

**BOILER UPGRADE PROJECT - CONTRACTOR ESTIMATE PREPARED BY BIGHORN ENGINEERING**

Equipment / Work <small>(+20% indicates increase in raw materials costs)</small>	Cost Per Length	Total Length	TOTAL PROJECT			PHASED PROJECT (Main only & partial completion for other two pools)			DIFFERENCE
			Quantity	Cost Per Item	Total Cost Per Item	Quantity	Cost Per Item	Total Cost Per Item	
Boiler (Lochinvar - #FTX-725N)			2	\$ 24,300.00	\$ 48,600.00	1	\$ 24,300.00	\$ 24,300.00	\$ 24,300.00
BOILER CIRCULATION PUMP (TACO - #VR30-3)			2	\$ 3,300.00	\$ 6,600.00	1	\$ 3,300.00	\$ 3,300.00	\$ 3,300.00
SYSTEM CIRCULATION PUMPS			2	\$ 5,850.00	\$ 11,700.00	2	\$ 5,850.00	\$ 11,700.00	\$ -
BRAZED PLATE HEAT EXCHANGER (TB12MTX60) ORIG\$1500	Main pool		1	\$ 1,500.00	\$ 1,500.00	1	\$ 1,800.00	\$ 1,500.00	\$ -
BRAZED PLATE HEAT EXCHANGER (TB12MTX50) ORIG \$1350			1	\$ 1,350.00	\$ 1,350.00			\$ -	\$ 1,350.00
BRAZED PLATE HEAT EXCHANGER (TB12MTX20) ORIG\$750			1	\$ 750.00	\$ 750.00			\$ -	\$ 750.00
HEAT EXCHANGER CIRC PUMPS #3.4. & 5 ((TACO- #1615			3	\$ 4,350.00	\$ 13,050.00	1	\$ 4,350.00	\$ 4,350.00	\$ 8,700.00
EXPANSION TANK			1	\$ 3,450.00	\$ 3,450.00	1	\$ 3,450.00	\$ 3,450.00	\$ -
HYDRAULIC SEPARATOR (TACO - #5903-P-42)			1	\$ 7,350.00	\$ 7,350.00	1	\$ 7,350.00	\$ 7,350.00	\$ -
JERIMIAS SS FLUE (316 PRESSURE RATED DOUBLE WALL FLUE)			2	\$ 7,500.00	\$ 15,000.00	1	\$ 7,500.00	\$ 7,500.00	\$ 7,500.00
CHEMICAL FEEDER			1	\$ 4,500.00	\$ 4,500.00	1	\$ 4,500.00	\$ 4,500.00	\$ -
2" FLANGED IRON BODY VALVES ORIG\$753EA <b>+20% 903.60ea</b>			9	\$ 903.60	\$ 8,132.40	3	\$ 903.60	\$ 2,710.80	\$ 5,421.60
3" FLANGED IRON BODY VALVES ORIG\$860EA <b>+20% 1032ea</b>			9	\$ 1,032.00	\$ 9,288.00	3	\$ 1,032.00	\$ 3,096.00	\$ 6,192.00
BOILER BALANCING			2	\$ 580.00	\$ 1,160.00	1	\$ 580.00	\$ 580.00	\$ 580.00
PUMP BALANCING			7	\$ 360.00	\$ 2,520.00	5	\$ 360.00	\$ 1,800.00	\$ 720.00
3" FLANGED FLOW CHECK CONTROL VALVES ORIG\$691 <b>+20% 829ea</b>			2	\$ 829.20	\$ 1,658.40	2	\$ 691.00	\$ 1,382.00	\$ 276.40
3" FLANGED Y TYPE BRONZE STRAINER			1	\$ 1,500.00	\$ 1,500.00	1	\$ 1,500.00	\$ 1,500.00	\$ -
HDPE 3" PIPING (INCLUDING LABOR) ORIG\$14.79/FT <b>+20% 17.75ft</b>	17.75	172		\$ 3,053.00				\$ 3,053.00	\$ -
3" SCHD 40 STEEL PIPING THREADED @ ONE END ORIG\$ 17.04/FT <b>+20% 20.45ft</b>	20.45	200		\$ 4,090.00				\$ 4,090.00	\$ -
2-1/2" SCHD 40 BLACK STEEL PIPING ORIG\$81/FT <b>+20% 97.20ft</b>	97.2	40		\$ 3,888.00				\$ 3,888.00	\$ -
3" SCHD 40 STEEL PIPING CELLULAR GLASS (2"THICK) INSULATION ORIG\$44.43/FT <b>+20% 53.31ft</b>	53.31	200		\$ 10,662.00				\$ 10,662.00	\$ -
CONDENSATE NEUTRALIZATION KIT			2	\$ 150.00	\$ 300.00	2	\$ 150.00	\$ 300.00	\$ -
NEW ELECTRICAL PANEL 120/208 100AMP 10,000 SCCR			1	\$ 5,000.00	\$ 5,000.00	1	\$ 5,000.00	\$ 5,000.00	\$ -
FLOOR DRAIN			1	\$ 2,000.00	\$ 2,000.00	1	\$ 2,000.00	\$ 2,000.00	\$ -
CONCRETE PAD (6FTX4FTX4")			1	\$ 500.00	\$ 500.00	1	\$ 500.00	\$ 500.00	\$ -
DEMOLITION OF BOILERS (TOTAL INCL O&P RMS MEANS W/ 4% INFLATION			3	\$ 4,100.00	\$ 12,300.00	1	\$ 4,100.00	\$ 4,100.00	\$ 8,200.00
MOBILIZATION OF CREW			2	\$ 10,000.00	\$ 20,000.00	1	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00
<b>SUBTOTAL</b>					\$ 199,901.80			\$ 122,611.80	\$ 77,290.00
EXISTING BUILDING FACTOR (10%)					\$ 19,990.18			\$ 12,261.18	\$ 7,729.00
CONTRACTOR OVERHEAD AND PROFIT (15%)					\$ 29,985.27			\$ 18,391.77	\$ 11,593.50
<b>PROJECT TOTAL (EXPECTED CONTRACTOR BIDS)</b>					\$ 249,877.25			\$ 153,264.75	\$ 96,612.50
CONTINGENCY ACCOUNT (10%)					\$ 19,990.18			\$ 12,261.18	\$ 7,729.00
<b>PROJECT TOTAL INCLUDING FORCE (CONTINGENCY) FUNDING</b>					\$ 269,867.43			\$ 165,525.93	\$ 104,341.50

Additional costs due to raw materials increase of 20% **\$ 9,173.14**

**\$ 6,186.94** **\$ 2,986.20**



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# Highorn Consulting Engineers, Inc.

## Mechanical & Electrical Engineers

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# HVAC & DUCTWORK SYMBOLS

	SECTION THROUGH RETURN DUCT
	SECTION THROUGH EXHAUST AIR DUCT
	SECTION THROUGH SUPPLY OR OUTSIDE AIR DUCT
	FIRE / SMOKE DAMPER
	SMOKE DAMPER
	SUPPLY OR OUTSIDE AIR DUCT
	ACCESS DOOR (BOTTOM OR SIDE)
	ACOUSTICALLY LINED DUCT
	FIRE DAMPER, SMOKE DAMPER, FIRE/SMOKE DAMPER
	MANUAL VOLUME DAMPER
	INCLINED DROP IN DIRECTION OF ARROW
	INCLINED RISE IN DIRECTION OF ARROW
	TRANSITION, RECTANGULAR TO ROUND
	FLEXIBLE DUCT
	IN-LINE FAN
	TRANSITION, RECTANGULAR
	SPIN-IN COLLAR INTO ADAPTER ON TOP OF DUCT
	CEILING SUPPLY AIR REGISTER/GRILLE
	SIDEWALL SUPPLY AIR REGISTER (SR)
	ELBOW TURNED DOWN
	ELBOW TURNED UP
	ELBOW, RADIUS TYPE
	ELBOW, SQUARE OR RECTANGULAR TYPE WITH AIRFOIL TURNING VANES
	CEILING RETURN AIR REGISTER (RR)
	SIDEWALL RETURN AIR REGISTER (RR)
	OPEN END DUCT
	FLEXIBLE CONNECTION
	FXC

LINE DESIGNATION SYMBOLS	
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CA	COMPRESSED AIR
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
D	DRAIN
HPR	HEAT PUMP RETURN
HPS	HEAT PUMP SUPPLY
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
G	NATURAL GAS
RH	REFRIGERANT HIGH PRESSURE VAPOR
R	REFRIGERANT LIQUID AND VAPOR LINE
RS	REFRIGERANT SUCTION / VAPOR
SMR	SNOWMELT RETURN
SMS	SNOWMELT SUPPLY
V	VENT PIPING

## RESPONSIBLE DIVISION:

LESS OTHERWISE INDICATED ALL HEATING, VENTILATING, AIR CONDITIONING, PLUMBING, AND OTHER MECHANICAL EQUIPMENT, MOTORS, AND CONTROLS SHALL BE FURNISHED, SET IN PLACE AND WIRED AS FOLLOWS:

	FURNISHED	SET	POWER WIRED	CONTROL WIRED
EQUIPMENT	23	23	26	--
MBINATION MAGNETIC TOR STARTERS, MAGNETIC TOR STARTERS, VFD'S AND NTACTORS	23(1)	26	26(2)	23
ED AND UNFUSED CONNECT SWITCHES, ERMAL OVERLOAD SWITCHES D HEATERS, MANUAL MOTOR ARTERS	26	26	26	--
NUAL-OPERATING AND LTI-SPEED SWITCHES	23	26	26	26
NTROLS, RELAYS, NSFORMERS	23	23	26	23
ERMOSTATS (LOW VOLTAGE) D TIME SWITCHES	23	23	26	23
ERMOSTATS (LINE VOLTAGE)	23	23	26	26
MPERATURE CONTROL PANELS	23	23	26	23
TOR AND SOLENOID VALVES, MPER MOTORS, PE & EP ITCHES	23	23(2)	--	23(2)
SH-BUTTON STATIONS D PILOT LIGHTS	23	23(2)	--	23(2)
ATING, COOLING, NTILITATION AND AIR NDITIONING CONTROLS	23	23	26	23
AUST FAN SWITCHES	23	26	26	23(2)

## SUBSTITUTIONS:

A. SUBSTITUTIONS: SUBSTITUTION OF SPECIFIED EQUIPMENT WILL BE ALLOWED THROUGH A PRIOR APPROVAL PROCESS INITIATED BY THE CONTRACTOR. CONTRACTOR SHALL SUBMIT INTENDED SUBSTITUTION AT LEAST FIVE DAYS PRIOR TO BID FOR APPROVAL FROM ENGINEER. SUBMITTAL SHALL INCLUDE CAPACITIES, DIMENSIONS AND OPERATING INSTRUCTIONS FOR EACH PIECE OF EQUIPMENT. SUBSTITUTION SHALL OCCUR AT NO COST TO THE OWNER. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF APPROVED SUBSTITUTION AND SHALL INCUR ALL COSTS ASSOCIATED WITH THE SUBSTITUTION INCLUDING STRUCTURAL MODIFICATIONS, SPACE LAYOUT AND REDESIGN COSTS. SEE ALSO DIVISION I GENERAL REQUIREMENTS.

### EXAMINATION OF SITE, DRAWINGS, SPECIFICATIONS:

A. EXAMINE CAREFULLY THE SITE AND CONDITIONS OF THE SITE. PROVIDE ALL NECESSARY EQUIPMENT AND LABOR TO INSTALL A COMPLETE WORKING SYSTEM WITHIN THE SITE CONDITIONS.

B. EXAMINE THE DRAWINGS AND SPECIFICATIONS AND 5 DAYS PRIOR TO BIDDING REPORT ANY ERRORS, OMISSIONS, INCONSISTENCIES, AND CONFLICTS TO THE ENGINEER TO BE REMEDIED IN AN ADDENDUM TO THE PROJECT PRIOR TO BID TIME

C. DRAWINGS ARE DIAGRAMMATIC AND CATALOG NUMBERS GIVEN ARE FOR REFERENCE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE CAPACITY OF THE EQUIPMENT MEETS THE DRAWING REQUIREMENTS AND SHALL NOT DIMENSION FROM THE MECHANICAL, PLUMBING, OR PIPING DRAWINGS.

D. THE LATEST ADOPTED VERSIONS OF THE INTERNATIONAL BUILDING CODES SHALL BE USED AS REQUIRED. THIS WILL ALSO INCLUDE THE LATEST ADOPTED VERSIONS OF THE MECHANICAL, PLUMBING AND ENERGY CONSERVATION CODES.

ALL METHODS AND MATERIALS REQUIRED BY THESE CODES SHALL BE REQUIRED BY THESE SPECIFICATIONS UNLESS INDICATED OTHERWISE. OTHER APPLICABLE LOCAL CODES AND ORDINANCES SHALL BE AS REQUIRED AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO BE KNOWLEDGEABLE OF THESE REQUIREMENTS.

E. WHERE INSTALLATION PROCEDURES OR ANY PART THEREOF ARE REQUIRED TO BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE MATERIAL BEING INSTALLED, PRINTED COPIES OF THESE RECOMMENDATIONS SHALL BE FURNISHED TO THE ENGINEER PRIOR TO INSTALLATION. INSTALLATION OF THE ITEM WILL NOT BE ALLOWED TO PROCEED UNTIL THE RECOMMENDATIONS ARE RECEIVED. FAILURE TO FURNISH THESE

## ABBREVIATIONS:

MOUNTING HEIGHT ABOVE ISHED FLOOR TO CENTER OF DEVICE	DIFF	DIFFERENTIAL	HR	HOUR	PT	PRESSURE TRANSMITTER
AMPS	DISCH	DISCHARGE	HT	HEIGHT	PTAC	PACKAGED TERMINAL AIR CONDITIONER
ACCESS DOOR	DIV	DIVISION	HTR	HEATER	PV	PLUG VALVE
/ AIR ADMITTANCE VALVE	DN	DOWN	HWR	HEATING WATER RETURN	PVC	POLYVINYL CHLORIDE
/ ABOVE	DS	DUCT SILENCER	HWS	HEATING WATER SUPPLY	QTY	QUANTITY
AIR CONDITIONING UNIT	DWG	DRAWING	HX	HEAT EXCHANGER	RA	RETURN AIR GRILLE / REGISTER
ABOVE COUNTER	DX	DIRECT EXPANSION	HZ	HERTZ	RCP	REFLECTED CEILING PLAN
AREA DRAIN (SEE SYMBOLS)	(A)	EXISTING	ID	INSIDE DIAMETER	RD	ROOF DRAIN
C. ABOVE FINISHED CEILING	EA	EXHAUST AIR GRILLE/REGISTER	IG	ISOLATED GROUND	REL	RELIEF
G. ABOVE FINISHED GRADE	EAT	ENTERING AIR TEMPERATURE	IN	INCHES	REQD	REQUIRED
AMPERE INTERRUPTING CAPACITY	EC	ELECTRICAL CONTRACTOR	INV	INVERT	RF	RETURN FAN
F. ABOVE FINISHED FLOOR	ECC	ECCENTRIC	JBOX	JUNCTION BOX	RH	RELATIVE HUMIDITY
J AIR HANDLING UNIT	EF	EXHAUST FAN	K	KELVIN	RHC	REHEAT COIL
JM ALUMINUM	EFF	EFFICIENCY	KW	KILOWATT	RLA	RATED LOAD AMPS
ACCESS PANEL OR DOOR	EL	ELEVATION	KVA	KILO VOLT - AMPS	RM	ROOM
S AUTOMATIC TRANSFER SWITCH	ELEC	ELECTRIC	L	LENGTH	RPM	REVOLUTIONS PER MINUTE
AUDIO / VIDEO	ELEV	ELEVATOR	LAT	LEAVING AIR TEMPERATURE	SA	SUPPLY AIR GRILLE / REGISTER
G AVERAGE	EM	EMERGENCY FUNCTION	LV	LAVATORY	SC	SHORT CIRCUIT
G AMERICAN WIRE GAGE	ENT	ENTERING	LB	POUND	SCA	SHORT CIRCUIT AVAILABLE
S BUILDING AUTOMATION SYSTEM	EMT	ELECTRIC METALLIC TUBE	LD	LINEAR DIFFUSER	SCCR	SHORT CIRCUIT CURRENT RATING
BASEBOARD	EQ	EQUAL	LF	LINEAR FEET	SCH	SCHEDULE
BACK DRAFT DAMPER	EQUIP	EQUIPMENT	LIN	LINEAR	SD	SMOKE DAMPER
P BACK FLOW PREVENTOR	EQUIV	EQUIVALENT	LIQ	LIQUID	SEF	SMOKE EXHAUST FAN
BOILER	ES	END SWITCH	LM	LUMEN	SF	SUPPLY FAN
G BUILDING	ESP	EXTERNAL STATIC PRESSURE	LRA	LOCKED ROTOR AMPS	SH	SENSIBLE HEAT
V BELOW	ET	EXPANSION TANK	LV	LOUVER	SH	SHOWER
B BOTTOM OF BEAM	EWC	ELECTRIC WATER COOLER	LVG	LEAVING	SP	STATIC PRESSURE
B BOTTOM OF DUCT	EWT	ENTERING WATER	LWT	LEAVING WATER TEMPERATURE	SPD	SURGE PROTECTION DEVICE
P BOTTOM OF PIPE	TEMPERATURE		MBH	THOUSANDS OF BTU PER HOUR	SPEC	SPECIFICATION
IT BASEMENT	EX	EXHAUST	MC	MECHANICAL CONTRACTOR	SQ	SQUARE
J BRITISH THERMAL UNIT	EXPAN	EXPANSION	MCA	MINIMUM CIRCUIT AMPACITY	SS	STAINLESS STEEL
CHILLER	EXT	EXTERNAL	MCB	MAIN CIRCUIT BREAKER	SS	SAFETY SHOWER
P CAPACITY	F	DEGREES FAHRENHEIT	MD	MOTORIZED DAMPER	STD	STANDARD
CIRCUIT BREAKER	FA	FREE AREA	MDP	MAIN DISTRIBUTION PANEL	STL	STEEL
/ CIRCUIT BALANCING VALVE	FC	FAN COIL UNIT	MED	MEDIUM	SYS	SYSTEM
T CORRELATED COLOR TEMPERATURE	FC	FOOTCANDLE	MFR	MANUFACTURER	TEMP	TEMPERATURE
T CIRCUIT	FCV	FLOW CONTROL VALVE	MIN	MINIMUM	TR	TRANSFER GRILLE / REGISTER
H CUBIC FEET PER HOUR	FD	FIRE DAMPER	MISC	MISCELLANEOUS	TR	TAMPER RESISTANT
M CUBIC FEET PER MINUTE	FD	FLOOR DRAIN	MLO	MAIN LUG ONLY	TT	TEMPERATURE TRANSMITTER
WR CHILLED WATER RETURN	FIN	FINISHED	MOCP	MAXIMUM OVERCURRENT PROTECTION	TTB	TELECOMMUNICATIONS TERMINAL BACKBOARD
WS CHILLED WATER SUPPLY	FLA	FULL LOAD AMPS	MTD	MOUNTED	TYP	TYPICAL
CAST IRON	FLEX	FLEXIBLE	MUA	MAKE-UP AIR UNIT	TX	TRANSFORMER
CENTER LINE	FLR	FLOOR	N	NEUTRAL	UC	UNDERCUT DOOR
G CEILING	FOB	FLAT ON BOTTOM	NC	NORMALLY CLOSED	UH	UNIT HEATER
U CONCRETE MASONRY UNIT	FOT	FLAT ON TOP	NEG	NEGATIVE	UNO	UNLESS NOTED OTHERWISE
CLEAN OUT	FP	FIRE PROTECTION	NIC	NOT IN CONTRACT	UNOCC	UNOCCUPIED
- COLUMN	FP	FIRE PUMP	NL	NIGHT / SECURITY LIGHT - DO NOT SWITCH	UR	URINAL
MP COMPRESSOR	FPM	FEET PER MINUTE	NO	NORMALLY OPEN	V	VOLTS
NC CONCRETE	FPS	FEET PER SECOND	NOM	NOMINAL	VA	VOLT AMPERE
ND CONDENSATE	FS	FLOW SWITCH	NTS	NOT TO SCALE	VAV	VARIABLE AIR VOLUME UNIT
NN CONNECTION	FSD	FIRE/SMOKE DAMPER	OA	OUTSIDE AIR	VFD	VARIABLE FREQUENCY DRIVE
NT CONTINUATION	FT	FEET	OBD	OPPOSED BLADE DAMPER	VRF	VARIABLE REFRIGERANT FLOW
NTR CONTRACTOR	FXC	FLEXIBLE CONNECTION	OC	ON CENTER	VOLT	VOLTAGE
COLOR RENDERING INDEX	GND	GROUND	OCC	OCCUPIED	VTR	VENT THROUGH ROOF
COOLING TOWER	GA	GAUGE	OCP	OVER CURRENT PROTECTION	W	WIDTH
CURRENT TRANSFORMER	GAL	GALLON	OD	OUTSIDE DIAMETER	W	WATTS
CONDENSING UNIT	GALV	GALVANIZED	OL	OVERLOAD	W/	WITH
COPPER	GEC	GROUND ELECTRODE	ORD	OVERFLOW ROOF DRAIN	W/O	WITHOUT
H CABINET UNIT HEATER	CONDUCTOR		OZ	OUNCE	WB	WET BULB
B CONSTANT VOLUME BOX	GFCI / GFI	GROUND FAULT CIRCUIT INTERRUPTER	PBD	PARALLEL BLADE DAMPER	WC	WATER COLUMN
R CONDENSER WATER RETURN	GPM	GALLONS PER MINUTE	PD	PRESSURE DROP	WC	WATER CLOSET
S CONDENSER WATER SUPPLY	GRS/LB	GRAINS PER POUND	PH	PHASE	WG	WATER GAUGE
DRY BULB	H 2O	WATER	POS	POSITIVE PRESSURE	WP	WEATHERPROOF
PT DEPARTMENT	HB	HOSE BIBB	POS	POINT OF SALES	WPIU	WEATHERPROOF IN-USE
DRINKING FOUNTAIN	HD	HEAD (SEE SCHEDULES)	PRV	PRESSURE REDUCING VALVE	WSR	WITHSTAND RATING
DIAMETER	HP	HEAT PUMP	PS	PRESSURE SWITCH	XEMR	TRANSFORMER
G DIAGRAM	HP	HORSEPOWER	PSI	POUNDS PER SQUARE INCH		

DELTA REC CENTER  
POOL BOILER UPGRADE  
531 PALMER STREET  
DELTA COLORADO

DATE: ISSUED FOR:

DATE:	1/21/20
JOB NO.:	20-2
DRAWN BY:	BO
CHECKED BY:	BO
SCALE:	AS SHOWN
FEET NUMBER:	

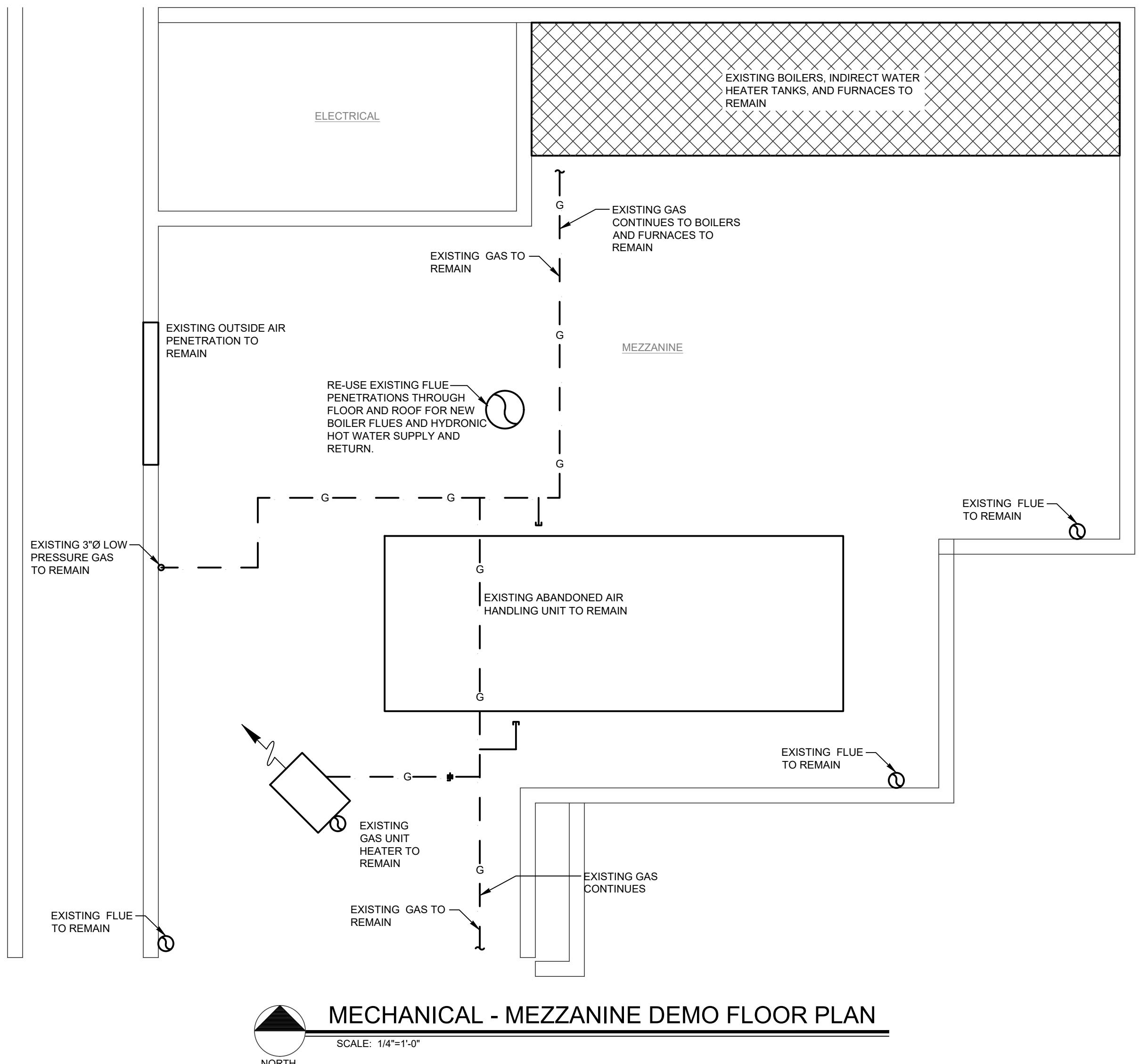
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### MECHANICAL GENERAL NOTES:

1. DRAWING IS DIAGRAMMATIC IN NATURE. LOCATIONS AND SIZES MAY VARY DURING FIELD COORDINATION & INSTALLATION OF MECHANICAL, PLUMBING, & ELECTRICAL. DRAWINGS DO NOT NECESSARILY INDICATE EVERY REQUIRED OFFSET, FITTING, ETC. DRAWINGS ARE NOT TO BE SCALED FOR DIMENSIONS. TAKE ALL DIMENSIONS FROM ARCHITECTURAL DRAWINGS, CERTIFIED EQUIPMENT DRAWINGS AND FROM THE STRUCTURE ITSELF BEFORE FABRICATING ANY WORK, VERIFY ALL SPACE REQUIREMENTS COORDINATING WITH OTHER TRADES, AND INSTALL THE SYSTEMS IN THE SPACE PROVIDED WITHOUT EXTRA CHARGES TO THE OWNER.
2. CONDENSING BOILER FLUE VENT MATERIAL SHALL BE EQUIVALENT TO SELKIRK PS - UL 103 PRESSURE RATED STAINLESS STEEL FLUE MATERIAL.
3. ROUTE CONDENSATE FROM CONDENSING MECHANICAL EQUIPMENT TO CONDENSATE NEUTRALIZATION KITS. CONDENSATE FROM NEUTRALIZATION KITS SHALL BE DISCHARGED INDIRECTLY THROUGH AIR GAP TO NEAREST FLOOR DRAIN.
4. MECHANICAL CONTRACTOR SHALL FIELD LOCATE EXISTING DUCTWORK PRIOR TO CONSTRUCTION. MECHANICAL CONTRACTOR SHALL COORDINATE TIE IN CONNECTION POINTS OF NEW COMBUSTION AIR TO BOILERS WITH EXISTING DUCTWORK AS NECESSARY.
5. CONTRACTOR SHALL CLEAN AND SERVICE ALL EXISTING EQUIPMENT TO REMAIN. CONTRACTOR SHALL VERIFY ALL EQUIPMENT TO REMAIN IS PROPERLY FUNCTIONING PRIOR TO RE-USING EQUIPMENT. CONTRACTOR TO INSURE THAT FINAL MECHANICAL SYSTEM WILL OPERATE AS INTENDED ON PROVIDED DRAWINGS.
6. EXISTING EQUIPMENT SHOWN IS FOR REFERENCE ONLY. FIELD LOCATE EXISTING EQUIPMENT AND PIPING PRIOR TO ANY WORK BEING DONE.
7. THE GENERAL CONTRACTOR SHALL COORDINATE THE ROUGH IN OF NEW EQUIPMENT ON THE MEZZANINE FLOOR AND PIPING DOWN TO THE 1ST FLOOR POOL MECHANICAL ROOM. SO THAT THE EXISTING POOL SYSTEM CAN BE SWITCHED OVER TO THE NEW BOILER SYSTEM WITH MINIMAL DOWN TIME. THE GENERAL CONTRACTOR SHALL PROVIDE A HIGH LEVEL WRITTEN SEQUENCE INDICATING A TIMELINE OF NEW EQUIPMENT ROUGH IN AND EXISTING EQUIPMENT DEMOLITION TO THE OWNER.

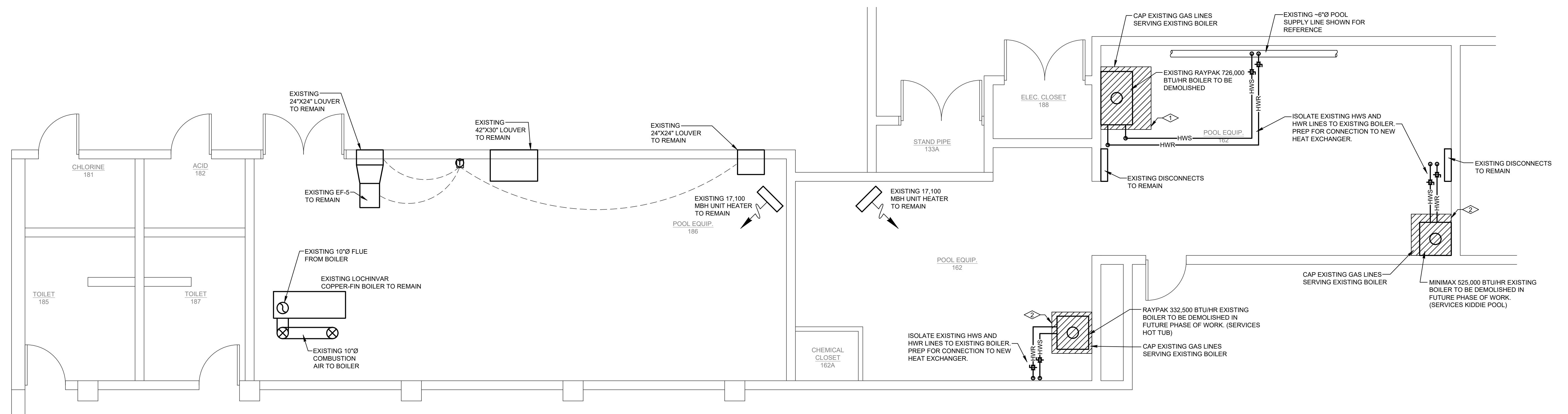
### FLAG NOTES:

1. DEMOLISH MECHANICAL EQUIPMENT WITHIN HATCHED AREA. THIS BOILER IS TO BE REMOVED IN THE FIRST PHASE OF WORK. FULL UPGRADE OF THESE BOILERS IS SHOWN FOR COMPLETENESS AND FINAL INTENT.
2. THIS BOILER IS TO BE REMOVED IN A FUTURE PHASE OF WORK.



MECHANICAL - MEZZANINE DEMO FLOOR PLAN

SCALE: 1/4"=



# MECHANICAL - DEMO FLOOR PLAN

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

DELTA REC CENTER  
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DELTA, COLORADO

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DATE: 1/21/2021  
JOB NO: 20-210  
DRAWN BY: BCE  
CHECKED BY: BCE  
SCALE: AS SHOWN  
SHEET NUMBER:

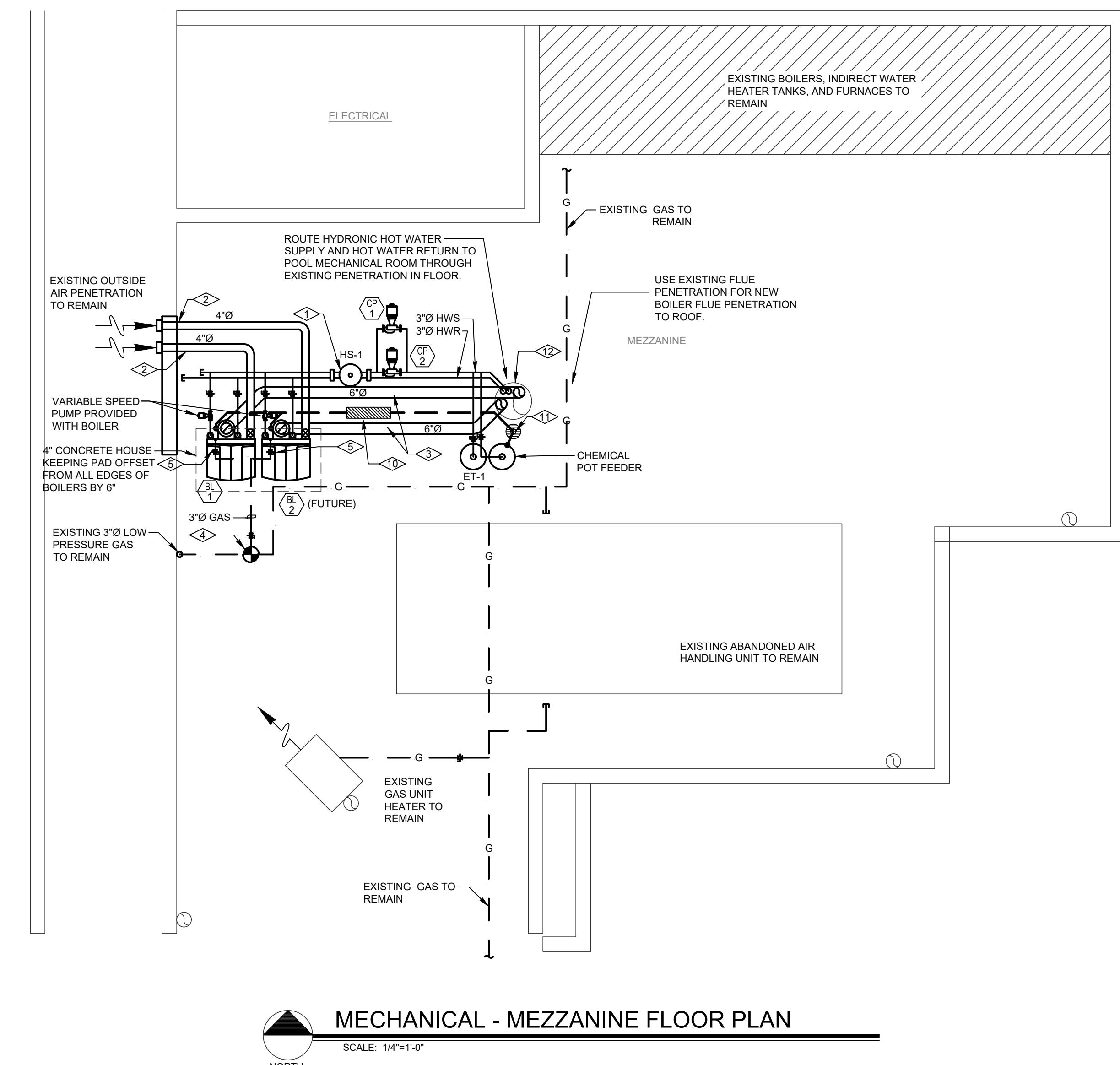
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6. EXISTING EQUIPMENT SHOWN IS FOR REFERENCE ONLY. FIELD LOCATE EXISTING EQUIPMENT AND PIPING PRIOR TO ANY WORK BEING DONE.
7. PIPING MATERIAL USED FOR THE POOL SIDE OF THE HEAT EXCHANGER SHALL BE RATED FOR USE WITH CHLORINATED WATER.

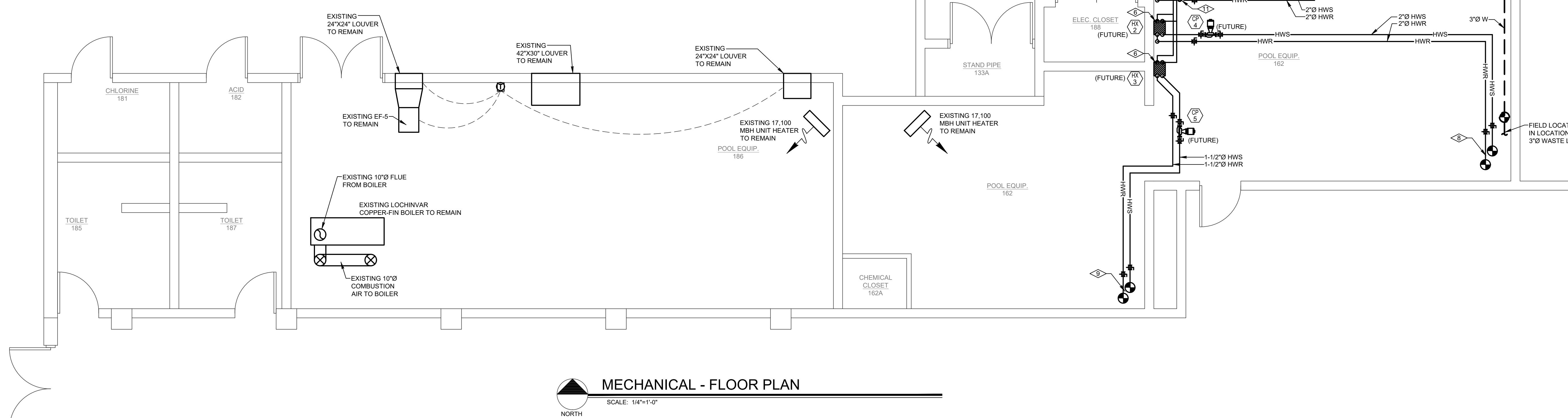
#### FLAG NOTE

1. TACO - 5903A HYDRAULIC AIR SEPARATOR. REFERENCE HYDRONIC SCHEMATIC AND MANUFACTURER'S INSTALLATION DETAILS FOR CONNECTIONS TO HYDRONIC HOT WATER SUPPLY AND RETURN (HWS/HWR).
2. ROUTE 4"Ø COMBUSTION AIR FROM NEW BOILER TO EXISTING OUTSIDE AIR PENETRATION THROUGH WALL. (MATERIAL OF NEW COMBUSTION AIR TO BE GALVANIZED STEEL.) PROPERLY SEAL ANNULAR SPACE AROUND PENETRATION THROUGH EXISTING PLENUM.
3. ROUTE 6"Ø FLUE FROM NEW BOILER TO ROOF PENETRATION AT EXISTING FLUE ROOF PENETRATION. PROVIDE EQUIVALENT TO SELKIRK - PS UL103 PRESSURE RATED ALL STAINLESS STEEL DOUBLE WALL FLUE MATERIAL. SLOPE FLUE MATERIAL 1/8" PER 12" BACK TOWARDS NEW BOILER.
4. FIELD LOCATE TIE IN LOCATION FROM EXISTING LOW PRESSURE NATURAL GAS TO NEW LOW PRESSURE NATURAL GAS FOR NEW BOILERS.
5. ROUTE NEW 2"Ø LOW PRESSURE GAS TO NEW BOILER. PROVIDE ISOLATION VALVE AND DIRT LEG BEFORE CONNECTION TO BOILER.
6. RACK HEAT EXCHANGERS ON WALL. COORDINATE FINAL LOCATION ALONG WALL IN FIELD WITH EXISTING EQUIPMENT, PIPING AND ELECTRICAL DISCONNECTS. PROVIDE ISOLATION VALVES AT ALL INLET/OUTLET CONNECTIONS AT HEAT EXCHANGER. ROUTE NEW POOL HOT WATER SUPPLY/RETURN PIPING TO EXISTING BOILER TIE IN LOCATIONS.
7. ROUTE NEW 2"Ø LAP POOL HOT WATER SUPPLY AND RETURN TO HX-1. FIELD LOCATE TIE IN LOCATION TO EXISTING PIPING. PROVIDE TRANSITIONS AS NEEDED FROM EXISTING PIPING TO NEW 2"Ø PIPING.
8. ROUTE NEW 2"Ø KIDDIE POOL HOT WATER SUPPLY AND RETURN TO HX-2. FIELD LOCATE TIE IN LOCATION TO EXISTING PIPING. PROVIDE TRANSITIONS AS NEEDED FROM EXISTING PIPING TO NEW 2"Ø PIPING.
9. ROUTE NEW 1-1/2"Ø HOT TUB HOT WATER SUPPLY AND RETURN TO HX-3. FIELD LOCATE TIE IN LOCATION TO EXISTING PIPING. PROVIDE TRANSITIONS AS NEEDED FROM EXISTING PIPING TO NEW 1-1/2"Ø PIPING.
10. ROUTE 3/4"Ø CONDENSATE PIPED FULL SIZE FROM NEW BOILERS ON MEZZANINE TO CONDENSATE NEUTRALIZATION KIT. ROUTE NEUTRALIZED CONDENSATE FROM TRAP TO NEW FLOOR DRAIN. DISCHARGE INDIRECTLY THROUGH AIR GAP TO FLOOR DRAIN. PIPING SHALL BE BALLASTED ON FLOOR AND SLOPED 1/8" PER 12" TOWARDS FLOOR DRAIN.
11. PROVIDE NEW 3"Ø FLOOR DRAIN EQUIVALENT TO J.R. SMITH 2005 WITH J.R. SMITH QUAD CLOSE MECHANICAL TRAP SEAL. RE-USE EXISTING PENETRATION THROUGH MEZZANINE FLOOR FOR SANITARY WASTE PENETRATION. ROUTE NEW SANITARY WASTE LINE FROM FLOOR DRAIN TO EXISTING WASTE WITHIN POOL MECHANICAL ROOM ON 1ST FLOOR. FIELD COORDINATE FINAL TIE IN LOCATION OF NEW WASTE LINE TO EXISTING WASTE LINE.
12. SEAL/CAP EXISTING PENETRATION THROUGH MEZZANINE FLOOR AFTER REMOVAL OF FLUE MATERIAL. (COORDINATE THE ROUTING OF NEW PIPING THROUGH EXISTING PENETRATION THROUGH FLOOR.)



# MECHANICAL - MEZZANINE FLOOR PLAN

A scale bar consisting of a horizontal line with a vertical line segment at its left end, forming a T-shape. The text "SCALE: 1/4"" is written to the right of the bar.



MECHANICAL - ELOOR PLAN

A circular compass rose with a vertical line extending downwards, labeled 'NORTH' at the bottom. A horizontal line extends to the right, labeled 'SCALE: 1/4" on the right side.

DELTA REC CENTER  
POOL BOILER UPGRADE  
531 PALMER STREET  
DETA CORRADO

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**Bighorn Consulting Engineers, Inc.**  
Mechanical & Electrical Engineers

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DATE:	1/21/20
JOB NO:	20-2
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SCALE:	AS SHOWN
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**M1-**



**DELTA REC CENTER  
531 PALMER STREET  
DELA, COLORADO**

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JOB NO: 20-210  
DRAWN BY: BCE  
CHECKED BY: BCE  
SCALE: AS SHOWN  
SHEET NUMBER: M2-1

February 05, 2021 - 11:53:22am

**MECHANICAL PROVISIONS**

- SCOPE OF WORK**
  - THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK, MATERIALS, AND LABOR TO SATISFY A COMPLETE WORKING SYSTEM WHETHER SPECIFIED OR IMPLIED.
  - ALL WORK IS TO BE PERFORMED IN STRICT COMPLIANCE WITH THE INTERNATIONAL PLUMBING CODE (LATEST EDITION), ALL LOCAL CODES AND ALL OTHER REGULATION GOVERNING WORK OF THIS NATURE.
  - THE CONTRACTOR SHALL, BEFORE SUBMITTING ANY PROPOSAL, EXAMINE THE PROPOSED SITE AND SHALL DETERMINE FOR HIMSELF THE CONDITIONS THAT MAY AFFECT THE WORK. NO ALLOWANCE SHALL BE MADE IF THE CONTRACTOR FAILS TO MAKE SUCH EXAMINATIONS.
  - ALL EQUIPMENT AND MATERIALS SHALL BE AS SPECIFIED OR "APPROVED EQUAL" BY THE ENGINEER OR ARCHITECT.
- PERMITS**
  - THE CONTRACTOR SHALL SECURE ALL PERMITS OR APPLICATIONS AND PAY ANY AND ALL FEES.
- SHOP DRAWINGS**
  - SUBMIT MATERIAL LIST AND SHOP DRAWINGS FOR MAJOR EQUIPMENT TO THE ARCHITECT/ENGINEER FOR APPROVAL. THE CONTRACTOR SHALL SUBMIT FIVE SETS OF SHOP DRAWINGS AND THEY SHALL BE CLEARLY LABELED.
- Flexible Duct Work**
  - THE FLEXIBLE TYPE DUCT SHALL BE OF TWO ELEMENT SPIRAL CONSTRUCTION COMPOSED OF A CORROSION RESISTANT METAL SUPPORTING SPIRAL AND COATED FABRIC WITH A MINERAL BASE. FLEXIBLE DUCT CONNECTORS SHALL BE LISTED BY UL, CLASS 1 DUCTS, AND SHALL HAVE A FLAME SPREAD RATING NOT EXCEDING 25 AND A SMOKE DEVELOPED RATING NOT EXCEDING 50.
  - USE OF FLEXIBLE DUCTWORK SHALL BE LIMITED TO NO MORE THAN 6 LINEAR FEET PER RUN.
  - CONTRACTOR SHALL BE CAREFUL SO AS NOT TO KINK OR COLLAPSE FLEXIBLE DUCT.
- Refrigerant**
  - PIPING CONTRACTOR SHALL PROVIDE AND INSTALL REFRIGERANT PIPING IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND DIRECTIONS. IT MUST BE INCONSPICUOUS AND FREE FROM ANY POSSIBLE CONDENSATION.
  - INSULATE REFRIGERANT LINES WITH ARMOUR-FLEX TYPE INSULATION, SHALL BE TYPE "K" COPPER TUBING, WITH WROUGHT COPPER SOLDER TYPE FITTINGS SUITABLE FOR CONNECTION WITH SILVER SOLDER.
- DUCTWORK**
  - THE DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "SMACNA" APPLICABLE MANUALS.
  - ALL DUCTWORK SHALL BE THE LOW VELOCITY TYPE, UNLESS SPECIFIED OTHERWISE.
  - CONTRACTOR SHALL PROVIDE AND INSTALL APPROVED FIRE DAMPERS AND ACCESS PANELS IN ANY AND ALL DUCTWORK WHICH PENETRATES ROOFS, FLOORS, OR VERTICAL FIRE PARTITION, OR AS OTHERS ARE SHOWN IN DRAWINGS.
  - ALL BRANCH DUCTS TO HAVE VOLUME DAMPERS, SMOOTH TURN DUCTWORK OR TURNING VENES SHALL BE USED THROUGHOUT WHERE FLOW EXCEEDS 150 CFM.
  - ALL DUCTS SHALL BE SEALED IN ACCORDANCE WITH "SMACNA" STANDARD AND ACCEPTED GOOD PRACTICE.
  - ALL DUCT DIMENSIONS SHOWN ARE NET INSIDE VALUES. DIMENSIONS MAY BE CHANGED SO LONG AS THE NET FREE FACE AREA IS MAINTAINED.
  - ALL CONCEALED DUCTWORK SHALL BE INSULATED WITH 1-1/2" FIBERGLASS INSULATING BLASTING ALUMINUM FOIL FACING.
  - ALL DUCT AND DUCTWORK IS TO BE DOWNSTREAM OF THE HVAC UNIT SHALL BE INTERNALLY LINED WITH A 1/2" ACOUSTICAL DUCT LINER UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- DRAINAGE PIPING**
  - (CONDENSATE) SHALL BE SCHEDULE 40 PVC PIPE WITH SOLVENT JOINTS. PITCH HORIZONTAL LINES 1" IN 10". CONDENSATE DRAINS SHALL BE ROUTED TO FLOOR DRAIN, ROOF DRAIN OR INDIRECT WASTE DRAIN.
  - HVAC CONTROLS
  - CONTRACTOR TO SUPPLY AND INSTALL ALL CONTROL WIRING AND THERMOSTATS AS REQUIRED.
  - ELECTRICAL
  - CONTRACTOR TO COORDINATE WITH ELECTRICAL CONTRACTOR FOR LOCATION OF WIRING FOR EACH HVAC UNIT.
  - PIPE SUPPORTS
  - ALL PIPE SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE IN A NEAT AND WORKMANLIKE MANNER. THE USE OF WIRE OR METAL STRAP TO SUPPORT PIPES WILL NOT BE PERMITTED. SPACING OF PIPE SUPPORTS SHALL NOT EXCEED 8 FEET FOR ALL PIPING. PLASTIC PIPING TO BE SUPPORTED EVERY 4 FEET.
  - GAS PIPING
  - PIPING SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH MALLEABLE IRON FITTINGS WHERE GAS PIPE CONNECTS TO EQUIPMENT. IT SHALL BE PROVIDED WITH A DRIP LEG THE FULL SIZE OF THE RUNOUT, A 100% SHUT-OFF VALVE AND A UNION. GAS PIPING CONTAINING PRESSURE GREATER THAN 9" W.G. SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH WELDED JOINTS.
  - MISCELLANEOUS
  - ALL EXTERIOR OPENINGS TO BE PROPERLY CAULKED AND SEALED WITH A SEAL OF HIGH QUALITY AND LONG LIFE, TO PREVENT INFILTRATION OF OUTSIDE AIR INTO CONDITIONED SPACE.
  - COORDINATE INSTALLATION OF ALL ROOF FLASHING AT ROOF PENETRATION.
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  - PEX TUBING: IF PEX TUBING IS USED AS AN APPROVED ALTERNATE FOR APPLICATIONS WHERE METALLIC PIPING IS THE BASIS OF DESIGN, THE PEX MANUFACTURER SHALL SUBMIT SHOP DRAWINGS CLEARLY INDICATING THAT THE DESIGN HAS BEEN ANALYZED AND APPROVED, AS REQUIRED TO MAINTAIN SYSTEM PRESSURE DROPS AND SYSTEM PARAMETERS. ANY DESIGN RESULTING IN INCREASED SYSTEM PRESSURE DROP AS A RESULT OF IMPROPER PEX SIZING OR DESIGN SHALL NOT BE PERMITTED.
  - TESTING AND BALANCING
  - THE HVAC SYSTEM SHALL BE TESTED AND BALANCED BY AN INDEPENDENT AGENCY, UNDER THE SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER. A SEALED TYPE WRITTEN REPORT SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR REVIEW AND APPROVAL.
  - GUARANTEE
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**PLUMBING SPECIFICATION**

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HEAT EXCHANGER SCHEDULE												
EQUIPMENT NO.	SERVICE	CAPACITY (MBH)	POOL WATER			BOILER WATER			POOL WATER FLOW RATE (GPM)	HOT WATER FLOW RATE (GPM)	MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
			PRESSURE DROP (PSI)	HW SUPPLY (°F)	HW RETURN (°F)	PRESSURE DROP (PSI)	HW SUPPLY (°F)	HW RETURN (°F)				
HX-1	LAP POOL	750	2.5	130	90	2.5	160	120	38	39	TACO TB12MTX60	NOTE-1
HX-2 (FUTURE)	KIDDIE POOL	525	1.34	120	84	1.14	160	120	30	27	TACO TB12MTX50	NOTE-1
HX-3 (FUTURE)	HOT TUB	350	2.38	130	90	2.57	160	120	18	18	TACO TB10x20	NOTE-1

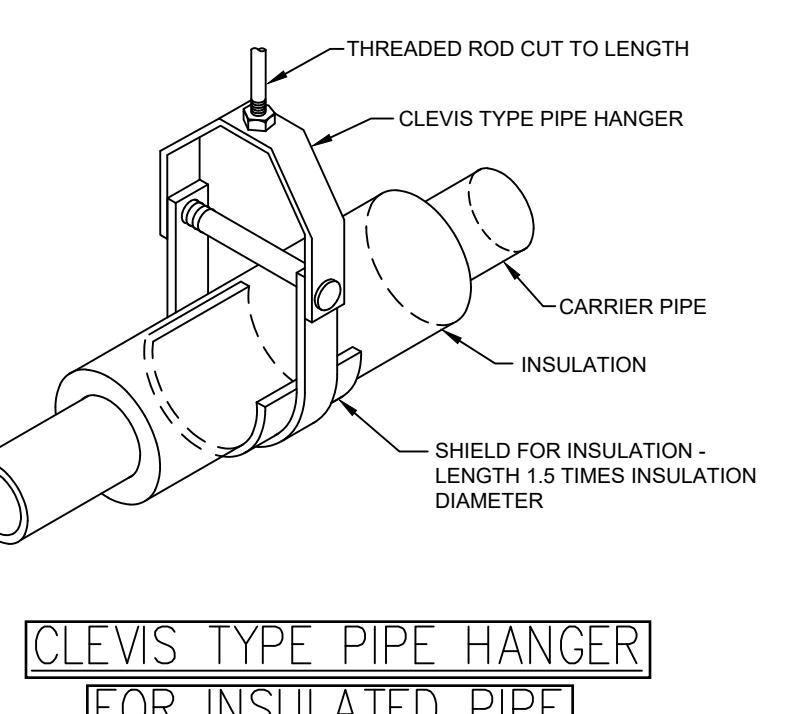
NOTES:  
1. PROVIDE WITH SMO 254 PLATES AND COPPER BRAZING MATERIAL. POOL SIDE FLUID CONTAINS CHLORINE.

TABLE C403.2.8 MINIMUM PIPE INSULATION THICKNESS IN INCHES A.							
FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE				
	CONDUCTIVITY (BTU*IN/(HR*FT²*°F)) B.	MEAN RATING TEMPERATURE (°F)	<1"Ø	1"Ø TO <1-1/2"Ø	1-1/2"Ø TO <4"Ø	4"Ø TO <8"Ø	≤8"Ø
> 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20-0.26	75	0.5	1.0	1.0	1.0	1.0

A. FOR PIPING SMALLER THAN 1-1/2" AND LOCATED IN PARTITIONS WITHIN CONDITIONED SPACES, REDUCTION OF THESE THICKNESSES BY 1" SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B) BUT NOT TO A THICKNESS LESS THAN 1".

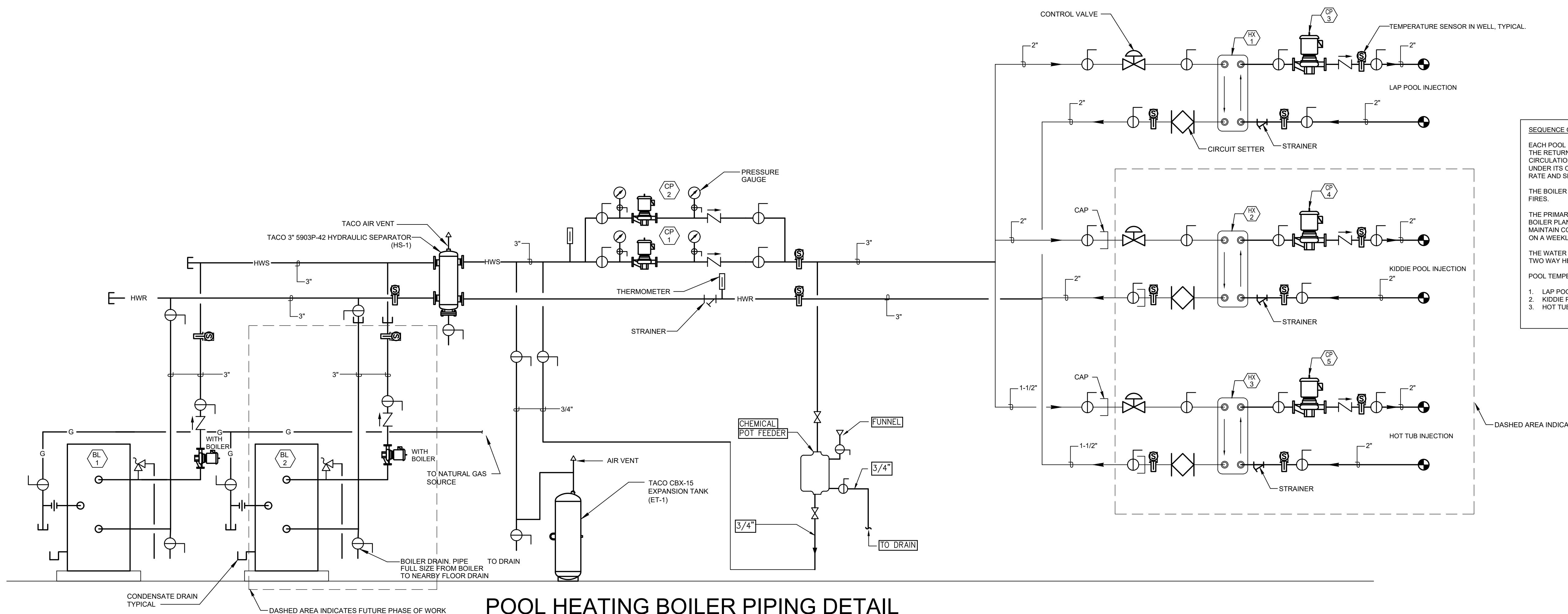
B. FOR INSULATION OUTSIDE THE STATED CONDUCTIVITY RANGE, THE MINIMUM THICKNESS (T) SHALL BE DETERMINED AS FOLLOWS:  $T = r((1+r/k)^2 - 1)/k$ . (T = minimum insulation thickness, r = actual outside radius of pipe, K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (btu\*in/(hr\*ft²\*°F)), k = the upper value of the conductivity range listed in the table for the applicable fluid temperature).

C. FOR DIRECT-BURIED HEATING AND HOT WATER SYSTEM PIPING REDUCTION OF THESE THICKNESSES BY 1-1/2" SHALL BE PERMITTED (BEFORE THICKNESS ADJUSTMENT REQUIRED IN FOOTNOTE B BUT NOT TO THICKNESS LESS THAN 1").



EQUIPMENT NO.	SERVICE	TYPE	LOCATION	GPM	HEAD (FT.)	MOTOR			MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
HORSEPOWER	RPM	V.PH./HZ.								

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**SEQUENCE OF OPERATION:**  
 EACH POOL HEAT EXCHANGER HAS A RETURN WATER TEMPERATURE SENSOR. IF THE RETURN WATER DROPS BELOW SETPOINT (ADJ), THE RESPONDING CIRCULATION PUMP WILL START (CP-3, 4, OR 5). THE PLANT WILL BE ENABLED TO FIRE UNDER ITS OWN CONTROLS TO MAINTAIN 160° F (ADJ) BY MODULATING THE FIRING RATE AND SEQUENCE OF THE BOILERS.  
 THE BOILER CIRCULATION PUMP WILL START WHEN ITS CORRESPONDING BOILER FIRES.  
 THE PRIMARY CIRCULATION PUMP (CP-1 OR CP-2) SHALL BE STARTED WHEN THE BOILER PLANT IS ENABLED. THE PUMP WILL RUN UNDER ITS OWN CONTROL TO MAINTAIN CONSTANT DIFFERENTIAL PRESSURE. THE PUMPS WILL BE ALTERNATED ON A WEEKLY BASIS.  
 THE WATER TEMPERATURE AT EACH POOL WILL BE MAINTAINED BY MODULATING THE TWO WAY HEATING CONTROL VALVE ON THE BOILER SUPPLY WATER.  
 POOL TEMPERATURES ARE AS FOLLOWS:  
 1. LAP POOL = 84° F  
 2. KIDDIE POOL = 90° F  
 3. HOT TUB = 101° F

DASHED AREA INDICATES FUTURE PHASE OF WORK

## DELTA REC CENTER POOL BOILER UPGRADE 531 PALMER STREET DELTA, COLORADO

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Grand Junction, CO 81501  
Phone: (970) 241-8709

Bighorn Consulting Engineers, Inc.  
Mechanical & Electrical Engineers

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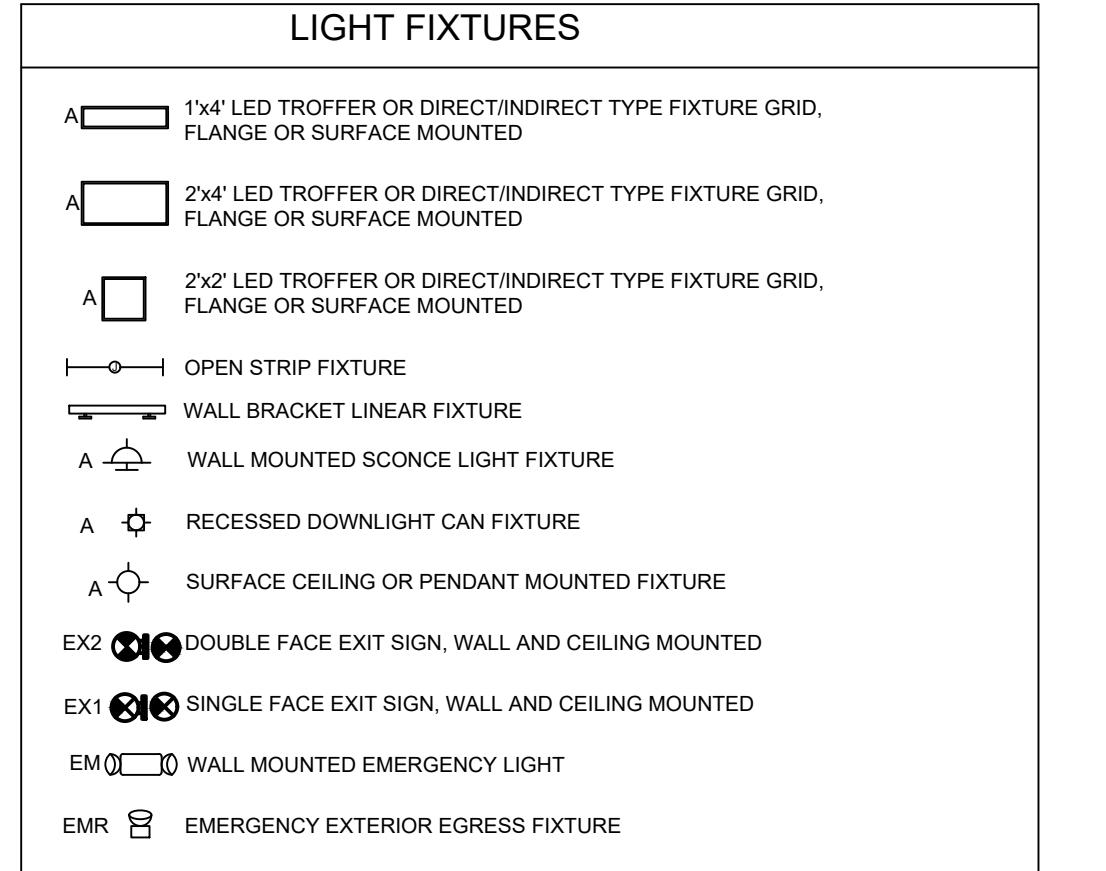
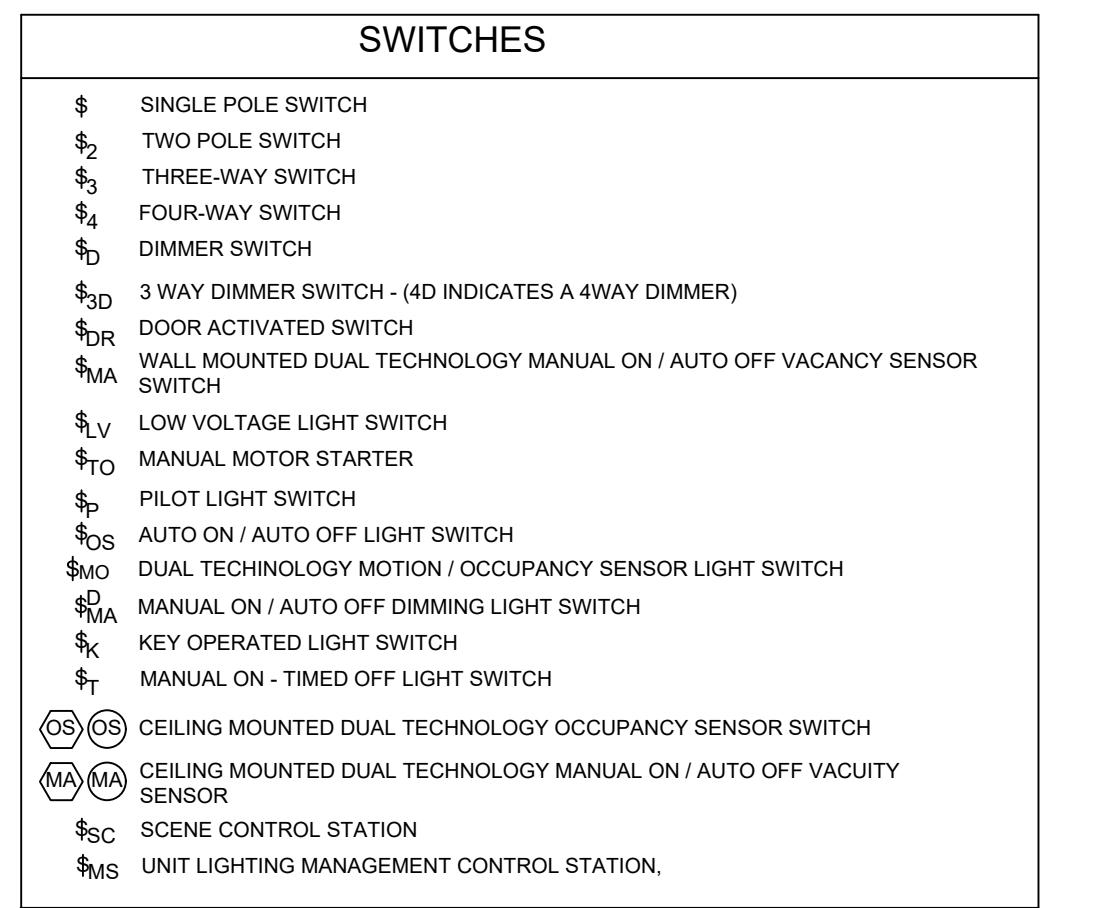
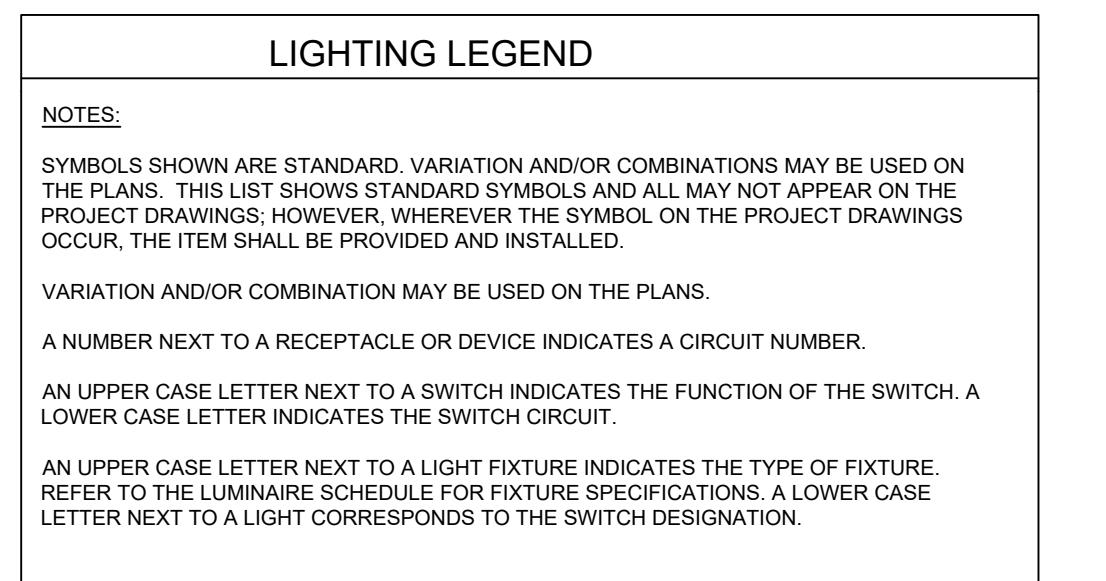
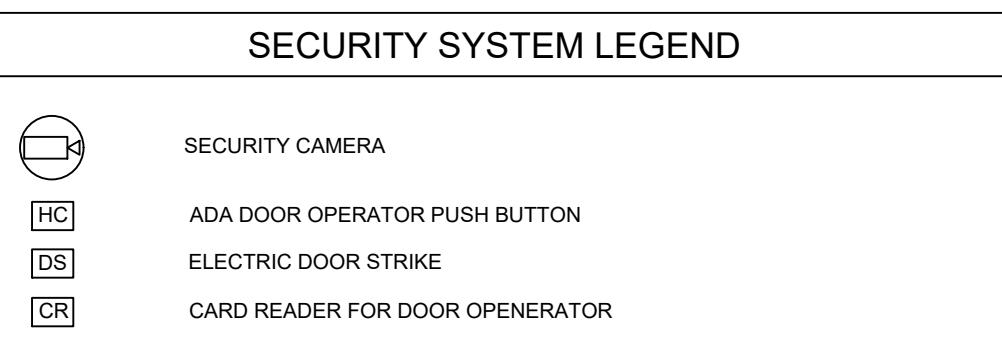
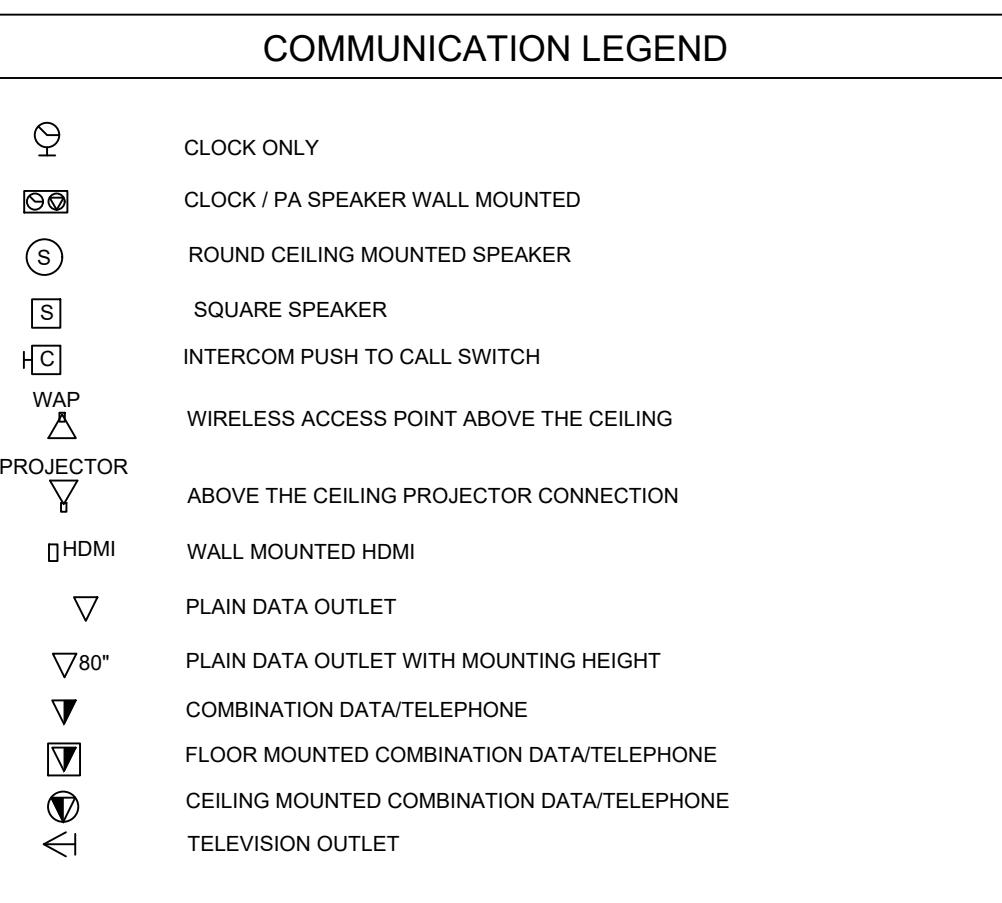
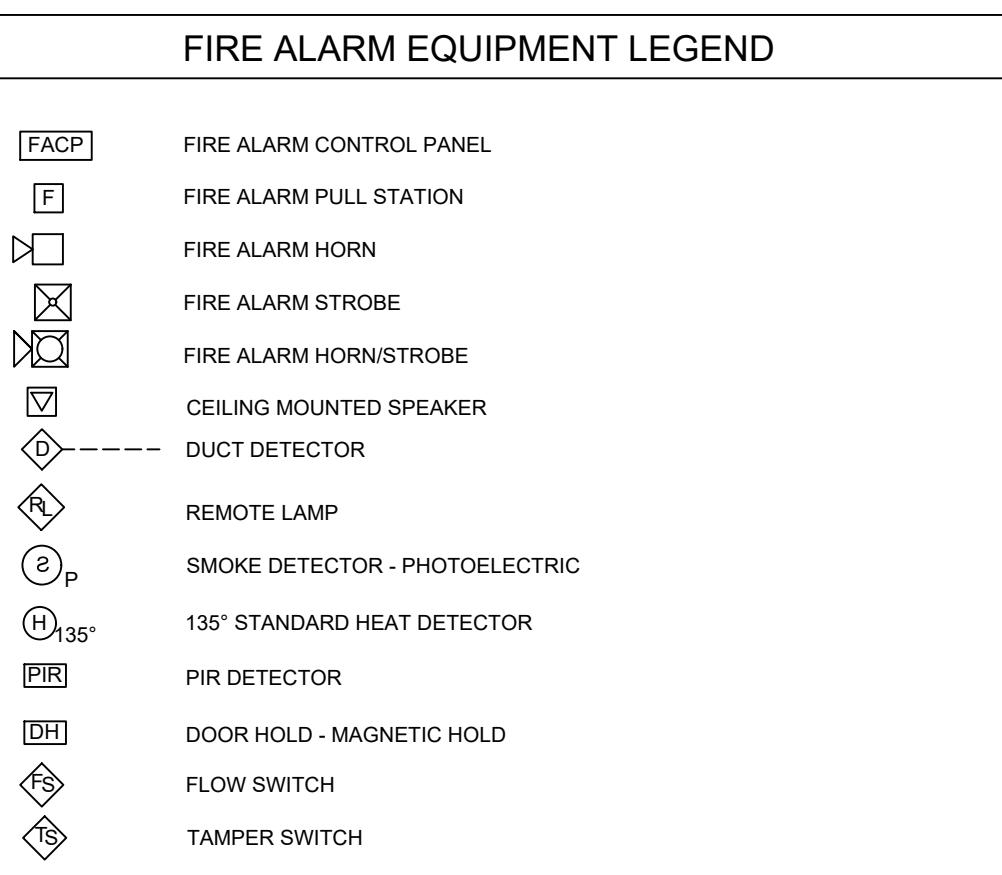
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531 PALMER STREET  
POOL BOILER UPGRADE  
DELTA, COLORADO**

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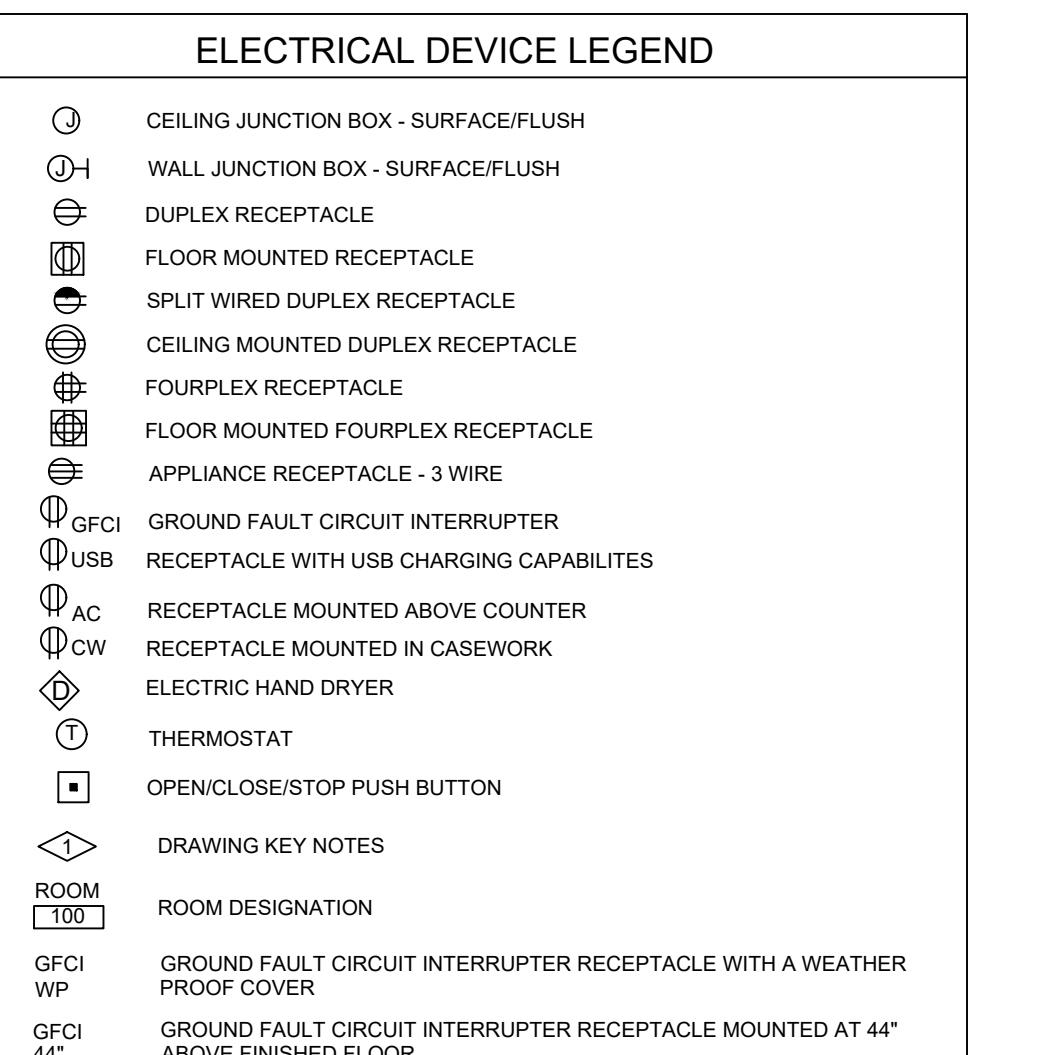
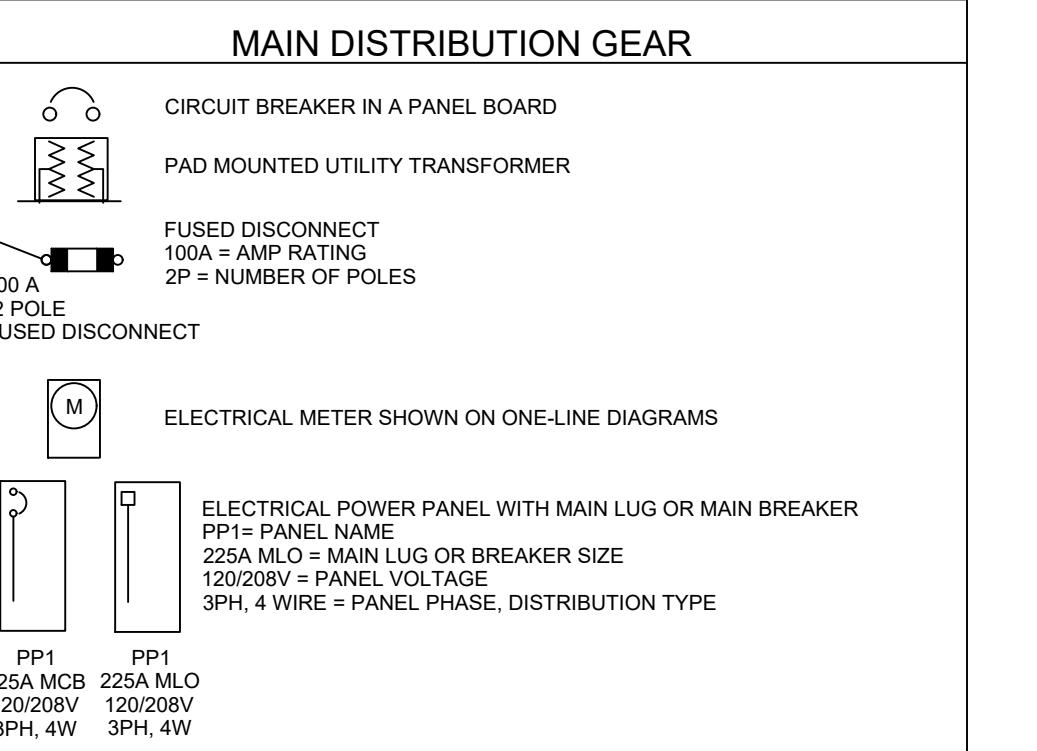
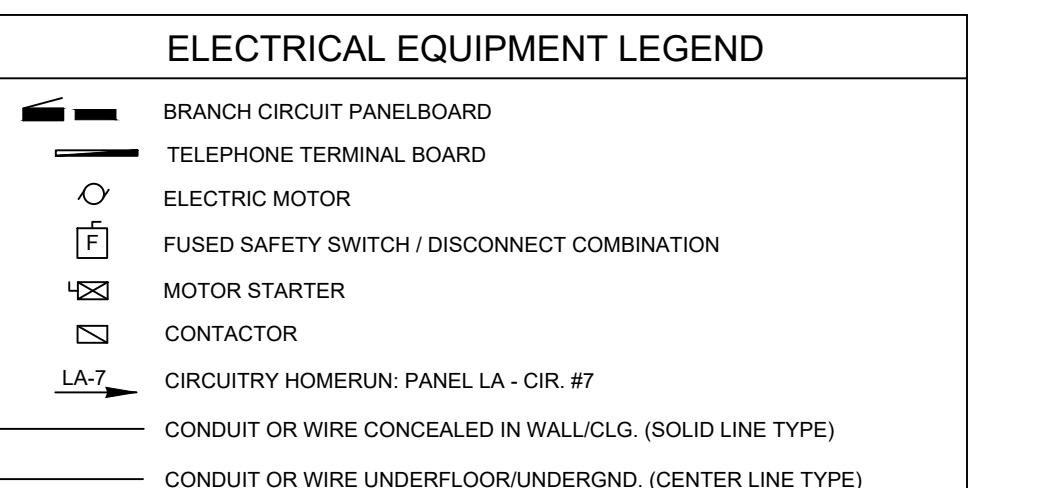
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**GENERAL ELECTRICAL NOTES:**  
1. ALL ELECTRICAL WORK TO COMPLY WITH LATEST EDITION OF NEC, IEC and ALL APPLICABLE GOVERNING CODES.  
2. FIELD COORDINATION DURING CONSTRUCTION IS IMPERATIVE. CONTRACTORS BIDDING THIS WORK MUST MAKE REASONABLE ALLOWANCES FOR UNFORESEEN CONTINGENCIES.  
3. ELECTRIC UTILITY TO ADVISE OWNER AND/OR THE ELECTRICAL ENGINEER PRIOR TO SERVICE MODIFICATION REQUIRING COST TO THE OWNER.  
  
**WIRING:**  
1. ALL WIRING IS SHOWN DIAGRAMMATICALLY ON DRAWING, FIELD VERIFY ALL CONDITIONS PRIOR TO ROUGH-IN.  
2. ALL CONDUITS AND CONVENTIONS SHALL BE CONCEALED. IN THE EVENT THAT A NEW DEVICE IS BEING INSTALLED IN AN EXISTING DOWNTOP PARTITION, PROVIDE A CUT IN TYPE BOX AND FISH FLEXIBLE CONDUIT DOWN INSIDE THE WALL FROM ABOVE THE CEILING AND REPAIR THE DRYWALL AROUND THE CONDUIT. TRANSITION TO EMT ONCE ABOVE THE CEILING.  
3. SIZES OF WIRE AND CABLES ARE BASED UPON COPPER CONDUCTORS, UNLESS OTHERWISE INDICATED. ALL CIRCUITS SHALL CONTAIN #2 AWG WITH #1 #2 GND IN 1/2" CONDUIT UNLESS NOTED OTHERWISE.  
4. ALL BRANCH CIRCUITS WITH THRU HOMES RUN OVER 5 FEET, WILL BE SIZED ONE SIZE LARGER.  
5. ALL PENETRATIONS IN OR THROUGH FIRE RATED PARTITIONS SHALL BE FIRE STOPPED IN SUCH A WAY THAT THE PENETRATION MATCHES THE FIRE RATING OF THE WALL.  
6. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION BETWEEN THE APPROPRIATE DISCIPLINES AND CONTRACTORS.  
7. COORDINATE ALL DEVICE, FIXTURE AND HARDWARE COLOR SELECTIONS WITH THE ARCHITECT PRIOR TO MAKING SHOP DRAWINGS SUBMITTALS.  
8. COORDINATE THE MOUNTING HEIGHTS OF ALL RECEPTACLES MOUNTED ABOVE COUNTERS, CASEWORK AND APPLIANCE RECEPTACLES WITH ARCHITECTURAL ELEVATIONS.  
9. BRANCH CIRCUIT AND SPECIAL SYSTEMS WIRING FOR DEVICES ON WALLS IN FINISHED AREAS WHICH CANNOT BE CONCEALED SHALL BE INSTALLED IN SURFACE MOUNTED RACEWAY.  
10. ALL EXPOSED CONDUITS, BOXES, ETC. IN ROOMS TO BE PAINTED SHALL BE PAINTED TO MATCH THE SURROUNDING PAINTED SURFACE. BOXES, ETC. ON THE EXTERIOR OF BUILDINGS SHALL BE PAINTED TO MATCH THE SURROUNDING SURFACE AS CLOSELY AS POSSIBLE.  
11. THE CONTRACTOR IS RESPONSIBLE FOR PATCHING, PAINTING, REPAIRING OR REPLACEMENT OF ALL WALLS, CEILING OR OTHER BUILDING ELEMENTS WHICH ARE DISTURBED AS PART OF THE DEMOLITION AND/OR INSTALLATION OF ELECTRICAL WORK.  
12. PROVIDE ELECTRICAL CONNECTION TO ALL FIRE, SMOKE, AND FIRE / SMOKE DAMPERS, INCLUDING POWER AND FIRE ALARM, VERIFY EXACT SIZE AND FINAL LOCATION OF ALL DAMPERS WITH THE MECHANICAL CONTRACTOR. ALL ROOFTOP UNITS RATED AT MORE THAN 2000 CFM WILL BE PROVIDED WITH A DUCT DETECTOR. ALL ROOFTOP UNITS RATED AT 2000 CFM OR LESS AND MORE THAN 1500 CFM WILL BE PROVIDED WITH A DUCT DETECTOR IN BOTH THE SUPPLY AND RETURN DUCT AT ROOFTOP LEVEL AND IN THE RETURN DUCT AT EVERY LEVEL THAT IS SERVED. ELECTRICAL CONTRACTOR WILL PROVIDE A REMOTE TEST STATION AND ALL WIRING NECESSARY TO COMPLETE INSTALLATION.  
13. REFER TO THE MECHANICAL EQUIPMENT SCHEDULE FOR ADDITIONAL REQUIREMENTS ASSOCIATED WITH PLUMBING AND HVAC EQUIPMENT AND OWNER/GENERAL CONTRACTOR FURNISHED EQUIPMENT.



**LUMINAIRES:**  
1. COORDINATE THE LOCATION OF ALL LIGHTING EQUIPMENT INCLUDING BUT NOT LIMITED TO THE LUMINAIRES, SWINGS, SWINGS AND ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS AND ALL RELATED TRADES AS REQUIRED REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS FOR DIMENSIONAL LOCATION OF LIGHT FIXTURES.  
2. LIGHTING FIXTURES SHALL BE SUPPORTED FROM THE STRUCTURE ABOVE AND SHALL NOT BE SUPPORTED FROM THE T-BAR CEILING GRID.  
3. THE ELECTRICAL CONTRACTOR IS TO CONFIRM THE LIGHT FIXTURES ORDERED WILL BE COMPATIBLE WITH THE CEILING TYPES AS SHOWN ON THE ARCHITECTURAL REFLECTED CEILING PLANS. NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING THE FIXTURES.  
4. VERIFY LUMINAIRE MOUNTING REQUIREMENTS AND OVERALL HEIGHT OF ALL PENDANT MOUNTED FIXTURES PRIOR TO ORDERING.  
5. ALL LIGHT FIXTURES SHALL NOT BE COMPATIBLE WITH THE SWITCHES AND CONTROLS BEING PROVIDED.  
6. THE LIGHTING PACKAGE SHALL BE APPROVED BY BOTH THE ARCHITECT AND ENGINEER AS APPROVED IN THE CONTRACTOR'S BID. NO LIGHT FIXTURE SHALL BE ORDERED UNTIL THE LIGHT FIXTURE SUBMITTAL PACKAGE HAS BEEN APPROVED IN WRITING BY THE ARCHITECT, GENERAL CONTRACTOR AND ELECTRICAL ENGINEER.  
7. COORDINATE LUMINAIRE MOUNTING REQUIREMENTS PRIOR TO PLACING ORDER.

**EMERGENCY AND EXIT LIGHTS:**  
1. PROVIDE EMERGENCY AND EXIT SIGNS AS PER ALL GOVERNING CODES.  
2. EXIT SIGNS CONNECTED TO A REMOTE EMERGENCY HEAD REQUIRE EXTRA BATTERY CAPACITY TO OPERATE THE REMOTELY LOCATED EMERGENCY HEAD FOR EGRES AWAY FROM THE BUILDING.  
3. REFER TO THE PLANS FOR THE NUMBER OF FACES REQUIRED AT EACH EXIT. FIELD ADJUST THE LOCATION OF THE EXIT SIGNS AND NUMBER OF FACES FOR THE BEST VISIBILITY POSSIBLE.  
4. ALL LIGHTING FIXTURES DENOTED WITH "EM" SHALL BE PROVIDED WITH AN ENGINEER APPROVED EMERGENCY DRIVER OR INVERTER TO OPERATE THE FIXTURE IN AN EMERGENCY MODE TO MEET ALL CURRENT GOVERNING CODES AND WILL BE CIRCUITED TO THE UNSWITCHED SIDE OF THE LIGHTING CIRCUIT.  
5. ALL LIGHT FIXTURES DESIGNATED WITH "EM" OR SPECIFIED WITH AN EMERGENCY FUNCTION SHALL BE PROVIDED WITH ONE OF THE FOLLOWING.  
a. INTEGRAL TEST SWITCH  
b. REMOTE INFRARED HANDHELD DEVICE  
c. INTEGRAL ELECTRONIC DEVICE THAT AUTOMATICALLY PERFORMS CODE REQUIRED TESTS.  
6. ALL STAIRWELLS AND PATHS OF EGRES TO THE EXTERIOR DOORS AND THE EXTERIOR PATH OF EGRES AWAY FROM THE BUILDING SHALL RECEIVE EMERGENCY LIGHTING PER CODE.

**RESPONSIBLE DIVISION:**  
UNLESS OTHERWISE INDICATED ALL HEATING, VENTILATING, AIR CONDITIONING, PLUMBING, AND OTHER MECHANICAL EQUIPMENT, MOTORS, AND CONTROLS SHALL BE FURNISHED, SET IN PLACE AND WIRED AS FOLLOWS:

ITEM	FURNISHED	SET	POWER WIRED	CONTROL WIRED
EQUIPMENT	23	23	26	--
COMBINATION MAGNETIC MOTOR STARTERS, MAGNETIC MOTOR STARTERS, VFD'S AND CONTACTORS	23(1)	26	26(2)	23
FUSED AND UNFUSED DISCONNECT SWITCHES, THERMAL OVERLOAD SWITCHES AND HEATERS, MANUAL MOTOR STARTERS	26	26	26	--
MANUAL-OPERATING AND MULTI-SPEED SWITCHES	23	26	26	26
CONTROLS, RELAYS, TRANSFORMERS	23	23	26	23
THERMOSTATS (LOW VOLTAGE) AND TIME SWITCHES	23	23	26	23
THERMOSTATS (LINE VOLTAGE)	23	23	26	26
TEMPERATURE CONTROL PANELS	23	23	26	23
MOTOR AND SOLENOID VALVES, DAMPER MOTORS, PE & EP SWITCHES	23	23(2)	--	23(2)
PUSH-BUTTON STATIONS AND PILOT LIGHTS	23	23(2)	--	23(2)
HEATING, COOLING, VENTILATION AND AIR CONDITIONING CONTROLS	23	23	26	23
EXHAUST FAN SWITCHES	23	26	26	23(2)

**SUBSTITUTIONS:**  
A. SUBSTITUTIONS: SUBSTITUTION OF SPECIFIED EQUIPMENT WILL BE ALLOWED THROUGH A PRIOR APPROVAL PROCESS INITIATED BY THE CONTRACTOR. THE SUBSTITUTION SHALL BE APPROVED BY THE CONTRACTOR 10 DAYS PRIOR TO BID TO APPROVAL FROM ENGINEER. SUBMITTAL SHALL INCLUDE CAPACITIES, DIMENSIONS AND OPERATING INSTRUCTIONS FOR EACH PIECE OF EQUIPMENT. SUBSTITUTION SHALL OCCUR AT NO COST TO THE OWNER. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF APPROVED SUBSTITUTION AND SUBSTITUTIONS ALONG WITH THE CONTRACTOR ASSOCIATED WITH THE SUBSTITUTION INCLUDING STRUCTURAL MODIFICATIONS, SPACE LAYOUT AND REDESIGN COSTS. SEE ALSO DIVISION I GENERAL REQUIREMENTS.

**EXAMINATION OF SITE DRAWINGS, SPECIFICATIONS:**

A. EXAMINE CAREFULLY THE SITE AND CONDITIONS OF THE SITE. PROVIDE ALL NECESSARY EQUIPMENT AND LABOR TO INSTALL A COMPLETE WORKING SYSTEM WITHIN THE SITE CONDITIONS.

B. EXAMINE THE DRAWINGS AND SPECIFICATIONS AND 5 DAYS PRIOR TO BIDDING REPORT ANY ERRORS, OMISSIONS, INCONSISTENCIES, AND CONFLICTS TO THE ENGINEER TO BE REMEDIED IN AN ADDENDUM TO THE PROJECT PRIOR TO BID TIME.

C. DRAWINGS ARE DIAGRAMMATIC AND CATALOG NUMBERS GIVEN ARE FOR REFERENCE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE CAPACITY OF THE EQUIPMENT MEETS THE DRAWING REQUIREMENTS AND SHALL NOT DIMENSION FROM THE MECHANICAL, PLUMBING, OR PIPING DRAWINGS.

D. THE LATEST ADOPTED VERSIONS OF THE INTERNATIONAL BUILDING CODES SHALL BE USED AS REQUIRED. THIS WILL ALSO INCLUDE THE LATEST ADOPTED VERSIONS OF THE MECHANICAL, PLUMBING AND ENERGY CONSERVATION CODES. ALL METHODS AND MATERIALS REQUIRED BY THESE CODES SHALL BE REQUIRED BY THE SPECIFICATIONS UNLESS INDICATED OTHERWISE. OTHER APPLICABLE LOCAL CODES AND ORDINANCES SHALL BE AS REQUIRED AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO BE KNOWLEDGEABLE OF THESE REQUIREMENTS.

E. WHERE INSTALLATION PROCEDURES OR ANY PART THEREOF ARE REQUIRED TO BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE MATERIAL BEING INSTALLED, PRINTED COPIES OF THESE RECOMMENDATIONS SHALL BE FURNISHED TO THE ENGINEER PRIOR TO INSTALLATION. INSTALLATION OF THE ITEM WILL NOT BE ALLOWED TO PROCEED UNTIL THE RECOMMENDATIONS ARE RECEIVED. FAILURE TO FURNISH THESE RECOMMENDATIONS CAN BE A CAUSE FOR REJECTION OF THE MATERIAL.

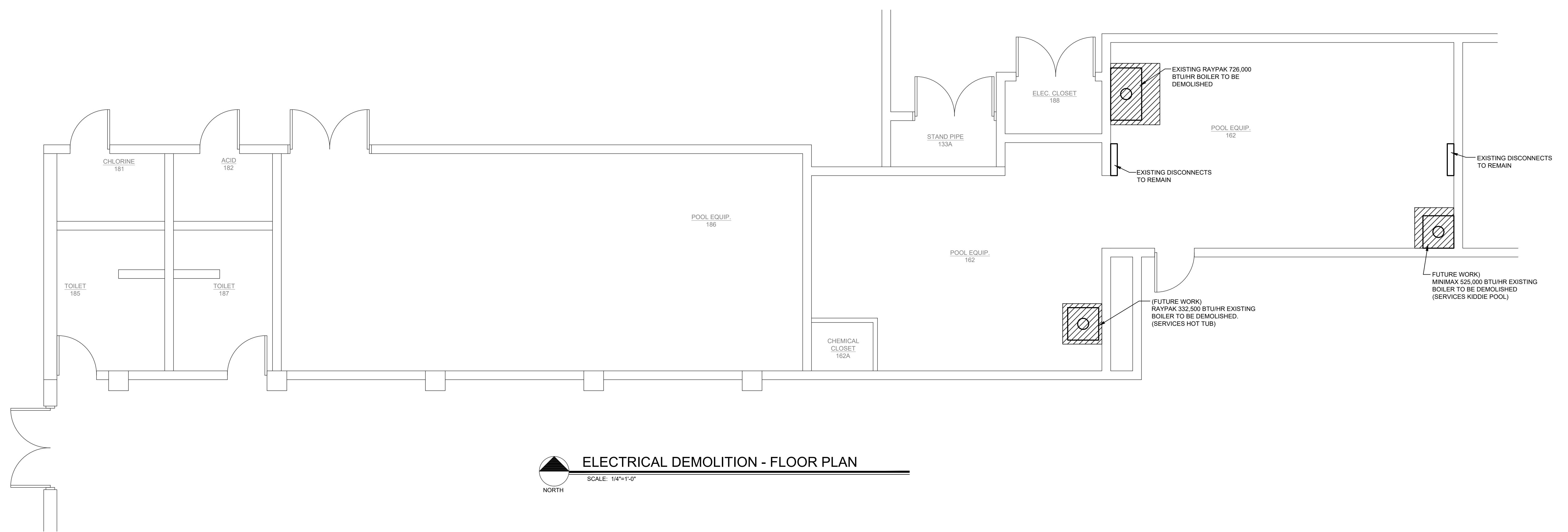
**ABBREVIATIONS:**

44"	MOUNTING HEIGHT ABOVE FINISHED FLOOR TO CENTER OF DEVICE	DIFF	DIFFERENTIAL	HR	HOUR	PT	PRESSURE TRANSMITTER
A	AMPS	DISCH	DISCHARGE	HT	HEIGHT		



**ELECTRICAL DEMOLITION - MEZZANINE FLOOR PLAN**  
SCALE: 1/4"=1'-0"

NORTH



**ELECTRICAL DEMOLITION - FLOOR PLAN**  
SCALE: 1/4"=1'-0"

NORTH

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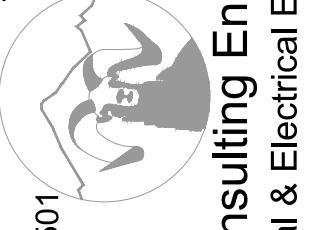
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Bighorn Consulting Engineers, Inc.  
Mechanical & Electrical Engineers



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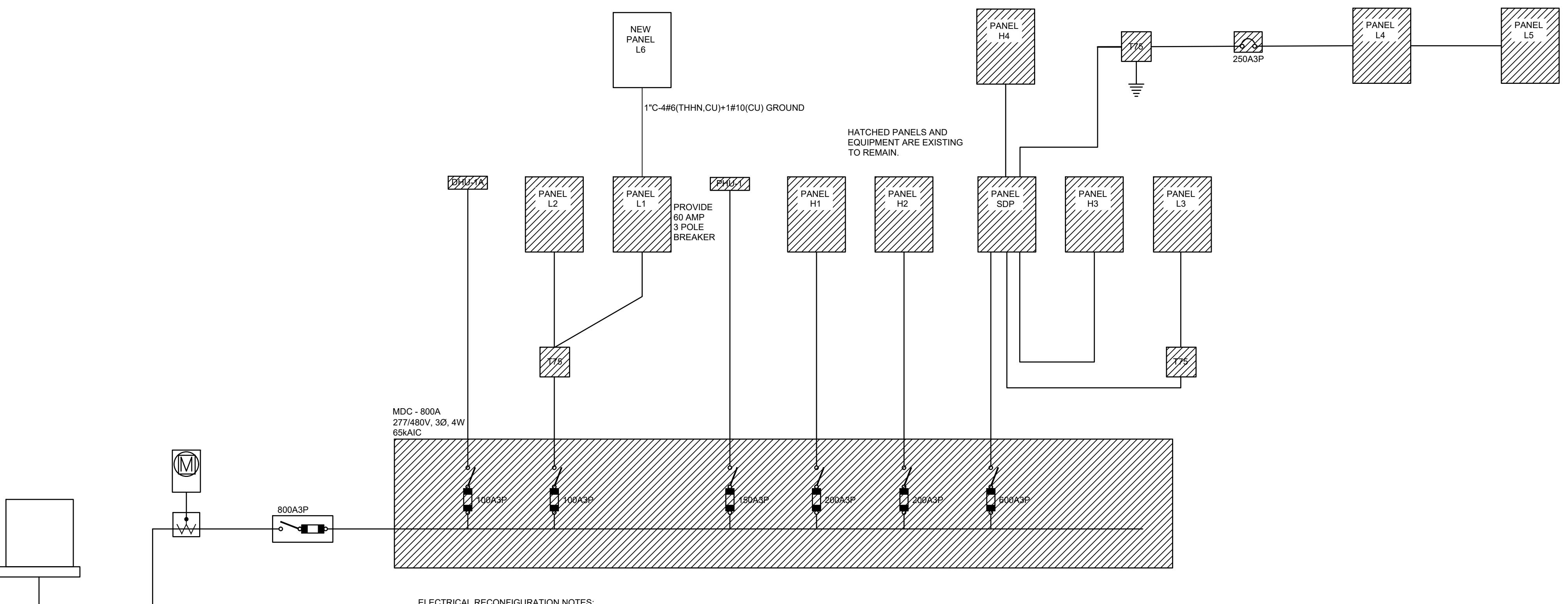
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ELECTRICAL RECONFIGURATION NOTES:  
 1. EXISTING POWER FOR BOILERS AND ASSOCIATED PUMPS WILL BE REMOVED FROM PANELS L1 & L2. ALL ABANDONED BREAKERS WILL BE RECYCLED AS SPARE. REMOVE UNUSED WIRING FROM THE PANEL.  
 2. THE ELECTRICAL CONTRACTOR WILL PROVIDE A 60 AMP 3 POLE BREAKER AND INSTALL NEW BREAKER IN PANEL "L1" AT SPACES 33, 35 & 37. THIS BREAKER WILL BE USED TO POWER THE NEW PANEL "L6". IF A LOAD IS ASSOCIATED WITH SPACE #37; IT WILL BE RELOCATED TO OPEN SPACE #22.  
 3. THE E.C. WILL PROVIDE A 60 AMP THREE PHASE PANEL BOARD (SEE PANEL SCHEDULE) AND INSTALL IN ELECTRICAL ROOM 206; PER NEC 2020 REQUIREMENTS.  
 4. PANEL "L6" WILL BE USED TO SUPPLY POWER TO THE NEW BOILERS AND ASSOCIATED PUMPS.

PUMP SCHEDULE											
EQUIPMENT NO.	SERVICE	TYPE	LOCATION	GPM	HEAD (FT.)	MOTOR			MANUFACTURER & MODEL	OPTIONS/ACCESSORIES	
						HORSEPOWER	RPM	V.PH./HZ.			
CP-1, 2	HEATING WATER	IN-LINE	MECHANICAL ROOM	65	35	2.175	3450	230/1/60	7.2	TACO-VR30-3	NOTE-1
CP-3	LAP POOL	IN-LINE	MECHANICAL ROOM	38	28	0.75	1760	115/1/60	14	TACO-1615	NOTE-2
CP-4	KIDDIE POOL	IN-LINE	MECHANICAL ROOM	30	32	0.75	1760	115/1/60	14	TACO-1615	NOTE-2
CP-5	HOT TUB	IN-LINE	MECHANICAL ROOM	18	36	0.75	1760	115/1/60	14	TACO-1615	NOTE-2

NOTES:  
 1. PROVIDE WITH CAST IRON CASING, SS IMPELLER AND SHAFT, FLANGED CONNECTIONS, MODBUS COMMUNICATION, AND ECM MOTOR WITH SELF SENSING TECHNOLOGY. MOTOR HORSEPOWER SHALL BE GREATER THAN NON-OVERLOADING BRAKE HORSEPOWER.  
 2. PROVIDE WITH STAINLESS STEEL CASING, SHAFT AND IMPELLER, AND FLANGED CONNECTIONS. 5.75" IMPELLER.

BOILER SCHEDULE										
EQUIPMENT NO.	SERVICE	INPUT CAPACITY (BTU/HR.)	OUTPUT CAPACITY (BTU/HR.)	BOILER VOLUME (GALLONS)	COMBUSTION AIR SIZE (INCHES)	FLUE SIZE (INCHES)	ELECTRICAL		MANUFACTURER & MODEL	OPTIONS/ACCESSORIES
							AMPS	V.JPH./HZ.		
BL-1	HEATING WATER	725,000	705,000	5	4"Ø	6"Ø	15	120/1/60	LOCHINVAR - FTX725	NOTE-1
BL-2	HEATING WATER	725,000	705,000	5	4"Ø	6"Ø	15	120/1/60	LOCHINVAR - FTX725	NOTE-1

NOTES:  
 1. PROVIDE WITH 50 PSI ASME RELIEF VALVE, CSD-1 CONTROLS, CONCENTRIC VENT KIT, VARIABLE SPEED CIRCULATION PUMP, LOW-WATER CUTOFF WITH MANUAL RESET & TEST, OUTDOOR TEMPERATURE RESET, FLOW SWITCH, ADJUSTABLE HIGH LIMIT WITH MANUAL RESET, MODULATING TEMPERATURE CONTROL, CONDENSATE NEUTRALIZING KIT, HIGH ALTITUDE KIT SIZED PER LOCATION ELEVATION, AND BLOWER MOTOR, CON-X-US REMOTE CONNECT, CASCADING SEQUENCER, BACNET COMMUNICATIONS.

PANEL SCHEDULE - L6		TYPE: MDC - 800A VOLTAGE: 277/480V, 30, 4W ENCLOSURE: NEMA1	PANELBOARD: 120/208 V SIZE: 16" x 24"	MAIN BREAKER: 200A MOUNTING: NONE PHASES: 3 WIRES: 4 SC RATING: 10000	NEUTRAL BUS: YES GROUND BUS: YES			
LOAD TYPE	LOAD DESCRIPTION	AMPS POLES	CKT# LOAD	D	CKT# LOAD	AMPS POLES	LOAD TYPE	LOAD DESCRIPTION
MOTOR	CP-1 CIRCULATION PUMP HEATING WATER	15A 2P	749	A	2 1656	200A 1P	MOTOR	CP-3 CIRC. PUMP LAP POOL
MOTOR	---	---	---	B	4 1656	200A 1P	MOTOR	CP-4 CIRC. PUMP KIDDIE POOL
MOTOR	CP-2 CIRCULATION PUMP HEATING WATER	15A 2P	749	C	6 1656	200A 1P	MOTOR	CP-5 CIRC. PUMP HOT TUB
MOTOR	---	---	749	A	8 1200	200A 1P	MECH HEATING	BL-1 BOILER HEATING WATER
MOTOR	BP-1 BOILER CIRCULATION PUMP	15A 1P	749	B	10 1200	200A 1P	MECH HEATING	BL-2 BOILER HEATING WATER
MOTOR	BP-2 BOILER CIRCULATION PUMP	15A 1P	749	C	12 0	200A 1P	SPARE	UNALLOCATED FUTURE
SPARE	UNALLOCATED FUTURE	20A 1P	13 0	A	14 0	200A 1P	SPARE	UNALLOCATED FUTURE
SPARE	UNALLOCATED FUTURE	20A 1P	15 0	B	16 0	200A 1P	SPARE	UNALLOCATED FUTURE
SPARE	UNALLOCATED FUTURE	20A 1P	17 0	C	18 0	200A 1P	SPARE	UNALLOCATED FUTURE
SPARE	UNALLOCATED FUTURE	20A 1P	19 0	A	20 0	---	SPACE	---
SPARE	UNALLOCATED FUTURE	20A 1P	21 0	B	22 0	---	SPACE	---
SPARE	UNALLOCATED FUTURE	20A 1P	23 0	C	24 0	---	SPACE	---

LOADS BY TYPE:		LOADS BY PHASE:			PHASE	CONNECTED LOAD (VA)	CONNECTED LOAD (AMPS)	BALANCE (PERCENT)
LOAD TYPE	CONNECTED LOAD (VA)	Demand Factor	Demand Load (VA)	PHASE	CONNECTED LOAD (VA)	CONNECTED LOAD (AMPS)	BALANCE (PERCENT)	
KITCHEN	0.00	1.25	0.00	A	4354.00	32.28	A-B: 100	
PROCESS	0.00	0.00	0.00	B	4354.00	32.28	B-C: 72.4	
RECEPTACLES	0.00	1.00	0.00	C	3154.00	23.28	C-A: 72.4	
MECH HEATING	2400.00	1.00	2400.00	TOTAL/AVERAGE	11862.00	32.95	81.6	
MECH COOLING	0.00	1.00	0.00					
NEUTRAL ROUND	0.00	1.00	0.00					
APPLIANCE	0.00	1.00	0.00					
MISCELLANEOUS	0.00	1.00	0.00					
MOTOR	9462.00	1.00	14193.00					
SPARE	0.00	1.00	0.00					
LARGEST MOTOR <sup>1</sup>	ABOVE	0.25	414.00					
TOTAL	11862.00		12276.00					

NOTES:  
 1. THE LARGEST CONNECTED MOTOR LOAD IS INCLUDED IN MECHANICAL, PROCESS, OR MOTOR LOADS.

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