING NEMA MG 1-1993, SECTION IV, PART 31.40.4.2 REQUIREMENTS, CLASS F INSULATION, AND CIV RATING 1600 VOLTS AT RATED OPERATING TEMPERATURE.
- 5) PUMP IN DOMESTIC WATER SERVICE, PROVIDE NON-FERROUS CONSTRUCTION.

PLATE AND FRAME HEAT EXCHANGER SCHEDULE														
DRAWING CODE	CAPACITY BTU/H	HEAT TRANSFER AREA, SF	EWT	COLD SIDE				HOT SIDE				MANUFACTURER MODEL NUMBER	REMARKS	
				GPM	MAX WPD FT	DEGF	LWT DEGF	PIPE CONN	GPM	MAX WPD FT	DEGF			LWT DEGF
HX1	487,500		15	15	60	125	1.5	15.0	15	140	75	1.5	POLARIS PHE	1,4
HX2	487,500		15	15	60	125	1.5	15.0	15	140	75	1.5	POLARIS PHE	1,4
HX3	1,917,500		59	15	60	125	2.5	59.0	30	140	75	2.5	POLARIS PHE	1,4
HX4	1,917,500		59	15	60	125	2.5	59.0	30	140	75	2.5	POLARIS PHE	1,4
HX5	937,500		25	15	60	135	2.0	28.8	30	140	75	2.0	POLARIS PHE	1,4
HX6	937,500		25	15	60	135	2.0	28.8	30	140	75	2.0	POLARIS PHE	1,4

GENERAL: FACTORY FABRICATED PLATE AND FRAME HEAT EXCHANGER, BOLTED ASSEMBLY WITH 10% MORE PLATES THAN ARE REQUIRED BY PERFORMANCE SCHEDULE, THESE ARE APPLIED FOR POTABLE WATER HEATING USING NON POTABLE WATER, PROVIDE A VENTILATED DRAIN CAVITY BETWEEN POTABLE AND NON-POTABLE, ANSI 150LB FLANGED CONNECTIONS 2" AND LARGER, EPDM OR NITRILE GASKETS MECHANICALLY HELD IN PLACE WITHOUT GLUE, COMPLETE ASSEMBLY RATED FOR 150 PSI MAXIMUM WORKING PRESSURE, ASME STAMPED, 195 PSI TEST PRESSURE, 284F MAXIMUM TEMPERATURE.

REMARKS: REFER TO RIGHT HAND COLUMN IN EQUIPMENT SCHEDULE FOR REMARK APPLICABILITY.

- 1) 316 STAINLESS STEEL PLATES, AND WATERWAYS, FLANGES.
- 2) BRAZED PLATE CONFIGURATION ALLOWED.
- 3) 304 STAINLESS STEEL PLATES
- 4) PROVIDE TWO SETS OF PERFORMANCE DATA, ONE PROVIDING THE SCHEDULED PERFORMANCE AND ONE WITH THE 10% ADDITIONAL PLATES.

HEATING WATER BOILER SCHEDULE									
DRAWING CODE	GPM	INPUT MBTUH	OUTPUT		BOILER TYPE	ELECTRICAL		MANUFACTURER MODEL NUMBER	REMARKS
			MBTUH	EFF		VOLTS	MOCF		
B3,4,5,6,7,8	196.5	3000.0	2850.0	92.0	SEALED COMBUSTION NATURAL GAS FIRED	208V/3PH	25A	HARSCO CC-3000 GG	1

GENERAL: FACTORY PACKAGED AND TESTED DOWN-FIRED VERTICAL FIN TUBE BOILER, ASME STAMPED AND LABELED FOR MINIMUM WORKING PRESSURE OF 125 PSIG, NATIONAL BOARD AND ANSI Z21.13 / UL 795 LISTED. BOILER SHALL BE BUILT TO IBC 2009 1.00 SEISMIC REQUIREMENTS, NATURAL GAS FIRED, SEALED COMBUSTION SYSTEM WITH FACTORY FILTERING AND ACCOMMODATING DUCTED COMBUSTION AIR, FORCED INDUCED DRAFT FULLY MODULATING BURNER WITH MINIMUM 5:1 TURNDOWN, REPLACEABLE COMBUSTION AIR FILTER, WATER FLOW PROVING SWITCH, GAS TRAIN SHALL MEET THE REQUIREMENTS OF CSA, ASME CSD-1, AND FM, AND SHALL INCLUDE MANUAL RESET LOW & HIGH GAS PRESSURE SAFETIES, AND COMBUSTION AIR PROVING SWITCH. BOILER TO BE FACTORY EQUIPPED TO NOT ALLOW FREEZING OF OFF LINE EQUIPMENT, AMBIENT CONDITIONS OF 10F, BOILER AMBIENT OF 50F. BOILER TO CLOSE DAMPERS OR START PUMPS AS NECESSARY TO PREVENT FREEZING. THE BOILER SHALL BE EQUIPPED WITH MICROPROCESSOR-BASED CONTROL SYSTEM TO PROVIDE MODULATION OF THE GAS SUPPLY AND COMBUSTION AIR BLOWER TO THE BURNER, BURNER IGNITION, FLAME SUPERVISION/PROVING, CONTROL OF WATER TEMPERATURE SET POINTS, AND MONITORING OF ALL SAFETY SYSTEMS. THE CONTROLLER SHALL HAVE LCD DISPLAY, KEYPAD / TOUCHSCREEN WITH PASSWORD SECURITY, AND INCLUDE CONTROL LOGIC FOR OUTDOOR RESET, PUMP DELAY WITH FREEZE PROTECTION, PUMP EXERCISE, AND BUILT-IN SEQUENCER TO SEQUENCE AND ROTATE UP TO EIGHT BOILERS WHILE MAINTAINING BURNER MODULATION. ALL PROGRAMMING AND A DISPLAY OF OPERATING AND ALARM STATUS CONDITIONS ACCESSIBLE THROUGH THE KEYPAD / TOUCHSCREEN / LCD DISPLAY. PROVIDE BACNET BAS INTERFACE, E.G. INPUTS FOR BOILER ENABLE AND HEATING WATER SUPPLY TEMPERATURE SETPOINT, OUTPUTS FOR BOILER RUN STATUS, ALARM/RUN FAILURE. BOILER TRIM SHALL INCLUDE 125 PSIG ASME APPROVED SAFETY VALVE(S), TEMPERATURE AND PRESSURE GAUGE ON THE WATER OUTLET, MANUAL RESET LOW WATER CUT-OFF, MANUAL RESET WATER SUPPLY HIGH TEMPERATURE LIMIT. HEAT EXCHANGER WARRANTED AGAINST THERMAL SHOCK AND MATERIALS / WORKMANSHIP FOR A PERIOD OF 10 YEARS, BURNER 5 YEARS, ALL OTHER PARTS 1 YEAR.

MANUFACTURERS: AERCO, LOCHINVAR, PATERSON-KELLY, LAARS, RAYPAK.

REMARKS: REFER TO RIGHT HAND COLUMN IN EQUIPMENT SCHEDULE FOR REMARK APPLICABILITY.

- 1) PROVIDE CONDENSATE NEUTRALIZATION TANK / TUBE FILLED WITH CALCIUM CARBONATE EQUAL TO JIM BOILER WORKS JM SERIES. PROVIDE ONE PER BOILER, CONNECT VENT AND BOILER DRAINS TO THIS DEVICE PRIOR TO SPILLING INTO FLOOR DRAIN.

VARIABLE FREQUENCY DRIVE SCHEDULE							
DRAWING CODE	CONTROLLED EQUIPMENT CODE	NOMINAL HP	MINIMUM AMPS AT 90HZ	ELECTRICAL		MANUFACTURER MODEL NUMBER	REMARKS
				VOLTS	PHASE		
VFD-P10	HEATING WATER PUMP 10	25	34	460	3	E7N	1,3
VFD-P11	HEATING WATER PUMP 11	25	34	460	3	E7N	1,3
VFD-P12	HEATING WATER PUMP 12	25	34	460	3	E7N	1,3
VFD-P13	HEATING WATER PUMP 12	25	34	460	3	E7N	1,3

DESCRIPTION: FULLY DIGITAL PWM, IGBT SWITCHING, MICROPROCESSOR BASED FOR STEP LESS MOTOR CONTROL FROM 0.1% TO 110% OF MOTOR BASE SPEED, UL AND CSA / CUL LABELED, NO DERATING TO 9 KHZ CARRIER FREQUENCY, 115% OF NAMEPLATE OVERLOAD RATING FOR 1 MINUTE WITHOUT DAMAGE TO DRIVE. ALPHANUMERIC BACKLIT LCD DISPLAY FOR RUN STATUS, SPEED, SPEED UNITS, %LOAD, HOA STATUS, SOURCE OF SPEED REFERENCE, START PENDING, FAULTS, VOLTAGE, AND PROGRAMMING PARAMETERS WITH HOA AND PUSHBUTTON SWITCHES FOR LOCAL CONTROL AND PROGRAMMING.

LOGIC CONTROLS: AUTOMATIC RESTART, CURRENT LIMIT ADJUSTMENT, CRITICAL SPEED AVOIDANCE SETTINGS, BRAKING AND RESTART CONTROL OF A SPINNING MOTOR, BAS COMMUNICATION PORT, NON-VOLATILE MEMORY OF 8 MOST RECENT FAULTS AND COINCIDENT ACTIVITY.

PROTECTIVE CIRCUITS: PHASE-TO-GROUND OR 3-PHASE SHORT CIRCUIT, OVER CURRENT, UNDER VOLTAGE, OVERVOLTAGE, OVER TEMPERATURE, THERMAL OVERLOAD, AND EXTERNAL FAULT TRIPS.

INPUTS AND OUTPUTS: ANALOG OUTPUTS PROPORTIONAL TO SPEED AND LOAD, THREE PROGRAMMABLE FORM C RELAYS, 4-20 MA / 0-10 VDC INPUTS FOR SPEED SETPOINT, LOCAL REMOTE RUN, AUTO/MAN, RESET, AND FIREMAN'S OVERRIDE (AHUS AND FANS).

REMARKS:

- 1) PROVIDE BACNET COMMUNICATION CARD.
- 2) PROVIDE CONTACTOR BYPASS, ELECTRICALLY INTERLOCKED, UL LISTED, 50,000 AIC, NEC MOTOR PROTECTION IN BOTH THE "VFD" AND "BYPASS" MODE BY MOTOR OVERLOAD RELAY(S), CONTACTOR BELOW VFD, VERTICAL CONFIGURATION (NEMA 1 APPLICATIONS).
- 3) DOOR INTERLOCKED MAIN POWER INPUT FUSED DISCONNECT OR CIRCUIT BREAKER PROVIDING POSITIVE SHUTDOWN OF ALL POWER TO BOTH THE BYPASS CIRCUITRY (WHERE APPLICABLE) AND THE VFD.
- 4) TWO MOTORS 15HP EACH ON A SINGLE VFD. PROVIDE INDIVIDUAL MOTOR OVERLOADS AND SHORT CIRCUIT PROTECTION.
- 5) PROVIDE A ULUL LISTED VFD WITH SPACE PRESSURIZATION SENSOR AND INHERENT CONTROL LOGIC. REFER TO SECTION 19550 FOR CONTROL SEQUENCE.

MEDIUM PRESSURE GAS REGULATOR SCHEDULE									
DRAWING CODE	FLOW CFH	CAPACITY			ACCURACY PERCENT	VALVE LOCATION	EQUIPMENT SERVED	EQUAL TO MFG AND M/N	REMARKS
		INLET PSIG	OUTLET IN W.C.	MAX DROOP IN W.C.					
MPR1	18,000	7.0	14.0	1.0	+/-0.5	MECHANICAL LEVEL EQUIP RM	BOILER B3,4,5,6,7,8	SENSUS 243 SERIES	1

GENERAL NOTES: ALUMINUM ALLOY OR CAST IRON BODY BODY, ALUMINUM DIAPHRAGM CASE, REINFORCED BUNA-N DIAPHRAGM, BUNA-N VALVE SEAT FOR POSITIVE LOCKUP, INTERCHANGEABLE ORIFICE, INTERNAL RELIEF TO VENT AND GAS PRESSURE BUILD UP DURING LONG PERIODS OF INACTIVITY, SUITABLE FOR OPERATING AT 15 PSIG INLET PRESSURE WITHOUT DAMAGE, -20 TO 150F OPERATING TEMPERATURE, MINIMUM 6 - 14" WC ADJUSTABLE OUTLET PRESSURE.

SIZE AND INSTALL REGULATOR IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

REMARKS: REFER TO RIGHT HAND COLUMN IN EQUIPMENT SCHEDULE FOR REMARK APPLICABILITY.

- 1) PROVIDE MINIMUM 3/4" VENT TO OUTDOORS, SCREENED INSECT RESISTANT WEATHER CAP, MATCH OUTPUT OF MPR.



REVISIONS	

PROJECT NUMBER	12077.2
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SHEET TITLE	SCHEDULES
SHEET NUMBER	M3.1

- PRESSURE GAUGE WITH P&T. REFER TO PROJECT MANUAL, 0-150 PSIG, ORIENT AND ADJUST ELEVATION FOR EASY VIEWING. 3/8" COPPER TUBING FOR SENSING LINES.
- BUTTERFLY VALVE WITH GEAR OPERATOR. ORIENT HAND WHEEL FOR EASY ACCESS.
- CONTROL VALVE WITH MODULATING ACTUATOR AND MANUAL OVERRIDE OPERATOR.
- BAS TEMPERATURE SENSOR WITH WELL, IN COMMON PIPING WITH CHILLER. SEE PIPING SCHEMATIC.
- THERMOMETER. REFER TO PROJECT MANUAL, ORIENT AND ADJUST ELEVATION FOR EASY VIEWING. 25-125° F.

- ECCENTRIC REDUCER / INCREASER AS NEEDED, FLAT SIDE FACES HEAT EXCHANGER CENTER LINE, AND OR PIPING OFFSET TO PROVIDE CLEARANCE BETWEEN PIPING FLANGES.
- SUCTION DIFFUSER OR STRAINER, SEE PIPING SCHEMATIC. PROVIDE ON WATER INLETS TO HEAT EXCHANGER, 1/8" STAINLESS STEEL PERFORATED SCREEN WITH 20 MESH SLEEVE.
- DRIP PAN, 16 GA GALVANIZED CONSTRUCTION, 3" SIDES, HEMMED EDGES, WELDED SEAMS, FABRICATE TO EXTEND 3" BEYOND EQUIPMENT FOOT PRINT AND EXTEND UNDER PIPING CONNECTIONS. SILICONE SEAL ANCHOR BOLT PENETRATIONS. SET EQUIPMENT ON 3/4" THICK NEOPRENE WAFFLE PAD AND INSTALL NEOPRENE ISOLATORS AT ALL ANCHOR BOLTS.

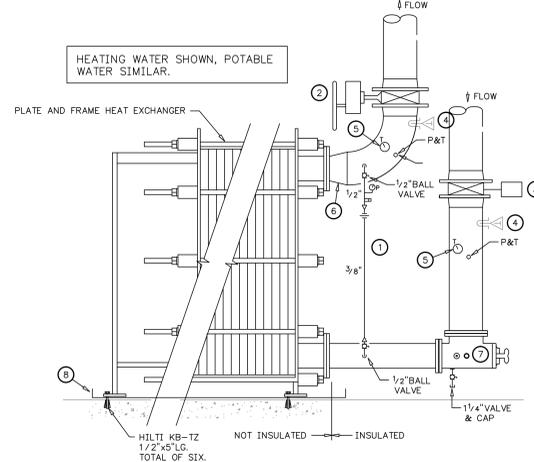
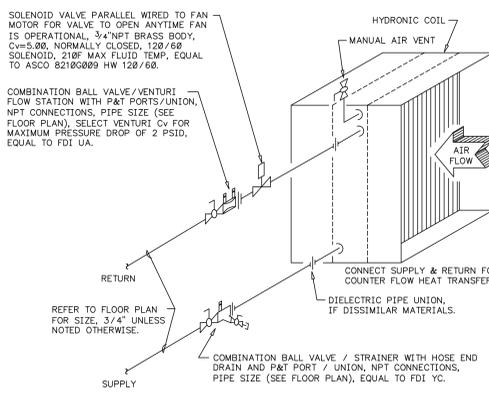
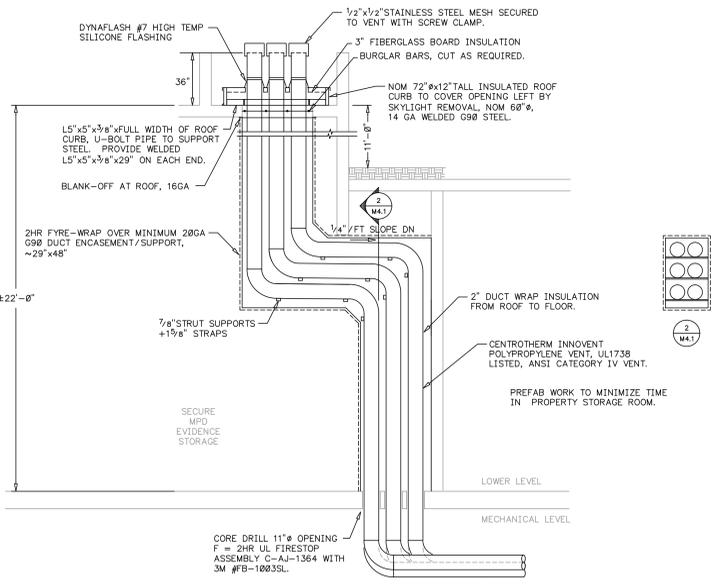


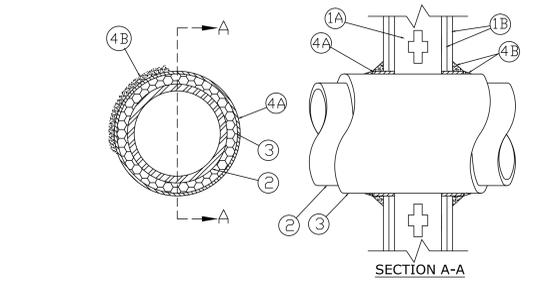
PLATE AND FRAME HEAT EXCHANGER
NTS



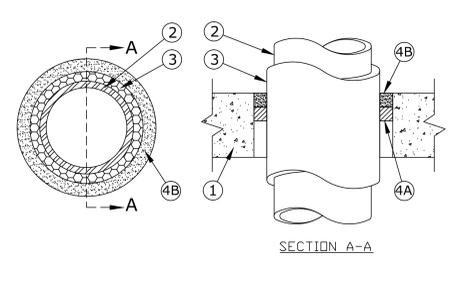
UNIT HEATER COIL PIPING DETAIL
NTS



BOILER VENT PIPING DETAIL
NTS



- Wall Assembly** - The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
 - Studs** - Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of non 2 in. by 4 in. (51 mm by 102 mm) lumber spaced 16 in. (406 mm) ID with non 2 by 4 in. lumber end plates and cross braces. Steel studs to be min 3-5/8 in. (92 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
 - Gypsum Board** - Non 5/8 in. (16 mm) thick, 4 ft (122 cm) wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls and 18 in. (457 mm) for steel stud walls.
- The hourly F Rating of the firestop system is 1 hr when installed in a 1 hr fire rated wall and 2 hr when installed in a 2 hr fire rated wall.**
- Through Penetrants** - One metallic pipe or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
 - Steel Pipe** - Non 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
 - Copper Tubing** - Non 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
 - Copper Pipe** - Non 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
- Pipe Covering** - Non 1 in. or 2 in. (25 mm or 51 mm) thick hollow cylindrical heavy density glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing top tape. Transverse joints sealed with metal fasteners or with butt strip tape supplied with the product. When non 1 in. (25 mm) thick pipe covering is used, the annular space between the pipe covering and the circular cutout in the gypsum wallboard layers on each side of the wall shall be min 1/4 in. to max 3/8 in. (6 mm to max 10 mm). When non 2 in. (51 mm) thick pipe covering is used, the annular space between the pipe covering and the circular cutout in the gypsum wallboard layers on each side of the wall shall be min 1/2 in. to max 3/4 in. (13 mm to max 19 mm).



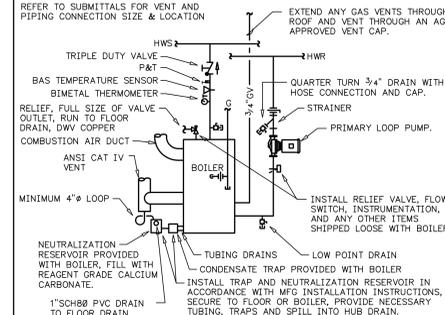
- Floor or Wall Assembly** - Min 2-1/2 in. (64 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 18 in. (457 mm).
See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
 - Through Penetrant** - Non 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper pipe, non 12 in. (305 mm) diam (or smaller) service weight (or heavier) cast iron soil pipe, non 12 in. (305 mm) diam (or smaller) Class 50 (or heavier) ductile iron pressure pipe or non 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe centered in the opening and rigidly supported on both sides of the floor or wall assembly.
 - Pipe Covering** - Non 1/2 in. to 2 in. (13 mm to 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing top tape. Transverse joints secured with metal fasteners or with butt strip tape supplied with the product.
 - Firestop System** - The details of the firestop system shall be as follows:
 - Packing Material** - Min 1 in. (25 mm) thickness of firmly packed mineral wool batt insulation used as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall as required to accommodate the required thickness of caulk fill material (Item 8).
 - Fill Void or Cavity Material** - Caulk or Sealant - Applied to fill the annular space flush with the top surface of the floor or sleeve or flush with both surfaces of wall. When non pipe covering thickness is 2 in. (51 mm), min thickness of caulk fill material is 2 in. (51 mm). When non pipe covering thickness is 1-1/2 in. (38 mm) or less, min thickness of caulk fill material is 1 in. (25 mm).
- The hourly F and T Ratings of the firestop system are dependent upon the thickness of the floor or wall, the size of pipe, the thickness of pipe covering material and the size of the annular space (between the pipe covering material and the edge of the circular through opening), as shown in the following table:

Min Floor or Wall Thkns in. (mm)	Max Pipe Diam in. (mm)	Non Pipe Covering Thkns in. (mm)	Annular Space in. (mm)	F Rating Hr	T Rating Hr
2-1/2 (64)	4 (102)	1 or 1-1/2 (25 or 38)	1/2 to 2-3/8 (13 to 60)	2	1
4-1/2 (114)	4 (102)	2 (51)	1/4 to 3-5/8 (6 to 92)	2	1-1/2
2-1/2 (64)	12 (305)	1 (25)	1/2 to 1-1/2 (13 to 38)	2	1/2
4-1/2 (114)	12 (305)	1 (25)	1/2 to 2-3/8 (13 to 60)	3	1
2-1/2 (64)	12 (305)	1/2 (13)	1/2 to 2-3/8 (13 to 60)	2	0

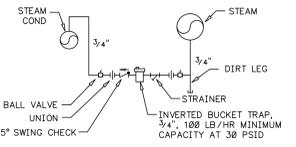
- 3M COMPANY** - FS-195+
B. Fill Void or Cavity Materials - Caulk or Sealant - Min 1/4 in. (6 mm) continuous bead applied to the wrap strip/wall interface and to the exposed edge of the wrap strip layer approx 3/4 in. (19 mm) from the wall surface.
 - 3M COMPANY** - CP 25WB+, IC 15WB+, FireDam 150+ caulk or FB-3000 WT sealant
*Bearing the UL Classification Marking
- System No. W-L-5001
May 19, 2005
(Formerly System No. 147)
F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 3/4, 1 and 1-1/2 Hr (See Item 3)
L Rating At Ambient - 2 CFM/sq ft
L Rating At 400 F - less than 1 CFM/sq ft
- System No. C-AJ-5001
June 15, 2005
(Formerly System No. 91)
F Ratings - 1-1/2, 2 and 3 Hr (See Item 4)
L Rating At 400 F - less than 1 CFM per sq ft
T Ratings - 0, 1/2, 3/4 and 1 Hr (See Items 1A and 5)
L Rating At Ambient - 2 CFM per sq ft

SYSTEM NO. W-L-5001

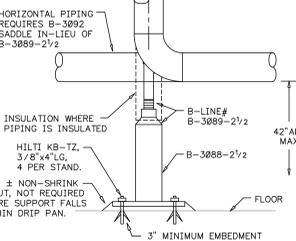
SYSTEM NO. C-AJ-5001



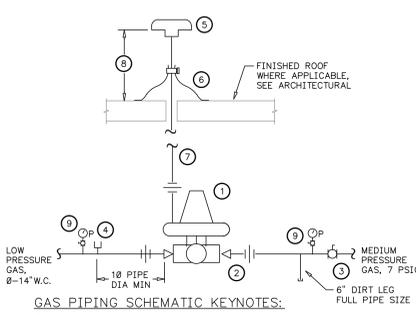
TYPICAL BOILER
NTS



STEAM PIPE TRAPPING DETAIL
NTS

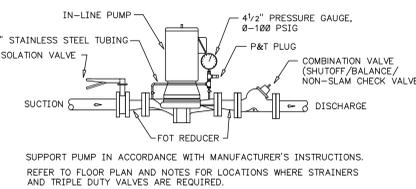


FLOOR MOUNTED PIPE SUPPORT
NTS



- GAS PIPING SCHEMATIC KEYNOTES:**
- GAS PRESSURE REGULATOR, SEE SCHEDULE.
 - FLANGE / UNION, NUMBER AND CONFIGURATION TO FACILITATE PRESSURE REGULATOR REMOVAL / SERVICE.
 - BALL VALVE, AGA/UL SANCTIONED FOR NATURAL GAS SERVICE.
 - PRESSURE AND TEMPERATURE PLUG, MINIMUM 10 PIPE DIAMETERS FROM REGULATOR.
 - SCREENED VENT, AGA/UL SANCTIONED FOR NATURAL GAS SERVICE. MORRISON FIG 155
 - RUBBER BOOT FLASHING, FLASH INTO ROOF SYSTEM IN ACCORDANCE WITH ROOF SYSTEM, SEE ARCHITECTURAL.
 - VENT/RELIEF PIPE, FULL SIZE OF VALVE CONNECTION, 3/4" MINIMUM.
 - 18" ABOVE FINISHED ROOF OR 24" ABOVE RTU OUTSIDE AIR INTAKE WHERE VENT FALLS WITHIN 15FT OF RTU INTAKE, GRACE VENT PIPING FROM ADJACENT EQUIPMENT OR BUILDING STRUCTURE FOR RIGID ASSEMBLY. PAINT WEATHER EXPOSED PIPING YELLOW. DO NOT LOCATE WITHIN SERVICE SPACE OF EQUIPMENT. SEE RTU ELEVATION.
 - 18 FT MINIMUM ABOVE GRADE ON WALL VENT, 15 FT MINIMUM FOR DOORS / WINDOWS OR BUILDING OUTSIDE AIR INTAKE.
 - PRESSURE GAUGE, 2-1/2" FACE, SELECT RANGE FOR 200-300% OF INDICATED PRESSURE.
- ITEMS 5, 6, and 7 MAY BE OMITTED WHEN PRESSURE REGULATOR IS EQUIPPED WITH AUTOMATIC VENT LIMITING DEVICE TO LIMIT GAS ESCAPEMENT TO ANSI LIMITS ON DIAPHRAGM FAILURE. REGULATORS ARE SPECIFIED WITH THIS FEATURE IF AVAILABLE, SEE SCHEDULE.
- ALTERNATE PIPING CONFIGURATIONS ARE ALLOWED AS NEEDED TO SUIT FIELD CONDITIONS. REGULATORS WITH VENT LIMITERS ARE POSITION SENSITIVE. INSTALL IN STRICT ACCORDANCE WITH MANUFACTURERS INSTALLATION INSTRUCTIONS.

MEDIUM PRESSURE REGULATOR DETAIL
NTS



IN-LINE CIRCULATING PUMP
NTS



REVISIONS

NO.	DATE	DESCRIPTION

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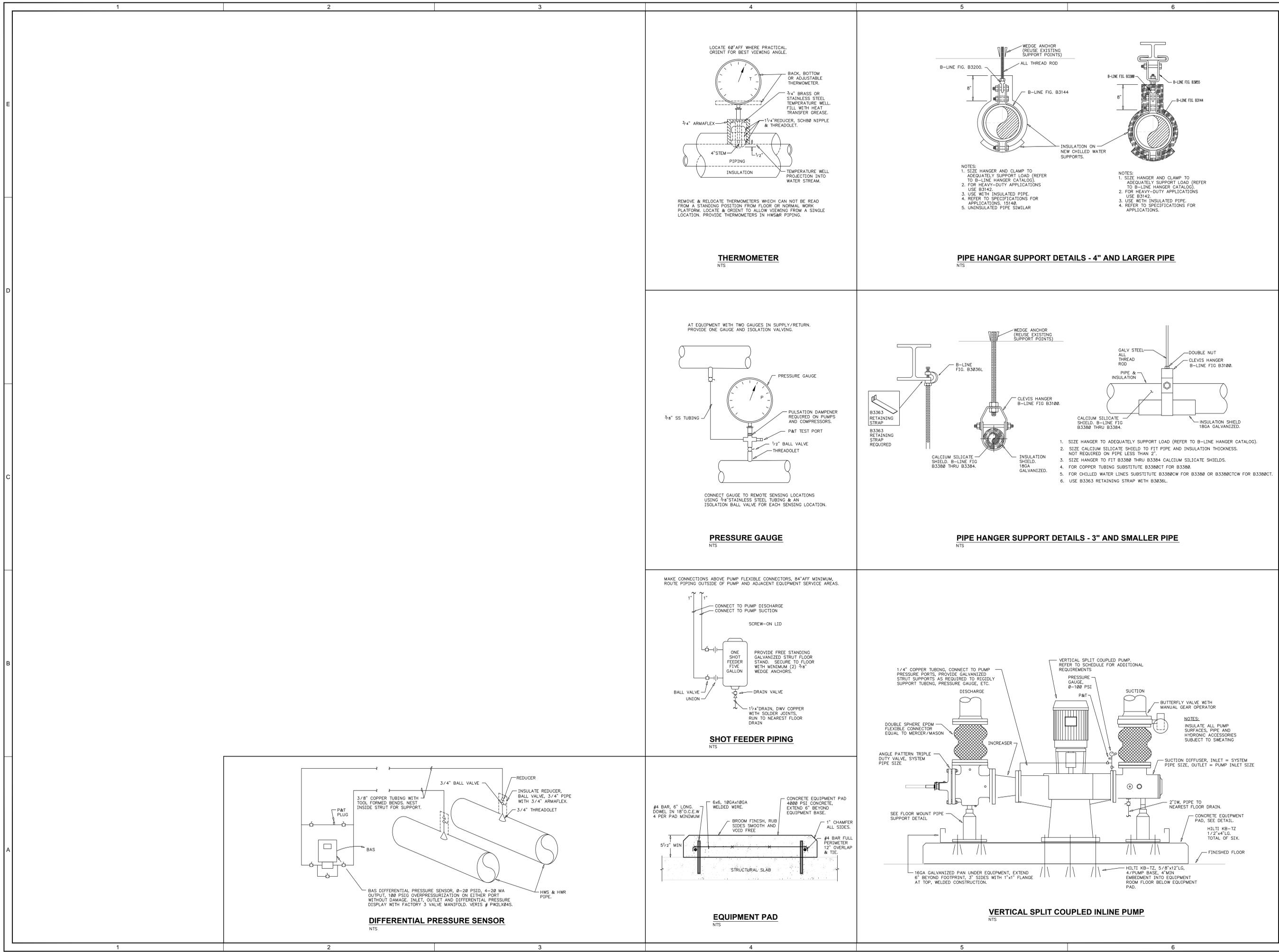
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DETAILS

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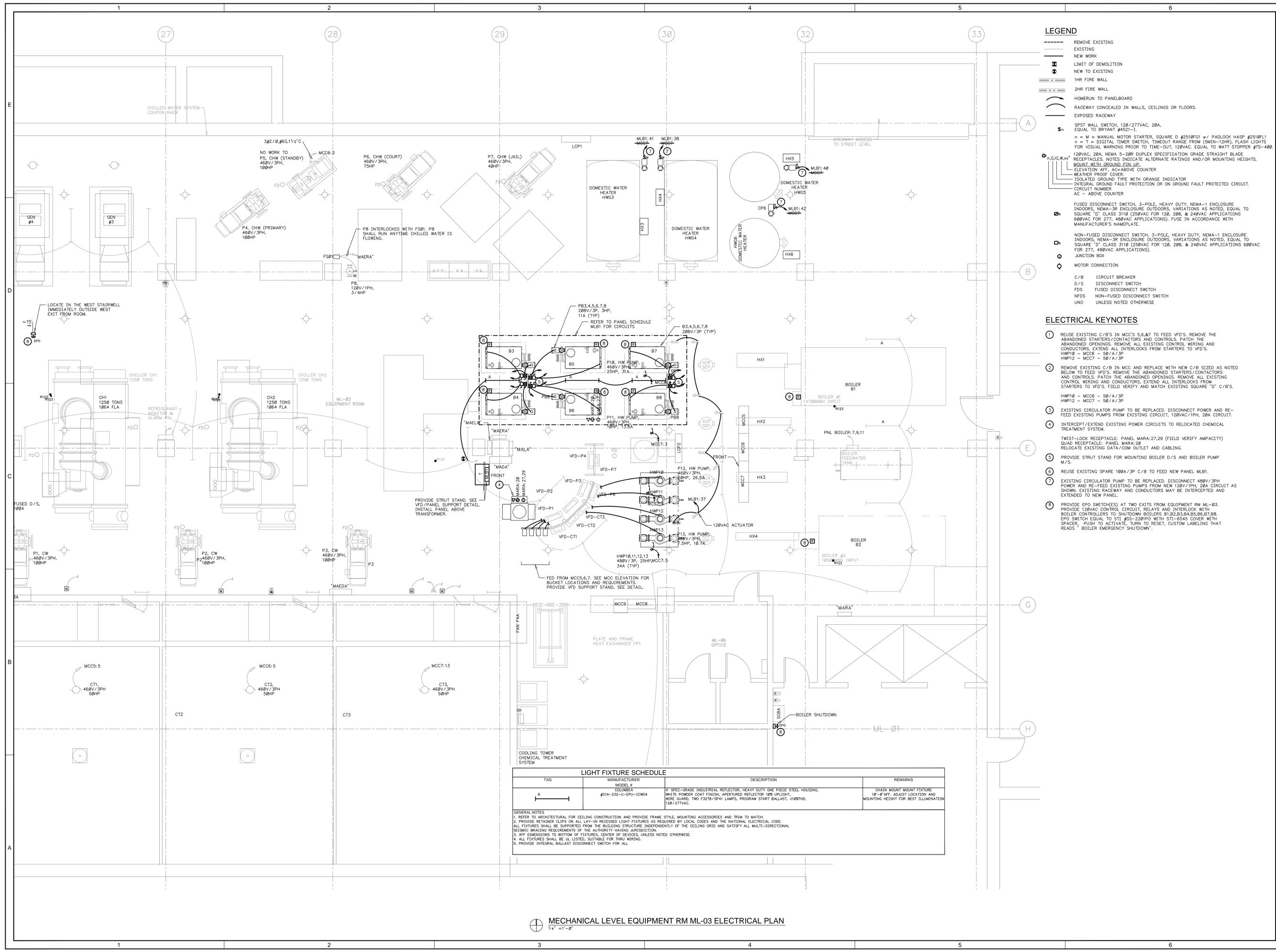
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SHEET TITLE
MECHANICAL LEVEL EQUIPMENT RM ML-03 ELECTRICAL PLAN

SHEET NUMBER

E1.1



- LEGEND**
- REMOVE EXISTING
 - EXISTING
 - NEW WORK
 - LIMIT OF DEMOLITION
 - NEW TO EXISTING
 - 1HR FIRE WALL
 - 2HR FIRE WALL
 - HOMERUN TO PANELBOARD
 - RACEWAY CONCEALED IN WALLS, CEILINGS OR FLOORS.
 - EXPOSED RACEWAY
 - S₁ SPST WALL SWITCH, 120/277VAC, 20A, EQUAL TO BRYANT #4521-1.
 - n = M = MANUAL MOTOR STARTER, SQUARE D #2510FG1 w/ PADLOCK HASP #2510FL1
 - n = T = DIGITAL TIMER SWITCH, TIMEOUT RANGE FROM (5MIN-12HR), FLASH LIGHTS FOR VISUAL WARNING PRIOR TO TIME-OUT, 120VAC, EQUAL TO WATT STOPPER #TS-400
 - 120VAC, 20A, NEMA 5-20R DUPLEX SPECIFICATION GRADE STRAIGHT BLADE RECEPTACLES, NOTES INDICATE ALTERNATE RATINGS AND/OR MOUNTING HEIGHTS. MOUNT WITH GROUND PIN UP.
 - ELEVATION AFF. AC=ABOVE COUNTER
 - WEATHER PROOF COVER.
 - ISOLATED GROUND TYPE WITH ORANGE INDICATOR
 - INTEGRAL GROUND FAULT PROTECTION OR ON GROUND FAULT PROTECTED CIRCUIT.
 - CIRCUIT NUMBER
 - AC - ABOVE COUNTER
 - FUSED DISCONNECT SWITCH, 3-POLE, HEAVY DUTY, NEMA-1 ENCLOSURE INDOORS, NEMA-3R ENCLOSURE OUTDOORS, VARIATIONS AS NOTED, EQUAL TO SQUARE "D" CLASS 3110 (250VAC FOR 120, 200, & 240VAC APPLICATIONS 600VAC FOR 277, 480VAC APPLICATIONS). FEED IN ACCORDANCE WITH MANUFACTURER'S NAMEPLATE.
 - NON-FUSED DISCONNECT SWITCH, 3-POLE, HEAVY DUTY, NEMA-1 ENCLOSURE INDOORS, NEMA-3R ENCLOSURE OUTDOORS, VARIATIONS AS NOTED, EQUAL TO SQUARE "D" CLASS 3110 (250VAC FOR 120, 200, & 240VAC APPLICATIONS 600VAC FOR 277, 480VAC APPLICATIONS).
 - JUNCTION BOX
 - MOTOR CONNECTION
 - C/B CIRCUIT BREAKER
 - D/S DISCONNECT SWITCH
 - FDS FUSED DISCONNECT SWITCH
 - NFDS NON-FUSED DISCONNECT SWITCH
 - UNO UNLESS NOTED OTHERWISE
- ELECTRICAL KEYNOTES**
- 1 REUSE EXISTING C/B'S IN MCC'S 5,6,8,7 TO FEED VFD'S. REMOVE THE ABANDONED STARTERS/CONTACTORS AND CONTROLS. PATCH THE ABANDONED OPENINGS. REMOVE ALL EXISTING CONTROL WIRING AND CONDUCTORS. EXTEND ALL INTERLOCKS FROM STARTERS TO VFD'S. HWP10 - MCC6 - 50/A/3P
HWP12 - MCC7 - 50/A/3P
 - 2 REMOVE EXISTING C/B IN MCC AND REPLACE WITH NEW C/B SIZED AS NOTED BELOW TO FEED VFD'S. REMOVE THE ABANDONED STARTERS/CONTACTORS AND CONTROLS. PATCH THE ABANDONED OPENINGS. REMOVE ALL EXISTING CONTROL WIRING AND CONDUCTORS. EXTEND ALL INTERLOCKS FROM STARTERS TO VFD'S. FIELD VERIFY AND MATCH EXISTING SQUARE "D" C/B'S.
HWP10 - MCC6 - 50/A/3P
HWP12 - MCC7 - 50/A/3P
 - 3 EXISTING CIRCULATOR PUMP TO BE REPLACED. DISCONNECT POWER AND RE-FEED EXISTING PUMPS FROM EXISTING CIRCUIT, 120VAC/1PH, 20A CIRCUIT.
 - 4 INTERCEPT/EXTEND EXISTING POWER CIRCUITS TO RELOCATED CHEMICAL TREATMENT SYSTEM.
 - 5 TWIST-LOCK RECEPTACLE: PANEL MARA:27,29 (FIELD VERIFY AMPACITY) QUAD RECEPTACLE: PANEL MARA:28
RELOCATE EXISTING DATA/COM OUTLET AND CABLING.
 - 6 PROVIDE STRUT STAND FOR MOUNTING BOILER D/S AND BOILER PUMP M/S.
 - 7 REUSE EXISTING SPARE 100A/3P C/B TO FEED NEW PANEL MLB1.
 - 8 EXISTING CIRCULATOR PUMP TO BE REPLACED. DISCONNECT 480V/3PH POWER AND RE-FEED EXISTING PUMPS FROM NEW 120V/1PH, 20A CIRCUIT AS SHOWN. EXISTING RACEWAY AND CONDUCTORS MAY BE INTERCEPTED AND EXTENDED TO NEW PANEL.
 - 9 PROVIDE EPO SWITCH(ES) AT TWO EXITS FROM EQUIPMENT RM ML-03. PROVIDE 120VAC CONTROL CIRCUIT, RELAYS AND INTERLOCK WITH BOILER CONTROLLERS TO SHUTDOWN BOILERS B1,B2,B3,B4,B5,B6,B7,B8. EPO SWITCH EQUAL TO STI #SS-2201PO WITH STI-8545 COVER WITH SPACER, PUSH TO ACTIVATE, TURN TO RESET, CUSTOM LABELING THAT READS "BOILER EMERGENCY SHUTDOWN".

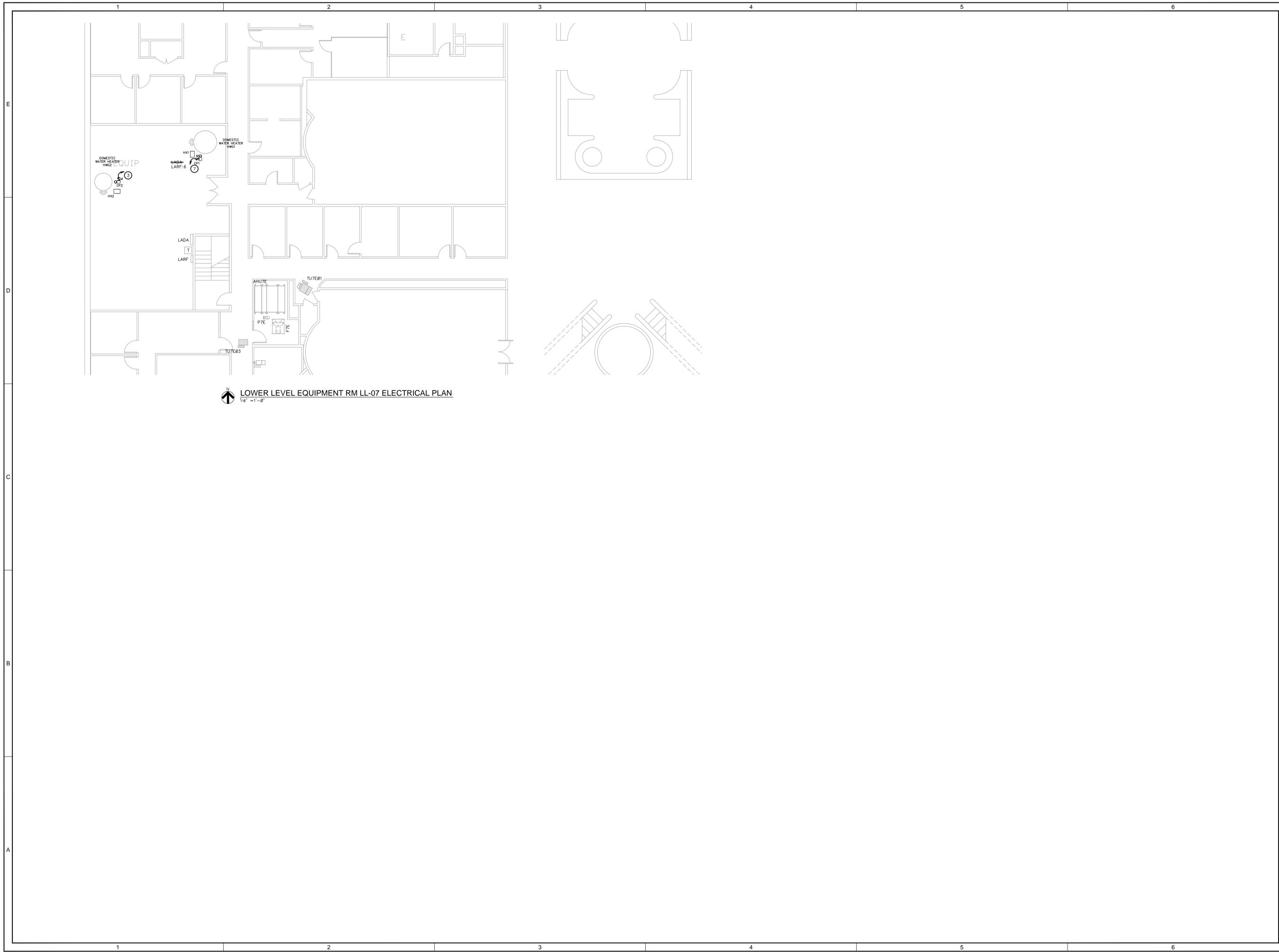
LIGHT FIXTURE SCHEDULE

TAG	MANUFACTURER	DESCRIPTION	REMARKS
A	COLUMBIA #1C4-232-U-EPU-1CW4	4' SPEC-GRADE INDUSTRIAL REFLECTOR, HEAVY DUTY ONE PIECE STEEL HOUSING, WHITE POWDER COAT FINISH, APERTURED REFLECTOR 180° UPLIGHT, WIRE GUARD, TWO F32T8/SP41 LAMPS, PROGRAM START BALLAST, <100KTHD, 120/277VAC	CHAIN MOUNT MOUNT FIXTURE 18" AFF. ADJUST LOCATION AND MOUNTING HEIGHT FOR BEST ILLUMINATION

GENERAL NOTES

1. REFER TO ARCHITECTURAL FOR CEILING CONSTRUCTION AND PROVIDE FRAME STYLE, MOUNTING ACCESSORIES AND TRIM TO MATCH.
2. PROVIDE RETAINER CLIPS ON ALL LAY-IN RECESSED LIGHT FIXTURES AS REQUIRED BY LOCAL CODES AND THE NATIONAL ELECTRICAL CODE.
3. ALL FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE INDEPENDENTLY OF THE CEILING GRID AND SATISFY ALL MULTI-DIRECTIONAL SEISMIC BRACING REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. ALL FIXTURES SHALL BE UL LISTED, SUITABLE FOR THRU WIRING.
5. PROVIDE INTEGRAL BALLAST DISCONNECT SWITCH FOR ALL.

MECHANICAL LEVEL EQUIPMENT RM ML-03 ELECTRICAL PLAN
1/4" = 1'-0"




LOWER LEVEL EQUIPMENT RM LL-07 ELECTRICAL PLAN
 1/8" = 1'-0"



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SHEET TITLE

LOWER LEVEL

EQUIPMENT RM LL-07

ELECTRICAL PLAN

SHEET NUMBER

E1.2

OF



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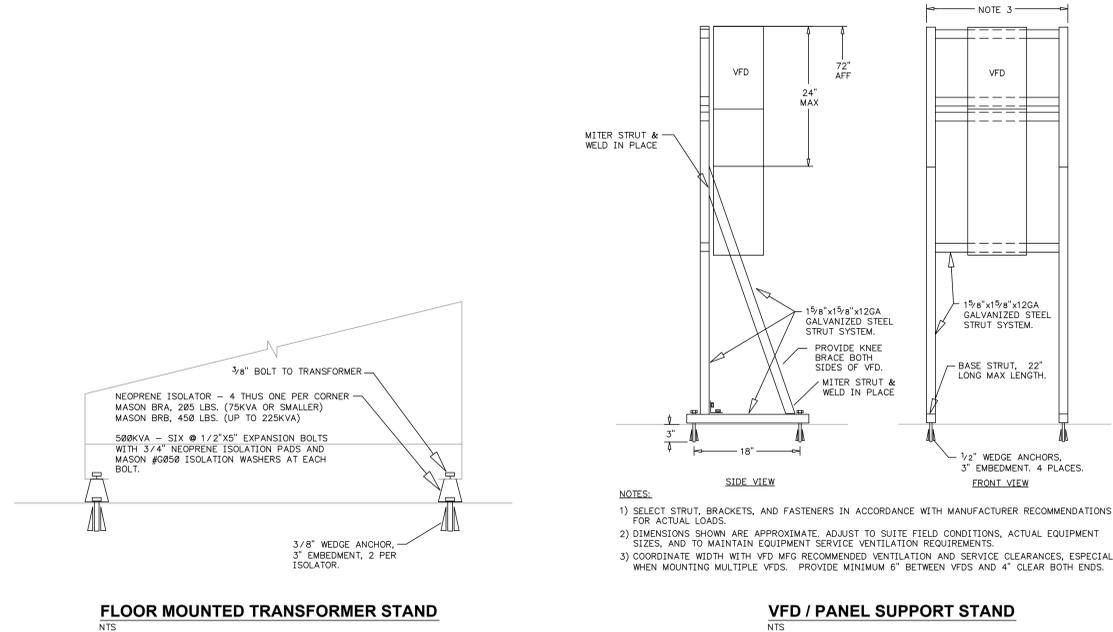
SHEET NUMBER
E2.1

FEEDER SCHEDULE						
TAG x = B Branch x = S Service	C/B OR FUSE AMPACITY	CONDUCTORS PHASE NEUTRAL	GROUND BRANCH	SERVICE	CONDUIT SIZES EMTR/RC	CONDUIT SIZES SCH40/SCH80 PVC
x20-n	20	#12	#12	#12	1/2"	3/4"
x30-n	30	#10	#10	#10	1/2"	3/4"
x40-n	40	#8	#10	#8	3/4"	1"
x50-n	50	#8	#10	#8	3/4"	1"
x60-n	60	#6	#10	#6	1"	1 1/4"
x70-n	70	#4	#8	#8	1-1/4"	1-1/4"
x80-n	80	#4	#8	#8	1-1/4"	1-1/4"
x100-n	100	#3	#8	#8	1-1/4"	1-1/4"
x125-n	125	#1	#6	#6	1-1/2"	1-1/2"
x150-n	150	#1/0	#6	#6	1-1/2"	2"
x175-n	175	#2/0	#6	#4	2"	2"
x200-n	200	#3/0	#6	#4	2"	2"
x225-n	225	#4/0	#4	#2	2-1/2"	2-1/2"
x250-n	250	#250M	#4	#2	2-1/2"	3"
x300-n	300	#350M	#4	#2	3"	3"
x350-n	350	#500M	#3	#1/0	3-1/2"	4"
x400-n	400	#600M	#3	#1/0	3-1/2"	4"
x500-n	500	2SETS #250M	#2	#2/0	2 @ 3"	2 @ 3"
x600-n	600	2SETS #350M	#1	#2/0	2 @ 3"	2 @ 3"
x800-n	800	3SETS #300M	#1/0	#2/0	3 @ 3"	3 @ 3"
x800-n	800	2SETS #600M	#1/0	#3/0	2 @ 3-1/2"	2 @ 4"
x1000-n	1000	3SETS #400M	#2/0	#3/0	3 @ 3"	3 @ 4"
x1200-n	1200	3SETS #600M	#3/0	#3/0	3 @ 3-1/2"	3 @ 4"
x1200-n	1200	4SETS #350M	#3/0	#3/0	4 @ 3"	4 @ 3"
x1600-n	1600	4SETS #600M	#4/0	#3/0	4 @ 3-1/2"	4 @ 4"
x1600-n	1600	5SETS #400M	#4/0	#3/0	5 @ 3"	5 @ 4"
x2000-n	2000	5SETS #600M	#250M	#3/0	5 @ 3-1/2"	5 @ 4"
x2000-n	2000	6SETS #400M	#250M	#3/0	6 @ 3"	6 @ 4"
x2500-n	2500	6SETS #600M	#350M	#3/0	6 @ 3-1/2"	6 @ 4"
x2500-n	2500	8SETS #400M	#350M	#3/0	8 @ 3"	8 @ 4"
x3000-n	3000	8SETS #600M	#400M	#3/0	8 @ 3-1/2"	8 @ 4"
x4000-n	4000	10SETS #600M	#500M	#3/0	10 @ 3-1/2"	10 @ 4"
x4000-n	4000	12SETS #400M	#400M	#3/0	12 @ 3"	12 @ 4"
#	CIRCUIT TYPE	#CONDUCTORS (PHASE/NEUTRAL)	# GROUND CONDUCTORS	# GROUND CONDUCTORS		
1	1PH,2W	1 / 1 OR 2 / 0				
2	1PH,3W	2 / 1	1	1		
3	3PH,3W	3 / 0	1	1		
4	3PH,4W	3 / 1	1	1		

- Notes:
- Conductor sizes are based upon copper conductors, 75deg C rating.
 - All conduit sizes are based upon a 3PH, 1N, & G within a single raceway.
 - Conductors for any branch circuit runs exceeding 100 L.F. shall be increased to the next standard wire size. Ground conductor size shall be increased in size proportionally when sized for voltage drop, NEC 250.122(B)
 - Ground conductor shall be installed within all raceways. Grounding electrode conductor is not required between utility transformer and service entrance equipment.
 - Grounding electrode conductor connection is required between service disconnecting means and the point where the system bonding jumper is installed.
 - Provide conductor sizes as scheduled above, unless noted otherwise.
 - Use next larger ampacity if current rating is not listed.

PANEL :MLB1													
208/120VAC,3PH,4W				400A BUS, 250A MCB				SURFACE					
SQUARE "D" NGOOD, BOLT-ON C/B'S													
NOTE	CKT	A	B	C	LOAD	C/B	C/B	LOAD	A	B	C	CKT	NOTE
	1	1922			BOILER B3	25/3	25/3	BOILER B4	1922			2	
	3		1922							1922		4	
	5			1922							1922	6	
	7	1922			BOILER B5	25/3	25/3	BOILER B6	1922			8	
	9		1922							1922		10	
	11			1922							1922	12	
	13	1922			BOILER B7	25/3	25/3	BOILER B8	1922			14	
	15		1922							1922		16	
	17			1922							1922	18	
	19	1321			BP3	20/3	20/3	BP4	1321			20	
	21		1321							1321		22	
	23			1321							1321	24	
	25	1321			BP5	20/3	20/3	BP6	1321			26	
	27		1321							1321		28	
	29			1321							1321	30	
	31	1321			BP7	20/3	20/3	BP8	1321			32	
	33		1321							1321		34	
	35			1321							1321	36	
	37				SPARE	20/1	20/1	CP4	1176			38	
	39					20/1	20/1	CP5		1176		40	
	41			1176	CP3	20/1	20/1	CP6			1176	42	
		9729	9729	10905	VA SUBTOTAL				10905	10905	10905		
PH	TOTAL VOLT AMP				% OF MAX			MAX AMPS			=	182	AMPS
A	20634				95			TOTAL KVA			=	63.1	KVA
B	20634				95								
C	21810				100								

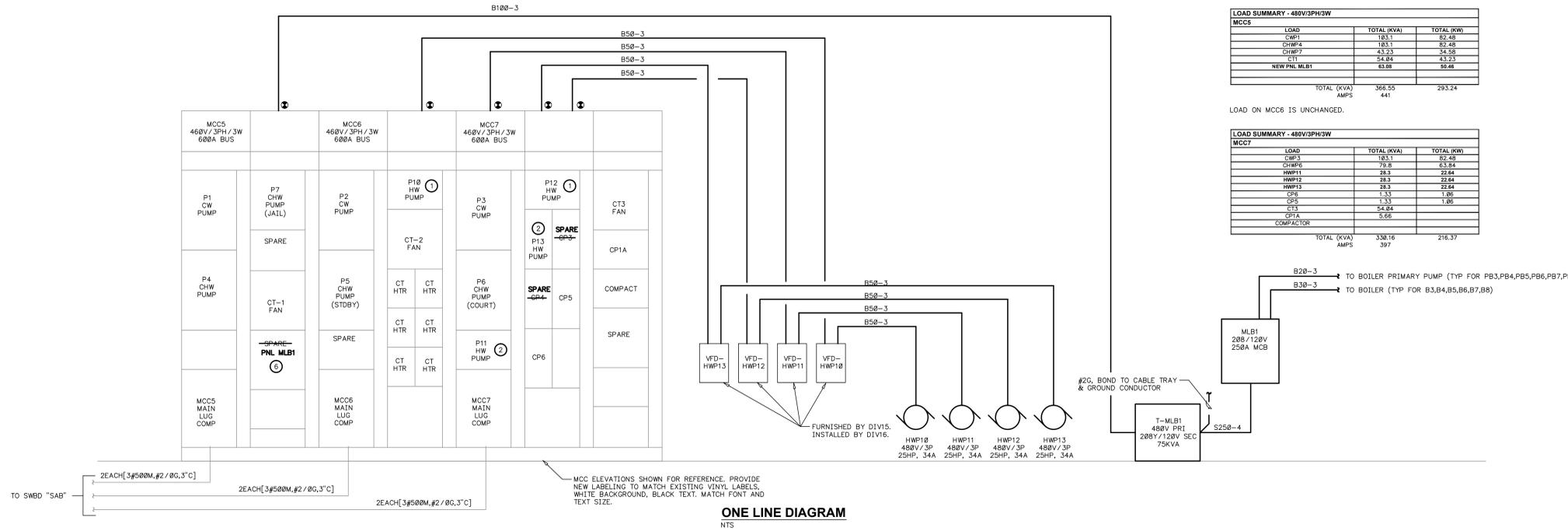
SCHEDULE NOTES:



FLOOR MOUNTED TRANSFORMER STAND
NTS

VFD / PANEL SUPPORT STAND
NTS

- NOTES:
- SELECT STRUT, BRACKETS, AND FASTENERS IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS FOR ACTUAL LOADS.
 - DIMENSIONS SHOWN ARE APPROXIMATE. ADJUST TO SUITE FIELD CONDITIONS, ACTUAL EQUIPMENT SIZES, AND TO MAINTAIN EQUIPMENT SERVICE VENTILATION REQUIREMENTS.
 - COORDINATE WIDTH WITH VFD MFG RECOMMENDED VENTILATION AND SERVICE CLEARANCES, ESPECIALLY WHEN MOUNTING MULTIPLE VFDs. PROVIDE MINIMUM 6" BETWEEN VFDs AND 4" CLEAR BOTH ENDS.



ONE LINE DIAGRAM
NTS