

ABBREVIATIONS

ACH AD ADJ AFF AHU	AIR CHANGES PER HOUR ACCESS DOOR ADJUSTABLE ABOVE FINISHED FLOOR AIR HANDLING UNIT	FD FMC FOB FPM FPS	FIRE DAMPER FACILITY MECH CONTRACTOR FLAT ON BOTTOM FEET PER MINUTE FEET PER SECOND	OA OAT OC	OUTSIDE OUTSIDE ON CENT
ALT	ALTITUDE	FT	FEET OR FOOT	PD PH	PRESSUF PHASE
BAS	BUILDING AUTOMATION SYSTEM	GA GAL GBD GPM	GAGE OR GAUGE GALLON GRAVITY BACKDRAFT DAMPER GALLONS PER MINUTE	PMC PSI PVC	PROCESS POUNDS POLYVIN
BDD BHP	BACKDRAFT DAMPER BRAKE HORSEPOWER	HOA	HAND-OFF-AUTOMATIC SWITCH	QTY	QUANTIT
BOD BOL BTUH	BOTTOM OF DUCT BOTTOM OF LOUVER BRITISH THERMAL UNIT PER HOUR	HP HR	HORSEPOWER HOUR	RA RH	RETURN RELATIVE
CD	CONDENSATE DRAIN LINE	IN. IN. WO	INCHES SINCHES OF WATER GAUGE	RPM	REVOLU
CFM	CUBIC FEET PER MINUTE	KW	KILOWATTS	SA SD	SUPPLY SMOKE D
DB DDC DEG DIA	DRY BULB TEMPERATURE DIRECT DIGITAL CONTROL DEGREES DIAMETER	LAT LBS LBS/H	LEAVING AIR TEMPERATURE POUNDS R POUNDS PER HOUR	SEER SF SP SS	SEASON, SQUARE STATIC P STAINLES
DN DWG DX	DOWN DRAWING DIRECT EXPANSION	MAX MBH MCA	MAXIMUM BTU PER HOUR (THOUSAND) MINIMUM CIRCUIT AMPS		TO BE DE
(E) EA	EXISTING EACH	MCC MD	MOTOR CONTROL CENTER MOTORIZED DAMPER	TSP TYP	TOTAL ST
EAT EER	ENTERING AIR TEMPERATURE ENERGY EFFICIENCY RATIO	MIN MISC	MINIMUM MISCELLANEOUS	UON	UNLESS
EL ESP	ELEVATION EXTERNAL STATIC PRESSURE	MOCP MVD	MAX OVER-CURRENT PROTECTION MANUAL VOLUME DAMPER	V	VOLT
EWT	ENTERING WATER TEMPERATURE	N.C. NIC	NORMALLY CLOSED NOT IN CONTRACT	VV VFD	VARIABL VARIABL
	FAHRENHEIT FLUID COOLER WATER SUPPLY FLUID COOLER WATER RETURN COMBO FIRE/SMOKE DAMPER	NO. N.O. NTS	NUMBER NORMALLY OPEN NOT TO SCALE	W WB	WATTS WET BUL

SEISMIC DESIGN REQUIREMENTS

OAT OUTSIDE AIR TEMPERATURE

PD PRESSURE DROP (FT OF H20)

PMC PROCESS MECH CONTRACTOR

PSI POUNDS PER SQUARE INCH

RPM REVOLUTIONS PER MINUTE

SEER SEASONAL ENERGY EFF. RATIO

SP STATIC PRESSURE (" OF H20)

PVC POLYVINYL CHLORIDE

RH RELATIVE HUMIDITY

SD SMOKE DETECTOR

SS STAINLESS STEEL

TBD TO BE DETERMINED

TSP TOTAL STATIC PRESSURE

UON UNLESS OTHERWISE NOTED

VFD VARIABLE FREQUENCY DRIVE

VV VARIABLE AIR VOLUME

<u>CATEGORY-A:</u> SEISMIC DESIGN CATEGORY FOR THIS PROJECT IS CATEGORY B. PER ASCE STANDARD, ASCE/SEI 7-05, CHAPTER 13, MECHANICAL AND ELECTRICAL COMPONENTS ARE EXEMPT AND REQUIRE NO SEISMIC SUPPORT OR SEISMIC BRACING.

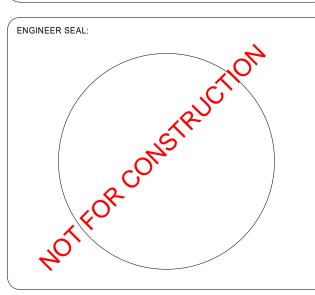
OCCUPIED HEALTHCARE CONSTRUCTION **REQUIREMENTS**

- ALL NEW WORK IS BEING DONE WITHIN AN ACTIVE HOSPITAL. ALL WORK PRODUCING DUST OR WORK THAT POSES A RISK TO INFECTION TO PATIENTS SHALL BE PERFORMED PER THE HOSPITAL'S INFECTION RISK CONTROL PROTOCOL. WORK WITHIN PATIENT CARE AREAS WILL REQUIRE AT A MINIMUM TEMPORARY BARRIERS WITH NEGATIVE AIR MACHINES TO BE UTILIZED ENSURING CONTAINMENT OF ALL DUST
- THE AREAS BELOW THE NEW BOILER PLANT IS AN ICU WING. WORK INVOLVING THE USE OF HEAVY TOOLS OR MACHINERY THAT COULD CAUSE VIBRATION SHOULD BE DONE IN COORDINATION WITH THE HOSPITAL STAFF ON OFF HOURS.
- THE CONTRACTOR SHALL PLAN AND COORDINATE ALL WORK WITH THE HOSPITAL'S INFECTION CONTROL STAFF.

GENERAL NOTES

- ANY DIFFERENCE BETWEEN THE APPLICABLE CODES, DRAWINGS, AND SPECIFICATIONS: THE MORE STRINGENT REQUIREMENTS SHALL APPLY. THE PLANS AND SPECIFICATIONS SHALL NOT BE MISCONSTRUED AS PERMISSION TO VIOLATE PUBLISHED CODES AND STANDARDS.
- MECHANICAL CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS AND EQUIPMENT TO FURNISH AND INSTALL ALL MECHANICAL (HVAC AND PLUMBING) WORK AS SHOWN AND DESCRIBED WITHIN THE CONTRACT DOCUMENTS (PLANS, SPECIFICATIONS, SUBCONTRACT AGREEMENT) AND PERFORM SUCH WORK AS MAY BE REASONABLY INFERRED FROM THE CONTRACT DOCUMENTS AS REQUIRED TO PROVIDE A COMPLETE AND OPERATIONAL MECHANICAL SYSTEM.
- THE SCHEDULED EQUIPMENT REPRESENTS THE BASIS OF DESIGN. THE MECHANICAL DRAWINGS (HVAC AND PLUMBING) AND PLANS ARE DIAGRAMMATIC AND ARE BASED ON THE MANUFACTURER AND MODEL NUMBER OF THE MECHANICAL EQUIPMENT AND DEVICES AS SCHEDULED. IN INSTANCES WHERE THE CONTRACTOR HAS SUBMITTED AND THE ENGINEER OF RECORD HAS ACCEPTED EQUIPMENT OTHER THAN THE BASIS OF DESIGN, THE CONTRACTOR SHALL PROVIDE FOR ALL REQUIRED CHANGES TO ACCOMMODATE THE SUBSTITUTION FROM ANY INVOLVED TRADE, INCLUDING (BUT NOT LIMITED TO) ELECTRICAL SERVICE, STRUCTURAL FRAMING, ROOF SUPPORT, SERVICE ACCESSIBILITY, AND SPACE REQUIREMENTS
- CONTRACTOR SHALL FIELD VERIFY ALL EXISTING PIPING THAT IS BEING REUSED OR CONNECTED TO. THE ENGINEER HAS REVIEWED THE EXISTING DRAWINGS, BUT THE PIPING SHOWN IS NOT EXHAUSTIVE, AND FIELD CONDITIONS SHALL BE VERIFIED.
- ALL NEW PIPING SHALL BE PRESSURE TESTED TO ENSURE TIGHT CONSTRUCTION.
- NEW HEATING WATER PIPING SHALL BE FLUSHED PRIOR TO CONNECTION TO ANY EXISTING SYSTEM. THE CONTRACTOR SHALL PROVIDE TEMPORARY PUMPS, CHEMICALS, AND TESTING TO ENSURE NEW PIPE IS CLEAN PRIOR TO CONNECTING TO THE EXISTING SYSTEMS.
- REFER TO LIFE SAFETY PLANS FOR WALL, CEILING AND FLOOR FIRE RATINGS. PROVIDE RATED FIRE DAMPERS OF THE APPROPRIATE FIRE RATING FOR THE INSTALLED LOCATION. ALL PENETRATIONS THROUGH THE FIRE RATED ASSEMBLIES SHALL COMPLY WITH SECTIONS OF THE APPLICABLE BUILDING CODE.
- ALL PENETRATIONS THROUGH EXTERIOR WALLS AND ROOF INCLUDING (BUT NOT LIMITED TO) PIPING, AND VENTS SHALL BE CAULKED MOISTURE AND AIR TIGHT.
- MECHANICAL CONTRACTORS SHALL DEVELOP COMPLETE COORDINATION SHOP DRAWINGS OR BUILDING INFORMATION MODEL AS DIRECTED BY THE CONTRACT THAT IDENTIFIES MECHANICAL EQUIPMENT, DUCTWORK AND PIPING, EQUIPMENT PADS AND PLATFORMS, DRAINS, ETC.
- ALL ROOF MOUNTED EQUIPMENT SHALL BE SUPPORTED ON AND PROPERLY SECURED TO FIELD FABRICATED OR FACTORY SUPPLIED ROOF CURBS SECURED TO ROOF TRUCTURE TO CARRY ALL WIND AND SEISMIC FORCES (SEISMIC ZONE B).
- INSTALL ALL EQUIPMENT AND ASSOCIATED SYSTEMS IN ACCORDANCE WITH THE PRODUCT MANUFACTURER'S INSTALLATION RECOMMENDATIONS INCLUDING SERVICE AND CODE CLEARANCES, ALONG WITH UL LISTINGS.
- 12. ALL MATERIAL INCORPORATED INTO THE WORK ARE TO BE NEW, UNUSED, AND UNDAMAGED. ANY DAMAGED OR QUESTIONABLE MATERIAL IS TO BE REMOVED AND REPLACED AT NO COST TO OWNER.
- MECHANICAL CONTRACTOR SHALL PROVIDE ALL REQUIRED DUCTWORK ACCESSORIES INCLUDING BUT NOT LIMITED TO HANGERS, SUPPORTS, ANCHORS, FASTENERS, RANSITIONS, OFF-SETS, TURNING VANES, REINFORCEMENT, MITERED BRANCH TAKE-OFFS, SPIN-IN FITTINGS, MANUAL VOLUME DAMPERS, CONTROL DAMPERS, FIRE AND SMOKE DAMPERS, FLEXIBLE CONNECTORS, STAND-OFFS, DIFFUSERS, REGISTERS, GRILLES, OPPOSED BLADE DAMPERS, PLENUMS, SLEEVES, COLLARS, SPRING ISOLATORS, AND ACCESS PANELS.
- PROVIDE A 4" THICK CONCRETE HOUSEKEEPING PAD UNDER EACH FLOOR OR AT GRADE-MOUNTED PIECE OF EQUIPMENT. HOUSEKEEPING PAD SHALL EXTEND 6" BEYOND EQUIPMENT FOOTPRINT IN ALL FOUR DIRECTIONS. COORDINATE SIZE AND LOCATION OF PAD WITH EQUIPMENT PURCHASED. PROVIDE 45-DEGREE CHAMFERED EDGES ON PAD.
- MECHANICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH ALL WALL CONTRACTORS TO ENSURE ALL WALL OPENINGS ARE PROPERLY FRAMED AND INSTALLED WITH REQUIRED CLEARANCES.
- DIVISION 23 SHALL PROVIDE ALL CONTROL WIRING, LOW VOLTAGE WIRING, CONTROL CONDUITS, CONTROL DEVICES INCLUDING T-STATS, DAMPER INTERLOCKS REMOTE SWITCHES, ETC. ALL CONTROL WIRING TO BE LOW VOLTAGE UNLESS NOTED OTHERWISE.





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GRADY MEMORIAL HOSPITAL	BOILER PLANT REPLACEMENT	MECHANICAL SYMBOLS AND NOTES

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DRAWN BY	CHECKED BY	SHEET
Author	Checker	11001
SCALE	41.00	M001
1/8" =	1'-0"	



		ALTE	RNATE	1 - DOMESTIC	WATE	R HEATI	ER SCHE	EDULE				
				DOMES	STIC WATER		STEAM					
MARK	SERVES	MANUFACTURER	MODEL	MAXIMUM CONTINUOUS FLOW RATE (GPM)	EWT (°F)	LWT (°F)	SUPPLY CAPACITY (LBS/HR)	STEAM INLET PRESSURE (PSIG)	RECIRCULATION PUMP HP	VOLTS	PHASE	WEIGHT
DWH-1	CLINICS DOMESTIC HOT WATER SYSTEM	AERCO	SWDW-45	150	60	140	5,100	70	1	120	1	
DWH-2	CLINICS DOMESTIC HOT WATER SYSTEM	AERCO	SWDW-45	150	60	140	5,100	70	1	120	1	

PROVIDE COMPLETE PACKAGED DOMESTIC WATER HEATER, WITH STEAM SUPPLY VALVE, HOT WATER RECIRCULATION PUMP, AND CONTROL SYSTEM FOR BAS CONNECTION.

DUAL FUEL STEAM BOILER SCHEDULE

						20, (2 1 0)			30. ILB	0							
							DESIGN STEAM	OPERATING		AVAILABLE GAS	OIL FIRE	BREECHING		AIR			
							PRESSURE	STEAM	GAS INPUT	PRESSURE	RATING	CONNECTION	COMBUSTION AIR C	OMPRESSOR			WEIGHT
	MARK	SERVES	LOCATION	MANUFACTURER	MODEL	OUTPUT CAPACITY (MBH)	(PSIG)	PRESSURE (PSIG)	(CFH)	(PSIG)	(GPH)	(IN.)	FAN MOTOR HP	HP	VOLTS	PHASE	(LBS.)
	B-4	ENTIRE HOSPITAL	8TH FLOOR PENTHOUSE	CLEAVER BROOKS	FLX-1850	15,064	125	70	18598	3	132	24	40	7.50	480	3	28750
	B-5	ENTIRE HOSPITAL	8TH FLOOR PENTHOUSE	CLEAVER BROOKS	FLX-1850	15,064	125	70	18598	3	132	24	40	7.50	480	3	28750
	B-6	ENTIRE HOSPITAL	8TH FLOOR PENTHOUSE	CLEAVER BROOKS	FLX-1850	15,064	125	70	18598	3	132	24	40	7.50	480	3	28750
\Box			•	•			•	•	•	•		•	•	•			

1. PROVIDE WITH STACK ECONOMIZER. COMBINED BOILER AND ECONOMIZER HEIGHT ALLOWANCE INCLUDING CLEARANCES IS 18'-1" EXCLUDING THE 4" HOUSEKEEPING PAD.

2. PROVIDE WITH GAS AND FUEL OIL BURNER CONNECTIONS AND PIPE ACCESSORIES

3 PROVIDE WITH TOP BLOWDOWN CONDUCTIVITY VALVE AND CONTROLLER 4 CONTROL SYSTEMS SHALL HAVE BACNET MSTP CONNECTION

						DUAL FUEL F	AW TOF	TER BOII	LER S	CHEDU	LE								
					NATUF	RAL GAS	#2 FL	JEL OIL		BURNER EL	ECTRICAL					WATER	-	-	
				INPUT	OUTPUT	MIN INLET PRESSURE	OIL USAGE	OIL SUPPLY PRESSURE					CONTROL	MAXIMUM WORKING	EWT.	LWT.		PRESSURE	WEIGHT
MARK	SERVES	MANUFACTURER	MODEL	(MBH)	(MBH)	(IN. W.C.)	(GPH)	(PSIG)	FLA	MOCP	VOLTS	PHASE	VOLTAGE	PRESSURE (PSI)	(°F)	(°F)	GPM	DROP (PSI)	(LBS.)
B-1	HOSPITAL HEATING WATER SYSTEMS	CLEAVER BROOKS	SFC-12000	12000	10500	3	85.7	14.5	25 A	62.5	480	3	120	160	160	180	1050	5	25130
B-2	HOSPITAL HEATING WATER SYSTEMS	CLEAVER BROOKS	SFC-12000	12000	10500	3	85.7	14.5	25 A	62.5	480	3	120	160	160	180	1050	5	25130
B-3	HOSPITAL HEATING WATER SYSTEMS	CLEAVER BROOKS	SFC-12000	12000	10500	3	85.7	14.5	25 A	62.5	480	3	120	160	160	180	1050	5	25130
NOTES:																		-	

1. PROVIDE WITH BACNET MSTP BAS CONNECTION 2. PROVIDE WITH BOILER PIPING ACCESSORIES PER SPECIFICATIONS.

				DEAER	RATOR S	CHE	EDUL	.E					
				CAPACITY	CAPACITY			BOILER FE	EED PUMPS			OPERATING PRESSURE	WEIGHT
MARK	SERVES	MANUFACTURER	MODEL	#/HR	(GALLONS)	NO	GPM	HEAD (FT)	NPSH	VOLTS	PHASE	(PSIG)	(LBS)
DA-1	STEAM BOILERS	CLEAVER BROOKS	DA-45-840	38000	840	2	124	194	3	480	3	5	14663
NOTEO													

1. REFER TO SPECIFICATIONS FOR FULL LIST OF ACCESSORIES AND REQUIREMENTS

2. PUMPS SHALL BE SIZED FOR N+1, WITH EACH PUMP SIZED FOR TOTAL SYSTEM FLOW (3 BOILERS), STANDBY PUMP SHALL BE TIED INTO COMMON HEADER, AND CONTROLS SHALL BE

3. DA TANK, PUMPS, ACCESSORIES, ELECTRICAL ENTRANCE, AND CONTROLS SHALL BE PROVIDED BY MANUFACTURER, AND ASSEMBLED IN THE FIELD.

4. PROVIDE HIGH TEMP CONDENSATE SPARGE TUBE FOR STEAM CONDENSATE RETURN IN ADDITION TO MAIN FEEDWATER CONNECTION

5. PUMPS SHALL BE EQUIPPED WITH VFDS

		S	STEAM (CONDEN	ISATE	SUR	RGE TANK SO	CHEDU	JLE			
							TRANSFER PU	MPS				
				VOLUME	NO. OF						MAKE-UP WATER	LOW TEMP. PUMPED
MARK	SERVICE	MANUFACTURER	MODEL	(GAL.)	PUMPS	GPM	HEAD (FT.)	NPSH	VOLTS	PHASE	%	CONDENSATE %
CR-1	CLINICS 8TH FLOOR	CLEAVER BROOKS	CB-900	900	2	180	200	3	480	3	50	50
NOTES:					•	•			•	•		

1. REFER TO SPECIFICATIONS FOR COMPLETE LIST OF REQUIRED ACCESSORIES AND EQUIPMENT.

2. PUMPS SHALL BE SIZED FOR N+1

	PUMP SCHEDULE													
				FLOW RATE	EFFICIENCY AT DUTY									
MARK	SERVES	MANUFACTURER	MODEL	(GPM)	POINT	HEAD (FT)	MOTOR HP	MOTOR RPM	VOLTS	PHASE	WEIGHT			
PHWP-1	HEATING WATER SYSTEM	BELL & GOSSETT	e80 8x8x9.5B	1700	81	55	30	1700	480	3	775			
PHWP-2	HEATING WATER SYSTEM	BELL & GOSSETT	e80 8x8x9.5B	1700	81	55	30	1700	480	3	775			
PHWP-3	HEATING WATER SYSTEM	BELL & GOSSETT	e80 8x8x9.5B	1700	81	55	30	1700	480	3	775			
NOTES:														
1 PROVID	E WITH SUCTION DIFFUSER													

1. PROVIDE WITH SUCTION DIFFUSER

2. VFD PROVIDED BY OTHERS 3. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS

		VARIAE	BLE FREQUENC	CY DRIVE	SCHED	ULE			
MARK	REFRENCE PRODUCT	SERVES	LOCATION.	ENCLOSURE	CONNECTED MOTOR HP	RATED MOTOR HP	EFFICIENCY (%)	VOLTAGE	PHASE
VFD-PHWP-1	YASKAWA Z1000	PHWP-1	8TH FLOOR PENTHOUSE	NEMA 1	30	40	98	480	3
VFD-PWHP-2	YASKAWA Z1000	PHWP-2	8TH FLOOR PENTHOUSE	NEMA 1	30	40	98	480	3
VFD-PHWP-3	YASKAWA Z1000	PHWP-3	8TH FLOOR PENTHOUSE	NEMA 1	30	40	98	480	3

PROVIDE WITH INTEGRAL 5% INPUT LINE REACTOR

PROVIDE WITH LINE SIDE DISCONNECT 3. PROVIDE WITH LINE SIDE BYPASS

4. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIRMENTS

	EXPANSION TANK SCHEDULE										
MARK	SERVES	REFERENCE PRODUCT	TYPE	MINIMUM FILL TEMPERATURE	MAXIMUM TEMPERATURE	MAXIMUM PRESSURE	TANK VOLUME (GAL.)	MINIMUM ACCEPTANCE (GAL.)	TANK HEIGHT	TANK DIAMETER	REMARKS
EXT-1	NEW HOT WATER BOILER SYSTEM	TACO CA7500-125	BLADDER	55 °F	180 °F	125.00 psi	9989	1674	10' - 8 3/4"	5' - 2"	FLOOR MOUNTED. ASME RATED 125-PSI.

	PRESSURE REDUCING VALVES SCHEDULE											
			MINIMUM CAPACITY	INLET STEAM	OUTLET STEAM	VALVE SIZE						
MARK	LOCATION	REFERENCE PRODUCT	(LBS/HR)	PRESSURE	PRESSURE	(IN.)	REMARKS					
PRV-3A	MAIN FIRST FLOOR	SPIRAX SARCO 25 SERIES	2300	70.00 psi	15.00 psi		CONTRACTOR SHALL FIELD VERIFY DOWNSTREAM STEAM PRESSURE AND VALVE SIZE REQUIREMENTS.					
PRV-3B	MAIN FIRST FLOOR	SPIRAX SARCO 25 SERIES	4600	70.00 psi	15.00 psi		CONTRACTOR SHALL FIELD VERIFY DOWNSTREAM STEAM PRESSURE AND VALVE SIZE REQUIREMENTS.					
PRV-C3	MAIN BASEMENT MECHANICAL STEAM ROOM	SPIRAX SARCO 25 SERIES	3800	70.00 psi	60.00 psi	3 X 4						

ECONOMIZER SUPPLY FAN SCHEDULE											
MARK	AREA SERVED	MANUFACTURER	MODEL.	DESIGN AIRFLOW (CFM)	EXT. S.P. (IN-WG)	VOLTS	PHASE	HP	DRIVE	WEIGHT	NOTES
SF-1	BOILER ROOM	COOK	36MRS412D11	10000	0.10	460	3	2	DIRECT		
SF-2	BOILER ROOM	COOK	36MRS412D11	10000	0.10	460	3	2	DIRECT		
SF-3	BOILER ROOM	COOK	36MRS412D11	10000	0.10	460	3	2	DIRECT		

2. FURNISH WITH BACKDRAFT DAMPER AND BIRDSCREEN.

3. FURNISH WITH FACTORY PRE-WIRED FAN SPEED CONTROLLER. 4. FURNISH WITH 18" ROOF CURB FOR FLAT ROOF.

HEAT TRACE SCHEDULE										
MARK	REFERENCE PRODUCT	SERVES	WATTS/LF	MAXIMUM CIRCUIT LENGTH (FT.)	MAXIMUM POWER INPUT	START-UP TEMPERATURE (DEG F)	MAINTAIN TEMPERATURE (DEG F)	VOLTS/PHASE	CB SIZE	REMARKS
HT-1	RAYCHEM 5XLE1-CR	HOT WATER SUPPLY AND RETURN PIPING	5	129	0.6	-20 °F	40 °F	120/1	20 A	
HT-2	RAYCHEM 5XLE1-CR	MEDIUM PRESSURE STEAM PIPING	5	129	0.6	-20 °F	40 °F	120/1	20 A	

MEDIUM PRESSURE STEAM PIPING	5	129	0.6	-20 F	40 F	120/1	20 A	
CONDENSATE RETURN PIPING	5	129	0.6	-20 °F	40 °F	120/1	20 A	
				FUEL OI	. 	(0 0 L LED L		
				FUEL OI	LIANK	(SCHEDL	JLE	
							VOLUME	
			055) (50				VOLUME	
		MARK	SERVES	MANUFACTURER		MODEL	(GAL.)	NOTES
		FOT-1	HEATING PLANT		10FT I	DXW UL TANK	33000	
		NOTEO		•	•			•

NOTES: 1. TANK SHALL BE DIRECT BURIED.

2. PROVIDE ALL REQUIRED ACCESSORIES FOR REFUELING, ACCESS, MAINTENANCE, AND CONNECTION TO PUMP SYSTEM 3 TANK IS LOCATED IN A VEHICLE ACCESS DRIVE, ALL ACCESS MANHOLES SHALL BE HEAVY DUTY TRAFFIC RATED H-20

ELECTRIC CONDENSATE PUMP AND RECEIVER												
MARK	SERVES	MANUFACTURER	PUMP TYPE	CAPACITY (GAL)	TOTAL FLOW (GPM)	DISCHARGE PRESSURE (PSIG)	ROTATION (RPM)	HP	VOLTAGE /			
CP-1	CLINICS 7TH AND 8TH STEAM CONDENSATE	SHIPCO	ELECTRIC (N+1)	37		10			208/1			

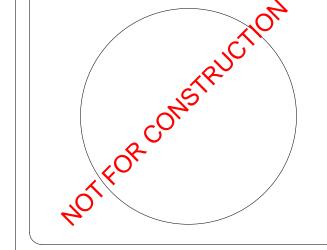
1. PROVIDE N+1 PUMPS DIRECTLY MOUNTED TO RECEIVER. 2. PROVIDE FACTORY CONTROL PANEL, AND BAS ALARM INTERFACE. 3. PROVIDE CAST IRON RECEIVER WITH 3" INLET, VENT, OVERFLOW, GAUGE GLASS, AND GAUGE THERMOMETER

FUEL OIL PUMP SKID										
MARK	SERVES	MANUFACTURER	FUEL TYPE	FLOW RATE (GPH)	TOTAL HEAD PRESSURE (PSIG)	NPSH(A) (FT)	ROTATION (RPM)	HP	VOLTAGE / PHASE	
FOP-1	HEATING PLANT	RED ARMOR	NO. 2 FUEL OIL	1000	100	7	-	2 HP X 2	208/1	
NOTES:		•								

1. PROVIDE PACKAGED FUEL OIL PUMP SKID WITH N+1 FUEL OIL PUMPS. 2. PROVIDE PACKAGED PUMP CONTROLS. BOILER FUEL OIL IS A RECIRCULATING SYSTEM WITH BACK PRESSURE VALVE.

3. PROVIDE BAS CONNECTION FOR PUMP AND TANK ALARMS 4. PIPING FOR FUEL OIL SKID SHALL INCLUDE ALL REQUIRED ACCESSORIES, ISOLATION VALVES, AND BACKPRESSURE RELIEF

5. PROVIDE SINGLE POINT POWER FOR PUMP PACKAGE AND CONTROLS. 6. PROVIDE FUEL OIL POLISHER WITH PUMP PACKAGE.



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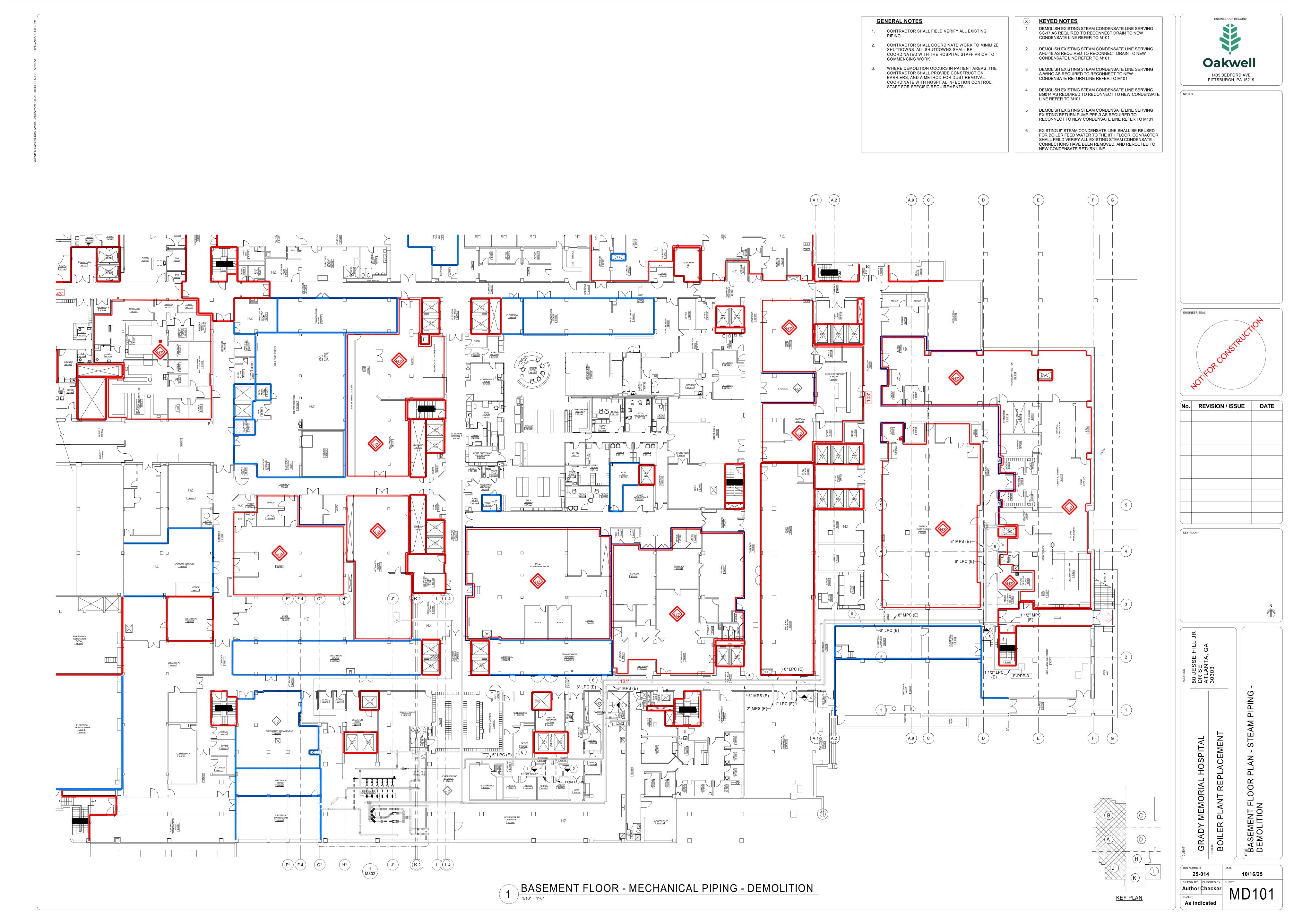
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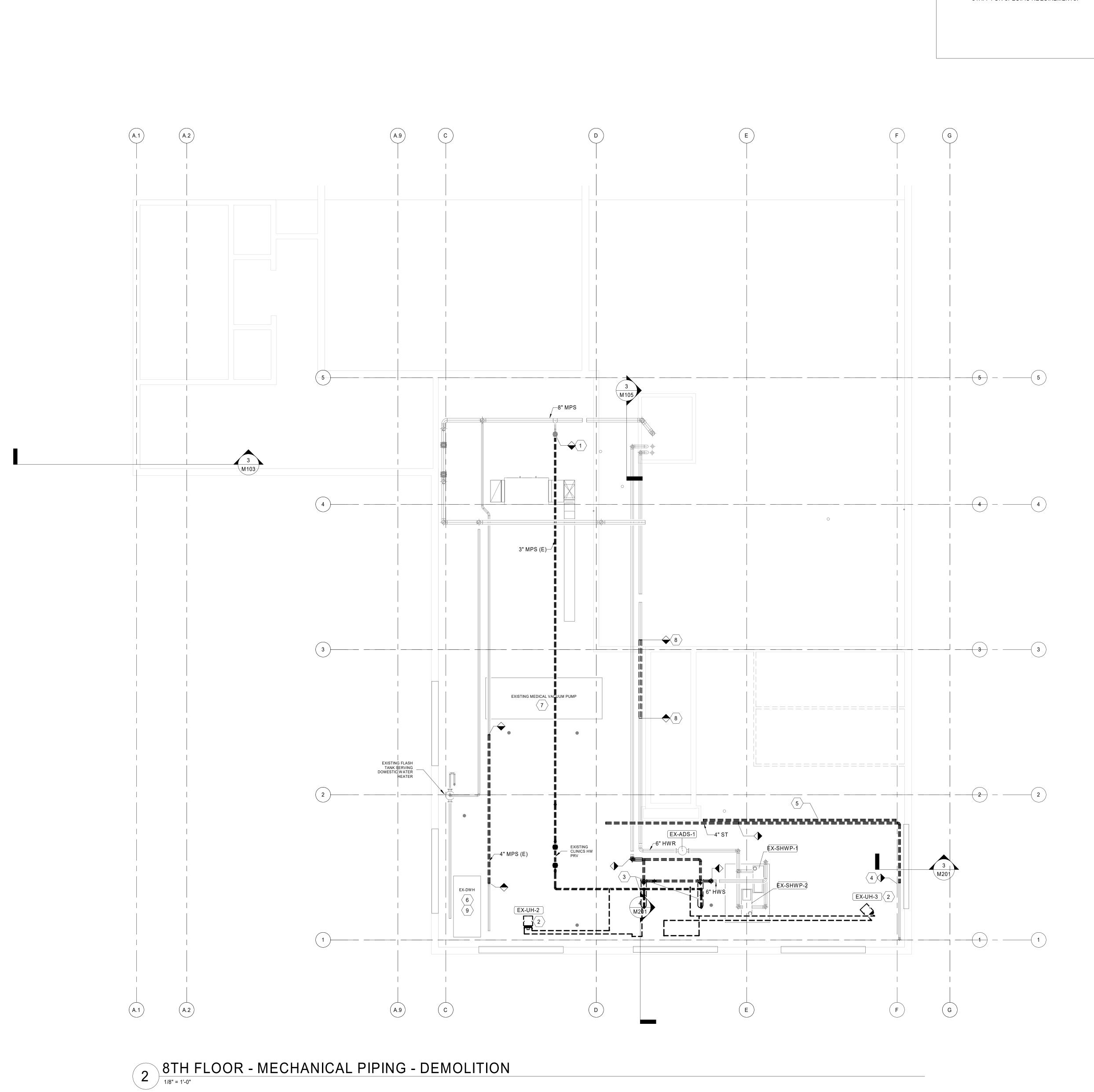
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GENERAL NOTES

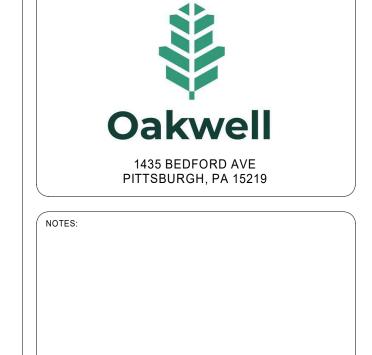
CONTRACTOR SHALL FIELD VERIFY ALL EXISTING

COMMENCING WORK.

- CONTRACTOR SHALL COORDINATE WORK TO MINIMIZE SHUTDOWNS. ALL SHUTDOWNS SHALL BE COORDINATED WITH THE HOSPITAL STAFF PRIOR TO
- WHERE DEMOLITION OCCURS IN PATIENT AREAS, THE CONTRACTOR SHALL PROVIDE CONSTRUCTION BARRIERS, AND A METHOD FOR DUST REMOVAL. COORDINATE WITH HOSPITAL INFECTION CONTROL STAFF FOR SPECIFIC REQUIREMENTS.

KEYED NOTES

- DEMOLISH EXISTING 3" MEDIUM PRESSURE STEAM LINE SERVING THE CLINICS HEAT EXCHANGERS.
- 2 DEMOLISH EXISTING STEAM UNIT HEATER.
- DEMOLISH EXISTING STEAM HEAT EXCHANGERS SERVING THE CLINICS HEATING WATER SYSTEM.
- DEMOLISH EXISTING ROOF DRAIN AS REQUIRED TO ACCOMMODATE NEW STEAM BOILER. RECONNECT TO EXISTING VERTICAL DROP.
- ACCOMNODATE NEW STEAM BOILER. REFER TO FIRE PROTECTION DRAWINGS FOR NEW PIPING.
- 6 EXISTING DOMESTIC WATER HEATER SHALL REMAIN. COORDINATE ANY SHUTDOWNS WITH THE OWNER. CONTRACTOR MAY TEMPORARILY CONNECT THE WATER HEATER TO THE CLINICS HEATING WATER STEAM LINE TO MINIMIZE SHUTDOWN.
- 7 EXISTING MEDICAL VACUUM SYSTEM SHALL REMAIN.
- 8 CAP AND SEAL PIPE AFTER DEMOLITION.
- 9 CONTRACTOR SHALL PRICE AN ALTERNATE FOR REPLACING THE DOMESTIC WATER HEAT EXCHANGER AND PUMP SKID. REFER TO NEW DRAWINGS FOR ALTERNATE REPLACEMENT

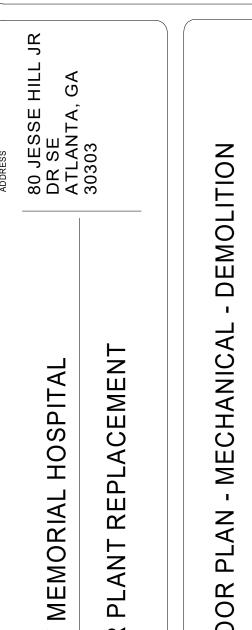


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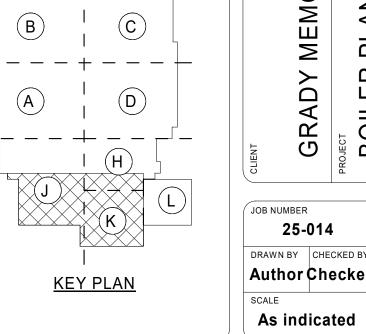


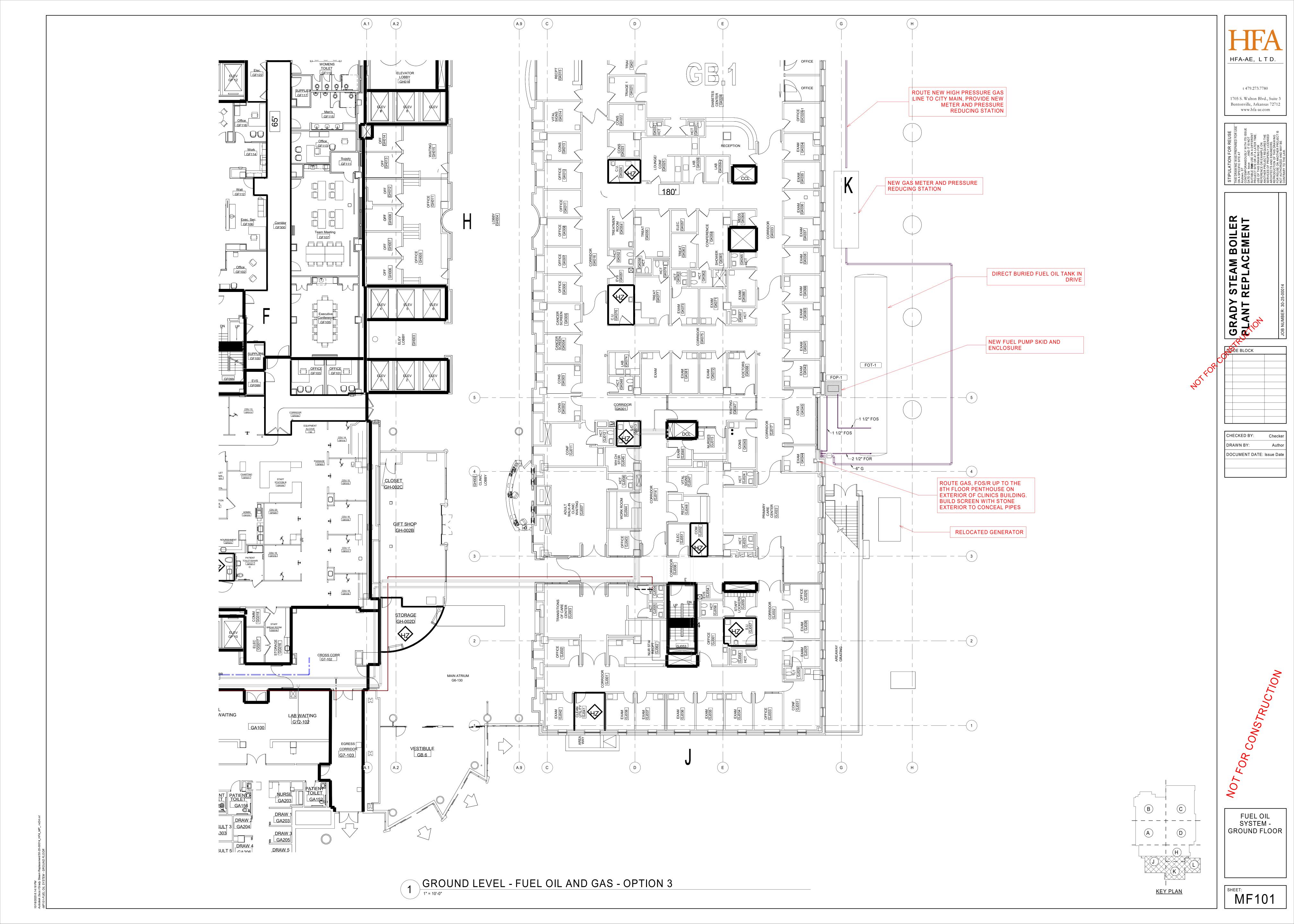
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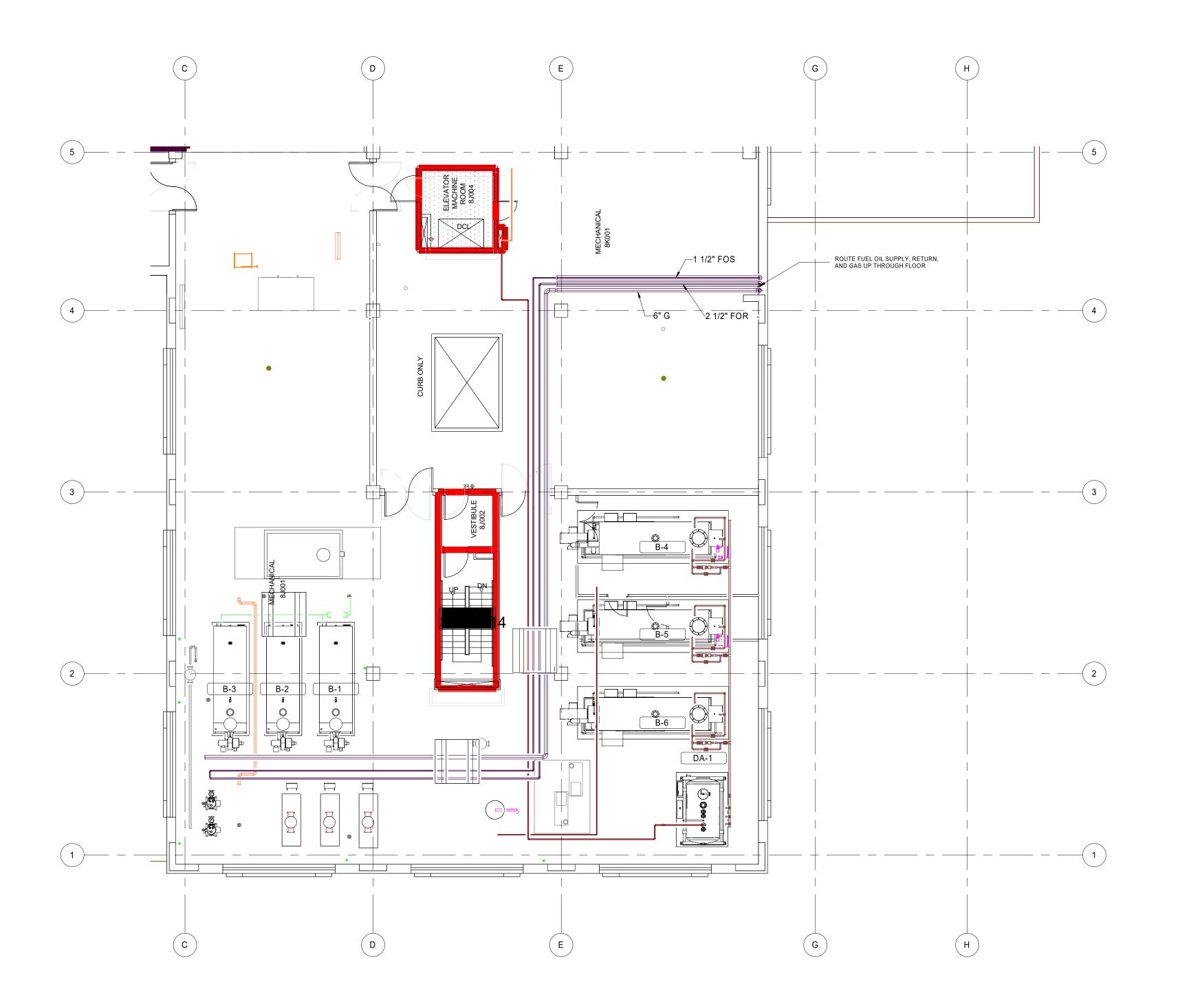




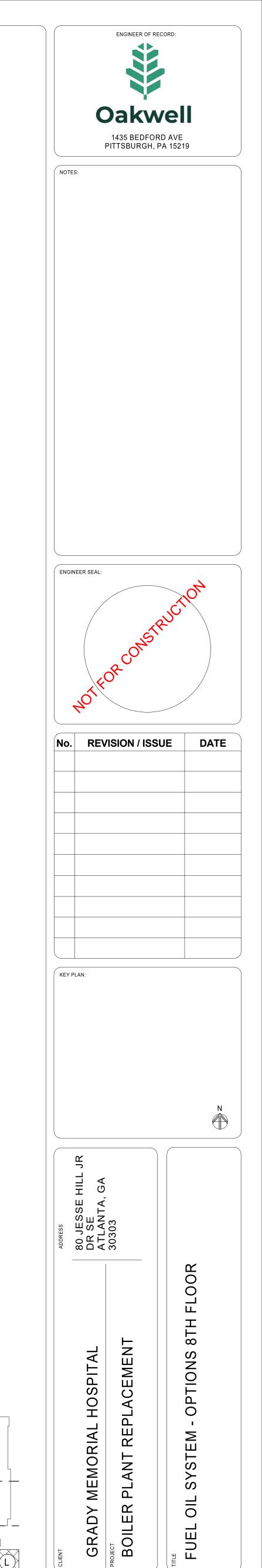
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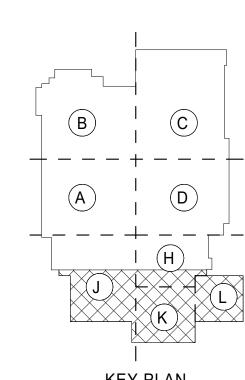




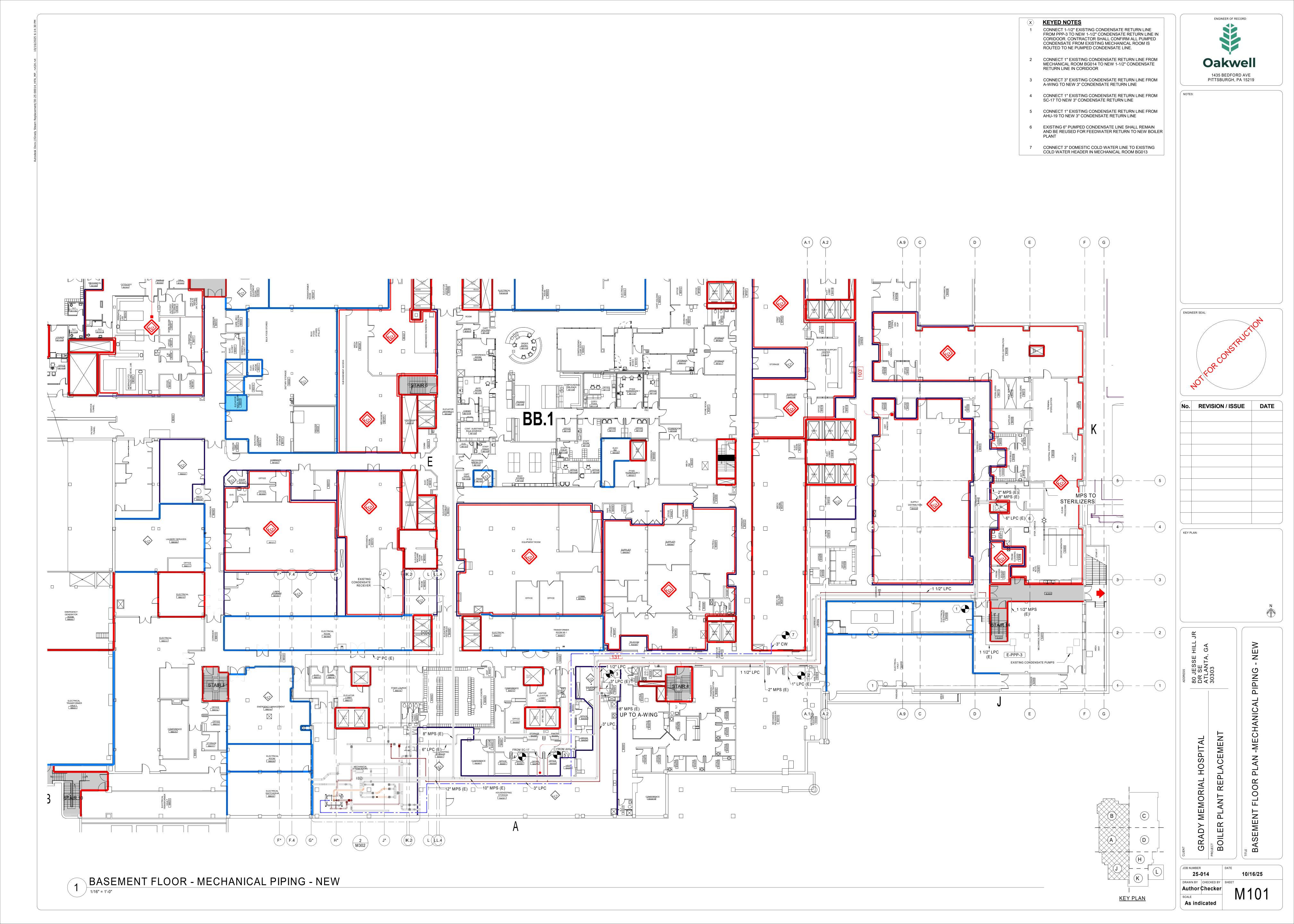


8TH FLOOR - FUEL OIL AND GAS







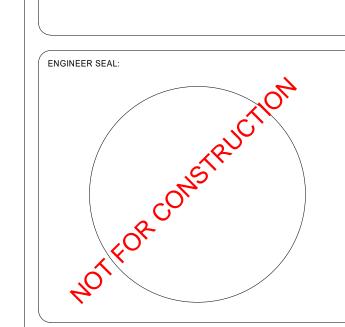


X KEYED NOTES

CONNECT TO EXISTING 3/4" GRAVITY CONDENSATE LINE ON THE 4TH FLOOR, AND ROUTE TO EXISTING EVS CLOSET.

2 ROUTE NEW 3/4" GRAVITY STEAM CONDENSATE TO EVS CLOSET. INSTALL DRAIN COOLER AND CONNECT NEARBY DOMESTIC COLD WATER TO TEMPER CONDENSATE. ROUTE TEMPERED CONDENSATE TO JANITOR SINK.





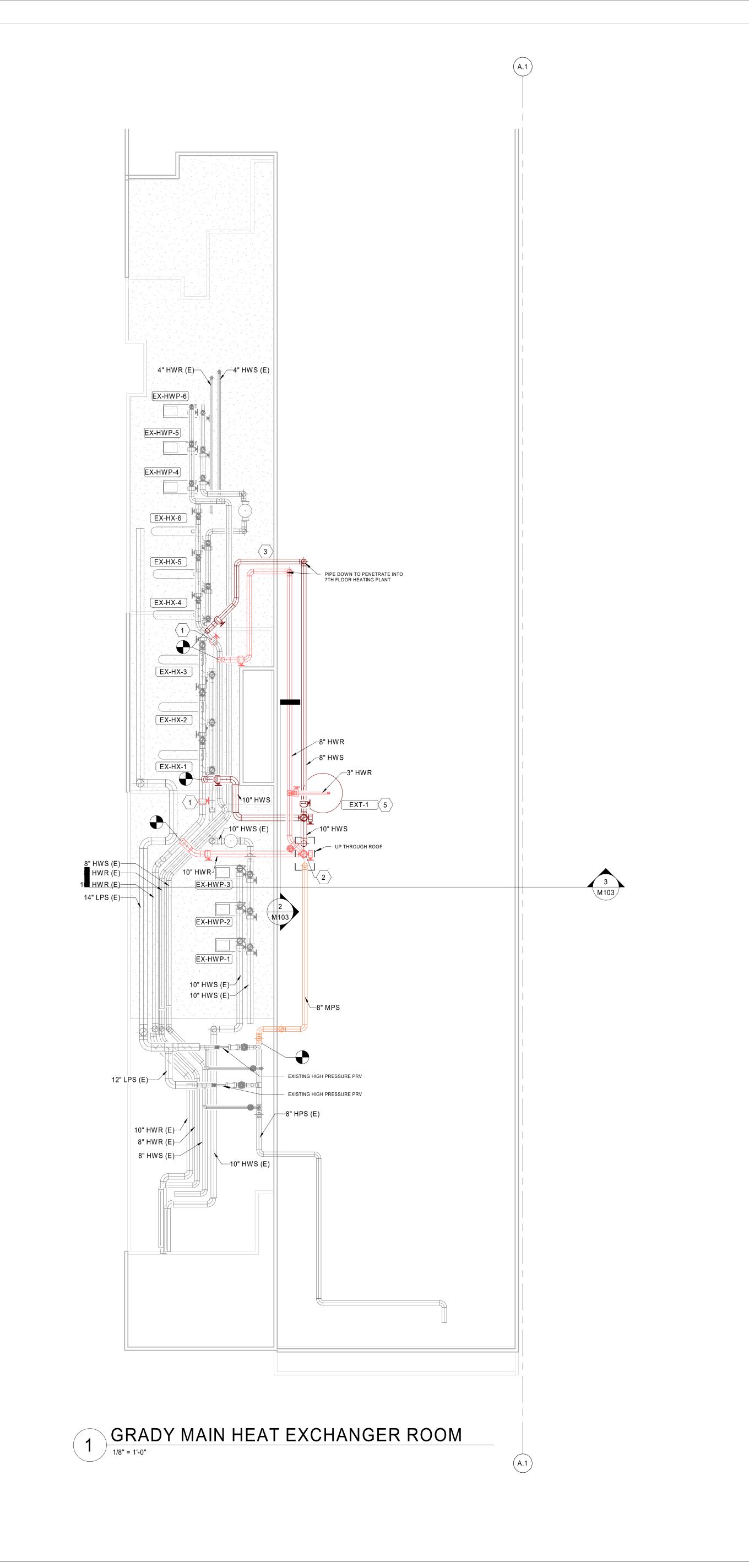
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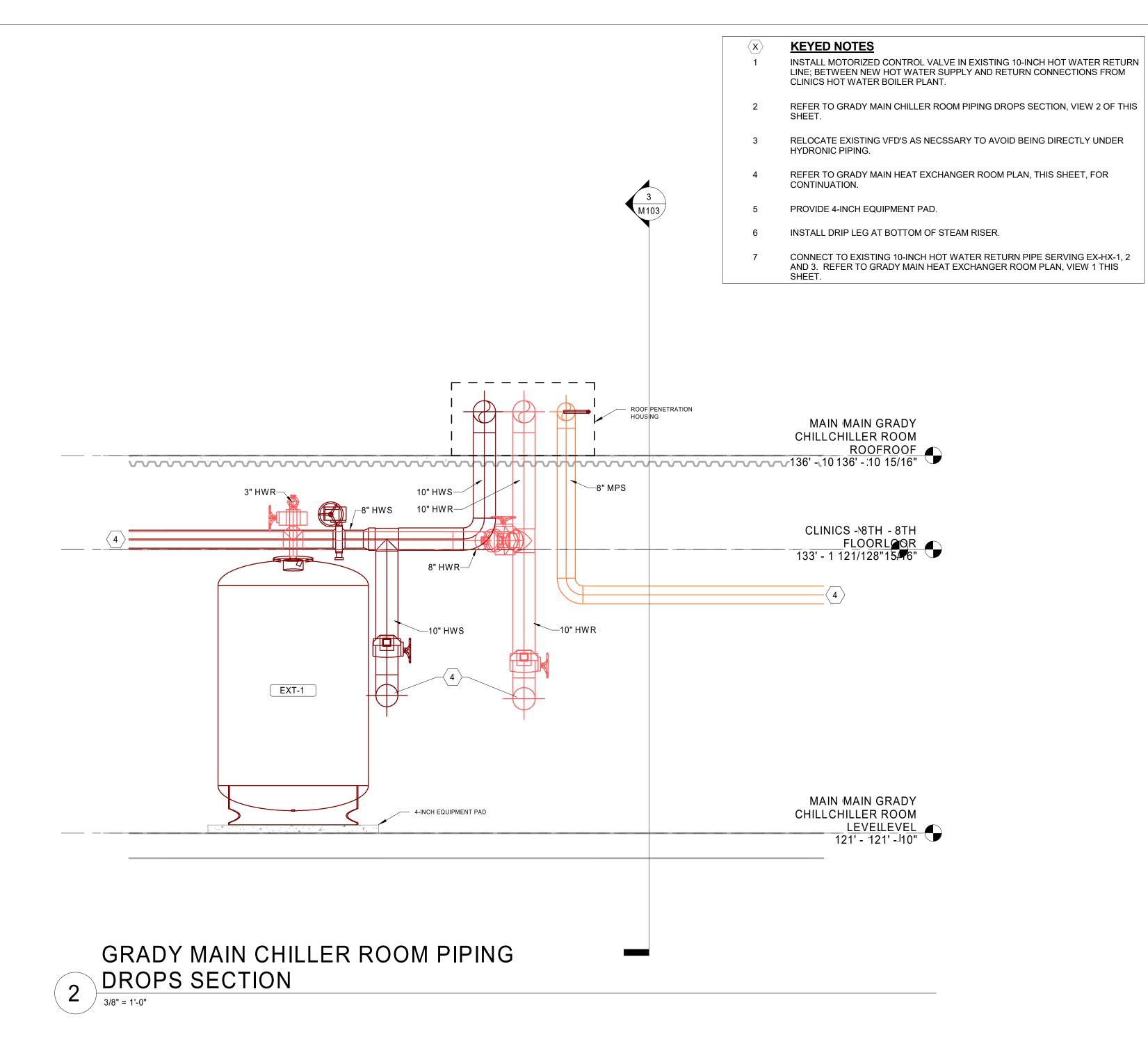
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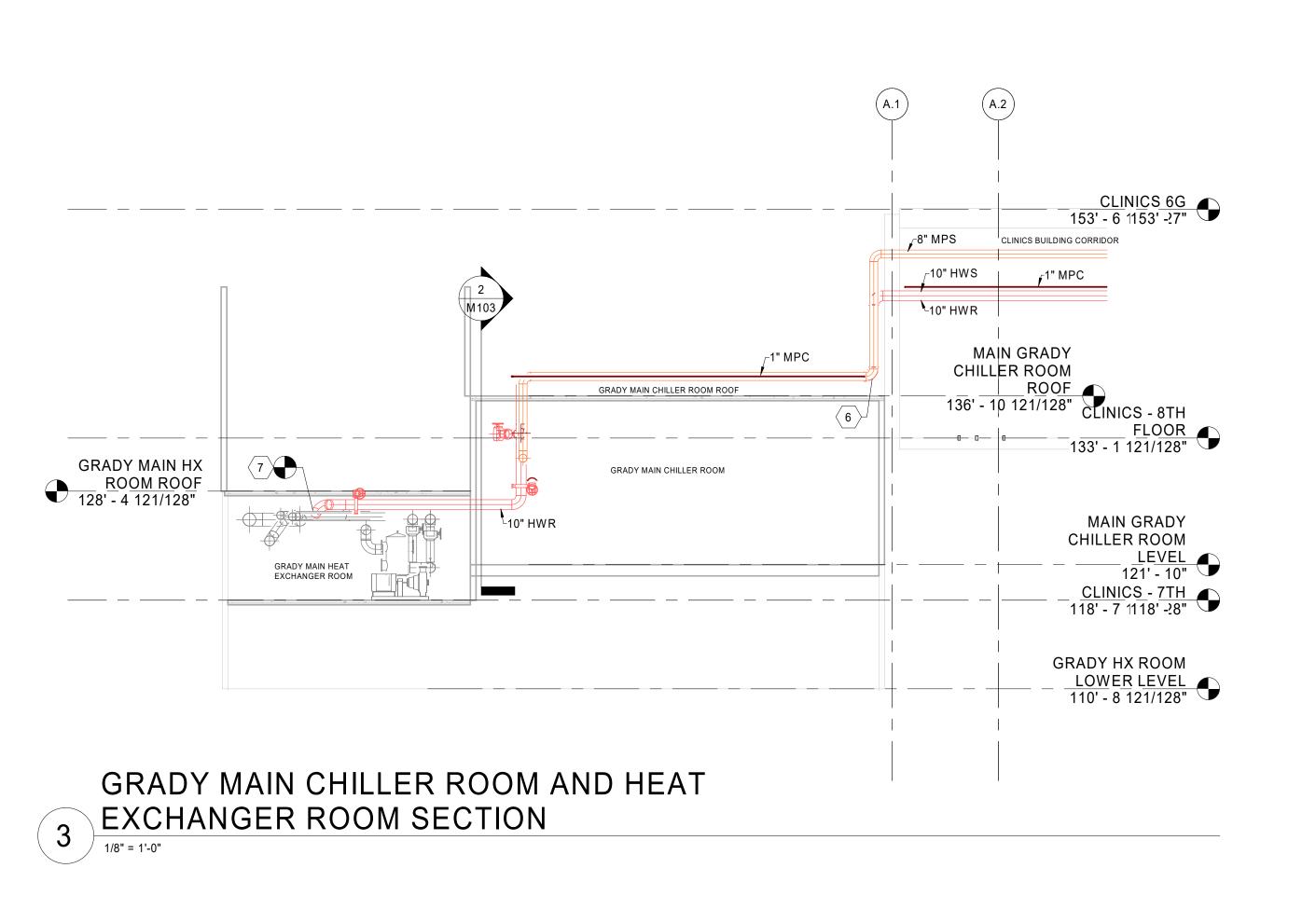
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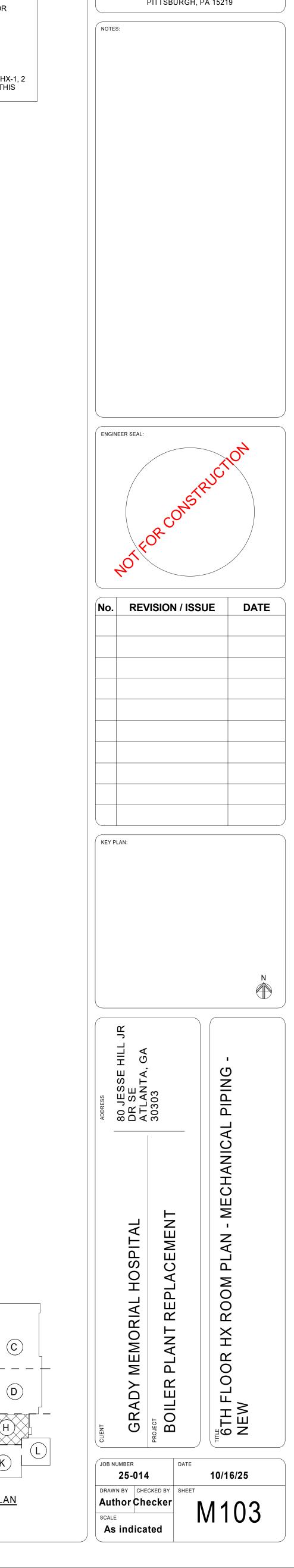
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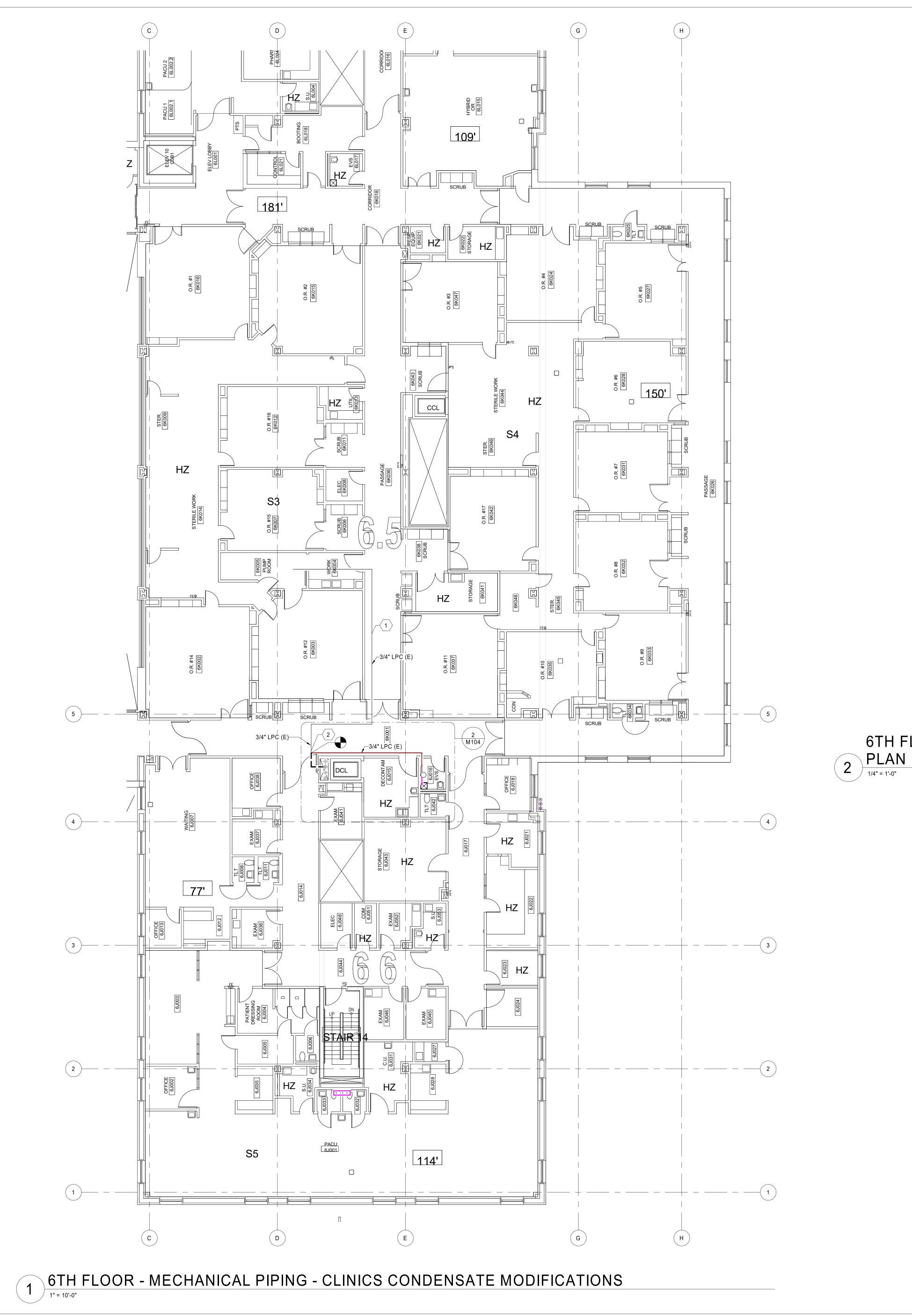


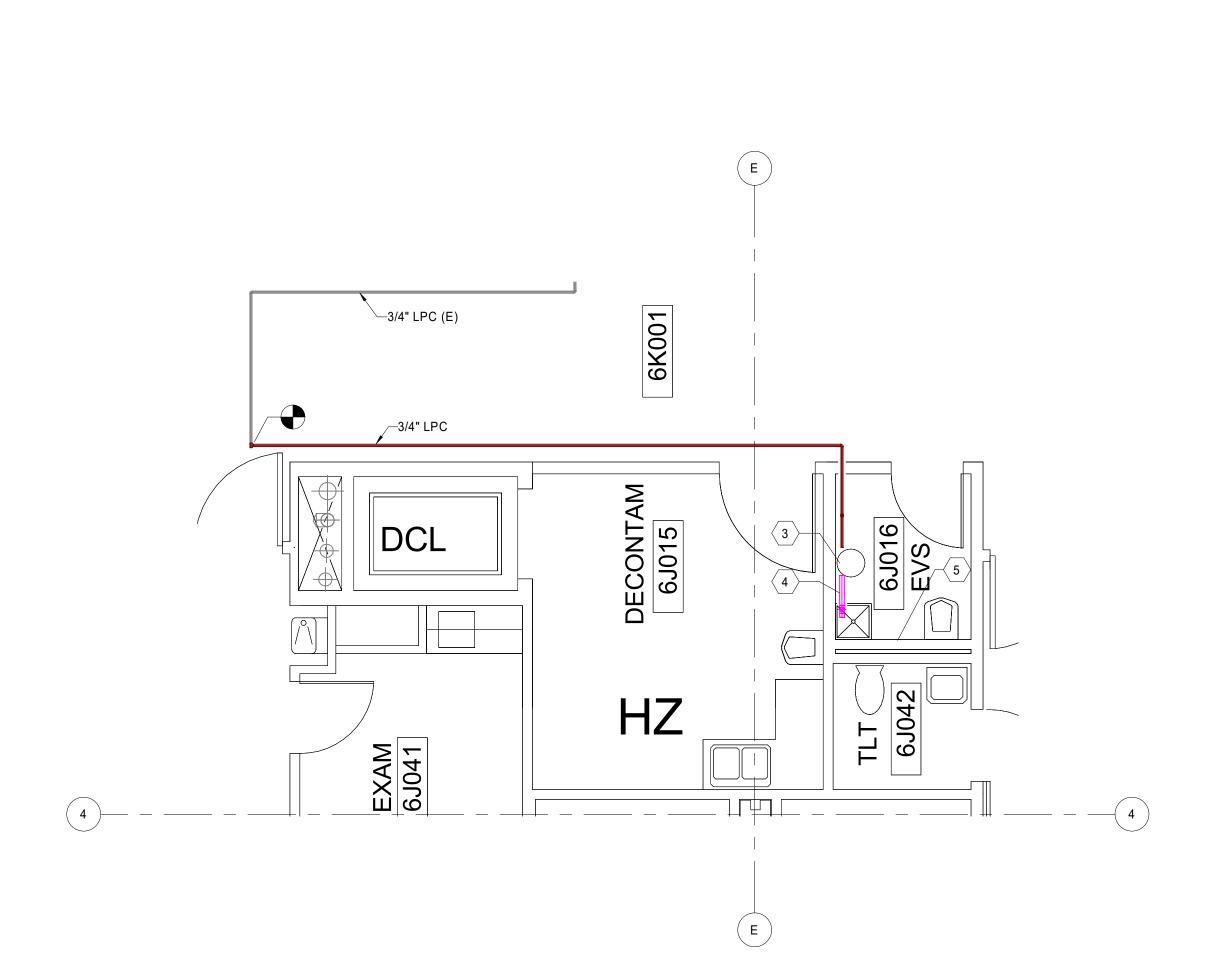












6TH FLOOR - MECHANICAL PIPING - CLINICS CONDENSATE MODIFICATIONS - ENLARGED PLAN



KEYED NOTES

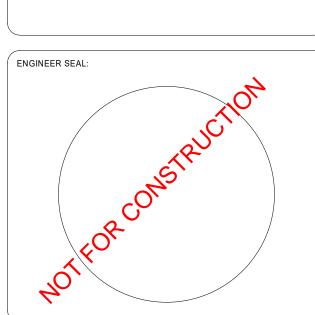
3/4" STEAM CONDENSATE RETURN FROM HUMIDIFIERS AND 15 PSIG STEAM MAIN TRAPS

REROUTE CONDENSATE DRAIN TO EVS CLOSET DRAIN COOLER

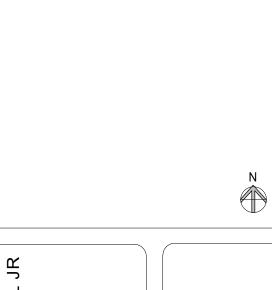
3 PROVIDE CONDENSATE DRAIN COOLER EQUAL TO SPIREX SARCO JC210-FCC315R-10

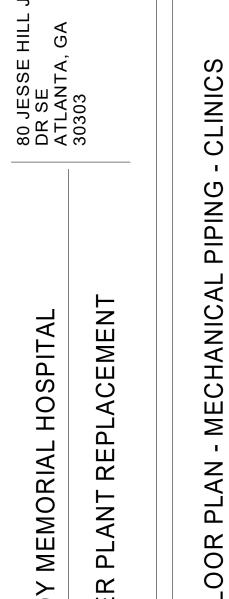
4 ROUTE 2" DRAIN TO JANITOR SINK, AND DISCHARGE TO

CONNECT NEW 3/4" DOMESTIC COLD WATER TO CONDENSATE DRAIN COOLER. PROVIDE BACKFLOW PREVENTER.

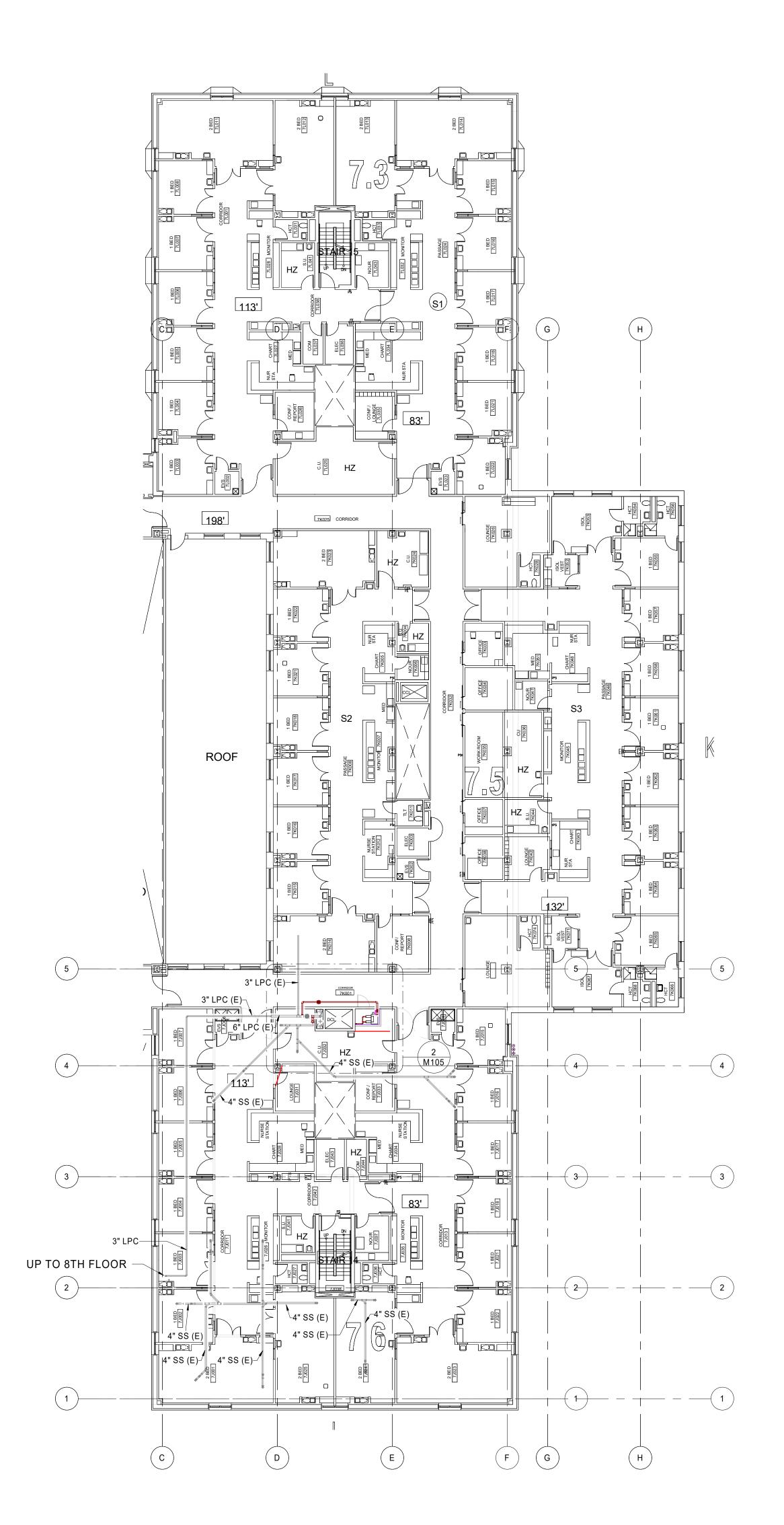


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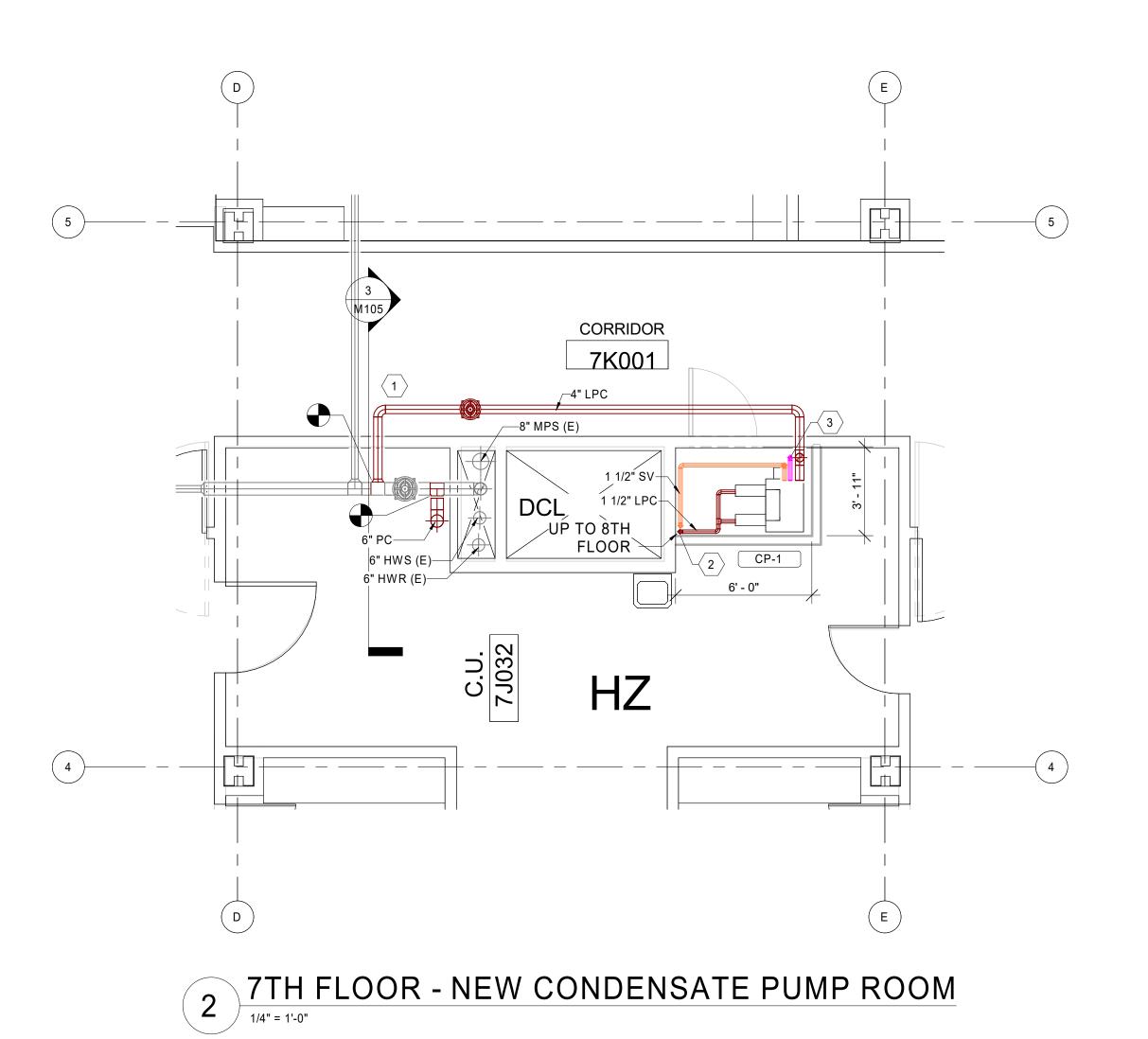


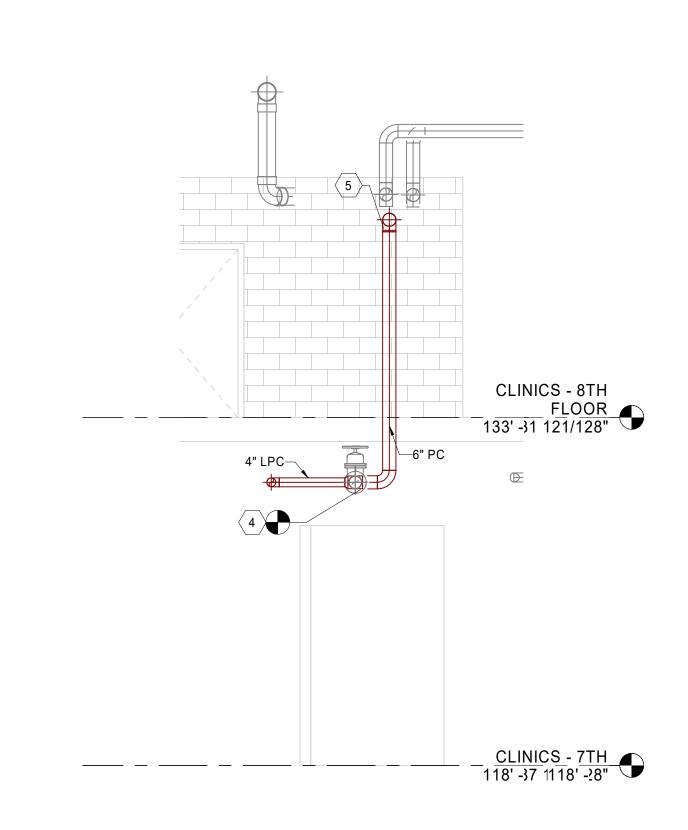


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7TH FLOOR - MECHANICAL PIPING - NEW



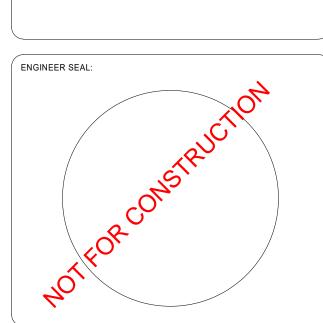


3 7TH FLOOR PUMPED CONDENSATE - ELEVATION

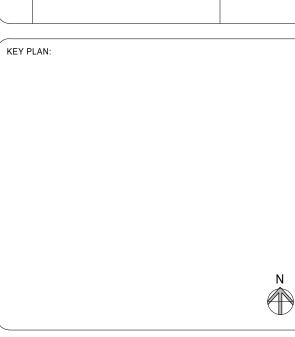


- CONNECT NEW 4" STEAM CONDENSATE LINE TO EXISTING 6" CONDENSATE LINE. ROUTE TO NEW CP-1 LOCATED ON 7TH FLOOR
- ROUTE NEW 1-1/2" PUMPED CONDENSATE LINE AND 1-1/2" VENT UP TO 8TH FLOOR PENTHOUSE
- 3 ROUTE 1-1/2" OVERFLOW DRAIN TO FLOOR BELOW
- 4 CONNECT NEW 6" PUMPED CONDENSATE LINE INTO EXISTING 6" GRAVITY CONDENSATE LINE THAT SHALL BE REUSED FOR BOILER FEEDWATER FROM THE SURGE TANK. ROUTE HORIZONTALLY, THEN UP TO THE 7TH FLOOR.
- 5 ROUTE NEW 6" PUMPED CONDENSATE TO NEW BOILER ROOM. REFER TO M104 FOR CONTINUATION

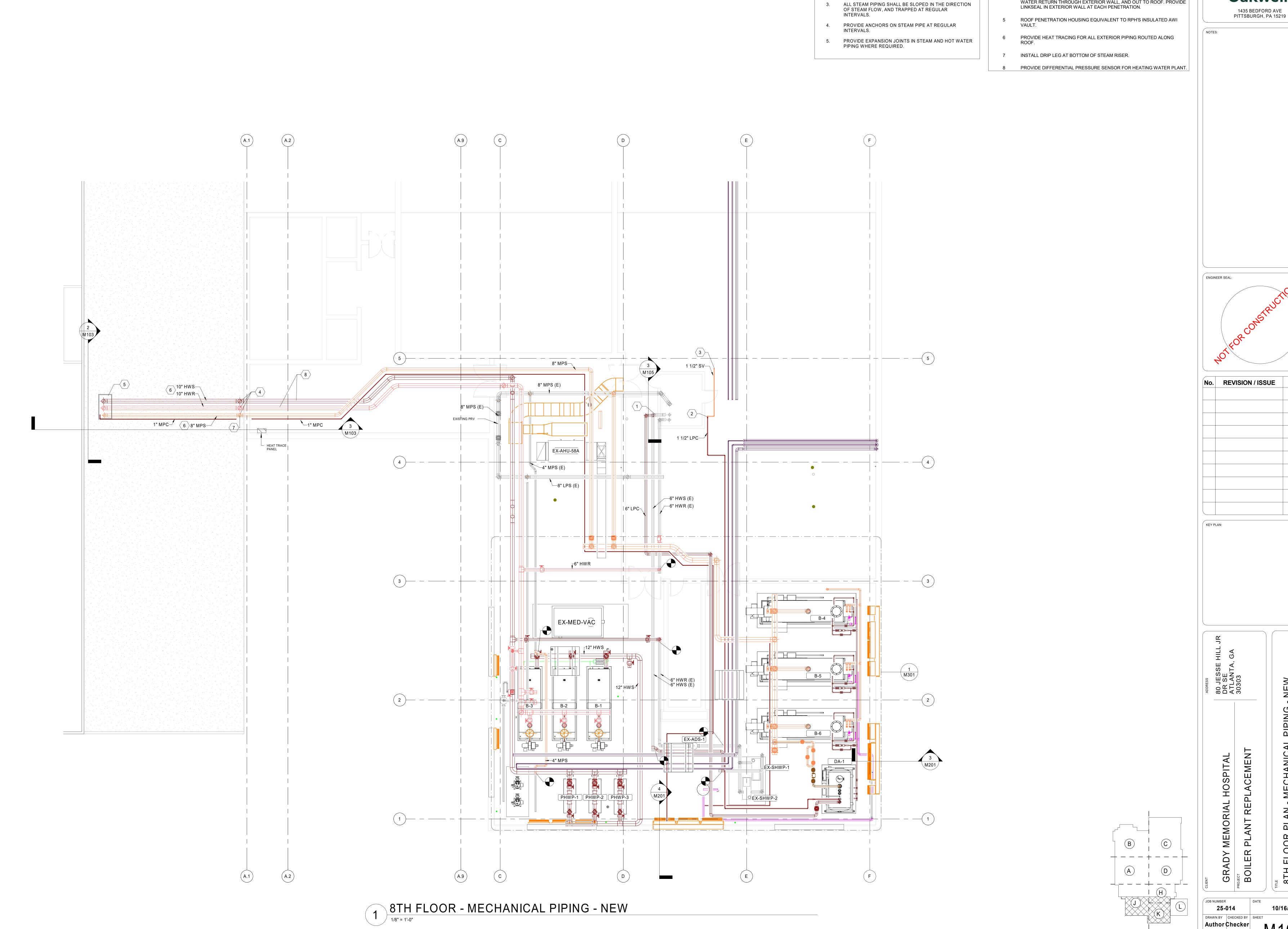




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BOILER PLANT REPLACEMENT	30303	
7TH FLOOR HVAC PLAN - MECHANICAL PIPING - NEW	PING - NEW	



KEYED NOTES

GENERAL NOTES

COMMENCING WORK

1. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING

2. CONTRACTOR SHALL COORDINATE WORK TO MINIMIZE

SHUTDOWNS. ALL SHUTDOWNS SHALL BE COORDINATED WITH THE HOSPITAL STAFF PRIOR TO

1 6" PUMPED CONDENSATE LINE FROM 7TH FLOOR.

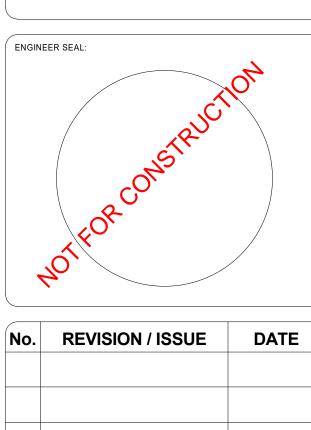
2 1-1/2" PUMPED CONDENSATE AND 1-1/2" STEAM VENT FROM 7TH FLOOR.

ROUTE STEAM VENT UP THROUGH ROOF.

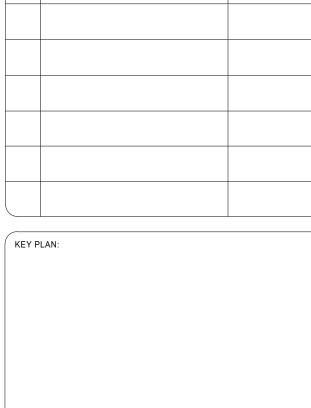
ROUTE NEW MEDIUM PRESSURE STEAM, HOT WATER SUPPLY, AND HOT WATER RETURN THROUGH EXTERIOR WALL, AND OUT TO ROOF. PROVIDE LINKSEAL IN EXTERIOR WALL AT EACH PENETRATION.

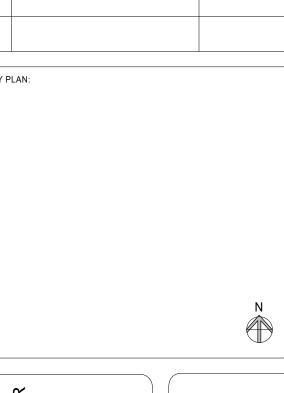


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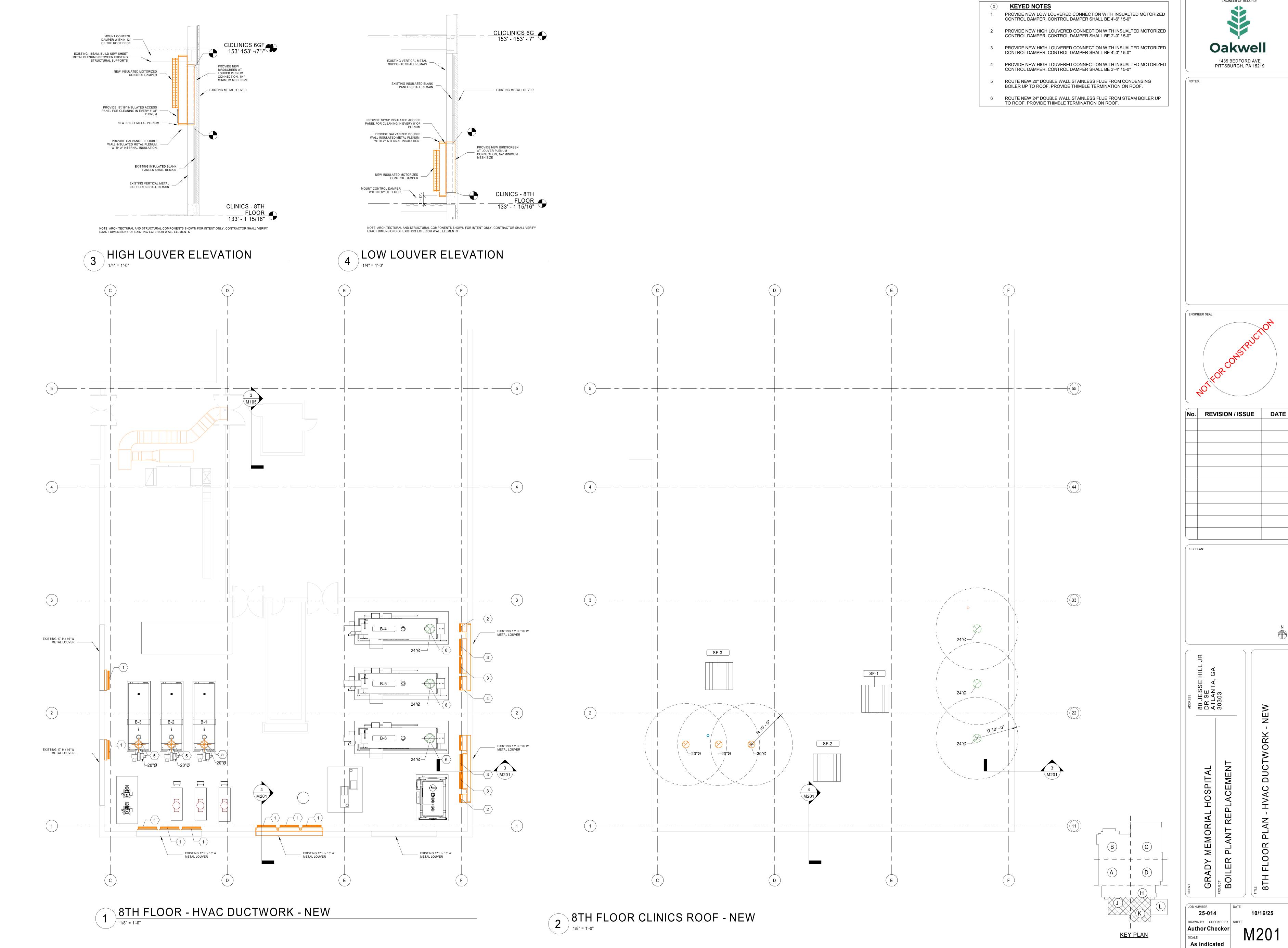




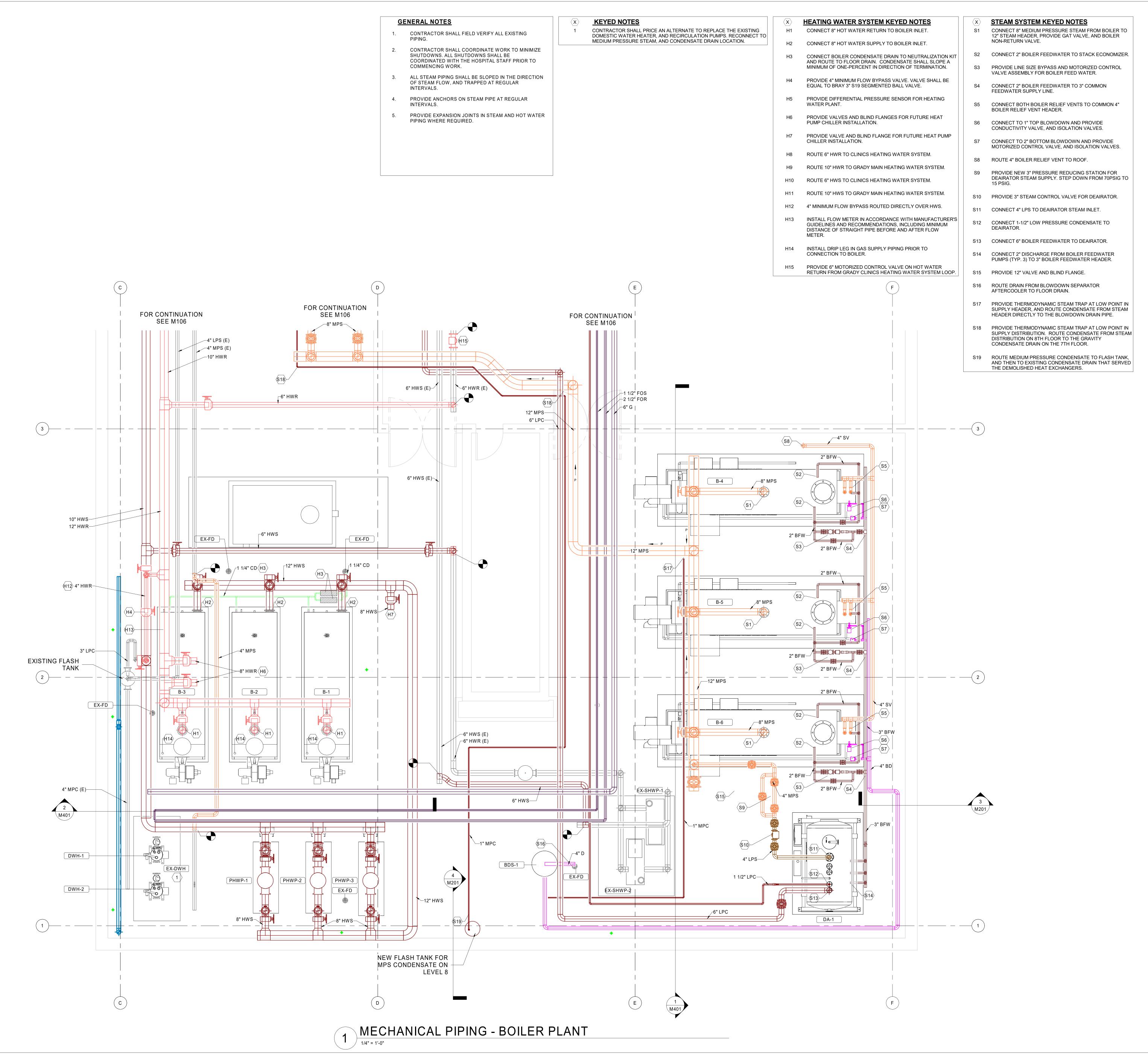
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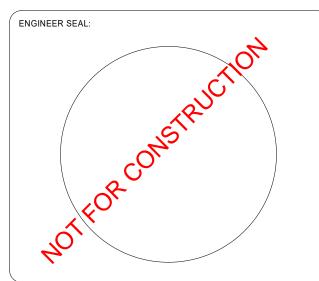
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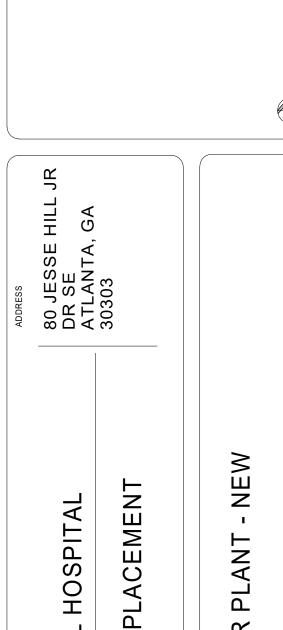
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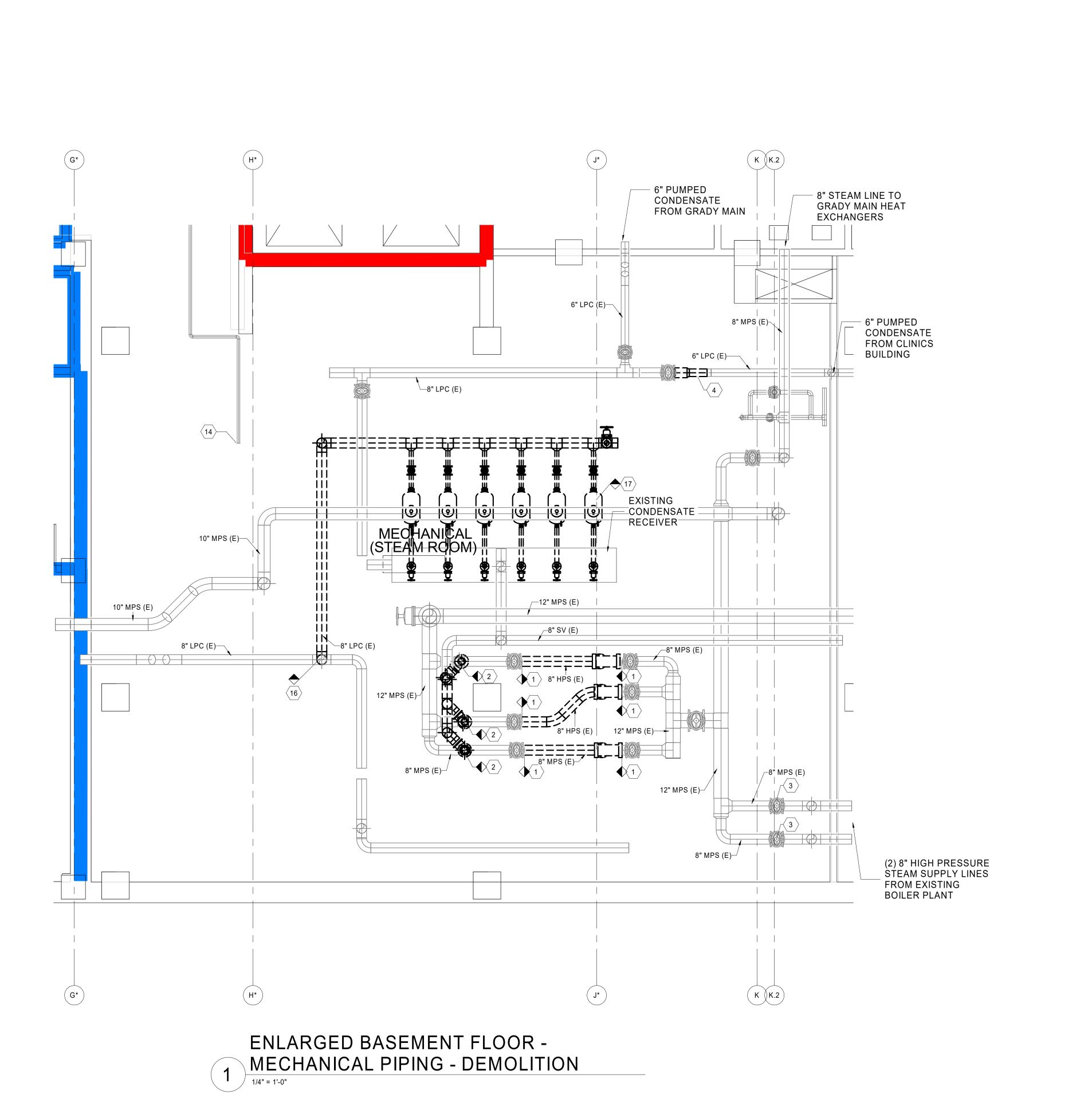
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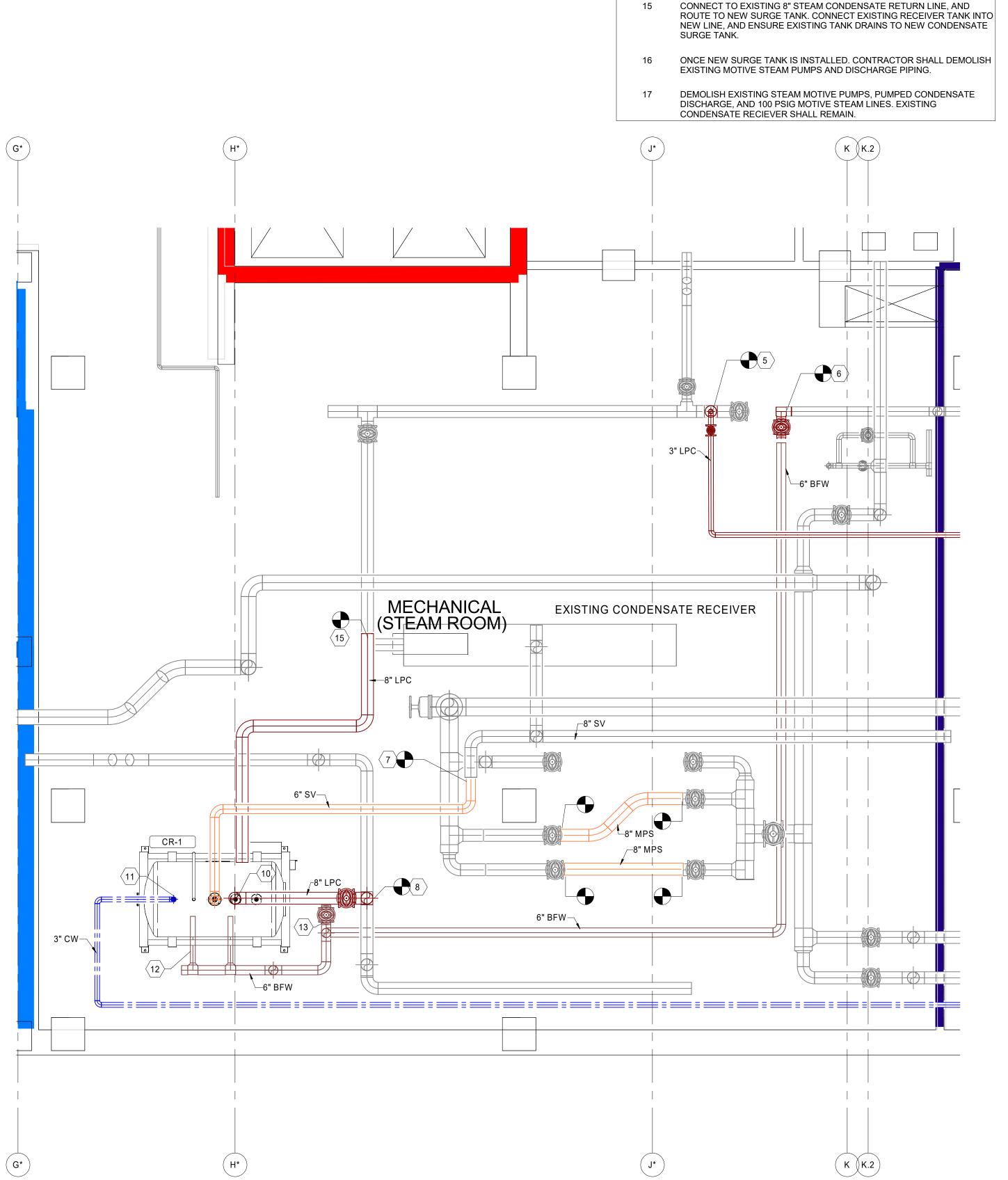
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ENLARGED BASEMENT FLOOR -

2 MECHANICAL PIPING - NEW



NOTES:

KEYED NOTES

TO THE HOSPITAL.

DEMOLISH EXISTING PRESSURE REDUCING VALVE, AND Y-STRAINER. CONTRACTOR SHALL REPLACE VALVES WITH SPOOL PIECES.

DEMOLISH EXISTING STEAM RELIEF VENT, AND STEAM VENT BRANCH

UPON COMPLETION OF THE NEW BOILER PLANT, SHUT EXISTING PLANT

CONNECT NEW 3" PUMPED CONDENSATE RETURN TO EXISTING 6"MAIN

DEMOLISH SECTION OF 6" STEAM CONDENSATE RETURN LINE TO

CONNECT NEW 6" BOILER FEEDWATER TO EXISTING 6" PUMPED CONDENSATE LINE. EXISTING LINE SHALL BE REUSED FOR BOILER

CONNECT NEW SURGE TANK VENT LINE TO EXISTING 8" STEAM VENT.

CONNECT NEW 8" PUMPED STEAM CONDENSATE LINE TO EXISTING PUMPED CONDENSATE DISCHARGE FROM MOTIVE STEAM PUMPS.

PROVIDE NEW 6" BOILER FEEDWATER LINE, AND CONNECT TO NEW

EXISTING PUMPED CONDENSATE LINE TIES INTO MOTIVE PUMP

PROVIDE NEW 6" BYPASS LINE AROUND NEW CONDENSATE RECIEVER

DISCHARGE LINE. CONTRACTOR SHALL REROUTE TO NEW SURGE TANK.

10 CONNECT 8" MOTIVE PUMP DISCHARGE TO NEW SURGE TANK.

CONNECTION VALVES, AND REMOVE VALVE HANDLE.

CONVERT TO NEW BOILER FEEDWATER LINE.

FEEDWATER UP TO THE 8TH FLOOR.

11 PROVIDE NEW 3" DOMESTIC WATER CONNECTION.

TRANSFER PUMPS LOCATED BELOW CR-1.

FROM EXISTING PUMPED CONDENSATE LINE.

CONTRACTOR SHALL REPLACE ONE AT A TIME TO MINIMIZE SHUTDOWN

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GRADY MEMORIAL HOSPITAL

BOILER PLANT REPLACEMENT

ENLARGED BASEMENT STEAM ROOM

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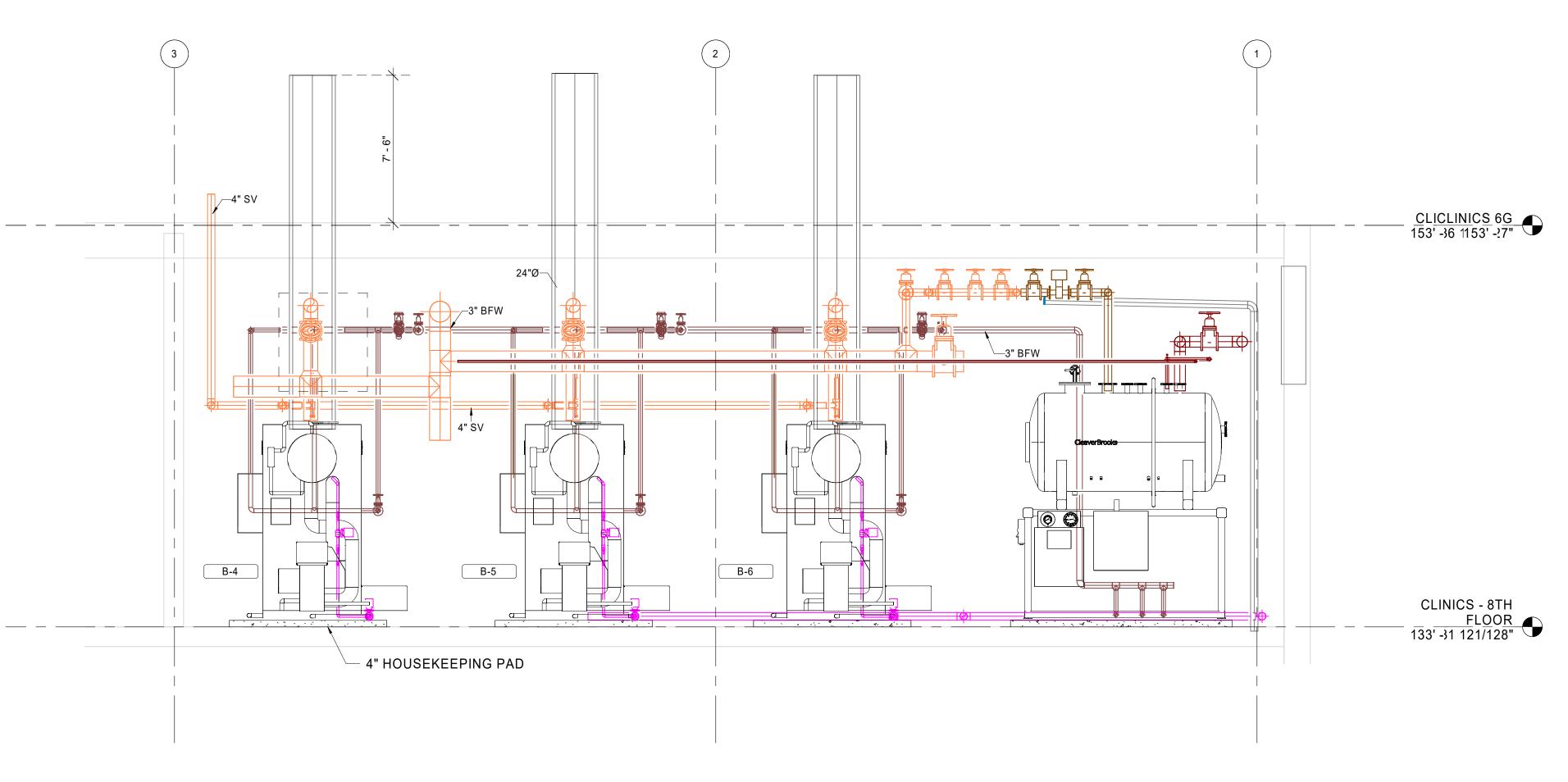
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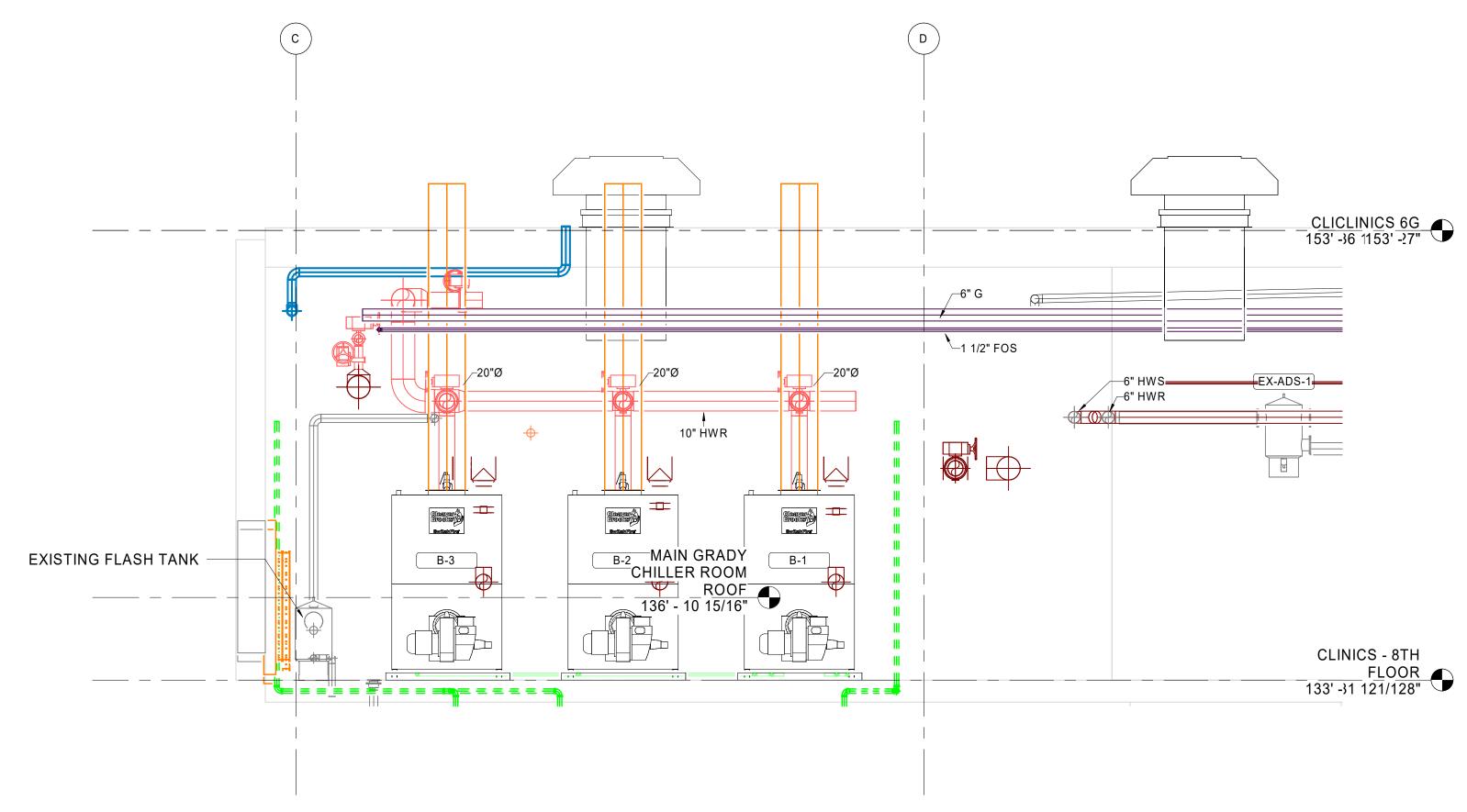
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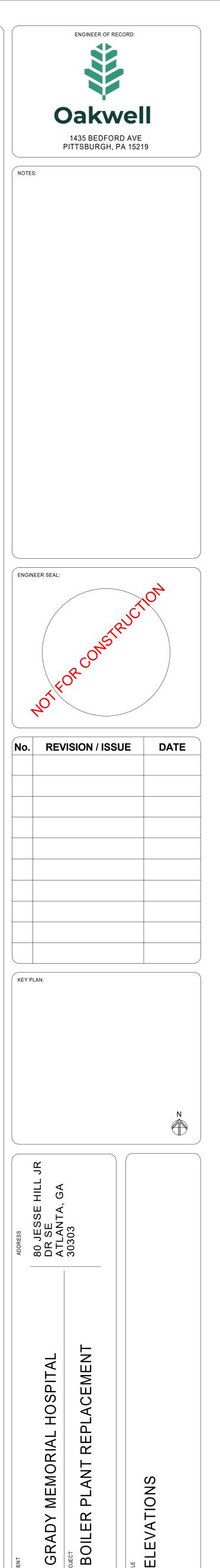


STEAM BOILER ELEVATION 1/4" = 1'-0"



2 CONDENSING BOILER ELEVATION

1/4" = 1'-0"



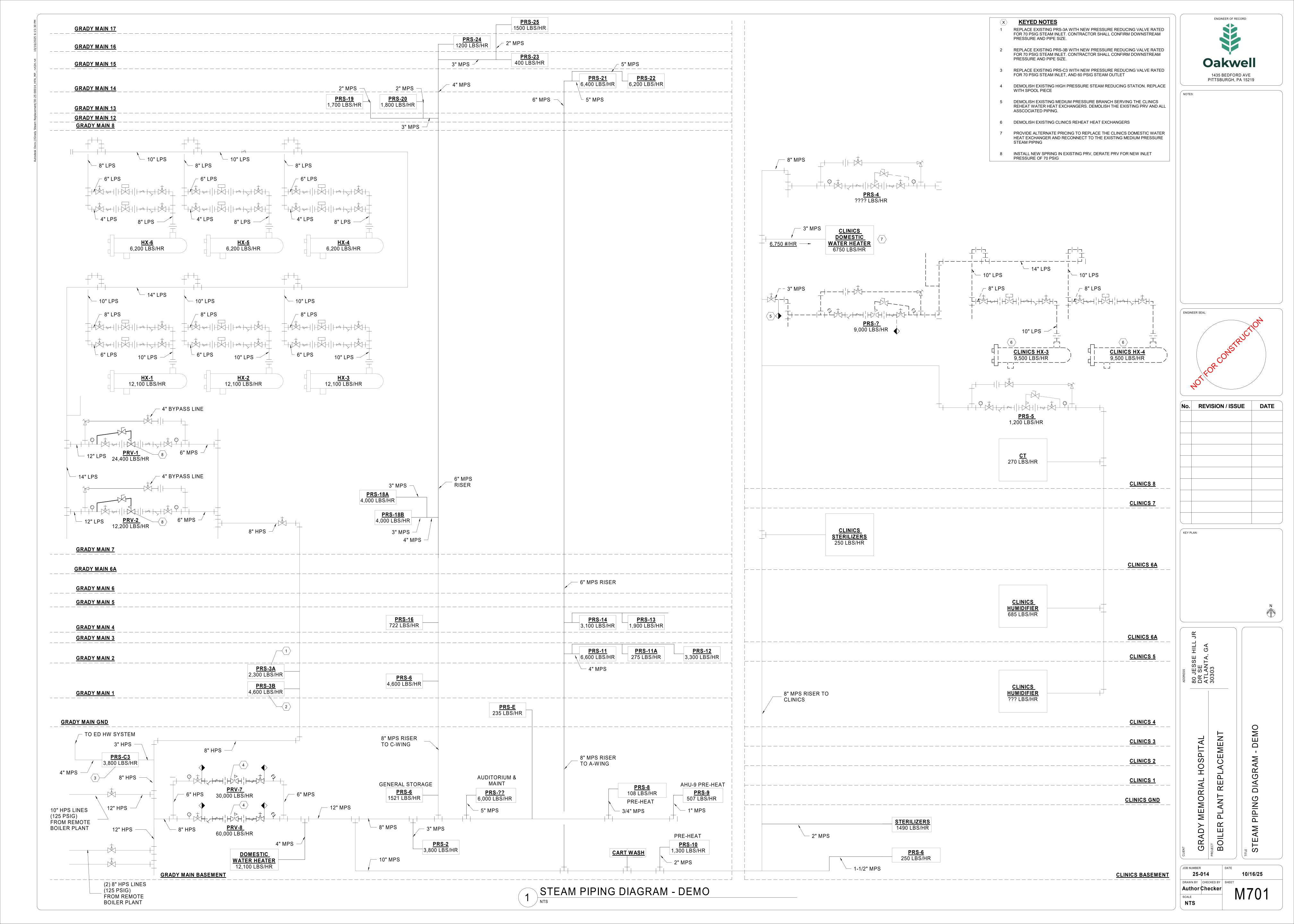
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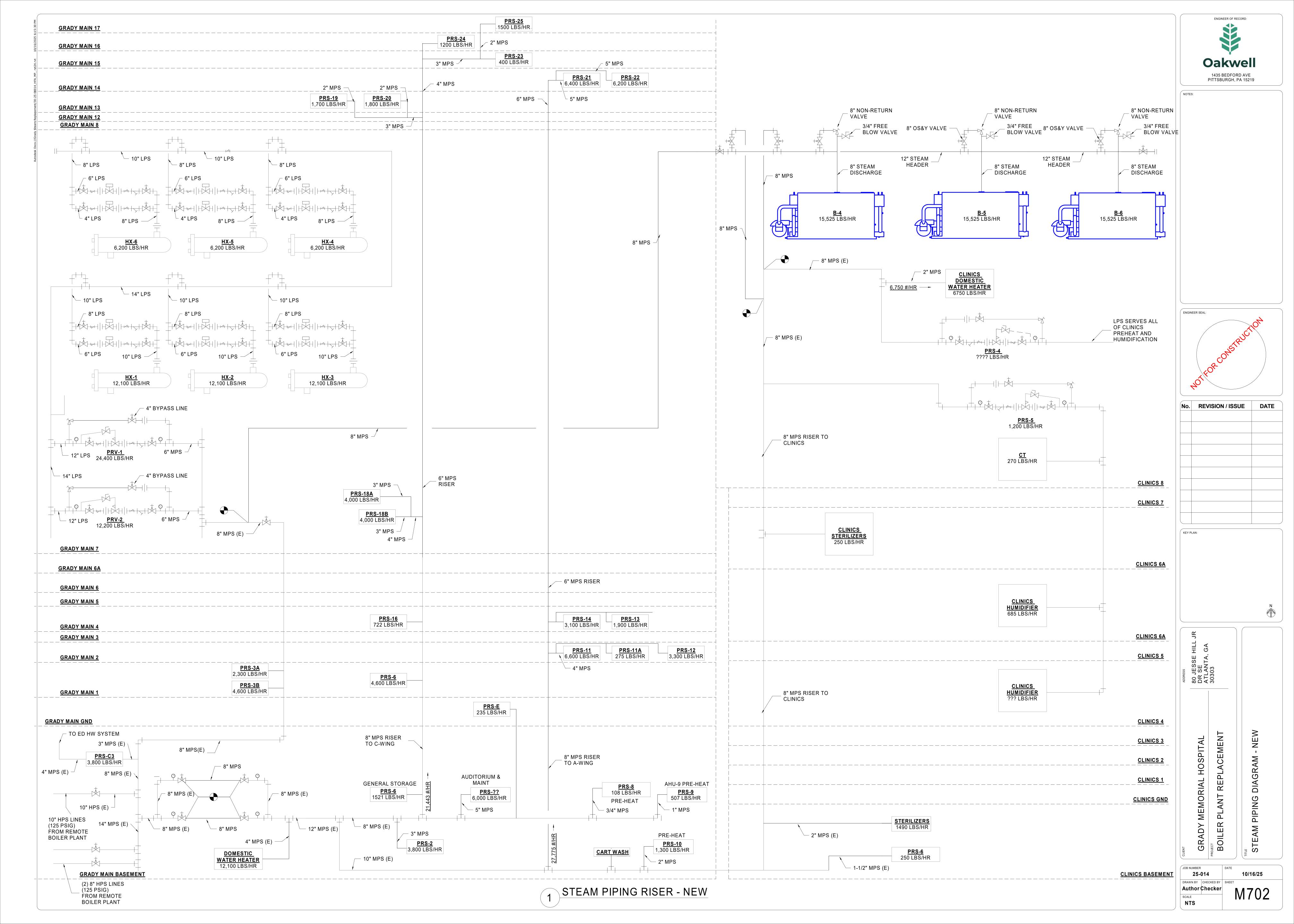
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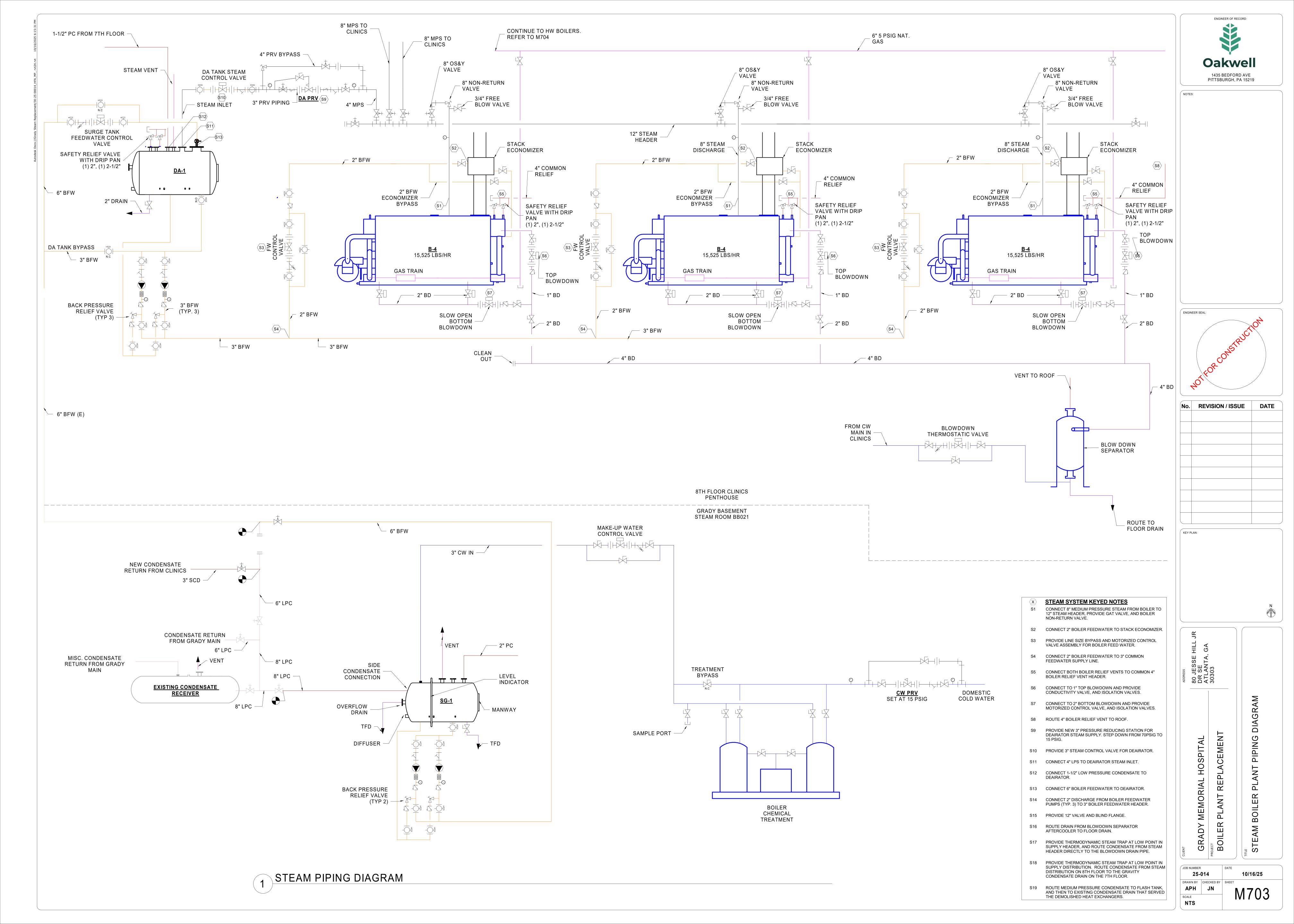
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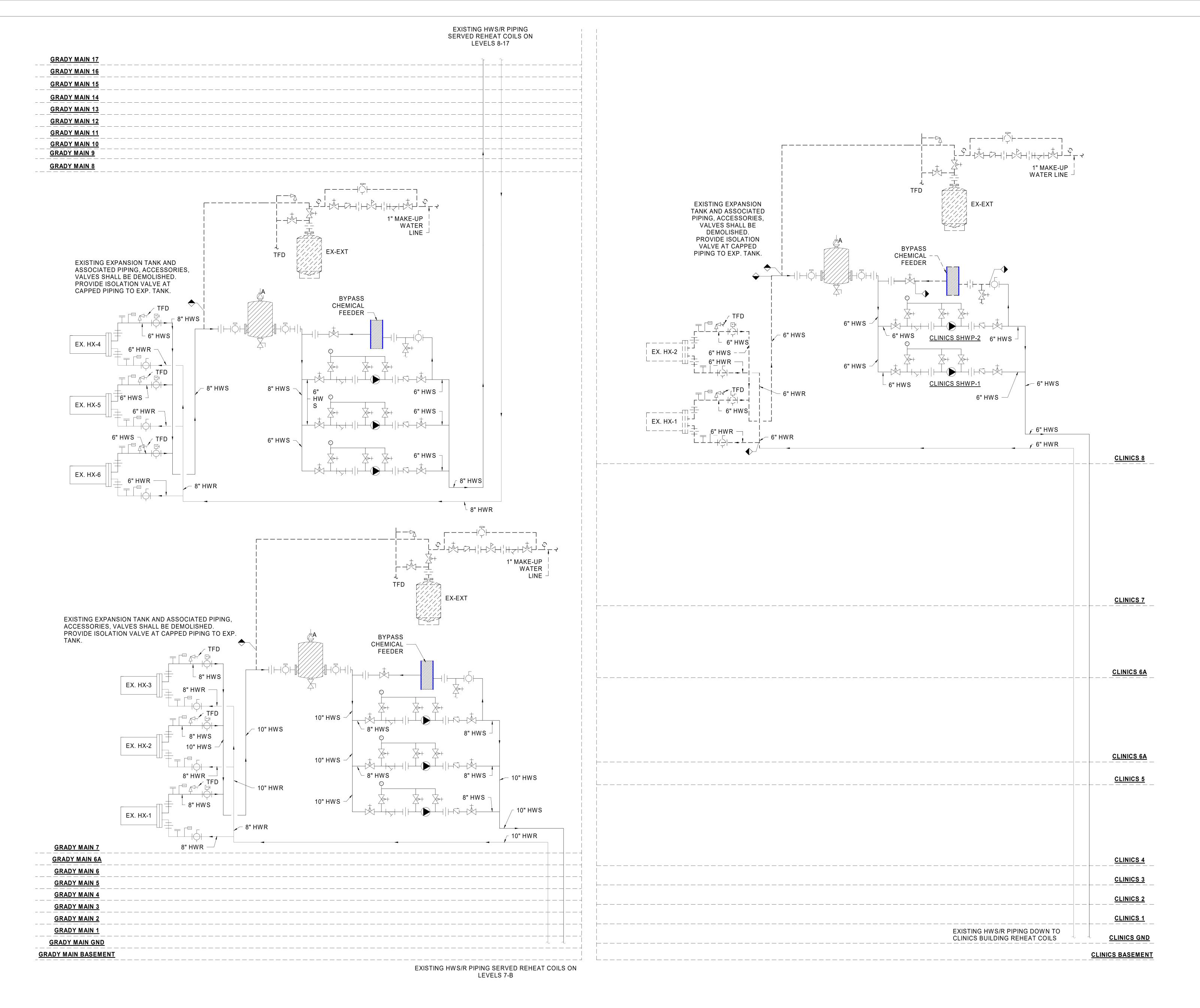
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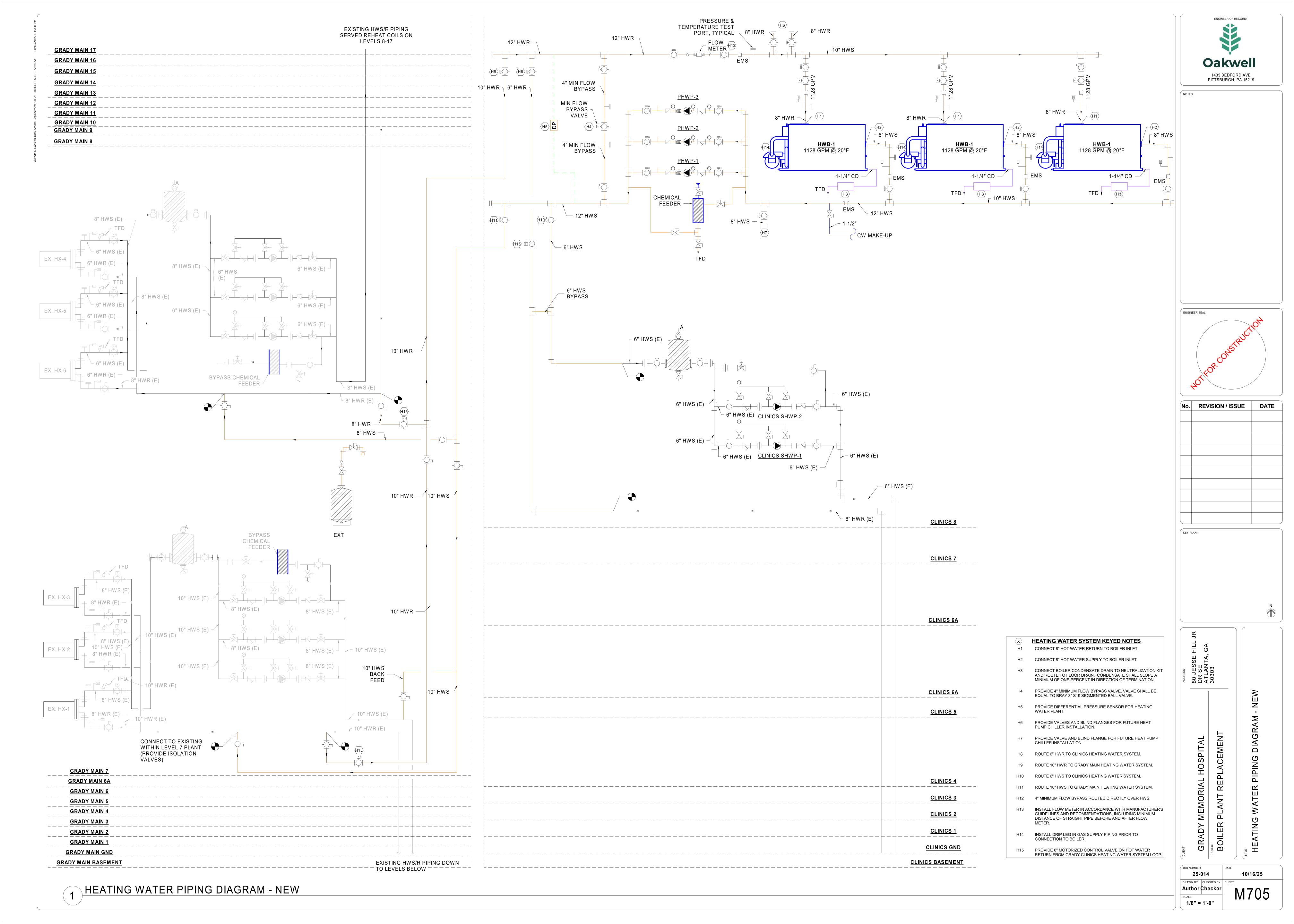
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1/8" = 1'-0"

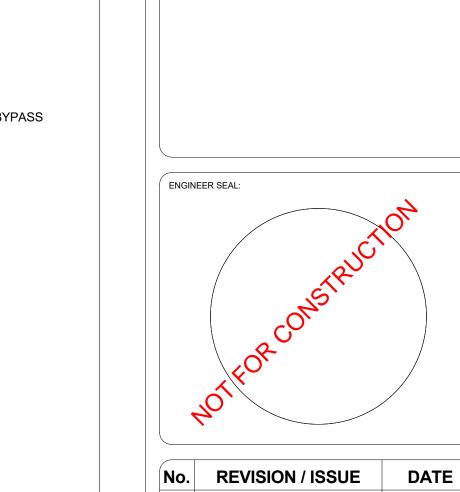
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WIRING NOTES WIRING IS INDICATED ON DRAWINGS ONLY FOR SPECIFIC ROUTES OR SPECIAL FEEDERS SHALL BE IN INDEPENDENT RACEWAYS AND BOXES, UNLESS OTHERWISE WIRING AND CONDUIT SHALL BE REQUIRED FOR ALL EQUIPMENT, SWITCHES, AND OUTLETS INDICATED WITH CIRCUIT NUMBERS. PROVIDE 3/4"C.,3#12 UNLESS OTHERWISE INDICATED. WIRE AND CONDUIT SIZES INDICATED ON HOMERUNS SHALL BE CONTINUOUS THROUGHOUT CIRCUIT. ALTHOUGH ALL BRANCH CIRCUIT WIRE AND CONDUIT MAY NOT BE INDICATED, IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE BRANCH CIRCUIT WIRING SYSTEM BE INSTALLED. RACEWAYS AND BOXES SHALL BE LIMITED TO SIX CURRENT CARRYING CONDUCTORS (PHASE AND NEUTRALS) AND GROUNDING CONDUCTOR, UNLESS OTHERWISE INDICATED. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH SINGLE PHASE CIRCUIT. MARK ALL CONDUITS AND JUNCTION BOXES WITH PERMANENT MARKER INDICATING PANEL AND CIRCUIT NUMBER OF CONDUCTORS CONTAINED WITHIN. LABEL WHERE CONDUITS ENTER PANELS, WIREWAYS, PULLBOXES, ETC. LABEL EMPTY CONDUITS WITH SYSTEM (VOICE, DATA, SECURITY, ETC.) AND SOURCE OF CONDUIT. **GENERAL NOTES** THE SCOPE OF WORK SHALL INCLUDE ALL WORK INDICATED UNLESS OTHERWISE SPECIFICALLY INDICATED AS EXISTING OR WORK BY OTHERS, AND COORDINATION WITH ALL TRADES. SCOPE OF WORK IS INDICATED ON THE CONTRACT DOCUMENTS INCLUDING THE DRAWINGS AND THE SPECIFICATIONS, WHICH ARE COMPLIMENTARY. WORK INDICATED IN ANY CONTRACT DOCUMENT SHALL BE CONSIDERED PART OF THE SCOPE OF WORK, UNLESS SPECIFICALLY INDICATED AS EXISTING OR WORK BY OTHERS, IN GENERAL, WORK REQUIREMENTS ARE NOT INDICATED IN BOTH DOCUMENTS. WHERE DOCUMENTS CONFLICT WITHIN THEMSELVES OR WITH CODES AND REGULATIONS, PROVIDE THE HIGHER QUANTITY AND QUALITY AND FOLLOW THE STRICTER REQUIREMENTS. WORK, AT A MINIMUM, SHALL BE IN ACCORDANCE WITH OSHA, NFPA STANDARDS, THE ELECTRIC CODE AND THE LOCAL GOVERNING AUTHORITIES. THE DRAWINGS AND SPECIFICATIONS DO NOT ATTEMPT TO INDICATE ALL WORK REQUIRED BY CODES AND AUTHORITIES. DO NOT INSTALL WORK THAT DOES NOT MEET MINIMUM REQUIREMENTS. IF NECESSARY, REQUEST CLARIFICATION FROM ARCHITECT BEFORE PROCEEDING. IT IS THE INTENT OF THESE PLANS AND SPECIFICATIONS TO PROVIDE A WORKING INSTALLATION IN EVERY DETAIL AND ALL ITEMS REQUIRED FOR SUCH AN INSTALLATION SHALL BE PROVIDED WHETHER OR NOT SPECIFICALLY INDICATED OR CONTRACTOR SHALL PAY FOR ALL PERMITS, INSURANCE, AND TESTS, AND SHALL PROVIDE LABOR AND MATERIAL TO COMPLETE THE ELECTRICAL WORK SHOWN. VISIT THE SITE TO DETERMINE PRE-EXISTING CONDITIONS AND WORK NECESSARY PRIOR TO SUBMISSION OF BID PRICE. SUBMIT ANY QUESTIONS REQUIRED TO CLARIFY SCOPE PRIOR TO BID. INCLUDE ALL REQUIRED WORK IN BID PRICE. INCLUDE IN BID WHATEVER IS REQUIRED TO MEET SCHEDULE INCLUDING OVERTIME, EXPRESS SHIPPING, EXPEDITING EQUIPMENT, ETC. PLAN PROJECT AND SUBMIT SHOP DRAWINGS AND ORDER EQUIPMENT IN A TIMELY MANNER, EQUIPMENT SHALL BE BASED ON THE SPECIFIED EQUIPMENT. ANY EQUIPMENT TO BE SUBSTITUTED SHALL BE IDENTIFIED AT TIME OF BID. REFER TO SPECIFICATIONS. 8. TEST ALL EQUIPMENT AND SYSTEMS INSTALLED TO CERTIFY COMPLIANCE WITH DRAWINGS, SPECIFICATIONS, CODES, LOCAL AUTHORITIES AND REGULATIONS. INCLUDE LABOR AND COSTS FOR TESTING, REVIEWS, APPROVALS AND CERTIFICATIONS. 9. ALL CUTTING AND PATCHING REQUIRED FOR ELECTRICAL WORK SHALL BE INCLUDED AS PART OF THIS SECTIONS. 10. CONTRACTOR SHALL PHASE BALANCE PANELBOARDS IN THE FIELD; LOAD ON EACH PHASE SHALL BE BALANCED WITHIN 10% OF EACH OTHER. 11. FURNISH AND INSTALL SLEEVES IN FLOORS, BEAMS, WALLS, ETC. REQUIRED FOR INSTALLING THIS WORK. 12. CONDUIT PASSING THROUGH FIRE-RATED WALLS AND FLOORS SHALL BE PROVIDED WITH ALL NECESSARY MATERIALS TO INSURE THAT THE FIRE-RATED INTEGRITY 13. PROVIDE TRAINING TO OWNER ON ALL EQUIPMENT AND SYSTEMS INSTALLED. 14. TEMPORARY LIGHTING AND POWER SHALL BE PROVIDED AS REQUIRED BY OSHA. CODES AND LOCAL AUTHORITIES. REMOVE ALL TEMPORARY FACILITIES PROVIDED AT PROJECT COMPLETION. 15. ANY BUILDING SYSTEMS THAT MUST BE MODIFIED TO PLACE NEW EQUIPMENT SHALL BE RESTORED TO ITS ORIGINAL CONDITION PRIOR TO THE CONCLUSION OF THE PROJECT, INCLUDING ALL TESTING AND RE-CERTIFICATION REQUIRED TO MEET CODE. 16. WORK SHALL CONFORM TO THE MASSACHUSETTS ELECTRICAL CODE, NATIONAL ELECTRICAL CODE, AND REQUIREMENTS OF LOCAL AUTHORIZES HAVING JURISDICTION. 17. CONDUIT RUNS AS SHOWN ON THE PLANS ARE DIAGRAMMATIC ONLY; EXACT LOCATION AND METHOD OF SUPPORT SHALL BE DETERMINED IN THE FIELD. 18. WHERE CONNECTIONS ARE MADE IN EXISTING PANELS, THE PANEL INDEX SHALL BE REVISED TO INDICATE THE NEW LOADS SERVED. NEW CIRCUIT BREAKERS ADDED TO EXISTING PANELS SHALL BE THE SAME FRAME, VOLTAGE RATING AND INTERRUPTING CAPACITY AS EXISTING PANEL AND CIRCUIT BREAKERS. 19. ELECTRICAL SHUTDOWNS SHALL BE AT A TIME AND DATE APPROVED BY THE OWNER. 20. SEPARATELY DERIVED SYSTEMS SHALL BE BONDED TO THE NEAREST WATER PIPE. BONDING CONDUCTOR SHALL BE SIZED PER NFPA REQUIREMENT. 21. FOR ANY NEW PIECE OF ELECTRICAL EQUIPMENT THE ELECTRICAL CONTRACTOR IS TO PROVIDE SUBMITTAL OF SEISMIC RESTRAINT DETAILS AND CALCULATION PERFORMED, SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF THE PROJECT. 22. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

GENERAL DEMOLITION NOTES **EQUIPMENT LEGEND** SITE PLAN LEGEND REFER TO DRAWINGS OF OTHER TRADES (MECHANICAL & STRUCTURAL) FOR THE DISTRIBUTION/PANEL BOARDS FULL EXTENT OF THE SCOPE OF DEMOLITION. DISCONNECT AND MAKE SAFE ALL ELECTRIC UTILTIY MANHOLE ELECTRICAL EQUIPMENT IDENTIFIED FOR REMOVAL ON THE PLANS. 480/277V BOARD "U" DENOTES UTILITY, "15KV" DENOTES 15KV CAMPUS LOOP 2. THE ELECTRICAL DEMOLITION PLANS AND DETAILS INDICATE THE GENERAL INTENT 208/120V BOARD "T" DENOTES TELECOMMUNICATION AND ARE NOT INTENDED TO SHOW ALL ITEMS TO BE REMOVED OR RETAINED. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO THE SUBMISSION OF BIDS PROGRAMMABLE LOGIC TO BECOME FAMILIAR WITH THE ACTUAL CONDITIONS AND EXTENT OF WORK. CONTROLLER/CONTROL PANEL HANDHOLE DEVICES AND EQUIPMENT LOCATED ON WALL AND/OR CEILINGS TO BE REMOVED SHALL BE DISCONNECTED AND MADE SAFE. THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE OF ANY UNANTICIPATED HIDDEN MOTOR STARTER CONDITIONS ENCOUNTERED DURING DEMOLITION. DISCONNECT SWITCHES THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ALL ONE-LINE LEGEND SYSTEMS OR BUILDING COMPONENTS DAMAGED DURING THE EXECUTION OF THE ď FUSED WORK. DAMAGE SHALL INCLUDE BUT NOT BE LIMITED TO DESTRUCTION OR DISPOSAL OF ITEMS INTENDED TO REMAIN OR TO BE SALVAGED. UNFUSED CIRCUIT BREAKER - MOLDED CASE "AF" DENOTES AMPERE FRAME SIZE . THE ELECTRICAL CONTRACTOR SHALL CIRCUIT TRACE AND LABEL ALL EXISTING COMBINATION DISCONNECT/STARTER "AT" DENOTES AMPERE TRIP SETTINGS BRANCH CIRCUITS AND FEEDERS WITHIN THE AREA OF DEMOLITION SCOPE PRIOR TO "A" DENOTES AMPERE TRIP SIZE DE-ENGERGIZING AND DISCONNECTION. ALL CIRCUITS WITHIN PANELBOARDS OVERLOAD PROTECTION DENOTES NUMBER OF POLES MANUAL MOTOR STARTER W/THERMAL IDENTIFIED FOR REMOVAL SHALL BE TRACED AND LABELED TO ENSURE THAT NO AREA OUTSIDE THE DEMOLITION SCOPE LIMIT IS AFFECTED. CIRCUIT BREAKER - DRAWOUT THE ELECTRICAL CONTRACTOR SHALL IDENTIFY ALL BRANCH CIRCUITS, FEEDERS "AF" DENOTES AMPERE FRAME SIZE AND SYSTEM COMPONENTS, WHICH ARE TO REMAIN WITHIN THE AREA OF DRY TYPE TRANSFORMER "AT" DENOTES AMPERE TRIP SETTINGS DEMOLITION SCOPE. THERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT APPROVAL FROM THE OWNERS REPRESENTATIVE. EXISTING EQUIPMENT TO REMAIN SHALL BE LEFT IN A CODE SWITCH AND FUSE COMPLIANT MANNER. "400AS" DENOTES AMPERE SWITCH SIZE JUNCTION BOX "300AF" DENOTES AMPERE FUSE SIZE 6. THE ELECTRICAL CONTRACTOR SHALL DE-ENERGIZE AND REMOVE ALL CONDUCTORS AND RACEWAY TO THEIR POINTS OF ORIGIN WITHIN THE AREA OF DEMOLITION SCOPE. ITEMS IDENTIFIED FOR DEMOLITION SHALL NOT BE ABANDONED IN PLACE. РВ RACEWAYS THAT ENTER MASONRY WALLS AND FLOORS SHALL BE CUT FLUSH AT MOTOR CURRENT PROTECTOR THE SURFACE FOR PATCHING BY OTHERS. ALL CIRCUIT BREAKERS ASSOCIATED "AT" DENOTES AMPERE TRIP SETTINGS WITH THE DEMOLITION SCOPE SHALL BE DE-ENERGIZED AND LABELED SPARE. ELECTRIC BASIN HEATER FULL VOLTAGE NON REVERSING MOTOR "#" DENOTES NEMA SIZE THE ELECTRICAL CONTRACTOR SHALL TEMPORARILY SUPPORT ALL ITEMS TO REMAIN PUSHBUTTON THAT ARE AFFECTED BY THE DEMOLITION OF BUILDING STRUCTURAL COMPONENTS (WALL, CEILINGS, ETC.). TEMPORARILY SUPPORTED ITEMS SHALL BE PERMANENTLY MUSHROOM TYPE SUPPORTED AND INSTALLED WHEN FINALIZED STRUCTURES ARE IN PLACE. PRIMARY DISCONNECT SWITCH (BOLTED PRESSURE TYPE) SHUNT TRIP EMERGENCY POWER OFF (EPO) ALL REMOVED ITEMS SHALL BE LEGALLY DISPOSED OF UNLESS IDENTIFIED FOR REUSE. THE OWNERS REPRESENTATIVE SHALL INSPECT ALL RETAINED ITEMS PRIOR TO PLACEMENT IN THE IDENTIFIED STORAGE LOCATION BY THE ELECTRICAL **HEAT TRACE** AUTOMATIC TRANSFER SWITCH "ATS" CONTRACTOR. 9. THE FIRE ALARM SYSTEM SHALL REMAIN FULLY FUNCTIONAL DURING THE DEMOLITION AND CONSTRUCTION. ALL REQUIRED SYSTEM SHUTDOWNS SHALL BE MOTOR COORDINATED WITH AND APPROVED BY THE OWNERS REPRESENTATIVE AND THE X = HP SIZE AUTOMATIC TRANSFER SWITCH "ATS" W/BYPASS AUTHORITY HAVING JURISDICTION. ISOLATION 10. REMOVED FLUORESCENT LAMPS AND ANY BATTERIES SHALL BE RECYCLED BY A FACILITY APPROVED BY THE OWNER'S REPRESENTATIVE. A UNIFORM HAZARDOUS WASTE MANIFEST SHALL BE PREPARED FOR ALL DISPOSALS AND RETURNED WITH ALL APPLICABLE SIGNOFFS PRIOR TO APPLICATION FOR FINAL PAYMENT. BUILDING GROUNDING & LIGHTNING 11. WHERE EXISTING WIRING IS INDICATED TO BE REUSED, CONTRACTOR SHALL VERIFY PROTECTION LEGEND THAT THE INTEGRITY OF THE INSULATION IS ADEQUATE FOR REUSE. CONTRATOR POWER TRANSFORMER SHALL REPLACE EXISTING WIRING WHERE REQUIRED. GROUND ROD ∇ DELTA WIRING DEVICES LEGEND EXOTHERMIC BONDING CONNECTION VOLTAGE TRANSFORMERS BOLTED BONDING CONNECTION 125 VOLT, 2 POLE, 3 WIRE, 20 AMP., DUPLEX CURRENT TRANSFORMERS RECEPTACLE. "2" DENOTES CIRCUIT NUMBER. TT | GROUND BUS COUNTER. "C" DENOTES MOUNTED ABOVE GROUND BUS CONNECTION TO EARTH BREAKER "GF" DENOTES GROUND FAULT CIRCUIT FAULT "GFI" DENOTES INTEGRAL GROUND INTERRUPTOR AIR TERMINAL SYSTEM GROUND OR EQUIPMENT GROUND "IG" DENOTES ISOLATED GROUND "a" DENOTES SWITCH CONTROL METER SOCKET DOWN CONDUCTOR WITH GROUND ROD. 125 VOLT, 2 POLE, 3 WIRE, 20 AMP., DOUBLE DUPLEX RECEPTACLE. PRIMARY UTILITY METERING LIGHTNING ARRESTER AND GROUNDING 125 VOLT, 2 POLE, 3 WIRE, 20 AMP., EMERGENCY DUPLEX RECEPTACLES. MONITORING AND PROTECTIVE DEVICE 125 VOLT, 2 POLE, 3 WIRE, 20 AMP., DUPLEX RECEPTACLE FLUSH FLOOR MOUNTED. GROUND FAULT SENSOR & RELAY **EXISTING EQUIPMENT & LINETYPE** SPECIAL PURPOSE RECEPTACLE. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION. SHUNT TRIP SWITCH "a" DENOTES SWITCH CONTROL EXISTING DEVICE TO BE MAINTAINED "#" DENOTES NUMBER OF POLES ON TOGGLE SWITCH EXISTING DEVICE TO BE REMOVED AND "P" SWITCH AND PILOT LIGHT COMBINATION CIRCUIT PULLED BACK TO POINT OF ORIGIN. "K" KEY OPERATED SWITCH NETWORK PROTECTOR EXISTING DEVICE TO BE RELOCATED NEW LOCATION OF EXISTING DEVICE, EXTEND ELECTRIC HEATER BRANCH/FEEDER CIRCUIT TO NEW LOCATION. OCCUPANCY SENSOR EXISTING DEVICE AND COVER TO BE VARIABLE FREQUENCY DRIVE REMOVED AND REPLACED WITH NEW. MAINTAIN BACK BOX AND CIRCUIT. EXISTING DEVICE AND COVER TO BE LIGHTING LEGEND REMOVED AND REPLACED WITH NEW. MAINTAIN BACK BOX AND PROVIDE A NEW CIRCUITRY, RACEWAYS & FEEDERS CIRCUIT AS INDICATED. A 7 8 2x2 LIGHT FIXTURE (REFER TO SCHEDULE FOR EXISTING DEVICE TO BE REWORKED ADDITIONAL INFORMATION) "A" DENOTES FIXTURE TYPE "8" DENOTES CIRCUIT NUMBER BOLD-DASHED LINEWEIGHT INDICATES TO BE HOMERUN TO PANEL "DP41", CIRCUIT #2 VIA 20A/1P "a" DENOTES SWITCH CONTROL CIRCUIT BREAKER. REFER TO ONE-LINE DIAGRAM AND "NL" DENOTES UNSWITCHED NIGHTLIGHT PANEL SCHEDULES FOR ADDITIONAL INFORMATION. LIGHT OUT OF FUNCTION LINEWEIGHT INDICATES TO 1x4 LIGHT FIXTURE (REFER TO SCHEDULE FOR REMAIN AS IS ADDITIONAL INFORMATION) HOMERUN TO PANEL "DP41", CIRCUIT #2,4,6 (VIA 50A/3P BOLD LINEWEIGHT INDICATES NEW OR C/B'S). CONDUCTORS UNLESS NOTED OTHERWISE. AFFECTED WORK 2x4 LIGHT FIXTURE (REFER TO SCHEDULE FOR PROVIDE GROUNDING CONDUCTOR IN ACCORDANCE WITH SPECIFICATIONS & NEC REQUIREMENTS ADDITIONAL INFORMATION) CEILING MOUNTED DOWNLIGHT OR PENDANT LOW VOLTAGE DEVICES LEGEND CIRCUITRY: FIXTURE (REFER TO SCHEDULE FOR ADDITIONAL INFORMATION) **TURNING UP** COMBINATION TEL/DATA OUTLET WALL MOUNTED DOWNLIGHT OR PENDANT "C" DENOTES MOUNTED ABOVE COUNTER FIXTURE. (REFER TO SCHEDULE FOR TURNING DOWN "W" DENOTES WALL MOUNTED ADDITIONAL INFORMATION) EMERGENCY LIGHT FIXTURE (REFER TO DATA OUTLET SURFACE METAL RACEWAY WITH FULL SIZE SCHEDULE FOR ADDITIONAL INFORMATION) DEVICES AS INDICATED ON CENTER. PROVIDE "•" DENOTES IF FIXTURE IS EMERGENCY RACEWAY WITH BARRIER SEPARATION FOR TELEPHONE OUTLET POWER AND COMMUNICATION. LED INDUSTRIAL STRIP CARD READER CABLE TRAY ILLUMINATED "EXIT" SIGN LIGHTING FIXTURE. CEILING MOUNTED OR WALL MOUNTED DOOR CONTACT PROVIDE DIRECTIONAL ARROWS AS INDICATED ON FLOOR PLANS. PUSH BUTTON EMERGENCY BATTERY UNIT EMERGENCY BATTERY UNIT WITH HEADS AS INDICATED REMOTE EMERGENCY LIGHTING HEADS SUPPLIED FROM BATTERY UNIT





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BOILER PLANT REPLACI

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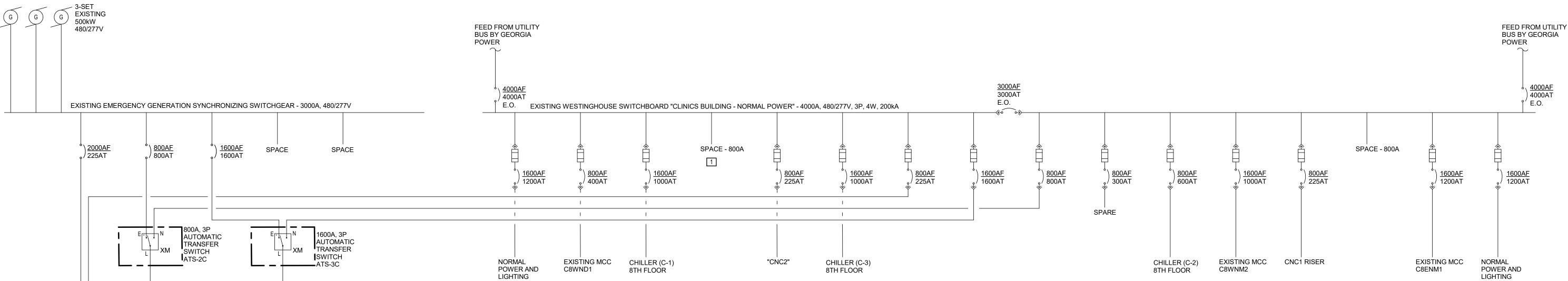
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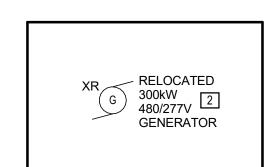
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1/4" = 1'-0"

ENGINEER OF RECORD: **GENERAL NOTES - DEMOLITION** PRIOR TO WORK CONTENTMENT, EC TO PROVIDE GPR SCANNING TO VERIFY EXISTING CONDITIONS. PROVIDE SCANNING AS A SUBMITTAL TO OWNER AND ENGINEER. PRIOR TO THE START OF DEMOLITION, THE EC AND THE DEMOLITION SUB SHALL WORK CLOSELY WITH OWNER, 1435 BEDFORD AVE PITTSBURGH, PA 15219 ENGINEER, AND ALL OTHER SUBS TO IDENTIFY WHICH EXISTING PIPE, DUCTWORK, EQUIPMENT, ETC. SHALL EITHER BE PROTECTED DURING CONSTRUCTION OR NOTES: DEMOLISHED AND REMOVED. | KEY NOTES - DEMOLITION 1. EC TO PREPARE EXISTING SPACE TO BREAKER PROVIDE UNDER NEW WORK SCOPE. 2. EC TO DISCONNECT FROM THE BOILER PLANT AND RELOCATE EXISTING GENERATOR. FEED FROM UTILITY **BUS BY GEORGIA** POWER 4000AF 4000AT E.O. ENGINEER SEAL: NORMAL POWER AND LIGHTING BUSWAY No. REVISION / ISSUE DATE **DEMOLITION WORK** MEMORIAL HOSPITAL E101





EXISTING

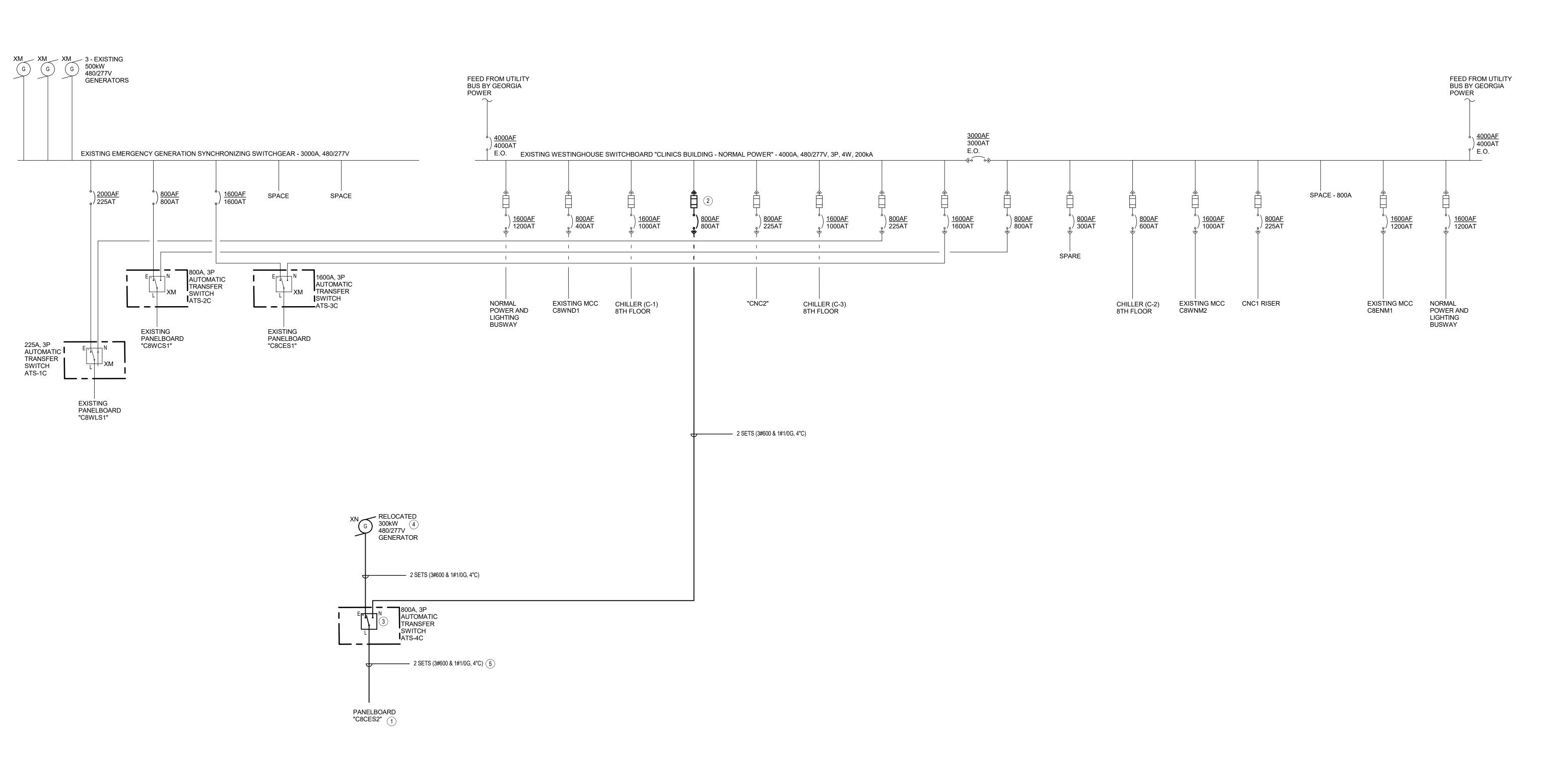
PANELBOARD "C8CES1"

EXISTING

225A, 3P AUTOMATIC TRANSFER SWITCH ATS-1C

> PANELBOARD "LSDP4"

BUSWAY



GENERAL NOTES - NEW WORK

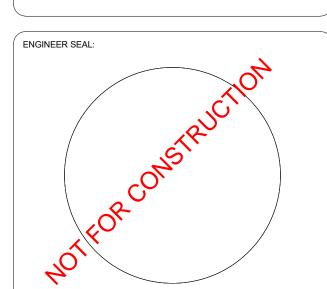
 REFER TO SPECIFICATIONS AND DETAILS FOR ADDITIONAL INFORMATION.



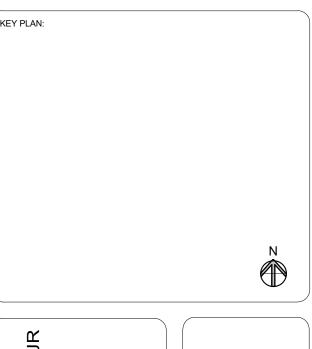
- EC TO PROVIDE PANELBOARD. REFER TO SCHEDULE FOR ADDTIONAL INFORMATION.
- 2. EC TO PROVIDE 800A BREAKER COMPATIBLE WITH
- EXISTING WESTINGHOUSE SWITCHBOARD.
- 3. PROVIDE 800AMP AUTOMATIC TRANSFORMER SWITCH TO SUPPORT EQUIPMENT BRANCH LOADS.
- 5. EC TO RELOCATE EXISTING GENERATOR TO CLINICS BUILDING. PRIOR TO BEING INSTALLED CONTRACTOR TO SEND TO LOCAL CUMMINGS FACTORY TO BE RETROFITTED WITH A BELLY TANK WITH 24 HOURS WORTH OF RUN TIME AND REPLACE EXISTING 400A BREAKER WITH A 500A BREAKER.
- 6. COORDINATE WITH MECHANICAL CONTRACTOR TO RUN THE CONDUIT AND PULL BOXES ON THE SAME RACK WITH MECHANICAL PIPING.



NOTES:

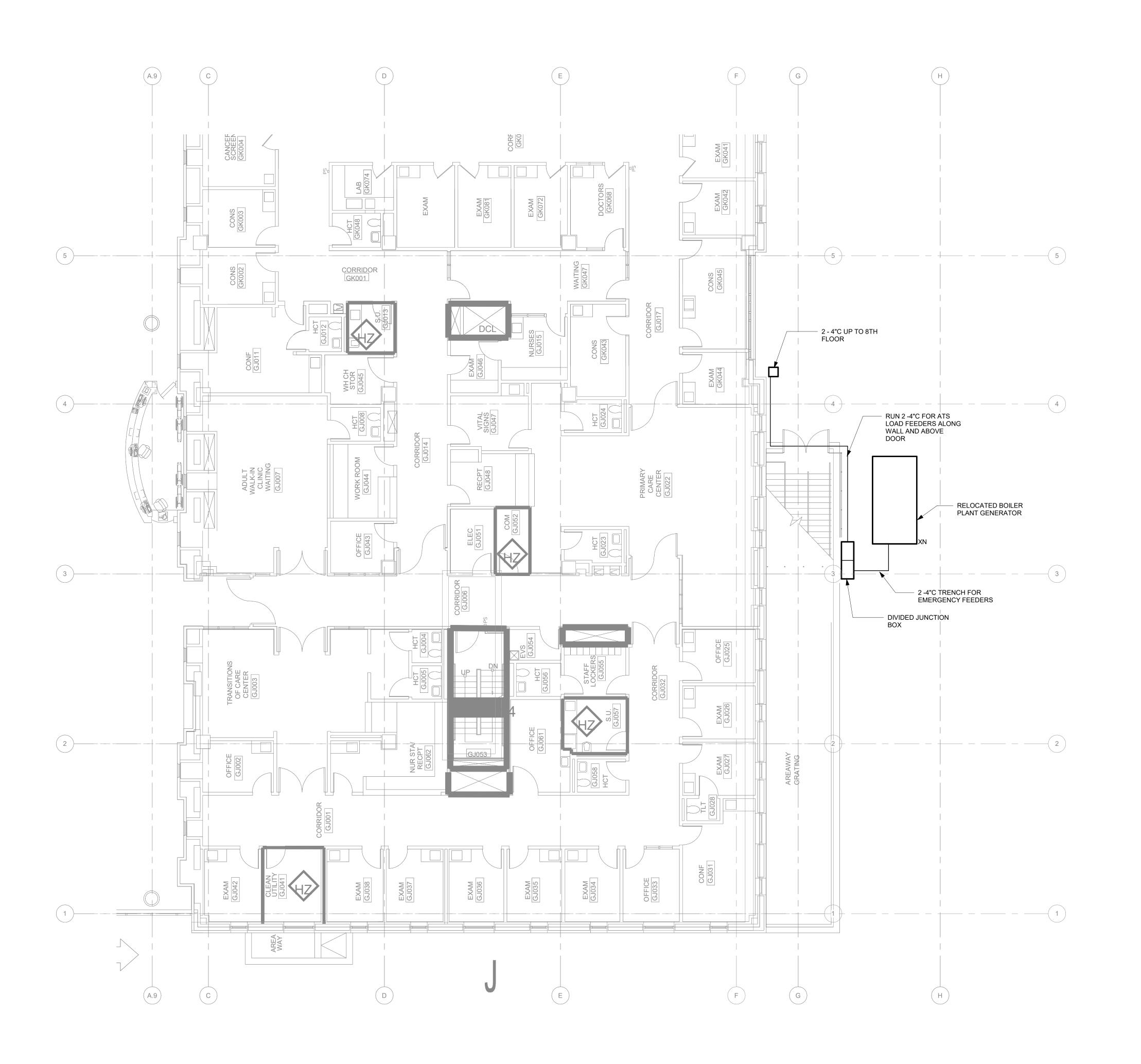


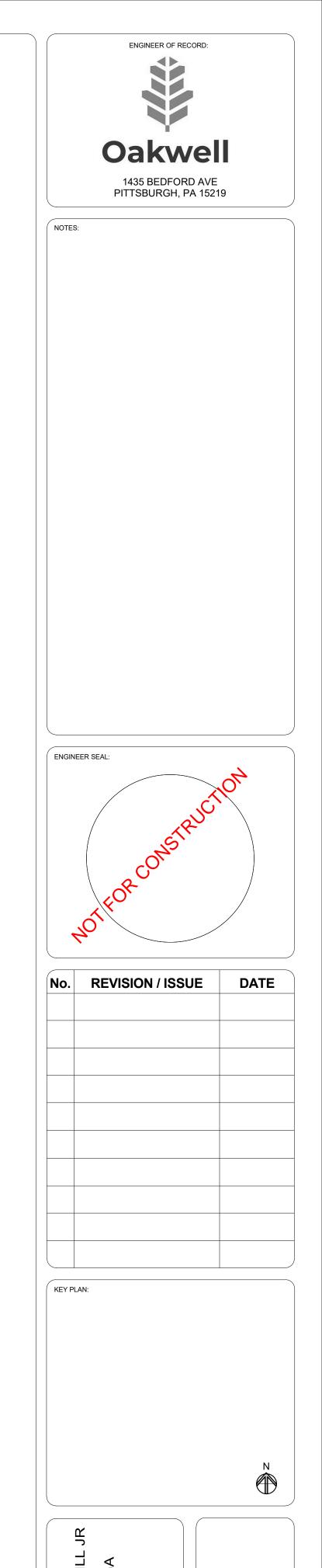
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GRADY MEMORIAL HOSPITAL	80 JESSE HILL JR DR SE ATLANTA, GA
BOILER PLANT REPLACEMENT	30303
ELECTRICAL ONELINE DIAGRAMS - NEW WORK	WORK

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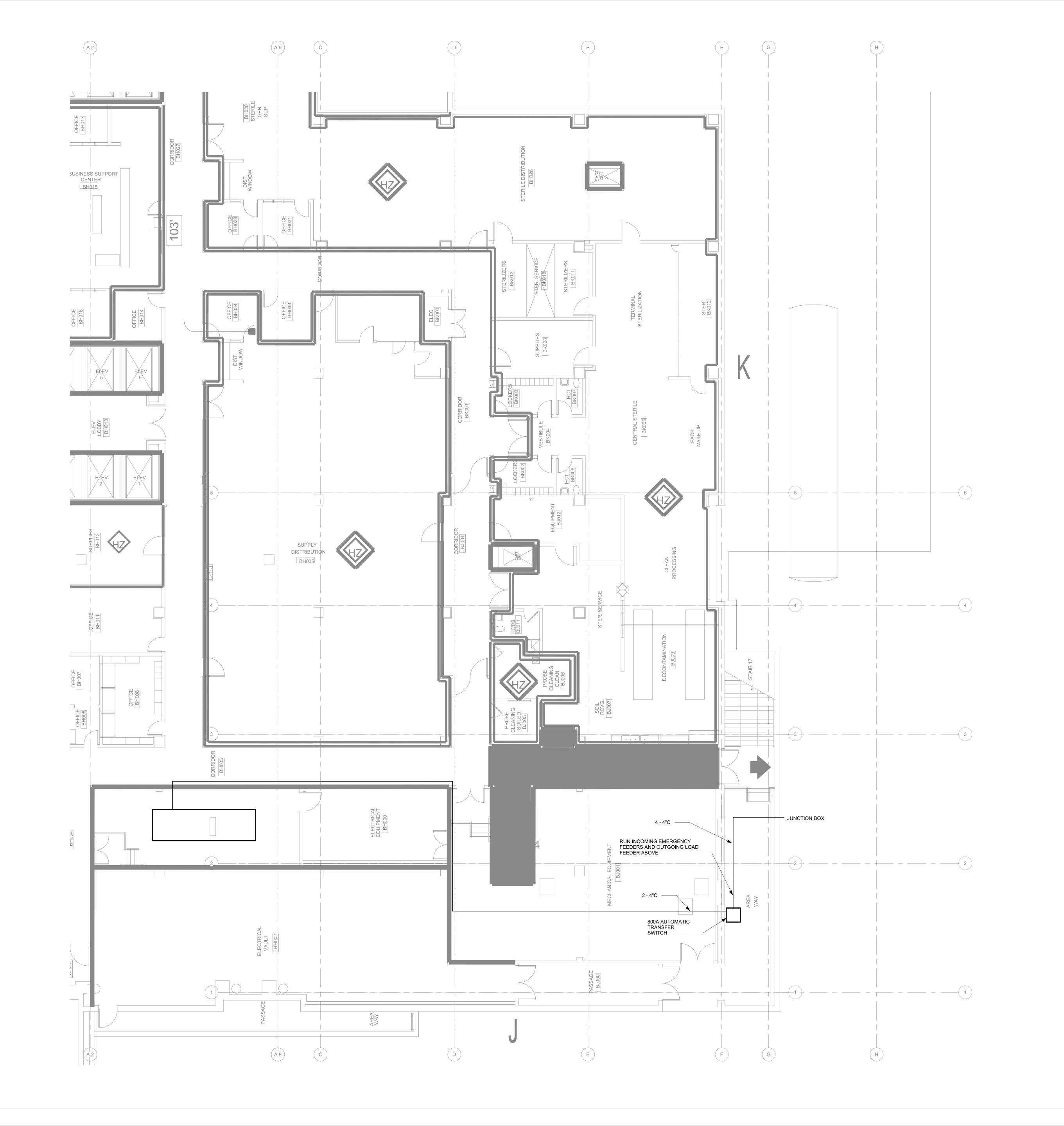




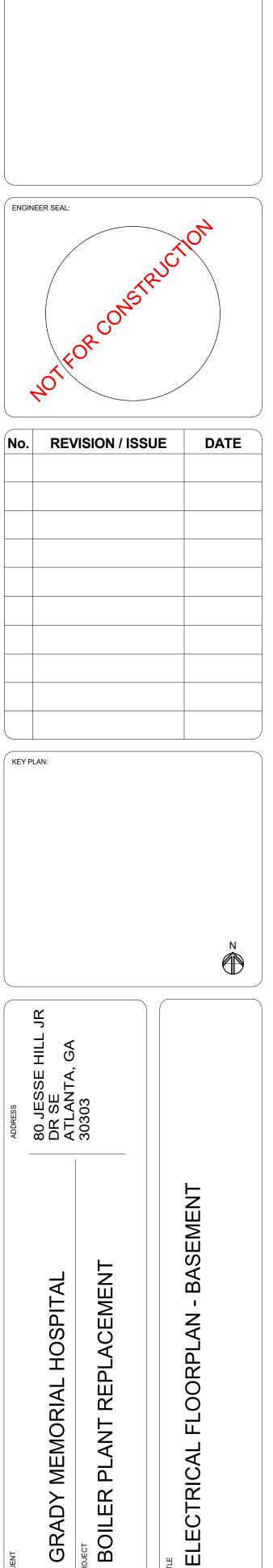
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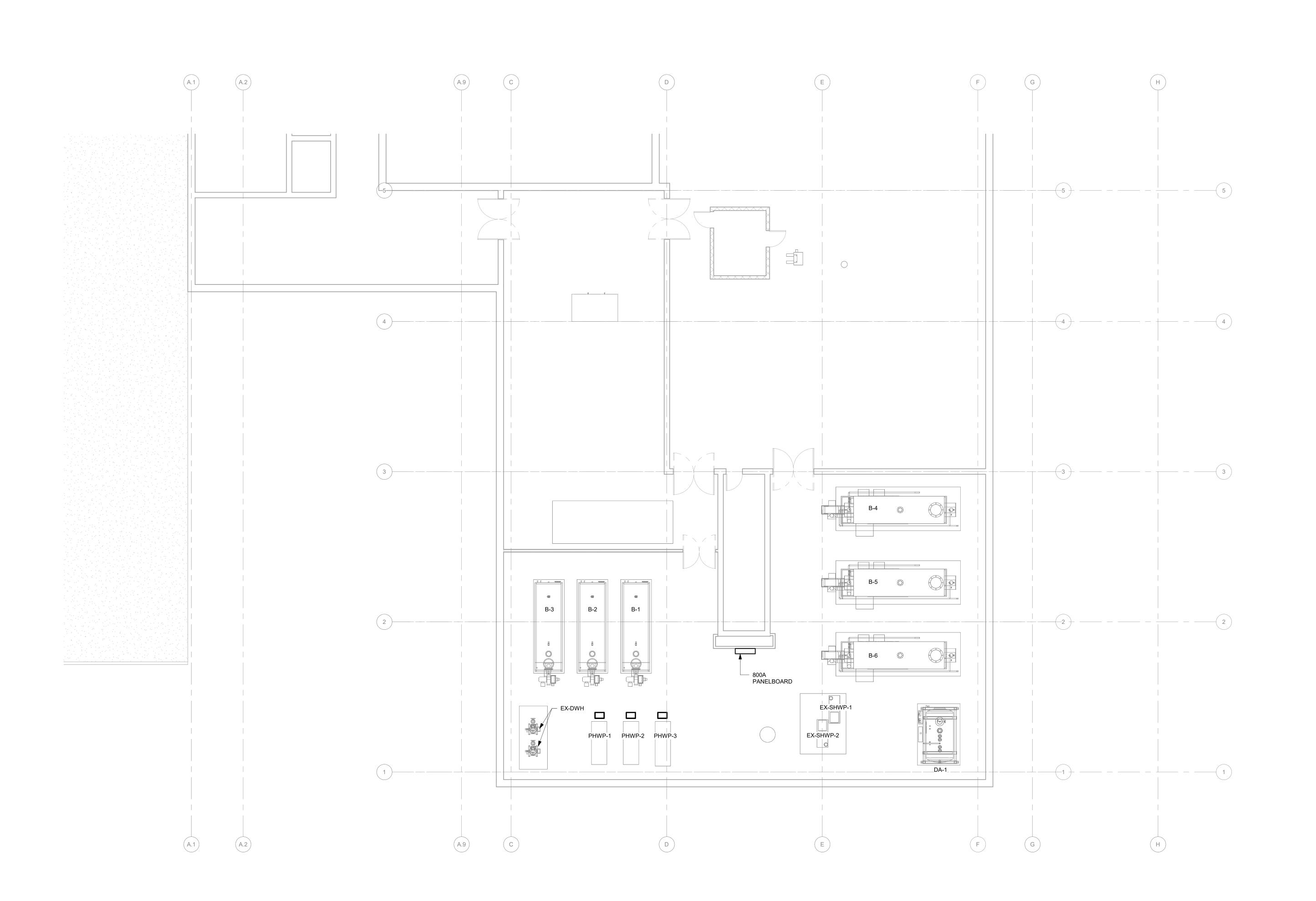
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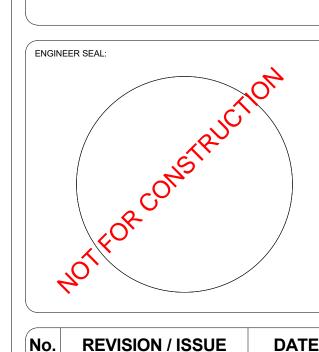
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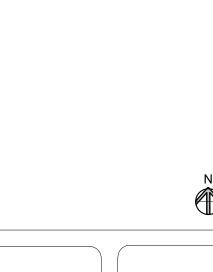
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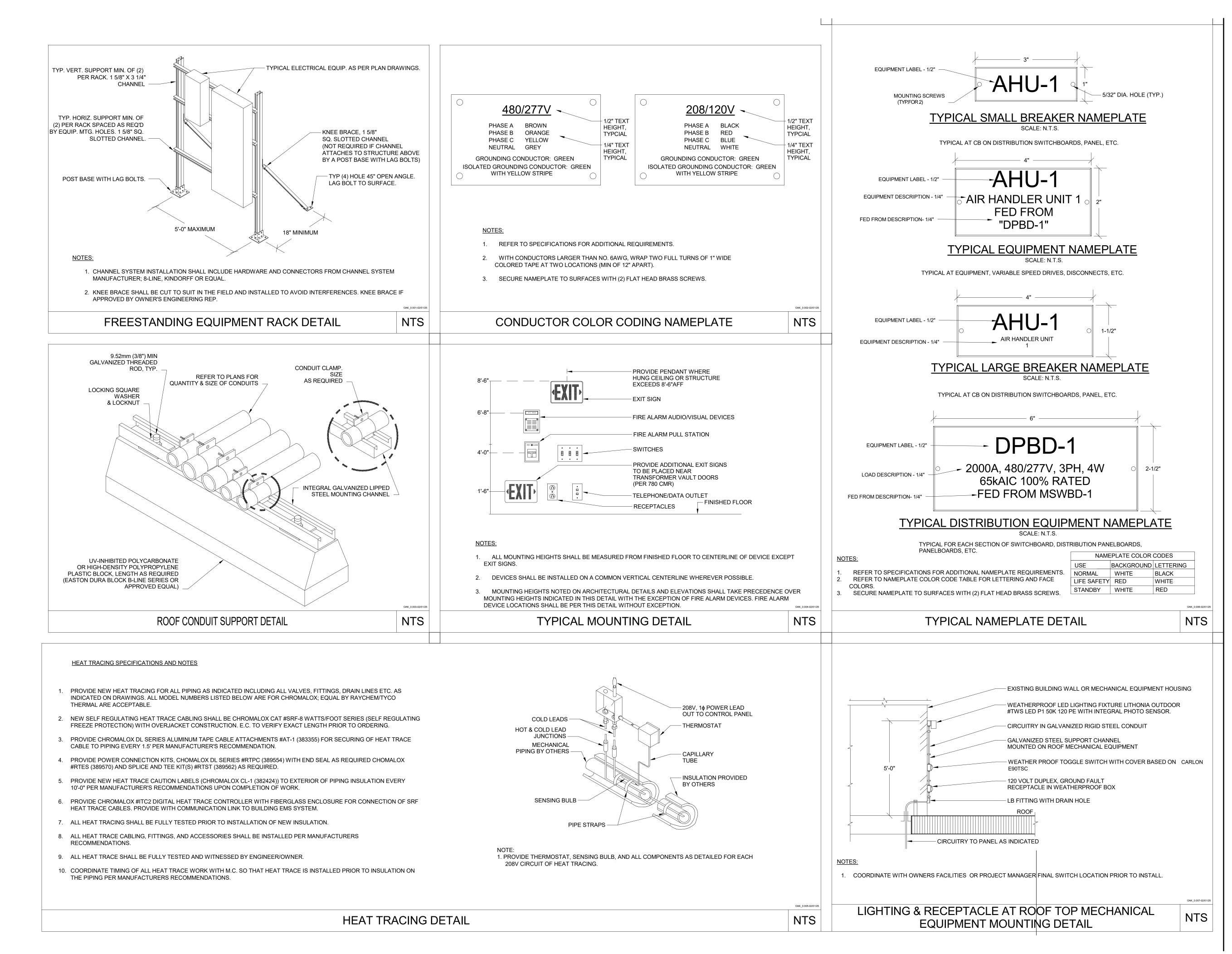


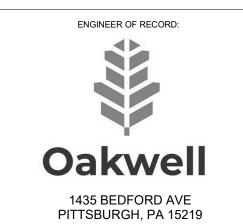
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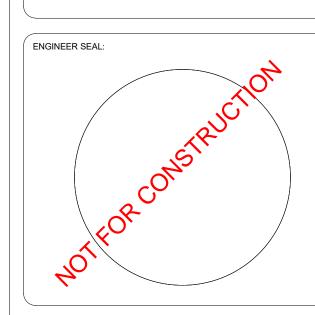
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ADRESS HILL JR DR SE ATLANTA, GA 30303

ADY MEMORIAL HOSPITAL
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JOB NUMBER 25-014 10/09/25

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UNIT		LOAD INFORMATION				POWER SOURCE			CONNECTION					
TAG	DESCRIPTION	MECH. LOAD	VOLTS	AMPS	PH	WIRE	KVA	PANEL	CIRCUIT BREAKER	BRANCH CIRCUIT	FLEX	TYPE (JB/REC/DISC)	REMARKS	
DA-1	DE-AERATOR TANK	10 HP	480	14.0	3	3	11.64	C8CES2	30A/3P	3#10 & 1#10G, 3/4"	X	DISC	SEE N	
B-1	HOT WATER BOILER		480	24.6	3	3	20.45	C8CES2	20A/1P	3#8 & 1#8G, 3/4"	x	DISC	SEE N	
B-2	HOT WATER BOILER		480	24.6	3	3	20.45	C8CES2	20A/1P	3#8 & 1#8G, 3/4"	Х	DISC	SEE N	
B-3	HOT WATER BOILER		480	24.6	3	3	20.45	C8CES2	20A/1P	3#8 & 1#8G, 3/4"	Х	DISC	SEE N	
B-4	STEAM BOILER - COMBUSTION AIR FAN	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	Х	DISC	SEE N	
D-4	STEAM BOILER - AIR COMPRESSOR	7.5	480	11.0	3	3	9.15	C8CES2	20A/3P	3#12 & 1#12G, 3/4"	Х	DISC	SEE N	
D. C.	STEAM BOILER - COMBUSTION AIR FAN	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	Х	DISC	SEE N	
B-5	STEAM BOILER - AIR COMPRESSOR	7.5	480	11.0	3	3	9.15	C8CES2	20A/3P	3#12 & 1#12G, 3/4"	Х	DISC	SEE N	
D.O.	STEAM BOILER - COMBUSTION AIR FAN	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	х	DISC	SEE N	
B-6	STEAM BOILER - AIR COMPRESSOR	7.5	480	11.0	3	3	9.15	C8CES2	20A/3P	3#12 & 1#12G, 3/4"	Х	DISC	SEE N	
PHWP-1	PRIMARY HOT WATER PUMP	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	Х	DISC	SEE N	
PHWP-2	PRIMARY HOT WATER PUMP	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	Х	DISC	SEE N	
PHWP-3	PRIMARY HOT WATER PUMP	40	480	52.0	3	3	43.23	C8CES2	100A/3P	3#4 & 1#8G, 1"	х	DISC	SEE N	
													-	
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REFER TO DRAWINGS & SPECIFICATION FOR ADDITIONAL INFORMATION OF BRANCH CIRCUIT WIRING METHODS BASED ON APPLICABLE LOCATION.

"FLEX" - DENOTES FINAL THREE FEET (MAX.) OF RACEWAY SHALL BE LIQUID-TIGHT FLEXIBLE METAL.

"JB" - DENOTES FINAL CONNECTION TO A JUNCTION BOX OR CONTROL PANEL PRE-WIRED TO UNIT.

"REC" - DENOTES FINAL CONNECTION TO A RECEPTACLE. REFER TO REMARKS COLUMN FOR NEMA CONFIGURATION.

EQUIPMENT NOTES BELOW ARE APPLICABLE WHEN NOTED IN THE REMARKS COLUMN.

EQUIPMENT NOTES:

- 1. DISCONNECT SHALL BE NON-FUSED. REFER TO DRAWINGS AND SPECIFICATION FOR AREA CLASSIFICATION TO DETERMINE NEMA ENCLOSURE.
- 2. DISCONNECT SHALL BE FUSED. REFER TO DRAWINGS AND SPECIFICATION FOR AREA CLASSIFICATION TO DETERMINE NEMA ENCLOSURE.
- 3. DISCONNECT SHALL BE MOTOR-RATED SWITCH WITH THERMAL OVERLOAD ELEMENT. REFER TO DRAWINGS AND SPECIFICATION FOR AREA CLASSIFICATION TO DETERMINE NEMA ENCLOSURE.
- 4.1 PROVIDED BY OTHERS. INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
- 4.2 PROVIDED BY ELECTRICAL CONTRACTOR. INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
- 5. STARTER TO BE PROVIDED BY ELECTRICAL CONTRACTOR WITHIN MOTOR CONTROL CENTER.
- 6. VFD FURNISHED BY OTHERS. INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
- 7. UNIT TO BE PROVIDED WITH WALL MOUNTED CONTROLLER WIRED BY OTHERS.
- 8. DISCONNECT SHALL BE PROVIDED WITH THE UNIT, WIRED BY ELECTRICAL CONTRACTOR.
- 9. VFD FURNISHED BY CHILLER MANUFACTURER. WIRED BY ELECTRICAL CONTRACTOR.

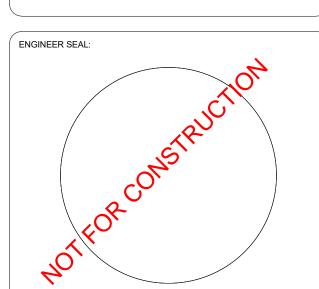
SPACING FO	R VERTICAL CON	IDUCTOR SU	JPPORTS
		CONDU	CTORS
		СОР	PER
SIZE OF WIRE	SUPPORT OF CONDUCTORS IN VERTICAL	m	ft
18 AWG THROUGH 8 AWG	RACEWAYS NOT GREATER THAN	30	100
6 AWG THROUGH 1/0 AWG	NOT GREATER THAN	30	100
2/0 AWG THROUGH 4/0 AWG	NOT GREATER THAN	25	80
OVER 4/0 AWG THROUGH 350 kcmil	NOT GREATER THAN	18	60
OVER 350 kcmil THROUGH 500 kcmil	NOT GREATER THAN	15	50
OVER 500 kcmil THROUGH 750 kcmil	NOT GREATER THAN	12	40
OVER 750 kcmil	NOT GREATER THAN	11	35

SUPPORT NOTES:

A. PROVIDE VERTICAL SUPPORT OF CONDUCTORS PER THE ELECTRICAL CODE AT DISTANCES NOT TO EXCEED THOSE INDICATED IN THE CHART.

B. PROVIDE 0.Z. GEDNEY OR EQUAL WEDGE SUPPORT FITTINGS IN PULL BOXES AT INTERVALS NOT TO EXCEED THOSE INDICATED.





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JOB		ADDRESS
NUMBER 25-014	GRADY MEMORIAL HOSPITAL	80 JES DR SE ATLAN
DATE	BOILER PLANT REPLACEMENT	30303
10/09/25	ELECTRICAL SCHEDULES	

1.1 GENERAL PROJECT REQUIREMENTS

A. THE GENERAL REQUIREMENTS, DIVISION 1, AND BIDDING AND CONTRACT
REQUIREMENTS, DIVISION 0, ARE HEREBY MADE PART OF THIS SPECIFICATION

B. THE ELECTRICAL CONTRACTOR SHALL FULLY COORDINATE HIS WORK AND THOSE OF ALL HIS DIRECT SUBS WITH THE OWNER, GC AND THE TRADE CONTRACTORS THAT ARE DIRECTS SUBS TO THE G.C.
C. THE WORD "CONTRACTOR" AS USED IN THIS SPECIFICATION SHALL MEAN THE ELECTRICAL CONTRACTOR. E.C. SHALL MEAN ELECTRICAL CONTRACTOR IN THIS SPECIFICATION.

D. AS USED IN THIS SECTION

1. "PROVIDE" MEANS "FURNISH AND INSTALL"

1.2 GENERAL WORK REQUIREMENTS

 "POS" MEANS "PROVIDED UNDER OTHER SECTIONS".
 "FURNISH" MEANS "TO PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE WITH EVERY NECESSARY APPURTENANCE AND SUPPORT"
 "INSTALL" MEANS "TO UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY

. "INSTALL" MEANS "TO UNLOAD AT THE DELIVERY POINT AT THE SITE AND PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT.

E. THE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK, INDICATE GENERAL ARRANGEMENT AND SIZE OF EQUIPMENT AND RACEWAY PATHWAYS. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS PRACTICAL IN LAYING OUT WORK AND VERIFYING SPACES IN WHICH THE WORK IN

THIS SECTION IS TO BE INSTALLED.

F. PROJECT DRAWINGS AND SPECIFICATIONS SHALL BE TAKEN TOGETHER; PROVIDE AS THOUGH MENTIONED IN BOTH, WORK SPECIFIED AND NOT SHOWN, OR WORK SHOWN AND NOT SPECIFIED. ALTHOUGH SUCH WORK IS NOT SPECIFICALLY SHOWN OR SPECIFIED, THIS CONTRACTOR SHALL PROVIDE AS PART OF HIS WORK ALL SUPPLEMENTARY AND MISCELLANEOUS ITEMS, APPURTENANCES, DEVICES OR MATERIALS INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND

COMPLETE INSTALLATION INCLUDING ALL REQUIRED LABOR AND SUPERVISION.

G. BEFORE SUBMITTING BID, THIS CONTRACTOR AND HIS DIRECT SUBS SHALL VISIT AND EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT MAY AFFECT ANY SPECIFIED WORK. IT IS THIS CONTRACTOR'S AND HIS DIRECT SUBS' RESPONSIBILITY TO FIELD VERIFY LOCATION OF ALL EQUIPMENT/MATERIAL LOCATION AND EXISTING CONDITIONS. NO EXTRA PAYMENT WILL BE ALLOWED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH PROJECT SITE THAT ARE VISIBLE OR READILY CONSTRUED BY EXPERIENCED OBSERVER.

A. ANY DAMAGE DONE TO EXISTING SYSTEMS AND BUILDING BY THIS CONTRACTOR AND HIS DIRECT SUBS SHALL BE IMMEDIATELY CORRECTED AND/OR REPAIRED AT THE CONTRACTOR'S EXPENSE AND WITH NO ADDITIONAL COST TO THE OWNER.
B. SPECIAL ATTENTION AND PLANNING SHALL BE GIVEN TO ALL MATTERS THAT INVOLVE INTERRUPTION OF BUILDING SERVICES. THE OWNER SHALL BE NOTIFIED PRIOR TO ANY INTERRUPTION OF BUILDING SERVICES. SHUTDOWNS SHALL ONLY BE MADE WHERE NECESSARY AND WHERE PRIOR ARRANGEMENTS WITH THE OWNER HAVE BEEN MADE.

C. E.C. AND HIS SUBS (IF NEEDED) SHALL PROVIDE A LOCKED GANG BOX FOR SECURING HIS EQUIPMENT THAT MAY BE LEFT IN AREA DESIGNATED BY OWNER. THE OWNER IS NOT RESPONSIBLE FOR THEFT OR DAMAGE TO THE CONTRACTOR'S EQUIPMENT.
D. REMOVE ALL TRASH AND EMPTY CONTAINERS AT END OF EACH WORKING DAY. AT

COMPLETION OF PROJECT WORK, CONTRACTOR SHALL THOROUGHLY CLEAN PROJECT WORK AREA.

E. E.C. SHALL COORDINATE PARKING REQUIREMENTS, USE OF BATHROOM FACILITIES, AND DAILY CONTRACTOR CHECK-IN AND MEANS OF ACCESS TO

PROJECT AREA WITH OWNER.

SCOPE OF WORK

A. THE SCOPE OF WORK UNDER THIS SECTION INCLUDES FURNISHING OF ALL LABOR, MATERIALS, APPURTINANCES, APPLIANCES, EQUIPMENT, TOOLS, TRANSPORTATION, SUPERVISION, AND SERVICES NECESSARY TO COMPLETE ALL ELECTRICAL WORK IN ACCORDANCE WITH THE INTENT OF THE SPECIFICATIONS AND THE DRAWINGS. THE OVERALL SCOPE SHALL BE INCLUSIVE OF ALTERATIONS

TO THE EXISTING ELECTRICAL SYSTEMS WITHIN THE AREAS BEING RENOVATED

UNDER THIS CONTRACT.

1.4 CODES, RULES, PERMITS & FEES, APPLIES TO EC AND HIS DIRECT SUBS

A. ALL WORK SHALL BE DONE PER LATEST REQUIREMENTS OF MASSACHUSETTS

STATE BUILDING CODE, OWNER'S LATEST CONSTRUCTION STANDARDS,

APPLICABLE CODES/STANDARDS, AND APPLICABLE REQUIREMENTS OF

AUTHORITIES HAVING JURISDICTION.

B. GIVE NOTICES, FILE PLANS, OBTAIN PERMITS AND LICENSES, PAY FEES AND BACK CHARGES, AND OBTAIN NECESSARY APPROVALS FROM AUTHORITIES THAT HAVE JURISDICTION AS REQUIRED TO PERFORM WORK IN ACCORDANCE WITH ALL LEGAL REQUIREMENTS AND WITH SPECIFICATIONS, DRAWINGS, ADDENDA AND

CHANGE ORDERS, ALL OF WHICH ARE PART OF CONTRACT DOCUMENTS.

C. INCLUDE IN WORK, WITHOUT EXTRA COST, ANY MINOR CHANGES FROM THE CONTRACT DOCUMENTS REQUIRED IN ORDER TO COMPLY WITH APPLICABLE LAWS, ORDINANCES, RULES AND REGULATIONS. THE CONTRACTOR WILL BE REIMBURSED FOR ANY MAJOR CHANGES REQUIRED.

D. MATERIALS FURNISHED, WORK INSTALLED SHALL COMPLY WITH RULES, RECOMMENDATIONS OF NFPA, REQUIREMENTS OF LOCAL AUTHORITIES HAVING JURISDICTION (AHJ), RECOMMENDATIONS OF FIRE INSURANCE RATING ORGANIZATION HAVING JURISDICTION, REQUIREMENTS OF GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION.
E. ANY CHANGES REQUIRED IN THE INTENT OF DRAWINGS AND SPECIFICATIONS BY ANY PROPERLY AUTHORIZED INSPECTION AGENCY SHALL BE BROUGHT TO

ENGINEER'S ATTENTION FOR REVIEW.

F. PERFORM WORK IN STRICT ACCORDANCE WITH THE RULES, REGULATIONS, LISTING OR LABELING REQUIREMENTS, STANDARDS, CODES, ORDINANCES, AND LAWS OF LOCAL, STATE, AND FEDERAL GOVERNMENTS, AND OTHER AUTHORITIES HAVING LEGAL JURISDICTION OVER THE SITE. NO ADDITIONAL COMPENSATION SHALL BE GRANTED FOR WORK THAT MUST BE CHANGED AS A RESULT OF THE WORK NOT ORIGINALLY COMPLYING WITH THE CODES, STANDARDS, LOCAL REQUIREMENTS, ETC.

G. PROVIDE PRODUCTS LISTED AND CLASSIFIED BY AN OSHA CERTIFIED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AS SUITABLE FOR PURPOSE SPECIFIED AND INDICATED. PROVIDE NRTL-LISTED MATERIAL AND EQUIPMENT WHERE STANDARDS ARE AVAILABLE. NOTIFY ARCHITECT OF ANY MATERIAL OR EQUIPMENT THAT IS NOT NRTL LISTED WHEN SUBMITTING INFORMATION.
 H. WHERE SPECIFICATIONS/DRAWINGS THAT SPECIFY AND REQUIRE MORE STRINGENT REQUIREMENTS, THE BID DOCUMENTS SHALL GOVERN.

OJECT WARRANTY

A. THIS CONTRACTOR SHALL WARRANTEE WORK PROVIDED UNDER THIS
SPECIFICATION IN WRITING FOR 1 YEAR FROM DATE OF FINAL ACCEPTANCE.
REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT OR WORKMANSHIP THAT
MAY DEVELOP DURING WARRANTY PERIOD AT NO ADDITIONAL COST TO OWNER.
CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS. REPLACE MATERIAL
OR EQUIPMENT THAT REQUIRES EXCESSIVE SERVICES DURING WARRANTY

B. OBTAIN ON BEHALF OF THE OWNER, ALL EQUIPMENT MANUFACTURER'S WARRANTIES FOR EQUIPMENT PROVIDED BY THIS CONTRACTOR AND FURNISH COPIES OF THE EQUIPMENT WARRANTIES TO THE OWNER'S G.C. AS PART OF THE REQUIRED PROJECT CLOSEOUT DOCUMENTS.

A. THE FOLLOWING WORK TASKS SHALL BE FULLY COORDINATED WITH THE OWNER TO BE PERFORMED DURING PREMIUM HOURS SO AS NOT TO DISRUPT THE NORMAL OPERATIONS OF THE BUILDING:

1. ANY ACTIVITY THAT MAY CREATE EXCESSIVE NOISE
2. ALL SYSTEM SHUTDOWNS FOR TIE-IN OF NEW EQUIPMENT/SYSTEMS TO EXISTING

1.6 WORK PERFORMED DURING PREMIUM TIME

EQUIPMENT (I.E. ELECTRICAL, FIRE ALARM, ETC.)

B. THIS CONTRACTOR SHALL SUBMIT FOR APPROVAL A METHOD OF PROCEDURE (MOP) FOR ALL SHUTDOWNS AND/OR EXPOSURES IDENTIFYING TASKS, TIMELINES AND RESPONSIBLE PARTIES. ON TIME CONSTRAINT TASKS A BACK-OUT PLAN SHALL BE INCLUDED IF THE TASK IS AT RISK OF EXCEEDING THE PRE-APPROVED TIMELINE.

TIMELINE.

1.7 RELATED WORK BY OTHERS AND INCLUDED UNDER OTHER SECTIONS OF THE SPECIFICATIONS AS DIRECTED BY THE GENERAL OR PRIME CONTRACTOR.

A. CUTTING AND PATCHING

B. PAINTING

THIS WITH THE FIRE ALARM CONTRACTOR.

C. HVAC SYSTEM INCLUDING AUTOMATIC TEMPERATURE CONTROLS
D. PLUMBING SYSTEM
E. FIRE PROTECTION SYSTEM
1.8 COORDINATION WITH OWNER

A. OWNER SHALL PROVIDE ALL REQUIRED ELECTRICAL POWER & WATER FOR ANY EQUIPMENT REQUIRED BY PC AND HIS SUBS.
B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ANY REQUIRED SHUTDOWNS OF EXISTING SYSTEM FOR TIE-IN OF NEW PIPE/EQUIPMENT (I.E. ELECTRICAL, ETC.) THE ELECTRICAL CONTRACTOR SHALL GIVE A MINIMUM OF (3) WEEKS NOTICE TO THE GC AND OWNER FOR ANY REQUIRED SHUTDOWNS OR AS FURTHER DEFINED IN THE DIVISION ONE SPECIFICATIONS. ALL SYSTEMS AFFECTED BY SHUTDOWNS MUST BE RETURNED TO NORMAL OPERATING CONDITIONS AS END OF WORK DAY.
C. OWNER IS RESPONSIBLE FOR ANY REQUIRED FIRE ALARM SHUTDOWNS. IF FIRE ALARM SHUTDOWNS ARE REQUIRED FOR WORK, THE OWNER SHALL COORDINATE

1.9 M/E/P/FP FIELD COORDINATION DRAWINGS

A. THIS PROJECT REQUIRES FULLY COORDINATED MEFP (HVAC, ATC/EMS, PLUMBING, FIRE PROTECTION, ELECTRICAL AND FIRE ALARM) FIELD COORDINATION DRAWINGS FOR ALL WORK, BOTH INSTALLED INSIDE THE BUILDING (ROOM SPACE AND CEILING PLENUM) AND FOR WORK INSTALLED OUTSIDE OF THE BUILDING. THE PLUMBING CONTRACTOR SHALL BE REQUIRED TO PREPARE FIELD COORDINATION DRAWINGS FOR HIS PLUMBING SCOPE FOR THESE AREAS.

B. THE OWNER'S GENERAL CONTRACTOR (G.C.) WILL OVERSEE THE DEVELOPMENT OF THE MEEP FIELD COORDINATION

C. AS PART OF THE FIELD COORDINATION DRAWINGS, THE G.C. SHALL HIGHLIGHT ALL

FIRE PARTITIONS/FIRE RATED WALLS FOR COMPLETE TRADE COORDINATION OF ALL PENETRATIONS.

D. THE ELECTRICAL AND FIRE ALARM CONTRACTOR SHALL PREPARE HIS FIELD

COORDINATION DRAWINGS AND WORK WITH THE OTHER TRADE CONTRACTORS

AND THE OWNER'S GC TO DEVELOP THESE DRAWINGS.

E. ANY REQUIRED ACCESS PANELS IN HARD CEILINGS, WALLS SHALL BE FURNISHED AND INSTALLED BY THE G.C. THE ELECTRICAL AND/OR FIRE ALARM CONTRACTOR SHALL COORDINATE WITH THE GC THE SIZE AND LOCATION OF ALL ACCESS PANELS TO ENSURE HIS EQUIPMENT/SYSTEMS ARE ACCESSIBLE FOR INSPECTION, SERVICE AND REPAIR.

F. THE OWNER'S ENGINEER WILL FURNISH AUTOCAD FILES TO THE OWNER'S GC WHO WILL IN TURN MAKE AVAILABLE THESE AUTOCAD FILES TO THE EC.
G. THE GC AND ALL TRADE CONTRACTORS SHALL REVIEW ANY CONFLICTS OF THE VARIOUS EQUIPMENT/SYSTEMS OF TRADES, THE GC IS RESPONSIBLE FOR ADDRESSING ANY CONFLICTS AMONG TRADE CONTRACTORS AND TO REVIEW ANY SIGNIFICANT ISSUES THAT MAY REQUIRE OWNER AND ENGINEER REVIEW. NO ADDITIONAL COST WILL BE INCURRED BY THE OWNER BASED ON ITEMS THAT ARE

IN CONFLICT IF GC AND TRADE CONTRACTOR HAVE NOT ADDRESSED THIS

DURING THEIR REVIEW OF FIELD COORDINATION DRAWINGS.

H. THE OWNER'S GC SHALL SUBMIT THE SIGNED OFF FIELD COORDINATION DRAWINGS TO THE OWNER AND ENGINEER FOR REVIEW PRIOR TO ANY WORK COMMENCING. IF THE EC CHOOSES TO PERFORM WORK PRIOR TO THE REVIEW OF THE FIELD COORDINATION DRAWINGS, THE EC IS AT RISK IF WORK IS INSPECTED BY THE GC, OWNER AND ENGINEER AND IS IN CONFLICT WITH OTHER TRADES WORK OR PRESENTS A FIELD CONFLICT FOR INSTALLATION OF OTHER TRADES' EQUIPMENT/SYSTEMS THAT HE WILL BE REQUIRED TO REMOVE AND

REINSTALL HIS WORK AT NO ADDITIONAL COST TO THE OWNER.

1.10 RECORD DOCUMENTS

A. DURING THE COURSE OF THIS PROJECT'S CONSTRUCTION, THE EC SHALL MAINTAIN A COMPLETE SET OF RECORD DRAWINGS REFLECTING THE WORK THAT IS BEING PROVIDED/INSTALLED UNDER THIS SPECIFICATION AND RELATED DRAWINGS. RECORD DRAWINGS SHALL REFLECT ALL FIELD CHANGES AND VARIATION FROM BID DRAWINGS.

B. AS PROJECT COMPLETION, THESE RECORD DOCUMENTS SHALL BE USED BY THE ELECTRICAL CONTRACTOR TO DEVELOP 'AS-BUILT' DRAWINGS WHICH WILL BE SUBMITTED BY THE EC TO THE GC AS PART OF THE REQUIRED PROJECT CLOSEOUT DOCUMENTS.

1.11 SHOP DRAWINGS & SUBMITTALS

A. COMPLY WITH ALL SUBMITTAL REQUIREMENTS ISSUED BY THE OWNER'S GC AND ANY REQUIREMENTS NOTED IN THE DIVISION 1 SPECS ISSUED BY THE ARCHITECT.
B. SHOP DRAWINGS/SUBMITTALS SHALL CLEARLY MARK THE SUBMITTED PRODUCT/EQUIPMENT AS THE SPECIFIED/SCHEDULED ITEM. FOR ALL ITEMS, CLEARLY MARK MANUFACTURER'S MODEL AND INCLUDE APPLICABLE PIPING, WIRING AND CONTROLS DIAGRAMS AND INSTALLATION MANUALS.
C. SUBMITTALS SHALL BEAR THE STAMP OF THE GC AND EC.

D. PROVIDE FOLLOWING SUBMITTALS:

1. WIRING DEVICES AND DEVICE PLATES

2. CONDUIT, WIRE, CABLE

3. CIRCUIT BREAKERS
4. NAMEPLATES
5. FUSES
6. LIGHTING

5. FUSES6. LIGHTING7. LIGHTING CONTROLS

8. DISCONNECTS

9. PANELBOARDS10. MODIFICATIONS TO EXISTING FIRE ALARM SYSTEMS

11. TRANSFORMERS
12. FIRE RETARDANT MATERIAL
1.12 SUBSTITUTE OR DEVIATIONS FROM SPECIFIED EQUIPMENT/MATERIALS
A. REFER TO DIVISION ONE SPECIFICATIONS FOR THE REQUIREMENTS OF HOW A

CONTRACTOR MAY ADDRESS A REQUEST FOR ANY SUBSTITUTE OR DEVIATION FROM THE SPECIFIED/SCHEDULED EQUIPMENT/MATERIALS.

B. WHERE EQUIPMENT IS IDENTIFIED BY MANUFACTURER AND CATALOG NUMBER, IT SHALL BE CONSTRUED AS THE BASIS OF DESIGN REQUIREMENTS FOR QUALITY AND PERFORMANCE. WHERE MANUFACTURERS FOR EQUIPMENT ARE IDENTIFIED BY NAME, THE CONTRACTOR MAY SUBMIT FOR APPROVAL, SIMILAR EQUIPMENT OF OTHER MANUFACTURERS AS A SUBSTITUTION, PROVIDED IT COMPLIES WITH THE BASIS OF DESIGN REQUIREMENTS. THIS CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS AND IDENTIFY ALL COMPARABLE BASIS OF DESIGN REQUIREMENTS TO THE ENGINEER FOR REVIEW. THE ENGINEER'S DECISION AS TO WHETHER THE SUBMITTED EQUIPMENT IS ACCPTABLE SHALL BE FINAL AND BINDING. CHANGES NECESSARY TO ACCOMMODATE THE SUBSTITUTED EQUIPMENT SHALL BE MADE

AT THIS CONTRACTOR'S EXPENSE.

C. IT IS THE ENGINEER'S RIGHT TO REJECT ANY PROPOSED SUBSTITUTE OR DEVIATION UPON REIVEW OF PROPOSED SUBSTITUTE/DEVIATION.

1.13 PROJECT CLOSEOUT DOCUMENTS

A. PROVIDE FOLLOWING FOR PROJECT CLOSEOUT DOCUMENTS:

1. AS-BUILT 'RECORD' DRAWINGS

 WARRANTY DOCUMENTATION
 O&M MANUALS
 SPECIFIED TEST REPORTS, BOTH FROM EQUIPMENT MANUFACTURERS AS SPECIFIED AND BY 3 PARTY AS SPECIFIED IN THE FOLLOWING SPECIFICATION SECTIONS.
 COPIES OF ALL FILED PERMITS AND INSPECTION REPORTS.

PART 2 PRODUCTS

2.1 MATERIALS

A. GENERAL

A. GENERAL

1. ALL EQUIPMENT AND MATERIAL FOR PERMANENT INSTALLATION SHALL BE NEW UNLESS SPECIFICALLY INDICATED OTHERWISE. IN ADDITION, MATERIAL SHALL:

(A) BE WITHOUT BLEMISH OR DEFECT.

(B) NOT BE USED FOR TEMPORARY POWER OR LIGHTING WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE OWNER.
(C) BE IN ACCORDANCE WITH NEMA STANDARDS.
(D) BEAR UL LABEL WHERE SUBJECT TO UL LABEL SERVICE.

B. FIRE STOPPING MATERIAL
1. FIRE STOPPING MATERIALS SHALL CONSIST OF COMMERCIALLY MANUFACTURED PRODUCTS CAPABLE OF PASSING ASTM E-814 (UL 1479).
2. FIRE STOPPING MATERIALS SHALL MAINTAIN THE RATING OF THE WALL, PARTITION OR FLOOR OPENING THAT PENETRATION IS MADE.
3. FIRE STOPPING MATERIALS SHALL BE UL CLASSIFIED.
4. ACCEPTABLE PRODUCTS

(A) 3M: FIRE BARRIER

(B) THOMAS & BETTS: FLAME SAFE
(C) NELSON ELECTRIC: FLAMESEAL
2.2 PANELBOARDS
A. GENERAL

PANELBOARD.

A. GENERAL

1. FURNISH AND INSTALL ALL PANELBOARDS FOR LIGHTING, POWER, AND DISTRIBUTION, MOLDED CASE CIRCUIT BREAKER TYPE WITH DEAD FRONT SAFETY CONSTRUCTION AS SCHEDULED ON PLANS AND DESCRIBED HEREIN.

2. PANELBOARDS SHALL BE UL LISTED (UL 67) AND SHALL CONFORM TO THE LATEST REQUIREMENTS OF NEC AND NEMA. THE PANELBOARD SHALL MEET SERVICE ENTRANCE REQUIREMENTS WHEN SPECIFIED.

3. PANELBOARDS SHALL BE PROVIDED WITH TYPEWRITTEN DIRECTORIES OF CIRCUIT NUMBERS, EQUIPMENT SERVED, AND AREA SERVED. EACH PANEL SHALL HAVE AN ENGRAVED NAMEPLATE FOR EACH SECTION.

B. RATINGS
1. PANELBOARDS SHALL BE FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINALS.
2. MINIMUM INTEGRATED SHORT CIRCUIT RATING: 10,000 AMPERES RMS SYMMETRICAL FOR 240 VOLT RATED PANELBOARDS; 22,000 AMPERES RMS SYMMETRICAL FOR 480 VOLT PANELBOARDS, PROVIDE HIGHER WHERE INDICATED ON THE DRAWINGS OR THE POWER SYSTEM STUDY

C. SERIES RATINGS

1. SERIES RATING OF PANELBOARDS IS NOT ACCEPTABLE ON THIS PROJECT.

D. CONSTRUCTION

1. INTERIORS SHALL BE COMPLETELY FACTORY ASSEMBLED. THEY SHALL BE DESIGNED SUCH THAT SWITCHING AND PROTECTIVE DEVICES CAN BE REPLACED WITHOUT DISTURBING ADJACENT UNITS AND WITHOUT REMOVING THE MAIN BUS CONNECTORS.

TRIMS FOR BRANCH CIRCUIT PANELBOARDS SHALL BE SUPPLIED WITH A HINGED DOOR OVER ALL CIRCUIT BREAKER HANDLES. DOORS IN PANELBOARD TRIMS SHALL NOT UNCOVER ANY LIVE PARTS. DOORS SHALL HAVE A SEMI FLUSH CYLINDER LOCK AND CATCH ASSEMBLY. POWER AND LIGHTING PANELS SHALL HAVE HEAVY-DUTY, CONTINUOUS, SECTION VERTICAL-HINGED TO BOX SECTION FOR ACCESS TO WIRING GUTTERS IN ADDITION TO TRIM DOOR (DOOR-IN-DOOR).
 DISTRIBUTION PANELBOARD TRIMS SHALL COVER ALL LIVE PARTS. SWITCHING DEVICE HANDLES SHALL BE ACCESSIBLE.
 SURFACE TRIMS SHALL BE SAME HEIGHT AND WIDTH AS BOX. FLUSH TRIMS SHALL OVERLAP THE BOX BY 3/4 OF AN INCH ON ALL SIDES.
 A DIRECTORY CARD WITH A CLEAR PLASTIC COVER SHALL BE SUPPLIED AND MOUNTED ON THE INSIDE OF EACH DOOR.
 ALL LOCKS SHALL BE KEYED ALIKE. PROVIDE A MINIMUM OF THREE KEYS PER

E. BUS
1. BUS BARS SHALL BE CURRENT DENSITY RATED AND MEET UL67 TEMPERATURE RISE LIMITS THROUGH ACTUAL TESTS.
2. BUS BARS SHALL BE SEQUENCED PHASED AND RIGIDLY SUPPORTED BY HIGH IMPACT RESISTANT, INSULATED BUS SUPPORTING ASSEMBLIES TO PREVENT VIBRATION OR SHORT CIRCUITS. ALL SOLDERLESS TERMINATIONS SHALL BE SUITABLE FOR EITHER COPPER OR ALUMINUM UL LISTED WIRE OR CABLE AND SHALL BE UL TESTED AND LISTED.
3. MAIN BUS BARS SHALL BE COPPER SIZED IN ACCORDANCE WITH UL STANDARDS TO LIMIT TEMPERATURE RISE ON ANY CURRENT CARRYING PART TO A MAXIMUM

OF 65 DEGREES C ABOVE AN AMBIENT OF 40 DEGREES C MAXIMUM.

4. PROVIDE A SEPARATE EQUIPMENT GROUND BUS FOR EACH PANELBOARD.

5. FULL-SIZE (100%-RATED) NEUTRAL BUS SHALL BE INCLUDED FOR PANELBOARDS SHOWN WITH NEUTRAL. BUS BAR TAPS FOR PANELS WITH SINGLE-POLE BRANCHES SHALL BE ARRANGED FOR SEQUENCE PHASING OF THE BRANCH CIRCUIT DEVICES. NEUTRAL BUSING SHALL HAVE A SUITABLE LUG FOR EACH OUTGOING FEEDER REQUIRING A NEUTRAL

CONNECTION.

6. ALL LUGS SHALL BE UL LISTED TIN-PLATED ALUMINUM SUITABLE FOR COPPER OR ALUMINUM CONDUCTORS FOR SIZES INDICATED ON DRAWINGS.

7. PROVIDE BUS CONNECTIONS FOR FUTURE OVERCURRENT DEVICES WITH SUITABLE INSULATION AND BRACING TO MAINTAIN PROPER SHORT CIRCUIT RATING AND VOLTAGE CLEARANCES. ALL REQUIRED HARDWARE SHALL BE INSTALLED AND BE IN PLACE FOR READY INSERTION OF FUTURE BREAKER WITHOUT THE NEED TO RELOCATE ORT ADJACENT UNITS. FUTURE SPACES SHALL ACCOMMODATE FRAME SIZES UP TO 50% OF THE MAIN BUS AMPACITY.

F. BRANCH CIRCUIT PANELBOARDS

THE MINIMUM SHORT-CIRCUIT RATING FOR BRANCH CIRCUIT PANELBOARDS SHALL BE AS SPECIFIED HEREIN OR AS INDICATED ON THE DRAWINGS. PANELBOARDS SHALL BE FULLY RATED. PANELBOARDS SHALL BE EATON/CUTLER-HAMMER TYPE POW-R-LINE 1A, POW-R-LINE 2A OR POW-R-LINE 3A OR APPROVED EQUAL.
 BOLT-ON TYPE, HEAVY-DUTY, QUICK-MAKE, QUICK-BREAK, SINGLE- AND MULTI-POLE CIRCUIT BREAKERS OF THE TYPES SPECIFIED HEREIN, SHALL BE PROVIDED FOR EACH CIRCUIT WITH TOGGLE HANDLES THAT INDICATE WHEN UNIT HAS TRIPPED.
 CIRCUIT BREAKERS SHALL BE THERMAL-MAGNETIC TYPE WITH COMMON TYPE HANDLE FOR ALL MULTIPLE POLE CIRCUIT BREAKERS. CIRCUIT BREAKERS SHALL BE MINIMUM 100-AMPERE FRAME AND THROUGH 100-AMPERE TRIP SIZES SHALL TAKE UP THE SAME POLE SPACING. CIRCUIT BREAKERS SHALL BE UL LISTED AS TYPE SWD FOR LIGHTING

(A) CIRCUIT BREAKER HANDLE LOCKS SHALL BE PROVIDED FOR ALL CIRCUITS
THAT SUPPLY EXIT SIGNS, EMERGENCY LIGHTS, ENERGY MANAGEMENT,
AND CONTROL SYSTEM (EMCS) PANELS AND FIRE ALARM PANELS.
4. CIRCUIT BREAKERS SHALL HAVE A MINIMUM INTERRUPTING RATING OF 10,000
AMPERES SYMMETRICAL AT 240 VOLTS, AND 22,000 AMPERES SYMMETRICAL AT
480 VOLTS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.

G. DISTRIBUTION PANELBAORDS - CIRCUIT BREAKER TYPE
1. DISTRIBUTION PANELBOARDS WITH BOLT-ON DEVICES CONTAINED THEREIN SHALL HAVE INTERRUPTING RATINGS AS SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS. PANELBOARDS SHALL BE FULLY RATED. PANELBOARDS SHALL BE EATON/CUTLER-HAMMER TYPE POW-R-LINE 3A OR POW-R-LINE 4B OR APPROVED EQUAL. PANELBOARDS SHALL HAVE MOLDED CASE CIRCUIT BREAKERS AS INDICATED BELOW.
2. WHERE INDICATED, PROVIDE CIRCUIT BREAKERS UL LISTED FOR APPLICATION AT 100% OF THEIR CONTINUOUS AMPERE RATING IN THEIR INTENDED ENCLOSURE.
3. PROVIDE SHUNT TRIPS, BELL ALARMS, AND AUXILIARY SWITCHES AS SHOWN ON THE CONTRACT DRAWINGS.

H. ENCLOSURE

1. ENCLOSURES SHALL BE AT LEAST 20 INCHES WIDE MADE FROM GALVANIZED STEEL. PROVIDE MINIMUM GUTTER SPACE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. WHERE FEEDER CABLES SUPPLYING THE MAINS OF A PANEL ARE CARRIED THROUGH ITS BOX TO SUPPLY OTHER ELECTRICAL EQUIPMENT, THE BOX SHALL BE SIZED TO INCLUDE THE ADDITIONAL REQUIRED WIRING SPACE. AT LEAST FOUR INTERIOR MOUNTING STUDS WITH ADJUSTABLE NUTS SHALL BE PROVIDED.

2. ENCLOSURES SHALL BE PROVIDED WITH BLANK ENDS.

I. NAMEPLATES1. PROVIDE AN ENGRAVED NAMEPLATE FOR EACH PANEL SECTION.J. FINISH

 SURFACES OF THE TRIM ASSEMBLY SHALL BE PROPERLY CLEANED, PRIMED, AND A FINISH COAT OF GRAY ANSI 61 PAINT APPLIED.
 K. ACCEPTABLE MANUFACTURERS
 EATON/CUTLER-HAMMER

3. ABB/GE 4. SIEMENS

SQUARE D

2.3 DRY-TYPE TRANSFORMERS
A. RATINGS

1. THE KVA AND VOLTAGE RATINGS SHALL BE AS INDICATED ON THE DRAWINGS.
2. TRANSFORMERS SHALL BE DESIGNED FOR CONTINUOUS OPERATION AT RATED KVA, FOR 24 HOURS A DAY, 365 DAYS A YEAR OPERATION, WITH NORMAL LIFE EXPECTANCY AS DEFINED IN ANSI C57.96.
3. TRANSFORMER SOUND LEVELS SHALL NOT EXCEED THE ANSI AND NEMA LEVELS FOR SELECOLED BATINGS.

3. TRANSFORMER SOUND LEVELS SHALL NOT EXCEED THE ANSTAND NEMA LEVELS FOR SELF-COOLED RATINGS.
4. TRANSFORMERS SHALL COMPLY WITH DOE 2016 REQUIREMENTS FOR ENERGY EFFICIENCY.
B. CONSTRUCTION
1. INSULATION SYSTEMS - TRANSFORMER INSULATION SYSTEM SHALL BE AS FOLLOWS:

(A) LESS THAN 15 KVA: 180 DEGREES C INSULATION SYSTEM WITH 150 DEGREE C RISE, VENTILATED DESIGN
(B) 15 KVA AND ABOVE: MINIMUM OF 220 DEGREE C INSULATION SYSTEM WITH 150 DEGREE C RISE, VENTILATED DESIGN.
(C) REQUIRED DEFENDMENTS SHALL BE OPTAINED WITHOUT EXCEEDING THE

(C) REQUIRED PERFORMANCE SHALL BE OBTAINED WITHOUT EXCEEDING THE ABOVE INDICATED TEMPERATURE RISE IN A 40 DEGREES C MAXIMUM AMBIENT, AND A 24-HOUR AVERAGE AMBIENT OF 30 DEGREES C
(D) ALL INSULATION MATERIALS SHALL BE FLAME-RETARDANT AND SHALL NOT SUPPORT COMBUSTION AS DEFINED IN ASTM STANDARD TEST METHOD D635

2. CORE AND COIL ASSEMBLIES

(A) TRANSFORMER CORE SHALL BE CONSTRUCTED WITH HIGH-GRADE,
NON-AGING, SILICON STEEL WITH HIGH MAGNETIC PERMEABILITY, AND LOW
HYSTERESIS AND EDDY CURRENT LOSSES. MAXIMUM MAGNETIC FLUX
DENSITIES SHALL BE SUBSTANTIALLY BELOW THE SATURATION POINT. THE
TRANSFORMER CORE VOLUME SHALL ALLOW EFFICIENT TRANSFORMER
OPERATION AT 10% ABOVE THE NOMINAL TAP VOLTAGE. THE CORE
LAMINATIONS SHALL BE TIGHTLY CLAMPED AND COMPRESSED. COILS
SHALL BE WOUND OF ELECTRICAL GRADE ALUMINUM WITH CONTINUOUS
WOUND CONSTRUCTION

(B) ON THREE-PHASE UNITS RATED 15 KVA AND ABOVE THE CORE AND COIL ASSEMBLY SHALL BE IMPREGNATED WITH NON-HYDROSCOPIC, THERMOSETTING VARNISH AND CURED TO REDUCE HOT SPOTS AND SEAL OUT MOISTURE. THE ASSEMBLY SHALL BE INSTALLED ON VIBRATION-ABSORBING PADS

3. TAPS

(A) THREE-PHASE TRANSFORMERS RATED 15 THROUGH 225 KVA SHALL BE PROVIDED WITH SIX 2-1/2% TAPS, TWO ABOVE AND FOUR BELOW RATED PRIMARY VOLTAGE. THREE-PHASE TRANSFORMERS RATED GREATER THAN 225 KVA SHALL BE PROVIDED WITH MANUFACTURER'S STANDARD TAPS FOR THAT RATING.

C. WIRING/TERMINATIONS

1. RECOMMENDED EXTERNAL CABLE SHALL BE RATED 90 DEGREES C (SIZED AT 75 DEGREES C AMPACITY) FOR ENCAPSULATED AND 75 DEGREES C FOR VENTILATED DESIGNS.

CONNECTORS SHOULD BE SELECTED ON THE BASIS OF THE TYPE AND CABLE SIZE USED TO WIRE THE SPECIFIC TRANSFORMER.

D. ENCLOSURE

1. THE ENCLOSURE SHALL BE MADE OF HEAVY-GAUGE STEEL. ALL TRANSFORMERS SHALL BE EQUIPPED WITH A WIRING COMPARTMENT SUITABLE FOR CONDUIT ENTRY AND LARGE ENOUGH TO ALLOW CONVENIENT WIRING. THE MAXIMUM TEMPERATURE OF THE ENCLOSURE SHALL NOT EXCEED 90 DEGREES C. THE CORE OF THE TRANSFORMER SHALL BE GROUNDED TO THE ENCLOSURE.

2. ON THREE-PHASE UNITS RATED 15 KVA AND ABOVE THE ENCLOSURE CONSTRUCTION SHALL BE VENTILATED, NEMA 2, DRIP-PROOF, WITH LIFTING PROVISIONS. ALL VENTILATION OPENINGS SHALL BE PROTECTED AGAINST FALLING DIRT.

E. FINISH
1. ENCLOSURES SHALL BE FINISHED WITH ANSI 61 COLOR, WEATHER-RESISTANT ENAMEL
F. ACCESSORIES
1. LUG KITS AND GROUND BUS SHALL BE PROVIDED BY THE MANUFACTURER OF THE TRANSFORMER

2.4 LIGHTING

A. PROVIDE MATERIALS, EQUIPMENT, APPURTENANCES AND WORKMANSHIP FOR THE WORK OF THIS SECTION CONFORMING TO THE HIGHEST COMMERCIAL STANDARDS AS SPECIFIED AND INDICATED ON THE DRAWINGS. ALL NEW LIGHTING FIXTURES SHALL BE UL LISTED AND SHALL HAVE AN INDIVIDUAL IES TEST REPORT INDICATING FIXTURE PERFORMANCE.CONTRACTOR SHALL SUPPLY AND INSTALL A COMPLETE, FULLY FUNCTIONING LIGHTING SYSTEM, INCLUDING BUT NOT LIMITED TO: MOUNTING HARDWARD AND ACCESSORIES; APPROPRIATELY SIZED TRANSFORMERS; POWER SUPPLIES; DRIVERS; LAMPS; OPTICALACCESSORIES; AND ELECTRICAL APPURTENANCES.

B. COORDINATE FIXTURE MOUNTINGS WITH CEILING TYPES AND PROVIDE THE REQUIRED COMPONENTS FOR CORRECT MOUNTING OF THE FIXTURE, INCLUDING PLASTER FRAMES, SLOPE ADJUSTERS, ETC. REVIEW ARCHITECTURAL REFLECTED CEILING DRAWINGS AND NOTIFY ARCHITECT/ENGINEER OF DISCREPANCIES PRIOR TO ORDERING FIXTURES OR SUBMITTING SHOP DRAWINGS. NO ADDITIONAL COMPENSATION WILL BE ALLOWED IF WRONG FIXTURES ARE ORDERED BECAUSE COORDINATION WAS NOT PERFORMED.
C. PROVIDE ALL LED FIXTURES WITH APPROPRIATE DRIVERS AND ACCESSORIES FOR A COMPLETE INSTALLATION. STANDARD LED DRIVER SHALL BE CLASS 2, 24V DC CONSTANT CURRENT WITH STANDARD 0-10V DIMMING BUILT-IN WITH 5 YEAR

WARRANTY.

D. LED ARRAYS/MODULES SHALL BE UL AND ROHS COMPLIANT. ADDITIONALLY, LED ARRAYS SHALL COMPLY WITH IESNA LM-79 AND LM-80 STANDARDS. STANDARD MODULE SHALL BE RATED FOR 50,000 HOURS TO L70 (70% LUMEN MAINTENANCE OVER LIFE); 5 YEAR WARRANTY.

E. INSTALL INSULATED BUSHINGS AT POINTS OF ENTRANCE AND EXIT OF ELEXIBLE.

E. INSTALL INSULATED BUSHINGS AT POINTS OF ENTRANCE AND EXIT OF FLEXIBLE WIRING.
F. LED MODULES SHALL BE REPLACEABLE AND SHALL NOT REQUIRE SPECIALIZED TOOLS TO SERVICE.

G. PROVIDE POLYESTER COVERS TO PROTECT LIGHT FIXTURES DURING CONSTRUCTION.
 2.5 HANGERS AND SUPPORTS

 A. GENERAL

SIZE FOR 200% MINIMUM SAFETY FACTOR
 DELEGATED DESIGN: DESIGN SUPPORTS FOR MULTIPLE RACEWAYS, INCLUDING
COMPREHENSIVE ENGINEERING ANALYSIS BY A QUANTIFIED PROFESSIONAL ENGINEER,
USING PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA.
 DESIGN SUPPORTS FOR MULTIPLE RACEWAYS CAPABLE OF SUPPORTING COMBINED
WEIGHT OF SUPPORTED SYSTEMS AND ITS CONTENTS.
 DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT
OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND COMPONENTS.
 RATED STRENGTH: ADEQUATE IN TENSION, SHEAR, AND PULLOUT FORCE TO RESIST
MAXIMUM LOADS CALCULATED OR IMPOSED FOR THIS PROJECT, WITH A MINIMUM
STRUCTURAL SAFETY FACTOR OF FIVE TIMES THE APPLIED FORCE.
 CHANNEL SUPPORT SYSTEMS SHALL COMPLY WITH MFMA-4, BE A MINIMUM OF #12 GAUGE,
HOT-DIPPED GALVANIZED FOR EXTERIOR AND PREGALVANIZED FOR INTERIOR
APPLICATIONS.

B. INSTALLATION OF HANGERS AND SUPPORTS
 PROVIDE ALL REQUIRED HANGERS, SUPPORTS, SLEEVES, CLAMPS, ETC., AS REQUIRED FOR ALL EQUIPMENT INDICATED ON THE DRAWINGS.
 ALL HORIZONTAL RUNS OF CONDUITS SHALL BE PROPERLY GROUPED, ALIGNED, USING SUBSTANTIAL HANGERS, STRAPS, ETC. HANGERS AND SUPPORTS SHALL BE INSTALLED AT INTERVALS NOT EXCEEDING NEC RECOMMENDATIONS.
 SUPPORTING RODS SHALL BE THREADED AT ENDS WITH ALLOWANCE FOR ADJUSTMENTS. WIRE AND STRAP HANGERS WILL NOT BE PERMITTED. ALL CONDUIT AND FITTINGS SHALL BE SUPPORTED BY HANGERS, CHANNELS, ETC., USING BOLTS AND/OR LEAD EXPANSION SLEEVES.
 LIGHTING FIXTURES SHALL BE SUPPORTED AND HUNG FROM BUILDING STEEL OR MASONRY, INDEPENDENT OF THE CEILING CONSTRUCTION EITHER USING RODS, CHAIN HANGERS, OR MECHANICAL SUSPENSION CHANNEL. ALL PENDANT LIGHTING FIXTURES SHALL BE SUSPENDED BY USING THREADED CONDUIT 1/2" MINIMUM, WITH CANOPY KIT AND PAINTED PER ARCHITECT'S SELECTION.
 STRUCTURAL SUPPORT INTERFACE

TURAL SUPPORT INTERFACE

(A) ALL CONDUIT, RACEWAYS, ELECTRICAL EQUIPMENT AND OTHER SIMILAR SYSTEM COMPONENTS WHICH ARE SUPPORTED BY ROOF JOINTS SHALL BE HUNG FROM THE TOP CHORD OR BOTTOM CHORD PANEL POINT OR A PANEL POINT SHALL BE PROVIDED BY APPLYING A VERTICAL WEB MEMBER. THE MAXIMUM LOAD SHALL NOT EXCEED 250 LBS.

(B) ALL CONDUIT, RACEWAYS, ELECTRICAL EQUIPMENT, ETC., WHICH ARE SUPPORTED BY ROOF/FLOOR BEAMS SHALL BE HUNG FROM THE BEAMS WITH CLAMP ATTACHMENTS WHICH ENGAGE BOTH EDGES OF THE BEAM FLANGE. THE HANGER SHALL BE LOCATED DIRECTLY BELOW THE WEB OF THE BEAM AND THE HANGER LOAD SHALL BE LIMITED TO 1000 LBS. IN AREA ABOVE MECHANICAL ROOM AND 250 LBS. IN REMAINING AREAS, UNLESS OTHERWISE APPROVED BY THE ARCHITECT.

(C) ALL ADDITIONAL SUPPORTS, CLAMPS, WEB MEMBERS, ETC., REQUIRED TO COMPLY WITH THE ABOVE REQUIREMENTS SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR, AS APPLICABLE, FOR THE WORK FURNISHED AND INSTALLED UNDER THIS CONTRACT.

C. RACEWAYS SUPPORTS AND HANGERS

1. RACEWAYS SHALL BE SECURELY FASTENED TO THE STRUCTURE, WITH SUPPORT MECHANISMS SPACED AS DICTATED BY THE NEC OR AS SPECIFIED BELOW, WHICHEVER IS MORE STRINGENT 2. RACEWAYS SUPPORTS AND HANGERS SHALL NOT BE HUNG FROM DUCTWORK, PIPING OR 3. SUPPORT RIGID IMC OR EMT CONDUITS WITHIN 3' -0" OF EVERY OUTLET BOX, JUNCTION BOX, PULL BOX, CABINET OR TERMINATION. SUPPORT FLEXIBLE CONDUIT WITHIN 12" ON EACH SIDE OF EVERY OUTLET BOX OR FITTING. 4. SUPPORT CONDUITS BY PIPE STRAPS, WALL BRACKETS, HANGERS, OR CEILING TRAPEZE. THE USE OF PERFORATED IRON OR WIRE FOR SUPPORTING CONDUITS IS PROHIBITED. FASTEN WITH BY TOGGLE BOLTS ON HOLLOW MASONRY UNITS. BY CONCRETE INSERTS OR EXPANSION BOLTS ON CONCRETE OR SPRING TENSION OR THREADED C CLAMPS FOR RIGID STEEL CONDUITS ON STEEL. DO NOT WELD CONDUITS OR PIPE STRAPS TO STEEL STRUCTURES UNLESS SPECIFICALLY INDICATED. 5. THE LOAD APPLIED TO FASTENERS SHALL NOT EXCEED 1/3 THE PROOF TEST LOAD OF THE FASTENERS 6. FASTENERS ATTACHED TO CONCRETE SHALL BE VIBRATION AND SHOCK RESISTANT. 7. WHERE (2) OR MORE CONDUITS 1" TRADE SIZE OR LARGER RUN PARALLEL, TRAPEZE HANGERS MAY BE USED CONSISTING OF THREADED SOLID RODS, WASHERS, NUTS AND

7. WHERE (2) OR MORE CONDUITS 1" TRADE SIZE OR LARGER RUN PARALLEL, TRAPEZE HANGERS MAY BE USED CONSISTING OF THREADED SOLID RODS, WASHERS, NUTS AND GALVANIZED "L" ANGLE OR CHANNEL IRON. INDIVIDUALLY FASTEN CONDUITS TO THE CROSS MEMBER OF EVERY OTHER TRAPEZE HANGER WITH ONE HOLD STRAPS OR CLAMP BACKS WITH PROPER SIZE BOLTS, WASHERS AND NUTS. WHEN ADJUSTABLE TRAPEZE HANGERS ARE USED, USED U-BOLT TYPE CLAMPS AT END OF CONDUIT RUNS, AT EACH ELBOW AND AT EACH THIRD INTERMEDIATE HANGER TO FASTEN EACH CONDUIT.

8. MAKE HANGERS OF DURABLE MATERIALS SUITABLE FOR THE APPLICATION INVOLVED. APPLIED LOADS SHALL NOT EXCEED 1/3 OF THEIR LOADING CAPACITY.

9. FABRICATE ALL SCREWS, BOLTS, WASHERS AND MISCELLANEOUS HARDWARE USED FOR CONDUIT SUPPORTS FROM RUST RESISTANT METAL. TRAPEZE HANGERS SHALL HAVE HANGER ASSEMBLIES PROTECTED BY A GALVANIZED FINISH.

A. MANUFACTURERS

1. MATERIALS USED FOR PULL, JUNCTION, OUTLET BOXES, ETC. SHALL BE MANUFACTURED
BY ONE OF THE FOLLOWING:

(A) APPLETON
(B) CROUSE HINDS
(C) KILLARK
(D) RACO
(E) STEEL CITY

2.6 BOXES - JUNCTION, PULL AND OUTLET

(F) LEE PRODUCTS
(G) HOFFMAN ENGINEERING
(H) MCKINSTRY, INC.

MINIMUM 16 GAUGE STEEL

B. PULL AND JUNCTION BOXES

1. PULL AND JUNCTION BOXES SHALL BE CONSTRUCTED OF MINIMUM 16 GAUGE GALVANIZED STEEL AND SHALL BE INSTALLED AT POINTS REQUIRED WHETHER INDICATED ON THE DRAWINGS OR NOT. MINIMUM DIMENSION SHALL NOT BE LESS THAN NEC ARTICLE 314 REQUIREMENTS. COVER SHALL BE OF THE SAME TYPE AND THICKNESS MATERIAL AS THE BOX CONSTRUCTION AND SHALL BE REINFORCED OR FORMED TO PREVENT DEFLECTION UNDER ITS OWN WEIGHT.

JUNCTION AND PULL BOXES INTENDED FOR DRY INTERIOR LOCATIONS SHALL BE NEMA 1 ENCLOSURES WITH ACCESSIBLE, REMOVABLE SCREW-ON COVERS. COVERS SHALL BE SECURED WITH CORROSION-RESISTANT SCREWS WITH KEYHOLE SLOTS TO ACCOMMODATE EASY REMOVAL.
 JUNCTION AND PULL BOXES INTENDED FOR WET OR EXTERIOR LOCATIONS SHALL BE NEMA 3R ENCLOSURES WITH HINGED GASKETED COVERS. HINGE SHALL BE GALVANIZED STEEL WITH STAINLESS STEEL PIN. COVERS SHALL BE SECURED WITH CORROSION-RESISTANT ZINC PLATED LOCKABLE PULL CATCHES.
 CUSTOM FABRICATED MEDIUM TO LARGE JUNCTION AND PULL BOXES (4'-0" OR LARGER IN ANY DIRECTION) SHALL HAVE INTERNAL STRUCTURAL STEEL BRACING WELDED TO FORM A RIGID ASSEMBLY ADEQUATE TO MAINTAIN ALIGNMENT AND SHAPE IN SHIPMENT AND INSTALLATION AND SHALL CONTAIN FIBERGLASS CABLE SUPPORTS
 BOXES MOUNTED FLUSH IN WALLS SHALL HAVE OVERLAPPING COVERS WITH FLUSH HEAD RETAINING SCREWS. COVERS SHALL BE OVERSIZED 2" ON ALL SIDES AND SHALL BE

6. ALL INTERIOR AND EXTERIOR PULL AND JUNCTION BOXES SHALL BE GRAY ENAMEL POWDER COAT PAINTED OVER THE GALVANIZED METAL

C. OUTLET BOXES

1. OUTLET BOXES SHALL BE 1-PIECE CODE-GAUGE GALVANIZED STEEL CONSTRUCTION CONFORMING TO UL 514A AND SHALL MEET NEC REQUIREMENTS FOR SIZE AND MATERIAL AND SHALL BE OF PROPER SIZE AND SUITABLE FOR LOCATION INDICATED ON THE DRAWINGS. OUTLET BOXES SHALL BE BY RACO, STEEL CITY ELECTRIC COMPANY, APPLETON ELECTRIC COMPANY, OR APPROVED EQUAL.

WHERE INSTALLED IN PLASTER OR SHEETROCK, BOXES SHALL BE FITTED WITH GALVANIZED STEEL PLASTER COVERS OF REQUIRED DEPTH TO FINISH FLUSH WITH FINISHED WALL OR CEILING.
 BOXES INSTALLED IN UNPLASTERED MASONRY WALLS SHALL BE UL LISTED FOR THE APPLICATION AND HAVE COVERS OF REQUIRED DEPTH TO AVOID CUTTING OF MASONRY.
 OUTLET BOXES FOR EXTERIOR SURFACE MOUNTING SHALL BE CAST ALUMINUM ALLOY WITH AN ALUMINUM POLYMER ENAMEL COATING EQUAL TO APPLETON TYPE FS OR FD. CONDUIT ENTRIES SHALL BE THREADED CAST HUBS. DEVICE COVERS SHALL BE CAST ALUMINUM ALLOY WITH MOISTURE SEALING GASKET AND STAINLESS STEEL FASTENERS. STEEL BOXES WILL NOT BE PERMITTED FOR THIS APPLICATION.
 OUTLET BOXES USED AS JUNCTION BOXES SHALL BE MINIMUM 4-11/16" SQUARE AND 2" DEEP. OUTLET BOXES FOR TELECOMMUNICATIONS/DATA OUTLETS SHALL BE MINIMUM OF 3" DEEP.

2. ROUND BOXES AND HANDY BOXES SHALL NOT BE USED.

CONNECTION OF A 10-32 GROUNDING SCREW.

7. ALL SWITCH AND RECEPTACLE BOXES SHALL BE MINIMUM 4" SQUARE FOR UP TO (2) DEVICES, OR SOLID GANGED BOXES FOR OVER (2) DEVICES. BOXES SHALL BE PROVIDED WITH 1/2" RAISED GALVANIZED DEVICE COVERS FOR EXPOSED CONDUIT WORK.
 8. OUTLET BOXES ON EXPOSED INTERIOR CONDUIT SYSTEMS, SHALL BE THREADED-HUB, CAST-MALLEABLE IRON WITH AN ALUMINUM POLYMER ENAMEL COATING, CONDUIT TYPE FITTING FS OR FD SUITABLE FOR WIRING DEVICES INSTALLED. DEVICE COVERS SHALL BE COATED MALLEABLE IRON WITH MOISTURE SEALING GASKET AND STAINLESS STEEL FASTENERS.
 9. ALL BOXES SHALL HAVE AT LEAST ONE TAPPED AND THREADED GROUNDING HOLE FOR

10. BOX DEPTH SHALL ACCOMMODATE CODE REQUIRED VOLUME FOR THE SPECIFIED INSTALLATION. THROUGH WALL BOXES SHALL NOT BE USED.

11. OUTLET BOXES FOR VARIOUS SYSTEMS INCLUDING BUT NOT LIMITED TO FIRE ALARM, PAGING AND MASTER CLOCKS SHALL BE SPECIFICALLY MADE FOR THE PURPOSE AND SIZED AS REQUIRED BY THE MANUFACTURER. BOXES SHALL BE CAST WHERE EXPOSED TO PHYSICAL DAMAGE OR INSTALLED IN AN EXPOSED EXTERIOR LOCATION. ALL SURFACE MOUNTED FIRE ALARM BACK BOXES SHALL

BE RED IN COLOR.

12. PROVIDE 3M FIRE BARRIER MOLDABLE PUTTY PADS (OR EQUAL) FOR EVERY BACKBOX LOCATED IN A FIRE RATED WALL.

2.7 RACEWAYS AND CONDUIT

A. GALVANIZED RIGID STEEL CONDUIT (GRSC, RMC), COUPLINGS, AND ELBOWS SHALL
BE HOT-DIP GALVANIZED, RIGID MILD STEEL. THE CONDUIT INTERIOR AND
EXTERIOR SURFACES SHALL HAVE A CONTINUOUS ZINC COATING WITH A
TRANSPARENT OVERCOAT OF ENAMEL, LACQUER, OR ZINC CHROMATE.
COUPLINGS, CONNECTORS, AND FITTINGS FOR RIGID STEEL CONDUIT SHALL BE
THREADED GALVANIZED STEEL OR GALVANIZED MALLEABLE IRON SPECIFICALLY

DESIGNED AND MANUFACTURED FOR THE PURPOSE.

B. ELECTRICAL METALLIC TUBING (EMT), INCLUDING ELBOWS AND BENDS, SHALL BE ZINC-COATED MILD STEEL. THE INTERIOR AND EXTERIOR SURFACES OF THE TUBING SHALL HAVE A CONTINUOUS ZINC COATING. EMT FITTINGS SHALL BE STEEL SET SCREW TYPE. PROVIDE DOUBLE SET SCREW TYPE FITTINGS FOR ALL CONDUITS OVER 1".

C. ALUMINUM CONDUIT SHALL NOT BE UTILIZED ON THIS PROJECT.

D. LIQUIDTIGHT FLEXIBLE CONDUIT SHALL BE PLASTIC JACKETED, GALVANIZED STEEL, SEALTITE TYPE LA OR UA. LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE HIGH TEMPERATURE, PLASTIC JACKETED GALVANIZED STEEL FOR HIGH TEMPERATURE LOCATIONS. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE USED IN SHORT RUNS TO CONNECT MOTORS WHERE MOVEMENT AND VIBRATION REQUIRES A FLEXIBLE CONNECTION. MINIMUM LENGTH SHALL NOT BE LESS THAN 1'-0", MAXIMUM LENGTH SHALL NOT EXCEED 5'-0".
E. COMBINATION FITTINGS USED TO CONNECT RIGID STEEL CONDUIT TO ELECTRICAL METALLIC TUBING SHALL HAVE A THREADED THROAT TO RECEIVE THE RIGID STEEL CONDUIT AND SHALL HAVE A COMPRESSION TYPE THROAT TO RECEIVE THE ELECTRICAL METALLIC TUBING.

F. ALL EXTERIOR FITTINGS SHALL BE STAINLESS STEEL.
G. MINIMUM SIZE RACEWAY AND CONDUIT SHALL BE 3/4".
H. CONDUIT SHALL BE AS MANUFACTURED BY ANACONDA, ALLIED, REPUBLIC, WHEATLAND OR APPROVED EQUAL.
I. ALL INTERIOR FEEDERS AND BRANCH CIRCUITS SHALL BE EMT. ALL EXTERIOR

FEEDERS AND BRANCH CIRCUITS SHALL BE GRSC. MAKE CONNECTIONS TO MOTORS AND EQUIPMENT WITH PVC JACKETED FLEXIBLE METALLIC CONDUIT AND LIQUID-TIGHT CONNECTORS.

J. CONDUIT AND EMT RUNS SHALL BE MECHANICALLY AND ELECTRICALLY CONTINUOUS. CONDUIT SHALL ENTER AND BE SECURED TO CABINET, JUNCTION BOX, PULL BOX, OR OUTLET BOX WITH LOCKNUT OUTSIDE AND BUSHING INSIDE, OR WITH LIQUID TIGHT, THREADED, SELF-LOCKING, COLD-WELD WEDGE ADAPTER.

K. PROVIDE BONDING BUSHINGS ON ALL CONDUITS 2" AND LARGER.

A. ALL INDOOR/INTERIOR WIRING SHALL BE TYPE THHN-THWN-2 OR XHHW-2, 600V INSULATION, RATED 90 DEGREE CELSIUS. TYPE XHHW-2 INSULATION SHALL BE USED FOR ALL EXTERIOR/ROOFTOP APPLICATIONS. TYPE RHW USE SHALL BE USED FOR ALL CONDUCTORS INSTALL IN BELOW GRADE RACEWAYS.
B. CONDUCTORS SHALL BE SOFT ANNEALED COPPER WITH MINIMUM CONDUCTIVITY OF 98%. THE JACKET SHALL BE ABRASION, MOISTURE, GASOLINE AND OIL RESISTANT NYLON. ALL WIRING SHALL BE UL LISTED AND CONFORM TO THE NEC FOR CONSTRUCTION AND USE.
C. WIRING INSULATION SHALL BE COLOR CODED PER OWNERS STANDARDS. WHERE

NO COLOR CODE IS PRESENT OR, THE FOLLOWING SHALL BE UTILIZED:

1. 208/120V / 3-PHASE: PHASE A: BLACK, PHASE B: RED, PHASE C: BLUE, NEUTRAL: WHITE, GROUND: GREEN

2. 480/277V/3 PHASE: PHASE A: BROWN, PHASE B: ORANGE, PHASE C: YELLOW, NEUTRAL: GRAY, GROUND: GREEN

D. ALL WIRE AND CABLE SHALL BE AS MANUFACTURED BY SOUTHWIRE, ANACONDA, ALLIED OR EQUAL.
E. MINIMUM SIZE WIRE FOR BRANCH CIRCUIT AND POWER WIRING SHALL BE #12 AWG. FOR 120V, 20A BRANCH CIRCUIT RUNS EXCEEDING 75'-0" AND 175'-0" IN LENGTH FOR 277V, THE BRANCH CIRCUIT RUN SHALL BE #10 AWG OR LARGER.
F. ALL WIRING SHALL BE INSTALLED PER MANUFACTURERS PUBLISHED INSTALLATION INSTRUCTIONS. ALL BENDS SHALL BE MADE SO AS NOT TO DAMAGE THE CABLE.

G. CONDUCTORS #10 AND #12 AWG SHALL BE CONNECTED WITH PREINSULATED SPRING CONNECTORS INCASED IN A STEEL SHELL AND MINIMUM RATED AT 105C. A MINIMUM OF 3/8" SKIRT SHALL COVER THE BARE WIRES. THE CONNECTOR SHALL MEET WITH UL APPROVAL FOR FIXTURE AND PRESSURE WORK. CONNECTORS SHALL BE MANUFACTURED BY BUCHANAN, IDEAL, 3M COMPANY OR APPROVED EQUAL.
 H. FLEXIBLE METAL CLAD (MC) CABLE SHALL BE UL LISTED WITH THHN INSULATED CONDUCTORS WITH AN INSULATED GROUNDING CONDUCTOR WITHIN A GALVANIZED STEEL INTERLOCKED ARMOR. ALUMINUM ARMOR IS NOT

ACCEPTABLE. CONNECTORS SHALL BE PROVIDED WITH LOCK NUT CONNECTION TO THE TERMINATION POINT ENCLOSURE. CONNECTORS SHALL BE STEEL, DIE CAST IS NOT ACCEPTABLE.

I. FLEXIBLE METAL CLAD (MC) CABLE UTILIZED FOR FIRE ALARM SERVICE SHALL BE IDENTIFIED WITH A FACTORY APPLIED TRACER ALONG THE ENTIRE LENGTH.

J. FLEXIBLE HOSPITAL GRADE ARMORED (AC) CABLE SHALL BE UL LISTED WITH THHN INSULATED CONDUCTORS WITH AN INSULATED GROUNDING CONDUCTOR WITHIN A GALVANIZED STEEL INTERLOCKED ARMOR WITH BARE BOND WIRE. ALUMINUM ARMOR IS NOT ACCEPTABLE. THE OUTER METAL ARMOR SHALL BE READILY IDENTIFIED AS AN ACCEPTABLE GROUNDING RETURN PATH TO MEET THE REQUIREMENTS OF NATIONAL ELECTRIC CODE ARTICLE 517-13. HOSPITAL GRADE AC CABLE SHALL BE TYPE HCF-90 AS MANUFACTURED BY AFC CABLE SYSTEMS OR APPROVED EQUAL. CONNECTORS SHALL BE SELF-GROMMETTED WITH LOCKNUT CONNECTION TO THE TERMINATION POINT ENCLOSURE.

K. CABLE PULLING COMPOUNDS SHALL BE UL LISTED AND BE SUITABLE FOR USE

WITH THE SPECIFIED CABLE INSULATION SYSTEM. THE COMPOUND SHALL REDUCE THE COEFFICIENT OF FRICTION, WHILE NOT ADDING ANY LONG TERM ISSUES TO THE INSTALLATION SUCH AS PREMATURE AGING OF THE INSULATION SYSTEM, ADDED FLAMMABILITY OR DRYING IN SUCH A MANNER AS TO STICK THE CABLE IN PLACE IN THE RACEWAY.

L. WIRE MANAGEMENT SHALL BE PROVIDED BY SELF-EXTINGUISHING SELF-LOCKING NYLON TIES WITH -65 TO 3500 F. RANGE FOR BUNDLING CONDUCTORS.

2.9 WIRING DEVICES AND DEVICE PLATES
A. ACCEPTABLE MANUFACTURERS
1. HUBBELL
2. LEVITON
3. ARROW HART/EATON
4. PASS * SEYMOUR! ECRAND

2.8 WIRE AND CABLE - 600 VOLT

4. PASS & SEYMOUR/LEGRAND
B. WIRING DEVICES
1. CATALOG NUMBERS USED ARE TO DESIGNATE A STANDARD OF QUALITY FOR EACH PRODUCT. COLOR SHALL NOT BE CONSIDERED AS FIXED BY THE CATALOG NUMBERS LISTED HEREIN AND SHALL BE PER CLIENT STANDARDS.
2. RECEPTACLES: 2 POLE, 3 WIRE GROUNDING FOR DRY LOCATIONS, 20 AMPERE NEMA 5-20R
- HUBBELL #5352A; COLOR PER ARCH, SMOOTH NYLON FACE, DUPLEX, BACK AND SIDE WIDED

 USB CHARGING RECEPTACLES; 2-POLE, 3 WIRE GROUNDING FOR DRY LOCATIONS, 20AMPERE NEMA 5-20R WITH USB A AND C CONNETIONS - HUBBELL #USB20AC5-COLOR PER ARCH.
 SWITCHES: 20A, 1 POLE, 120/277V - HUBBELL #CS120 - COLOR PER ARCH.
 SPECIAL PURPOSE OUTLETS: COORDINATE WITH EQUIPMENT UTILIZED FOR AMPERE SIZE AND CONFIGURATION, USE EQUIPMENT OF SAME MANUFACTURER AS ALL DEVICES.
 GROUND FAULT RECEPTACLES: HUBBELL #GFRST20-COLOR PER ARCH; STRAIGHT BLADE WITH GFCI SELF TEST.
 C. DEVICE PLATES

DEVICES PLATES SHALL BE STAINLESS STEEL (TYPE 302/304) WITH PANEL NUMBER AND CIRCUIT NUMBER. REFER TO DETAIL ON DRAWING.
 DEVICE PLATES SHALL BE HIGH-IMPACT, SELF -EXTINGUISHING NYLON, COLOR TO MATCH DEVICE UNLESS OTHERWISE SPECIFIED, SCREWS TO MATCH FACEPLATE COLOR. CONFIGURATION AS REQUIRED TO MATCH DEVICES.
 WEATHERPROOF COVERS SHALL BE 'WHILE-IN-USE' SYLE, NEMA 3R RATED METALLIC OR NON-METALLIC, SIZE AS REQUIRED FOR APPLICATION; HUBBELL #RW57XXX SERIES.
 10 DISCONNECTS AND ENCLOSED CIRCUIT BREAKERS

A. GENERAL

1. FURNISH AND INSTALL DISCONNECT SWITCHES FOR DISCONNECTING MEANS FOR ALL EQUIPMENT AS SHOWN ON DRAWINGS. DISCONNECT SWITCHES SHALL BE OF THE TYPE "A", QUICK-MAKE, QUICK-BREAK HEAVY DUTY CONSTRUCTION. DISCONNECT SWITCHES SHALL HAVE INTERLOCKING DOORS. CABINETS SHALL BE BONDERIZED AND FINISHED IN GRAY ENAMEL. WHERE (1) FEEDER SUPPLIES MORE THAN (1) PIECE OF EQUIPMENT, DISCONNECTING SWITCHES SHALL BE OF THE FUSIBLE TYPE AND SHALL BE COMPLETE WITH FUSES OF THE SIZE REQUIRED FOR EACH LOAD. NEMA TYPE 3R ENCLOSURES SHALL BE USED WHERE THE DISCONNECT SWITCH IS EXPOSED TO THE WEATHER OR IN WET

CUTLER-HAMMER, GENERAL ELECTRIC OR SQUARE D.

3. ALL EQUIPMENT SHALL BE PROVIDED WITH THE PROPER SIZE/RATING DISCONNECT SWITCH WHETHER INDICATED ON THE DRAWINGS OR NOT TO COMPLY WITH NEC. ALSO, INSTALL AND CONNECT DISCONNECT SWITCHES FURNISHED BY OTHER TRADES.

4. ALL POWER WIRING SHALL BE FURNISHED AND INSTALLED BETWEEN DISCONNECT SWITCHES, CONTROL CABINETS, CONTACTORS, AND EQUIPMENT TERMINALS REQUIRED BY EQUIPMENT FURNISHED BY OTHER TRADES.

5. FUSES FOR FUSED DISCONNECT SWITCHES SHALL BE THE REJECTION TYPE. FUSES SHALL BE SIZED IN ACCORDANCE WITH NEC.

2. DISCONNECT DEVICES SHALL BE ONE OF THE FOLLOWING MANUFACTURERS: EATON

B. MOTOR DISCONNECT SWITCHES
1. ALL MOTOR DISCONNECT DEVICES SHOWN ON THE DRAWINGS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
2. DISCONNECT SWITCHES INSTALLED ON THE LOAD OF VARIABLE SPEED DRIVES SHALL INCLUDE AN AUXILIARY CONTACT (NO/NC) FOR PURPOSES OF SENDING A "STOP" SIGNAL TO THE DRIVE WHEN THE DISCONNECT SWITCH IS OPENED.
3. FURNISH AND INSTALL DISCONNECT SWITCHES FOR DISCONNECTING MEANS FOR ALL MOTORS AS SHOWN ON DRAWINGS. DISCONNECT SWITCHES SHALL BE

OF THE TYPE "A", QUICK-MAKE, QUICK-BREAK HEAVY DUTY CONSTRUCTION SIZED FOR THE HORSEPOWER OF THE MOTOR SERVED. DISCONNECT SWITCHES SHALL HAVE INTERLOCKING DOORS. CABINETS SHALL BE BONDERIZED AND FINISHED IN GRAY ENAMEL NEMA, TYPE 3R ENCLOSURES SHALL BE USED WHERE THE DISCONNECT SWITCH IS EXPOSED TO THE WEATHER OR IN WET AREAS.

4. FURNISH AND INSTALL MANUAL STARTING THERMAL-OVERLOAD TYPE SWITCH WITH PILOT LIGHT AS A DISCONNECTING MEANS FOR ALL MOTORS UNDER 0.5 HP, UNLESS OTHERWISE INDICATED ON THE PLANS. THESE THERMAL SWITCHES SHALL BE TOGGLE OPERATED AND SHALL BE RATED 1 HP, MOTOR OVERLOAD PROTECTION SHALL BE INTERCHANGEABLE HEATERS. HEATERS SHALL BE INSTALL ED WITHOUT REMOVING THE STARTER FROM THE

HEATERS. HEATERS SHALL BE INSTALLED WITHOUT REMOVING THE STARTER FROM THE HOUSING OR DISTURBING THE WIRING. TOGGLE SHALL BE TRIP-FREE. THERMAL SWITCHES SHALL BE FURNISHED IN A NEMA, TYPE 1 ENCLOSURE IN MECHANICAL AND UTILITY AREAS AND FLUSH IN WALLS WITH STAINLESS STEEL PLATES IN ARCHITECTURALLY FINISHED AREAS. ALL HEATERS SHALL BE SIZED PER THE HP OF THE MOTOR CODE LETTER. COORDINATE WITH HVAC AND PLUMBING TRADES.

5. ALL POWER WIRING SHALL BE FURNISHED AND INSTALLED BETWEEN DISCONNECT SWITCHES, CONTROL CABINETS, CONTACTORS, AND EQUIPMENT TERMINALS REQUIRED BY EQUIPMENT FURNISHED BY OTHER TRADES.

6. ALL MOTOR/PUMPS/AIR HANDLING UNITS SHALL BE PROVIDED WITH THE PROPER FUSE SIZE/RATING DISCONNECT SWITCH WHETHER INDICATED ON THE DRAWINGS OR NOT TO

C. ENCLOSED CIRCUIT BREAKERS

1. FURNISH AND INSTALL, WHERE INDICATED, ENCLOSED CIRCUIT BREAKER HAVING THE ELECTRICAL CHARACTERISTICS, RATINGS, AND MODIFICATION SHOWN ON THE DRAWINGS. ALL ENCLOSED CIRCUIT BREAKERS SHALL HAVE THE FOLLOWING:

COMPLY WITH NEC. INSTALL AND CONNECT DISCONNECT SWITCHES FURNISHED BY

(A) NEMA 1 GENERAL PURPOSE FLUSH MOUNTED ENCLOSURES UNLESS
 OTHERWISE NOTED.
 (B) METAL NAMEPLATE MOUNTED ON THE FRONT COVER CONTAINING A
 PERMANENT RECORD OF CATALOG NUMBER AND MAXIMUM RATINGS.

(D) GROUND FAULT TRIP FUNCTION.
2.11 FUSES
A. GENERAL

B. FUSE TYPES

OTHER TRADES.

ALL FUSES SHALL BE RATED FOR PROPER VOLTAGE IN WHICH THEY ARE APPLIED. INTERRUPTING RATINGS SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT AVAILABLE AT THE TERMINALS OF THE SWITCH.
 PROVIDE FUSES FOR PROPERLY COORDINATED SYSTEM OF OVERCURRENT PROTECTION BLOWN FUSES ARE TO BE REPLACED DURING CONSTRUCTION AND DURING TESTS. FURNISH IN EACH DEVICE TO BE USED ON REPLACEMENT.
 PROVIDE ALL REQUIRED ACCESSORIES (FUSE CLIPS, HOLDERS, ETC.) AS REQUIRED FOR INSTALLATION OF FUSES WITHIN REQUIRED DISCONNECT.

(C) HANDLES PADLOCKABLE IN "OFF" POSITION.

FUSES SHALL BE SIZED AT 125% OF RATED FLA OF EQUIPMENT SERVED.
 LIGHTING AND HEATING LOAD 600V OR LESS

 (A) 600A OR LESS IN INTERRUPTER SWITCHES CLASS RK-1
 (B) 600A OR LESS IN INTERRUPTER SWITCHES CLASS RK-1
 (C) 600A OR LESS IN INTERRUPTER SWITCHES CLASS RK-1
 (C) 600A OR LESS IN INTERRUPTER SWITCHES CLASS RK-1

3. MOTORS AND TRANSFORMER LOAD 600V OR LESS

(A) 600A OR LESS IN INTERRUPTER SWITCHES CLASS RK-5.

C. SPARE FUSES

1. PROVIDE A COMPLETE SET OF SPARE FUSES FOR EACH FUSE SWITCH.

2. SPARE FUSES SHALL INCLUDE GENERAL PURPOSE FUSES, MOTOR FUSES, AND CONTROL FUSES USED IN STARTERS, ETC.

D. MANUFACTURERS

FERRAZ SHAWMUT
 BUSSMAN
 LITTELFUSE
 2.12 GROUNDING

A. GENERAL

1. ALL GROUNDING MATERIALS REQUIRED SHALL BE FURNISHED NEW AND UNDAMAGED.

2. ALL CIRCUITS SHALL CONTAIN A GREEN INSULATED GROUND CONDUCTOR.

B. CABLE

1. INSULATED CABLE: SOFT DRAWN COPPER, CLASS B STRANDING WITH GREEN PVC INSULATION, UL 83, TYPE TW, AND THW.

BARE CABLE: SOFT DRAWN COPPER. CLASS AA STRANDING, ASTM B8.
 BUS AND BARS
 SOFT COPPER, CROSS MINIMUM 1/8" THICK BY 1" WIDE, ASTM B187.
 COPPER BUS 1/4" X 2 1/2" X 24" FOR GROUND TERMINAL BARS IN ELECTRIC ROOMS.
 MISCELLANEOUS
 ALL CLAMPS, CONNECTORS, BOLTS, WASHERS, NUTS, AND OTHER HARDWARE USED WITH

THE GROUNDING SYSTEM SHALL BE HIGH-STRENGTH, HIGH CONDUCTIVITY COPPER ALL OY.

2. ALL CONDUCTORS SHALL BE INSULATED UNLESS OTHERWISE INDICATED.

3. PROVIDE EXOTHERMIC (CADWELD) CONNECTIONS FOR ALL TRANSFORMERS SECONDARY GROUNDS TO BUILDING STEEL OR PIPING.

4. PROVIDE EXOTHERMIC (CADWELD) FOR CONNECTIONS TO ALL GROUND RODS AND STRUCTURAL STEEL MEMBERS.

E. MECHANICAL CONNECTORS -

1. MANUFACTURERS: APPLETON CO., THOMAS & BETTS, O.Z. GEDNEY CORP, AND BURNDY CORP., MATERIAL: BRONZE

F. EXOTHERMIC CONNECTIONS - MANUFACTURERS: ERICO PRODUCTS, INC., AMERICAN BRASS MFG. CO.

2.13 ELECTRICAL IDENTIFICATION

A. NAMEPLATES 1. COMPLY WITH ANSI A13.1, 29 CFR 1910.144 AND 29 CFR 1910.145, AND ANSI Z535.4 FOR SAFETY SIGNS. PROVIDE NAMEPLATES ON SWITCHGEAR, UNIT SUBSTATIONS, TRANSFORMERS, AUTOMATIC TRANSFER SWITCHES, MOTOR CONTROL CENTER, REMOTE MOUNTED ENCLOSED CIRCUIT BREAKERS, RECEPTACLES ON EMERGENCY, PANELBOARDS AND MOTOR DISCONNECT SWITCHES, REMOTE CONTROL STATIONS, STARTERS, ETC., OR OTHER CONTROLS FURNISHED OR INSTALLED UNDER THIS SECTION. 2. NAMEPLATES SHALL DESIGNATE EQUIPMENT NAME, DESCRIPTION , VOLTAGE, AMPA¢IT|Y & — AIC RATINGS AND SOURCE OF POWER. 3. NAMEPLATES SHALL BE LAMINATED, BLACK BAKELITE WITH 1/4" HIGH, WHITE RECESSED LETTERS. NAMEPLATES SHALL BE SECURELY ATTACHED TO THE EQUIPMENT WITH GALVANIZED SCREWS. ADHESIVES OR CEMENTS SHALL NOT BE USED. 4. PROVIDE A SHOP DRAWING OF NAMEPLATE SCHEDULES TO OWNER AND ENGINEER FOR REVIEW APPROVAL PRIOR TO ORDERING. 5. NAMEPLATES FOR DEVICES ON EMERGENCY POWER SHALL BE "RED" IN COLOR. B. PANEL DIRECTORIES

B. PANEL DIRECTORIES

1. PANELBOARDS SHALL HAVE TYPED DIRECTORIES, LISTING ALL CIRCUIT LOADS, BREAKER SIZES, AND PHASES.

C. WIRE MARKERS

1. MARKERS FOR WIRE AND CABLE CIRCUITS SHALL BE BRADLEY SELF-LAMINATING VINYL DATA LABELS OR ACCEPTABLE EQUAL.

D. CABLE TAGS

1. CABLE TAGS FOR 15KV RATED CONDUCTORS SHALL BE BRASS IDENTIFICATION TAGS WITH

PLASTIC TIE WRAP; THE PROPOSED CIRCUIT DESIGNATIONS CAN BE OBTAINED FROM THE CONTRACT DOCUMENTS. EXACT DESIGNATIONS SHALL BE COORDINATED WITH OWNER AND ENGINEER AFTER REVIEW OF CABLE TAG SCHEDULE SUBMITTAL.

2. CABLE TAGS FOR 600V OR LESS RATED CIRCUITS, SELF-ADHESIVE VINYL LABELS: PREPRINTED, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHER AND CHEMICAL RESISTANT COATING AND MATCHING WRAPAROUND ADHESIVE TAPE FOR SECURING ENDS OF LEGEND LABEL.

E. CONDUIT IDENTIFICATION

COMPLY WITH ANSI A13.1 FOR MINIMUM SIZE LETTERS FOR LEGEND AND MINIMUM LENGTH OF COLOR FIELD FOR EACH RACEWAY SIZE.
 PROVIDE MANUFACTURER'S STANDARD PRE-PRINTED, FLEXIBLE OR SEMI-RIGID, PERMANENT, PLASTIC-SHEET CONDUIT MARKERS, EXTENDING 360 AROUND CONDUITS; DESIGNED FOR ATTACHMENT TO CONDUIT BY ADHESIVE, ADHESIVE LAP JOINT OF MARKER, MATCHING ADHESIVE PLASTIC TAPE AT EACH END OF MARKER, OR PREENSIONED SNAP-ON. EXCEPT AS OTHERWISE INDICATED, PROVIDE LETTERING WHICH INDICATES VOLTAGE OF CONDUCTOR(S) IN CONDUIT. PROVIDE MINIMUM 8" LENGTH FOR 2" AND SMALLER CONDUIT, 12" LENGTH FOR LARGER CONDUIT.
 PAINT CONDUITS FOR EMERGENCY SYSTEMS PER OWNER'S STANDARDS. SPACING OF PAINT MARKINGS SHALL BE 10'-0" ON CENTERS FOR ENTIRE LENGTH OF CONDUIT.

1. COLORED TAPE SHALL BE PVC, SELF-ADHESIVE AT LEAST 3 MILS THICK AND 1-1/2" WIDE,

SUITABLE FOR USE ON 90C CONDUCTORS, UL LISTED AND SHALL BE FURNISHED IN

COLORS TO MATCH SPECIFIED CONDUCTOR COLOR CODING.

PART 3 <u>EXECUTION</u> 3.1 GENERAL REQUIREMENTS

3.2 EXISTING WORK AND DEMOLITION

A. REFER TO THE DIVISION ONE SPECIFICATIONS FOR GENERAL REQUIREMENTS
THAT RELATE TO WORK PROVIDED BY ALL CONTRACTORS.
B. REFER TO ANY PROJECT SPECIFIC DOCUMENTS THAT THE OWNER'S GENERAL
CONTRACTOR SHALL ISSUE THAT REFERENCES ELECTRICAL WORK AND
COORDINATION REQUIRED BY THE OWNER'S ELECTRICAL CONTRACTOR.

A. THIS CONTRACTOR SHALL PARTICIPATE IN THE SURVEY OF THE EXISTING ELECTRICAL SYSTEMS.

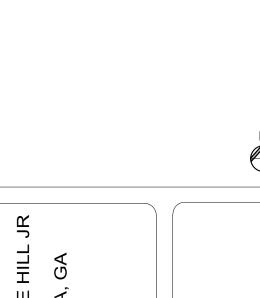
B. THIS CONTRACTOR SHALL MAKE SAFE ALL EXISTING MECHANICAL DESIGNATED 1台 BE DEMOLISHED AND REMOVED BY OTHER CONTRACTORS. PATICULAR CARE SHALL BE TAKEN TO AVOID CREATING HAZARD OR CAUSING DISRUPTION OF SERVICES IN ADJOINING AREAS.

C. THE DEMOLITION, INCLUDING THE DISMANTLING AND REMOVAL OF EXISTING



No. REVISION / ISSUE DATE

AN:



TRICAL SPECIFICATIONS (1 OF 2)

JOB NUMBER DATE 25-014 10/09/25

DRAWN BY CHECKED BY SHEET E501

1/4" = 1'-0"

LEGAL AND PROPER MANNER BY THIS CONTRACTOR. A. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL HIS OWN REQUIRED CORE DRILLING AND DRILLING NECESSARY TO INSTALL NEW PIPE THROUGH EXISTING BUILDING WALLS AND FLOORS. THIS CONTRACTOR SHALL INCLUDE ALL REQUIRED RENTALS. WATER AND OTHER ACCESSORY COSTS ASSOCIATED WITH PROVIDING REQUIRED CORE DRILLING

B. STRUCTURAL ELEMENTS SUCH AS BEAMS, FLOORS, WALLS, ETC. SHALL NOT BE CORED OR DRILLED WITHOUT PRIOR APPROVAL FROM THE PROJECT STRUCTURAL C. A DETERMINATION OF LOCATION OF EXISTING ELECTRIC CONDUITS IN SLABS

SHALL BE MADE PRIOR TO THE START OF THIS WORK BY EITHER X-RAY METHOD OR SOME OTHER PROPOSED MEANS D. CORE DRILLED HOLES SHALL BE SIZED TO PROVIDE A TOTAL OF NOT LESS THAN 1/2 INCH CLEARANCE AROUND THE PIPING.

E. CORE DRILLED HOLES SHALL NOT BE USED AS SUPPORT POINTS FOR ANY PIPING. . ALL OPENINGS WITHIN THE BUILDING SHALL BE SEALED AIRTIGHT USING FIRE BARRIER CAULKING WITH A UL CLASSIFICATION FOR USE AS A FIRE PENETRATION SEAL FOR FLOORS AND WALLS WITH 2 OR 3 HOUR FIRE RATING, EXPANDED AND TAMPED INTO PLACE FOR THE FULL DEPTH OF THE OPENING. OPENINGS THROUGH EXTERIOR WALLS AND FLOORS SHALL ALSO BE SEALED OUTSIDE USING WATERPROOF MASTIC ETY REQUIREMENTS

A. THIS CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF THE "CONSTRUCTION SAFETY ACT" AND THE LATEST OSHA REQUIREMENTS AS WELL AS ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS AND SPECIFIC REQUIREMENTS SET FORTH BY THE DIVISION ONE SPEC AND THE GC B. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY, EFFICIENCY AND ADEQUACY OF HIS FURNISHED EQUIPMENT, MATERIALS AND METHODS, AND FOR ANY DAMAGE WHICH MAY RESULT FROM THEIR FAILURE OR THEIR IMPROPER

CONSTRUCTION. MAINTENANCE OR OPERATION. C. THIS CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR OF ANY FLAMMABLE, COMBUSTIBLE AND/OR TOXIC MATERIALS INTENDED FOR USE ON THIS PROJECT AND SHALL FURNISH THE GENERAL CONTRACTOR LITERATURE

PERTINENT TO THE USE AND CONTROL OF SUCH MATERIALS. D. $\,$ IF REQUIRED BY THE GC, THIS CONTRACTOR SHALL ATTEND ALL PROJECT SAFETY MEETINGS SCHEDULED BY THE GC

DIECTION AND CLEAN-UP A. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND PROTECTION OF ALL MATERIALS AND EQUIPMENT FURNISHED BY HIM DURING THE CONSTRUCTION PERIOD FROM LOSS, DAMAGE OR DETERIORATION UNTIL FINAL ACCEPTANCE BY THE OWNER. ALL MATERIALS AND EQUIPMENT ON THE JOB SITE SHALL BE SUITABLY STORED AND PROTECTED FROM THE WEATHER, DIRT AND DEBRIS. ALL PIPING AND EQUIPMENT OPENINGS SHALL BE TEMPORARILY CLOSED DURING CONSTRUCTION TO PREVENT OBSTRUCTION AND DAMAGE ALL EQUIPMENT WITH DAMAGED FINISHED SURFACES SHALL BE CLEANED AND

REPAINTED WITH THE SAME PAINTS AS WAS FACTORY APPLIED. C. REMOVE ALL TRASH AND EMPTY CONTAINERS AT THE END OF EACH WORKING DAY. ALL OTHER MATERIALS AND EQUIPMENT SHALL BE RETURNED TO THE CONTRACTOR'S STORAGE AREA AT THE END OF THE DAY. AT THE COMPLETION OF THE JOB, THE CONTRACTOR SHALL THOROUGHLY CLEAN THE WORK AREA. NER'S OPERATOR TRAINING

A. FOR ALL NEW EQUIPMENT FURNISHED, PROVIDE OWNER'S OPERATOR TRAINING TO INSTRUCT OWNER-DESIGNATED PERSONNEL ON THE START-UP, OPERATION, SHUT-DOWN AND SERVICING OF ALL EQUIPMENT AND SYSTEMS FURNISHED AND INSTALLED BY THIS CONTRACTOR. B. COORDINATE THE SCHEDULING OF ALL TRAINING WITH THE OWNER, GIVING A MINIMUM OF TEN (10) DAYS NOTICE FOR OWNER TO SCHEDULE WITH HIS

PERSONNEL. OPERATOR TRAINING SHALL BE A PREREQUISITE TO SYSTEM ACCEPTANCE. STEM START-UP AND OPERATION A. PROVIDE ALL LABOR AND MATERIALS AND SERVICES NECESSARY FOR THE INITIAL

START-UP AND OPERATION OF ALL SYSTEMS AND EQUIPMENT FURNISHED AND INSTALLED UNDER THIS SPECIFICATION. B. PROVIDE THE SERVICES OF A QUALIFIED REPRESENTATIVE FOR ALL MAJOR EQUIPMENT PRE-START SET-UP, START-UP AND INITIAL OPERATION. DURING START-UP OPERATION AND THE FIRST YEAR OPERATION OF THE NEW

EQUIPMENT AND SYSTEMS INSTALLED UNDER THIS PROJECT, REVIEW AND INSPECT EQUIPMENT/SYSTEMS TO VERIFY PROPER OPERATION. FAILURE OF EQUIPMENT DURING THIS PERIOD DUE TO LACK OF PROPER SUPERVISION IS THE RESPONSIBILITY OF THIS CONTRACTOR, AND CONTINUED FAILURES SHALL BE GROUNDS FOR THE OWNER TO OBTAIN SUCH SERVICES FROM ANOTHER CONTRACTOR AND BACK-CHARGE THIS CONTRACTOR. NERAL ELECTRICAL

ENERGIZING. ANY DEFECTS FOUND SHALL BE CORRECTED. B. ALL WORK SHALL BE GROUNDED IN ACCORDANCE WITH CODE REQUIREMENTS. COMPLETE EQUIPMENT GROUNDING SYSTEM (INSULATED GREEN WIRE) SHALL BE INSTALLED IN ALL BRANCH CIRCUITS. C. CIRCUIT BREAKERS USED TO CONTROL HEATING, AIR CONDITIONS AND

A. ALL SYSTEMS SHALL BE TESTED FOR SHORT CIRCUITS AND GROUNDS PRIOR TO

REFRIGERATION EQUIPMENT SHALL BE UL LISTED TYPE HACR RATED. D. CLEAN OUT CONDUIT BEFORE INSTALLATION OF CONDUCTOR. E. ALL CONDUITS SHALL BE PROPERLY SUPPORTED IN ACCORDANCE WITH CODE

NNECTIONS TO EQUIPMENT

A. WHERE CONNECTIONS ARE MADE IN EXISTING PANELS, THE PANEL INDEX SHALL BE REVISED TO INDICATE THE NEW LOADS SERVED. NEW CIRCUIT BREAKERS ADDED TO EXISTING PANELS SHALL BE THE SAME FRAME SIZE, VOLTAGE RATING AND INTERRUPTING CAPACITY AS EXISTING PANEL AND CIRCUIT BREAKERS.

B. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH ALL SECTIONS OF THESE SPECIFICATIONS IN ORDER TO PROVIDE NECESSARY ELECTRICAL CONNECTIONS TO ALL EQUIPMENT, WHETHER OR NOT SUCH EQUIPMENT SHALL BE CONNECTED, COMPLETE, READY FOR OPERATION IN ACCORDANCE WITH THE MANUFACTURER'S PROVIDE ALL POWER WIRING COMPLETE FROM POWER SOURCE TO MOTOR OR EQUIPMENT JUNCTION BOX INCLUDING POWER WIRING THROUGH STARTERS.

SAFETY DISCONNECT SWITCHES SHALL BE PROVIDED FOR ALL MOTORS WHERE REQUIRED BY THE NATIONAL ELECTRICAL CODE WHETHER SHOWN ON THE DRAWINGS OR NOT PECTIONS AND TESTING

A. ALL WORK AND MATERIALS COVERED BY THESE SPECIFICATIONS SHALL BE SUBJECT TO INSPECTION AT ANY AND ALL TIMES BY REPRESENTATIVES OF THE

B. IF THE OWNER'S INSPECTOR FINDS THAT ANY MATERIAL DOES NOT CONFORM TO THESE SPECIFICATIONS, THE ELECTRICAL CONTRACTOR SHALL REMOVE THE MATERIAL FROM THE PREMISES, IF SAID MATERIAL HAS BEEN INSTALLED. THE ENTIRE EXPENSE OF REMOVING AND REPLACING SAME, INCLUDING ANY CUTTING AND PATCHING THAT MAY BE NECESSARY, SHALL BE BORNE BY THE ELECTRICAL CONTRACTOR C. AT THE TIME OF FINAL INSPECTION, ALL CONNECTIONS AT PANELBOARDS AND EQUIPMENT MUST BE COMPLETED

OPERATION WITH OTHER TRADES A. COOPERATE WITH OTHER TRADES IN ORDER THAT ALL SYSTEMS MAY BE INSTALLED IN THE BEST ARRANGEMENT. COORDINATION AS REQUIRED WITH ALL OTHER TRADES TO SHARE SPACE IN COMMON AREAS AND TO PROVIDE THE MAXIMUM OF ACCESS TO EACH SYSTEM.

MPLETENESS A. IT IS THE INTENT OF THE SPECIFICATIONS TO PROVIDE A COMPLETE SYSTEM. COMPLETENESS SHALL MEAN NOT ONLY THAT ALL MATERIAL AND EQUIPMENT HAS BEEN INSTALLED PROPERLY, BUT THAT ALL MATERIAL AND EQUIPMENT IS OPERATING PROPERLY AS DESIGNED. JEL BOARDS

VELBOARDS SHALL BE INSTALLED IN LOCATIONS AS SHOWN ON THE DRAWINGS. JELBOARDS SHALL BE MOUNTED SUCH THAT THE HANDLE OF THE HIGHEST CIRCUIT EAKER DOES NOT EXCEED 6'-6" ABOVE FINISHED FLOOR. PANELBOARD CABINETS SHALL INSTALLED SURFACE MOUNTED AS INDICATED BY TRIM TYPE AS SHOWN ON THE AWINGS. TRIM TYPE AS SHOWN ON THE DRAWING. NO PIPING, DUCTWORK, OR OTHER CHANICAL EQUIPMENT SHALL BE ALLOWED TO PASS THROUGH THE AREA EXTENDING)M THE FLOOR TO THE STRUCTURAL CALLING WITH THE WIDTH EQUAL TO WIDTH OF E PANEL PLUS 6" ON EITHER SIDE OF PANEL. REACE MOUNTED PANELBOARDS SHALL BE MOUNTED INDEPENDENT OF THE WALL AND NNECTING RACEWAYS. FURNISH STEEL CHANNEL SUPPORTS MOUNTED ON THE WALL

) ATTACH THE PANELBOARDS TO THIS SUPPORT. CONDUIT AND PULL BOX SHALL BE PTY AT TIME OF COMPLETION. VELBOARD DOORS SHALL CONTAIN HOLDERS FOR DIRECTORY CARDS WITH PLASTIC TECTOR. PANELBOARD DIRECTORY CARDS SHALL BE TYPEWRITTEN TO INDICATE EAS AND/OR DEVICES SERVED BY EACH CIRCUIT. DIRECTORY CARDS SHALL BE EDITED) MAINTAINED DURING THE COURSE OF CONSTRUCTION TO KEEP AN ACCURATE, UP TO TE RECORD OF EACH FEEDER OR BRANCH CIRCUIT JELBOARDS SHALL BE INSTALLED WITH CLEAR WORK SPACE AS REQUIRED BY NEC. JELBOARDS IN FINISHED AREAS, INSTALLED RECESSED IN WALLS, SHALL BE PRIME ATED ONLY, FOR FINISH PAINTING BY OTHERS IELBOARDS LOCATED IN SPACES SUBJECT TO STORAGE SHALL HAVE THE CLEAR RKING SPACE PER NFPA 70. "ELECTRIC ACCESS - NOT FOR STORAGE" SHALL BE RMANENTLY MARKED ON THE FLOOR AND WALL ABOUT THE PANEL. PANELBOARDS

ALL NOT BE LOCATED IN EGRESS CORRIDORS.

7. PROVIDE BAKELITE NAMEPLATES WITH LABELING ON ALL ELECTRICAL EQUIPMENT. NAMEPLATES SHALL BE SECURED TO PANELBOARDS AND EQUIPMENT BY MEANS OF SELF TAPPING SCREWS OR POP RIVETS. BLACK BACKGROUND WITH WHITE LETTERS, 1" X 3" WITH 3/8" HIGH LETTERS ON 1/16" THICK PLATE FOR ALL NORMAL POWER SYSTEMS 1" X 3" WITH 3/8" LETTERS ON 1/16" THICK PLATE: RED ON WHITE FOR LIFE SAFETY, EMERGENCY, AND FIRE ALARM CONNECTED EQUIPMENT. B. CLEANING

1. ALL PANELBOARDS SHALL BE COMPLETELY CLEANED PRIOR TO ENERGIZING. 2. CLEANING SHALL CONSIST OF VACUUMING ALL BUSES, ENCLOSURES (INSIDE AND OUT), ETC. AFTER VACUUMING IS COMPLETE, ALL EQUIPMENT SHALL BE WIPED DOWN. IF EQUIPMENT IS WET OR CONTAINS MOISTURE, IT SHALL BE THOROUGHLY DRIED BEFORE ENERGIZING.

 REFER TO PART 4 TESTING OF ELECTRICAL EQUIPMENT FOR TESTING REQUIREMENTS. 3.14 DRY-TYPE TRANSFORMERS 1. TRANSFORMERS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS 2. DUST PROTECTION PLASTIC COVERS SHALL BE MAINTAINED DURING CONSTRUCTION. 3. PRIOR TO ENERGIZING, TRANSFORMERS SHALL BE TESTED AND VACUUMED CLEAN OF DUST AND DEBRIS. 4. PROTECT TRANSFORMERS FROM MOISTURE.

B. INSTALLATION 1. FLOOR MOUNT TRANSFORMERS AS SHOWN ON DRAWINGS. ALL FLOOR MOUNTED TRANSFORMERS SHALL BE SET ON A 4" HIGH CONCRETE HOUSEKEEPING PAD. 2. ALL CONDUIT CONNECTIONS TO TRANSFORMERS SHALL HAVE A MINIMUM OF 24" LENGTH OF FLEXIBLE CONDUIT TO MINIMIZE VIBRATION TRANSMISSION. MAXIMUM LENGTH SHALL NOT EXCEED SIZES ALLOWED BY THE NEC. 3. SET TRANSFORMERS ON ISOLATION PADS OF PROPER SIZE AND THICKNESS TO PREVENT TRANSMISSION OF SOUND INTO BUILDING STRUCTURE.

(A) ACCEPTABLE PRODUCTS: ISOMODE, KELDUR, KORFUND. 4. GROUND SECONDARY OF TRANSFORMER TO THE GROUND ELECTRODE SYSTEM IN ACCORDANCE WITH THE NEC. 5. A MINIMUM 6" CLEARANCE FROM WALLS SHALL BE MAINTAINED FOR PROPER VENTILATION.

 REFER TO PART 4 TESTING OF ELECTRICAL EQUIPMENT FOR TESTING REQUIREMENTS. 3 15 LIGHTING INSTALLATION A. FURNISH, ASSEMBLE, HANG AND CONNECT ALL LIGHTING FIXTURES. LIGHTING

FIXTURES SHALL BE AS INDICATED ON THE DRAWINGS. B. INSTALL EACH FIXTURE PROPERLY AND SAFELY. PROVIDE HANGERS, RODS, MOUNTING BRACKETS, SUPPORTS, FRAMES, YOKES, SUPPORT BARS AND ANY OTHER EQUIPMENT REQUIRED FOR A COMPLETE INSTALLATION. C. LAY-IN RECESSED FIXTURES IN GRID TYPE CEILING SHALL BE SUPPORTED FROM

THE UNDERSIDE OF ROOF OR FLOOR SLAB, AND UTILIZE ADEQUATE HANGERS WITH ATTACHMENTS TO BUILDING CONSTRUCTION INDEPENDENT OF OTHER SYSTEMS. ALL FIXTURES SHALL HAVE A MINIMUM OF (2) HANGERS SUPPORTS D. REFELCTORS. REFLECTOR CONES. AND VISIBLE TRIM OF ALL LIGHTING FIXTURES SHALL NOT BE INSTALLED UNTIL COMPLETION OF PLASTERING, CEILING TILE WORK, PAINTING, AND GENRAL CLEANUP. REFLECTORS, REFLECTOR CONES, AND VISIBLE TRIM SHALL BE CAREFULLY HANDLED TO AVOID SCRATCHING OR

FINGERPRINTING. E. AT THE TIME OF ACCEPTANCE BY THE OWNER, ALL LIGHTING FIXTURES SHALL HAVE BEEN THOROUGHLY CLEANED WITH MATERIALS AND METHODS

RECOMMENDED BY THE MANUFACTURERS, ALL BROKEN PARTS SHALL HAVE BEEN REPLACED, AND ALL LAMPS AND/OR LED MODULES SHALL BE OPERATIVE F. ALL LIGHTING FIXTURES SHALL BE SUPPORTED FROM THE SLAB ABOVE AND SHALL NOT BE SUSPENDED FROM DUCTS, PIPING, EQUIPMENT, CEILING SUPPORT

G. CHECK FOR ADEQUATE HEADROOM AND NON-INTERFERENCE WITH OTHER EQUIPMENT, SUCH AS DUCTS, PIPES OR OPENINGS.

H. PENDANT OR SURFACE MOUNTED FIXTURES SHALL BE PROVIDED WITH REQUIRED MOUNTING DEVICES AND ACCESSORIES, INCLUDING HICKEYS, STUD EXTENSIONS, BALL ALIGNERS, CANOPIES AND STEMS. LOCATIONS OF FIXTURES IN MECHANICAL AREAS SHALL BE COORDINATED WITH THE CONTRACTOR. I. INSTALL PENDANT LIGHTING FIXTURES PLUMB AND AT A HEIGHT FROM THE FLOOR AS SPECIFIED OR INDICATED ON THE DRAWINGS. IN CASES WHERE CONDITIONS MAKE THIS IMPRACTICAL, REFER TO THE ARCHITECT AND INSTALL AS DIRECTED. USE BALL ALIGNERS AND CANOPIES ON PENDANT FIXTURES UNLESS NOTED

J. REPLACE BLEMISHED, DAMAGED OR UNSATISFACTORY FIXTURES AS DIRECTED. K. ANY LAMPS, DRIVERS, REFLECTORS, LENS, DIFFUSERS, SIDE PANELS OR OTHER PARTS DAMAGED PRIOR TO THE FINAL INSPECTION SHALL BE REPLACED AT NO EXPENSE TO THE OWNER. 3.16 HANGERS AND SUPPORTS

A. RACEWAYS SHALL BE SECURELY FASTENED TO THE STRUCTURE, WITH SUPPORT MECHANISMS SPACED AS DICTATED BY THE NEC OR AS SPECIFIED BELOW. WHICHEVER IS MORE STRINGENT: 1. 1/2" THRU 1": 6'-0" 2. 1 1/4" THRU 1 1/2": 8'-0"

3. 2" THRU 4": 10'-0" 4. FLEXIBLE METAL CONDUIT: 4'-6" 5. WIREWAYS: 5'-0"

B. SUPPORT EMT CONDUITS WITHIN 3'-0" OF EVERY JUNCTION BOX, PULLBOX OR TERMINATION. SUPPORT FLEXIBLE CONDUIT WITHIN 12" ON EACH SIDE OF EVERY

OUTLET BOX OR FITTING C. SUPPORT CONDUITS BY PIPE STRAPS, WALL BRACKETS, HANGERS OR CEILING TRAPEZE. DO NOT WELD CONDUITS OR PIPE STRAPS TO STEEL STRUCTURES UNLESS SPECIFICALLY INDICATED.

D. FASTENERS ATTACHED TO CONCRETE SHALL BE VIBRATION AND SHOCK RESISTANT.

3.17 BOXES - JUNCTION, PULL AND OUTLET A. GENERAL INSTALLATION REQUIREMENTS 1. ALL BOXES SHALL BE ERECTED, RIGIDLY SUPPORTED AND SECURELY FASTENED IN PLACE, IN SUCH A MANNER THAT PLUMB, LEVEL, AND TRUE FINISHED LINES AND SURFACES WILL RESULT IN THE FINISHED WORK. 2. THE PLACEMENT OF ALL BOXES SHALL NOT INTERFERE WITH HVAC, PLUMBING OR

SPRINKI FR PIPING WORK 3. LOCATE ALL CEILING OUTLETS WITH DUE CONSIDERATION TO CLEARANCE FROM VENTILATING DUCTS AND PIPING 4. THE LOCATION OF OUTLETS SHOWN ON THE DRAWINGS IS DIAGRAMMATIC ONLY. COORDINATE THE EXACT LOCATION OF OUTLETS WITH ARCHITECTURAL DETAILS, EQUIPMENT CONNECTION REQUIREMENTS, AND WORK OF OTHER CONTRACTORS. THE OWNER'S REPRESENTATIVE MAY ALTER THE LOCATING OF OUTLETS SHOWN WITHIN A 6'-0" RADIUS PRIOR TO INSTALLATION.

5. PROTECT ALL OUTLET BOXES FROM ENTRY OF FOREIGN MATERIALS. 6. INDEPENDENTLY SUPPORT ALL BOXES. NO PARTS OF THE WEIGHT OR STRESS OR THEREOF SHALL BE BORNE BY CONDUITS TERMINATING THEREIN. 7. ALL BOXES SHALL BE RIGIDLY MOUNTED TO CONSTRUCTION AND SHALL BE EQUIPPED WITH SUITABLE SCREW FASTENED COVERS. UNUSED OPEN KNOCKOUTS IN ALL BOXES SHALL BE PLUGGED WITH SUITABLE BLANKING DEVICES. ALL BOXES INSTALLED THAT DO NOT HAVE EQUIPMENT MOUNTED ON THEM SHALL BE PROVIDED WITH BLANK COVERS. B. INSTALLATION OF PULL AND JUNCTION BOXES 1. THE CONTRACTOR SHALL FURNISH AND INSTALL PULL BOXES FOR ALL FEEDERS AS REQUIRED BY NEC. PULL BOXES SHALL BE CODE GAUGE STEEL PLATES FASTENED TO ANGLE IRON FRAMES WITH REMOVABLE COVERS. COVERS SHALL BE SECURED WITH BRASS MACHINE SCREWS. 2. THE CONTRACTOR SHALL FURNISH AND INSTALL JUNCTION BOXES FOR FEEDERS AND BRANCH CIRCUITS AS REQUIRED. BOXES SHALL BE SIZED IN ACCORDANCE WITH NEC. JUNCTION BOXES SHALL BE CODE GAUGE STEEL WITH REMOVABLE COVERS. COVERS SHALL BE SECURED WITH BRASS MACHINE SCREWS. 3. SUITABLE PULL BOXES SHALL BE INSTALLED IN CONVENIENT INTERMEDIATE LOCATIONS IN

ALL CONDUIT RUNS IN EXCESS OF 150 LINEAR FEET AND RUNS REQUIRING MORE THAN (3) 4. LOCATE PULL BOXES AND JUNCTION BOXES ABOVE REMOVABLE CEILINGS OR IN ELECTRICAL ROOMS, UTILITY ROOMS, STORAGE OR OTHER AREAS. 5. PULL BOXES SHALL BE INSTALLED IN A RIGID AND SATISFACTORY MANNER BY USE OF SHEET METAL SCREWS ON WOOD, BOLTS AND EXPANSION SHIELD ON CONCRETE OR BRICK, TOGGLE BOLTS ON HOLLOW MASONRY UNITS, AND MACHINE SCREWS OR WELDED THREADED STUDS ON STEEL WORK.

C. INSTALLATION OF OUTLET BOXES 1. LOCATION OF ALL WALL OUTLETS, SWITCHES, ETC., SHALL BE VERIFIED WITH THE ENGINEER PRIOR TO ROUGHING IN. REFER TO DETAILS AND WALL ELEVATIONS ON 2. THE CONTRACTOR SHALL FURNISH AND INSTALL OUTLET BOXES FOR ALL WIRING DEVICES AS SHOWN ON THE DRAWINGS.

3. THRU-THE-WALL OUTLET BOXES SHALL NOT BE PERMITTED. 4. WHENEVER OUTLET BOXES OF ANY SYSTEM ARE INSTALLED IN BRICK, TILE, AND ALL TYPES OF CONSTRUCTION BLOCKS AT OUTLETS. EXPOSED MORTAR SHALL NOT BE PERMITTED AROUND DEVICE PLATES

(A) THE CONTRACTOR IS RESPONSIBLE FOR CUTTING OPENINGS IN BRICK, TILE, AND ALL TYPES OF CONSTRUCTION BLOCKS AT OUTLETS. EXPOSED MORTAR SHALL NOT BE PERMITTED AROUND DEVICE PLATE. 5. LOCATION OF OUTLETS SHOWN ON THE DRAWINGS ARE APPROXIMATE; THE EXACT LOCATIONS SHALL BE DETERMINED BY THE PROJECT CONDITIONS. 6. ALL BOXES SHALL BE RIGIDLY MOUNTED TO CONSTRUCTION AND SHALL BE EQUIPPED WITH SUITABLE SCREW FASTENED COVERS. UNUSED OPEN KNOCKOUTS IN ALL BOXES SHALL BE PLUGGED WITH SUITABLE BLANKING DEVICES. ALL BOXES INSTALLED THAT DO NOT HAVE EQUIPMENT MOUNTED ON THEM SHALL BE PROVIDED WITH BLANK COVERS.

7. PROVIDE PERMANENT BARRIERS IN COMMON BOXES TO LIMIT VOLTAGE BETWEEN ADJACENT SWITCHES TO 300V OR LESS.

8. OUTLET BOXES SERVING PENDANT MOUNTED FIXTURES INSTALLED IN STRUCTURAL SLABS SHALL BE INSTALLED IN BOTTOM OF RIB SECTION OF STRUCTURAL ASSEMBLY UNLESS OTHERWISE INDICATED. 9. THE HEIGHT OF OUTLETS AND DEVICES SHALL BE OBTAINED FROM THE ENGINEER. ALL MOUNTING HEIGHTS TO BE IN ACCORDANCE WITH ADA AND NFPA GUIDELINES. COORDINATE HEIGHT OF OUTLETS WITH DRAWINGS AND EQUIPMENT INSTALLATIONS DRAWINGS AND PROPERLY LOCATE HEIGHT OF ALL OUTLETS. PLUG ALL UNUSED OPENINGS. USE THREADED PLUGS FOR CAST BOXES AND SNAP IN METAL PLUGS FOR SHEET METAL BOXES.

COMMON BOXES USED FOR GANG INSTALLATION WITH SWITCHES AND RECEPTACLES AND LOW VOLTAGE DEVICES SHALL INCLUDE BARRIERS BETWEEN THE DEVICES AND THE SWITCHES OR RECEPTACLES. D CLEANING

1. ALL PULL, JUNCTION, AND OUTLET BOXES SHALL BE THOROUGHLY CLEANED PRIOR TO INSTALLATION OF CONDUCTORS AND/OR WIRING DEVICES.

E. IDENTIFICATION 1. ALL BOXES SHALL BE PERMANENTLY MARKED WITH CIRCUIT NUMBER(S) AND VOLTAGE. 3.18 RACEWAYS AND CONDUIT

A. UTILIZE ELECTRICAL METALLIC TUBING IN EXPOSED FINISHED AREAS, ABOVE

HUNG CEILINGS AND IN OTHER LOCATIONS NOT LISTED AS DAMP, WET, OR SUBJECT TO PHYSICAL ABUSE. B. EMT SHALL NOT BE USED IN EXPOSED APPLICATIONS BELOW 8 FEET ABOVE FINISHED FLOOR OR IN EXTERIOR OR DAMP/WET/CORROSIVE LOCATIONS. C. ALL CONDUIT RUNS IN EXPOSED INTERIOR (UP TO 8'-0" AFF) AND EXTERIOR APPLICATIONS SHALL BE GALVANIZED RIGID STEEL CONDUIT (GRSCECTRICAL, TELEPHONE AND COMMUNICATIONS CLOSETS ARE CONSIDERED EXEMPT FROM THIS RESTRICTION AND EMT MAY BE INSTALLED BELOW 8' AFF IN THIS

APPLICATION ONLY. D. GALVANIZED RIGID STEEL CONDUIT SHALL NOT BE USED IN CORROSIVE

ENVIRONMENTS.

E. FOR EXPOSED RUNS IN AREAS SUBJECT TO WEATHER, ATTACH SURFACE MOUNTED CONDUIT WITH CLAMPS. UTILIZE GALVANIZED STEEL STRAPS AND STAINLESS STEEL HARDWARE FOR ALL EXPOSED WORK IN DAMP LOCATIONS. ALLOW 1/16-INCH CLEARANCE AT ALL SUPPORTS FOR EXPANSION AND DEFLECTION.

F. MAKE CONNECTIONS TO MOTORS AND EQUIPMENT WITH PVC JACKETED FLEXIBLE METALLIC CONDUIT AND LIQUID-TIGHT CONNECTORS 3.19 WIRE AND CABLE - 600 VOLTS AND BELOW

A. GENERAL INSTALLATION REQUIREMENTS 1. ALL WORK SHALL CONFORM TO THE PRINTED SPECIFICATIONS AND INSTALLATIONS OF EACH OF THE MANUFACTURERS, THE APPROVED SHOP DRAWINGS, AND TO THE REQUIREMENTS OF THE GOVERNING LAWS AND BUILDING CODE. 2. INSPECT JOB CONDITIONS AND RELATED WORK AND REPORT TO THE ENGINEER, ANY CONDITIONS ADVERSELY AFFECTING RACEWAY WORK. 3. ALL WIRE AND CABLE SHALL BE INSTALLED IN APPROVED RACEWAYS (AS SPECIFIED ELSEWHERE IN THESE SPECIFICATIONS), AND AS APPROVED BY AUTHORITIES HAVING

JURISDICTION. DO NOT USE SURFACE MOUNTED RACEWAYS ON FLOOR. B. INSTALLATION OF FEEDERS AND BRANCH CIRCUITS ALL FEEDER, BRANCH CIRCUIT, OR AUXILIARY SYSTEM WIRING PASSING THROUGH PULL BOXES AND/OR BEING MADE UP IN PANELBOARDS SHALL BE PROPERLY GROUPED, BOUND AND TIED TOGETHER IN A NEAT AND ORDERLY MANNER IN KEEPING WITH THE HIGHEST STANDARDS OF THE TRADE, WITH PLASTIC CABLE TIES. LOOSE ENDS OF THE CABLE TIES SHALL BE PROPERLY TRIMMED AFTER MAKING UP SAME. CABLE TIES SHALL BY TY-RAPS, AS MANUFACTURED BY THOMAS AND BETTS, HOLUB INDUSTRIES, INC., QUICK-WRAP, BURNDY UNIRAP, OR EQUAL.

2. FOR LARGE SIZE CONDUCTORS AVAILABLE ONLY IN BLACK, USE COLORED PLASTIC TAPE AT ALL ENDS AND IN ALL JUNCTION AND PULL BOXES WHERE CONNECTIONS AND SPLICES ARE MADE FOR THE SPECIFIED COLOR CODE IDENTIFICATION. TAPE SHALL BE WRAPPED AROUND THE CONDUCTOR (3) COMPLETE TURNS. 3. FOR FEEDERS AND BRANCH CIRCUITS CONDUCTORS #8 AWG AND LARGER JOINTS AND SPLICES SHALL BE MADE IN AN APPROVED MANNER AND SHALL BE EQUIVALENT. ELECTRICALLY, AND MECHANICALLY, TO THE CONDUCTOR INSULATION. CONDUCTORS SHALL BE CONNECTED BY USE OF SOLDERLESS PRESSURE CONNECTORS; THESE JOINTS AND SPLICES SHALL HAVE 3M PUTTY APPLIED AND THEN TAPED WITH A MINIMUM OF (3) WRAPS OF #88 SCOTCHBRAND (3M COMPANY) ALL-WEATHER VINYL PLASTIC ELECTRICAL TAPE, AND A DOUBLE HALF LAYER OF #33 ON TOP OF #88, OR EQUAL PERMACEL OR

PLYMOUTH CO. EACH WRAP OF TAPE SHALL BE HALF-LAPPED. 4. PROVIDE NONFERROUS IDENTIFYING TAGS OR PRESSURE-SENSITIVE LABELS FOR CABLES, FEEDERS, AND POWER CIRCUITS IN PULL BOXES, WIREWAYS, CABLE TERMINATIONS, JUNCTION BOXES, PANELS, ETC. 5. TAGS OR LABELS SHALL BE STAMPED OR PRINTED TO CORRESPOND WITH MARKINGS ON THE DRAWINGS OR MARKED SO THAT FEEDER OR CABLE MAY BE IDENTIFIED READILY. IF SUSPENDED TAGS ARE PROVIDED, ATTACH WITH 1/32" DIAMETER, NYLON, 55LB. TEST MONOFILAMENT LINE OR SLIP-FREE PLASTIC CABLE LACING UNIT.

6. ALL WIRING SHALL BE INSTALLED AND SUPPORTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEC 7. WIRE FROM POINT OF SERVICE CONNECTION TO RECEPTACLES, LIGHTING FIXTURES, DEVICES, EQUIPMENT, OUTLETS FOR FUTURE EXTENSION, AND OTHER ELECTRICAL APPARATUS AS SHOWN ON THE DRAWINGS. PROVIDE SLACK WIRE FOR CONNECTIONS WHERE REQUIRED. TAPE ENDS OF WIRES AND PROVIDE BLANK COVERS FOR OUTLET BOXES DESIGNED FOR FUTURE USE. ALL BRANCH CIRCUIT WIRING SHALL BE INSTALLED IN

8 ALL CONDUCTORS IN BRANCH CIRCUIT PANELBOARDS SHALL BE BUNDLED 9. BRANCH CIRCUIT HOME RUNS WITH (2) OR (3) CIRCUITS AND COMMON NEUTRAL SHALL BE WIRED TO CIRCUIT BREAKERS SUCH THAT NONE OF THE CIRCUITS IN A COMMON CONDUIT ARE FED FROM THE SAME PHASE. BRANCH CIRCUITS WIRING SHALL BE PEELED OUT OF THE WIRING GUTTERS AT THE TERMINAL CABINET AND PANELS AT 90 (DEGREES) TO CIRCUIT BREAKERS AND

TERMINAL LUGS FOR CONNECTING TO SAME. THE NUMBER AND SIZE OF CONDUCTORS IN EACH RUN OF CONDUIT IS INDICATED ON THE DRAWINGS AND WHERE THERE IS A CONFLICT BETWEEN THE NUMBER OF WIRES INDICATED AND THE ACTUAL NUMBER REQUIRED, THE ACTUAL NUMBER AND SIZE SHALL BE INSTALLED.

CONDUCTORS #10 AND SMALLER IN BRANCH CIRCUIT PANELBOARDS, SIGNAL CABINETS, SIGNAL CONTROL BOARDS IN SWITCHBOARDS, AND MOTOR CONTROL CENTERS SHALL BE BUNDLED FOLLOW HOMERUN CIRCUIT NUMBERS SHOWN ON THE DRAWINGS TO CONNECT CIRCUITS TO PANELBOARDS. WHERE HOMERUN CIRCUIT NUMBERS ARE NOT SHOWN ON THE DRAWINGS, DIVIDE SIMILAR TYPES OF CONNECTED LOADS AMONG PHASE BUSSES SO THAT CURRENTS IN EACH PHASE ARE WITHIN 10% OF EACH OTHER DURING NORMAL USAGE. BRANCH CIRCUIT HOMERUN WITH (2) OR (3) CIRCUITS AND COMMON NEUTRAL SHALL BE WIRED TO CIRCUIT BREAKERS SUCH THAT NONE OF THE CIRCUITS ARE FED

FROM THE SAME PHASE. JOINTS AND SPLICES SHALL BE MADE IN AN APPROVED MANNER AND SHALL BE EQUIVALENT, ELECTRICALLY AND MECHANICALLY, TO THE CONDUCTOR INSULATION. ALL CONDUCTORS SHALL BE CONNECTED BY USE OF SOLDERLESS CRIMP (COMPRESSION) TYPE CONNECTORS; THESE JOINTS AND SPLICES SHALL BE TAPED WITH (1) WRAP OF VARNISH CAMBRIC TAPE AND THEN A MINIMUM OF (3) WRAPS OF #88 SCOTCHBRAND (3M COMPANY) ALL WEATHER VINYL PLASTIC ELECTRICAL TAPE, OR EQUAL PERMACEL OR PLYMOUTH CO. EACH WRAP OF TAPE SHALL BE HALF-LAPPED. ALL BRANCH CIRCUITS SHALL BE CONNECTED TO BREAKERS AT CONTRACTOR'S DISCRETION. THE BALANCING OF ALL LOADS SHALL BE THE CONTRACTOR'S

RESPONSIBILITY. SPLICES, TAPS, AND LUGS SHALL BE ELECTRICALLY AND MECHANICALLY SECURE AND SOLDERLESS LUGS, AND CRIMP CONNECTORS SHALL BE USED. LUGS SHALL BE USED FOR CONDUCTOR SIZES #8 AWG AND LARGER. ALL LUGS SHALL BE OF THE PROPER SIZE, AND IN NO CASE SHALL STRANDS BE CUT FROM A CONDUCTOR IN ORDER TO FIT THE CONDUCTOR INTO A LUG. PROVIDE LUG/CABLE ADAPTORS FOR BREAKERS WHERE OVERSIZED CABLES ARE INDICATED. ALL LUG CONNECTIONS TO BUSES IN SWITCHBOARDS, UNIT SUBSTATIONS, MOTOR CONTROL CENTERS, ETC., SHALL BE 2-BOLT/NUT

CONNECTIONS. PROVIDE CABLE SUPPORTS FOR VERTICAL FEEDERS AS REQUIRED BY NEC. PROVIDE SPLIT WEDGE CABLE SUPPORTS WITH CLAMPS FOR CABLE WITHOUT METALLIC SHEATH IN PULL BOXES. SUPPORTS SHALL BE AS MANUFACTURED BY O.Z. GEDNEY OR APPROVED EQUAL

C. GENERAL 1. WHERE CONDUCTORS ARE ADJUSTED IN SIZE TO COMPENSATE FOR VOLTAGE DROP, EQUIPMENT GROUNDING CONDUCTORS AND CONDUITS SHALL BE ADJUSTED PROPORTIONATELY.

2. SPLICE ONLY IN ACCESSIBLE JUNCTION OR OUTLET BOXES. 3. NEATLY TRAIN AND LACE WIRING INSIDE BOXES, EQUIPMENT, AND PANELBOARDS. 4. MAKE CONDUCTOR LENGTHS FOR PARALLEL CIRCUITS EQUAL. 5. MAINTAIN COLOR CODING OF CONDUCTORS FOR ALL SYSTEMS. D. CONNECTIONS AND TERMINATIONS

1. IDENTIFY EACH CONDUCTOR IN PANELBOARDS, JUNCTION OR PULL BOXES, OR TROUGHS WITH A PERMANENT PRESSURE SENSITIVE LABEL WITH SUITABLE NUMBERS OR LETTERS FOR EASY RECOGNITION. IDENTIFY CONTROL WIRING AT EACH END AND IN JUNCTION BOXES WITH NUMERIC WIRE NUMBER CORRESPONDING TO CONTROL WIRING DIAGRAM 2. THOROUGHLY CLEAN WIRE BEFORE INSTALLING LUGS AND CONNECTORS. 3. MAKE SPLICES, TAPS, AND TERMINATIONS TO CARRY FULL AMPACITY OF CONDUCTORS WITHOUT PERCEPTIBLE TEMPERATURE RISE. 4. TERMINATE SPARE CONDUCTORS WITH ELECTRICAL TAPE AND ROLL UP IN BOX. E. FIELD QUALITY CONTROL

 INSPECT WIRING FOR PHYSICAL DAMAGE AND PROPER CONNECTION. 2. TORQUE CONDUCTOR TERMINATIONS TO MANUFACTURER'S RECOMMENDED VALUES. 3. PERFORM CONTINUITY TESTS ON ALL POWER AND BRANCH CIRCUIT CONDUCTORS. VERIFY PROPER PHASING. REFER TO TESTING SECTION OF THIS

SPECIFICATION FOR SPECIFIC TESTING REQUIREMENTS. 3.20 WIRING DEVICES AND DEVICE PLATES

A. INSTALLATION 1. INSTALL IN BOXES APPROVED FOR THE PURPOSE. 2. UTILIZE SCREW TERMINALS. DO NOT UTILIZE "PUSH-IN" TYPE SPEED TERMINALS. 3. RECEPTACLES INSTALLED VERTICALLY SHALL BE ORIENTED WITH THE GROUND PIN POSITION UP. RECEPTACLES INSTALLED HORIZONTALLY SHALL BE ORIENTED WITH THE NEUTRAL POSITION UP.

4. PROVIDE LABELLING FOR ALL NEW EQUIPMENT INDICATING SOURCE AND CIRCUIT NUMBER. 5. PROVIDE LABELLING FOR ALL EXISTING EQUIPMENT BEING MAINTAINED AND REFED INDICATING SOURCE AND PANEL NUMBER. 3.21 DISCONNECTS AND CIRCUIT BREAKERS A. INSTALLATION OF MOTOR AND CIRCUIT DISCONNECT SWITCHES

1. SWITCHES AND FUSES SHALL BE INSTALLED AS INDICATED ON THE DRAWINGS AND AS DESCRIBED IN THESE SPECIFICATIONS 2. ALL EQUIPMENT OR MOTORS SHALL HAVE LOCAL DISCONNECT SWITCHES. THESE SWITCHES SHALL BE MOUNTED ON, OR ADJACENT TO, THE EQUIPMENT OR MOTOR IN SUCH A MANNER THAT THEY SHALL BE ACCESSIBLE. 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ALL BLOWN FUSES UNTIL SUCH TIME THAT THE JOB IS FINISHED AND ACCEPTED BY THE OWNER. THE CONTRACTOR SHALL ALSO, AT THE TIME OF ACCEPTANCE, FURNISH 10% SPARE FUSES OF EACH SIZE

USED. IN NO CASE SHALL LESS THAN (3) FUSES BE FURNISHED OF EACH SIZE.

4. SWITCHES SHALL BE MOUNTED IN ACCORDANCE WITH THE MANUFACTURER'S

RECOMMENDATIONS USING THE MOUNTING HARDWARE, MATERIALS, AND METHODS AS 5. MOUNTING HEIGHT OF DISCONNECT SWITCHES SHALL BE A MAXIMUM OF 6'-6" ABOVE THE FINISHED FLOOR TO THE TOP OF THE SWITCH, UNLESS OTHERWISE INDICTED ON THE DRAWINGS OR DUE TO CONSTRUCTION INTERFERENCE. 6. ALL DISCONNECT SWITCHES MOUNTED WITHIN 6'-0" OF THE CENTER LINE OF SINKS, EMERGENCY SHOWERS, AND/OR EYEWASH SHALL BE EQUIPPED WITH A NEMA 3R RATED FNCLOSURE. 7. CONDUIT OPENINGS AND SWITCHES SHALL BE MADE WITH A HOLE SAW OR SHALL BE

PUNCHED. ALL UNUSED OPENINGS SHALL BE PLUGGED OR CAPPED. 8. ALL DISCONNECT SWITCHES SHALL BE LABELED IN ACCORDANCE WITH THE REQUIREMENTS THE SPECIFICATIONS. 9. ALL DISCONNECT SWITCHES SHALL BE THOROUGHLY CLEANED PRIOR TO FINAL ACCEPTANCE BY OWNER.

1. FUSES SHALL NOT BE INSTALLED UNTIL EQUIPMENT IS READY TO BE ENERGIZED. 2. FINAL TESTINGS AND INSPECTIONS SHALL BE MADE PRIOR TO ENERGIZING OF EQUIPMENT. B. INSPECTION 1. THE PROPER FUSE RATING SHALL BE DETERMINED FROM THE EQUIPMENT MANUFACTURER'S RECOMMENDATION FOR ALL EQUIPMENT REQUIRED TO BE PROTECTED

2. THE PROPER SIZE SWITCH WITH FUSE HOLDERS SHALL MATCH THE FUSE APPLICATION. A. THE REQUIRED EQUIPMENT GROUNDING CONDUCTORS AND STRAPS SHALL BE SIZED IN COMPLIANCE WITH NEC TABLE 250-122. B. ALL EQUIPMENT GROUNDING CONDUCTORS SHALL BE PROVIDED WITH

INSULATION EQUIVALENT TO THE INSULATION ON THE ASSOCIATED PHASE CONDUCTORS AND COLOR CODED AS DESCRIBED IN SYSTEMS IDENTIFICATION. C. FLEXIBLE METALLIC CONDUIT EQUIPMENT CONNECTIONS SHALL BE PROVIDED WITH SUITABLE GREEN INSULATED GROUNDING CONDUCTORS CONNECTED TO APPROVED GROUNDING TERMINALS AT EACH END OF THE FLEXIBLE CONDUIT.

D. EACH ELECTRICAL EXPANSION FITTING SHALL BE PROVIDED WITH A BONDING E. CONTINUITY BETWEEN ALL METALLIC AND NON-METALLIC RACEWAYS, WIREWAYS AND EQUIPMENT SHALL BE MAINTAINED.

F. ALL BRANCH CIRCUITS SHALL BE PROVIDED WITH A SEPARATE GROUNDING CONDUCTOR. 3.24 ELECTRICAL IDENTIFICATION A. DEMOLITION 1. REMOVE LABELS AND/OR MODIFY DIRECTORY ASSOCIATED WITH THE CIRCUIT BEING DEMOLISHED AT THE SOURCE AND REPLACE WITH A LABEL IDENTIFYING IT AS A "SPARE".

2. LIGHTING AND RECEPTACLE OUTLET BOXES AND JUNCTION BOXES 3. BOXES SHALL BE IDENTIFIED WITH THE PANEL AND CIRCUIT DESIGNATION. B. NFW WORK 1. PROVIDE LABELS FOR DEVICE PLATES ON ALL LIGHT SWITCHES AND RECEPTACLES. LABEL SHALL INDICATE PANEL FED FROM AND BRANCH CIRCUIT NUMBER. 2. PROVIDE LABLES FOR DISCONNECT SWTICHES AND VFDS. LABELS SHALL INDICATE PANEL

FED FROM AND BRANCH CIRCUIT NUMBER. C. TERMINAL BLOCKS 1. TERMINAL BLOCKS REQUIRING IDENTIFICATION NUMBERS SHALL BE NUMBERED BY THE CONTRACTOR WITH DESIGNATIONS SHOWN ON THE WIRING DIAGRAM USING NAMEPLATES. TERMINAL BLOCK NAMEPLATES SHALL BE INSTALLED AT THE TOP OF VERTICALLY MOUNTED TERMINAL BLOCKS AND AT THE END OF HORIZONTALLY MOUNTED TERMINAL BLOCKS. TERMINAL BLOCK MARKING STRIPS SHALL BE FILLED OUT BY THE CONTRACTOR USING PERMANENT INK AND SHALL INDICATE THE INDIVIDUAL TERMINAL POINT

3.25 AS-BUILT DRAWINGS A. A COMPLETE SET OF AS-BUILT DRAWINGS IN ELECTRONIC FORMAT (AUTOCAD) FOR THE PROJECT SHALL BE DELIVERED TO THE ENGINEER FOR APPROVAL AND ALL DEVIATIONS NOTED BY THE ENGINEER SHALL BE CORRECTED BY THE CONTRACTOR AND RETURNED TO THE ENGINEER FOR FURTHER DELIVERY TO THE

PART 4 <u>TESTING OF ELECTRICAL EQUIPMENT</u> 4.1 GENERAL SCOPE

DESIGNATIONS SHOWN ON THE WIRING DIAGRAMS.

A. THE ELECTRICAL CONTRACTOR SHALL ENGAGE THE SERVICES OF A RECOGNIZED INDEPENDENT TESTING FIRM FOR THE PURPOSE OF PERFORMING INSPECTIONS AND TESTS AS HEREIN SPECIFIED. ALL ASSOCIATE COSTS SHALL BE INCLUDED IN THE ELECTRICAL CONTRACTORS CONTRACT.

B. IT IS THE PURPOSE OF THESE SPECIFICATIONS TO ASSURE THAT ALL TESTED ELECTRICAL EQUIPMENT, BOTH CONTRACTOR AND OWNER-SUPPLIED, IS OPERATIONAL AND WITHIN INDUSTRY AND MANUFACTURER'S TOLERANCES AND IS INSTALLED IN ACCORDANCE WITH DESIGN SPECIFICATIONS.

A. NOTIFY THE ENGINEER AT LEAST 48 HOURS PRIOR TO SCHEDULED PERFORMANCE OF TEST. B. PERFORM ALL TESTS IN ACCORDANCE WITH NETA STANDARDS.

4.3 TEST PROCEDURES A. MOLDED CASE CIRCUIT BREAKERS (GREATER THAN 100A FRAME) 1. VISUAL AND MECHANICAL INSPECTION

> (B) CHECK FOR PROPER MOUNTING, CONDUCTOR SIZE AND FEEDER DESIGNATION. (C) OPERATE BREAKER TO CHECK OPERATION. (D) INSPECT CONNECTIONS FOR PROPER TORQUE IN ACCORDANCE WITH

(A) INSPECT COVER AND CASE, AND CHECK FOR BROKEN OR LOOSE

MANUFACTURER RECOMMENDATIONS. 2. ELECTRICAL TESTS (A) PERFORM A CONTACT-RESISTANCE TEST (B) PERFORM AN INSULATION-RESISTANCE TEST AT 1000 VOLTS DC FROM POLE-TO-POLE AND FROM EACH POLE-TO-GROUND WITH BREAKER CLOSED

AND ACROSS OPEN CONTACTS OF EACH PHASE. (C) PERFORM ADJUSTMENTS FOR FINAL SETTINGS IN ACCORDANCE WITH COORDINATION STUDY. (D) PERFORM LONG-TIME DELAY TIME-CURRENT CHARACTERISTIC TESTS BY

PASSING 300 PERCENT RATED PRIMARY CURRENT THROUGH EACH POLE SEPARATELY UNLESS SERIES TESTING IS REQUIRED TO DEFEAT GROUND FAULT FUNCTIONS. (E) DETERMINE SHORT-TIME PICKUP AND DELAY BY PRIMARY CURRENT INJECTION

(F) DETERMINE INSTANTANEOUS PICKUP CURRENT BY PRIMARY INJECTION. B. PANELBOARDS 1. VISUAL AND MECHANICAL INSPECTION (A) INSPECT FOR PHYSICAL DAMAGE. VERIFY THAT THE CONTRACTOR HAS

CLEANED ENCLOSURE INTERIORS OF ACCUMULATED DUST, DIRT, OIL FILMS, AND OTHER FOREIGN MATERIAL. (B) COMPARE EQUIPMENT NAMEPLATE INFORMATION WITH THE LATEST SINGLE-LINE DIAGRAM AND REPORT DISCREPANCIES. (C) INSPECT ALL ELECTRICAL AND MECHANICAL COMPONENTS FOR CONDITION

AND ANY EVIDENCE OF DEFECTS OR FAILURE. (D) CHECK FOR PROPER TRAVEL AND ALIGNMENT OF PLUG-IN CIRCUIT

BREAKERS. (E) CHECK BREAKER CONNECTIONS TO BUS. (F) INSPECT BOLTED CONNECTIONS. THE CONTRACTOR SHALL TORQUE

WRENCH TIGHTEN OR REMAKE ANY QUESTIONABLE CONNECTIONS. (G) INSPECT FOR MISSING OR LOOSE HARDWARE OR ACCESSORIES.

(H) INSPECT GROUND BUS CONNECTIONS. (I) OPERATE KEY AND DOOR INTERLOCK DEVICES TO ENSURE PROPER OPERATION 2. ELECTRICAL TESTS

(A) INSULATION RESISTANCE TEST: MEGGER MAIN SECONDARY BUS AND FEEDER CIRCUITS PHASE-TO-PHASE AND PHASE-TO-GROUND FOR A MINIMUM OF (1) MINUTE.

C. TRANSFORMERS

3. INSTRUMENTS AND METER TESTS (A) INSPECT PANEL MOUNTED INSTRUMENTS AND METERS. CLEAN AND CHECK FOR CALIBRATION ACCURACY. MAKE MINOR ADJUSTMENTS AS NECESSARY.

1. VISUAL AND MECHANICAL INSPECTIONS (A) COMPARE EQUIPMENT NAMEPLATE DATA WITH DRAWINGS AND

> (B) INSPECT PHYSICAL AND MECHANICAL CONDITION. (C) VERIFY REMOVAL OF ANY SHIPPING BRACING AFTER FINAL PLACEMENT (D) VERIFY SETTINGS AND OPERATION OF ALL TEMPERATURE DEVICES AS REQUIRED. (E) INSPECT ALL BOLTED ELECTRICAL CONNECTIONS FOR HIGH RESISTANCE.

(F) VERIFY CORRECT EQUIPMENT GROUNDING. (G) PERFORM ALL TESTS AS RECOMMENDED PER MANUFACTURER 2. FLECTRICAL TESTS (A) PERFORM RESISTANCE MEASUREMENTS THROUGH ALL BOLTED CONNECTIONS WITH LOW-RESISTANCE OHMMETER.

(B) PERFORM INSULATION-RESISTANCE TESTS, WINDING-TO-WINDING AND WINDING-TO-GROUND PER NETA RECOMMENDATIONS. (C) PERFORM TURNS-RATIO TESTS AT ALL TAP POSITIONS. (D) PERFORM POWER-FACTOR/DISSIPATION FACTOR TEST ON WINDINGS AND

BUSHINGS PER MANUFACTURER'S RECOMMENDATIONS. (E) MEASURE RESISTANCE OF EACH HIGH-VOLTAGE WINDING AND LOW-VOLTAGE WINDING IN EACH LOAD TAP-CHANGER POSITION. D. CONDUCTORS (600V AND LESS) 1. VISUAL AND MECHANICAL INSPECTION

> (A) INSPECT FOR PHYSICAL DAMAGE AND PROPER CONNECTION IN ACCORDANCE WITH SINGLE-LINE DIAGRAM. (B) CABLE CONNECTIONS SHALL BE TORQUE TESTED TO MANUFACTURER'S RECOMMENDED VALUES. (C) VERIFY CABLE COLOR CODING WITH APPLICABLE SPECIFICATIONS AND THE

2. ELECTRICAL TESTS (A) PERFORM INSULATION-RESISTANCE TEST ON EACH CONDUCTOR WITH RESPECT TO GROUND AND ADJACENT CONDUCTORS. TEST DURATION SHALL BE A MINIMUM OF 1 MINUTE

(B) PERFORM RESISTANCE MEASUREMENTS THROUGH ALL BOLTED CONNECTIONS WITH LOW-RESISTANCE OHMMETER. (C) PERFORM CONTINUITY TEST TO INSURE CORRECT CABLE CONNECTION E. GROUNDING SYSTEM TESTS 1. VISUAL AND MECHANICAL INSPECTION

(A) VERIFY GROUND SYSTEM IS IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS. (B) INSPECT GROUND SYSTEM FOR ADEQUATE TERMINATION AT ALL DEVICES. 2. ELECTRICAL TESTS

(A) PERFORM FALL OF POTENTIAL TEST PER IEEE 81, SECTION 9.04 ON THE MAIN GROUNDING ELECTRODE OR SYSTEM (B) PERFORM THE 2-POINT METHOD TEST PER IEEE 81, SECTION 9.03 TO DETERMINE THE GROUND RESISTANCE BETWEEN THE MAIN GROUNDING SYSTEM AND ALL MAJOR ELECTRICAL EQUIPMENT FRAMES, SYSTEM NEUTRAL AND/OR DERIVED NEUTRAL POINTS.

(A) THE MAIN GROUND ELECTRODE SYSTEM RESISTANCE TO GROUND SHALL BE NO GREATER THAN 5 OHMS. PROVIDE ADDITIONAL GROUND RODS REQUIRED TO ACHIEVE 5 OHMS RESISTANCE VALUE.

(B) INVESTIGATE POINT-TO-POINT RESISTANCE VALUES WHICH EXCEED 0.5 (C) THE CONTRACTOR SHALL CORRECT OR REPLACE ANY NOMINAL CURRENT-CARRYING CIRCUIT WHICH IS DEFECTIVE OR GROUNDED, AND HE SHALL ALSO CORRECT ALL OTHER TROUBLES ENCOUNTERED BY THESE TESTS. ALL DEFECTS WHETHER THROUGH FAULTY WORKMANSHIP OR MATERIAL FURNISHED SHALL BE CORRECTED UNDER THIS SECTION, AT THE CONTRACTOR'S EXPENSE.

F. INFRARED SCAN 1. INFRARED SCAN OF ALL EQUIPMENT HEREIN OUTLINED UPON COMPLETION OF THE PROJECT AND WITH FULL CONNECTED LOAD OPERATING: (A) TRANSFORMER CONNECTIONS.

> (B) PANELBOARD CONNECTIONS (C) CIRCUIT BREAKER AND LOAD SIDE CONNECTORS. 2. UTILIZE EQUIPMENT OF TYPE WHICH USES SCANNING TECHNIQUES TO CLEARLY INDICATE ALL "HOT SPOTS". EQUIPMENT SHALL BE DIRECT TEMPERATURE READOUT TYPE WITH MINIMUM THERMAL SENSITIVITY OF 0.1 DEG C SIMILAR 3. INSURE THE BUS IS FULLY LOADED WITH NORMAL BUILDING LOADS DURING TESTS. OBTAIN AMPROBE READINGS FOR EACH PHASE AND NEUTRAL PRIOR TO 4. PHOTOGRAPH ALL "HOT SPOTS" AND RECORD FLOOR, BUS, LOCATION ON BUS AND RELATIVE TEMPERATE GRADIENT. SUBMIT RESULTS.

PART 5 POWER SYSTEM STUDIES 5.1 PROVISIONS INCLUDED

A. EXAMINE ALL DRAWINGS AND ALL OTHER SECTIONS OF THESE SPECIFICATIONS FOR REQUIREMENTS WHICH AFFECT WORK UNDER THIS SECTION WHETHER OR NOT SUCH WORK IS SPECIFICALLY MENTIONED IN THIS SECTION. B. COORDINATE WORK WITH THAT OF ALL OTHER TRADES AFFECTING OR AFFECTED BY WORK OF THIS SECTION. COOPERATE WITH SUCH TRADES TO ENSURE THE STEADY PROGRESS OF ALL WORK UNDER THE CONTRACT. 5.2 SCOPE OF WORK

A. SHORT CIRCUIT, COORDINATION AND ARC FLASH STUDIES SHALL BE PERFORMED BY THE CONTRACTOR. THE STUDIES SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO RECEIVING FINAL APPROVAL OF THE DISTRIBUTION EQUIPMENT SHOP DRAWINGS AND/OR PRIOR TO RELEASE OF EQUIPMENT FOR MANUFACTURE. IF FORMAL COMPLETION OF THE STUDIES MAY CAUSE DELAY IN EQUIPMENT MANUFACTURE, APPROVAL FROM THE ENGINEER MAY BE OBTAINED FOR A PRELIMINARY SUBMITTAL OF SUFFICIENT STUDY DATA TO ENSURE THAT THE SELECTION OF DEVICE RATINGS AND CHARACTERISTICS WILL BE SATISFACTORY. B. THE STUDIES SHALL INCLUDE ALL NEW PORTIONS OF THE ELECTRICAL DISTRIBUTION SYSTEM AS FOLLOWS:

1. LIST DISTRIBUTION TO BE STUDIED. 2. A SAMPLE OF THE LARGEST AND THE SMALLEST BRANCH CIRCUIT IN EACH PANELBOARD SHALL BE INCLUDED C. WHERE THE NEW DISTRIBUTION SYSTEM CONNECTS TO EXISTING DISTRIBUTION, THE STUDIES SHALL INCLUDE THE EXISTING SERVICE TRANSFORMER AND THE

EXISTING SECONDARY MAIN CIRCUIT BREAKER(S). D. THE STUDY SHALL BE PERFORMED AND SEALED BY A REGISTERED PROFESSIONAL ELECTRICAL ENGINEER LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS. THIS FIRM SHALL BE ENGAGED IN FIELD CALIBRATION, SETTINGS AND TESTING OF PROTECTIVE DEVICES. THIS FIRM SHALL HAVE BEEN REGULARLY ENGAGED IN

SUCH SERVICES FOR A MINIMUM OF TEN (10) YEARS. E. THE CONTRACTOR SHALL COORDINATE AND PROVIDE THE REQUIRED DATA FOR PREPARATION OF THE STUDIES TO THE ENGINEER PERFORMING THE STUDIES. THE CONTRACTOR SHALL OBTAIN THE REQUIRED DATA INFORMATION FROM THI SWITCHBOARD/SWITCHGEAR, PANELBOARD AND TRANSFORMER MANUFACTURER IMMEDIATELY AFTER AWARD OF THE CONTRACT. F. THE CONTRACTOR SHALL SUBMIT THE FINAL STUDY REPORT FOR REVIEW AND APPROVAL BY THE OWNERS ENGINEER.

5.3 STUDY REPORT A. THE RESULTS OF THE POWER SYSTEM STUDY SHALL BE SUMMARIZED IN A FINAL REPORT AND SHALL BE PERFORMED USING AFAULT AND CAPTOR (SKM SYSTEM ANALYSIS) SOFTWARE. THREE (3) BOUND COPIES OF THE FINAL REPORT AND THE COMPLETE DATA FILES ON DISKETTE SHALL BE SUBMITTED. THE DATA FILES SHALL BE CAPABLE OF BEING ACCESSED AND MODIFIED BY THE OWNER AND BECOME THE PROPERTY OF THE OWNER.

B. THE REPORT SHALL INCLUDE THE FOLLOWING SECTIONS:

RECOMMENDATIONS TO REDUCE THE INCIDENT ENERGY.

1. DESCRIPTION, PURPOSE, BASIS AND SCOPE OF THE STUDY AND A SINGLE-LINE DIAGRAM OF THAT PORTION OF THE POWER SYSTEM WHICH IS INCLUDED WITHIN THE SCOPE OF THE 2. TABULATIONS OF CIRCUIT BREAKER, FUSE AND OTHER PROTECTIVE DEVICE RATINGS VERSUS CALCULATED SHORT CIRCUIT DUTIES, AND COMMENTARY REGARDING SAME. 3. PROTECTIVE DEVICE TIME VS. CURRENT COORDINATION CURVES, TABULATIONS OF RELAY AND CIRCUIT BREAKER TRIP SETTINGS, FUSE SELECTION, AND COMMENTARY REGARDING 4. FAULT CURRENT CALCULATIONS INCLUDING A DEFINITION OF TERMS AND GUIDE FOR INTERPRETATION OF COMPUTER PRINTOUT. 5. ARC FLASH STUDY INDICATING THE INCIDENT ENERGY AT EACH PIECE OF EVALUATED

EQUIPMENT. EQUIPMENT CALCULATED ABOVE 8 CAL/SQ-M SHALL BE PROVIDED WITH

5.4 REFERENCE STANDARDS A. APPLICABLE PROVISIONS OF THE FOLLOWING CODES AND TRADE STANDARD PUBLICATIONS SHALL APPLY TO THE WORK OF THIS SECTION AND ARE HEREBY INCORPORATED INTO, AND MADE A PART OF, THE CONTRACT DOCUMENTS: 2. NFPA 70E - LATEST VERSION

3. IEEE 1584 - LATEST VERSION 5.5 SHORT CIRCUIT STUDY AND PROTECTIVE DEVICE EVALUATION STUDY A. THE SHORT CIRCUIT STUDY SHALL BE PERFORMED WITH THE AID OF A DIGITAL COMPUTER PROGRAM AND SHALL BE IN ACCORDANCE WITH THE LATEST APPLICABLE IFFE AND ANSI STANDARDS B. THE STUDY INPUT DATA SHALL INCLUDE THE SHORT CIRCUIT CONTRIBUTION, RESISTANCE AND REACTANCE COMPONENTS OF THE BRANCH IMPEDANCES, THE

X/R RATIOS, BASE QUANTITIES SELECTED, AND OTHER SOURCE IMPEDANCES. C. SHORT CIRCUIT CLOSE AND LATCH DUTY VALUES AND INTERRUPTING DUTY

VALUES SHALL BE CALCULATED ON THE BASIS OF ASSUMED 3-PHASE BOLTED SHORT CIRCUITS AT THE DISTRIBUTION PANELBOARD PERTINENT BRANCH CIRCUIT PANEL AND OTHER SIGNIFICANT LOCATIONS THROUGH THE SYSTEM. THE SHORT CIRCUIT TABULATIONS SHALL INCLUDE SYMMETRICAL FAULT CURRENTS AND X/R RATIOS. FOR EACH FAULT LOCATION, THE TOTAL DUTY ON THE BUS, AS WELL AS THE INDIVIDUAL CONTRIBUTION FROM EACH CONNECTED BRANCH, SHALL BE LISTED WITH ITS RESPECTIVE X/R RATIO.

D. A PROTECTIVE DEVICE EVALUATION STUDY SHALL BE PERFORMED TO DETERMINE THE ADEQUACY OF CIRCUIT BREAKERS AND FUSES BY TABULATING AND COMPARING THE SHORT CIRCUIT RATINGS OF THESE DEVICES WITH THE CALCULATED FAULT CURRENTS. APPROPRIATE MULTIPLYING FACTORS BASED ON SYSTEM X/R RATIOS AND PROTECTIVE DEVICE RATING STANDARDS SHALL BE APPLIED. ANY PROBLEM AREAS OR INADEQUACIES IN THE EQUIPMENT DUE TO SHORT CIRCUIT CURRENTS SHALL BE PROMPTLY BROUGHT TO THE ENGINEER'S

5.6 PROTECTIVE DEVICE COORDINATION STUDY A. A PROTECTIVE DEVICE COORDINATION STUDY SHALL BE PERFORMED TO PROVIDE THE NECESSARY CALCULATIONS AND LOGIC DECISIONS REQUIRED TO SELECT OR TO CHECK THE SELECTION OF POWER FUSE RATINGS. PROTECTIVE RELAY CHARACTERISTICS AND SETTINGS, RATIOS AND CHARACTERISTICS OF ASSOCIATED CURRENT TRANSFORMERS, AND LOW VOLTAGE BREAKER TRIP CHARACTERISTICS AND SETTINGS. THE STUDIES SHALL BE IN ACCORDANCE WITH

THE LATEST APPLICABLE IEEE AND ANSI STANDARDS. B. THE COORDINATION STUDY SHALL INCLUDE ALL LOW VOLTAGE CLASSES OF EQUIPMENT FROM THE BUILDING OR PLANT SERVICE PROTECTIVE DEVICES DOWN TO AND INCLUDING THE LARGEST RATED DEVICE IN THE LOW VOLTAGE MOTOR CONTROL CENTERS AND PANELBOARDS. THE PHASE AND GROUND OVERCURRENT PROTECTION SHALL BE INCLUDED AS WELL AS SETTINGS OF ALL OTHER ADJUSTABLE PROTECTIVE DEVICES.

THE TIME-CURRENT CHARACTERISTICS OF THE SPECIFIED PROTECTIVE DEVICES SHALL BE DRAWN ON KEUFFEL AND ESSER LOG-LOG PAPER. THE PLOTS SHALL INCLUDE COMPLETE TITLES. REPRESENTATIVE ONE-LINE DIAGRAM AND LEGENDS. SIGNIFICANT MOTOR STARTING CHARACTERISTICS, COMPLETE PARAMETERS OF TRANSFORMERS. COMPLETE OPERATING BANDS OF LOW VOLTAGE CIRCUIT BREAKER TRIP CURVES AND FUSES. THE COORDINATION PLOTS SHALL INDICATE THE TYPES OF PROTECTIVE DEVICES SELECTED, PROPOSED RELAY TAPS, TIME DIAL AND INSTANTANEOUS TRIP SETTINGS, TRANSFORMER MAGNETIZING INRUSH AND ANSI TRANSFORMER WITHSTAND PARAMETERS. CABLE THERMAL OVERCURRENT WITHSTAND LIMITS AND SIGNIFICANT SYMMETRICAL AND ASYMMETRICAL FAULT CURRENTS. ALL RESTRICTIONS OF THE CEC SHALL BE ADHERED TO AND PROPER COORDINATION INTERVALS AND SEPARATION OF CHARACTERISTIC CURVES SHALL BE MAINTAINED. THE COORDINATION PLOTS FOR PHASE AND GROUND PROTECTIVE DEVICES SHALL BE PROVIDED ON A SYSTEM BASIS. A SUFFICIENT NUMBER OF SEPARATE CURVES SHALL BE USED TO CLEARLY INDICATE THE COORDINATION ACHIEVED.

D. THE SELECTION AND SETTINGS OF THE PROTECTIVE DEVICES SHALL BE PROVIDED SEPARATELY IN A TABULATED FORM LISTING CIRCUIT IDENTIFICATION, IEEE DEVICE NUMBER, CURRENT TRANSFORMER RATIOS AND CONNECTION, MANUFACTURER AND TYPE, RANGE OF ADJUSTMENT AND RECOMMENDED SETTINGS. A TABULATION OF THE RECOMMENDED POWER FUSE SELECTION SHALL BE PROVIDED FOR THE MEDIUM VOLTAGE FUSES WHERE APPLIED IN THE SYSTEM. ANY DISCREPANCIES, PROBLEM AREAS, OR INADEQUACIES SHALL BE PROMPTLY BROUGHT TO THE ENGINEER'S ATTENTION.

5.7 ARC FLASH HAZARD ANALYSIS A. THE ARC-FLASH HAZARD ANALYSIS SHALL BE PERFORMED WITH THE AID OF COMPUTER SOFTWARE INTENDED FOR THIS PURPOSE IN ORDER TO CALCULATE ARC-FLASH INCIDENT ENERGY (AFIE) LEVELS AND FLASH PROTECTION BOUNDARY

DISTANCES

CLASSES.

B. THE ARC-FLASH HAZARD ANALYSIS SHALL BE PERFORMED IN CONJUNCTION WITH A SHORT-CIRCUIT ANALYSIS AND A TIME-CURRENT COORDINATION ANALYSIS. RESULTS OF THE ANALYSIS SHALL BE SUBMITTED IN TABULAR FORM, AND SHALL INCLUDE DEVICE OR BUS NAME, BOLTED FAULT AND ARCING FAULT CURRENT LEVELS, FLASH PROTECTION BOUNDARY DISTANCES, PERSONAL-PROTECTIVE EQUIPMENT CLASSES AND AFIE LEVELS.

CONDITIONS, AND THE FINAL REPORT SHALL DESCRIBE, WHEN APPLICABLE, HOW THESE CONDITIONS DIFFER FROM WORST-CASE BOLTED FAULT CONDITIONS. THE ARC-FLASH HAZARD ANALYSIS SHALL BE PERFORMED BY A REGISTERED PROFESSIONAL ENGINEER. F. THE ARC-FLASH HAZARD ANALYSIS SHALL BE PERFORMED IN COMPLIANCE WITH IEEE STANDARD 1584-2002, THE IEEE FOR PERFORMING ARC-FLASH

THE ANALYSIS SHALL BE PERFORMED UNDER WORST-CASE ARC-FLASH

CALCULATIONS G. THE ARC-FLASH HAZARD ANALYSIS SHALL INCLUDE RECOMMENDATIONS FOR REDUCING AFIE LEVELS AND ENHANCING WORKER SAFETY. H. THE PROPOSED VENDOR SHALL DEMONSTRATE EXPERIENCE WITH ARC-FLASH HAZARD ANALYSIS BY SUBMITTING NAMES OF AT LEAST TEN ACTUAL ARC-FLASH

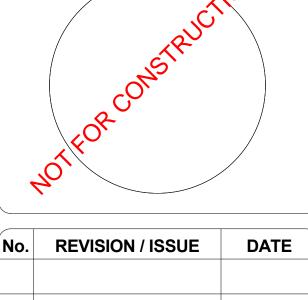
HAZARD ANALYSES IT HAS PERFORMED IN THE PAST YEAR. I. THE PROPOSED VENDOR SHALL DEMONSTRATE CAPABILITIES IN PROVIDING EQUIPMENT, SERVICES, AND TRAINING TO REDUCE ARC-FLASH EXPOSURE AND TRAIN WORKERS IN ACCORDANCE WITH NFPA 70E AND OTHER APPLICABLE J. THE PROPOSED VENDOR SHALL DEMONSTRATE EXPERIENCE IN PROVIDING EQUIPMENT LABELS IN COMPLIANCE WITH NEC-2002 SECTION 110 AND ANSI Z535.4

TO IDENTIFY AFIE AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT

1435 BEDFORD AVE

ENGINEER OF RECORD:

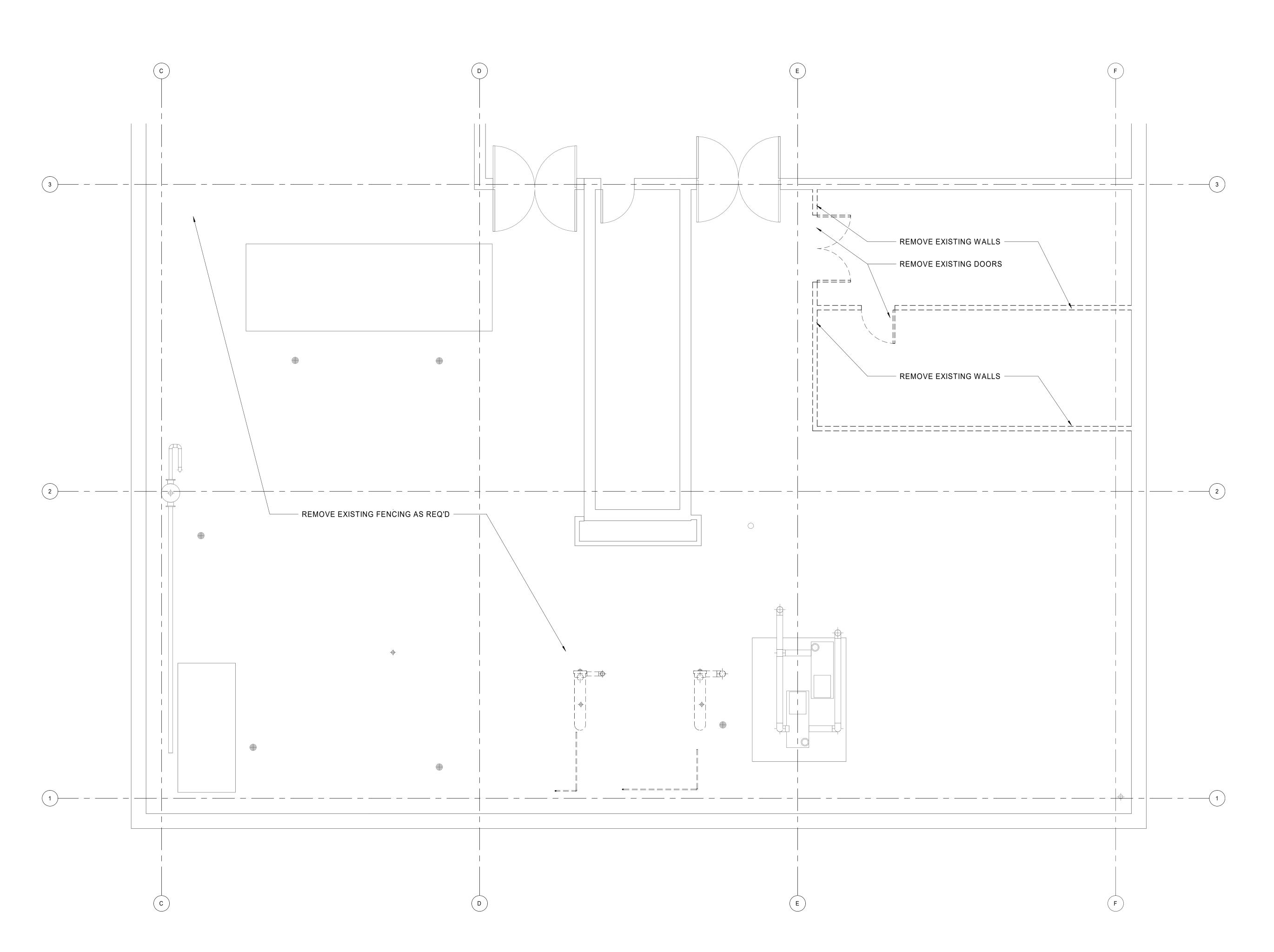
PITTSBURGH, PA 15219



ENGINEER SEAL:

	ADDRESS	
MEMORIAL HOSPITAL	80 JESSE HILL JR DR SE ATLANTA, GA	
PLANT REPLACEMENT	30303	
CAL SPECIFICATIONS (2 OF 2)		

1/4" = 1'-0"



1 8TH FLOOR DEMO PLAN

1/4" = 1'-0"

GENERAL DEMOLITION NOTES

- BE RESPONSIBLE FOR THE REMOVAL OF ANY EQUIPMENT WHICH IS TO REMAIN THE PROPERTY OF THE OWNER PRIOR TO ANY WORK DONE BY THE CONTRACTOR FOR THIS PORTION OF THE SEQUENCE.

 2. INSTALL TEMPORARY DUST PARTITION AND/OR BARRIERS AND OTHER METHODS AS MAY BE REQUIRED/NECESSARY AS INDICATED ON THE PLAN AND AS NECESSARY TO
 - MAY BE REQUIRED/NECESSARY AS INDICATED ON THE PLAN AND AS NECESSARY CONTAIN DEMOLITION/ CONSTRUCTION DUST AND DEBRIS WITHIN THE AREA OF CONSTRUCTION. REFER TO DUST PARTITION "DP" ON THIS SHEET AND THE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

THE OWNER SHALL VACATE THE EXISTING ROOMS AS INDICATED ON THE PLAN AND

WHICH CONFLICTS WITH THE INTENT OF THE NEW CONSTRUCTION. EVERY DEMOLITION DETAIL MAY NOT NECESSARILY BE COVERED ON THESE DRAWINGS. FIELD VERIFY THE EXTENT OF ALL DEMOLITION.

IT IS THE INTENT OF THIS DEMOLITION TO REMOVE ALL EXISTING CONSTRUCTION

- 4. THE CONTRACTOR SHALL USE EXTREME CARE IN THE PROTECTION OF ALL ADJACENT AREAS FOR IT IS IMPERATIVE TO PROVIDE CONTINUOUS OPERATION OF ALL OCCUPIED AREAS DURING THE DEMOLITION, CONSTRUCTION AND RENOVATION.
- ALL DEMOLITION DESCRIBED IN THESE DOCUMENTS SHALL BE COORDINATED WITH PHASING WORK REQUIRED TO COMPLETE THE WORK.
- THE CONTRACTOR SHALL COORDINATE ALL DEMOLITION WORK WITHIN OCCUPIED SPACES ABOVE, BELOW AND ADJACENT TO THE WORK, THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE MANAGEMENT OF THE OCCUPIED SPACES ABOVE, BELOW, AND ADJACENT TO THE WORK, TWO WEEKS PRIOR TO COMMENCING WORK. SUCH SPACES ARE TO REMAIN OCCUPIED DIVRING DEMOLITION AND ALL WORK SHALL BE PERFORMED IN SUCH A MANNER TO MINIMIZE DISRUPTION TO OCCUPIED SPACES. EXISTING FLOOR, WALL AND CEILING FINISHES TO REMAIN SHALL BE PROTECTED AND ANY DAMAGE DONE AS A RESULT OF DEMOLITION WORK SHALL BE REPAIRED.
- IN AREAS SCHEDULED FOR DEMOLITION, THE CONTRACTOR SHALL REMOVE ALL ACCESSORIES. GRAB BARS, MIRRORS, SOAP AND PAPER TOWEL DISPENSERS, SHELVES, BULLETIN BOARDS, ETC., SHALL BE TURNED OVER TO THE OWNER, EXCEPT FOR RELOCATED ITEMS.
- 8. WHERE NEW FINISHES ARE CALLED FOR, REMOVE AND DISCARD EXISTING FLOORING, CEILINGS AND WALL COVERING THROUGH-OUT AREA DESIGNATED FOR NEW CONSTRUCTION AND PREP EXISTING FLOOR AND WALL SUBSTRATE TO RECEIVE THE INSTALLATION OF NEW FINISH AS SCHEDULED.
- 9. SEE NEW WORK PLAN FOR REPAIR AND PREPARATION OF ADJACENT SURFACES.
- WHERE CEILING IS TO REMAIN, REMOVE ALL DAMAGED CEILING PANELS/ TILES AND REPLACE WITH NEW TO MATCH EXISTING.
 REMOVE AND RETURN TO THE OWNER ALL EXISTING PLUMBING FIXTURES. CAP ALL
- SUPPLY AND WASTE LINES AS REQUIRED. REFER TO PLUMBING DRAWINGS FOR ADDITIONAL INFORMATION.

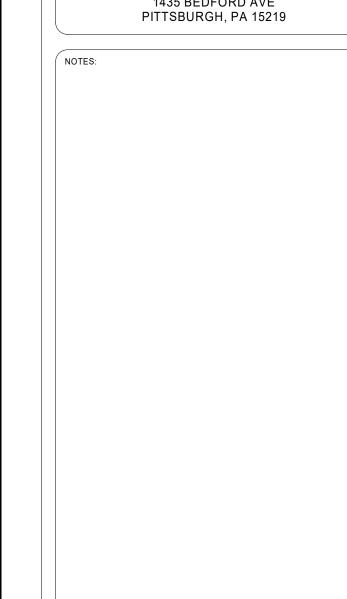
 12. THE CONTRACTOR SHALL PATCH TO MATCH ADJACENT SURFACES OF EXISTING
- WALLS. FLOOR, AND CEILINGS IN ALL AREAS THAT REQUIRE THE REMOVAL OF GENERAL MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION WORK AND OF EQUIPMENT AND FIXTURES.
- 13. THE CONTRACTOR SHALL PROVIDE FOR ALL NECESSARY TEMPORARY RELOCATION AND MAINTENANCE OF ALL EXISTING UTILITIES WHICH ARE CURRENTLY IN USE AND WHICH MUST BE TEMPORARILY RELOCATED DURING CONSTRUCTION OF NEW AREAS AND RENOVATION OF EXISTING AREAS.
- 14. REFER TO MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS FOR WORK REQUIRED FOR NEW CONSTRUCTION..
- 15. WHERE REMOVAL OF EXISTING PARTITIONS, EQUIPMENT, ETC. DISTURBS EXISTING MECHANICAL, PLUMBING OR ELECTRICAL SERVICES, THE CONTRACTOR SHALL MAKE PERMANENT REVISIONS/PROVISIONS AS REQUIRED T MAINTAIN SERVICES AND IF NECESSARY, PROVIDE TEMPORARY SERVICES TO AREAS NOT SCHEDULED FOR DEMOLITION, RENOVATION, AND/OR NEW CONSTRUCTION.
- 16. WHERE EXISTING WALLS, CEILINGS, OR FLOORS ARE DAMAGED BY THE CONTRACTOR FOR ACCESS TO SERVICES AND NEW CONSTRUCTION WHICH MAY NOT BE INDICATED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL BE RESPONSIBLE TO PATCH TO MATCH MATERIAL AND FINISHES TO ORIGINAL CONDITIONS. IF EXISTING FINISHES CANNOT BE MATCHED, THE ENTIRE WALL, CEILING, OR FLOOR SHALL BE REFINISHED TO THE NEAREST CORNER OR POSITIVE BREAKING POINT.
- WHICH WILL REMAIN EXPOSED IN THE FINISHED WORK, SUCH CONDITIONS SHALL BE REPAIRED AND LEVELED AS REQUIRED TO RECEIVE NEW FINISHES.

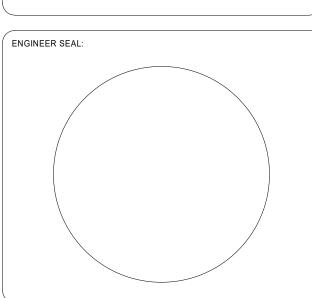
 18. WHEN DEMOLITION EXPOSES DAMAGE TO FLOOR SLAB, WALL, OR CEILING SURFACES

WHEN DEMOLITION CAUSES DAMAGE TO FLOOR SLAB. WALL, OR CEILING SURFACES

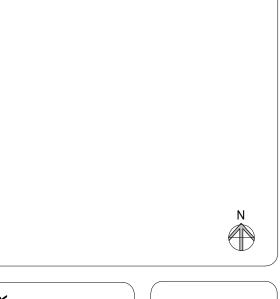
- WHEN DEMOLITION EXPOSES DAMAGE TO FLOOR SLAB, WALL, OR CEILING SURFACES
 WHICH WILL REMAIN EXPOSED IN THE FINISHED WORK, SUCH CONDITIONS SHALL BE
 REPORTED TO THE ARCHITECT AND OWNER WITH A RECOMMENDATION FOR
 RESOLUTION OF THE CONDITIONS.
- 19. CLEAN AIR GRILLES AND LIGHT FIXTURES THROUGHOUT PROJECT AREA UPON COMPLETION OF WORK.
 20. WHERE EXISTING PHONE, DATA, OR PHONE/DATA OUTLETS ARE REMOVED, THE
- CONTRACTOR SHALL USE EXTREME CARE IN PULLING WIRE THROUGH THE EXISTING CONDUITS, COIL AND WRAP ABOVE EXISTING CEILING FOR REUSE.
- 21. WHERE EXTERIOR WALLS, WINDOWS, AND/OR DOORS ARE BEING REMOVED, THE CONTRACTOR WILL BE RESPONSIBLE TO CONSTRUCT TEMPORARY PARTITIONS AS REQUIRED TO ENSURE THAT THE EXISTING BUILDINGS REMAIN WATERTIGHT, SECURE, AND WITHOUT DRAFTS DURING DEMOLITION WORK. THESE PARTITIONS SHALL REMAIN IN PLACE DURING THE NEW CONSTRUCTION WORK, OR AS REQUIRED TO MAINTAIN THIS SEPARATION.
- PROVIDE SHORING AND BRACING AS REQUIRED DURING DEMOLITION AND NEW CONSTRUCTION.

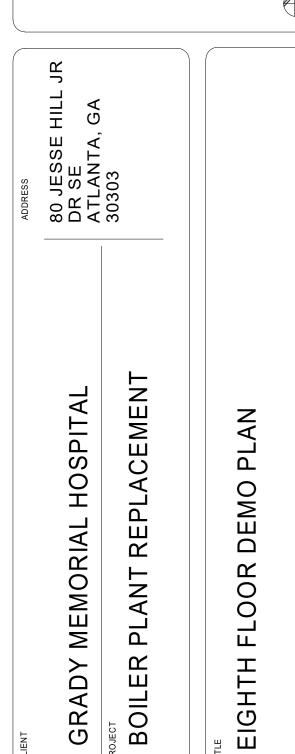






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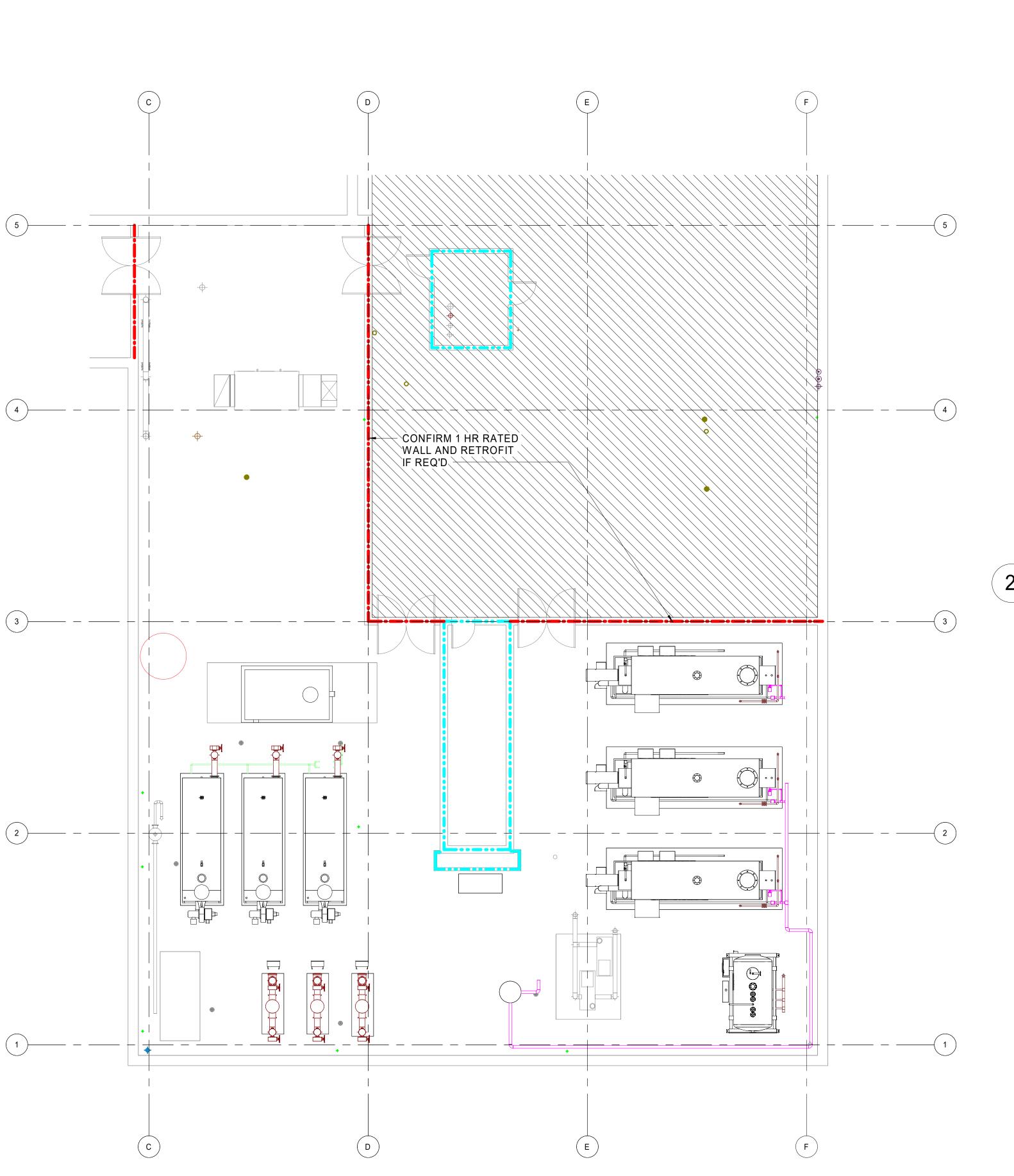
SCALE
As indicated

DATE

10/13/25

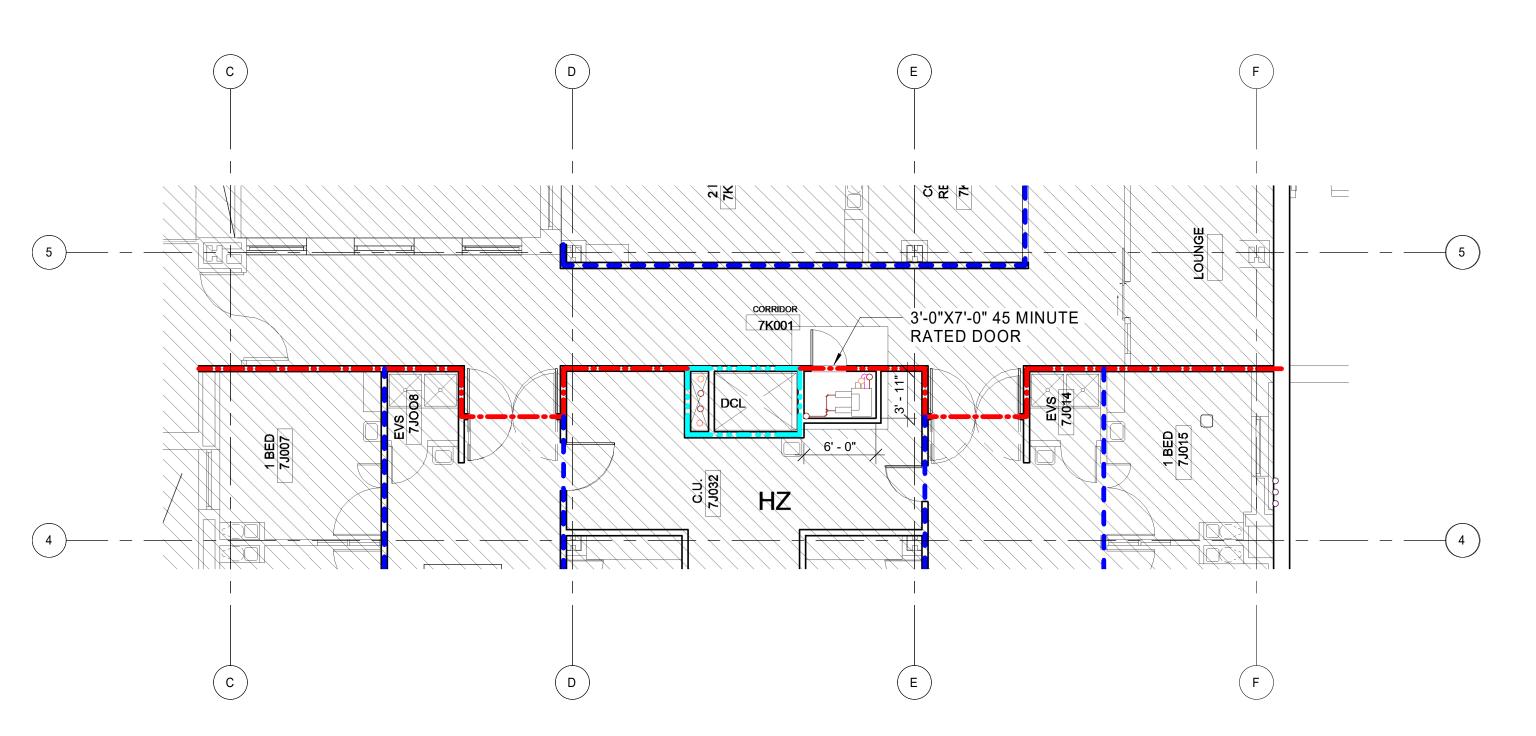
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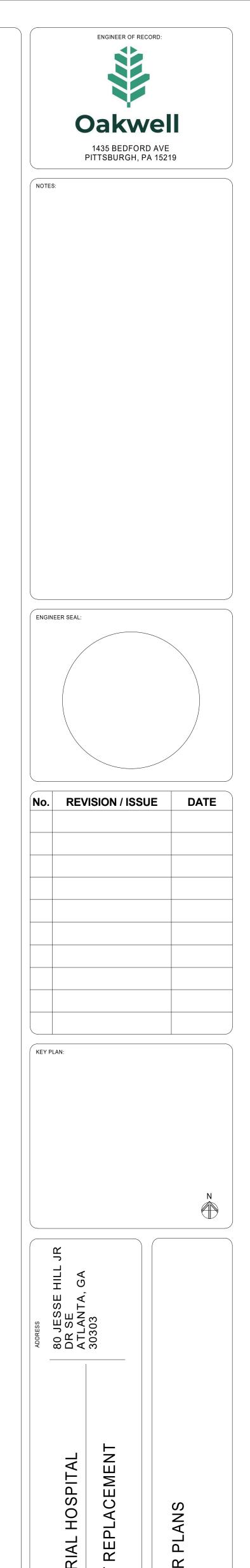
8TH FLOOR PARTIAL PLAN

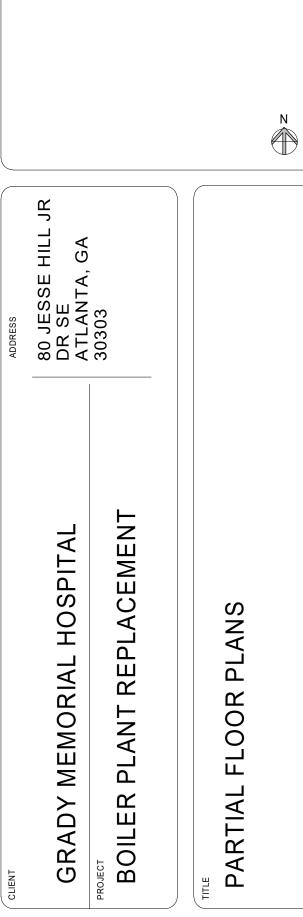
1/8" = 1'-0"



2 7TH FLOOR PARTIAL PLAN

1/8" = 1'-0"





10/13/25 ALC ALC

SCALE

1/8" = 1'-0" A101