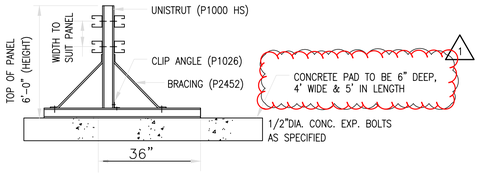


3 EXTERIOR EQUIPMENT MOUNTING DETAIL
NTS

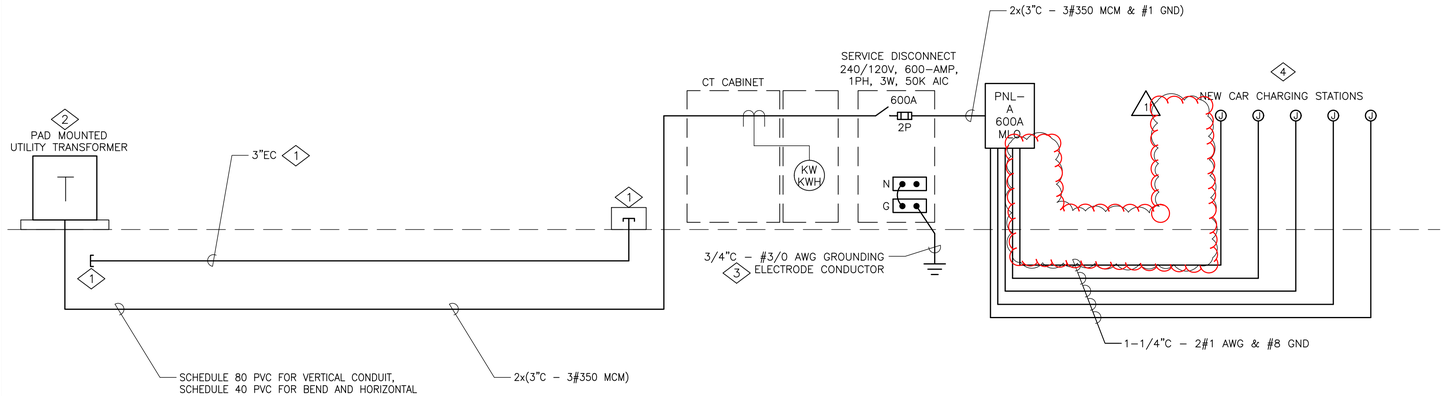
	ABBREVIATIONS	NOTES
A, AMP	AMPERE	
AIC	AMPERE INTERRUPTING CAPACITY	
AF	FRAME RATING IN AMPERES	
AS	SWITCH RATING IN AMPERES	
AT	TRIP RATING IN AMPERES	
AWG	AMERICAN WIRE GAUGE	
C	CONDUIT	
CKT	CIRCUIT	
(E)	EXISTING TO REMAIN	
EC	EMPTY CONDUIT	
ELEC	ELECTRICAL	
EMT	ELECTRO METALLIC TUBING	
FA	FIRE ALARM	
G, GND	GROUND	
HP	HORSEPOWER	
MECH	MECHANICAL	
MCB	MAIN CIRCUIT BREAKER	
(N)	NEW EQUIPMENT OR DEVICE	
NEC	NATIONAL ELECTRIC CODE	
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION	
NO	NORMALLY OPEN	
NTS	NOT TO SCALE	
ø, PH	PHASE	
PNL	PANEL	
PVC	POLYVINYL CHLORIDE CONDUIT	
PWR	POWER	
RSC	RIGID STEEL CONDUIT	
TEL	TELEPHONE	
TYP	TYPICAL	
UON	UNLESS OTHERWISE NOTED	
V	VOLT	
VA	VOLT AMPERES	
W	WATT	
(X)	EXISTING TO BE DEMOLISHED	

SYMBOLS	WIRING DEVICE SYMBOLS
	20A, 125V, DUPLEX RECEPTACLE OUTLET +18" UNLESS NOTED OTHERWISE
	SURFACE 20A, 125V, DUPLEX RECEPTACLE OUTLET +18" UNLESS NOTED OTHERWISE
	20A, 125V, DOUBLE DUPLEX RECEPTACLE OUTLET +18" UNLESS NOTED OTHERWISE
	SURFACE 20A, 125V, DOUBLE DUPLEX RECEPTACLE OUTLET +18" UNO
	SPECIAL PURPOSE RECEPTACLE OUTLET, +18" UNLESS NOTED OTHERWISE, NEMA CONFIGURATION AS NOTED ON PLANS
	SURFACE SPECIAL PURPOSE RECEPTACLE OUTLET, +18" UNLESS NOTED OTHERWISE, NEMA CONFIGURATION AS NOTED ON PLANS
	20A, 125V, DEDICATED DUPLEX RECEPTACLE OUTLET +18" UON
GFI	DUPLEX OUTLET WITH GROUND FAULT INTERRUPTER
	CEILING MOUNTED 20A, 125V, DUPLEX RECEPTACLE OUTLET
	CEILING MOUNTED 20A, 125V, DOUBLE DUPLEX RECEPTACLE OUTLET
	FLOOR MOUNTED DUPLEX CONVENIENCE/TELECOM OUTLET WITH BLANK STAINLESS STEEL COVER. COORDINATE TYPE AND FINISH WITH ARCHITECT.
$	SPST WALL SWITCH, LETTERS INDICATE THE NUMBER OF SWITCHES AND OUTLETS THEY CONTROL
$D	DIMMER SWITCH
$OS	OCCUPANCY LIGHT CONTROL SWITCH; WALL MOUNTED

GENERAL NOTES

1. ALL WORK SHOWN IS NEW, UNLESS NOTED OTHERWISE.
2. ALL WORK TO BE IN ACCORDANCE WITH NATIONAL ELECTRIC CODE, 2020 EDITION.
3. SEAL ALL CONDUIT PENETRATIONS OF FLOORS AND FIRE RATED ASSEMBLIES TO MAINTAIN FIRE RATING.
4. PROVIDE NEW TYPEWRITTEN DIRECTORIES REFLECTING WORK PERFORMED FOR ALL NEW PANELBOARDS IN THIS PROJECT.
5. PLANS ARE PREPARED WITH REQUIRED BRANCH CIRCUITS INDICATED BY CIRCUIT NUMBERS. PROVIDE AND INSTALL ALL CONDUITS, CONDUCTORS, BOXES, MISCELLANEOUS FITTINGS, ETC. FOR A COMPLETE AND OPERABLE SYSTEM (HOMERUN SHOWN). BRANCH CIRCUIT INSTALLATION SHALL COMPLY WITH SPECIFICATIONS AND N.E.C.
6. ALL NEUTRAL CONDUCTORS ON POWER BRANCH CIRCUITING ROUNDHOUSES TO BE #10 AWG UNLESS NOTED OTHERWISE.

SHEET LIST



RISER NOTES

1. PROVIDE EMPTY CONDUIT AS NOTED STUBBED INTO TRANSFORMER VAULT AND RUN UNDER THE STREET TO A CHRISTY BOX LOCATED ON NORTH SIDE OF STREET FOR POTENTIAL FUTURE TRANSFORMER.
2. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR CONNECTION TO YVEA PAD MOUNTED TRANSFORMER. COORDINATE CONNECTION SCHEDULE WITH UTILITY COMPANY DURING CONSTRUCTION.
3. BOND NEUTRAL TO GROUND BUS AND THEN TO (2) GROUND RODS, AT LEAST 6' APART, AND INCOMING COLD WATER PIPE. PROVIDE GROUND RODS AT 3/4" X 8' (COPPER CLAD STEEL).
4. VERIFY CONNECTION REQUIREMENTS WITH MANUFACTURER.

DIAGRAM NOTES

1. ALL WORK SHOWN IS NEW UNLESS OTHERWISE NOTED.
2. ALL WIRING SHOWN IS SIZED FOR COPPER CONDUCTORS, UON
3. SEE DETAIL #3 FOR EQUIPMENT MOUNTING DETAIL.

2 SINGLE LINE DIAGRAM
NTS

PANEL A

MOUNTING SURFACE — 50,000 A.I.C. SYM
240/120 VOLTS 1 PHASE 3 WIRE — MAIN MLO — BUS 600 A

VOLT AMPS ØA	VOLT AMPS ØB	VOLT AMPS ØC	DESCRIPTION	RELOC	LTG	POLE	BKR	CIR		CIR	BKR	POLE	LTG	RELOC	DESCRIPTION	VOLT AMPS ØA	VOLT AMPS ØB	VOLT AMPS ØC
			SPACE					1	A	2	100	2			EV CAR CHRGR	9600		
			SPACE					3	B	4	-	-			-		9600	
9600			EV CAR CHRGR			2	100	5	A	6	100	2			EV CAR CHRGR	9600		
	9600		-			-	-	7	B	8	-	-			-		9600	
9600			EV CAR CHRGR			2	100	9	A	10	100	2			EV CAR CHRGR	9600		
	9600		-			-	-	11	B	12	-	-			-		9600	
			SPACE					13	A	14					SPACE			
			SPACE					15	B	16					SPACE			
			SPACE					17	A	18					SPACE			
			SPACE					19	B	20					SPACE			
			SPACE					21	A	22					SPACE			
			SPACE					23	B	24					SPACE			
			SPACE					25	A	26					SPACE			
			SPACE					27	B	28					SPACE			
			SPACE					29	A	30					SPACE			
			SPACE					31	B	32					SPACE			
			SPACE					33	A	34					SPACE			
			SPACE					35	B	36					SPACE			
			SPACE					37	A	38					SPACE			
			SPACE					39	B	40					SPACE			
			SPACE					41	A	42					SPACE			
19200	19200		VA/LINE													28800	28800	

Ø A= 48000 Ø B= 48000 Ø C=

CONTINUOUS LOADS	NON-CONTINUOUS LOADS	
x1.25=	UP TO 10 kVA ____ x1.00= ____ RECEPTACLES ____ REMAINDER ____ x0.50= ____	OTHER 96000 x1.00 96000

TOTAL DESIGN kVA= 96 TOTAL DESIGN AMPS= 400

1 PANEL SCHEDULES
NTS

SKI TIME SQUARE DRIVE PUBLIC TURNAROUND

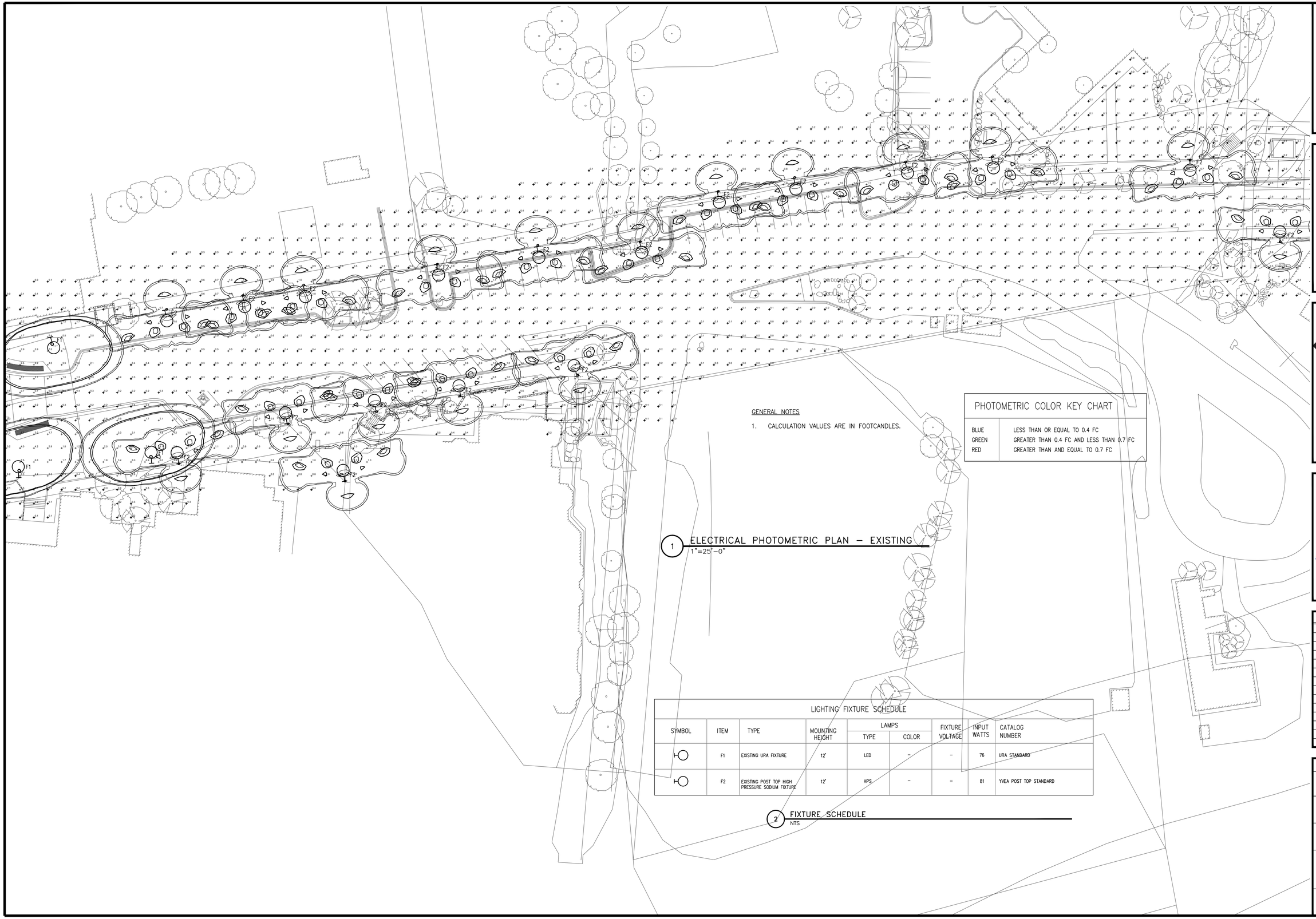
BASELINE ENGINEERING
1169 Hilltop Parkway, Suite 204
PO Box 770152
Steamboat Springs, CO 80477

WILDER ENGINEERING LLC
Andrew Wilder PE
1170 Blue Sage Drive
Steamboat Springs, CO 80487
P: 970-819-7848
E: andy@wilder-eng.com

COLORADO LICENSED ANDREW CHARLES WILDER 49009 PROFESSIONAL ENGINEER

Issue	By Date & Issue Description	By
–	PROGRESS SET – 1.6.23	AW
–	100% DESIGN – 1.16.23	AW
–	BID DOCUMENTS – 2.8.23	AW
1	REVISION #1 – 2.9.24	AW

Scale: NTS
24x36
Description: SYMBOLS, ONE LINE
Project Name: SKI TIME SQ TURNAROUND
Project Number: 2022009
Sheet No.
E-0.1



GENERAL NOTES

1. CALCULATION VALUES ARE IN FOOTCANDLES.

PHOTOMETRIC COLOR KEY CHART	
BLUE	LESS THAN OR EQUAL TO 0.4 FC
GREEN	GREATER THAN 0.4 FC AND LESS THAN 0.7 FC
RED	GREATER THAN AND EQUAL TO 0.7 FC

1 ELECTRICAL PHOTOMETRIC PLAN – EXISTING
1"=25'-0"

LIGHTING FIXTURE SCHEDULE

SYMBOL	ITEM	TYPE	MOUNTING HEIGHT	LAMPS		FIXTURE VOLTAGE	INPUT WATTS	CATALOG NUMBER
				TYPE	COLOR			
⊢○	F1	EXISTING URA FIXTURE	12'	LED	–	–	76	URA STANDARD
⊢○	F2	EXISTING POST TOP HIGH PRESSURE SODIUM FIXTURE	12'	HPS	–	–	81	YVEA POST TOP STANDARD

2 FIXTURE SCHEDULE
NTS

SKI TIME SQUARE DRIVE PUBLIC TURNAROUND

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PO Box 770152
Steamboat Springs, CO 80477

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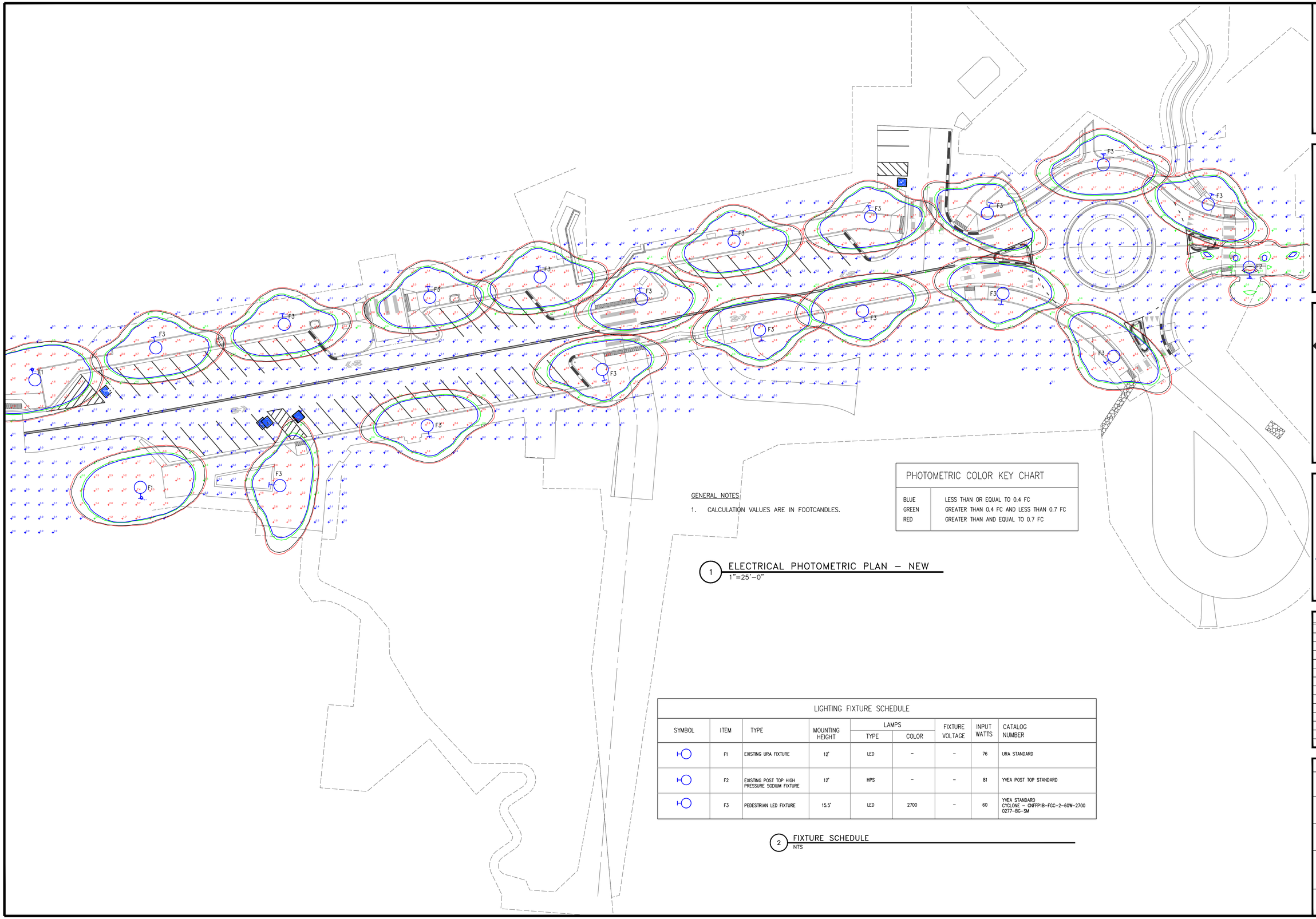
Andrew Wilder PE
1170 Blue Sage Drive
Steamboat Springs, CO 80487
P: 970-819-7848
E: andy@wilder-eng.com

COLORADO LICENSED
ANDREW CHARLES WILDER
49009
PROFESSIONAL ENGINEER

Issue	By Date & Issue Description	By
–	CHECK SET – 5.25.22	AW
–	CHECK SET – 5.26.22	AW
–	CHECK SET – 10.6.22	AW
–	DD SET – 10.19.22	AW
–	PROGRESS SET – 1.6.23	AW
–	100% DESIGN – 1.16.23	AW
–	BID DOCUMENTS – 2.8.23	AW
–	REVISION #1 – 2.9.24	AW

Scale: 1"=25'-0"
24x36
Description: EXISTING PHOTOMETRIC
Project Name: SKI TIME SQ TURNAROUND
Project Number: 2022009
Sheet No.
E-1.0



GENERAL NOTES

1. CALCULATION VALUES ARE IN FOOTCANDLES.

PHOTOMETRIC COLOR KEY CHART	
BLUE	LESS THAN OR EQUAL TO 0.4 FC
GREEN	GREATER THAN 0.4 FC AND LESS THAN 0.7 FC
RED	GREATER THAN AND EQUAL TO 0.7 FC

1 ELECTRICAL PHOTOMETRIC PLAN – NEW
1"=25'–0"

LIGHTING FIXTURE SCHEDULE

SYMBOL	ITEM	TYPE	MOUNTING HEIGHT	LAMPS		FIXTURE VOLTAGE	INPUT WATTS	CATALOG NUMBER
				TYPE	COLOR			
⊢○	F1	EXISTING URA FIXTURE	12'	LED	–	–	76	URA STANDARD
⊢○	F2	EXISTING POST TOP HIGH PRESSURE SODIUM FIXTURE	12'	HPS	–	–	81	YVEA POST TOP STANDARD
⊢○	F3	PEDESTRIAN LED FIXTURE	15.5'	LED	2700	–	60	YVEA STANDARD CYCLONE – CNFFP1B–FGC–2–60W–2700 0277–BG–SM

2 FIXTURE SCHEDULE
NTS

SKI TIME SQUARE DRIVE PUBLIC TURNAROUND

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Andrew Wilder PE
1170 Blue Sage Drive
Steamboat Springs, CO 80487
P: 970-819-7848
E: andy@wilder-eng.com

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49009
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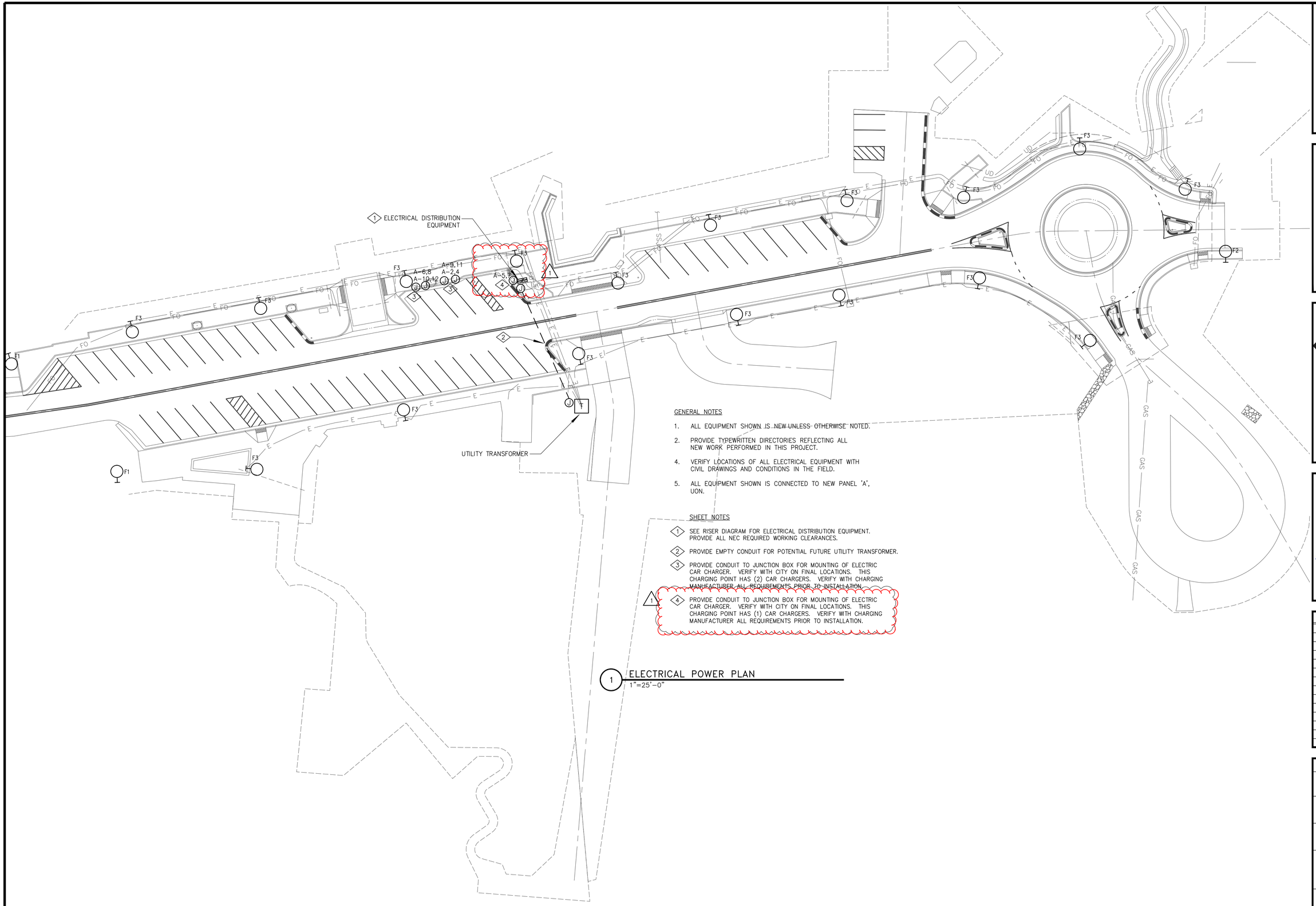
Issue	By Date & Issue Description	By
–	CHECK SET – 5.25.22	AW
–	CHECK SET – 5.26.22	AW
–	CHECK SET – 10.6.22	AW
–	DD SET – 10.19.22	AW
–	PROGRESS SET – 1.6.23	AW
–	BID DOCUMENTS – 2.8.23	AW

Scale: 1"=25'-0"
24x36
Description: PROPOSED PHOTOMETRIC
Project Name: SKI TIME SQ TURNAROUND
Project Number: 2022009
Sheet No.
E-1.1



GENERAL NOTES

1. ALL EQUIPMENT SHOWN IS NEW UNLESS OTHERWISE NOTED.
2. PROVIDE TYPEWRITTEN DIRECTORIES REFLECTING ALL NEW WORK PERFORMED IN THIS PROJECT.
4. VERIFY LOCATIONS OF ALL ELECTRICAL EQUIPMENT WITH CIVIL DRAWINGS AND CONDITIONS IN THE FIELD.
5. ALL EQUIPMENT SHOWN IS CONNECTED TO NEW PANEL 'A', UON.

SHEET NOTES

1. SEE RISER DIAGRAM FOR ELECTRICAL DISTRIBUTION EQUIPMENT. PROVIDE ALL NEC REQUIRED WORKING CLEARANCES.
2. PROVIDE EMPTY CONDUIT FOR POTENTIAL FUTURE UTILITY TRANSFORMER.
3. PROVIDE CONDUIT TO JUNCTION BOX FOR MOUNTING OF ELECTRIC CAR CHARGER. VERIFY WITH CITY ON FINAL LOCATIONS. THIS CHARGING POINT HAS (2) CAR CHARGERS. VERIFY WITH CHARGING MANUFACTURER ALL REQUIREMENTS PRIOR TO INSTALLATION.
4. PROVIDE CONDUIT TO JUNCTION BOX FOR MOUNTING OF ELECTRIC CAR CHARGER. VERIFY WITH CITY ON FINAL LOCATIONS. THIS CHARGING POINT HAS (1) CAR CHARGERS. VERIFY WITH CHARGING MANUFACTURER ALL REQUIREMENTS PRIOR TO INSTALLATION.

1 ELECTRICAL POWER PLAN
1"=25'-0"

SKI TIME SQUARE DRIVE PUBLIC TURNAROUND

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–	BID DOCUMENTS – 2.8.23	AW
1	REVISION #1 – 2.9.24	AW

Scale: 1" = 25'-0"
24x36
Description: POWER PLAN
Project Name: SKI TIME SQ TURNAROUND
Project Number: 2022009
Sheet No.
E-2.0

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS

1) PART 1 GENERAL

a) POWER AND CONTROL WIRING

i) Provide power system conduit and wiring to mechanical equipment. Controls system conduit and wiring for mechanical systems is included under Division 15. "Power" wiring includes line voltage wiring from distribution apparatus to disconnecting means provided or installed under this section, and from such disconnecting means to motors, and to terminal boxes of 'package' equipment. "Controls" wiring includes wiring, regardless of voltage, which provides start-stop control for mechanical equipment and/or which is used to monitor functions of mechanical systems. Where line voltage wiring is extended from a local disconnecting means to relays, thermostats, by-pass timers, starter coils or the like, or from mechanical control panels or motor control centers to control devices, such extensions are considered "control" wiring.

b) MOUNTING HEIGHTS

i) Mounting heights and locations: verify the exact location of equipment with architect prior to installation. Wall mounted devices requiring operational access shall be mounted a minimum of 15 inches above finished floor to bottom of device and a maximum of 48 inches above finished floor to top of device. Visual alarms shall be mounted not less than 80 inches to the bottom or 96 inches to the top of the device.

c) REGULATORY REQUIREMENTS

i) Conform to:

(1) NFPA-70 - National Electric Code.

ii) Comply with the current applicable codes, ordinances, and regulations of the authority or authorities having jurisdiction, the Owner's insurance underwriter, and applicable base building standards.

iii) When conflict exists between two or more governing codes, comply with the stricter requirement.

iv) Obtain permits, and request inspections from authority having jurisdiction.

d) PROJECT/SITE CONDITIONS

i) Install Work in locations shown on Drawings, unless prevented by Project conditions. Coordinate installation of work in available space with work furnished under other Divisions.

2) PRODUCTS

a) Where manufacturer's model or series numbers are specified or shown, these indicate generally acceptable types required. Furnish products which comply with all requirements, as specified or shown.

b) When more than one unit of the same class of equipment is required, provide units produced by a single manufacturer.

3) TESTS

a) Furnish test equipment, facilities, and technical personnel required to perform field tests.

b) At completion of job, check voltage at several points of utilization on the system. Energize all loads installed.

4) CLEANING

a) Clean all fixtures and equipment at the completion of the project. Wipe clean exposed lighting fixture reflectors and trim pieces with a non-abrasive cloth just prior to occupancy.

5) RECORD DRAWINGS

a) Upon completion of the Work, deliver to Architect and up-to-date set of "as-built" record drawings on a reproducible medium including AutoCAD.

6) DEMOLITION

a) Remove, relocate, and reroute existing electrical equipment to facilitate new construction or remodeling work.

b) Examine the site to observe and note existing conditions prior to submitting a bid.

c) Schedule demolition in advance. Schedule work to avoid disruption of normal operations.

d) Reconnect circuits serving equipment required to remain in service to other panelboards, motor control centers, or other appropriate distribution equipment. Provide additional panelboards, motor control centers, or other appropriate distribution equipment where there is insufficient available capacity in remaining existing equipment for reconnection.

e) Remove existing conduit and wire back to panelboard, motor control center, or other distribution source.

f) Where a circuit is interrupted by removal of a device or fixture from that circuit, provide additional conduit and wire to restore service to the remaining devices and fixtures on that circuit.

g) Electrical equipment to be removed that is in good working order shall be carefully removed and offered to the Owner. Items rejected by the Owner shall be removed from the project site and properly disposed of.

SECTION 16100 - BASIC MATERIALS AND METHODS

1) PART 1 GENERAL

a) REFERENCES

i) All equipment and installations shall meet or exceed minimum requirements of ADA, ANSI, ASTM, IEEE, IES, NEC, NEMA, NETA, NFPA, OSHA, SMACNA, UL, and the State Fire Marshal. Equipment shall be certified for use in the State of the project and shall meet the State energy code. Provide products and materials that are new, clean, free of defects, and free of damage and corrosion.

b) PERFORMANCE REQUIREMENTS

i) Provide support system for equipment and conduit, including wiring, with a minimum safety factor of 4. For empty conduits, include weight of 4 type XHHW wires of maximum permissible size.

c) QUALITY ASSURANCE

i) All equipment and installations shall meet or exceed minimum requirements of ADA, ANSI, ASTM, IEEE, IES, NEC, NEMA, NETA, NFPA, OSHA, SMACNA, UL, and the State Fire Marshal. Equipment shall be certified for use in the State of the project and shall meet the State energy code. Provide products and materials that are new, clean, free of defects, and free of damage and corrosion.

2) PART 2 PRODUCTS

a) CONDUIT

i) General

(1) Exposed Dry and Damp Locations:

(a) Use electrical metallic tubing.

(2) Concealed Locations:

(a) Furred, Ceiling Spaces and Stud Walls: Use electrical metallic tubing.

(b) Connections to Lighting Fixtures in Accessible Ceilings: Use flexible conduit.

(3) Equipment Connections:

(a) Connections to Liquid-Handling Equipment in Dry Locations: Use liquid-tight flexible conduit.

(4) Equipment for Dry Systems in Dry Locations: Use flexible conduit.

ii) Electrical Metallic Tubing:

(1) Continuous, seamless steel tubing, galvanized or sherardized on exterior, coated on interior with smooth hard finish of lacquer, varnish or enamel, with steel, set screw or compression type fittings. Provide concrete type fittings where required.

(2) Use for general purpose feeders and branch circuits.

iii) Flexible Steel Conduit:

(1) Single strip, continuous, flexible interlocked double-wrapped steel, hot dip galvanized inside and out forming smooth internal wiring channel, with steel, compression type fittings.

(2) Use in dry locations only, connections to lighting fixtures in suspended ceilings, connections to equipment installed above suspended ceilings, transformer connections, busway plug in units, and connections to equipment where vibration isolation is required, maximum length of 6 feet.

iv) Liquid Tight Flexible Steel Conduit:

(1) Same as flexible steel conduit except with tough, inert, watertight plastic outer jacket. Fittings shall be cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings threaded to interior of conduit. Spiral molded vinyl sealing ring between gland nut and bushing and nylon insulated throat.

(2) Use same as flexible steel conduit in damp or wet locations and at motor connections.

b) BUILDING WIRE AND CABLE

i) Provide wire with a minimum insulating rating of 600 volts, except for wire used in low voltage (below 50 volts) control or signal systems. The use of teflon (multi-conductor) for low tension systems may be permitted for fire alarm, signal and communication systems (voice and data) as approved on shop drawings by engineers and where permitted by local codes and union practice.

ii) Conductors

(1) Electrical grade, annealed copper, and fabricated in accordance with ASTM standards. Minimum size number 12 AWG for branch circuits; number 14 AWG for control wiring.

(2) Unless otherwise specified, all wires numbers 10 and smaller shall be solid.

(3) All wires number 8 and larger shall be stranded in accordance with ASTM Class B stranding designations.

(4) Control wires shall be stranded in accordance with ASTM Class B stranding designations.

(5) Cables for low tension systems shall be multi-conductor, 16 gauge, color coded and insulated in armored cable assembly, with number of conductors as required.

(6) All 600 volt wire and cables unless otherwise specified shall be single conductor suitable for use in wet and dry and locations.

iii) Connectors

(1) Make connections, splices, taps and joints with solderless devices, mechanically and electrically secure. Protect exposed wires and connecting devices with electrical tape or insulation to provide insulation values not less than on conductor.

iv) Cables (No. 8 and Larger):

(1) Use set screw or compression type connectors, taps and splices specifically designed for the particular connection. Insulate splice either by taping or by use of "Bakelite" covers designed to fit around splice.

v) Branch Circuit Wires (Number 10 and Smaller): Use any of the following types of terminals and connecting devices:

(1) Hand Applied: Coiled, tapered, spring wound devices with a conducting corrosion-resistant coating over the spring steel and a plastic cover and skirt providing full insulation for splice and wired ends. Screw connector on by hand.

(2) Tool Applied: Steel cap, with conduction and corrosion resistant metallic plating, open at both ends, fitted around the twisted ends of the wire and compressed or crimped by means of a special die designed for the purpose. Specifically fitted plastic or rubber insulating cover wrap over each connector.

c) BOXES

i) Pressed steel, galvanized or cadmium-plated, 4 inches minimum octagonal or square with galvanized cover or extension ring as required.

ii) Back-to-back outlets in the same wall, or "through-wall" type boxes are not permitted. Provide 12 inch minimum spacing for outlets shown on opposite sides of a common wall. Provide acoustical potting compound on all outlet boxes.

d) WIRING DEVICES

i) Switches and Receptacles: Arrow Hart, Hubbell, Leviton, Pass & Seymour, or Slater.

ii) Wall Dimmers: Lutron.

iii) Occupancy Sensors: Mytech, Novitas, or Watt Stopper.

iv) Floor Boxes and Fittings:

(1) Poke through type: Wiremold Legrand.

(2) Recessed flush floor box type: Steel City or Wiremold Legrand.

v) Plugstrip: Wiremold.

vi) Device and cover plate colors shall be as selected by Architect.

e) SUPPORTS

i) Support raceways on accepted types of wall brackets, specialty steel clips, or hangers, ceiling trapeze hangers, or malleable iron straps. Plumber's perforated straps are not permitted. Acceptable manufacturers' brackets or hangers are Kindorf, Elcan, Binkley, Multi-Frame, Power-Strut, or Unistrut. Do not suspend raceways or equipment from other raceways, steam, water, or other piping or ductwork, except as otherwise permitted. Provide independent and secure support methods.

f) PANELBOARDS

i) Acceptable Manufacturers: Cutler-Hammer/Westinghouse, General Electric, Siemens, or Square D/Groupe Schneider.

ii) AIC Rating: Branch panelboards and overcurrent protection devices shall have a minimum short circuit rating of 10,000 RMS symmetrical amperes minimum interrupting capacity (120/208V) or 14,000 RMS symmetrical amperes minimum interrupting capacity (277/480V).

iii) AIC Rating: Distribution panelboards and overcurrent protection devices shall have a minimum short circuit rating of 42,000 RMS symmetrical amperes minimum interrupting capacity (120/208V) or 200,000 RMS symmetrical amperes minimum interrupting capacity (277/480V).

iv) Enclosures: Corrosion resistant galvanized (zinc finished) sheet steel. Fronts shall be cold rolled steel, finish coated with ANSI 61 grey enamel over a rust inhibitor. Panel locks shall be keyed alike.

v) Doors: One piece bolt on front with a lockable hinged door over the overcurrent protection devices.

vi) Bus Bars: Silver plated aluminum or copper. Neutral bus shall be full size. Neutral bus shall be 200% rated when supplied from a double neutral feeder. Provide an equipment ground bus in each panelboard. In addition to the equipment ground bus, provide an isolated ground bus when supplied from a feeder which includes an isolated grounding conductor.

f) LIGHTING FIXTURES

i) Acceptable Manufacturers: See fixture schedule on sheet E1.1 for fixture types.

j) All exterior fixtures shall conform to section 405 of the Steamboat Springs Municipal Code Community Development Code.

vii) Overcurrent Protection Devices: Molded case circuit breakers for branch panelboards and 120/208V rated distribution panels, and fusible switch units for 277/480V rated distribution panels.

g) MOTOR STARTERS

i) Acceptable Manufacturers: Eaton/Cutler-Hammer, General Electric, Siemens, or Square D/Groupe Schneider.

ii) Manual Motor Starters

iii) Fractional Horsepower Manual Starter: General-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, and toggle operator.

iv) Voltage, Rating and Thermal Element: As required by motor controller.

v) Enclosure: NEMA ICS 6; Type 1.

h) PULL LINE

i) 1/8 inch diameter braided yellow polypropylene.

3) PART 3 EXECUTION

a) INSTALLATION

i) Conduit

(1) Install conduit in accordance with NECA "Standard of Installation".

(2) Do not combine individual homeruns into common conduit.

(3) Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

(4) Arrange conduit to maintain headroom and present neat appearance.

(5) Use conduit hubs to fasten conduit to cast boxes.

(6) Provide insulated equipment ground conductor in flexible conduit.

(7) Install conduit to preserve fire resistance rating of partitions and other elements.

(8) Do not attach conduit to ceiling support wires.

ii) Building Wire and Cable

(1) Use conductor not smaller than 12 AWG for power and lighting circuits.

(2) Neatly train and lace wiring inside boxes, equipment, and panelboards.

(3) Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

(4) Use hardened and tempered steel, tin-plated or stainless steel Belleville washer with slightly larger tin-plated mild steel flat washer for aluminum lugs.

(5) Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 8 AWG and smaller.

iii) Boxes

(1) Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

(2) Install electrical boxes to maintain headroom and to present neat mechanical appearance.

(3) Install boxes to preserve fire resistance rating of partitions and other elements; arrange boxes to meet regulatory requirements.

(4) Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices to each other.

(5) Do not use through-walls boxes or install flush mounting boxes back-to-back in walls; provide minimum 6 inch separation. Provide minimum24 inches separation in acoustic rated walls.

(6) Use stamped steel bridges in bar hanger assemblies to fasten flush mounting outlet box between studs.

(7) Use adjustable steel channel fasteners for hung ceiling outlet box.

(8) Do not fasten boxes to ceiling support wires.

(9) Support steel metal boxes independently of conduit.

(10) Use gang box where more than one device is mounted together, including floor boxes. Do not use sectional box.

(11) Plaster Rings: Use for all concealed work; depth of rings as required to reach finished surfaces.

(12) Coordinate trimming of openings for outlet boxes in partitions to achieve neat, closely-fitting openings.

(13) Install knockout closure in unused box opening.

iv) Wiring Devices

(1) Install devices plumb, level, and rigidly in place.

(2) Install switches 2 inches to 8 inches from trim on the strike side.

(3) Install decorative plates on switch, receptacle, and blank outlets in finished areas. Use multi-gang plates for multiple devices.

(4) Connect wiring devices by wrapping conductor around screw terminal.

v) Supporting Devices

(1) Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps, steel ramset fasteners.

(2) Use toggle bolts or hollow wall fasteners in plaster or gypsum board partitions and walls; sheet metal screws or spring steel bar retainer clips in sheet metal studs.

(3) Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

(4) Do not use powder-actuated anchors without specific permission.

(5) Do not drill structural steel members without specific permission.

(6) Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under nuts.

vi) Electrical Identification

(1) Provide wire markers on each conductor in panelboard gutters, pull boxes, and at load connection. Identify with branch circuit for power and lighting circuits, and with control wire number as indicated on equipment manufacturer's shop drawings for control wiring. If more than one neutral conductor is present, mark each with related circuit numbers.

(2) Color code all secondary branch circuit and feeder conductors as follows:

(a) Four Wire, Three Phase, Grounded Wye System: For 120/208 volt systems, use one black, one red, one blue, one white (neutral). For 277/480 volt systems, use one brown, one orange, one yellow and one gray (neutral).

(3) Use wire with insulation of required color. For sizes of wire, which may not be available in specified colors use self-adhesive wrap around, markers of solid colors to color code conductors.

(4) Color code conductors at accessible locations.

(5) Pull Rope Marking: Affix label identifying termination point at each end of pull rope.

vii) Disconnect Switches

(1) Install disconnect switches shown mounted on walls at +4'-6" to centerline of switch.

(2) Install disconnect switches shown on or adjacent to equipment on field fabricated galvanized steel frames.

viii) Panelboards

(1) Provide filler plates for unused spaces in panelboards.

(2) Provide typed circuit directory in plastic holder for each branch circuit panelboard.

ix) Motor Starters

(1) Install motor control equipment in accordance with manufacturer's instructions.

(2) Select and install heater elements in motor starters to match installed motor characteristics.

x) Pull Line: Provide in each empty conduit except sleeves and nipples; leave 8 inches of slack at each outlet.

xi) Firestopping: Provide firestopping around all pipes, conduits, sleeves, etc., which pass through rated walls, partitions and floors.

END OF SECTION

SKI TIME SQUARE DRIVE PUBLIC TURNAROUND

BASELINE ENGINEERING
1169 Hilltop Parkway, Suite 204
PO Box 770152
Steamboat Springs, CO 80477

WILDER ENGINEERING LLC
Andrew Wilder PE
1170 Blue Sage Drive
Steamboat Springs, CO 80487
P: 970-819-7848
E: andy@wilder-eng.com

COLORADO LICENSED
ANDREW CHARLES WILDER
49009
PROFESSIONAL ENGINEER

Issue	By Date & Issue Description	By
–	PROGRESS SET – 1.6.23	AW
–	100% DESIGN – 1.16.23	AW
–	BID DOCUMENTS – 2.8.23	AW
–	REVISION #1 – 2.9.24	AW

Scale: NTS
24x36
Description: SPECIFICATIONS
Project Name: SKI TIME SQ TURNAROUND
Project Number: 2022009
Sheet No.
E-3.0

IFGC PIPE SIZING CALCULATOR FOR NATURAL GAS PRESSURES LESS THAN 1.5 PSI

METER DISCHARGE PRESSURE =	14	("W.C.)
ALLOWABLE PRESSURE DROP =	7	("W.C.)
TOTAL EQUIVALENT LENGTH OF PIPE =	180	FEET
ALTITUDE CORRECTION FACTOR =	831	BTU/CFH @ ALT.

NOMINAL SCHD. 40 STEEL PIPE SIZE	CAPACITY (CFH)	CAPACITY (MBH)
1/2"	150	125
3/4"	314	262
1"	592	492
1-1/4"	1215	1010
1-1/2"	1820	1513
2"	3506	2914
2-1/2"	5588	4644
3"	9878	8209
4"	20148	16743
5"	36450	30290
6"	59021	49047

*PIPE CAPACITY IS CALCULATED USING FORMULA FOR LOW PRESSURE GAS (1.5 PSI AND LESS) LOCATED IN IFGC APPENDIX A

Q = 2313*D^2.623*((H)/(Cr*L))^.541

Q = CAPACITY (CFH)

D = INSIDE PIPE DIAMETER

H = ALLOWABLE PRESSURE DROP ("W.C.)

Cr = FACTOR FOR VISCOSITY, DENSITY AND TEMPERATURE = .6064

L = LENGTH OF PIPE (FEET)

SNOWMELT BOILER SCHEDULE

SYMBOL	SERVICE	MANUFACTURER	MODEL	SNOWMELT ZONE AREA	HEATING CAPACITY INPUT @ S.L. MBH	HEATING CAPACITY OUTPUT @ S.L. MBH	HEATING CAPACITY OUTPUT @ 6700' MBH	HEATING CAPACITY EWT (°F)	HEATING CAPACITY LWT (°F)	GPM	ELECTRICAL VOLTAGE	ELECTRICAL PHASE	ELECTRICAL FLA	ELECTRICAL MCA	ELECTRICAL MOCP	FLUE SIZE IN	COMB. AIR SIZE IN	UNIT WEIGHT (LBS.)	REMARKS
B-1	SNOWMELT	LOCHINVAR	KBX500N	2,308	500,000	485,000	349,200	120	140	30	120	1	9.2	11.5	20	14	8	X	1, 2, 3, 4

REMARKS:
1. ACCEPTABLE MANUFACTURERS: AERCO, LAARS, RHEEM.
2. BURNER SHALL BE DESIGNED TO FIRE ON NATURAL GAS, 720 BTU/CF, 7" WC.
3. PROVIDE INDIVIDUAL FACTORY MOUNTED BOILER CONTROL PANEL WITH (BUILDING STANDARD) CONTROLS TO COMMUNICATE WITH BUILDING AUTOMATION SYSTEM. COORDINATE WITH CONTROLS CONTRACTOR.
4. 40% GLYCOL.

EXPANSION TANK SCHEDULE

SYMBOL	MANUFACTURER	MODEL	TYPE	APPROX SYSTEM VOLUME (GAL)	SYSTEM TEMPERATURE RANGE MIN (F)	SYSTEM TEMPERATURE RANGE MAX (F)	INITIAL PRESSURE IN TANK (PSIG)	MAX OPERATING PRESSURE (PSIG)	FILL PRESSURE AT TANK RELIEF VALVE (PSIG)	FILL PRESSURE AT TANK AT TANK (PSIG)	MIN VOLUME TANK (GAL)	MIN BLADDER VOLUME (GAL)	PIPE SIZE TO TANK (IN)	APPROX. OPERATING WT. (LBS)	REMARKS
ET-1	BELL AND GOSSETT	B130	BLADDER	500	25	180	12	30	35	X	34	22	1	450	1, 2, 3, 4

REMARKS:
1. ASME CONSTRUCTION.
2. REPLACEABLE BUTYL BLADDER
3. PRECHARGED, ADJUASTABLE.
4. RATED FOR GLYCOL USE.

PUMP SCHEDULE

SYMBOL	MANUFACTURER	SERVICE	PUMP TYPE	PUMP SERIES	MODEL	GPM	HEAD FT WC	EFF %	MIN HP	RPM	ELECTRICAL VOLTS	ELECTRICAL PHASE	SUCTION SIZE IN	DISCH SIZE IN	APPROX OPERATING WEIGHT	REMARKS
P-1	BELL AND GOSSETT	SNOW-MELT	BASE MTD	E-1510	1.25AD	30	115	52	5	1800	208	3	1-1/2	1-1/2	100	1, 2

REMARKS:
1. ACCEPTABLE MANUFACTURERS: ARMSTRONG, TACO.
2. 40% GLYCOL.

SNOWMELT SYSTEM SUMMARY

LOCATION	PROJECT NAME	ZONE SEE CIVIL PLANS	PROJECT ELEVATION (FT.)	SNOWMELT DESIGN TEMPERATURE (°F)	SNOWMELT DESIGN WIND SPEED (MPH)	TOTAL AREA PH 1 (SQ. FT.)	BTUH PER AREA SQ. FT.	TOTAL LOAD (BTUH)	TOTAL GPM @ 25 DEG DELTA T	SNOWMELT GLYCOL LEVEL (%)	SNOWMELT FLUID TEMP. DROP (°F)	TOTAL FLUID VOLUME (GAL)	GLYCOL VOLUME (GAL)
STEAMBOAT COLORADO	KUTUK APARTMENTS	NEW #2	6,700	0	10	2,057	145	298,265	30	40	25	135	54

BOILER SELECTION CALCULATIONS:

TOTAL SNOW-MELT LOAD: 298,265 BTUH / (0.97 * 0.72) = 427,0690 BTUH REQUIRED — SELECTED BOILER AT 500,000 BTUH TOTAL.

0.97 BOILER EFFICIENCY

0.72 ALTITUDE ADJUSTMENT

PLUMBING EQUIPMENT SCHEDULE

SYMBOL	TYPE	ADA	ACCESSORIES	FINISH	MANUFACTURER & MODEL NUMBER	REMARKS
HB-1	SURFACE MOUNTED EXPOSED TYPE HOSE BIBB, ALL BRASS REMOVABLE TEE HANDLE, SPOUT OUTLET VACUUM BREAKER	N/A	3/4" HOSE THREAD OUTLET, PROVIDE WITH SHUTOFF BALL VALVE IN BRANCH PIPE	ROUGH BRASS	WOODFORD 24	1/2" SUPPLY CONNECTION

NOTE: ALL CONNECTIONS TO POTABLE WATER SYSTEM SHALL CONFORM TO NSF/ANSI-61 AND NSF/ANSI-372 EFFECTIVE 01/04/2014.

TOTAL CONNECTED GAS LOAD SCHEDULE

EQUIPMENT	QTY	INPUT EACH (BTUH @ SL)	INPUT TOTAL (BTUH @ SL)	INLET PRESSURE	NOTES
EXISTING EQUIPMENT					
BOILER	1	399,000	399,000	7" WC	EXISTING TO REMAIN
POOL HEATER	1	400,000	400,000	7"WC	EXISTING TO REMAIN
SPA HEATER	1	300,000	300,000	7"WC	EXISTING TO REMAIN
WATER HEATER	1	199,999	199,999	7"WC	EXISTING TO REMAIN
		TOTAL GAS LOAD REMAINING	1,298,999		
NEW EQUIPMENT					
BOILER B-1	1	500,000	500,000	7" WC	1, 2, 3
		TOTAL NEW LOAD=	500,000		
		TOTAL EXISTING LOAD TO REMAIN=	1,298,999		
		BUILDING TOTAL CONNECTED LOAD=	1,798,999		NEW AND EXISTING

NOTES:
1. MODIFICATIONS TO GAS METER AND/OR SERVICE PIPING SHALL BE PERFORMED BY THE GAS COMPANY. SUBMIT REQUIRED GAS SERVICE APPLICATION TO GAS COMPANY IN A TIMELY MANNER TO MEET THE CONSTRUCTION SCHEDULE.
2. FARTHEST CONNECTED DEVICE DISTANCE BASED ON 180'.
3. PIPE SIZING BASED ON PRESSURE AT METER OUTLET OF 14 INCHES WC. CONTRACTOR TO FIELD VERIFY OUTLET PRESSURE PRIOR TO STARTING WORK.

AIR SEPARATOR SCHEDULE

SYMBOL	MANUFACTURER	MODEL	TYPE	SIZE (IN)	FLOW (GPM)	WPD (FT)	BUILT IN STRAINER	REMARKS
AS-1	BELL AND GOSSETT	R-3F	FLANGED	3	30	0.25	YES	1, 2

REMARKS:
1. BLOWDOWN FOR ROUTINE MAINTENANCE.
2. AUTOMATIC AIR VENT.

SPECIFICATIONS:
A. TANGENTIAL OPENINGS.
B. CONSTRUCTED PER ASME SECTION VIII DIVISION 1
C. CARBON STEEL SHELL.
D. TYPE 304 STAINLESS STEEL STRAINER, 3/16" DIAMETER PERFORATIONS, 51% OPEN AREA.
E. MAXIMUM WORKING PRESSURE 125 PSIG.

GENERAL NOTES:

CONTRACTOR SHALL DESIGN THE SNOW MELT SYSTEM ZONES BASED ON UPONOR, OR EQUAL. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE SNOW MELT ZONES FROM MANUFACTURER. SEE CIVIL PLANS FOR SNOW MELT ZONE LOCATIONS AND ADDITIONAL INFORMATION.

MECHANICAL LEGEND

NOT ALL ITEMS LISTED BELOW ARE USED ON THIS SET OF MECHANICAL DRAWINGS

GENERAL

SYMBOL	DESCRIPTION
DTL / SHT	REFERENCE BUBBLE
EQUIP#	MECHANICAL/ELECTRICAL EQUIPMENT DESIGNATION
	REMOVE EXISTING
U	UNDERCUT DOOR
	AIR FLOW
	CONNECT NEW TO EXISTING

DOUBLE LINE DUCTWORK

SYMBOL	DESCRIPTION
	RECTANGULAR SUPPLY AIR DUCT UP
	RECTANGULAR SUPPLY AIR DUCT DOWN
	RECTANGULAR RETURN AIR / EXHAUST DUCT UP
	RECTANGULAR RETURN AIR / EXHAUST DUCT DOWN
	ROUND DUCT UP
	ROUND DUCT DOWN
	BRANCH DUCT 45° TAKE-OFF
	RECTANGULAR DUCT ELBOW WITH TURNING VANES
	RADIUS ELBOW RECTANGULAR/ROUND DUCT
	DUCT TRANSITION
	FLEX CONNECTION

SINGLE LINE DUCTWORK

SYMBOL	DESCRIPTION
	RECTANGULAR DUCT ELBOW WITH TURNING VANES
	RADIUS ELBOW RECTANGULAR/ROUND DUCT
	DUCT TRANSITION
	CONICAL SPIN-IN FITTING
	CONICAL SPIN-IN FITTING W/DAMPER
	FLEXIBLE DUCT

CONTROL DEVICES AND DAMPERS

SYMBOL	DESCRIPTION
H	HUMIDISTAT
PS	PRESSURE SENSOR
S	SENSOR
T	WALL MOUNTED THERMOSTAT
T	UNIT MOUNTED THERMOSTAT
S	SWITCH
	FIRE DAMPER
R	RADIATION DAMPER
S	SMOKE DAMPER
	COMBINATION FIRE AND SMOKE DAMPER
	MANUAL VOLUME DAMPER W/LOCKING QUADRANT
M	MOTORIZED DAMPER

PIPING

SYMBOL	ABBV.	DESCRIPTION
HS	HS	HOT WATER SUPPLY
HR	HR	HOT WATER RETURN
CWS	CWS	CHILLED WATER SUPPLY
CWR	CWR	CHILLED WATER RETURN
CS	CS	CONDENSER SUPPLY
CR	CR	CONDENSER RETURN
HPS	HPS	HIGH PRESSURE STEAM
HPC	HPC	HIGH PRESSURE CONDENSATE
PC	PC	PUMPED CONDENSATE
D	D	EQUIPMENT DRAIN
RL	RL	REFRIGERANT LIQUID
RS	RS	REFRIGERANT SUCTION

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	ARROW IN LINE INDICATES DIRECTION OF FLOW
XX	INDICATES PIPE SLOPE DOWN
	BOTTOM PIPE CONNECTION
	PIPING UP
	PIPING DOWN
	FIXTURE TRAP OR DRAIN TRAP
	PIPING CAP OR PLUG
	PUMP
	BALANCING VALVE/ FLOW MEASURING DEVICE
	CALIBRATED BALANCING VALVE
	BALL VALVE
	PLUG VALVE
	GATE VALVE
	CHECK VALVE
	BUTTERFLY VALVE
	FLOW SWITCH
	SOLENOID VALVE
	PRESSURE REDUCING VALVE
	3-WAY TEMPERATURE CONTROL VALVE
	2-WAY TEMPERATURE CONTROL VALVE
	RELIEF VALVE
	STRAINER
	STRAINER WITH BLOW-OFF VALVE
	UNION
	PRESSURE GUAGE
	THERMOMETER
P/T	PRESSURE AND TEMPERATURE TAP
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	FLEXIBLE CONNECTOR
	HOSE END DRAIN VALVE
	MANUAL AIR VENT

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR	RA	RETURN AIR
AP	ACCESS PANEL	(N)	NEW	RE	REFER TO
C	COMMON	NC	NORMALLY CLOSED	SA	SUPPLY AIR
(E)	EXISTING	NIC	NOT IN CONTRACT	SRV	SAFETY RELIEF VALVE
EC	ELECTRICAL CONTRACTOR	NO	NORMALLY OPEN	TCC	TEMPERATURE CONTROL CONTRACTOR
ELEV	ELEVATION	NTS	NOT TO SCALE	TYP	TYPICAL
EQ	EQUIPMENT	OA	OUTSIDE AIR		
GC	GENERAL CONTRACTOR	PRV	PRESSURE REDUCING VALVE		

NOTE:

APPLICABLE CODE STANDARDS

2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL FIRE CODE
2018 INTERNATIONAL MECHANICAL CODE
2018 INTERNATIONAL PLUMBING CODE
2018 INTERNATIONAL ENERGY CONSERVATION CODE
2018 INTERNATIONAL FUEL GAS CODE

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

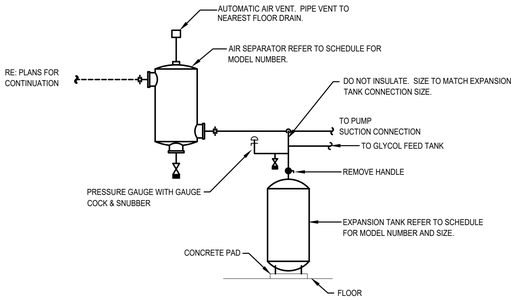
MEP JOB: 22336

DESIGNED: MAB

CHECKED: KVB

MECHANICAL EQUIPMENT SCHEDULES

COLORADO REGISTERED PROFESSIONAL ENGINEER 35133 11.09.23



EXPANSION TANK DIAGRAM

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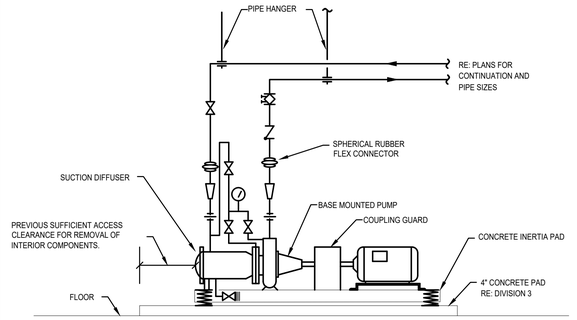

END SUCTION PUMP PIPING DIAGRAM

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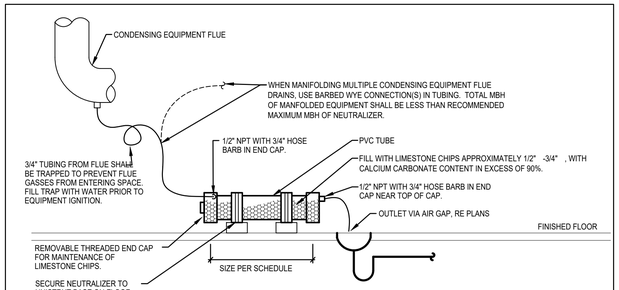

INLINE CONDENSATE NEUTRALIZER DIAGRAM

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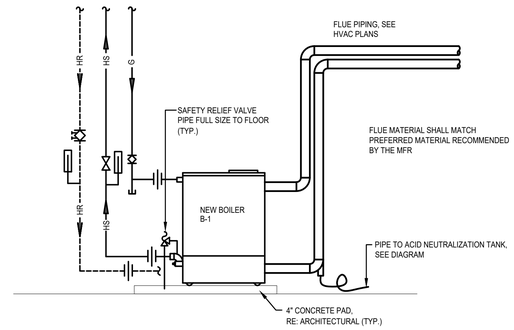

BOILER MOUNTING/PIPING DIAGRAM

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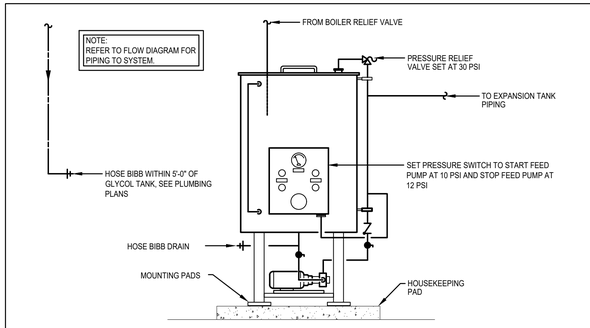

GLYCOL FEEDER DIAGRAM

NOT TO SCALE 232100.09

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CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

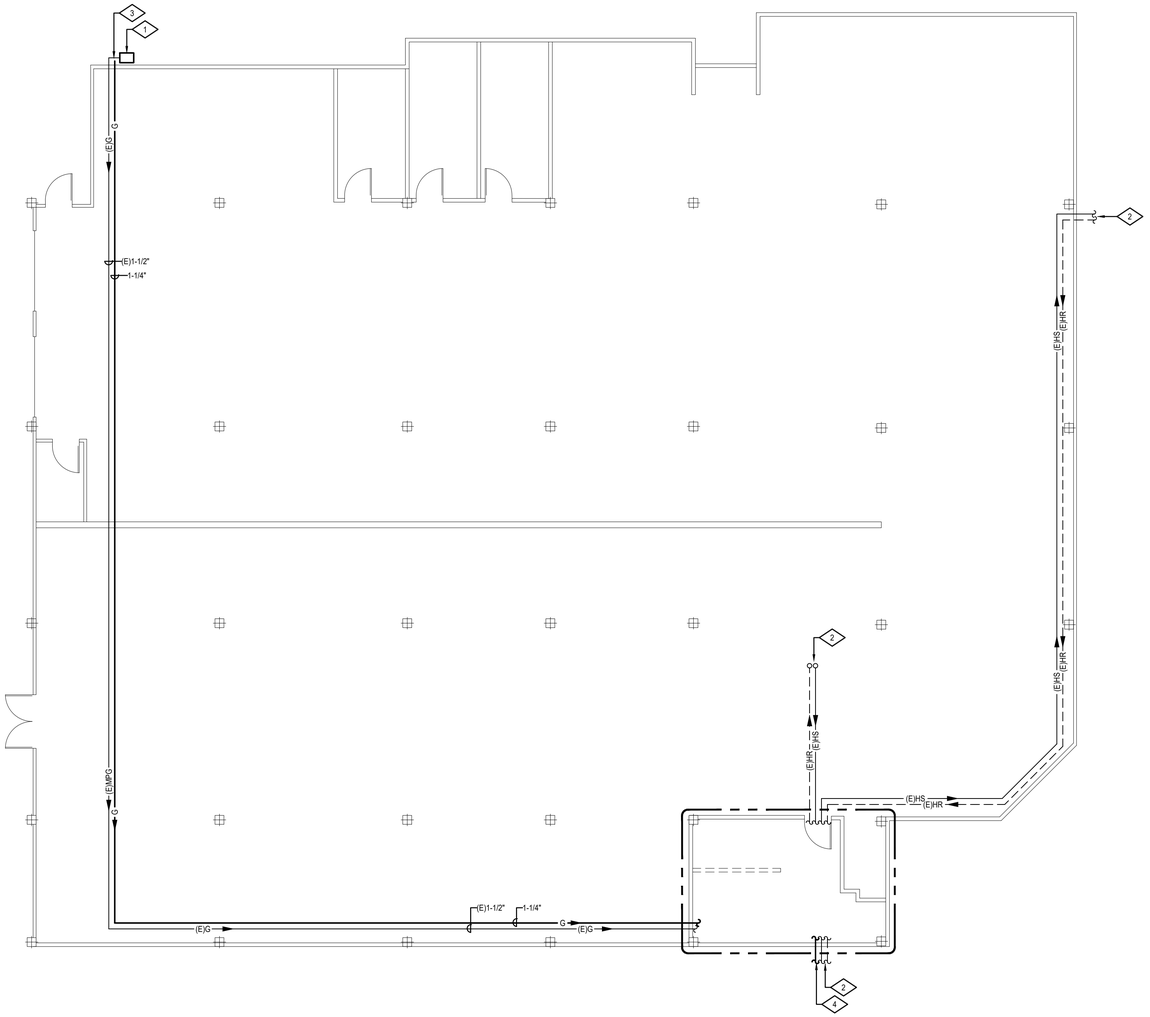
ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL DIAGRAMS

COLORADO REGISTERED 35133 11.09.23 PROFESSIONAL ENGINEER

M1.1



MECHANICAL FLOOR PLAN

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

DRAWING NOTES

1. EXISTING GAS METER. NEW GAS LOAD 2,399.9 BTUH. COORDINATE NEW GAS LOAD WITH ATMOS ENERGY IN A TIMELY MANNER THAT MEETS THE CONSTRUCTION SCHEDULE. MODIFICATIONS TO THE GAS SERVICE AND GAS METER SHALL BE PERFORMED BY ATMOS ENERGY.
2. EXISTING HEATING WATER SUPPLY AND RETURN PIPING TO EXISTING SNOW MELT ZONES. FIELD VERIFY.
3. CONNECT NEW 1-1/4" GAS PIPING TO EXISTING GAS METER. PROVIDE NEW 2" MANIFOLD AT EXISTING GAS METER AND CONNECT EXISTING 1-1/2" GAS AND NEW 1-1/4" GAS.
4. NEW 2" CONTROL WIRING CONDUIT TO EACH SNOW MELT ZONE VALVE BOX ASSEMBLY AND SNOW MELT SENSOR. CONTRACTOR SHALL FIELD DETERMINE ROUTING DURING CONSTRUCTION. NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100
Centennial, CO 80111
info@mep-eng.com
(W) 303.936.1633
(F) 303.934.3299
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STEAMBOAT SPRINGS, COLORADO

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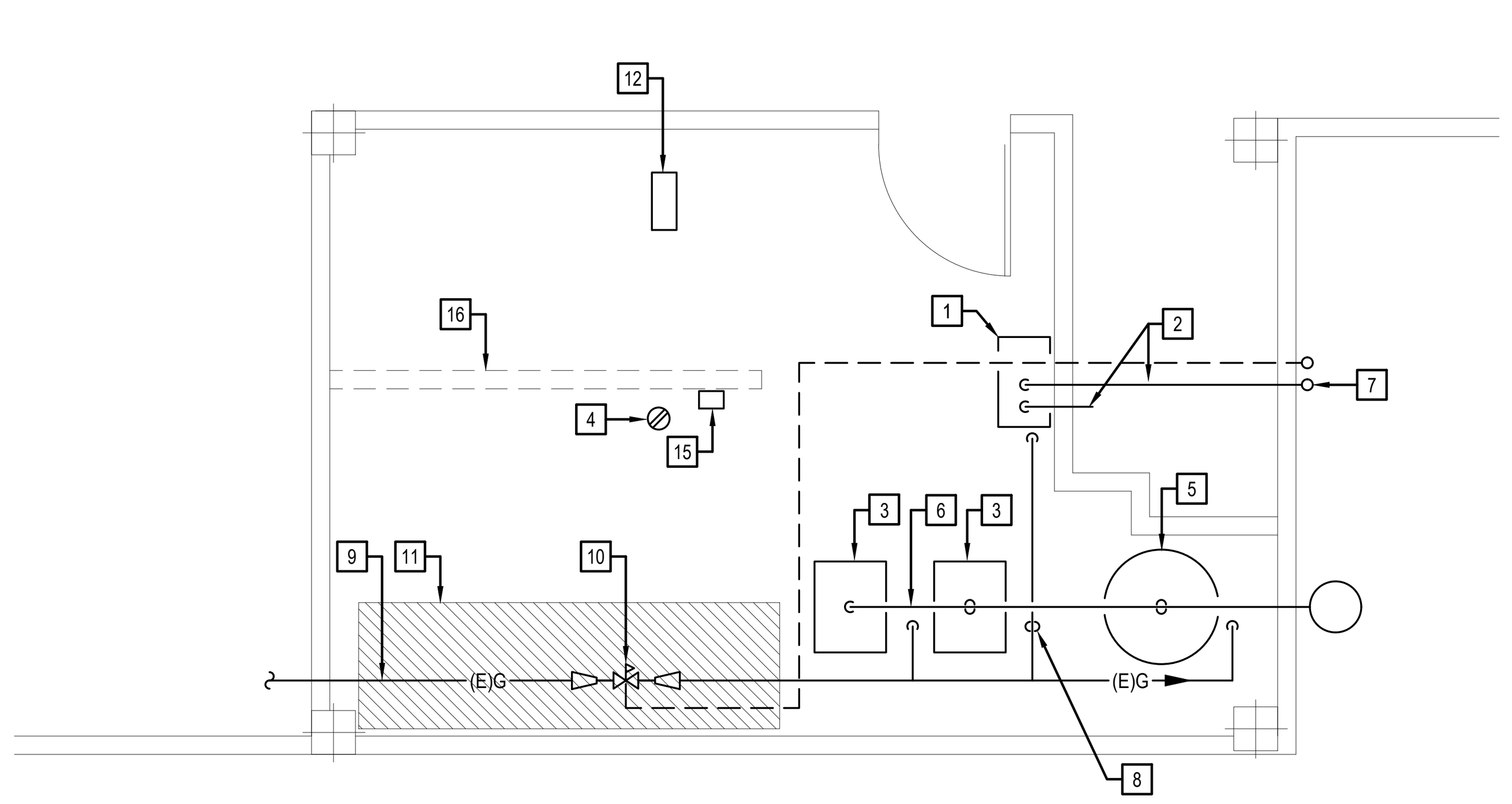
MECHANICAL FLOOR PLAN

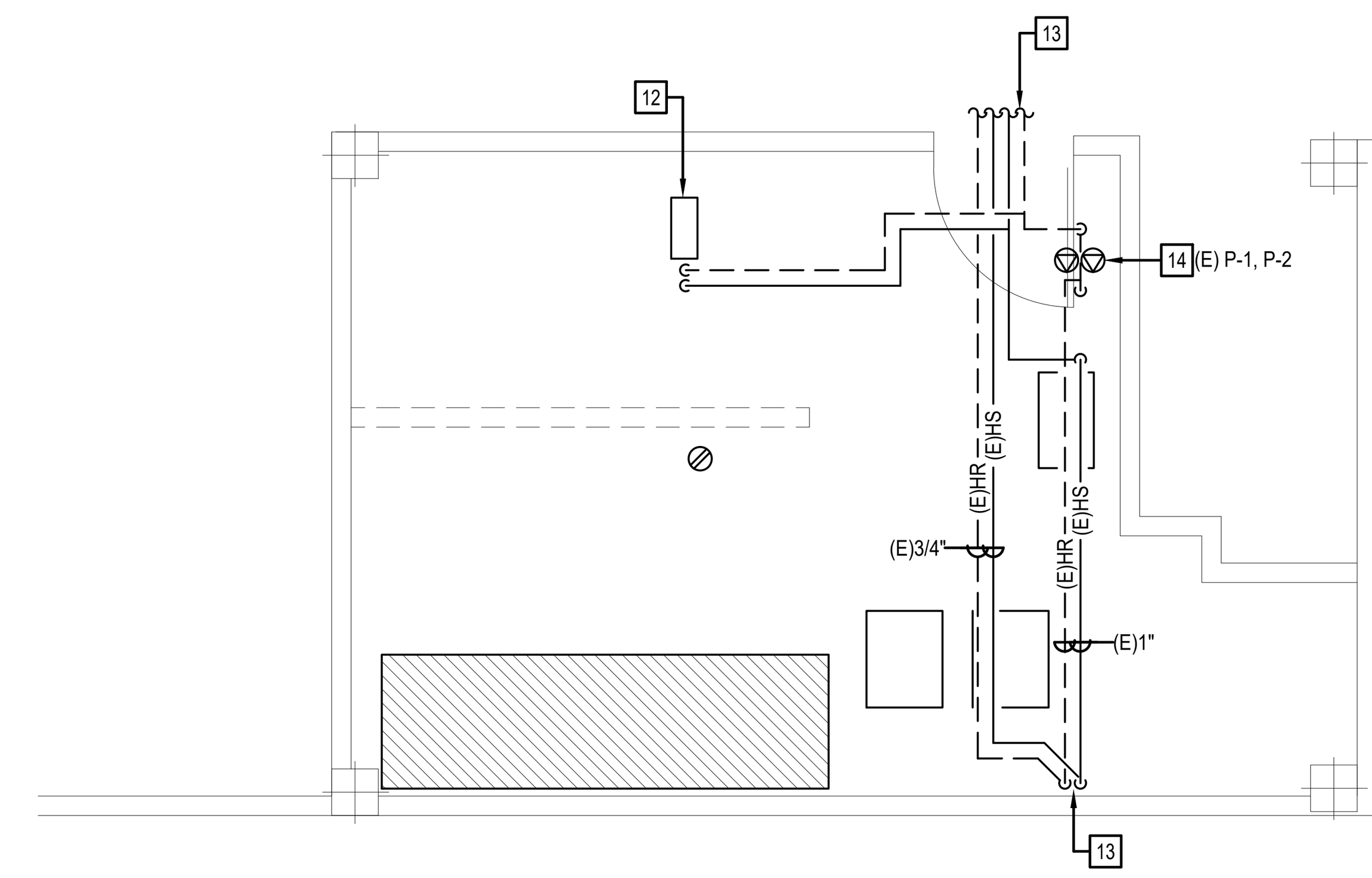
COLORADO REGISTERED 35133 11.09.23 PROFESSIONAL ENGINEER

M2.0



MECHANICAL ROOM EQUIPMENT DEMOLITION PLAN

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

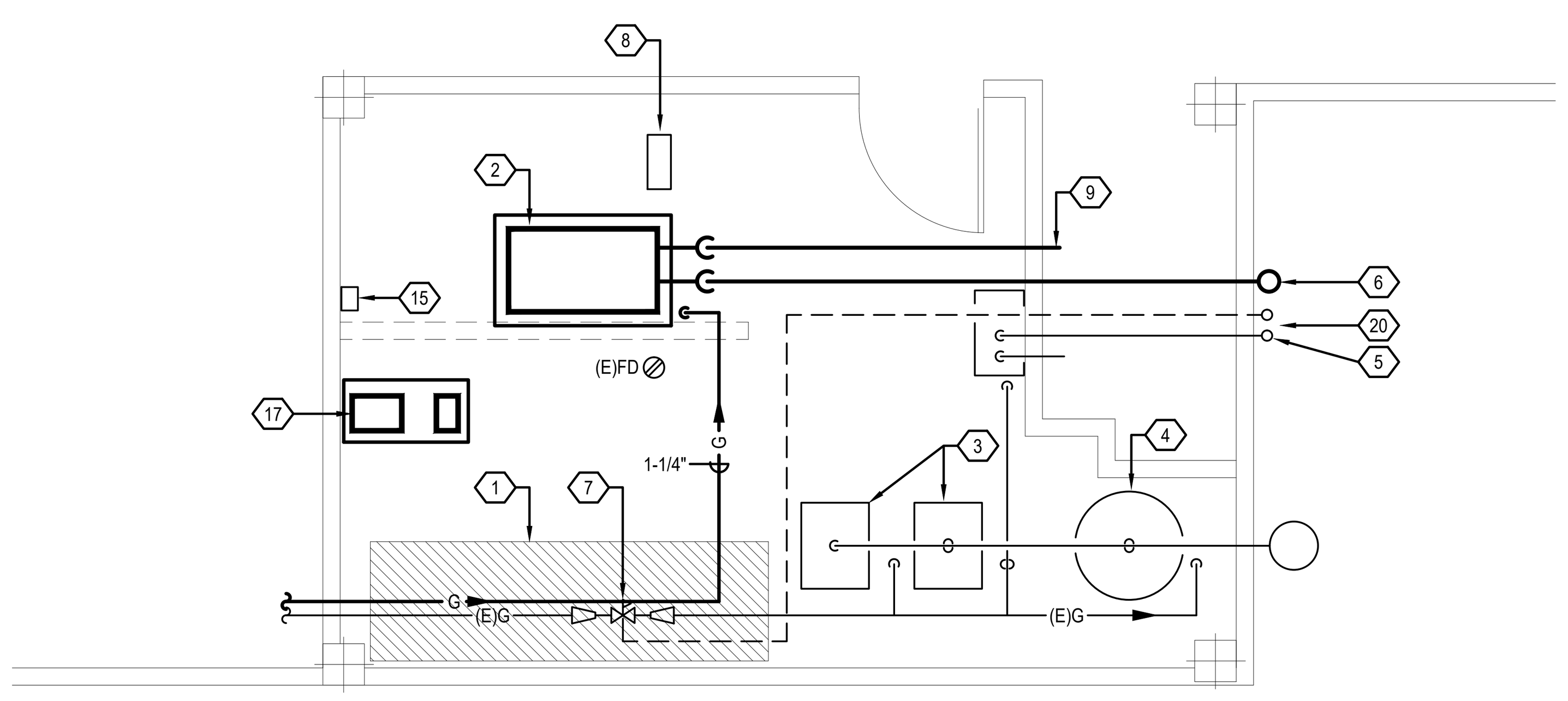


MECHANICAL ROOM HYDRONIC EQUIPMENT DEMOLITION PLAN

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

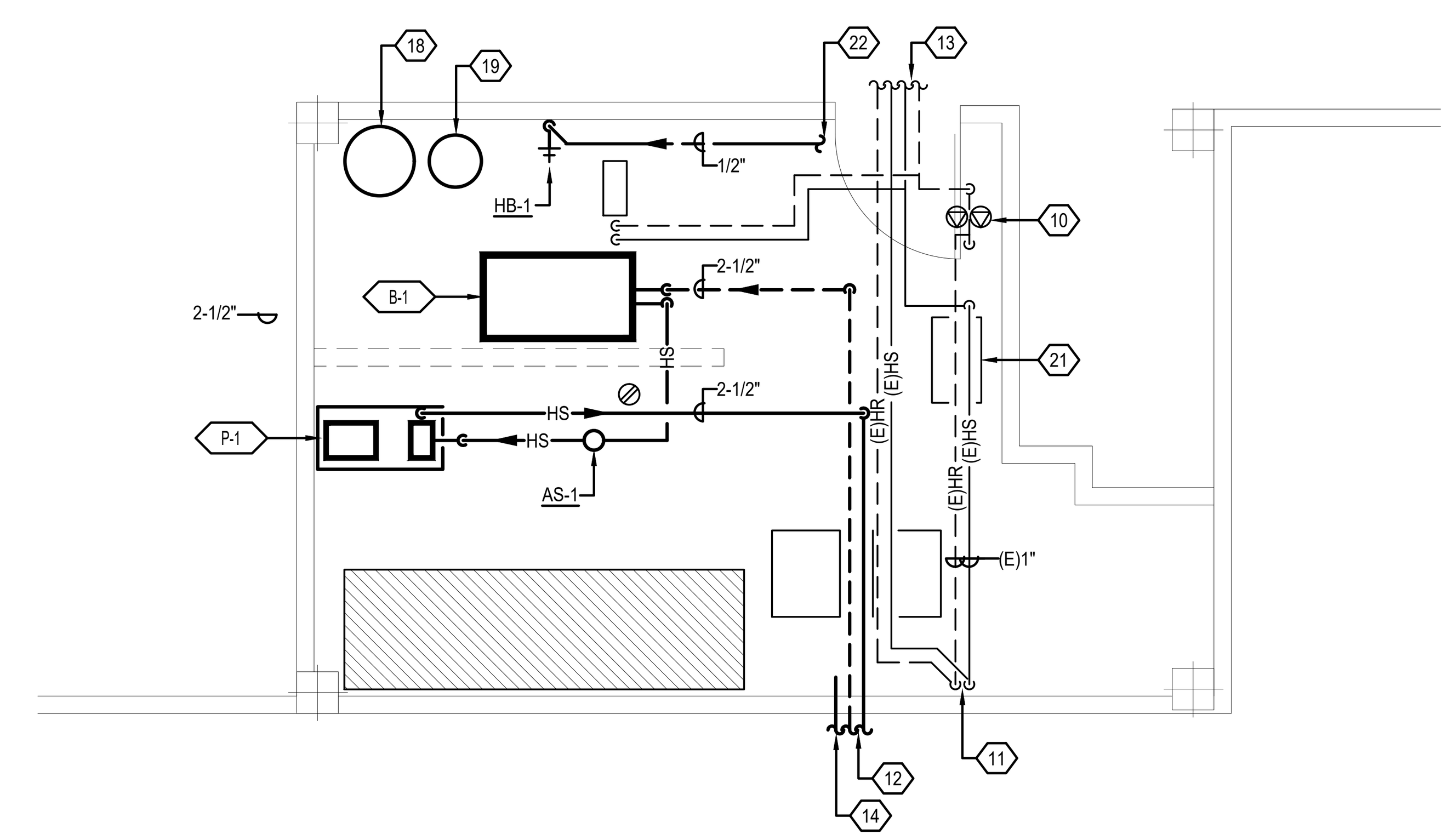
DRAWING NOTES

1. EXISTING SNOW MELT BOILER AND ALL ASSOCIATED ACCESSORIES AND PIPING TO REMAIN.
2. EXISTING BOILER FLUE AND COMBUSTION AIR DUCT TO REMAIN.
3. EXISTING POOL/SPA HEATER, NO CHANGE.
4. EXISTING FLOOR DRAIN TO REMAIN. FIELD VERIFY ACTUAL LOCATION.
5. EXISTING WATER HEATER, NO CHANGE.
6. EXISTING BOILER FLUE, NO CHANGE.
7. EXISTING FLUE UP TO ROOF. FIELD VERIFY ACTUAL FLUE ROUTING. CONTRACTOR SHALL NOTE ROUTING AND MATERIALS THAT MAY POTENTIALLY BE REQUIRED TO REMOVE FOR NEW BOILER FLUE ROUTING.
8. EXISTING GAS PIPING DOWN TO POOL/SPA BOILER TO REMAIN. REMOVE GAS PIPING SERVING EXISTING BOILER TO REMAIN.
9. EXISTING 1-1/2" GAS PIPING, NO CHANGE.
10. EXISTING GAS PRESSURE REGULATING VALVE, NO CHANGE.
11. EXISTING POOL/SPA EQUIPMENT, FIELD VERIFY, NO CHANGE.
12. EXISTING HEATING WATER UNIT HEATER TO REMAIN.
13. EXISTING HEATING WATER SUPPLY AND RETURN TO EXISTING SNOW MELT ZONES TO REMAIN. FIELD VERIFY.
14. EXISTING SNOW MELT PUMPS TO REMAIN.
15. REMOVE AND RELOCATE EXISTING CONTROL PANEL. CONTRACTOR SHALL FIELD VERIFY PROPER FUNCTION AND PURPOSE. MAINTAIN FUNCTIONALITY AT NEW LOCATION.
16. REMOVE EXISTING WALL. CONTRACTOR SHALL FIELD VERIFY AND MOVE/RELOCATE EXISTING EQUIPMENT CURRENTLY ON THE WALL.



MECHANICAL ROOM EQUIPMENT PLAN

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

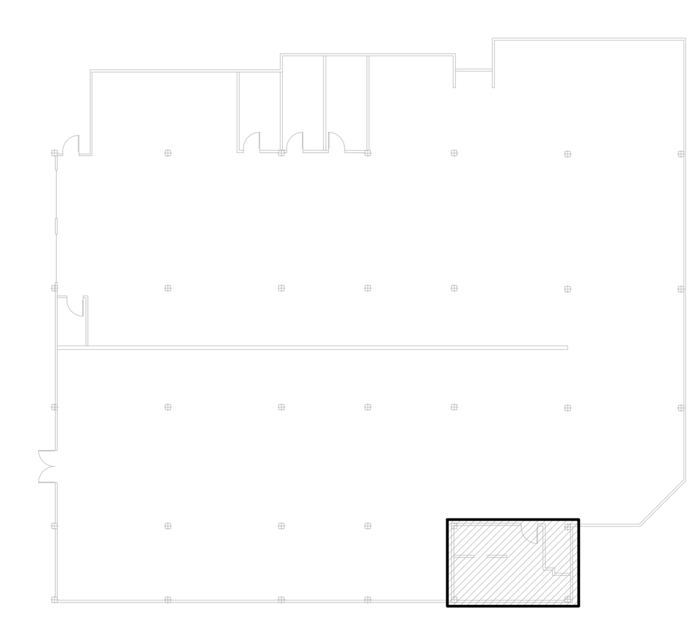


MECHANICAL ROOM HYDRONIC EQUIPMENT PLAN

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

DRAWING NOTES

1. EXISTING POOL/SPA EQUIPMENT LOCATION, NO CHANGE.
2. PROVIDE NEW CONCRETE PAD FOR BOILER. CONCRETE PAD SHALL BE 4" TALL AND 4" WIDER THAN THE OVERALL FOOTPRINT OF THE BOILER. COORDINATE DIMENSIONS WITH BOILER SELECTION BY M.C.
3. EXISTING POOL/SPA HEATING BOILERS, NO CHANGE.
4. EXISTING WATER HEATER, NO CHANGE.
5. EXISTING FLUE UP THRU ROOF, FIELD VERIFY. CONTRACTOR SHALL FIELD VERIFY EXISTING FLUE ROUTING TO DETERMINE ROUTING OF NEW FLUE IN THE SAME MANNER.
6. NEW BOILER FLUE ROUTING SHALL MATCH ROUTING OF EXISTING FLUE. CONTRACTOR SHALL FIELD VERIFY ACTUAL ROUTING. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF MATERIALS REQUIRED FOR FLUE INSTALLATION. REPAIR WALLS, CEILINGS AND ROOFS TO MATCH EXISTING. TERMINATE WITH GOOSENECK AND OPENING BIRD SCREEN PROTECTION.
7. EXISTING GAS PRESSURE REGULATING VALVE.
8. EXISTING HEATING WATER UNIT HEATER, NO CHANGE.
9. COMBUSTION AIR INTAKE FOR BOILER OPEN TO GARAGE. PROVIDE BIRD SCREEN.
10. EXISTING SNOW MELT ZONE PUMP(S) TO REMAIN.
11. EXISTING SNOW MELT ZONE MANIFOLD, FIELD VERIFY.
12. HEATING WATER SUPPLY AND RETURN PIPING TO NEW SNOW MELT ZONE.
13. EXISTING HEATING WATER SUPPLY AND RETURN PIPING TO EXISTING SNOW MELT ZONES, FIELD VERIFY.
14. 2" CONDUIT FOR NEW SNOW MELT SYSTEM CONTROL WIRING. CONDUIT SHALL BE ROUTED TO NEW SNOW MELT SYSTEM SENSOR AND TO EACH NEW ZONE VALVE BOX.
15. NEW LOCATION, EXISTING CONTROL PANEL. CONTRACTOR SHALL FIELD VERIFY PROPER FUNCTION AND PURPOSE. MAINTAIN FUNCTIONALITY AT NEW LOCATION. PROVIDE NEW ELECTRICAL CONDUIT AS REQUIRED.
16. NOT USED.
17. PROVIDE NEW CONCRETE PAD FOR PUMP. CONCRETE PAD SHALL BE 4" TALL AND 4" WIDER THAN THE OVERALL FOOTPRINT OF THE PUMP. COORDINATE DIMENSIONS WITH PUMP SELECTION.
18. EXPANSION TANK ET-1.
19. GLYCOL FEEDER ASSEMBLY.
20. EXISTING SNOW MELT BOILER INTAKE AND FLUE PIPING. FIELD VERIFY.
21. EXISTING SNOW MELT BOILER AND ALL ASSOCIATED ACCESSORIES TO REMAIN. FIELD VERIFY.
22. COLD WATER PIPING TO NEAREST COLD WATER BRANCH/MAIN. FIELD VERIFY.



KEY PLAN

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL ROOM PLANS

M3.0

DIVISION 230000 - HYDRONIC SPECIFICATIONS

PIPE AND PIPE FITTINGS

WORK INCLUDED
1. HOT WATER, CHILLED WATER, CONDENSER WATER PIPING.

QUALITY ASSURANCE
1. WELDING MATERIALS AND LABOR SHALL CONFORM TO ASME CODE FOR PRESSURE PIPING AND APPLICABLE STATE LABOR REGULATIONS.
2. USE WELDERS FULLY QUALIFIED AND LICENSED BY STATE AUTHORITIES. FURNISH CERTIFICATION FROM APPROVED TESTING AGENCY OR NATIONAL CERTIFIED PIPE WELDING BUREAU THAT WELDERS PERFORMING WORK ARE CERTIFIED.
3. ALL PIPING MATERIALS SHALL COMPLY WITH LOCAL CODES.

REFERENCE STANDARDS
1. (CURRENT) ANSI/ASTM - GRAY IRON CASTINGS FOR VALVES, FLANGES, AND PIPE FITTINGS.
2. (CURRENT) ANSI/AWS - STRUCTURAL WELDING CODE.
3. (CURRENT) ANSI/AWWA - POLYETHYLENE ENCASEMENT FOR GRAY AND DUCTILE CAST IRON PIPING FOR WATER AND OTHER LIQUIDS.
4. (CURRENT) ASTM - PRACTICE FOR MAKING SOLVENT_CEMENTED JOINTS WITH PVC PIPE AND FITTINGS.

PIPE AND TUBE
1. STEEL PIPE: ANSI/ASTM A53, BLACK.
2. DUCTILE IRON WATER PIPE: ANSI/AWWA C151.
3. COPPER WATER TUBE: ASTM B88-99EL, SEAMLESS.
4. CROSSLINKED POLYETHYLENE (PEX) PIPING FOR SNOWMELT ZONE SYSTEMS ONLY, ASTM 876-01.

PIPE AND TUBE JOINTS AND FITTINGS
1. THREADED PIPE FITTINGS: MALLEABLE IRON, ANSI/ASME B16.3 - 1999.
2. COPPER AND BRASS PIPE FITTINGS: ANSI/ASME B16.22 - 1995, PRESSURE FITTINGS.
3. CROSSLINKED POLYETHYLENE (PEX) FITTINGS - ASTM F1974-OOe, SNOW MELT ZONES ONLY.

UNIONS AND COUPLINGS
1. 2" AND SMALLER: 125 PSI BRONZE FOR COPPER OR BRASS PIPE, SOLDERED JOINTS.
2. 2 1/2" AND LARGER: 150 PSI FORGED STEEL FLANGES, RAISED FACE WITH WELDING NECK, FOR FERROUS PIPING; BRONZE FLANGES FOR COPPER OR BRASS PIPING. GASKETS FOR WATER ABOVE 140 DEG F.
3. GROOVED AND SHOULDERED PIPE ENDS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, DESIGNED TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION, EXPANSION; C_SHAPE COMPOSITION SEALING GASKET, STEEL BOLTS, NUTS, WASHERS; GALVANIZED COUPLINGS FOR GALVANIZED PIPE.
4. DIELECTRIC UNIONS AND FLANGES: (CHILLED WATER ONLY) PROPER GASKET MATERIAL FOR CONNECTION OF DISSIMILAR METALS. UNIONS, 2" AND SMALLER; DIELECTRICALLY GASKETED FLANGES, 2_1/2" AND LARGER. USE DIELECTRIC CONNECTIONS WHEREVER JOINING DISSIMILAR METALS IN OPEN CONDENSER WATER SYSTEMS.

STRAINERS
1. 2" AND SMALLER: THREADED BRASS OR IRON BODY, Y PATTERN WITH 1/32" STAINLESS STEEL PERFORATED SCREEN.
2. 2-1/2" AND LARGER: FLANGED IRON BODY, Y PATTERN WITH 3/64" STAINLESS STEEL PERFORATED SCREEN.
3. SCREEN FREE AREA: MINIMUM THREE TIMES AREA OF INLET PIPE.

GENERAL EXECUTION
1. VERIFY LOCATION(S) OF ALL AIR PLENUMS. ALL PIPING AND SUPPORT MATERIALS INSTALLED IN AIR PLENUMS SHALL BE PLENUM-RATED. DO NOT INSTALL SPECIFIED NON-PLENUM-RATED MATERIALS IN AIR PLENUMS; USE PLENUM-RATED OPTIONS.
2. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN PROPER SLOPE. INSTALL TO CONSERVE HEADROOM AND INTERFERE AS LITTLE AS POSSIBLE WITH USE OF SPACE. RUN EXPOSED PIPING PARALLEL TO WALLS. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS. INSTALL CONCEALED PIPES CLOSE TO BUILDING STRUCTURE TO KEEP FURRING TO A MINIMUM.
3. CONCEAL PIPING IN WALLS OR ABOVE CEILING UNLESS OTHERWISE NOTED.
4. MAINTAIN FOLLOWING PIPE SLOPES UNLESS OTHERWISE NOTED ON DRAWINGS:
   A. HYDRONIC PIPING: 1" UP PER 40'_0" IN DIRECTION OF FLOW.
   B. COOLING COIL CONDENSATE DRAIN PIPING: 1/8" DOWN PER LINEAR FOOT IN THE DIRECTION OF FLOW.
5. MAKE REDUCTIONS IN HORIZONTAL HYDRONIC WATER PIPE WITH FLAT TOP ECCENTRIC REDUCING FITTINGS.
6. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE OR CONNECTED EQUIPMENT.
7. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND FOR ACCESS TO VALVES, AIR VENTS, DRAINS, UNIONS.
8. INSTALL SAME TYPE PIPING MATERIAL SPECIFIED FOR INSIDE BUILDING TO 5'-0" OUTSIDE BUILDING.
9. PROVIDE HOSE END DRAIN VALVE ON ALL STRAINERS 1 1/2" AND LARGER.
10. MAKE CONNECTIONS TO EQUIPMENT WITH UNIONS OR FLANGES.
11. COOLING COIL CONDENSATE DRAIN PIPING SHALL BE EQUAL TO OR LARGER THAN THE EXIT DIAMETER OF THE DRAIN PAN DRAIN CONNECTION.
12. PIPE REDUCERS: USE REDUCERS, NOT BUSHINGS, FOR CHANGES IN PIPE SIZES.
13. ON CLOSED SYSTEMS, EQUIP LOW POINTS WITH 3/4" DRAIN VALVES, HIGH POINTS WITH AIR VENTS.

PREPARATION
1. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN END PIPE. REMOVE SCALE AND DIRT, INSIDE AND OUTSIDE, BEFORE ASSEMBLY. REMOVE WELDING SLAG OR FOREIGN MATERIAL FROM PIPE AND FITTING MATERIALS.
2. CLOSE ENDS OF PIPE IMMEDIATELY AFTER INSTALLATION. LEAVE CLOSURE IN PLACE UNTIL REMOVAL IS NECESSARY FOR COMPLETION OF INSTALLATION.
3. FLUSH EACH PIPING SYSTEM AND PROVE CLEAN.

STEEL PIPE CONNECTIONS
1. 2-1/2" AND LARGER - WELDED.
2. DO NOT USE MITERED AND WELDED ELBOWS IN LIEU OF FITTINGS.
3. USE BUTT WELD FITTINGS FOR WELDED STEEL PIPES. USE OXYACETYLENE OR ELECTRIC ARC PROCESS.
4. FLANGED PIPING _ USE AMERICAN NATIONAL STANDARD REGULAR GALVANIZED HEX HEAD BOLTS AND GALVANIZED HEAVY COLD PRESSED HEX NUTS. COAT GASKETS WITH LUBRICANT BEFORE INSTALLING.
5. GROOVED PIPING _ DUCTILE IRON CONFORMING TO ASTM-395. VICTAULIC STYLE 07, WITH EPDM SYNTHETIC ELASTOMER GASKET, OVAL NECK TRACK BOLTS AND NUTS FOR GROOVED END PIPE. USE PIPE GROOVING TOOL SPECIFICALLY DESIGNED FOR SYSTEM. USE GROOVED MECHANICAL COUPLINGS AND FASTENERS ONLY FOR CHILLED WATER AND CONDENSER WATER PIPING AND ONLY IN ACCESSIBLE LOCATIONS.
6. USE LONG RADIUS ELBOWS FOR WATER PIPING.

COPPER PIPE CONNECTIONS
1. 2-1/2" AND SMALLER: USE 15% SILVER BRAZING ALLOY AND SILVER BRAZING FLUX ON CONCEALED JOINTS. USE 95% TIN, 5% ANTIMONY LEAD_FREE SOLDER AND ASTM B813-91 NON-CORROSIVE STM 1.0 FLUX ON OTHER JOINTS. APPLY FLUX ON CLEANED END OF PIPE AND INSIDE FITTINGS WITH SMOOTH EVEN COATS.
2. 3" AND LARGER: USE 15% SILVER BRAZING ALLOY AND SILVER BRAZING FLUX. APPLY FLUX ON CLEANED END OF PIPE AND INSIDE FITTINGS WITH SMOOTH EVEN COATS.
3. CONTINUOUSLY PURGE PIPING WITH DRY NITROGEN DURING SILVER BRAZING PROCESS.

APPLICATION OF PIPING SYSTEMS
SERVICE & MATERIAL
1. HEATING HOT WATER (TO 250 F), CONDENSER WATER, CHILLED WATER
   STEEL, SCHEDULE 40; COPPER, TYPE L, HARD DRAWN.
2. EQUIPMENT DRAINS AND OVERFLOWS.
   COPPER, TYPE M OR DWV, HARD DRAWN.

PIPE TESTING
1. TEST ALL PIPING SYSTEMS. CORRECT LEAKS BY REMAKING JOINTS. REMOVE EQUIPMENT NOT ABLE TO WITHSTAND TEST PRESSURE FROM SYSTEM DURING TEST. CONSULT GOVERNING CODES FOR SPECIAL SYSTEM REQUIREMENTS.
2. GIVE AMPLE NOTICE OF DATES WHEN ACCEPTANCE TEST WILL BE CONDUCTED. CONDUCT PRESSURE, PERFORMANCE, OPERATING TESTS IN PRESENCE OF REPRESENTATIVE OF AGENCIES HAVING JURISDICTION. SUBMIT THREE COPIES OF SUCCESSFUL TEST REPORTS TO OWNER.
3. TEST PIPING BEFORE BEING PERMANENTLY ENCLOSED.
4. OBTAIN CERTIFICATES OF APPROVAL, ACCEPTANCE, COMPLIANCE WITH REGULATIONS OF AGENCIES HAVING JURISDICTION. SUBMIT TO OWNER.

PIPE AND PIPE FITTINGS (CONT.)

SYSTEM TESTS
1. HYDROSTATIC TEST - WATER PIPING (NEW PIPING ONLY): HAND PUMP SYSTEM TO GREATER OF 100 PSIG OR 150% OF OPERATING PRESSURE. MAINTAIN PRESSURE UNTIL SYSTEM HAS BEEN INSPECTED FOR LEAKS BUT NOT LESS THAN FOUR HOURS.
2. AFTER TESTING THE HYDRONIC SYSTEM (NEW PIPING ONLY) FOR PROPER OPERATION OF AUTOMATIC DEVICES AND CONTROLS, OPERATE SYSTEM FOR ONE WEEK, THEN DRAIN AND WASH OUT WITH PRE-START UP CLEANING CHEMICALS. CLEAN STRAINER BASKETS, REFILL SYSTEM, LEAVE IN PROPER WORKING ORDER. AFTER SYSTEM HAS BEEN IN OPERATION FOR ONE MONTH, THOROUGHLY CHECK SYSTEM AND DEVICES FOR WATER LEAKAGE.

UNDERGROUND PIPE INSTALLATION
1. PROTECT STEEL PIPE INSTALLED BELOW GRADE AND TO MINIMUM 6" ABOVE GRADE WITH FACTORY APPLIED COVERING, PRO-CO FELT AND PIPE LINE ENAMEL NO. 4 DOUBLE WRAP OR X-TRU-COAT PLASTIC COATING.
2. CLEAN FITTINGS, NIPPLES, OTHER FIELD JOINTS THOROUGHLY.
3. APPLY TAPECOAT COMPANY PRIME COAT AND ONE LAYER OF TAPECOAT #20 HEAT APPLIED, 62 MIL TAPE PER MANUFACTURER'S RECOMMENDATIONS.

VALVES

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR VALVES.
2. VALVES SHALL BE OF SAME MANUFACTURER WHERE POSSIBLE.

VALVE SEATS, MATERIALS
1. SUITABLE FOR SERVICE INTENDED.

ACCEPTABLE MANUFACTURES
1. BALL VALVE: APOLLO, NIBCO.
2. BUTTERFLY VALVE: KEYSTONE, NIBCO.
3. PLUG VALVE: DEZURIK, ROCKWELL.

RATINGS
1. UNLESS OTHERWISE INDICATED, VALVES SHALL BE SUITABLE FOR 200 PSIG WOG AND 250 F.

SHUTOFF VALVE
1. BALL VALVE, 2" AND SMALLER: TWO-PIECE BRONZE OR FORGED BRASS BODY WITH PTFE SEATS, PRESSURE RATED TO 150 SWP/600 WOG, FULL PORT, BLOWOUT-PROOF STEM AND POSITIVE SHUT-OFF. PACKING GLAND WITH PTFE PACKING. STEM EXTENSION WHERE INSULATED, LOCKABLE HANDLE WHERE REQUIRED.
2. BUTTERFLY VALVE, 2-1/2" AND LARGER: FULL LUG TYPE, DUCTILE IRON BODY, 250 F SERVICE; ALUMINUM BRONZE DISK, STAINLESS STEEL STEM; CORROSION RESISTANT BEARINGS, EPDM SEAT, EXTENDED NECK FOR 2" INSULATION, CAPABLE OF BI-DIRECTIONAL DEAD END SERVICE TO FULL RATED WORKING PRESSURE OF THE VALVE UPON REMOVAL OF DOWNSTREAM FLANGE.

BALANCING VALVE
1. 2" AND SMALLER: FULL PORTED BALL VALVE WITH BALANCING STOPS.
2. 2-1/2" AND LARGER: ECCENTRIC PLUG, SEMI-STEEL BODY, RESILIENT PLUG SEALS, CORROSION RESISTANT BEARINGS, ADJUSTABLE MEMORY STOP.

CHECK VALVE
1. 2" AND SMALLER: BRONZE, SWING DISC, SOLDER OR THREADED ENDS.
2. 2-1/2" AND LARGER: IRON BODY, BRONZE TRIM, SWING DISC, RENEWABLE DISC AND SEAT, FLANGED ENDS.
3. SPRING LOADED, SILENT TYPE, CAST IRON BODY WITH BUNA-N SEATS SUITABLE FOR 250 F. WAFER AND DISCS OF ALUMINUM, BRONZE, OR DUCTILE IRON. SHAFT AND SPRINGS TYPE 316 STAINLESS STEEL.

DRAIN VALVE
1. BALL VALVE WITH NIPPLE, CAP, HOSE THREAD.

VALVE OPERATORS
1. BUTTERFLY VALVES: 2-1/2" THROUGH 6" -LEVER LOCK HANDLE WITH TOOTHED PLATE FOR SHUT-OFF SERVICE; INFINITELY ADJUSTABLE HANDLE WITH LOCK NUT AND MEMORY STOP FOR THROTTLING SERVICE. VALVES 8" AND LARGER SHALL BE GEAR OPERATED.
2. PROVIDE VALVES LOCATED MORE THAN 7'-0" FROM FLOOR IN EQUIPMENT ROOM AREAS WITH CHAIN OPERATED SHEAVES. EXTEND CHAINS TO ABOUT 5'-0" ABOVE FLOOR AND HOOK TO CLIPS ARRANGED TO CLEAR WALKING AISLES.
3. AUTOMATIC TEMPERATURE CONTROL VALVE SHALL HAVE ELECTRONIC ACTUATORS FOR MODULATING OR OPEN/CLOSE SERVICE.

INSTALLATION
1. PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZE VALVES.
   A. 2" AND SMALLER: THREADED OR SOLDERED.
   B. 2-1/2" AND LARGER: FLANGED.
2. SOLDER OR SCREW TO SOLDER ADAPTERS FOR COPPER TUBING.
3. USE GROOVED BODY VALVES WITH GROOVED JOINT PIPING.
4. USE BUTTERFLY VALVE WITH TAPPED LUG BODY WHEN USED FOR ISOLATING SERVICE.
5. WHEN POSSIBLE INSTALL BUTTERFLY VALVES 8" AND LARGER WITH STEMS IN THE HORIZONTAL POSITION AND THE BOTTOM OF THE DISC OPENING DOWNSTREAM.
6. INSTALL PLUG VALVES USED FOR COMBINATION ISOLATION AND BALANCING DUTY CONSISTENT WITH FLOW DIRECTION ANTICIPATED DURING ISOLATION, NOT NORMAL DUTY.
7. PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES, LOW POINTS OF PIPING AND APPARATUS.
8. REMOVE STEMS AND BONNETS FROM SOLDER END VALVES DURING INSTALLATION.
9. USE SPRING LOADED CHECK VALVES AT PUMPS AND WHERE INSTALLED IN VERTICAL POSITION.

EXPANSION COMPENSATION

DESIGN CRITERIA
1. BASE EXPANSION CALCULATIONS ON 40 F INSTALLATION TEMPERATURE TO 200 F FOR HOT WATER HEATING. INCLUDE 30% SAFETY FACTOR.

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
   A. FLEXIBLE PUMP AND PIPE CONNECTORS.
   B. EXPANSION JOINTS.

ACCEPTABLE MANUFACTURES
1. FLEXONICS
2. GARLOCK
3. HYSPAN

FLEXIBLE PUMP AND PIPE CONNECTORS
1. HOSE AND BRAID, THREADED MALE NIPPLES 2" AND SMALLER, FLANGED CONNECTIONS 2-1/2" AND LARGER. STAINLESS STEEL HOSE FOR STEEL PIPING. BRONZE INNER HOSE FOR COPPER PIPING.
2. NEOPRENE SINGLE-SPHERE UNIT WITH 150 PSIG ASA STEEL FLOATING FLANGES, 150 PSIG MAXIMUM OPERATING PRESSURE, 220 F MAXIMUM OPERATING TEMPERATURE. MAXIMUM ALLOWABLE MOVEMENT LIMITS: 3/8" AXIAL COMPRESSION, 1/4" AXIAL ELONGATION, 3/8" LATERAL MOVEMENT, 15 DEGREE ANGULAR MOVEMENT.

EXPANSION LOOPS
1. FLEXIBLE LOOPS SHALL BE DESIGNED TO IMPART NO THRUST LOADS ON THE ANCHORS. THE LOOPS SHALL CONSIST OF TWO FLEXIBLE SECTIONS OF STAINLESS STEEL HOSE AND BRAID, TWO 90 DEGREE ELBOWS AND A 180 DEGREE BEND FITTING. LOOPS SHALL BE INSTALLED IN A NEUTRAL, PRE-COMPRESSED OR PRE-EXTENDED CONDITION AS REQUIRED FOR APPLICATION. INSTALL AND GUIDE PER MANUFACTURER'S RECOMMENDATIONS.

CONNECTIONS
1. PROVIDE DEVICES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZED UNITS.

INSTALLATION
1. INSTALL FLEXIBLE PIPE CONNECTORS ON PIPES CONNECTED TO EQUIPMENT SUPPORTED BY VIBRATION ISOLATORS.
2. INSTALL FLEXIBLE CONNECTORS AT RIGHT ANGLES TO DISPLACEMENT. INSTALL ONE END IMMEDIATELY ADJACENT TO ISOLATED EQUIPMENT AND ANCHOR OTHER END.
3. INSTALL PIPING, ANCHORS, GUIDES TO CONTROL EXPANSION AND CONTRACTION OF PIPING INCLUDING LOOPS, PIPE OFFSETS, SWING JOINTS.
4. RIGIDLY ANCHOR PIPE TO BUILDING STRUCTURE WHERE NECESSARY. PROVIDE PIPE GUIDES SO MOVEMENT TAKES PLACE ALONG AXIS OF PIPE ONLY.

SUPPORTS, ANCHORS, SEALS

WORK INCLUDED
1. PIPE HANGERS AND SUPPORTS.

REFERENCE STANDARDS
1. PIPE SUPPORTS: CURRENT ANSI STANDARD.
2. FIRE BARRIER PRODUCTS: CURRENT ASTM AND UL STANDARDS.

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR PREFABRICATED EQUIPMENT SUPPORTS.

PIPE HANGERS AND SUPPORTS
1. HANGERS, PIPE SIZES TO 1-1/2": ADJUSTABLE STEEL RING (INSULATED PIPE) OR BAND (UNINSULATED PIPE).
2. HANGERS, HOT PIPE SIZES 2" TO 4" AND ALL COLD PIPE SIZES: ADJUSTABLE STEEL CLEVIS.
3. HANGERS, HOT PIPE SIZES 5" AND OVER: ADJUSTABLE STEEL YOKE AND CAST IRON ROLL.
4. MULTIPLE OR TRAPEZE HANGERS:
   A. TRAPEZE HANGERS SHALL BE CONSTRUCTED FROM 12 GAUGE ROLL FORMED ASTM A570 GR. 33 STRUCTURAL STEEL CHANNEL 1-5/8" X 1-5/8" MINIMUM.
   B. MOUNT PIPES TO TRAPEZE WITH TWO PIECE PIPE STRAPS SIZED FOR OUTSIDE DIAMETER OF PIPE OR INSULATION (IF PIPES ARE REQUIRED TO BE INSULATED). FOR PIPE REQUIRED TO BE INSULATED, PROVIDE A 360 DEGREE 12" LONG GALVANIZED METAL SHIELD SURROUNDING A 360 DEGREE INSERT OF HIGH DENSITY CALCIUM SILICATE INSULATION OF THE SAME THICKNESS AS THE ADJOINING PIPE INSULATION.
   C. FOR PIPES SUBJECTED TO AXIAL MOVEMENT:
      - STRUT MOUNTED ROLLER SUPPORT FOR PIPES 5" AND OVER. USE PIPE PROTECTION SHIELD OR SADDLES ON INSULATED LINES.
      - STRUT MOUNTED PIPE GUIDE.
5. WALL SUPPORT, PIPE SIZES TO 3": CARBON STEEL HOOK.
6. WALL SUPPORT, PIPE SIZES 4" AND OVER: WELDED STEEL BRACKET AND PIPE STRAP. ADJUSTABLE STEEL YOKE PIPE ROLL OR ROLLER CHAIR FOR HOT PIPE SIZES 5" AND OVER.
7. VERTICAL SUPPORT: STEEL RISER CLAMP.
8. FLOOR SUPPORT, HOT PIPE SIZES TO 4" AND ALL COLD PIPE SIZES: CARBON STEEL, ADJUSTABLE PIPE SADDLE, LOCKNUT NIPPLE, FLOOR FLANGE, CONCRETE PIER OR STEEL SUPPORT SIZED FOR PIPE ELEVATION.
9. FLOOR SUPPORT, HOT PIPE SIZES 5" AND OVER: ADJUSTABLE ROLLER STAND AND BASE PLATE, STEEL SCREWS, CONCRETE PIER OR STEEL SUPPORT SIZED FOR PIPE ELEVATION.
10. FOR PIPE SIZES 1-1/2" AND SMALLER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG SHEET METAL SHIELD. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL.
11. FOR PIPE SIZES 2" AND LARGER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG GALVANIZED SHEET METAL SHIELD SURROUNDING 180 DEGREE INSERT OF HIGH DENSITY CALCIUM SILICATE INSULATION OF SAME THICKNESS AS ADJOINING PIPE INSULATION. ON COLD PIPING, EXTEND INSULATION INSERT 1" BEYOND SHEET METAL SHIELD AT EACH END. OVERSIZE HANGERS TO ACCOMMODATE SHIELDED INSERTS. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL. AT CONTRACTOR'S OPTION, PRE-MANUFACTURED THERMAL HANGER SHIELDS WITH INTEGRAL VAPOR BARRIER, EQUIVALENT TO VALUE ENGINEERED PRODUCTS PRO-SHIELD OR PRO-SHIELD N/T, MAY BE UTILIZED. FOR EXTERIOR INSTALLATIONS USE WEATHER SHIELD WITH ALUMINUM JACKET.
12. PROVIDE COPPER PLATED HANGERS AND SUPPORTS FOR COPPER PIPING WHERE PIPING AND HANGER ARE IN DIRECT CONTACT WITH ONE ANOTHER.

PIPE HANGER RODS
1. THREADED STEEL.

UPPER ATTACHMENTS
1. STEEL STRUCTURE: BEAM CLAMP OR C-CLAMP WITH RETAINING STRAP.
2. CONCRETE STRUCTURE: DROP-IN ANCHOR, ZINC PLATED CARBON STEEL BODY WITH FLANGED TOP, FOUR WAY EXPANSION SLOTS.
3. WOOD STRUCTURE: ANGLE CLIP - MINIMUM 1-1/2" BY 1-1/2" BY 3/16" THICK WITH TWO LAG OR WOOD SCREWS INTO WOOD MEMBER, PENETRATED A MINIMUM OF 2" INTO WOOD. FOR NOMINAL 2" LUMBER (1-1/2" THICK) THROUGH-BOLT WITH MINIMUM 1/4" DIAMETER MACHINE SCREW AND MINIMUM 1" OD FLAT WASHER EACH SIDE. DOUBLE-NUT THREADED ROD THROUGH ANGLE CLIP.

ANCHORS
1. USE ANCHORS FOR SUSPENDING HANGERS FROM REINFORCED CONCRETE SLABS, AND SIDES OF REINFORCED CONCRETE BEAMS.
2. REVIEW ANCHOR LOCATIONS, DEPTHS WITH ARCHITECT AND STRUCTURAL ENGINEER BEFORE INSTALLATION.
3. INSTALL PER MANUFACTURER'S DESIGN CRITERIA, INSTALLATION INSTRUCTIONS.

PIPE HANGERS AND SUPPORTS
1. SUPPORT HORIZONTAL PIPING AS FOLLOWS:

PIPE HANGER AND SUPPORT CHART

NOMINAL PIPE SIZE	MAXIMUM HANGER SPACING		HANGER ROD DIAMETER
	STEEL	COPPER	
1-1/4" AND SMALLER	6'-0"	6'-0"	3/8"
1-1/2" TO 4"	12'-0"	12'-0"	3/8"
5" TO 8"	12'-0"	12'-0"	1/2"
10" TO 12"	12'-0"	12'-0"	5/8"

2. PLACE HANGER WITHIN 1'-6" OF EACH ELBOW OR TEE.
3. USE HANGERS WHICH ARE VERTICALLY ADJUSTABLE 1-1/2" MINIMUM AFTER PIPING IS ERECTED.
4. SUPPORT VERTICAL PIPING AT EVERY FLOOR.
5. SUPPORT EACH BRANCH PIPE TO EQUIPMENT AT TAKE-OFF AND WITHIN 12" OF TERMINATION.
6. PROVIDE GALVANIZED STEEL INSULATION PROTECTION SADDLES AT ALL SUPPORT POINTS FOR INSULATED PIPES ON TRAPEZE HANGERS.
7. ANCHOR ALL SUPPORTING LUGS OR GUIDES TO BUILDING STRUCTURE.
8. PROVIDE MULTIPLE OR TRAPEZE HANGERS WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT SAME ELEVATION. SPACE TRAPEZE HANGERS BASED UPON SMALLEST PIPE SIZE.
9. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.
10. REPAIR ANY FIRE RATED COATING TO STRUCTURE DAMAGED DURING INSTALLATION OF ATTACHMENTS.

FLASHING AND SAFING
1. WHERE EXPOSED PIPING PASSES THROUGH WALLS, FLOORS OR ROOFS, PROVIDE CHROME PLATED OR STAINLESS STEEL ESCUTCHEON FOR PIPING.
2. PROVIDE SOUND RATED FLASHING AROUND PIPES PASSING FROM EQUIPMENT ROOMS, INSTALLED PER MANUFACTURER'S DATA FOR SOUND CONTROL TO MEET THE ATTENUATION SPECIFIED ON ARCHITECTURAL DRAWINGS FOR THE DESIGNATED WALL.
3. FLASH AND COUNTERFLASH WHERE MECHANICAL EQUIPMENT PASSES THROUGH WEATHER- OR WATER-PROOFED WALLS, FLOORS AND ROOFS.

SUPPORTS, ANCHORS, SEALS (CONT.)

SLEEVES
1. PROVIDE PIPE SLEEVES TO APPLICABLE TRADES WITH PRECISE ROUGH-IN LOCATIONS FOR PIPES PASSING THROUGH CONCRETE OR MASONRY CONSTRUCTION. UNLESS OTHERWISE INDICATED, SLEEVES SHALL BE OF SIZE TO PROVIDE FROM 1/4" TO 1" CLEARANCE BETWEEN BARE PIPE AND SLEEVE OR BETWEEN INSULATION JACKET AND SLEEVE. WHERE PIPE PASSES THROUGH CONCRETE FLOOR, EXTEND SLEEVE MINIMUM 1" ABOVE FINISHED FLOOR.
2. SLEEVES IN BEARING WALLS, WATERPROOF MEMBRANE FLOORS AND WET AREAS SHALL BE STEEL PIPE OR CAST IRON PIPE FOR SMALL PIPES. SLEEVES IN NON-BEARING WALLS, FLOORS AND CEILINGS SHALL BE STEEL PIPE OR CAST IRON PIPE.
3. WHERE UNINSULATED PIPES PENETRATE BEARING WALLS (EXCLUDING FOUNDATIONS), FIRE RATED WALLS, PARTITIONS OR FLOORS, PACK AND SEAL ENTIRE SPACE BETWEEN PIPE AND SLEEVE WITH DOW CORNING 3-6548 SILICONE RTV FOAM, OR 1" MINIMUM THICKNESS OF 3M FIRE BARRIER, CP-25 CAULK, OR 303 PUTTY ON EACH SIDE OF OPENING.
4. ENCASE ALL INSULATED PIPES PENETRATING FIRE WALLS AND FLOORS IN 360 DEGREE METAL-SHIELDED INSULATION INSERTS AS MANUFACTURED BY VALUE ENGINEERED PRODUCTS. PACK AND SEAL SPACE BETWEEN SHIELD AND SLEEVE PER PRECEDING PARAGRAPH. EXTEND INSULATION INSERT ON ALL REFRIGERANT AND CHILLED WATER LINES 1" BEYOND SHEET METAL SHIELD.
5. WHERE PIPE PENETRATIONS OCCUR IN NON_FIRE RATED FLOORS OR WALLS, PACK SPACE BETWEEN PIPE AND SLEEVE OR INSULATION INSERT AND SLEEVE ON EACH END WITH MINERAL WOOL OR OTHER NON-COMBUSTIBLE MATERIAL.
6. PIPE TO SLEEVE CLOSURE FOR PIPES PENETRATING FOUNDATIONS, WATERPROOFING MEMBRANE FLOORS OR WET AREAS SHALL BE "LINK-SEAL."
7. AFTER PAINTING IS COMPLETED, INSTALL CHROME PLATED ESCUTCHEONS ON ALL PIPES PASSING THROUGH FINISHED WALLS AND FLOORS.

METERS AND GAUGES

WORK INCLUDED:
1. PORTABLE INSERTION TYPE THERMOMETERS.
2. CONSTANT READ THERMOMETERS.
3. PORTABLE INSERTION TYPE PRESSURE GAUGES.
4. CONSTANT READ PRESSURE GAUGES.
5. FLOW MEASURING DEVICES.
6. TEST PLUGS.

FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
1. THERMOMETERS
2. PRESSURE GAUGES
3. FLOW MEASURING DEVICES
4. TEST PLUGS

ACCEPTABLE MANUFACTURERS
1. THERMOMETERS: ASHCROFT, DURO, MARSHALLTOWN, TEL_TRU, WEISS, WEKSLER
2. PRESSURE GAUGES: ASHCROFT, DURO, MARSH, MARSHALLTOWN, U.S. GAUGE, WEISS, WEKSLER
3. FLOW MEASURING DEVICES:
   A. 2" AND SMALLER: FLOW DESIGN (FLOWSET), GERAND, GRISWOLD, PRESO
   B. 2-1/2" AND LARGER: BARCO/HYSPAN, FLOW DESIGN (FLOWSET), GERAND, PRESO
5. TEST PLUGS: FAIRFAX COMPANY, PETERSON EQUIPMENT, SISCO, UNIVERSAL LANCASTER

PORTABLE INSERTION TYPE THERMOMETERS
1. 5" STEMS, ACCURATE WITHIN 1% OVER DIAL RANGE, HERMETICALLY SEALED.

CONSTANT READ THERMOMETERS
1. 4-1/2" OR 5" DIAL, SEPARABLE SOCKET CONNECTION, EXTENSION NECK TO CLEAR INSULATION, SWIVEL ANGLE STEM, FULLY ADJUSTABLE, ACCURATE WITHIN 1% OVER DIAL RANGE.
2. 9" ALUMINUM CASE, MERCURY-FILLED TUBE, SEPARABLE SOCKET CONNECTION, EXTENSION NECK TO CLEAR INSULATION, SWIVEL ANGLE STEM, FULLY ADJUSTABLE, ACCURATE WITHIN 1% OVER DIAL RANGE.

PORTABLE INSERTION TYPE PRESSURE GAUGES
1. 4-1/2" DIAL, PHOSPHOR-BRONZE BOURDON TUBE, STAINLESS STEEL MOVEMENT, ACCURATE WITHIN 1/2% OVER SCALE RANGE.

CONSTANT READ PRESSURE GAUGES
1. 4-1/2" OR 5" DIAL, STANDARD BLACK CASE, BRASS PRESSURE SNUBBER AND NEEDLE VALVE. ACCURATE WITHIN 1% OVER MIDDLE HALF OF SCALE RANGE, 2% OVER REMAINDER.

FLOW MEASURING DEVICE
1. 2" AND SMALLER:
   A. ORIFICE OR VENTURI TYPE, FACTORY ASSEMBLED WITH 300 PSIG RATED BALL VALVE OR 125 PSIG RATED MULTI-TURN GLOBE VALVE WITH ADJUSTABLE MEMORY STOP.
   B. SCHRADER TYPE PRESSURE TEST PORTS AND CAPS WITH PORT EXTENSIONS.
   C. CHAINED METAL TAG INDICATING LOCATION, GPM, AND METER READING.
2. 2-1/2" AND LARGER:
   D. FOR EXISTING SYSTEMS: AVERAGING PITOT-TYPE FLOW ELEMENTS, SIMILAR TO ANNUBAR MODEL ANR-C25 FOR HOT WATER AND AWR-C25 FOR CHILLED WATER AND CONDENSER WATER,316 STAINLESS STEEL DIAMOND SHAPED SENSING ELEMENTS. PERMANENT PRESSURE LOSS TO SYSTEM SHALL NOT EXCEED 5" WATER COLUMN.
   E. FOR NEW SYSTEMS: MACHINED AND CALIBRATED VENTURI, PRESSURE DROP RANGE 20" TO 80" WATER COLUMN. COMPLETE WITH 1/4" SAE FLARE SAFETY SHUT-OFF INSTRUMENT VALVES AND SCHRADER TYPE PRESSURE PORTS AND CAPS, CHAINED METAL TAG INDICATING LOCATION, GPM AND METER READING.
   F. FOR NEW SYSTEMS: COMPLETE WITH 1/4" SAE FLARE SAFETY SHUT-OFF INSTRUMENT VALVES AND SCHRADER TYPE PRESSURE TEST PORTS AND CAPS, CHAINED METAL TAG INDICATING LOCATION, GPM, AND METER READING.

TEST PLUGS
1. NORDEL VALVE CORE AND 1/2" NPT BRASS BODY COMPLETE WITH GASKETED CAP, PRESSURE GAUGE ADAPTER.

INSTALLATION
1. MOUNT THERMOMETERS TO BE EASILY READ FROM FLOOR.
2. INSTALL THERMOMETERS IN PIPING WITH WELLS.
3. PROVIDE ONE PORTABLE INSERTION TYPE PRESSURE GAUGE AND THERMOMETER FOR EACH TEN TEST PLUGS INSTALLED.
4. INSTALL FLOW MEASURING DEVICES PER MANUFACTURER'S RECOMMENDATIONS.

MECHANICAL IDENTIFICATION

WORK INCLUDED:
1. PIPING.
2. VALVES.
3. EQUIPMENT.

EXECUTION:

3.01 PIPE IDENTIFICATION
   A. IDENTIFY EACH PIPING SYSTEM AND INDICATE DIRECTION OF FLOW WITH BAND-SECURED OR SNAP-ON PRINTED LABELS IN MECHANICAL ROOM AND OTHER EXPOSED AREAS AND PRESSURE SENSITIVE, SELF-ADHESIVE LABELS IN CONSEALED AREAS. APPLY MARKINGS AFTER PAINTING AND CLEANING OF PIPING AND INSULATION IS COMPLETED.
   B. APPLY LEGEND AND FLOW ARROWS AT VALVE LOCATIONS, AT POINTS WHERE PIPING ENTERS OR LEAVES VALVE OR METER BOX, AT NOT LESS THAN EVERY 30'-0" OF RUN OR AT LEAST ONCE IN EVERY EXPOSED LOCATION. LOCATE MARKINGS FOR MAXIMUM VISIBILITY.
   C. WHEREVER TWO OR MORE PIPES RUN PARALLEL, APPLY MARKINGS IN SAME RELATIVE LOCATION ON EACH.
   D. WORDING/COLOR COMBINATIONS SHALL MEET ANSI SPECIFICATIONS UNLESS COLORS ARE SPECIFIED OTHERWISE.
   E. SIZES OF LETTERING AND FLOW ARROWS SHALL BE AS FOLLOWS:

OUTSIDE DIAMETER OF PIPE OR COVERING (INCLUSIVE)	SIZE OF LETTER	MINIMUM LENGTH OF FLOW ARROW
5/8" TO 2"	1/2"	2-1/2"
2-1/2" AND LARGER	1"	4"

3.02 EQUIPMENT IDENTIFICATION
   A. IDENTIFY EQUIPMENT WITH LAMINATED BLACK PLASTIC TAG WITH ENGRAVED WHITE CORE LETTERING. TAG SHALL INDICATE EQUIPMENT DUTY SUCH AS "HEATING PUMP", "BOILER" AND EQUIPMENT DESIGNATION AS SHOWN ON DRAWINGS. TAGS SHALL HAVE MINIMUM THICKNESS OF 1/16", MINIMUM SIZE OF 1-1/2"x4", WITH MOUNTING HOLES. SECURE TAGS TO EQUIPMENT BY MEANS OF SCREWS, BOLTS OR CHAIN.
   B. IDENTIFY EACH THERMOSTAT AND HUMIDISTAT BY MEANS OF GUN TAG INDICATING CORRESPONDING UNIT WHICH IT CONTROLS. LOCATE TAG INSIDE THE INSTRUMENT COVER.

3.03 VALVE IDENTIFICATION
   A. IDENTIFY EACH AUTOMATIC TEMPERATURE CONTROL VALVE AND EACH MANUALLY OPERATED VALVE BY MEANS OF A BRASS OR ALUMINUM TAG, 1-1/2" ROUND, WITH STAMPED LETTERS 1/2" HIGH, FILLED WITH BLACK PAINT. NUMBER TAGS CONSECUTIVELY. FASTEN WITH CHAINS AND BRASS "S" HOOKS.

3.04 CHARTS AND DIAGRAMS
   A. PROVIDE 8-1/2"x11" CHARTS IN EACH EQUIPMENT ROOM DESIGNATING NUMBER, AREA SERVED, SERVICE OR FUNCTION AND LOCATION OF EACH TAGGED ITEM. FRAME CHARTS AND DIAGRAMS IN METAL FRAMES WITH CLEAR GLASS AND HANG IN LOCATIONS AS DIRECTED.

3.05 WARNING SIGNS
   A. PLACE WARNING SIGNS ON ALL MACHINES DRIVEN BY ELECTRIC MOTORS WHICH ARE CONTROLLED BY FULLY AUTOMATIC STARTERS, PER ARTICLE 3281, GENERAL INDUSTRY SAFETY ORDERS.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL SPECIFICATIONS

35133
11.09.23

M4.0

DIVISION 230000 - HYDRONIC SPECIFICATIONS (CONT.)

WATER TREATMENT

PART 1: GENERAL

1.01 WORK INCLUDED

A. TREATMENT FOR CLOSED SYSTEMS:

1. HEATING WATER SYSTEM.
2. CHILLED WATER SYSTEM.

B. TREATMENT FOR OPEN SYSTEMS:

1. CONDENSER WATER SYSTEM.

1.02 WORK FURNISHED BUT INSTALLED BY OTHERS

A. FURNISH THE FOLLOWING ITEMS TO PIPING CONTRACTOR FOR INSTALLATION:

1. CONDENSER WATER CONTROL SYSTEM.
2. CHEMICAL FEED PUMPS.
3. WATER METER FOR CONDENSER WATER MAKE-UP.
4. CORROSION COUPON RACKS.
5. SOLENOID VALVES.
6. CHEMICAL BYPASS FEEDERS.

B. COORDINATE LOCATION OF RECEPTACLES FOR CONTROLLERS, MONITORS AND PUMPS WITH ELECTRICAL CONTRACTOR.

1.03 QUALITY ASSURANCE

A. THE WATER TREATMENT COMPANY SHALL BE A RECOGNIZED SPECIALIST, ACTIVE IN THE FIELD OF INDUSTRIAL WATER TREATMENT WHOSE MAJOR BUSINESS IS IN THE FIELD OF WATER TREATMENT, AND SHALL HAVE REGIONAL WATER ANALYSIS LABORATORIES, DEVELOPMENT FACILITIES, AND SERVICE DEPARTMENT, PLUS FULL-TIME SERVICE REPRESENTATIVE WITH A MINIMUM OF TEN YEARS EXPERIENCE WITHIN THE LOCAL AREA.
B. ALL PRODUCTS SHALL BE PROVIDED BY A SINGLE CONTRACTOR TO ENSURE A SINGLE SOURCE OF RESPONSIBILITY.
C. WHILE IT IS RECOGNIZED THAT THERE ARE, FOR MOST ITEMS, SEVERAL EQUAL BRANDS AND MANUFACTURERS, THE BIDDERS SHALL FOR THE PURPOSE OF THE BID, OFFER ONLY SPECIFIED EQUIPMENT AND CHEMICALS.

1.04 SUBMITTALS

A. TECHNICAL DATA: SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR THE FOLLOWING ITEMS IN ACCORDANCE WITH THE GENERAL CONDITIONS OF THE CONTRACT:

1. WATER TREATMENT MATERIALS AND EQUIPMENT.
2. CONTROL DIAGRAMS.
3. CHEMICALS AND QUANTITY PROVIDED.

B. OPERATING INSTRUCTIONS AND MAINTENANCE DATA: SUBMIT PRINTED OPERATING INSTRUCTIONS AND MAINTENANCE DATA FOR THE FOLLOWING ITEMS:

1. ALL WATER TREATMENT EQUIPMENT AND PROCEDURES.
2. WATER TREATMENT PROGRAM CONTROL CHART.

1.05 MAINTENANCE SERVICE (OPEN SYSTEMS)

A. PROVIDE THE SERVICES OF A FULLY QUALIFIED FIELD ENGINEER AND LABORATORY AND TECHNICAL ASSISTANCE FROM A FULLY QUALIFIED LABORATORY STAFF FOR A ONE YEAR WARRANTY PERIOD. SERVICES AND ASSISTANCE SHALL INCLUDE THE FOLLOWING:

1. A TWO HOUR MINIMUM TRAINING COURSE FOR THE OPERATING PERSONNEL, INSTRUCTING THEM CLEARLY AND FULLY ON THE INSTALLATION, CARE, MAINTENANCE, TESTING AND OPERATION OF THE WATER TREATMENT SYSTEMS. THE TRAINING COURSE SHALL BE ARRANGED AT THE START-UP OF THE SYSTEM.
2. QUARTERLY TECHNICAL SERVICE VISITS TO THE JOB SITE OF THE INSTALLATION TO PERFORM FIELD INSPECTIONS AND TO MAKE WATER ANALYSES ON SITE, BOTH OF SUCH COMPLEXITY AS TO EVALUATE THE WATER SYSTEMS OPERATIONS. THE FIELD ENGINEER SHALL DETAIL FINDINGS WITH THE OWNER IN WRITING ON PROPER PRACTICES, CHEMICAL TREATING REQUIREMENTS AND ANY CORRECTIVE ACTIONS NEEDED TO PROTECT THE WATER SYSTEMS FROM SCALE, CORROSION AND FOULING.
3. BE ON CALL AT NO ADDITIONAL COST TO MAKE ON-SITE INSPECTIONS OF EQUIPMENT DURING EMERGENCY OUTAGES. MAKE RECOMMENDATIONS IN WRITING BASED ON THESE INSPECTIONS.

1.06 CHEMICAL STOCK

A. PROVIDE SUFFICIENT CHEMICALS FOR TREATMENT AND TESTING DURING THE ONE YEAR WARRANTY PERIOD. CHEMICALS SHALL NOT BE HARMFUL TO THE SYSTEM IN WHICH THEY ARE USED.

1.07 WARRANTY

A. PROVIDE ONE YEAR WARRANTY ON ALL CHEMICAL FEED EQUIPMENT.

PART 2: PRODUCTS

2.01 ACCEPTABLE WATER TREATMENT SUPPLIERS

A. CALCIUM CONTROL, INC.
B. ROCKY MOUNTAIN AQUATECH.
C. MILE HI WATER TEC, INC.

2.02 PRE-STARTUP CLEANING AND FLUSHING

A. PROVIDE A PRE-STARTUP CLEANER FOR THE FLUSHING AND CLEANING OF ALL NEW WATER SYSTEMS TO REMOVE OIL AND FOREIGN MATTER FROM THE PIPING AND EQUIPMENT PRIOR TO THE FINAL FILLING OF THE SYSTEMS. THIS CHEMICAL SHALL NOT BE INJURIOUS TO PERSON, PIPING, PIPE JOINT COMPOUNDS, PACKAGING, COILS, VALVES, PUMPS, AND THEIR MECHANICAL SEALS, TUBES, OR OTHER PART OF THE SYSTEM. THIS CHEMICAL SHALL NOT DAMAGE OR ERODE GALVANIZED COMPONENTS OR EQUIPMENT (I.E. COOLING TOWER).
B. THE WATER TREATMENT COMPANY SHALL FURNISH COMPLETE INSTRUCTIONS DICTATING THE QUANTITIES OF CLEANER TO USE, METHODS, AND DURATION OF THE OPERATIONS. THE WATER TREATMENT FIRM MUST SUBMIT TO THE MECHANICAL CONTRACTOR A COMPLETE ANALYSIS AND REPORT REGARDING CLEANING, FLUSHING, AND LEVEL OF INHIBITOR FOR EACH CLOSED LOOP SYSTEM.

2.03 CHEMICAL FEED EQUIPMENT FOR CLOSED SYSTEMS

A. PROVIDE CHEMICAL BYPASS POT FEEDERS, RATED AT 175 PSIG, FOR THE FOLLOWING CLOSED SYSTEMS:

1. HEATING WATER.
2. CHILLED WATER.
3. CONDENSOR WATER.

2.04 CLOSED SYSTEM WATER TTREATMENT CHEMICALS

A. PROVIDE A NON-CHROMATE, LIQUID NITRATE BASED CORROSION INHIBITOR FOR THE PREVENTION OF CORROSION IN CLOSED SYSTEMS, TO ACHIEVE 700 PPM TOTAL NITRATE LEVEL.

2.05 COOLING TOWER CHEMICAL TREATMENT

A. PROVIDE CHEMICAL TREATMENT, INCLUDING PASSIVATION, TO PREVENT "WHITE RUST" OF GALVANIZED METAL COMPONENTS.
B. PASSIVATION SHOULD INCLUDE EIGHT WEEKS OF COOLING TOWER OPERATION WITH WATER OF NEUTRAL PH, CALCIUM HARNESS OF 100 TO 300 PPM ($CaCO_3$) AND ALKALINITY OF 100 TO 300 PPM ($CaCO_3$). APPLY A CORROSION INHIBITOR TREATMENT OF THE PHOSPHATE/POLYMER/PHOSPHONATE TYPE.

2.06 OPEN CONDENSER WATER SYSTEM TREATMENT CHEMICALS

A. PROVIDE AN ORGANIC PHOSPHORATE BASED SCALE INHIBITOR CONTAINING CORROSION INHIBITORS AND A POLYMER BASED DISPERSANT. THE TREATMENT SHALL BE IN LIQUID FORM AND BE SUITABLE FOR FEEDING INTO THE SYSTEM DIRECTLY FROM THE SHIPPING CONTAINER. THIS CHEMICAL TREATMENT SHALL NOT CONTAIN CHROMATE OR PHOSPHATE. ACID FOR PH CONTROL WILL NOT BE CONSIDERED.
B. PROVIDE LIQUID BIOCIDES OF TWO CHEMICALLY DIFFERENT TYPES OF FORMULATION TO BE USED ON AN ALTERNATING BASIS AND TO BE EFFECTIVE AGAINST ALL NORMALLY ENCOUNTERED ALGAE AND SLIME GROWTHS.

WATER TREATMENT (CONT.)

2.07 OPEN CONDENSER WATER TREATMENT SYSTEM

A. PROVIDE AN AUTOMATIC CONDENSER WATER CONTROL SYSTEM FOR INHIBITOR FEED, BLOWDOWN, AND BIOCIDE FEEDS. INHIBITOR APPLICATION SHALL BE METER ACTIVATED, BLOWDOWN SHALL BE CONDUCTIVITY ACTIVATED, AND BIOCIDE SHALL BE AUTOMATICALLY FED ON AN ALTERNATING BASIS WITH BLOWDOWN LOCKED OUT TO ENSURE PROPER BIOCIDE RETENTION TIME IN THE RECIRCULATING WATER.
B. CONTROL SYSTEM SHALL INCORPORATE SOLID STATE INTEGRATED CIRCUITS AND DIGITAL LED DISPLAYS IN A PAINTED ENCLOSURE. INCLUDE PREWIRED, PRE-PIPED WATER SAMPLE ASSEMBLY
C. TOTAL DISSOLVED SOLIDS CONTROL FOR CONDUCTIVITY SHALL INCLUDE:
1. LED DIGITAL CONDUCTIVITY READOUT DISPLAY (MICROMHO/CM).
2. TEMPERATURE COMPENSATED SENSOR PROBE, COMPATIBLE WITH SAMPLE STREAM MANIFOLD.
3. CONDUCTIVITY RANGE: 0-2000 MMHOS 0-5000 MMHOS.
4. TEST SWITCH FOR SOLENOID BLEED VALVE
5. ILLUMINATED LIGHT TO INDICATE WHEN BLEED VALVE IS OPERATED.
6. ADJUSTABLE HYSTERESIS OR DEAD BAND (INTERNAL).
7. FLOW SWITCH TO DEACTIVATE FEED AND BLEED WHEN THERE IS NO FLOW.

D. INHIBITOR FEED CONTROL BASED ON MAKE-UP VOLUME SHALL INCLUDE:

1. PROGRAMMABLE PRECISION RESET TIMER.
2. TEST SWITCH FOR INHIBITOR PUMP.
3. ILLUMINATED LIGHT TO INDICATE WHEN INHIBITOR PUMP IS ACTIVATED.

E. BIOCIDE PROGRAMMER SHALL INCLUDE:

1. 24 HOUR TIMER WITH 14 OR 28 DAY SKIP FEATURE TO PERMIT BIOCIDE ACTIVATION ANY TIME OF THE DAY.
2. PRECISION SOLID STATE BLEED LOCK-OUT TIME AND BIOCIDE PUMP TIMER, CLOCK CONTROLLED.
3. SOLID STATE ALTERNATOR TO ENABLE THE USE OF TWO DIFFERENT FORMULATIONS.
4. INDICATORS TO SHOW THE STATUS OF THE BIOCIDE OPERATIONS. INDICATORS SHALL BE ILLUMINATED WHENEVER A BIOCIDE FUNCTION IS ACTIVE.

F. PROVIDE A WATER METER OF SUFFICIENT SIZE ON SYSTEM MAKE-UP, WIRED TO CONTROL SYSTEM.
G. PROVIDE THREE CHEMICAL FEED PUMPS TO INJECT CHEMICALS DIRECT FROM THE SHIPPING DRUMS INTO THE CONDENSER WATER.
H. PROVIDE A BLOWDOWN CONTROL ASSEMBLY OF SUFFICIENT SIZE INCLUDING A CAST IRON PIPE STRAINER WITH 20 MESH SCREEN, AND SOLENOID VALVE.
I. PROVIDE A PVC PIPING MANIFOLD SYSTEM INCLUDING A FLOW SWITCH. CONDUCTIVITY PROBE, AND SAMPLE COCK. THE MANIFOLD SYSTEM SHALL BE ATTACHED TO THE SIDE OF THE CONTROLLER, PREWIRED, AND PREPIPED.

2.08 OPEN CONDENSER WATER SIDESTREAM FILTER SYSTEM

A. GENERAL: FILTER SYSTEM SHALL CONSIST OF PRESSURE VESSEL WITH PERMANENT MEDIA (SAND), PREFILTER WITH REMOVABLE BASKET, PUMP, CONTROL VALVES, OPERATING CONTROLS.

B. COMPONENTS

1. PRESSURE VESSEL: 30" DIAMETER CYLINDER, 16 GAUGE 304 STAINLESS STEEL, REMOVABLE TOP JOINED WITH STAINLESS STEEL COMPRESSION BAND. INCLUDE AUTOMATIC AIR VENT, MANUAL AIR VENT, PRESSURE GAUGE ON TOP OF FILTER.
2. MEDIA: SHARP SILICA SAND WITH MINIMUM 90% PASSING THROUGH 20 MESH SCREEN.
3. OVERDRAIN AND UNDERDRAIN ASSEMBLIES: PVC.
4. PRESTRAINER: 6" DIAMETER, BRONZE, WITH CLAMP_ON CLEAR LEXAN LID, CORROSION RESISTANT NORYL BASKET.
5. PUMP: ALL BRONZE CONSTRUCTION WITH SEMI_OPEN FACE IMPELLER. PUMP MOTOR: TEFC, SUITABLE FOR OUTDOOR SERVICE.
6. INTERCONNECTING PIPING: FACTORY ASSEMBLED, SCHEDULE 80 PVC, WITH BRONZE BODIED SIGHT GLASS FOR FIELD INSTALLATION ON BACKWASH LINE.
7. FURNISH TWO INTERLINKED 3_WAY BALL VALVES WITH ELECTRIC ACTUATOR. VALVES SHALL HAVE TWO POSITIONS: ONE TO ALLOW LIQUID TO BE FILTERED, THE OTHER FOR REVERSE OF LIQUID FLOW FOR CLEANING OF FILTER MEDIA. VALVES: BRONZE CONSTRUCTION, CHROME_PLATE BALLS, TEFLON SEATS.
8. MOUNT COMPONENTS ON COMMON ABS BASE.

C. AUTOMATIC BACKWASH SYSTEM

1. FACTORY PIPED AND WIRED.
2. ENCLOSED PRESSURE SWITCH: NEMA_4, ADJUSTABLE FROM 0 TO 30 PSIG.
3. BACKWASH AND MOTOR CONTROLS: NEMA_4 ENCLOSURE, FUSIBLE DISCONNECT SWITCH (OPERABLE WITHOUT OPENING PANEL), THERMAL OVERLOAD PROTECTION FOR PUMP MOTOR, ADJUSTABLE BACKWASH TIMER, PUSH_BUTTON SWITCH FOR MANUAL BACKWASH CONTROL, INDICATING DEVICE FOR FILTER STATUS.

D. EACH UNIT SHALL BE FULLY ASSEMBLED (EXCEPT MEDIA), TESTED, ADJUSTED AT FACTORY.

2.09 COUPON RACK

A. A TWO TIER CORROSION COUPON RACK SHALL BE PROVIDED TO MONITOR THE CHEMICAL TREATMENT PROGRAM IN THE CONDENSER WATER, CHILLED WATER, AND HOT WATER SYSTEMS. THE RACK SHALL BE CONSTRUCTED OF SCHEDULE 80 WITH TWO COUPON HOLDERS. THE INLET AND OUTLET SHALL BE 3/4" NPT WITH A 0-10 GPM FLOW INDICATOR. METALLURGY OF THE TWO COUPON PER RACK SHALL BE STEEL AND COPPER.

2.10 WATER TREATMENT CONTROL TESTING EQUIPMENT

A. PROVIDE TESTING CHEMICALS TO PROPERLY ANALYZE THE OPEN CONDENSER WATER FOR ORGANIC PHOSPHORATE AND THE CLOSED WATER SYSTEM FOR NITRATE. FURNISH THE NECESSARY TEST KITS FOR THESE TESTS.
B. PROVIDE A MYRON-L TDS METER, THREE RANGE, 0-50, 0-500, AND 0_5,000 MMHOS/CM AUTO-TEMP COMPENSATION 50-160 F, 9 VOLT TRANSISTOR BATTERIES, AND BUILT-IN CELL.
C. FURNISH A SUPPLY OF LOG SHEETS ON WHICH TO RECORD THE TEST RESULTS AND A BOUND COPY OF FULL TEST INSTRUCTIONS.

PART 3: EXECUTION

3.01 INSTALLATION

A. AT CONTRACTOR'S OPTION, THE WATER TREATMENT COMPANY MAY PERFORM ALL SERVICES SPECIFIED IN GLYCOL SYSTEM SECTION.
B. THE WATER TREATMENT SUBCONTRACTOR SHALL SUBMIT A COMPLETE REPORT, INCLUDING ANALYSIS, TO THE MECHANICAL CONTRACTOR. INCLUDE A COPY IN THE OPERATION AND MAINTENANCE MANUALS.

MECHANICAL INSULATION

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR INSULATION.

2. SUBMITTALS SHALL INDICATE COMPLETE MATERIAL DATA PROPOSED AND THICKNESS OF MATERIAL FOR INDIVIDUAL SERVICES.

QUALITY ASSURANCE
1. INSULATING MATERIALS AND FINISHES SHALL COMPLY WITH APPLICABLE CODES.

2. DETERMINE THAT CODE AUTHORITIES WILL APPROVE ANY PRODUCT INSTALLED.

JOB CONDITIONS
1. PERFORM WORK AT AMBIENT AND EQUIPMENT TEMPERATURES AS RECOMMENDED BY MANUFACTURER.

ACCEPTABLE MANUFACTURERS
1. CERTAINTEED
2. KNAUF
3. OWENS-CORNING
4. JOHNS MANVILLE

GENERAL
1. ADHESIVES AND INSULATION MATERIALS: COMPOSITE FIRE AND SMOKE HAZARD RATINGS MAXIMUM 25 FOR FLAME SPREAD AND 50 FOR SMOKE DEVELOPED. ADHESIVES SHALL BE WATERPROOF.

MECHANICAL INSULATION (CONT.)

MATERIALS AND COMPONENTS
1. PIPE INSULATION
A. TYPE A: HEAVY DENSITY ONE_PIECE FIBERGLASS, FACTORY APPLIED VAPOR BARRIER JACKET, DOUBLE SURFACE ADHESIVE SELF_SEALING LAP, "K" FACTOR 0.23 AT 75 F MEAN TEMPERATURE.

B. INSULATION EXPOSED TO WEATHER: PROTECT INSULATION WITH WEATHERPROOF METAL JACKET. JACKET SHALL BE FACTORY APPLIED ALUMINUM, 0.016" THICK, WITH LAMINATED VAPOR BARRIER AND "Z" GROOVE WATERTIGHT SEAL. SEAL EACH JOINT WITH SNAP STRAPS CONTAINING PERMANENT PLASTIC SEALING COMPOUND. SECURE WITH 1/2" WIDE STAINLESS STEEL BANDS. INSULATE FITTINGS WITH MITERED SECTIONS OF SAME MATERIAL. SEAL JOINTS WITH SEALING COMPOUND AND PREFORMED ALUMINUM BANDS.

2. HOT EQUIPMENT INSULATION
A. TYPE A (60 F - 350 F): SEMI-RIGID, 3 LB. DENSITY FIBERGLASS BOARD, "K" FACTOR 0.23 AT 75 F MEAN OPERATING TEMPERATURE. SECURE INSULATION WITH WELD PINS OR STICK CLIPS ON FLAT SURFACES. POINT ALL JOINTS, FINISH WITH WIRE MESH AND INSULATING CEMENT. COVER WITH GLASS CLOTH.

3. COLD EQUIPMENT INSULATION
A. TYPE A: 1" THICK, 3 LB. DENSITY FIBERGLASS BOARD WITH FACTORY APPLIED VAPOR BARRIER FACING, "K" FACTOR 0.22 AT 75 F MEAN TEMPERATURE, VAPOR TRANSMISSION RATE 0.02 PERMS. SECURE WITH 1/2" STAINLESS STEEL BANDS, WELD PINS, OR STICK CLIPS SPACED 12" APART. POINT ALL VOIDS AND JOINTS, SEAL ALL BREAKS AND JOINTS WITH VAPOR BARRIER MASTIC AND HEAT SEALED TAPE. FINISH WITH TWO COATS OF VAPOR BARRIER MASTIC BETWEEN GLASS CLOTH COVER.

PREPARATION
1. SURFACE SHALL BE CLEAN AND DRY PRIOR TO INSTALLATION. INSULATION SHALL BE DRY BEFORE AND DURING APPLICATION. FINISH WITH SYSTEMS AT OPERATING TEMPERATURES.

INSTALLATION
1. INSULATION SHALL BE CONTINUOUS THROUGH INSIDE WALLS. PACK AROUND PIPES WITH FIREPROOF SELF_SUPPORTING INSULATION MATERIAL, FULLY SEALED.

2. FINISH INSULATION NEATLY AT HANGERS, SUPPORTS, OTHER PROTRUSIONS, AND WHERE THE INSULATION BREAKS FOR SERVICE OR ACCESS REQUIREMENTS.

3. DO NOT INSULATE THE FOLLOWING UNLESS SPECIFIED:
A. DRAIN PIPING DOWNSTREAM OF SYSTEM DRAIN VALVE.
B. RELIEF VALVE AND DISCHARGE PIPING.
C. RADIATION PIPING INSIDE RADIATION COVER.
D. UNIONS AND FLANGED VALVES ON HOT LINES (65 F TO 250 F).
E. STEAM CONTROL VALVE BODIES.
F. BONNET ON SCREWED VALVE BODIES.
G. STEAM TRAPS.
H. EXPANSION JOINTS, FLEXIBLE CONNECTIONS.
I. REMOVABLE PLATES ON CHECK VALVES.

4. DO NOT COVER PIPING UNTIL TESTED.

5. REMOVE AND REAPPLY INSULATION IF, IN OPINION OF ARCHITECT, IT HAS NOT BEEN INSTALLED IN FIRST CLASS WORKMANLIKE MANNER.

6. LOCATE INSULATION SEAMS IN LEAST VISIBLE LOCATIONS.

7. CLEAN INSULATION FINISHES AFTER INSTALLATION, LEAVING CLEAN SURFACE FOR PAINTING. REPLACE SURFACES IF DAMAGED DURING CONSTRUCTION. REAPPLY TAPE FOUND PEELING DURING CONSTRUCTION OR GUARANTEE PERIOD.

8. WHERE REMOVED FOR NEW CONNECTION OR REMODELING, REPLACE EXISTING INSULATION TO MATCH EXISTING THICKNESS, DENSITY, FINISH.

9. REPAIR SEPARATION OF JOINTS OR CRACKING OF INSULATION DUE TO THERMAL MOVEMENT OR POOR WORKMANSHIP.

INSTALLATION OF PIPE INSULATION
1. SEAL LONGITUDINAL LAPS WITH VAPOR BARRIER ADHESIVE OR WITH FACTORY APPLIED DOUBLE SURFACE PRESSURE SENSITIVE ADHESIVE SYSTEM. SEAL END JOINTS WITH 3" WIDE BUTT STRIPS SECURED WITH VAPOR BARRIER ADHESIVE. SEAL ALL SEAMS ON COLD WATER PIPING WITH BENJAMIN FOSTER 30_35 SEAL FAST MASTIC.

INSTALLATION OF INSULATION ON FITTINGS AND VALVES
1. INSULATE FITTINGS AND VALVES WITH FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET AND 25/50 UL RATED PVC FITTING COVERS (ZESTON OR EQUAL).

2. WHERE INSTALLATION OF PVC FITTING COVERS IS PROHIBITED BY LOCAL AUTHORITIES, INSULATE FITTINGS AND VALVES WITH MOLDED FIBERGLASS FITTINGS OR FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET. SECURE IN PLACE WITH 20 GAUGE CORROSION RESISTANT WIRE AND APPLY SMOOTHING COAT OF INSULATING CEMENT. FINISH WITH LAYER OF GLASS CLOTH EMBEDDED BETWEEN TWO COATS OF VAPOR BARRIER MASTIC. LAP GLASS FABRIC 2" ONTO ADJACENT INSULATION.

3. INSULATION ON FITTINGS AND VALVES SHALL BE SAME THICKNESS AS ON PIPE.

4. TROWEL INSULATION CEMENT TO NEAT BEVEL AT UNIONS, FLANGES, AND WHENEVER INSULATION TERMINATES. ALLOW ROOM TO REMOVE FLANGE BOLTS, DISCONNECT UNIONS, ETC.

INSTALLATION OF HOT EQUIPMENT INSULATION
1. CUT, CONTOUR, AND MITER INSULATION BOARD AND APPLY WITH EDGES TIGHTLY BUTTED, JOINTS STAGGERED WHERE TWO OR MORE LAYERS ARE NECESSARY, SECURED WITH 1/2" X 0.015" GALVANIZED STEEL BANDS ON 12" CENTERS OR WITH WELD PINS OR STICK CLIPS WITH WASHERS ON 18" CENTERS.

INSTALLATION OF COLD EQUIPMENT INSULATION
1. CUT AND MITER INSULATION BOARD TO FIT CONTOUR OF VESSEL AND APPLY WITH EDGES TIGHTLY BUTTED, JOINTS STAGGERED WHERE TWO OR MORE LAYERS ARE NECESSARY, SECURED WITH 1/2" X 0.015" GALVANIZED STEEL BANDS ON 12" CENTERS.

2. SEAL ALL JOINTS, BREAKS, PUNCTURES IN FACING WITH FIRE RETARDANT VAPOR BARRIER ADHESIVE AND 4" WIDE FACING MATERIAL TAPE.

3. WHERE MAINTENANCE ACCESS FOR DISASSEMBLY IS REQUIRED ON PUMPS, CHILLERS, ETC., INSTALL INSULATION SO REMOVAL OF INSULATION FROM PARTS IS NOT REQUIRED.

4. IF CHILLER HAS FACTORY APPLIED INSULATION, PROVIDE INSULATION ON ALL COLD PARTS NOT FACTORY INSULATED SUCH AS CHILLER WATER BOXES, CHILLER COOLING LINES, ETC.

PIPE INSULATION CHART

PIPE CLASSIFICATION		PIPE SIZE	INSULATION THICKNESS TYP A - INSULATION
HEATING HOT WATER	LOW PRESS./TEMP. (250F-201F)	TO 2"	1-1/2"
		2-1/2" - 6"	2"
		8" & LARGER	3-1/2"
	LOW TEMP. (200F-120F)	ALL	1-1/2"
CHILLED WATER	---	ALL	1-1/2"
COLD EQUIPMENT INSULATION	CHILLER EVAP.	ALL	1"
	CHILLED WATER PUMP.	ALL	1"
	AIR SEPARATOR	ALL	1"
	EXPANSION TANK	ALL	1"

GLYCOL SYSTEM

WORK INCLUDED
1. FILL TANK, PRESSURE SENSOR, PRESSURE RELIEF VALVE, CHECK VALVE.

2. INHIBITED PROPYLENE GLYCOL SOLUTION.

3. FEED PUMP.

4. SOLUTION TESTER.

SUBMITTALS AND SHOP DRAWINGS
1. FURNISH SHOP DRAWINGS AND MANUFACTURER'S SUBMITTAL DATA FOR GLYCOL AND EQUIPMENT.

WARRANTY
1. REPLACE GLYCOL SOLUTION LOST FROM SYSTEM DURING FIRST YEAR OF OPERATION.

ACCEPTABLE MANUFACTURERS
1. ARCO
2. DOW CHEMICAL

INHIBITED PROPYLENE GLYCOL SOLUTION
1. CORROSION PROTECTION: LESS THAN OR EQUAL TO 5 MIL PER YEAR WHEN LABORATORY TESTED TO ASTM D1384.

GLYCOL FEEDER SYSTEM
1. TANK: POLYETHYLENE, 55 GALLON CAPACITY, SUITABLE FOR 160 F OPERATING TEMPERATURE, WITH HINGED COVER, LEVEL GAUGE, LEVEL MARKINGS ON SIDE OF TANK IN GALLONS, AND LOW WATER LEVEL SWITCH WITH DRY CONTACTS FOR REMOTE ALARM AND PUMP SHUT-OFF.

2. PUMP: POSITIVE DISPLACEMENT ROTARY GEAR TYPE, ALL BRONZE CONSTRUCTION, 1.5 GPM AT 100 PSIG, 1750 RPM, ADJUSTABLE PRESSURE SWITCH, ADJUSTABLE TIME DELAY RELAY.

3. TRANSFER PUMP: HAND OPERATED ROTARY TYPE, 8'-0" LONG 1" HOSE WITH 3/4" NONSPARKING NOZZLE, 1" TELESCOPING SUCTION PIPE, BUNG ADAPTOR WITH 2" THREAD.

SOLUTION TESTER
1. PORTABLE REFRACTOMETER TYPE.

INSTALLATION
1. PERFORM LABORATORY GLYCOL SOLUTION STRENGTH TESTS BEFORE SYSTEM IS TURNED OVER TO OWNER AND AT END OF FIRST YEAR OF OPERATION. REPLENISH AS REQUIRED.

2. SUBMIT A COPY OF LABORATORY REPORT TO OWNER.

HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. AIR VENT.
B. EXPANSION TANK.
C. AIR SEPARATOR.
D. RELIEF VALVE.
E. END SUCTION DIFFUSER
F. PRESSURE REDUCING VALVE.
G. FLOW SWITCH.

1.02 SUBMITTALS

A. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
1. AIR VENT
2. EXPANSION TANK.
3. AIR SEPARATOR.
4. RELIEF VALVE.
5. PUMP INLET FLOW STRAIGHTENING FITTING.
6. PRESSURE REDUCING VALVE.
7. FLOW SWITCH.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. EXPANSION TANK
1. ARMSTRONG
2. AMTROL
3. BELL & GOSSETT
4. TACO

B. AIR SEPARATOR
1. AMTROL
2. ARMSTRONG
3. BELL & GOSSETT
4. TACO ACT

C. RELIEF VALVE
1. BELL & GOSSETT
2. MCDONNELL & MILLER, INC.
3. WATTS REGULATOR CO.

D. END SUCTION DIFFUSER
1. AMTROL
2. ARMSTRONG
3. BELL & GOSSETT
4. TACO

H. PRESSURE REDUCING VALVE
1. ARMSTRONG
2. BELL & GOSSETT
4. TACO
6. WATTS REGULATOR CO.

2.02 MANUAL AIR VENT

A. COIN OR KEY OPERATED TYPE SIMILAR TO BELL & GOSSETT #4V.

2.03 AUTOMATIC AIR VENT

A. FLOAT ACTUATED, CAST IRON BODY, POSITIVE SHUT-OFF AGAINST NEGATIVE PRESSURE, SUITABLE FOR MAXIMUM OPERATING PRESSURE OF 150 PSIG AND MAXIMUM OPERATING TEMPERATURE OF 250 F, SIMILAR TO BELL & GOSSETT MODEL 107A.

2.04 EXPANSION TANK

A. CLOSED TYPE, WELDED STEEL RATED FOR WORKING PRESSURE OF 125 PSIG, CLEANED, PRIME COATED, SUPPLIED WITH STEEL SUPPORT SADDLES, TAPPINGS FOR INSTALLATION OF ACCESSORIES, GAUGE GLASS SET CONSISTING OF BRASS COMPRESSION STOPS AND GUARD.

2.05 AIR SEPARATOR

A. TANGENTIAL AIR SEPARATOR: CAST IRON OR STEEL TANK, REMOVABLE GALVANIZED STEEL STRAINER, PERFORATED STAINLESS STEEL AIR COLLECTOR TUBE, ASME RATED FOR 125 PSIG WORKING PRESSURE.

2.06 END SUCTION DIFFUSER

A. ANGLE TYPE CAST IRON BODY AND COVER WITH SUITABLE NPT, FLANGED, OR GROOVED PIPE CONNECTIONS, STRAIGHTENING VANES, ORIFICE CYLINDER, 16 MESH BRONZE START-UP STRAINER, AND EPDM O-RING SEALS, SUITABLE FOR 175 PSIG WORKING PRESSURE AND 300 F OPERATING TEMPERATURE. PROVIDE EXTRA SET OF O-RING SEALS FOR START-UP STRAINER REMOVAL.

2.07 PRESSURE REDUCING VALVE

A. ALL BRONZE, SPRING AND DIAPHRAGM, MANUAL ADJUSTMENT FOR OUTLET WATER PRESSURE, INTEGRAL STRAINER, FEMALE THREAD CONNECTIONS, SIMILAR TO BELL & GOSSETT MODEL #12.

2.08 FLOW SWITCH

A. SIMILAR TO MCDONNELL_MILLER NO. FS4_3.

PART 3 EXECUTION

3.01 AIR VENT

A. PROVIDE 1/4" VALVES AT THE HIGH POINTS OF ALL MAINS AND RISERS FOR SYSTEM VENTING. PROVIDE 1/4" OVERFLOW TO NEAREST DRAIN.

B. PROVIDE VENT TUBING TO NEAREST DRAIN FOR AUTOMATIC AIR VENTS AND AIR VENTS IN CONCEALED LOCATIONS.

C. PROVIDE ACCESS TO ALL AIR VENTS.

3.02 END SUCTION DIFFUSER

A. SUPPORT FITTINGS WITH FLOOR MOUNTED PIPE AND FLANGE SUPPORTS. REMOVE START-UP STRAINER AFTER 30 DAYS OPERATION.

3.03 FLOW SWITCH

A. INSTALL IN HORIZONTAL SECTION OF PIPING.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL SPECIFICATIONS

COLORADO REGISTERED 35133 11.09.23 PROFESSIONAL ENGINEER

M4.1

DIVISION 230000 - MECHANICAL SNOW MELT SPECIFICATIONS

SNOW MELT SYSTEM REQUIREMENTS

1.01 WORK INCLUDED

A. ALL LABOR, MATERIALS, TRANSPORTATION, EQUIPMENT, AND SERVICES TO INSTALL A HYDRONIC SNOW MELTING SYSTEM.

1.02 SUBMITTALS

A. MANUFACTURER'S SUBMITTAL DATA SHALL CONSIST OF SHOP DRAWINGS, AND/OR DESCRIPTIONS OF MATERIALS, DETAILS OF INSTALLATION, CAPACITY RATINGS, AND CONTROL SEQUENCING.

1.03 SINGLE SOURCE RESPONSIBILITY

A. COMPONENTS OF THE BURIED TUBING SYSTEM SHALL BE PROVIDED BY ONE MANUFACTURER, INCLUDING TUBE, FITTINGS, MANIFOLDS, CONTROLS, AND OTHER ANCILLARY ITEMS REQUIRED FOR A COMPLETE INSTALLATION.

B. BOILERS, PUMP, EXPANSION TANK AIR SEPARATOR, ETC., SHALL BE APPROVED BY SYSTEM MANUFACTURER.

1.04 MANUFACTURER'S WARRANTY

A. TUBE SHALL CARRY A TWENTY-FIVE (25) YEAR NON-PRORATED WARRANTY AGAINST FAILURE DUE TO DEFECT IN MATERIAL AND WORKMANSHIP OR EXPOSURE TO STRESS CRACKING AGENTS. MANIFOLDS AND OTHER ANCILLARY COMPONENTS SHALL BE WARRANTED FOR 24 MONTHS FROM DATE OF OWNER ACCEPTANCE OF PROJECT.

1.05 SCOPE OF WORK

A. THE SNOWMELT SYSTEM CONTROL PANEL, OUTDOOR SENSOR, AND SNOW/ICE SENSOR SHALL BE FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER. THE BAS CONTRACTOR SHALL INSTALL THE COMPLETE SNOWMELT CONTROL SYSTEM AND SHALL FURNISH ALL CONTROL DEVICES, VALVES, WIRING, AND TUBING NOT FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER.

SNOW MELT SYSTEM PRODUCTS

2.01 TUBE

A. TUBE SHALL BE CROSS-LINKED POLYETHYLENE, WITH MAXIMUM WORKING PRESSURE/TEMPERATURE OF 160 PSI AT 73.4 F, 100 PSI AT 180 F, 80 PSI AT 200 F.

B. THE TUBE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM STANDARD SPECIFICATION F876-01. THE TUBE SHALL BE LISTED TO ASTM BY INDEPENDENT THIRD PARTY TESTING LABORATORY.

C. THE TUBE SHALL HAVE AN OXYGEN DIFFUSION BARRIER CAPABLE OF LIMITING OXYGEN DIFFUSION THROUGH THE TUBE TO NO GREATER THAN 0.10 g / M^3 / DAY AT 104 F WATER TEMPERATURE.

D. THE TUBE SHALL BE A MAXIMUM OF 3/4" DIAMETER IN ACCORDANCE WITH ASTM STANDARD SPECIFICATION AS ABOVE.

E. THE MINIMUM BEND RADIUS FOR COLD BENDING OF THE TUBE SHALL NOT BE LESS THAN SIX (6) TIMES THE OUTSIDE DIAMETER. BENDS WITH A RADIUS LESS THAN STATED SHALL REQUIRE THE USE OF A BEND SUPPORT AS SUPPLIED BY THE TUBE MANUFACTURER.

2.02 MANIFOLDS

A. MULTIPLE CONNECTION MANIFOLDS SHALL BE OF CAST BRASS CONSTRUCTION, MANUFACTURED OF ALLOYS TO PREVENT DEZINCIFICATION, AND SHALL HAVE INTEGRAL CIRCUIT BALANCING VALVES. MANIFOLDS SHALL BE ABLE TO VENT AIR FROM THE SYSTEM AND SHALL BE PROVIDED WITH SUPPORT BRACKETS AND TUBE BEND SUPPORTS. MANIFOLD CIRCUITS SHALL BE ISOLATED FROM SUPPLY AND RETURN TUBING WITH VALVES THAT ARE SUITABLE FOR ISOLATION AND BALANCING.

2.03 FITTINGS

A. FITTINGS SHALL BE MANUFACTURED OF DEZINCIFICATION RESISTANT BRASS. THESE FITTINGS SHALL BE SUPPLIED BY THE TUBE MANUFACTURER. THE FITTINGS SHALL CONSIST OF A COMPRESSION FITTING WITH INSERT COMPRESSION RING AND A COMPRESSION NUT.

2.04 ACCESS COVERS

A. REMOVABLE ACCESS COVERS SHALL BE OF REINFORCED CONCRETE FORMED IN PLACE OR PRE-CAST CONCRETE OVER PIPE CONNECTIONS, FITTINGS, AND DISTRIBUTION MANIFOLDS. THEY SHALL BE BOTH INCONSPICUOUS AND HEAVY ENOUGH TO PREVENT UNAUTHORIZED REMOVAL. TAPERED FORMS FOR COVERS SHALL BE FURNISHED. COVERS SUBJECT TO VEHICULAR TRAFFIC SHALL BE TRAFFIC RATED.

2.05 SNOWMELT CONTROLS

A. PROVIDE A MICROPROCESSOR BASED CONTROL PANEL THAT ACTIVATES THE SNOW MELTING SYSTEM BASED ON SIGNALS FROM A SNOW SENSOR AND AN OUTDOOR AIR TEMPERATURE SENSOR. THE CONTROL PANEL SHALL INCLUDE THE FOLLOWING FEATURES:

1. SELECTABLE LCD DISPLAY OF SLAB SURFACE TEMPERATURE, SURFACE TEMPERATURE SETTING, MELT SEQUENCE TIME REMAINING, ACCUMULATED HOURS OF USE, AND PERCENT HEAT OUTPUT. CONTROL PANEL SHALL BE CAPABLE OF ENABLING OR DISABLING THE SYSTEM AS NECESSARY.
2. STATUS LIGHTS INDICATING POWER ON, REMOTE ENABLE SIGNAL PRESENT, WARM WEATHER CUT-OFF, MELTING MODE ACTIVATED, WATER DETECTED, COLD WEATHER CUT-OFF, IDLING MODE ACTIVATED, PUMP ACTIVATED, SYSTEM MELTING, AND SENSOR FAULT.
3. SLAB SURFACE MELTING TEMPERATURE SETPOINT ADJUSTMENT.
4. SLAB SURFACE IDLING TEMPERATURE SETPOINT ADJUSTMENT.
5. MOISTURE SENSOR SENSITIVITY SETPOINT ADJUSTMENT.
6. MELTING SYSTEM MINIMUM ON TIME ADJUSTMENT.
7. COLD WEATHER CUT-OFF TEMPERATURE SETPOINT ADJUSTMENT.
8. TEST BUTTON TO INITIATE TEST SEQUENCE.

B. PROVIDE AN OUTDOOR AIR TEMPERATURE SENSOR CONSISTING OF A 10,000 OHM THERMISTOR PROTECTED WITHIN A WHITE U.V. RESISTANT PVC PLASTIC ENCLOSURE.

C. PROVIDE A SNOW/ICE SENSOR WHICH SITS FLUSH WITH THE SLAB SURFACE AFTER BEING MOUNTED INTO A SENSOR SOCKET. THE SENSOR SHALL MEASURE SLAB SURFACE TEMPERATURE AND SENSOR CORE TEMPERATURE AND SHALL DETECT MOISTURE ON THE SENSOR SURFACE. THE SENSOR SOCKET SHALL BE CONSTRUCTED OF DIE CAST BRASS.

SNOW MELT SYSTEM INSTALLATION

3.01 INSTALLATION

A. HYDRONIC RADIANT HEAT TUBING LOOPS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.

B. ALL FITTINGS AND MANIFOLDS SHOULD BE ACCESSIBLE THROUGH ACCESS COVERS FOR MAINTENANCE. TUBING LOOPS SHALL BE INSTALLED WITHOUT SPLICES, AS A MINIMUM, FROM THE POINT AT WHICH THE TUBING ENTERS THE MANIFOLD TO THE POINT AT WHICH IT EXITS THE MANIFOLD.

C. INSTALLATION SHALL FOLLOW THE MANUFACTURER'S SHOP DRAWINGS FOR TUBING LAYOUT, TUBE SPACING, MANIFOLD CONFIGURATION, MANIFOLD LOCATION, AND CONTROLS. ALL NOTES ON THE SHOP DRAWINGS SHALL BE FOLLOWED.

D. DISTRIBUTION MANIFOLDS SHALL BE ATTACHED TO SUPPLY AND RETURN MAINS AT ACCESS COVER LOCATIONS. A MINIMUM OF ONE SUPPLY AND ONE RETURN MANIFOLD IS REQUIRED AND FOR ALTERNATE EXPANSION/CONSTRUCTION JOINTS.

E. PIPING SHALL BE ATTACHED TO REINFORCING STEEL USING WIRE TIES. ALL LOOPS SHALL BE FORM A CONTINUOUS CONDUIT WITHOUT JOINTS FROM SUPPLY TO RETURN MANIFOLDS.

F. NO PIPE SHALL EXTEND THROUGH EXPANSION, CONSTRUCTION, OR WORKING JOINTS IN CONCRETE SLAB. COORDINATE EXPANSION JOINTS INSTALLED DURING, OR CUT AFTER, CONCRETE POUR WITH TUBING LAYOUT.

G. ALL PIPE CONNECTIONS, FITTINGS, AND DISTRIBUTION MANIFOLDS SHALL BE FREE OF CONCRETE AND ARRANGED TO BE EASILY SERVICED BY REMOVAL OF POURED-IN-PLACE CONCRETE ACCESS COVERS.

H. COORDINATE SYSTEM FLUSHING AND GLYCOL FILL WORK WITH WATER TREATMENT CONTRACTOR.

I. ALL PIPING CONNECTIONS SHALL BE FIELD WRAPPED WITH INSULATION. WRAP AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

3.02 TESTING

A. THE TUBING SYSTEM SHALL BE PRESSURIZED WITH WATER OR AIR TO A PRESSURE OF 60 PSIG 24 HOURS PRIOR TO ENCASEMENT IN THE CONCRETE SLAB. THE TUBING SYSTEM SHALL REMAIN AT THIS PRESSURE DURING THE SLAB INSTALLATION AND FOR A MINIMUM OF 24 HOURS THEREAFTER TO ENSURE SYSTEM INTEGRITY.

3.03 SYSTEM STARTUP

A. AT STARTUP TIME, THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S RECOMMENDATIONS FOR SYSTEM WATER AND TEMPERATURE BALANCING, RECORD BALANCE SETTINGS AT EACH MANIFOLD LOCATION, AND INCLUDE A COMPLETE RECORD OF THESE SETTINGS IN THE OPERATION AND MAINTENANCE MANUALS.

B. VERIFY CONTROL OPERATION IS IN ACCORDANCE WITH SEQUENCE SPECIFIED.

3.04 SEQUENCE OF CONTROL

A. SNOWMELT SYSTEM CONTROL

B. THE SNOWMELT SYSTEM SHALL BE CONTROLLED BY A MICROPROCESSOR BASED CONTROL PANEL FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER. THE OUTDOOR TEMPERATURE SENSOR AND SNOW/ICE SENSOR SHALL ALSO BE FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER.

C. THE CONTROL PANEL SHALL CONTINUOUSLY MONITOR THE SNOW/ICE SENSOR LOCATED IN THE SLAB. WHEN SNOW, ICE, OR WATER ARE DETECTED THE MELTING MODE SHALL BE INITIATED, UNLESS THE WARM WEATHER OR COLD WEATHER CUT-OFF CONTROLS HAVE BEEN ACTIVATED.

D. IF THE OUTDOOR AIR TEMPERATURE IS ABOVE 40 deg.F (ADJUSTABLE), THE SNOWMELT SYSTEM SHALL ENTER THE WARM WEATHER CUT-OFF MODE. IT SHALL REMAIN THERE UNTIL THE OUTDOOR AIR TEMPERATURE DROPS BELOW THE MELTING TEMPERATURE SETPOINT. THE WARM WEATHER CUT-OFF MODE SHALL DEACTIVATE THE SNOWMELT SYSTEM.

E. THE MELTING MODE SHALL BE CAPABLE OF BEING ACTIVATED EITHER THROUGH THE SNOW/ICE SENSOR OR THROUGH A REMOTE ENABLE SIGNAL FROM THE BAS. WHEN THE MELTING MODE IS ACTIVATED, THE PUMP SHALL BE ENERGIZED AND THE HEAT RELAY SHALL CYCLE ON AND OFF, USING PULSE WIDTH MODULATION (PWM) CONTROL, TO MAINTAIN THE SLAB SURFACE AT THE MELTING TEMPERATURE SETPOINT.

F. THE SLAB SHALL BE MAINTAINED AT AN IDLING TEMPERATURE WHEN THE SNOWMELT SYSTEM IS NOT IN THE MELTING MODE. CONTROL OPERATION IS SIMILAR TO THE MELTING MODE EXCEPT THE SLAB IS MAINTAINED AT A LOWER IDLING TEMPERATURE SETPOINT.

G. IF A SENSOR FAULT OCCURS, A WARNING LIGHT SHALL BE ACTIVATED AT THE CONTROL PANEL.

H. DESIRED SLAB SURFACE MELTING TEMPERATURE, SLAB SURFACE IDLING TEMPERATURE, AND COLD WEATHER CUT-OFF TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE AT THE CONTROL PANEL.

NOTE:

THESE SPECIFICATIONS APPLY TO THE ANTLERS SNOW MELT TUBING EXPANSION. CONTRACTOR SHALL TEST GLYCOL SOLUTION FOR 40% GLYCOL MIXTURE AT THE ANTLER'S EXPANSION.

THESE SPECIFICATIONS APPLY TO THE PARCEL B SNOW MELT EXPANSION. SNOW MELT PIPING FOR THIS PROPERTY SHALL BE INSTALLED, TESTED, DRAINED AND CAPPED FOR FUTURE EXPANSION.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

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MECHANICAL SPECIFICATIONS

M4.2

EXISTING

PANEL "BR" VOLTAGE 120 / 208 V 3 PH 4 W

FLUSH ___ MAIN ___ MLO X

SURFACE X BUS 250A FEED THRU ___ A.I.C. 10,000A

	TYPE	DESCRIPTION	BKR	CIR	LOAD (VA/PHASE) A		B		C		CIR	BKR	DESCRIPTION	TYPE
	M	UPPER SPA JET PUMP	20/2	1	1000	360					2	20	R - CEILING MECH RM	R
	M	-		3			1000	1000			4	20	HEAT CABLE	G
	M	LOWER SPA JET PUMP	20/2	5					1000	696	6	20	HOT WATER CIRC PUMP	M
	M	-		7	1000	360					8	20	R - N MECH ROOM DOOR	R
	M	UPPER SPA CIRC PUMP	20	9			500	0			10	20	SPARE	
	M	LOWER SPA CIRC PUMP	20	11					500	500	12	30/3	GARAGE EXHAUST FAN	R
	G	SPA BOILERS	20	13	200	500					14		-	R
	L	L R - MECH ROOM	20	15			500	500			16		-	R
	G	SNOWMELT BOILER	20	17					200	100	18	20	BOILER	G
	R	R - DECK	20	19	720	100					20	20	R - GFCI	G
	L	L - POLE MOUNTED	20	21			500	0			22	20	SPARE	
	L	L - BOLLARDS	20	23					500	2200	24	30/2	GARAGE HEAT TRACE	G
	G	LTG CONTACTOR	20	25	200	2200					26		-	G
	L	L - SPA	20	27			100	0			28		SPACE	
*	G	BOILER B-1	20	29					1344	0	30		SPACE	
*	M	BOILER PUMP P-1	40/3	31	3038	0					32		SPACE	
	M	-		33			3038	0			34		SPACE	
	M	-		35					3038	0	36		SPACE	
		SPACE		37	0	0					38		SPACE	
		SPACE		39			0	0			40		SPACE	
		SPACE		41					0	0	42		SPACE	
					9678		7138		10078					

LOAD TYPE	CONNECTED KVA A	B	C	TOTAL ALL	FACTOR	DEMAND KVA A	B	C	TOTAL ALL
LIGHTING/CONTINUOUS	0.0	1.1	0.5	1.6	125%	0.0	1.4	0.6	2.0
RECEPTACLE (10KVA OR LESS)	1.9	0.5	0.5	2.9	100%	1.9	0.5	0.5	2.9
RECEPTACLE (OVER 10KVA)	0.0	0.0	0.0	0.0	100%	0.0	0.0	0.0	0.0
HVAC/MOTOR	5.0	4.5	5.2	14.8	100%	5.0	4.5	5.2	14.8
MOTOR(LARGEST)	0.0	0.0	0.0	0.0	125%	0.0	0.0	0.0	0.0
KITCHEN EQUIPMENT	0.0	0.0	0.0	0.0	100%	0.0	0.0	0.0	0.0
MISCELLANEOUS	2.7	1.0	3.8	7.5	100%	2.7	1.0	3.8	7.5
TOTAL KVA	9.7	7.1	10.1	26.9	TOTAL KVA	9.7	7.4	10.2	27.3
					TOTAL AMPERES	80.7	61.8	85.0	85.0

LEGEND L = LIGHTING R = RECEPTACLE M = HVAC / MOTOR K = KITCHEN G = MISCELLANEOUS

* PROVIDE NEW SIEMENS BREAKER. MATCH EXISTING AIC RATING.

ELECTRICAL SYMBOLS LEGEND

ALL SYMBOLS INDICATED IN THE LEGEND MAY NOT NECESSARILY BE USED ON PLANS.

CIRCUITING

SYMBOL	DESCRIPTION
	CIRCUITING DESIGNATION - OPEN:277/480V., SOLID 120/208V.
	CIRCUITING - RUN CONCEALED IN WALL OR CEILING
	CIRCUITING - RUN CONCEALED IN FLOOR OR GRADE
	CONDUIT RISER - TURNED UP, TURNED DOWN
	CIRCUITING - CONTINUED AS DESIGNATED
	CIRCUITING - END CAP

LINETYPES and LINEWEIGHTS

	NEW CIRCUITING - CONTINUOUS AND BOLD
	NEW CIRCUITING - UNDER FLOOR OR GRADE - LARGER DASHED AND BOLD
	EXISTING CIRCUITING - CONTINUOUS AND THIN
	DEMOLITION CIRCUITING - LARGER DASHED AND THIN
	NEW AND RELOCATED DEVICES AND FIXTURES - CONTINUOUS AND BOLD
	EXISTING DEVICES AND FIXTURES - CONTINUOUS AND THIN
	DEMOLITION DEVICES AND FIXTURES - SMALLER DASHED AND THIN

GENERAL

SYMBOL	DESCRIPTION
#	REVISION DELTA
#	DRAWING NOTE
#	MECHANICAL EQUIPMENT
#	KITCHEN EQUIPMENT

TELECOMMUNICATION SYMBOLS

SYMBOL	DESCRIPTION
	TELEPHONE OUTLET, SINGLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
	TELEPHONE/DATA OUTLET, DOUBLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
	DATA OUTLET, SINGLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
	FLOOR DATA OUTLET - (S) SURFACE, (F) FLUSH
	FLOOR TELEPHONE/DATA OUTLET - (S) SURFACE, (F) FLUSH
	CABLE TV OUTLET - (S) SURFACE, (F) FLUSH

POWER SYMBOLS

SYMBOL	DESCRIPTION
	FLOOR MOUNTED JUNCTION BOX
	JUNCTION BOX
	JUNCTION BOX W/ BLANK COVER
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	HALF SWITCHED DUPLEX RECEPTACLE
	DEDICATED DUPLEX RECEPTACLE
	CEILING MOUNTED DUPLEX RECEPTACLE
	FOURPLEX RECEPTACLE
	DEDICATED FOURPLEX RECEPTACLE
	CLG. MOUNTED FOURPLEX RECEPTACLE
	SPECIAL RECEPTACLE - SEE DRAWING NOTES
	FLOOR MOUNTED DEVICE
	FLUSH FLOOR COMBINATION FLOOR BOX
	NON FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MOTOR STARTER
M	MOTOR
	ONE, TWO, and THREE BUTTON PUSH SWITCH
PP	POWER POLE
TC	TIME CLOCK
C	CONTACTOR
M	METER
	PANEL BOARD
	CLOCK
	PULLBOX
	CURRENT TRANSFORMER
T F	TRANSFORMER
WH	WATER HEATER

LIGHTING SYMBOLS

SYMBOL	DESCRIPTION
	RECESS MOUNTED FLUORESCENT STRIP
	SURFACE MOUNTED FLUORESCENT STRIP
	SURFACE MOUNTED 1' x 4' FLUORESCENT
	SURFACE MOUNTED 2' x 2' FLUORESCENT
	RECESS MOUNTED 2' x 4' FLUORESCENT
	RECESS MOUNTED 1' x 4' FLUORESCENT
	CEILING MOUNTED SINGLE FACE EXIT SIGN W/ "FROG EYE"
	CEILING MOUNTED EXIT SIGN
	WALL MOUNT (ANY FIXTURE TYPE)
	EMERGENCY BATTERY PACK, "FROG-EYE"
	EMERGENCY, REMOTE HEAD, SINGLE & DOUBLE
	DOWNLIGHT/PENDANT FIXTURE
	WALL MOUNTED FIXTURE
	WALLWASH DOWNLIGHT
	PORCELAIN KEYLESS LAMPHOLDER
	TRACK LIGHTING
	TRACK LIGHTING, HEAD
	SINGLE ARM SITE LIGHTING - ADDITIONAL ARMS AS REQUIRED
	BUILDING EXTERIOR WALL MOUNTED

SWITCHES

SYMBOL	DESCRIPTION
S	SWITCH, SINGLE POLE
S2	SWITCH, DOUBLE POLE
S3	SWITCH, THREE WAY
S4	SWITCH, FOUR WAY
SD	SWITCH, DIMMER
SK	SWITCH, KEYED
SP	SWITCH, WITH PILOT LIGHT
STO	SWITCH, THERMAL OVERLOAD
SM	SWITCH, MOTOR CONTROL
SV	SWITCH, VARIABLE SPEED CONTROL
SSU	SWITCH, WITH TYPE S FUSE HOLDER (INCLUDE FUSE)
OS	WALL MOUNTED OCCUPANCY SENSOR
	CEILING MOUNTED OCCUPANCY SENSOR

FIRE ALARM SYMBOLS

SYMBOL	DESCRIPTION
	CEILING MOUNTED FIRE SPEAKER/STROBE
	CEILING MOUNTED STROBE
	CEILING MOUNTED FIRE SPEAKER
	REMOTE INDICATOR LAMP
	MANUAL PULL STATION
FS	FLOW SWITCH
TS	TAMPER SWITCH
PS	PRESSURE SWITCH
	CEILING/WALL MOUNTED STROBE
	FIRE HORN
	FIRE HORN WITH STROBE
DH	MAGNETIC DOOR HOLD OPEN
FACP	FIRE ALARM CONTROL PANEL
ANN	ANNUNCIATOR PANEL
	DUCT DETECTOR
	FIRE SMOKE DAMPER
H	HEAT DETECTOR
S	SMOKE DETECTOR
FF	FIREFIGHTER'S PHONE JACK/ WALL PHONE

MISCELLANEOUS SYMBOLS

SYMBOL	DESCRIPTION
CR	CARD READER
RTS	REMOTE TEST SWITCH
TC	TIME CLOCK
	PHOTOCELL
	MUSIC OR PAGING SPEAKER
	THERMOSTAT, LINE VOLTAGE
MS	SECURITY MOTION SENSOR, WALL MOUNTED
	SECURITY MOTION SENSOR, CEILING MOUNTED
EPO	EMERGENCY POWER OFF
	BELL
B	DOORBELL BUZZER
	TELEVISION CABLE OUTLET
	SECURITY CAMERA
I	INTERCOM PUSH BUTTON
MIC	MICROPHONE JACK
	COMBINATION CLOCK/SPEAKER BOX

ONE LINE DIAGRAM SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
PANEL "LA"	PANEL BOARD	100A FRN-R, 100/3	FUSED DISCONNECT SWITCH WITHIN SWITCHBOARD
C T	CURRENT TRANSFORMER ENCLOSURE	SPARE, 100/3	SPARE SWITCH WITHIN SWITCHBOARD
P B	PULL BOX	SPACE, 100/3	SPACE WITHIN SWITCHBOARD
100/3, 100A FRN-R	FUSED DISCONNECT SWITCH		CIRCUIT BREAKER
100/3	NON-FUSED DISCONNECT SWITCH		SERVICE WEATHER HEAD
T F	TRANSFORMER (PLAN VIEW)		CURRENT TRANSFORMER
T F	PAD MOUNTED TRANSFORMER (ONE-LINE)		GROUNDING CONNECTION
	TRANSFER SWITCH	M	MOTOR
	OVERHEAD POLE MOUNTED TRANSFORMER BANK	G	GENERATOR
		M	METER

ABBREVIATIONS

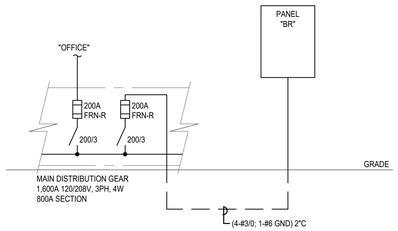
AC	ABOVE COUNTER	C.W.P.	COLD WATER PIPE	EWH	ELECTRIC WATER HEATER	IG	ISOLATED GROUND DEVICE	N.O.	NORMALLY OPEN
A.F.F.	ABOVE FINISHED FLOOR	(E)	EXISTING	FF PT	FLUSH FLOOR POKE THRU	MC	MECHANICAL CONTRACTOR	NTS	NOT TO SCALE
AFCI	ARC FAULT CIRCUIT INTERRUPTER	EPO	EMERGENCY POWER OFF	GC	GENERAL CONTRACTOR	(N)	NEW	(PART)	PARTIAL CIRCUIT
BLDG.	BUILDING	EM	EMERGENCY POWER CIRCUIT	GND	GROUND	N.C.	NORMALLY CLOSED	RL	RELOCATED
CLG.	CEILING MOUNTED	EWC	ELECTRIC WATER COOLER	GFCI/GFI	GROUND FAULT CIRCUIT INTERRUPTER	NIC	NOT IN CONTRACT	RTS	REMOTE TEST SWITCH
						NL	NIGHT LIGHT		

SM	SURFACE MOUNT		
T/D	TELEPHONE AND DATA OUTLET		
TYP	TYPICAL		
UF	UNDER FLOOR		
WP	WEATHERPROOF - NEMA 3R		
WF	WALL PHONE +54" A.F.F.		

2018 INTERNATIONAL BUILDING CODE 2018 INTERNATIONAL ENERGY CONSERVATION CODE
2018 INTERNATIONAL FIRE CODE 2023 NATIONAL ELECTRIC CODE

MECHANICAL EQUIPMENT SCHEDULE

DESIGNATION	DESCRIPTION	VOLTAGE	PH	HP	kVA	FLA (MCA)	CONDUCTORS	CONDUIT	SWITCH	CB	FUSE SIZE/TYPE	REMARKS
B-1	BOILER	120	1	-	-	9.2	2-#12; 1-#12 GND	1/2"	STO	20/1	-	-
P-1	PUMP	208	3	5	-	-	3-#8; 1-#8 GND	1"	60/3	40/3	40A FRN-R	-



ONE-LINE DIAGRAM

SCALE: N.T.S.

NOTE: ALL CONDUCTORS ARE COPPER UNLESS NOTED OTHERWISE.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

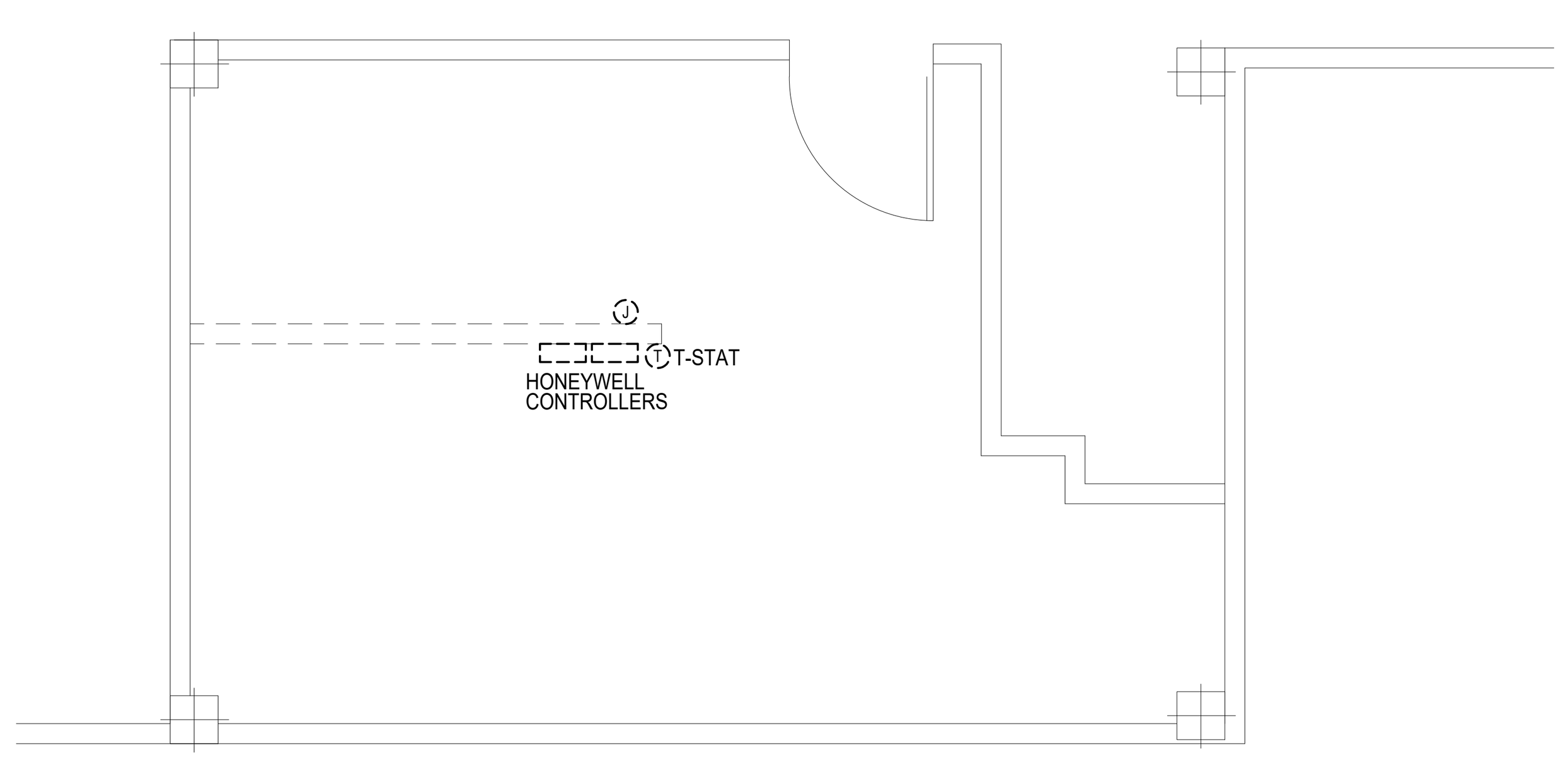
ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: KSP
CHECKED: RCC

ELECTRICAL COVER SHEET

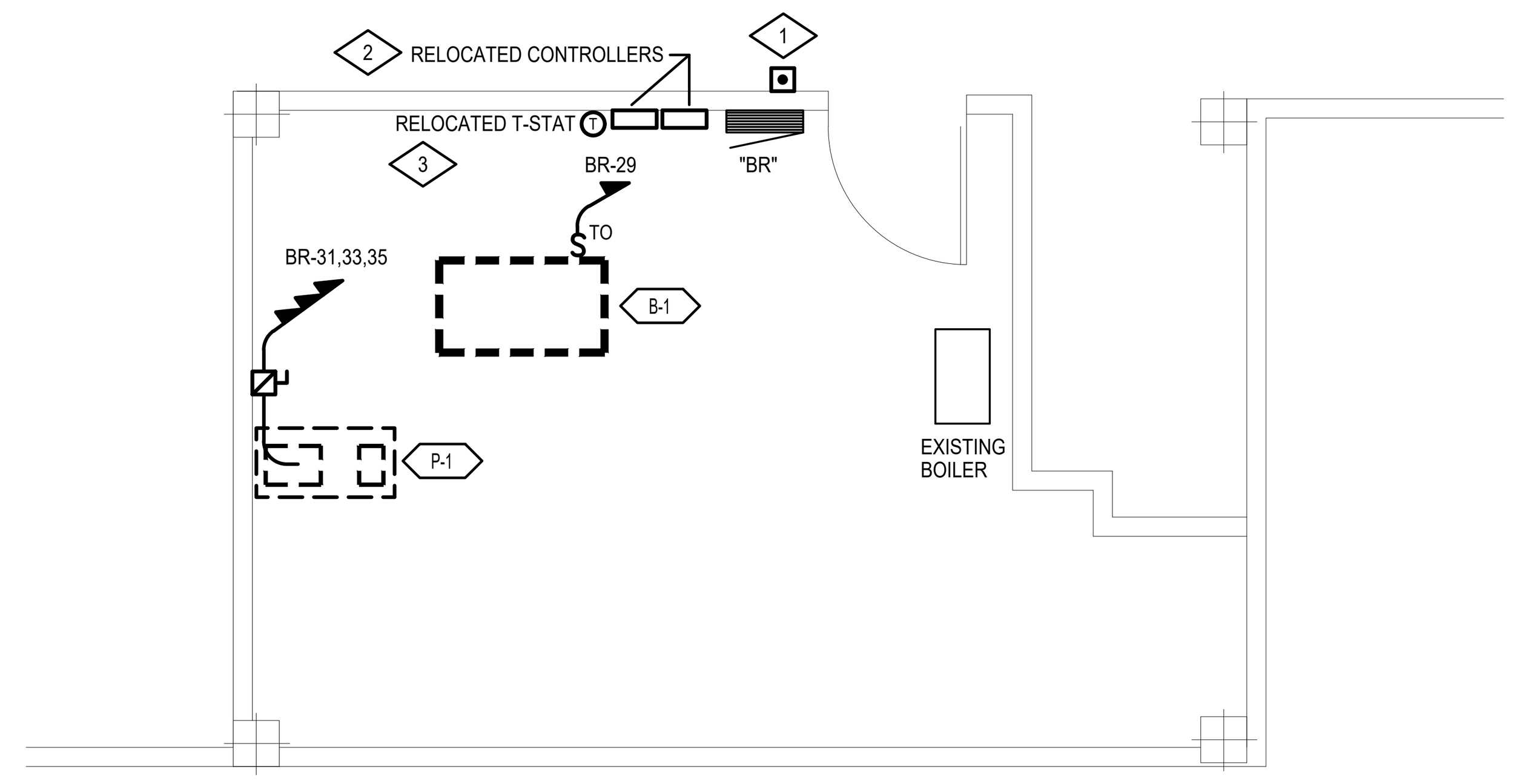
REGISTERED COLORADO PROFESSIONAL ENGINEER 35656 11.08.23

E1.0



BOILER ROOM DEMOLITION PLAN

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



BOILER ROOM EQUIPMENT PLAN

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

DRAWING NOTES

1. NEW EMERGENCY POWER OFF (EPO) SWITCH FOR BOILER SHUT DOWN. PROVIDE PROTECTIVE CASE TO PREVENT ACCIDENTAL ACTIVATION.
2. EXTEND CABLE AND CONDUIT FOR CONTROLLERS AS REQUIRED.
3. EXTEND CABLE AND CONDUIT FOR T-STAT AS REQUIRED.

KEY PLAN

SCALE: NONE

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Centennial, CO 80111 (F) 303.934.3299
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ELECTRICAL - BOILER ROOM PLANS

COLORADO REGISTERED PROFESSIONAL ENGINEER 35656 11.08.23

E2.0

DIVISION 26 - ELECTRICAL SPECIFICATIONS

BASIC ELECTRICAL REQUIREMENTS

GENERAL

1. PRIOR TO SUBMITTING BIDS, THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING ELECTRICAL EQUIPMENT CONDITIONS AND DIFFICULTIES THAT WILL AFFECT EXECUTION OF THE WORK. FIELD VERIFY QUANTITIES OF EXISTING LIGHT FIXTURES, ELECTRICAL DEVICES, COMMUNICATION DEVICES, FIRE ALARM DEVICES, AND ELECTRICAL EQUIPMENT. NOTIFY THE ARCHITECT AND ENGINEER OF ANY EXISTING CONDITIONS, WHICH MODIFY THE SCOPE OF WORK AS SHOWN ON THE CONSTRUCTION DOCUMENTS. SUBMISSION OF A BID PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND LATER CLAIMS FOR MOBILIZATION, LABOR, EQUIPMENT, AND/OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WILL NOT BE RECOGNIZED.

2. ELECTRICAL CONTRACTOR SHALL FULLY COORDINATE WITH OWNER REPRESENTATIVES. ALL ELECTRICAL WORK PERFORMED UNDER THIS CONTRACT SHALL CONFORM WITH LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE, UNIFORM BUILDING CODE OR INTERNATIONAL BUILDING CODE, LOCAL BUILDING AND FIRE DEPARTMENT REQUIREMENTS. PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS OF OWNER REPRESENTATIVES.

3. ELECTRICAL CONTRACTOR SHALL MAINTAIN ON THE JOB AN UP TO DATE SET OF WORKING DRAWINGS, MARKED UP TO SHOW ELECTRICAL SYSTEMS AS INSTALLED. PROVIDE ARCHITECT WITH ONE SET OF REPRODUCIBLES WITH "AS BUILT" PROJECT RECORD AFTER COMPLETION OF PROJECT. INFORMATION CLEARLY INDICATED. INCLUDE DISCREPANCIES IN FEEDER SIZES, EQUIPMENT SIZES AND LOCATIONS, AND DEVICE TYPES AND LOCATIONS.

4. ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LOCAL FEES, PERMITS, AND SERVICES OF INSPECTION AUTHORITIES REQUIRED BY ELECTRICAL WORK FOR THIS ELECTRICAL CONSTRUCTION.

5. REFER TO ARCHITECTURAL AND MECHANICAL EQUIPMENT DRAWINGS FOR EXACT LOCATIONS OF ELECTRICAL DEVICES AND LIGHT FIXTURES. DO NOT SCALE FROM THE ELECTRICAL PLANS. ADDITIONAL ELECTRICAL REQUIREMENTS ON ARCHITECTURAL PLANS, KITCHEN EQUIPMENT PLANS, AND MECHANICAL PLANS SHALL BE INCLUDED IN THE ELECTRICAL CONTRACTOR'S BID.

6. THE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF ELECTRICAL WORK. LOCATIONS ARE APPROXIMATE AND SHALL BE SUBJECT TO MINOR MODIFICATIONS AS DIRECTED BY THE GENERAL CONTRACTOR AND OWNER REPRESENTATIVES. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE EXACT FITTING OF ALL MATERIALS, EQUIPMENT, ETC., IN THE BUILDING AND TENANT SPACE. ALL DIMENSIONS SHALL BE VERIFIED ON THE JOB. ELECTRICAL CONTRACTOR SHALL CUT, CHANNEL, CHASE, AND/OR DRILL FLOORS, WALLS, PARTITIONS, CEILINGS, OR OTHER SURFACES AS REQUIRED FOR INSTALLATION, SUPPORT, ANCHORAGE, ETC., OF WORK. PROVIDE X-RAY OF FLOOR PRIOR TO CORE DRILLS. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUBSEQUENT PATCHING WORK.

7. EXISTING EQUIPMENT IS SHOWN FOR REFERENCE PURPOSES AND SHALL REMAIN. EXISTING EQUIPMENT NOT SHOWN SHALL ALSO REMAIN. EXISTING EQUIPMENT TO REMAIN SHALL BE PROTECTED FROM DAMAGE.

8. WORK SHOWN AS EXISTING CONDITIONS WAS TAKEN FROM OWNER FURNISHED DRAWINGS AND/OR VERIFIED DURING FIELD SURVEY. MEP IS NOT RESPONSIBLE FOR THE ACCURACY OF ANY INFORMATION OR THE ADEQUACY, SAFETY AND CONFORMANCE TO CURRENT PREVAILING CODES OF ANY WORK SHOWN AS EXISTING ON THESE DOCUMENTS.

9. IT IS THE INTENT OF THESE DOCUMENTS TO RESULT IN A COMPLETE ELECTRICAL INSTALLATION IN COMPLETE ACCORDANCE WITH APPLICABLE CODES AND ORDINANCES. THE DRAWINGS ARE DIAGRAMMATIC IN CHARACTER AND DO NOT NECESSARILY INDICATE EVERY REQUIRED JUNCTION BOX, PULL BOX, FITTING, ETCETERA. ITEMS NOT SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOTED ON THE DRAWINGS, BUT WHICH ARE OBVIOUSLY NECESSARY TO MAKE A COMPLETE WORKING INSTALLATION, SHALL BE INCLUDED.

10. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. WHATEVER IS CALLED FOR IN EITHER IS BINDING AS THOUGH CALLED FOR IN BOTH. THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.

11. IF CONFLICTS ARE DISCOVERED IN CONTRACT DOCUMENTS AS WORK PROGRESSES, A SET OF PRINTS MARKED WITH RED PENCIL SHOWING RECOMMENDED MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.

12. IN THE EVENT THAT DISCREPANCIES EXIST OR REQUIRED ITEMS OR DETAILS HAVE BEEN OMITTED, NOTIFY THE ARCHITECT IN WRITING OF SUCH DISCREPANCY OR OMISSION AT LEAST THREE DAYS PRIOR TO BID DATE. FAILURE TO DO SO SHALL BE CONSTRUED AS WILLINGNESS TO SUPPLY NECESSARY MATERIALS AND LABOR REQUIRED FOR THE PROPER COMPLETION OF THIS WORK. FOR DISCREPANCIES WHICH ARE NOT REPORTED BY CONTRACTOR THE MOST STRINGENT REQUIREMENT SHALL APPLY.

13. IN THE EVENT THAT ADDITIONAL INFORMATION IS REQUIRED DURING CONSTRUCTION, REQUEST SUCH INFORMATION FROM THE ARCHITECT IN WRITING PRIOR TO PERFORMING RELATED WORK. THE REQUEST FOR INFORMATION SHALL INCLUDE AN EXPLANATION OF THE INFORMATION REQUIRED INCLUDING REFERENCES TO RELATED PORTIONS OF THE DOCUMENTS AND CONTRACTOR'S RECOMMENDATIONS.

14. THE TERM "PROVIDE" SHALL MEAN FURNISH AND INSTALL ITEMS OR SYSTEMS IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

15. INSTALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS UNLESS LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.

16. PROVIDE APPURTENANCES AND CONSUMABLES AS REQUIRED.

17. WORK SHALL CONFORM TO BASE BUILDING SPECIFICATIONS EXCEPT AS AMENDED BY THESE SPECIFICATIONS. CONTRACTOR SHALL VERIFY EXISTING CIRCUITS PRIOR TO STARTING WORK.

18. COMPLY WITH THE LATEST EDITION OF NATIONAL ELECTRICAL CODE, APPLICABLE STATE AND LOCAL CODES, ORDINANCES AND OSHA REQUIREMENTS.

19. WHERE A CONFLICT EXISTS BETWEEN ANY PREVAILING CODES AND WORK INDICATED ON THESE DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.

20. PAY FOR ALL ELECTRICAL PERMITS, LICENSES AND CONSTRUCTION FEES.

21. EXAMINE SITE AND PREMISES PRIOR TO SUBMISSION OF BID. NO ADDITIONAL COMPENSATION WILL BE MADE FOR EXTRA EXPENSE INCURRED DUE TO FAILURE TO EXAMINE EXISTING SITE CONDITIONS.

22. DEMOLITION OR ABANDONING ANY ELECTRICAL AND COMMUNICATIONS CONDUIT, WIRING, CABLING, OR DEVICE MEANS TO REMOVE IN ITS ENTIRETY. REMOVE UNUSED CONDUITS FROM CEILING SPACES IN AREAS OF WORK. ABANDONED OUTLET JUNCTION BOXES ARE TO BE REMOVED AND COVERED WITH NEW GYPSUM BOARD. ABANDONED POKE THRU OUTLETS SHALL HAVE COVER PLATES AND BE FILLED WITH FIRE RATED FOAM SEALANT TO MAINTAIN FIRE RATING OF FLOOR.

23. ELECTRICAL CONTRACTOR SHALL RE-USE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING WHERE POSSIBLE. RE-USE EXISTING PREFABRICATED LIGHTING SYSTEM CONDUIT AND WIRING WHERE POSSIBLE. RE-ROUTE AND EXTEND AS NECESSARY FOR THIS TENANT FINISH CONSTRUCTION. PROVIDE ADDITIONAL NEW CONDUIT, WIRING, COMPONENTS, AND CONNECTIONS AS REQUIRED FOR COMPLETE AND OPERATIONAL SYSTEMS, TYPICAL.

24. SCHEDULE SERVICE INTERRUPTIONS IN WRITING WITH OWNER AND BUILDING OCCUPANTS ONE (1) WEEK IN ADVANCE.

25. COORDINATE WORK AND POWER OUTAGES WITH BUILDING MANAGEMENT, AFFECTED TENANTS, AND OTHER TRADES.

26. COORDINATE BUILDING ELECTRICAL SERVICE REVISIONS AND ADDITIONS WITH LOCAL UTILITY COMPANY.

27. EQUIPMENT REMOVED IS THE PROPERTY OF THE OWNER AND SHALL BE RETURNED TO THE OWNER FOR DISPOSITION. SALVAGE ALL REMOVED EQUIPMENT FOR OWNER AND STORE IN OWNER DESIGNATED LOCATION. EQUIPMENT NOT RETAINED BY THE OWNER SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.

28. ALL MATERIALS SHALL BE NEW AND BEAR THE "UL" LABEL.

29. PROVIDE SUBMITTALS (ELECTRONIC PDF FORMAT) ON ALL PROPOSED MATERIALS. SUBMITTALS SHALL CLEARLY INDICATE COMPLETE MODEL NUMBERS OF MATERIALS OR EQUIPMENT PROPOSED. SUBMITTALS SHALL BE SUBMITTED WITHIN 10 DAYS OF AWARD OF CONTRACT FOR REVIEW. SUBMITTALS SHALL BE PROVIDED IN A TIMELY MANNER WITH LEAD TIMES FOR MATERIALS AND ADEQUATE TIME FOR ENGINEER REVIEW TAKEN INTO ACCOUNT. CONTRACTOR IS RESPONSIBLE FOR ANY ADDITIONAL COSTS ASSOCIATED WITH EXPEDITING MATERIAL DELIVERIES OR SUBSTITUTIONS OF MATERIALS FROM WHAT WAS SPECIFIED IN THE PLANS OR SPECIFICATIONS.

30. REMOVE ALL REFUSE AND WASTE MATERIAL FROM BUILDING DAILY.

31. LEFT OVER OR REMOVED EQUIPMENT REQUIRING HAZARDOUS WASTE REMOVAL SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR UPON COMPLETION OF THE CONSTRUCTION PROJECT AND DISPOSED OF PER EPA REQUIREMENTS.

32. PROVIDE TEST EQUIPMENT AND CONDUCT NECESSARY TESTING TO DETERMINE CONFORMITY WITH EQUIPMENT SPECIFICATIONS. PERFORM TESTS UNDER OBSERVATION OF OWNER'S REPRESENTATIVE. CORRECT DEFECTS AND RETEST. COMPLETE TESTS TO SATISFACTION OF OWNER'S REPRESENTATIVE.

33. PROVIDE UPDATED, COMPLETE AND ACCURATE TYPED PANELBOARD CIRCUIT DIRECTORIES AT THE COMPLETION OF WORK. CLEARLY LABEL ALL SPACES AND SPARES IN PENCIL. CLEAN EXPOSED PANELBOARD SURFACES AND CHECK TIGHTNESS OF ELECTRICAL CONNECTIONS. REPLACE DAMAGED CIRCUIT BREAKERS AS REQUIRED AND PROVIDE FILLER PLATES FOR VACANT SPACES.

34. PROVIDE UPDATED LABELING OF ALL NEW AND RELOCATED ELECTRICAL EQUIPMENT IN SCOPE OF WORK INCLUDING, BUT NOT LIMITED TO, ENGINE GENERATOR SYSTEMS, TRANSFER SWITCHES, TRANSFORMERS, SWITCHGEAR, SWITCHBOARDS, PANELBOARDS, MOTOR CONTROL CENTERS, AND DISCONNECTS TO INDICATE THE AMPERE RATING, VOLTAGE RATING, PHASE, CONDUCTOR COLOR CODING WITHIN THE EQUIPMENT AND APPLICABLE AIC RATING.

35. GUARANTEE ELECTRICAL INSTALLATION AND ALL WORK UNDER THIS DIVISION (EXCLUDING LAMPS) FOR A PERIOD OF TWO YEARS FROM DATE OF FINAL ACCEPTANCE BY OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP, FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT. REPLACE WORK FOUND DEFECTIVE WITHIN THIS PERIOD PROMPTLY AT NO COST TO OWNER.

36. GUARANTEE ELECTRICAL INSTALLATION AND ALL WORK UNDER THIS DIVISION (EXCLUDING LAMPS) FOR A PERIOD OF TWO YEARS FROM DATE OF FINAL ACCEPTANCE BY OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP, FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT. REPLACE WORK FOUND DEFECTIVE WITHIN THIS PERIOD PROMPTLY AT NO COST TO OWNER.

MATERIALS AND EQUIPMENT

1. WIRE AND CABLE SHALL BE MINIMUM NUMBER 12 AWG COPPER WITH THWN OR THHN INSULATION. NUMBER 10 AWG AND SMALLER WIRE EXCEPT FOR MOTOR CIRCUITS SHALL BE SOLID. LARGER WIRE AND MOTOR CIRCUIT FEEDERS SHALL BE STRANDED. MOTOR CONNECTIONS SHALL BE WITH STRANDED CONDUCTORS. WIRE AND CABLE SHALL BE AS MANUFACTURED BY SOUTHWIRE, OR APPROVED EQUIVALENT.

2. ALL CONDUCTORS SHALL BE THHN/THWN INSULATED COPPER UNLESS OTHERWISE NOTED ON THE DRAWINGS. #12 AWG FOR 120 VOLT, 20 AMPERE CIRCUITS, 75 FEET OR LESS; #12 AWG FOR 277 VOLT, 20 AMPERE CIRCUITS, 150 FEET OR LESS TO FIRST DEVICE, TYPE THHN OR THWN INSULATION. PROVIDE WIRE COLOR CODING AS REQUIRED BY THE NATIONAL ELECTRICAL CODE. ALL WIRING SHALL BE RUN CONCEALED AND IN EMT CONDUIT. ALL HOMERUNS SHALL BE IN EMT CONDUIT. ALL EMPTY CONDUITS INDICATED ON THE DRAWINGS SHALL BE SUPPLIED WITH NYLON PULL LINES.

3. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT. WRITTEN APPROVAL FROM DESIGN ENGINEER AND PROPERTY MANAGEMENT FOR THE USE OF "MC" AND "AC" TYPE CABLING. IF APPROVED, "MC" AND "AC" TYPE CABLE SHALL BE PERMITTED FOR USE IN BRANCH CIRCUIT WIRING FROM JUNCTION BOXES TO DEVICES ONLY. ALL HOME RUNS SHALL BE RUN IN CONDUIT. "MC" AND "AC" CABLING SHALL BE INSTALLED PER NATIONAL ELECTRICAL CODE AND LOCAL BUILDING DEPARTMENT REQUIREMENTS. USE APPROVED TYPE COUPLINGS AND CONNECTORS. PROVIDE CONDUIT SUPPORTS AS REQUIRED BY THE NATIONAL ELECTRICAL CODE AS A MINIMUM. PRE-MANUFACTURED CABLE ASSEMBLIES SHALL NOT BE PERMITTED.

4. INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING WITH SET SCREW FITTINGS.

5. EXTERIOR CONDUIT SHALL BE RIGID METAL CONDUIT, GALVANIZED, WITH THREADED FITTINGS.

6. CONDUIT IN AREAS SUBJECT TO MECHANICAL INJURY SHALL BE RIGID METAL CONDUIT, GALVANIZED, WITH THREADED FITTINGS.

7. CONDUIT SUBJECT TO VIBRATION OR WHERE USED FOR MECHANICAL EQUIPMENT CONNECTIONS SHALL BE PVC JACKETED FLEXIBLE METAL CONDUIT.

8. OUTLET AND JUNCTION BOXES SHALL BE OF PRESSED STEEL AND AS MANUFACTURED BY STEEL CITY, APPLETON, OR RACO. OUTLET BOXES SHALL BE DOUBLE GANG BOX WITH SINGLE OR DOUBLE GANG TRIM RINGS AS REQUIRED.

9. WIRING DEVICES SHALL BE SPECIFICATION GRADE; 20 AMP FOR GENERAL APPLICATION, 20 AMP OR GREATER FOR DEDICATED CIRCUITS AND AS REQUIRED BY CIRCUIT LOAD. LEVITON #5362 RECEPTACLES, 5362-IG (ORANGE) ISOLATED GROUND RECEPTACLES, and #1221 SWITCHES (OR EQUAL). COLOR TO MATCH EXISTING BUILDING STANDARD OR PROVIDE (WHITE) UNLESS OTHERWISE NOTED.

10. FIRE RESISTIVE WALLS AND OPENINGS MAY HAVE OPENINGS FOR STEEL ELECTRICAL OUTLET BOXES NOT EXCEEDING 16 SQUARE INCHES IN AREA, PROVIDED THE AGGREGATE AREA OF SUCH OPENINGS IS NOT MORE THAN 100 SQUARE INCHES FOR ANY 100 SQUARE FEET OF WALL, TYPICAL.

11. ALL 15 AMPERE AND 20 AMPERE, 125 VOLT AND 250 VOLT NON-LOCKING RECEPTACLES INSTALLED IN DAMP OR WET LOCATIONS SHALL BE LISTED AS WEATHER-RESISTANT PER 2011 NEC, ARTICLE 406.9 (A) AND (B). ALL RECEPTACLES MOUNTED IN WET LOCATIONS AS REFERENCED ABOVE SHALL HAVE AN "IN-USE" WEATHERPROOF COVER.

12. ALL 125 VOLT, SINGLE PHASE, 15 AND 20 AMPERE RECEPTACLES SHALL HAVE GFCI PROTECTION FOR PERSONNEL IN THE FOLLOWING AREAS: BATHROOMS, KITCHENS (AREAS WITH A SINK AND PERMANENT FACILITIES FOR FOOD PREPARATION AND COOKING); ROOFTOPS, OUTDOORS AND WITHIN 6 FEET FROM THE OUTSIDE EDGE OF SINKS.

13. EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE. A SEPARATE EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED WITH ALL FEEDER AND BRANCH CIRCUITS CONDUCTORS. GROUND WIRES SHALL BE COPPER.

14. FUSES SHALL BE AS INDICATED AND AS MANUFACTURED BY COOPER-BUSSMANN.

15. CIRCUIT BREAKERS SHALL BE THERMAL-MAGNETIC, QUICK-MAKE, QUICK-BREAK, TRIP-FREE AND TRIP INDICATING, MULTI-POLE CIRCUIT BREAKERS SHALL BE EQUIPPED WITH AN INTERNAL COMMON TRIP MECHANISM. CIRCUIT BREAKERS SHALL BE OF SAME MANUFACTURER AS PANELBOARD OR DISCONNECTING DEVICE.

16. MOTOR AND CIRCUIT DISCONNECTS SHALL BE HEAVY DUTY, FUSIBLE OR NON-FUSIBLE AS INDICATED.

EXECUTION

1. ELECTRICAL CONTRACTOR SHALL USE #10 AWG CU WIRE WHEN LENGTH OF CONDUCTOR EXCEEDS 75 FEET FOR 120 VOLT, 20 AMP CIRCUITS AND 150 FEET FOR 277 VOLT, 20 AMP CIRCUITS. SIZE CONDUCTORS FOR MINIMUM VOLTAGE DROP ALLOWED PER THE NATIONAL ELECTRICAL CODE.

2. ELECTRICAL CONTRACTOR SHALL USE #8 AWG CU WIRE WHEN LENGTH OF CONDUCTOR EXCEEDS 150 FEET FOR 120 VOLT, 20 AMP CIRCUITS AND 300 FEET FOR 277 VOLT, 20 AMP CIRCUITS. SIZE CONDUCTORS FOR MINIMUM VOLTAGE DROP ALLOWED PER THE NATIONAL ELECTRICAL CODE.

3. NEUTRALS, RACEWAYS, AND NON-CURRENT CARRYING PARTS OF ELECTRICAL EQUIPMENT AND ASSOCIATED ENCLOSURES SHALL BE GROUNDED IN FULL ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. PROVIDE HARD WIRED GROUND CONNECTIONS TO ALL DEVICES AND SEPARATE INSULATED GROUND WIRE CONTINUOUS IN EACH CIRCUIT (#12 AWG CU MINIMUM "GREEN" TRACER GROUND).

4. ALL FLOOR AND WALL PENETRATIONS WHERE ELECTRICAL DEVICES AND RACEWAY HAVE BEEN REMOVED MUST BE REPAIRED AND SEALED TO MAINTAIN THE REQUIRED FIRE RATING. CONDUITS PENETRATING FIRE RATED WALLS OR CEILINGS SHALL BE FIRE STOPPED WITH A U.L. LISTED FIRE STOPPING COMPOUND SEALANT TO MAINTAIN THE REQUIRED FIRE RATING. FIRE RATED FLOOR AND WALL PENETRATIONS IMMEDIATELY.

5. ELECTRICAL CONTRACTOR SHALL PROVIDE PRODUCT LITERATURE INFORMATION ON SITE FOR FIELD INSPECTOR REGARDING FIRE RATING OF FLOOR BOXES AND POKE THRU DEVICES.

6. ALL CONDUITS PENETRATING A ONE HOUR FIRE RATED WALL OR CEILING SHALL BE FIRE STOPPED WITH A U.L. LISTED FIRE STOPPING COMPOUND SEALANT.

7.. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF LIGHTING FIXTURES IN MECHANICAL ROOMS/SPACES WITH MECHANICAL DUCT WORK INSTALLER PRIOR TO ROUGH IN. LOCATE BELOW DUCT WORK (8'-0" A.F.F. MIN.) CENTERED IN ROOM AS MUCH AS POSSIBLE. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ALL MECHANICAL EQUIPMENT LOCATIONS AND REQUIREMENTS WITH MECHANICAL PLANS, MECHANICAL CONTRACTOR, AND ACTUAL MECHANICAL EQUIPMENT SUPPLIED. INCLUDE ALL REQUIRED OUTLETS, HEAVY DUTY DISCONNECT SWITCHES, FUSES, CONTROLS, CONTROL WIRING AND ALL CONNECTIONS IN THE ELECTRICAL BID.

8. COORDINATE ALL INTERCONNECTIONS TO AND BETWEEN NEW AND EXISTING SYSTEMS INCLUDING, BUT NOT LIMITED TO: POWER, LIGHTING, FIRE ALARM AND DETECTION, TELEPHONE AND INTERCOM.

9. COORDINATE LOCATIONS OF DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.

10. COORDINATE WITH MECHANICAL CONTRACTOR FOR LOCATIONS OF EQUIPMENT CONNECTIONS PRIOR TO ROUGH-IN.

11. ALL NEW LIGHT SWITCHES, RECEPTACLE OUTLETS, TELEPHONE OUTLETS, FIRE ALARM DEVICES, AND COMMUNICATION/DATA OUTLETS SHALL MEET THE REQUIREMENTS FOR AMERICANS WITH DISABILITIES (A.D.A.) AND ANSI A117.1 REQUIREMENTS FOR MOUNTING HEIGHTS AND ORIENTATIONS, TYPICAL UNLESS OTHERWISE NOTED. RECEPTACLES SHALL BE A MINIMUM OF 15" A.F.F. AT BOTTOM OF DEVICE AND SWITCHES A MAXIMUM OF 48" A.F.F. AT TOP OF DEVICE, TYPICAL UNLESS OTHERWISE NOTED.

12. COORDINATE LOCATIONS OF MECHANICAL EQUIPMENT CONTROL PANELS WITH DIVISION 23. CIRCUITS FOR CONTROL PANEL POWER IS INDICATED ON PANELBOARD SCHEDULES.

13. REMOVE CONDUCTORS AND CONDUIT BACK TO SOURCE FOR EQUIPMENT WHICH IS TO BE REMOVED UNLESS EXISTING WIRING AND CONDUIT CAN BE REMOVED TO ACCESSIBLE JUNCTION BOX AT CONTRACTORS OPTION TO FEED NEW EQUIPMENT. MAINTAIN CIRCUIT CONTINUITY OF REMAINING DEVICES AND EQUIPMENT. CONTRACTOR IS TO PHASE WORK TO MAINTAIN CONTINUITY OF CIRCUITS IN AREAS WHICH ARE IN ANOTHER PHASE.

14. EXTEND EXISTING CIRCUITRY TO RECONNECT TO RELOCATED ITEMS AS INDICATED OR UNLESS OTHERWISE NOTED.

15. PROVIDE BLANK COVER PLATES ON WALLS TO REMAIN FOR REMOVED OR RELOCATED DEVICES. COVER PLATES SHALL MATCH EXISTING.

16. ALL JUNCTION BOX COVERS SHALL BE INDELIBLY LABELED WITH PANEL DESIGNATION AND BRANCH CIRCUIT NUMBER OF EACH WIRE WITHIN THE JUNCTION BOX.

17. CONDUIT SHALL BE CONCEALED WHERE LOCATED IN FINISHED AREAS, OR ON EXTERIOR OF BUILDING. CONDUITS IN UNFINISHED OR UTILITY AREAS MAY BE EXPOSED.

18. DO NOT DRILL OR SHOOT CONCRETE ANCHORS INTO THE BOTTOM OF CONCRETE STRUCTURAL TEES.

19. MINIMUM WORKING CLEARANCES PER THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE SHALL BE PROVIDED AROUND AND IN FRONT OF ALL ELECTRICAL EQUIPMENT.

20. ALL CIRCUIT BREAKER LUGS SHALL BE RATED FOR A MINIMUM OF 75 DEGREE CELSIUS.

21. ALL NEW AND MODIFIED ELECTRICAL EQUIPMENT, SUCH AS SWITCHBOARDS, PANELBOARDS, INDUSTRIAL CONTROL PANELS, METER SOCKET ENCLOSURES, AND MOTOR CONTROL CENTERS THAT ARE LIKELY TO REQUIRE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE WHILE ENERGIZED SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

KUTUK SNOWMELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: KSP
CHECKED: RCC

ELECTRICAL SPECIFICATIONS

COLORADO REGISTERED PROFESSIONAL ENGINEER
35656
11.08.23

E3.0

IFGC PIPE SIZING CALCULATOR FOR NATURAL GAS PRESSURES LESS THAN 1.5 PSI

METER DISCHARGE PRESSURE =	14	("W.C.)
ALLOWABLE PRESSURE DROP =	7	("W.C.)
TOTAL EQUIVALENT LENGTH OF PIPE =	75	FEET
ALTITUDE CORRECTION FACTOR =	831	BTU/CFH @ ALT.

NOMINAL SCHD. 40 STEEL PIPE SIZE	CAPACITY (CFH)	CAPACITY (MBH)
1/2"	241	201
3/4"	504	420
1"	950	790
1-1/4"	1951	1622
1-1/2"	2923	2430
2"	5630	4679
2-1/2"	8973	7457
3"	15862	13182
4"	32353	26886
5"	58532	48640
6"	94776	78759

*PIPE CAPACITY IS CALCULATED USING FORMULA FOR LOW PRESSURE GAS (1.5 PSI AND LESS) LOCATED IN IFGC APPENDIX A

Q = 2313*D^2.623*((H)/(Cr*L))^.541

Q = CAPACITY (CFH)

D = INSIDE PIPE DIAMETER

H = ALLOWABLE PRESSURE DROP ("W.C.)

Cr = FACTOR FOR VISCOSITY, DENSITY AND TEMPERATURE = .6064

L = LENGTH OF PIPE (FEET)

SNOWMELT BOILER SCHEDULE

SYMBOL	SERVICE	MANUFACTURER	MODEL	HEATING CAPACITY: INPUT @ S.L. MBH	OUTPUT @ S.L. MBH	OUTPUT @ 6700' MBH	EWT (°F)	LWT (°F)	GPM	ELECTRICAL: VOLTAGE	PHASE	FLA	MCA	MOCP	FLUE SIZE IN	COMB. AIR SIZE IN	UNIT WEIGHT (LBS.)	REMARKS
EXISTING TO REMAIN, NOTED FOR REFERENCE ONLY																		
(E)B-1	SNOWMELT	AERCO	BMK 1500	1500	1410	1190	120	140	119	120	1	9.2	11.5	20	14	8	X	4
NEW BOILER																		
B-2	SNOWMELT	AERCO	BMK 1500	1500	1410	1190	120	140	119	120	1	9.2	11.5	20	14	8	X	1, 2, 3, 5

REMARKS:
1. ACCEPTABLE MANUFACTURERS: LAARS, LOCHINVAR.
2. BURNER SHALL BE DESIGNED TO FIRE ON NATURAL GAS. 720 BTU/CF, 7" WC.
3. PROVIDE INDIVIDUAL FACTORY MOUNTED BOILER CONTROL PANEL WITH (BUILDING STANDARD) CONTROLS TO COMMUNICATE WITH BUILDING AUTOMATION SYSTEM. COORDINATE WITH CONTROLS CONTRACTOR.
4. EXISTING BOILER TO REMAIN, SHOWN FOR REFERENCE ONLY. FIELD VERIFY.
5. 50% GLYCOL.

IN-LINE PUMP SCHEDULE

SYMBOL	MANUFACTURER	SERVICE	PUMP TYPE	MODEL	GPM	HEAD FT WC	EFF %	MIN HP	RPM	ELECTRICAL: VOLTS	PHASE	SUCTION SIZE IN	DISCH SIZE IN	APPROX OPERATING WEIGHT	REMARKS
EXISTING TO REMAIN, NOTED FOR REFERENCE ONLY															
(E)P-1	ARMSTRONG	SNOW-MELT	INLINE	4300	101	115	74	10	3600	208	3	3	3	100	3
NEW PUMP															
P-2	ARMSTRONG	SNOW-MELT	INLINE	4300	101	115	74	10	3600	208	3	3	3	100	1, 2

REMARKS:
1. ACCEPTABLE MANUFACTURERS: BELL AND GOSSETT, TACO.
2. PUMP SELECTION BASED ON 50% ETHYLENE GLYCOL.
3. EXISTING PUMP TO REMAIN, SHOWN FOR REFERENCE ONLY.

SNOWMELT SYSTEM SUMMARY

LOCATION	PROJECT NAME	ZONE	PROJECT ELEVATION (FT.)	SNOWMELT DESIGN TEMPERATURE (°F)	SNOWMELT DESIGN WIND SPEED (MPH)	TOTAL AREA PH 1 (SQ. FT.)	BTUH PER AREA SQ. FT.	TOTAL LOAD (BTUH)	TOTAL GPM @ 25 DEG DELTA T	SNOWMELT GLYCOL LEVEL (%)	SNOWMELT FLUID TEMP. DROP (°F)	TOTAL FLUID VOLUME (GAL)	GLYCOL VOLUME (GAL)	REMARKS
STEAMBOAT COLORADO	TORIAN PLUM APARTMENTS	EXISTING #1	6,700	0	10	10,776	140	1,508,000	101	50	25	108	44	1
		NEW #2	6,700	0	10	7,230	140	1,012,000	81	50	25	100	40	2

NEW BOILER SELECTION CALCULATIONS:
TOTAL SNOW-MELT LOAD: 1,012,000 BTUH / (0.94 * 0.72) = 1,500,000 BTUH INPUT @ S.L.REQUIRED
0.94 BOILER EFFICIENCY
0.72 ALTITUDE ADJUSTMENT
SELECTED BOILER AT 1,500,000 INPUT BTUH TOTAL.

REMARKS:
1. EXISTING SNOW MELT ZONE.
2. EXISTING SNOW MELT ZONE INSTALLED, ACTIVATED UNDER THIS PROJECT.

TOTAL CONNECTED GAS LOAD SCHEDULE

EQUIPMENT	QTY	INPUT EACH (BTUH @ SL)	INPUT TOTAL (BTUH @ SL)	INLET PRESSURE	NOTES
EXISTING EQUIPMENT					
EXISTING BOILER B-1	1	1,500,000	1,500,000	7" WC	EXISTING TO REMAIN
TOTAL GAS LOAD REMAINING			1,500,000		
NEW EQUIPMENT					
NEW BOILER B-2	1	1,500,000	1,500,000	7" WC	1, 2, 3
TOTAL NEW LOAD=			1,500,000		
TOTAL EXISTING LOAD TO REMAIN=			1,500,000		
BUILDING TOTAL CONNECTED LOAD=			3,000,000		NEW AND EXISTING

NOTES:
1. MODIFICATIONS TO GAS METER AND/OR SERVICE PIPING SHALL BE PERFORMED BY THE GAS COMPANY. SUBMIT REQUIRED GAS SERVICE APPLICATION TO GAS COMPANY IN A TIMELY MANNER TO MEET THE CONSTRUCTION SCHEDULE.
2. FARTHEST CONNECTED DEVICE DISTANCE BASED ON 75'.
3. PIPE SIZING BASED ON PRESSURE AT METER OUTLET OF 14 INCHES WC. CONTRACTOR TO FIELD VERIFY OUTLET PRESSURE PRIOR TO STARTING WORK.

GENERAL NOTES:

CONTRACTOR SHALL DESIGN THE SNOW MELT SYSTEM ZONES BASED ON UPONOR, OR EQUAL. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE SNOW MELT ZONES FROM MANUFACTURER. SEE CIVIL PLANS FOR SNOW MELT ZONE LOCATIONS AND ADDITIONAL INFORMATION.

MECHANICAL LEGEND

NOT ALL ITEMS LISTED BELOW ARE USED ON THIS SET OF MECHANICAL DRAWINGS

GENERAL

SYMBOL	DESCRIPTION
DTL / SHT	REFERENCE BUBBLE
EQUIP#	MECHANICAL/ELECTRICAL EQUIPMENT DESIGNATION
**********	REMOVE EXISTING
U	UNDERCUT DOOR
	AIR FLOW
	CONNECT NEW TO EXISTING

DOUBLE LINE DUCTWORK

SYMBOL	DESCRIPTION
	RECTANGULAR SUPPLY AIR DUCT UP
	RECTANGULAR SUPPLY AIR DUCT DOWN
	RECTANGULAR RETURN AIR / EXHAUST DUCT UP
	RECTANGULAR RETURN AIR / EXHAUST DUCT DOWN
	ROUND DUCT UP
	ROUND DUCT DOWN
	BRANCH DUCT 45° TAKE-OFF
	RECTANGULAR DUCT ELBOW WITH TURNING VANES
	RADIUS ELBOW RECTANGULAR/ROUND DUCT
	DUCT TRANSITION
	FLEX CONNECTION

SINGLE LINE DUCTWORK

SYMBOL	DESCRIPTION
	RECTANGULAR DUCT ELBOW WITH TURNING VANES
	RADIUS ELBOW RECTANGULAR/ROUND DUCT
	DUCT TRANSITION
	CONICAL SPIN-IN FITTING
	CONICAL SPIN-IN FITTING W/DAMPER
	FLEXIBLE DUCT

CONTROL DEVICES AND DAMPERS

SYMBOL	DESCRIPTION
H	HUMIDISTAT
P	PRESSURE SENSOR
T	SENSOR
T	WALL MOUNTED THERMOSTAT
T	UNIT MOUNTED THERMOSTAT
S	SWITCH
F	FIRE DAMPER
FR	RADIATION DAMPER
FS	SMOKE DAMPER
F	COMBINATION FIRE AND SMOKE DAMPER
	MANUAL VOLUME DAMPER W/LOCKING QUADRANT
M	MOTORIZED DAMPER

PIPING

SYMBOL	ABBV.	DESCRIPTION
HS	HS	HOT WATER SUPPLY
HR	HR	HOT WATER RETURN
CWS	CWS	CHILLED WATER SUPPLY
CWR	CWR	CHILLED WATER RETURN
CS	CS	CONDENSER SUPPLY
CR	CR	CONDENSER RETURN
HPS	HPS	HIGH PRESSURE STEAM
HPC	HPC	HIGH PRESSURE CONDENSATE
PC	PC	PUMPED CONDENSATE
D	D	EQUIPMENT DRAIN
RL	RL	REFRIGERANT LIQUID
RS	RS	REFRIGERANT SUCTION

PIPING SYMBOLS

SYMBOL	DESCRIPTION
	ARROW IN LINE INDICATES DIRECTION OF FLOW
XX	INDICATES PIPE SLOPE DOWN
	BOTTOM PIPE CONNECTION
	PIPING UP
	PIPING DOWN
	FIXTURE TRAP OR DRAIN TRAP
	PIPING CAP OR PLUG
	PUMP
BAL	BALANCING VALVE/ FLOW MEASURING DEVICE
	CALIBRATED BALANCING VALVE
	BALL VALVE
	PLUG VALVE
	GATE VALVE
	CHECK VALVE
	BUTTERFLY VALVE
	FLOW SWITCH
	SOLENOID VALVE
	PRESSURE REDUCING VALVE
	3-WAY TEMPERATURE CONTROL VALVE
	2-WAY TEMPERATURE CONTROL VALVE
	RELIEF VALVE
	STRAINER
	STRAINER WITH BLOW-OFF VALVE
	UNION
	PRESSURE GUAGE
	THERMOMETER
P/T	PRESSURE AND TEMPERATURE TAP
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	FLEXIBLE CONNECTOR
	HOSE END DRAIN VALVE
	MANUAL AIR VENT

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR	RA	RETURN AIR
AP	ACCESS PANEL	(N)	NEW	RE	REFER TO
C	COMMON	NC	NORMALLY CLOSED	SA	SUPPLY AIR
(E)	EXISTING	NIC	NOT IN CONTRACT	SRV	SAFETY RELIEF VALVE
EC	ELECTRICAL CONTRACTOR	NO	NORMALLY OPEN	TCC	TEMPERATURE CONTROL CONTRACTOR
ELEV	ELEVATION	NTS	NOT TO SCALE	TYP	TYPICAL
EQ	EQUIPMENT	OA	OUTSIDE AIR		
GC	GENERAL CONTRACTOR	PRV	PRESSURE REDUCING VALVE		

NOTE:

APPLICABLE CODE STANDARDS

2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL FIRE CODE
2018 INTERNATIONAL MECHANICAL CODE
2018 INTERNATIONAL PLUMBING CODE
2018 INTERNATIONAL ENERGY CONSERVATION CODE
2018 INTERNATIONAL FUEL GAS CODE

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CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
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TORIAN PLUM SNOW MELT UPGRADES

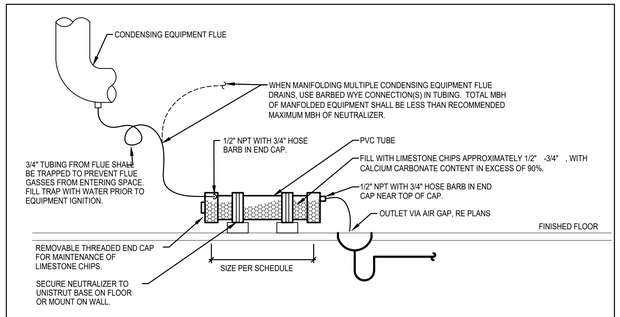
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

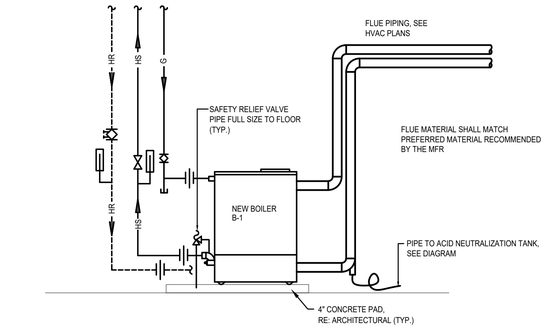
MECHANICAL EQUIPMENT SCHEDULES

M1.0



INLINE CONDENSATE NEUTRALIZER DIAGRAM

NOT TO SCALE 221319.03



BOILER MOUNTING/PIPING DIAGRAM

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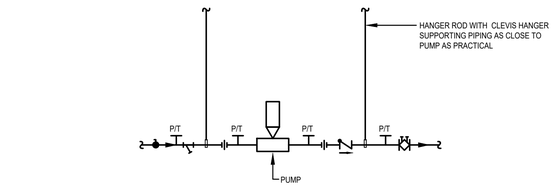

VERTICAL IN-LINE PUMP PIPING DIAGRAM

NOT TO SCALE 232100.02

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CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
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STEAMBOAT SPRINGS, COLORADO

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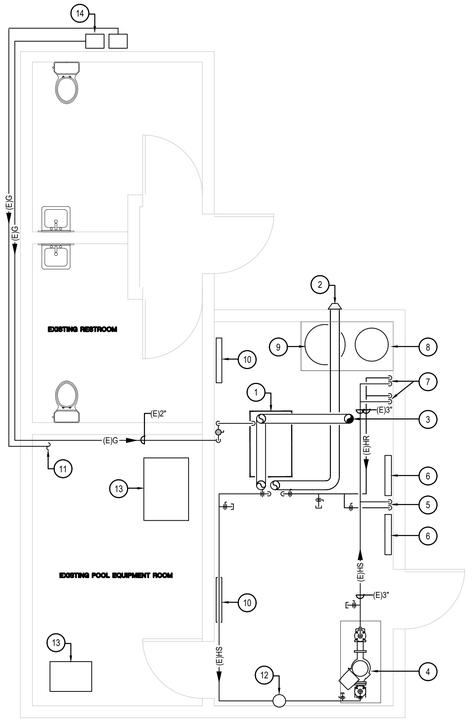
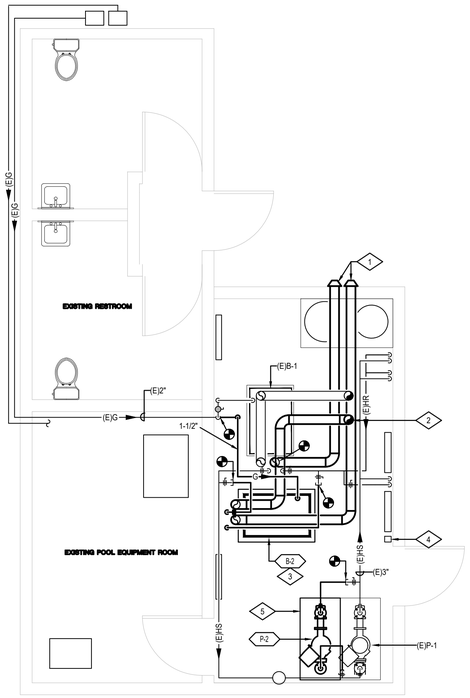
MECHANICAL DIAGRAMS

M1.1



BOILER ROOM MECHANICAL DEMOLITION PLAN

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



BOILER ROOM MECHANICAL PLAN

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

DEMOLITION DRAWING NOTES

1. EXISTING SNOW MELT GAS FIRED BOILER TO REMAIN. NO CHANGE.
2. REMOVE EXISTING DAMAGED 8" SNOW MELT BOILER INTAKE FROM EXTERIOR WALL PENETRATION BACK TO BOILER CONNECTION, FIELD VERIFY.
3. EXISTING BOILER FLUE DUCT UP THRU ROOF AND BACK TO BOILER TO REMAIN.
4. EXISTING PUMP P-1 TO REMAIN. NO CHANGE.
5. EXISTING HOT WATER SUPPLY AND RETURN PIPING TO SNOW MELT MANIFOLDS, FIELD VERIFY.
6. EXISTING SNOW MELT SYSTEM MANIFOLD.
7. EXISTING HOT WATER SUPPLY AND RETURN PIPING TO EXTERIOR SNOW MELT SYSTEM MANIFOLDS. FIELD VERIFY.
8. EXISTING GLYCOL FEEDER ASSEMBLY TO REMAIN. NO CHANGE.
9. EXISTING EXPANSION TANK TO REMAIN. NO CHANGE.
10. EXISTING ELECTRIC BASEBOARD HEATER TO REMAIN.
11. EXISTING GAS PIPING SERVING POOL/SPA EQUIPMENT TO REMAIN. FIELD VERIFY.
12. EXISTING AIR SEPARATOR TO REMAIN.
13. EXISTING POOL/SPA GAS FIRED HEATING EQUIPMENT TO REMAIN. FIELD VERIFY.
14. EXISTING GAS METER. FIELD VERIFY.

DRAWING NOTES

1. TERMINATE 8" COMBUSTION INTAKE PIPE THROUGH WALL WITH HOODED INTAKE CAP. CAP SHALL BE PROVIDED WITH BIRD SCREEN. TERMINATION SHALL BE 8 FT. ABOVE GRADE.
2. TERMINATE 8" FLUE DUCTS WITH UL LISTED AND APPROVED VERTICAL VENT TERMINATION. VENT PIPE SHALL BE AL29-4C POLYPRO MATERIAL. INSTALL PER MANUFACTURERS INSTALLATION INSTRUCTIONS. TERMINATION SHALL BE LOCATED AT LEAST 8 FT. FROM ADJACENT VERTICAL WALL.
3. CONDENSATE DRAINS FROM BOILER SHALL BE ROUTED TO AN ACID NEUTRALIZING TANK BEFORE ENTERING THE PUBLIC SANITARY SEWER SYSTEM. ALL MATERIALS FROM BOILER TO NEUTRALIZATION TANK SHALL BE ACID RESISTANT. INSTALLING CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF ACID NEUTRALIZATION TANK WITH EQUIPMENT LAYOUT.
4. PROVIDE EPO SWITCH FOR BOILER SHUT OFF COORDINATED WITH ELECTRICAL.
5. EXTEND EXISTING CONCRETE PAD FOR NEW PUMP. MATCH EXISTING CONCRETE PAD.

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TORIAN PLUM SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

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MECHANICAL ROOM PLANS

REGISTERED 35133 11.09.23 PROFESSIONAL ENGINEER

M2.0

DIVISION 230000 - HYDRONIC SPECIFICATIONS

PIPE AND PIPE FITTINGS

WORK INCLUDED
1. HOT WATER, CHILLED WATER, CONDENSER WATER PIPING.

QUALITY ASSURANCE
1. WELDING MATERIALS AND LABOR SHALL CONFORM TO ASME CODE FOR PRESSURE PIPING AND APPLICABLE STATE LABOR REGULATIONS.
2. USE WELDERS FULLY QUALIFIED AND LICENSED BY STATE AUTHORITIES. FURNISH CERTIFICATION FROM APPROVED TESTING AGENCY OR NATIONAL CERTIFIED PIPE WELDING BUREAU THAT WELDERS PERFORMING WORK ARE CERTIFIED.
3. ALL PIPING MATERIALS SHALL COMPLY WITH LOCAL CODES.

REFERENCE STANDARDS
1. (CURRENT) ANSI/ASTM - GRAY IRON CASTINGS FOR VALVES, FLANGES, AND PIPE FITTINGS.
2. (CURRENT) ANSI/AWS - STRUCTURAL WELDING CODE.
3. (CURRENT) ANSI/AWWA - POLYETHYLENE ENCASEMENT FOR GRAY AND DUCTILE CAST IRON PIPING FOR WATER AND OTHER LIQUIDS.
4. (CURRENT) ASTM - PRACTICE FOR MAKING SOLVENT_CEMENTED JOINTS WITH PVC PIPE AND FITTINGS.

PIPE AND TUBE
1. STEEL PIPE: ANSI/ASTM A53, BLACK.
2. DUCTILE IRON WATER PIPE: ANSI/AWWA C151.
3. COPPER WATER TUBE: ASTM B88-99EL, SEAMLESS.
4. CROSSLINKED POLYETHYLENE (PEX) PIPING FOR SNOWMELT ZONE SYSTEMS ONLY, ASTM 876-01.

PIPE AND TUBE JOINTS AND FITTINGS
1. THREADED PIPE FITTINGS: MALLEABLE IRON, ANSI/ASME B16.3 - 1999.
2. COPPER AND BRASS PIPE FITTINGS: ANSI/ASME B16.22 - 1995, PRESSURE FITTINGS.
3. CROSSLINKED POLYETHYLENE (PEX) FITTINGS - ASTM F1974-OOe. SNOWMELT ZONE SYSTEM ONLY.

UNIONS AND COUPLINGS
1. 2" AND SMALLER: 125 PSI BRONZE FOR COPPER OR BRASS PIPE, SOLDERED JOINTS.
2. 2 1/2" AND LARGER: 150 PSI FORGED STEEL FLANGES, RAISED FACE WITH WELDING NECK, FOR FERROUS PIPING; BRONZE FLANGES FOR COPPER OR BRASS PIPING. GASKETS FOR WATER ABOVE 140 DEG F.
3. GROOVED AND SHOULDERED PIPE ENDS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, DESIGNED TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION, EXPANSION; C_SHAPE COMPOSITION SEALING GASKET, STEEL BOLTS, NUTS, WASHERS; GALVANIZED COUPLINGS FOR GALVANIZED PIPE.
4. DIELECTRIC UNIONS AND FLANGES: (CHILLED WATER ONLY) PROPER GASKET MATERIAL FOR CONNECTION OF DISSIMILAR METALS. UNIONS, 2" AND SMALLER; DIELECTRICALLY GASKETED FLANGES, 2_1/2" AND LARGER. USE DIELECTRIC CONNECTIONS WHEREVER JOINING DISSIMILAR METALS IN OPEN CONDENSER WATER SYSTEMS.

STRAINERS
1. 2" AND SMALLER: THREADED BRASS OR IRON BODY, Y PATTERN WITH 1/32" STAINLESS STEEL PERFORATED SCREEN.
2. 2-1/2" AND LARGER: FLANGED IRON BODY, Y PATTERN WITH 3/64" STAINLESS STEEL PERFORATED SCREEN.
3. SCREEN FREE AREA: MINIMUM THREE TIMES AREA OF INLET PIPE.

GENERAL EXECUTION
1. VERIFY LOCATION(S) OF ALL AIR PLENUMS. ALL PIPING AND SUPPORT MATERIALS INSTALLED IN AIR PLENUMS SHALL BE PLENUM-RATED. DO NOT INSTALL SPECIFIED NON-PLENUM-RATED MATERIALS IN AIR PLENUMS; USE PLENUM-RATED OPTIONS.
2. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN PROPER SLOPE. INSTALL TO CONSERVE HEADROOM AND INTERFERE AS LITTLE AS POSSIBLE WITH USE OF SPACE. RUN EXPOSED PIPING PARALLEL TO WALLS. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS. INSTALL CONCEALED PIPES CLOSE TO BUILDING STRUCTURE TO KEEP FURRING TO A MINIMUM.
3. CONCEAL PIPING IN WALLS OR ABOVE CEILING UNLESS OTHERWISE NOTED.
4. MAINTAIN FOLLOWING PIPE SLOPES UNLESS OTHERWISE NOTED ON DRAWINGS:
   - A. HYDRONIC PIPING: 1" UP PER 40'_0" IN DIRECTION OF FLOW.
   - B. COOLING COIL CONDENSATE DRAIN PIPING: 1/8" DOWN PER LINEAR FOOT IN THE DIRECTION OF FLOW.
5. MAKE REDUCTIONS IN HORIZONTAL HYDRONIC WATER PIPE WITH FLAT TOP ECCENTRIC REDUCING FITTINGS.
6. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE OR CONNECTED EQUIPMENT.
7. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND FOR ACCESS TO VALVES, AIR VENTS, DRAINS, UNIONS.
8. INSTALL SAME TYPE PIPING MATERIAL SPECIFIED FOR INSIDE BUILDING TO 5'-0" OUTSIDE BUILDING.
9. PROVIDE HOSE END DRAIN VALVE ON ALL STRAINERS 1 1/2" AND LARGER.
10. MAKE CONNECTIONS TO EQUIPMENT WITH UNIONS OR FLANGES.
11. COOLING COIL CONDENSATE DRAIN PIPING SHALL BE EQUAL TO OR LARGER THAN THE EXIT DIAMETER OF THE DRAIN PAN DRAIN CONNECTION.
12. PIPE REDUCERS: USE REDUCERS, NOT BUSHINGS, FOR CHANGES IN PIPE SIZES.
13. ON CLOSED SYSTEMS, EQUIP LOW POINTS WITH 3/4" DRAIN VALVES, HIGH POINTS WITH AIR VENTS.

PREPARATION
1. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN END PIPE. REMOVE SCALE AND DIRT, INSIDE AND OUTSIDE, BEFORE ASSEMBLY. REMOVE WELDING SLAG OR FOREIGN MATERIAL FROM PIPE AND FITTING MATERIALS.
2. CLOSE ENDS OF PIPE IMMEDIATELY AFTER INSTALLATION. LEAVE CLOSURE IN PLACE UNTIL REMOVAL IS NECESSARY FOR COMPLETION OF INSTALLATION.
3. FLUSH EACH PIPING SYSTEM AND PROVE CLEAN.

STEEL PIPE CONNECTIONS
1. 2-1/2" AND LARGER - WELDED.
2. DO NOT USE MITERED AND WELDED ELBOWS IN LIEU OF FITTINGS.
3. USE BUTT WELD FITTINGS FOR WELDED STEEL PIPES. USE OXYACETYLENE OR ELECTRIC ARC PROCESS.
4. FLANGED PIPING _ USE AMERICAN NATIONAL STANDARD REGULAR GALVANIZED HEX HEAD BOLTS AND GALVANIZED HEAVY COLD PRESSED HEX NUTS. COAT GASKETS WITH LUBRICANT BEFORE INSTALLING.
5. GROOVED PIPING _ DUCTILE IRON CONFORMING TO ASTM-395. VICTAULIC STYLE 07, WITH EPDM SYNTHETIC ELASTOMER GASKET, OVAL NECK TRACK BOLTS AND NUTS FOR GROOVED END PIPE. USE PIPE GROOVING TOOL SPECIFICALLY DESIGNED FOR SYSTEM. USE GROOVED MECHANICAL COUPLINGS AND FASTENERS ONLY FOR CHILLED WATER AND CONDENSER WATER PIPING AND ONLY IN ACCESSIBLE LOCATIONS.
6. USE LONG RADIUS ELBOWS FOR WATER PIPING.

COPPER PIPE CONNECTIONS
1. 2-1/2" AND SMALLER: USE 15% SILVER BRAZING ALLOY AND SILVER BRAZING FLUX ON CONCEALED JOINTS. USE 95% TIN, 5% ANTIMONY LEAD_FREE SOLDER AND ASTM B813-91 NON-CORROSIVE STM 1.0 FLUX ON OTHER JOINTS. APPLY FLUX ON CLEANED END OF PIPE AND INSIDE FITTINGS WITH SMOOTH EVEN COATS.
2. 3" AND LARGER: USE 15% SILVER BRAZING ALLOY AND SILVER BRAZING FLUX. APPLY FLUX ON CLEANED END OF PIPE AND INSIDE FITTINGS WITH SMOOTH EVEN COATS.
3. CONTINUOUSLY PURGE PIPING WITH DRY NITROGEN DURING SILVER BRAZING PROCESS.

APPLICATION OF PIPING SYSTEMS

SERVICE & MATERIAL
1. HEATING HOT WATER (TO 250 F), CONDENSER WATER, CHILLED WATER
   STEEL, SCHEDULE 40; COPPER, TYPE L, HARD DRAWN.
2. EQUIPMENT DRAINS AND OVERFLOWS.
   COPPER, TYPE M OR DWV, HARD DRAWN.

PIPE TESTING
1. TEST ALL PIPING SYSTEMS. CORRECT LEAKS BY REMAKING JOINTS. REMOVE EQUIPMENT NOT ABLE TO WITHSTAND TEST PRESSURE FROM SYSTEM DURING TEST. CONSULT GOVERNING CODES FOR SPECIAL SYSTEM REQUIREMENTS.
2. GIVE AMPLE NOTICE OF DATES WHEN ACCEPTANCE TEST WILL BE CONDUCTED. CONDUCT PRESSURE, PERFORMANCE, OPERATING TESTS IN PRESENCE OF REPRESENTATIVE OF AGENCIES HAVING JURISDICTION. SUBMIT THREE COPIES OF SUCCESSFUL TEST REPORTS TO OWNER.
3. TEST PIPING BEFORE BEING PERMANENTLY ENCLOSED.
4. OBTAIN CERTIFICATES OF APPROVAL, ACCEPTANCE, COMPLIANCE WITH REGULATIONS OF AGENCIES HAVING JURISDICTION. SUBMIT TO OWNER.

PIPE AND PIPE FITTINGS (CONT.)

SYSTEM TESTS
1. HYDROSTATIC TEST - WATER PIPING (NEW PIPING ONLY): HAND PUMP SYSTEM TO GREATER OF 100 PSIG OR 150% OF OPERATING PRESSURE. MAINTAIN PRESSURE UNTIL SYSTEM HAS BEEN INSPECTED FOR LEAKS BUT NOT LESS THAN FOUR HOURS.
2. AFTER TESTING THE HYDRONIC SYSTEM (NEW PIPING ONLY) FOR PROPER OPERATION OF AUTOMATIC DEVICES AND CONTROLS, OPERATE SYSTEM FOR ONE WEEK, THEN DRAIN AND WASH OUT WITH PRE-START UP CLEANING CHEMICALS. CLEAN STRAINER BASKETS, REFILL SYSTEM, LEAVE IN PROPER WORKING ORDER. AFTER SYSTEM HAS BEEN IN OPERATION FOR ONE MONTH, THOROUGHLY CHECK SYSTEM AND DEVICES FOR WATER LEAKAGE.

UNDERGROUND PIPE INSTALLATION
1. PROTECT STEEL PIPE INSTALLED BELOW GRADE AND TO MINIMUM 6" ABOVE GRADE WITH FACTORY APPLIED COVERING, PRO-CO FELT AND PIPE LINE ENAMEL NO. 4 DOUBLE WRAP OR X-TRU-COAT PLASTIC COATING.
2. CLEAN FITTINGS, NIPPLES, OTHER FIELD JOINTS THOROUGHLY.
3. APPLY TAPECOAT COMPANY PRIME COAT AND ONE LAYER OF TAPECOAT #20 HEAT APPLIED, 62 MIL TAPE PER MANUFACTURER'S RECOMMENDATIONS.

VALVES

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR VALVES.
2. VALVES SHALL BE OF SAME MANUFACTURER WHERE POSSIBLE.

VALVE SEATS, MATERIALS
1. SUITABLE FOR SERVICE INTENDED.

ACCEPTABLE MANUFACTURES
1. BALL VALVE: APOLLO, NIBCO.
2. BUTTERFLY VALVE: KEYSTONE, NIBCO.
3. PLUG VALVE: DEZURIK, ROCKWELL.

RATINGS
1. UNLESS OTHERWISE INDICATED, VALVES SHALL BE SUITABLE FOR 200 PSIG WOG AND 250 F.

SHUTOFF VALVE
1. BALL VALVE, 2" AND SMALLER: TWO-PIECE BRONZE OR FORGED BRASS BODY WITH PTFE SEATS, PRESSURE RATED TO 150 SWP/600 WOG, FULL PORT, BLOWOUT-PROOF STEM AND POSITIVE SHUT-OFF. PACKING GLAND WITH PTFE PACKING. STEM EXTENSION WHERE INSULATED, LOCKABLE HANDLE WHERE REQUIRED.
2. BUTTERFLY VALVE, 2-1/2" AND LARGER: FULL LUG TYPE, DUCTILE IRON BODY, 250 F SERVICE; ALUMINUM BRONZE DISK, STAINLESS STEEL STEM; CORROSION RESISTANT BEARINGS, EPDM SEAT, EXTENDED NECK FOR 2" INSULATION, CAPABLE OF BI-DIRECTIONAL DEAD END SERVICE TO FULL RATED WORKING PRESSURE OF THE VALVE UPON REMOVAL OF DOWNSTREAM FLANGE.

BALANCING VALVE
1. 2" AND SMALLER: FULL PORTED BALL VALVE WITH BALANCING STOPS.
2. 2-1/2" AND LARGER: ECCENTRIC PLUG, SEMI-STEEL BODY, RESILIENT PLUG SEALS, CORROSION RESISTANT BEARINGS, ADJUSTABLE MEMORY STOP.

CHECK VALVE
1. 2" AND SMALLER: BRONZE, SWING DISC, SOLDER OR THREADED ENDS.
2. 2-1/2" AND LARGER: IRON BODY, BRONZE TRIM, SWING DISC, RENEWABLE DISC AND SEAT, FLANGED ENDS.
3. SPRING LOADED, SILENT TYPE, CAST IRON BODY WITH BUNA-N SEATS SUITABLE FOR 250 F. WAFER AND DISCS OF ALUMINUM, BRONZE, OR DUCTILE IRON. SHAFT AND SPRINGS TYPE 316 STAINLESS STEEL.

DRAIN VALVE
1. BALL VALVE WITH NIPPLE, CAP, HOSE THREAD.

VALVE OPERATORS
1. BUTTERFLY VALVES: 2-1/2" THROUGH 6" -LEVER LOCK HANDLE WITH TOOTHED PLATE FOR SHUT-OFF SERVICE; INFINITELY ADJUSTABLE HANDLE WITH LOCK NUT AND MEMORY STOP FOR THROTTLING SERVICE. VALVES 8" AND LARGER SHALL BE GEAR OPERATED.
2. PROVIDE VALVES LOCATED MORE THAN 7'-0" FROM FLOOR IN EQUIPMENT ROOM AREAS WITH CHAIN OPERATED SHEAVES. EXTEND CHAINS TO ABOUT 5'-0" ABOVE FLOOR AND HOOK TO CLIPS ARRANGED TO CLEAR WALKING AISLES.
3. AUTOMATIC TEMPERATURE CONTROL VALVE SHALL HAVE ELECTRONIC ACTUATORS FOR MODULATING OR OPEN/CLOSE SERVICE.

INSTALLATION
1. PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZE VALVES.
   - A. 2" AND SMALLER: THREADED OR SOLDERED.
   - B. 2-1/2" AND LARGER: FLANGED.
2. SOLDER OR SCREW TO SOLDER ADAPTERS FOR COPPER TUBING.
3. USE GROOVED BODY VALVES WITH GROOVED JOINT PIPING.
4. USE BUTTERFLY VALVE WITH TAPPED LUG BODY WHEN USED FOR ISOLATING SERVICE.
5. WHEN POSSIBLE INSTALL BUTTERFLY VALVES 8" AND LARGER WITH STEMS IN THE HORIZONTAL POSITION AND THE BOTTOM OF THE DISC OPENING DOWNSTREAM.
6. INSTALL PLUG VALVES USED FOR COMBINATION ISOLATION AND BALANCING DUTY CONSISTENT WITH FLOW DIRECTION ANTICIPATED DURING ISOLATION, NOT NORMAL DUTY.
7. PROVIDE DRAIN VALVES AT MAIN SHUT-OFF VALVES, LOW POINTS OF PIPING AND APPARATUS.
8. REMOVE STEMS AND BONNETS FROM SOLDER END VALVES DURING INSTALLATION.
9. USE SPRING LOADED CHECK VALVES AT PUMPS AND WHERE INSTALLED IN VERTICAL POSITION.

EXPANSION COMPENSATION

DESIGN CRITERIA
1. BASE EXPANSION CALCULATIONS ON 40 F INSTALLATION TEMPERATURE TO 200 F FOR HOT WATER HEATING. INCLUDE 30% SAFETY FACTOR.

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
   - A. FLEXIBLE PUMP AND PIPE CONNECTORS.
   - B. EXPANSION JOINTS.

ACCEPTABLE MANUFACTURES
1. FLEXONICS
2. GARLOCK
3. HYSPAN

FLEXIBLE PUMP AND PIPE CONNECTORS
1. HOSE AND BRAID, THREADED MALE NIPPLES 2" AND SMALLER, FLANGED CONNECTIONS 2-1/2" AND LARGER. STAINLESS STEEL HOSE FOR STEEL PIPING. BRONZE INNER HOSE FOR COPPER PIPING.
2. NEOPRENE SINGLE-SPHERE UNIT WITH 150 PSIG ASA STEEL FLOATING FLANGES, 150 PSIG MAXIMUM OPERATING PRESSURE, 220 F MAXIMUM OPERATING TEMPERATURE. MAXIMUM ALLOWABLE MOVEMENT LIMITS: 3/8" AXIAL COMPRESSION, 1/4" AXIAL ELONGATION, 3/8" LATERAL MOVEMENT, 15 DEGREE ANGULAR MOVEMENT.

EXPANSION LOOPS
1. FLEXIBLE LOOPS SHALL BE DESIGNED TO IMPART NO THRUST LOADS ON THE ANCHORS. THE LOOPS SHALL CONSIST OF TWO FLEXIBLE SECTIONS OF STAINLESS STEEL HOSE AND BRAID, TWO 90 DEGREE ELBOWS AND A 180 DEGREE BEND FITTING. LOOPS SHALL BE INSTALLED IN A NEUTRAL, PRE-COMPRESSED OR PRE-EXTENDED CONDITION AS REQUIRED FOR APPLICATION. INSTALL AND GUIDE PER MANUFACTURER'S RECOMMENDATIONS.

CONNECTIONS
1. PROVIDE DEVICES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. USE PIPE SIZED UNITS.

INSTALLATION
1. INSTALL FLEXIBLE PIPE CONNECTORS ON PIPES CONNECTED TO EQUIPMENT SUPPORTED BY VIBRATION ISOLATORS.
2. INSTALL FLEXIBLE CONNECTORS AT RIGHT ANGLES TO DISPLACEMENT. INSTALL ONE END IMMEDIATELY ADJACENT TO ISOLATED EQUIPMENT AND ANCHOR OTHER END.
3. INSTALL PIPING, ANCHORS, GUIDES TO CONTROL EXPANSION AND CONTRACTION OF PIPING INCLUDING LOOPS, PIPE OFFSETS, SWING JOINTS.
4. RIGIDLY ANCHOR PIPE TO BUILDING STRUCTURE WHERE NECESSARY. PROVIDE PIPE GUIDES SO MOVEMENT TAKES PLACE ALONG AXIS OF PIPE ONLY.

SUPPORTS, ANCHORS, SEALS

WORK INCLUDED
1. PIPE HANGERS AND SUPPORTS.

REFERENCE STANDARDS
1. PIPE SUPPORTS: CURRENT ANSI STANDARD.
2. FIRE BARRIER PRODUCTS: CURRENT ASTM AND UL STANDARDS.

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR PREFABRICATED EQUIPMENT SUPPORTS.

PIPE HANGERS AND SUPPORTS
1. HANGERS, PIPE SIZES TO 1-1/2": ADJUSTABLE STEEL RING (INSULATED PIPE) OR BAND (UNINSULATED PIPE).
2. HANGERS, HOT PIPE SIZES 2" TO 4" AND ALL COLD PIPE SIZES: ADJUSTABLE STEEL CLEVIS.
3. HANGERS, HOT PIPE SIZES 5" AND OVER: ADJUSTABLE STEEL YOKE AND CAST IRON ROLL.
4. MULTIPLE OR TRAPEZE HANGERS:
   - A. TRAPEZE HANGERS SHALL BE CONSTRUCTED FROM 12 GAUGE ROLL FORMED ASTM A570 GR. 33 STRUCTURAL STEEL CHANNEL 1-5/8" X 1-5/8" MINIMUM.
   - B. MOUNT PIPES TO TRAPEZE WITH TWO PIECE PIPE STRAPS SIZED FOR OUTSIDE DIAMETER OF PIPE OR INSULATION (IF PIPES ARE REQUIRED TO BE INSULATED). FOR PIPE REQUIRED TO BE INSULATED, PROVIDE A 360 DEGREE 12" LONG GALVANIZED METAL SHIELD SURROUNDING A 360 DEGREE INSERT OF HIGH DENSITY CALCIUM SILICATE INSULATION OF THE SAME THICKNESS AS THE ADJOINING PIPE INSULATION.
   - C. FOR PIPES SUBJECTED TO AXIAL MOVEMENT:
     - STRUT MOUNTED ROLLER SUPPORT FOR PIPES 5" AND OVER. USE PIPE PROTECTION SHIELD OR SADDLES ON INSULATED LINES.
     - STRUT MOUNTED PIPE GUIDE.
5. WALL SUPPORT, PIPE SIZES TO 3": CARBON STEEL HOOK.
6. WALL SUPPORT, PIPE SIZES 4" AND OVER: WELDED STEEL BRACKET AND PIPE STRAP. ADJUSTABLE STEEL YOKE PIPE ROLL OR ROLLER CHAIR FOR HOT PIPE SIZES 5" AND OVER.
7. VERTICAL SUPPORT: STEEL RISER CLAMP.
8. FLOOR SUPPORT, HOT PIPE SIZES TO 4" AND ALL COLD PIPE SIZES: CARBON STEEL, ADJUSTABLE PIPE SADDLE, LOCKNUT NIPPLE, FLOOR FLANGE, CONCRETE PIER OR STEEL SUPPORT SIZED FOR PIPE ELEVATION.
9. FLOOR SUPPORT, HOT PIPE SIZES 5" AND OVER: ADJUSTABLE ROLLER STAND AND BASE PLATE, STEEL SCREWS, CONCRETE PIER OR STEEL SUPPORT SIZED FOR PIPE ELEVATION.
10. FOR PIPE SIZES 1-1/2" AND SMALLER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG SHEET METAL SHIELD. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL.
11. FOR PIPE SIZES 2" AND LARGER, PROTECT INSULATED HORIZONTAL PIPE AT POINT OF SUPPORT BY 180 DEGREE, 12" LONG GALVANIZED SHEET METAL SHIELD SURROUNDING 180 DEGREE INSERT OF HIGH DENSITY CALCIUM SILICATE INSULATION OF SAME THICKNESS AS ADJOINING PIPE INSULATION. ON COLD PIPING, EXTEND INSULATION INSERT 1" BEYOND SHEET METAL SHIELD AT EACH END. OVERSIZE HANGERS TO ACCOMMODATE SHIELDED INSERTS. NO HANGER SHALL PENETRATE OR CRUSH INSULATING MATERIAL. AT CONTRACTOR'S OPTION, PRE-MANUFACTURED THERMAL HANGER SHIELDS WITH INTEGRAL VAPOR BARRIER, EQUIVALENT TO VALUE ENGINEERED PRODUCTS PRO-SHIELD OR PRO-SHIELD N/T, MAY BE UTILIZED. FOR EXTERIOR INSTALLATIONS USE WEATHER SHIELD WITH ALUMINUM JACKET.
12. PROVIDE COPPER PLATED HANGERS AND SUPPORTS FOR COPPER PIPING WHERE PIPING AND HANGER ARE IN DIRECT CONTACT WITH ONE ANOTHER.

PIPE HANGER RODS
1. THREADED STEEL.

UPPER ATTACHMENTS
1. STEEL STRUCTURE: BEAM CLAMP OR C-CLAMP WITH RETAINING STRAP.
2. CONCRETE STRUCTURE: DROP-IN ANCHOR, ZINC PLATED CARBON STEEL BODY WITH FLANGED TOP, FOUR WAY EXPANSION SLOTS.
3. WOOD STRUCTURE: ANGLE CLIP - MINIMUM 1-1/2" BY 1-1/2" BY 3/16" THICK WITH TWO LAG OR WOOD SCREWS INTO WOOD MEMBER, PENETRATED A MINIMUM OF 2" INTO WOOD. FOR NOMINAL 2" LUMBER (1-1/2" THICK) THROUGH-BOLT WITH MINIMUM 1/4" DIAMETER MACHINE SCREW AND MINIMUM 1" OD FLAT WASHER EACH SIDE. DOUBLE-NUT THREADED ROD THROUGH ANGLE CLIP.

ANCHORS
1. USE ANCHORS FOR SUSPENDING HANGERS FROM REINFORCED CONCRETE SLABS, AND SIDES OF REINFORCED CONCRETE BEAMS.
2. REVIEW ANCHOR LOCATIONS, DEPTHS WITH ARCHITECT AND STRUCTURAL ENGINEER BEFORE INSTALLATION.
3. INSTALL PER MANUFACTURER'S DESIGN CRITERIA, INSTALLATION INSTRUCTIONS.

PIPE HANGERS AND SUPPORTS
1. SUPPORT HORIZONTAL PIPING AS FOLLOWS:

PIPE HANGER AND SUPPORT CHART

NOMINAL PIPE SIZE	MAXIMUM HANGER SPACING		HANGER ROD DIAMETER
	STEEL	COPPER	
1-1/4" AND SMALLER	6'-0"	6'-0"	3/8"
1-1/2" TO 4"	12'-0"	12'-0"	3/8"
5" TO 8"	12'-0"	12'-0"	1/2"
10" TO 12"	12'-0"	12'-0"	5/8"

2. PLACE HANGER WITHIN 1'-6" OF EACH ELBOW OR TEE.
3. USE HANGERS WHICH ARE VERTICALLY ADJUSTABLE 1-1/2" MINIMUM AFTER PIPING IS ERECTED.
4. SUPPORT VERTICAL PIPING AT EVERY FLOOR.
5. SUPPORT EACH BRANCH PIPE TO EQUIPMENT AT TAKE-OFF AND WITHIN 12" OF TERMINATION.
6. PROVIDE GALVANIZED STEEL INSULATION PROTECTION SADDLES AT ALL SUPPORT POINTS FOR INSULATED PIPES ON TRAPEZE HANGERS.
7. ANCHOR ALL SUPPORTING LUGS OR GUIDES TO BUILDING STRUCTURE.
8. PROVIDE MULTIPLE OR TRAPEZE HANGERS WHERE SEVERAL PIPES CAN BE INSTALLED IN PARALLEL AND AT SAME ELEVATION. SPACE TRAPEZE HANGERS BASED UPON SMALLEST PIPE SIZE.
9. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.
10. REPAIR ANY FIRE RATED COATING TO STRUCTURE DAMAGED DURING INSTALLATION OF ATTACHMENTS.

FLASHING AND SAFING
1. WHERE EXPOSED PIPING PASSES THROUGH WALLS, FLOORS OR ROOFS, PROVIDE CHROME PLATED OR STAINLESS STEEL ESCUTCHEON FOR PIPING.
2. PROVIDE SOUND RATED FLASHING AROUND PIPES PASSING FROM EQUIPMENT ROOMS, INSTALLED PER MANUFACTURER'S DATA FOR SOUND CONTROL TO MEET THE ATTENUATION SPECIFIED ON ARCHITECTURAL DRAWINGS FOR THE DESIGNATED WALL.
3. FLASH AND COUNTERFLASH WHERE MECHANICAL EQUIPMENT PASSES THROUGH WEATHER- OR WATER-PROOFED WALLS, FLOORS AND ROOFS.

SUPPORTS, ANCHORS, SEALS (CONT.)

SLEEVES
1. PROVIDE PIPE SLEEVES TO APPLICABLE TRADES WITH PRECISE ROUGH-IN LOCATIONS FOR PIPES PASSING THROUGH CONCRETE OR MASONRY CONSTRUCTION. UNLESS OTHERWISE INDICATED, SLEEVES SHALL BE OF SIZE TO PROVIDE FROM 1/4" TO 1" CLEARANCE BETWEEN BARE PIPE AND SLEEVE OR BETWEEN INSULATION JACKET AND SLEEVE. WHERE PIPE PASSES THROUGH CONCRETE FLOOR, EXTEND SLEEVE MINIMUM 1" ABOVE FINISHED FLOOR.
2. SLEEVES IN BEARING WALLS, WATERPROOF MEMBRANE FLOORS AND WET AREAS SHALL BE STEEL PIPE OR CAST IRON PIPE FOR SMALL PIPES. SLEEVES IN NON-BEARING WALLS, FLOORS AND CEILINGS SHALL BE STEEL PIPE OR CAST IRON PIPE.
3. WHERE UNINSULATED PIPES PENETRATE BEARING WALLS (EXCLUDING FOUNDATIONS), FIRE RATED WALLS, PARTITIONS OR FLOORS, PACK AND SEAL ENTIRE SPACE BETWEEN PIPE AND SLEEVE WITH DOW CORNING 3-6548 SILICONE RTV FOAM, OR 1" MINIMUM THICKNESS OF 3M FIRE BARRIER, CP-25 CAULK, OR 303 PUTTY ON EACH SIDE OF OPENING.
4. ENCASE ALL INSULATED PIPES PENETRATING FIRE WALLS AND FLOORS IN 360 DEGREE METAL-SHIELDED INSULATION INSERTS AS MANUFACTURED BY VALUE ENGINEERED PRODUCTS. PACK AND SEAL SPACE BETWEEN SHIELD AND SLEEVE PER PRECEDING PARAGRAPH. EXTEND INSULATION INSERT ON ALL REFRIGERANT AND CHILLED WATER LINES 1" BEYOND SHEET METAL SHIELD.
5. WHERE PIPE PENETRATIONS OCCUR IN NON_FIRE RATED FLOORS OR WALLS, PACK SPACE BETWEEN PIPE AND SLEEVE OR INSULATION INSERT AND SLEEVE ON EACH END WITH MINERAL WOOL OR OTHER NON-COMBUSTIBLE MATERIAL.
6. PIPE TO SLEEVE CLOSURE FOR PIPES PENETRATING FOUNDATIONS, WATERPROOFING MEMBRANE FLOORS OR WET AREAS SHALL BE "LINK-SEAL."
7. AFTER PAINTING IS COMPLETED, INSTALL CHROME PLATED ESCUTCHEONS ON ALL PIPES PASSING THROUGH FINISHED WALLS AND FLOORS.

METERS AND GAUGES

WORK INCLUDED:
1. PORTABLE INSERTION TYPE THERMOMETERS.
2. CONSTANT READ THERMOMETERS.
3. PORTABLE INSERTION TYPE PRESSURE GAUGES.
4. CONSTANT READ PRESSURE GAUGES.
5. FLOW MEASURING DEVICES.
6. TEST PLUGS.

FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
1. THERMOMETERS
2. PRESSURE GAUGES
3. FLOW MEASURING DEVICES
4. TEST PLUGS

ACCEPTABLE MANUFACTURERS
1. THERMOMETERS: ASHCROFT, DURO, MARSHALLTOWN, TEL_TRU, WEISS, WEKSLER
2. PRESSURE GAUGES: ASHCROFT, DURO, MARSH, MARSHALLTOWN, U.S. GAUGE, WEISS, WEKSLER
3. FLOW MEASURING DEVICES:
   - A. 2" AND SMALLER: FLOW DESIGN (FLOWSET), GERAND, GRISWOLD, PRESO
   - B. 2-1/2" AND LARGER: BARCO/HYSPAN, FLOW DESIGN (FLOWSET), GERAND, PRESO
5. TEST PLUGS: FAIRFAX COMPANY, PETERSON EQUIPMENT, SISCO, UNIVERSAL LANCASTER

PORTABLE INSERTION TYPE THERMOMETERS
1. 5" STEMS, ACCURATE WITHIN 1% OVER DIAL RANGE, HERMETICALLY SEALED.

CONSTANT READ THERMOMETERS
1. 4-1/2" OR 5" DIAL, SEPARABLE SOCKET CONNECTION, EXTENSION NECK TO CLEAR INSULATION, SWIVEL ANGLE STEM, FULLY ADJUSTABLE, ACCURATE WITHIN 1% OVER DIAL RANGE.
2. 9" ALUMINUM CASE, MERCURY-FILLED TUBE, SEPARABLE SOCKET CONNECTION, EXTENSION NECK TO CLEAR INSULATION, SWIVEL ANGLE STEM, FULLY ADJUSTABLE, ACCURATE WITHIN 1% OVER DIAL RANGE.

PORTABLE INSERTION TYPE PRESSURE GAUGES
1. 4-1/2" DIAL, PHOSPHOR-BRONZE BOURDON TUBE, STAINLESS STEEL MOVEMENT, ACCURATE WITHIN 1/2% OVER SCALE RANGE.

CONSTANT READ PRESSURE GAUGES
1. 4-1/2" OR 5" DIAL, STANDARD BLACK CASE, BRASS PRESSURE SNUBBER AND NEEDLE VALVE. ACCURATE WITHIN 1% OVER MIDDLE HALF OF SCALE RANGE, 2% OVER REMAINDER.

FLOW MEASURING DEVICE
1. 2" AND SMALLER:
   - A. ORIFICE OR VENTURI TYPE, FACTORY ASSEMBLED WITH 300 PSIG RATED BALL VALVE OR 125 PSIG RATED MULTI-TURN GLOBE VALVE WITH ADJUSTABLE MEMORY STOP.
   - B. SCHRADER TYPE PRESSURE TEST PORTS AND CAPS WITH PORT EXTENSIONS.
   - C. CHAINED METAL TAG INDICATING LOCATION, GPM, AND METER READING.
2. 2-1/2" AND LARGER:
   - D. FOR EXISTING SYSTEMS: AVERAGING PITOT-TYPE FLOW ELEMENTS, SIMILAR TO ANNUBAR MODEL ANR-C25 FOR HOT WATER AND AWR-C25 FOR CHILLED WATER AND CONDENSER WATER,316 STAINLESS STEEL DIAMOND SHAPED SENSING ELEMENTS. PERMANENT PRESSURE LOSS TO SYSTEM SHALL NOT EXCEED 5" WATER COLUMN.
   - E. FOR NEW SYSTEMS: MACHINED AND CALIBRATED VENTURI, PRESSURE DROP RANGE 20" TO 80" WATER COLUMN. COMPLETE WITH 1/4" SAE FLARE SAFETY SHUT-OFF INSTRUMENT VALVES AND SCHRADER TYPE PRESSURE PORTS AND CAPS, CHAINED METAL TAG INDICATING LOCATION, GPM AND METER READING.
   - F. FOR NEW SYSTEMS: COMPLETE WITH 1/4" SAE FLARE SAFETY SHUT-OFF INSTRUMENT VALVES AND SCHRADER TYPE PRESSURE TEST PORTS AND CAPS, CHAINED METAL TAG INDICATING LOCATION, GPM, AND METER READING.

TEST PLUGS
1. NORDEL VALVE CORE AND 1/2" NPT BRASS BODY COMPLETE WITH GASKETED CAP, PRESSURE GAUGE ADAPTER.

INSTALLATION
1. MOUNT THERMOMETERS TO BE EASILY READ FROM FLOOR.
2. INSTALL THERMOMETERS IN PIPING WITH WELLS.
3. PROVIDE ONE PORTABLE INSERTION TYPE PRESSURE GAUGE AND THERMOMETER FOR EACH TEN TEST PLUGS INSTALLED.
4. INSTALL FLOW MEASURING DEVICES PER MANUFACTURER'S RECOMMENDATIONS.

MECHANICAL IDENTIFICATION

WORK INCLUDED:
1. PIPING.
2. VALVES.
3. EQUIPMENT.

EXECUTION:

3.01 PIPE IDENTIFICATION
- A. IDENTIFY EACH PIPING SYSTEM AND INDICATE DIRECTION OF FLOW WITH BAND-SECURED OR SNAP-ON PRINTED LABELS IN MECHANICAL ROOM AND OTHER EXPOSED AREAS AND PRESSURE SENSITIVE, SELF-ADHESIVE LABELS IN CONSEALED AREAS. APPLY MARKINGS AFTER PAINTING AND CLEANING OF PIPING AND INSULATION IS COMPLETED.
- B. APPLY LEGEND AND FLOW ARROWS AT VALVE LOCATIONS, AT POINTS WHERE PIPING ENTERS OR LEAVES VALVE OR METER BOX, AT NOT LESS THAN EVERY 30'-0" OF RUN OR AT LEAST ONCE IN EVERY EXPOSED LOCATION. LOCATE MARKINGS FOR MAXIMUM VISIBILITY.
- C. WHEREVER TWO OR MORE PIPES RUN PARALLEL, APPLY MARKINGS IN SAME RELATIVE LOCATION ON EACH.
- D. WORDING/COLOR COMBINATIONS SHALL MEET ANSI SPECIFICATIONS UNLESS COLORS ARE SPECIFIED OTHERWISE.
- E. SIZES OF LETTERING AND FLOW ARROWS SHALL BE AS FOLLOWS:

OUTSIDE DIAMETER OF PIPE OR COVERING (INCLUSIVE)	SIZE OF LETTER	MINIMUM LENGTH OF FLOW ARROW
5/8" TO 2"	1/2"	2-1/2"
2-1/2" AND LARGER	1"	4"

3.02 EQUIPMENT IDENTIFICATION
- A. IDENTIFY EQUIPMENT WITH LAMINATED BLACK PLASTIC TAG WITH ENGRAVED WHITE CORE LETTERING. TAG SHALL INDICATE EQUIPMENT DUTY SUCH AS "HEATING PUMP", "BOILER" AND EQUIPMENT DESIGNATION AS SHOWN ON DRAWINGS. TAGS SHALL HAVE MINIMUM THICKNESS OF 1/16", MINIMUM SIZE OF 1-1/2"x4", WITH MOUNTING HOLES. SECURE TAGS TO EQUIPMENT BY MEANS OF SCREWS, BOLTS OR CHAIN.
- B. IDENTIFY EACH THERMOSTAT AND HUMIDISTAT BY MEANS OF GUN TAG INDICATING CORRESPONDING UNIT WHICH IT CONTROLS. LOCATE TAG INSIDE THE INSTRUMENT COVER.

3.03 VALVE IDENTIFICATION
- A. IDENTIFY EACH AUTOMATIC TEMPERATURE CONTROL VALVE AND EACH MANUALLY OPERATED VALVE BY MEANS OF A BRASS OR ALUMINUM TAG, 1-1/2" ROUND, WITH STAMPED LETTERS 1/2" HIGH, FILLED WITH BLACK PAINT. NUMBER TAGS CONSECUTIVELY. FASTEN WITH CHAINS AND BRASS "S" HOOKS.

3.04 CHARTS AND DIAGRAMS
- A. PROVIDE 8-1/2"x11" CHARTS IN EACH EQUIPMENT ROOM DESIGNATING NUMBER, AREA SERVED, SERVICE OR FUNCTION AND LOCATION OF EACH TAGGED ITEM. FRAME CHARTS AND DIAGRAMS IN METAL FRAMES WITH CLEAR GLASS AND HANG IN LOCATIONS AS DIRECTED.

3.05 WARNING SIGNS
- A. PLACE WARNING SIGNS ON ALL MACHINES DRIVEN BY ELECTRIC MOTORS WHICH ARE CONTROLLED BY FULLY AUTOMATIC STARTERS, PER ARTICLE 3281, GENERAL INDUSTRY SAFETY ORDERS.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

TORIAN PLUM SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL SPECIFICATIONS

KATHERINE V. BROWAN-BALAS
35133
11.09.23

DIVISION 230000 - HYDRONIC SPECIFICATIONS (CONT.)

WATER TREATMENT

PART 1: GENERAL

1.01 WORK INCLUDED

A. TREATMENT FOR CLOSED SYSTEMS:

1. HEATING WATER SYSTEM.
2. CHILLED WATER SYSTEM.

B. TREATMENT FOR OPEN SYSTEMS:

1. CONDENSER WATER SYSTEM.

1.02 WORK FURNISHED BUT INSTALLED BY OTHERS

A. FURNISH THE FOLLOWING ITEMS TO PIPING CONTRACTOR FOR INSTALLATION:

1. CONDENSER WATER CONTROL SYSTEM.
2. CHEMICAL FEED PUMPS.
3. WATER METER FOR CONDENSER WATER MAKE-UP.
4. CORROSION COUPON RACKS.
5. SOLENOID VALVES.
6. CHEMICAL BYPASS FEEDERS.

B. COORDINATE LOCATION OF RECEPTACLES FOR CONTROLLERS, MONITORS AND PUMPS WITH ELECTRICAL CONTRACTOR.

1.03 QUALITY ASSURANCE

A. THE WATER TREATMENT COMPANY SHALL BE A RECOGNIZED SPECIALIST, ACTIVE IN THE FIELD OF INDUSTRIAL WATER TREATMENT WHOSE MAJOR BUSINESS IS IN THE FIELD OF WATER TREATMENT, AND SHALL HAVE REGIONAL WATER ANALYSIS LABORATORIES, DEVELOPMENT FACILITIES, AND SERVICE DEPARTMENT, PLUS FULL-TIME SERVICE REPRESENTATIVE WITH A MINIMUM OF TEN YEARS EXPERIENCE WITHIN THE LOCAL AREA.
B. ALL PRODUCTS SHALL BE PROVIDED BY A SINGLE CONTRACTOR TO ENSURE A SINGLE SOURCE OF RESPONSIBILITY.
C. WHILE IT IS RECOGNIZED THAT THERE ARE, FOR MOST ITEMS, SEVERAL EQUAL BRANDS AND MANUFACTURERS, THE BIDDERS SHALL FOR THE PURPOSE OF THE BID, OFFER ONLY SPECIFIED EQUIPMENT AND CHEMICALS.

1.04 SUBMITTALS

A. TECHNICAL DATA: SUBMIT SHOP DRAWINGS AND PRODUCT DATA FOR THE FOLLOWING ITEMS IN ACCORDANCE WITH THE GENERAL CONDITIONS OF THE CONTRACT:

1. WATER TREATMENT MATERIALS AND EQUIPMENT.
2. CONTROL DIAGRAMS.
3. CHEMICALS AND QUANTITY PROVIDED.

B. OPERATING INSTRUCTIONS AND MAINTENANCE DATA: SUBMIT PRINTED OPERATING INSTRUCTIONS AND MAINTENANCE DATA FOR THE FOLLOWING ITEMS:

1. ALL WATER TREATMENT EQUIPMENT AND PROCEDURES.
2. WATER TREATMENT PROGRAM CONTROL CHART.

1.05 MAINTENANCE SERVICE (OPEN SYSTEMS)

A. PROVIDE THE SERVICES OF A FULLY QUALIFIED FIELD ENGINEER AND LABORATORY AND TECHNICAL ASSISTANCE FROM A FULLY QUALIFIED LABORATORY STAFF FOR A ONE YEAR WARRANTY PERIOD. SERVICES AND ASSISTANCE SHALL INCLUDE THE FOLLOWING:

1. A TWO HOUR MINIMUM TRAINING COURSE FOR THE OPERATING PERSONNEL, INSTRUCTING THEM CLEARLY AND FULLY ON THE INSTALLATION, CARE, MAINTENANCE, TESTING AND OPERATION OF THE WATER TREATMENT SYSTEMS. THE TRAINING COURSE SHALL BE ARRANGED AT THE START-UP OF THE SYSTEM.
2. QUARTERLY TECHNICAL SERVICE VISITS TO THE JOB SITE OF THE INSTALLATION TO PERFORM FIELD INSPECTIONS AND TO MAKE WATER ANALYSES ON SITE, BOTH OF SUCH COMPLEXITY AS TO EVALUATE THE WATER SYSTEMS OPERATIONS. THE FIELD ENGINEER SHALL DETAIL FINDINGS WITH THE OWNER IN WRITING ON PROPER PRACTICES, CHEMICAL TREATING REQUIREMENTS AND ANY CORRECTIVE ACTIONS NEEDED TO PROTECT THE WATER SYSTEMS FROM SCALE, CORROSION AND FOULING.
3. BE ON CALL AT NO ADDITIONAL COST TO MAKE ON-SITE INSPECTIONS OF EQUIPMENT DURING EMERGENCY OUTAGES. MAKE RECOMMENDATIONS IN WRITING BASED ON THESE INSPECTIONS.

1.06 CHEMICAL STOCK

A. PROVIDE SUFFICIENT CHEMICALS FOR TREATMENT AND TESTING DURING THE ONE YEAR WARRANTY PERIOD. CHEMICALS SHALL NOT BE HARMFUL TO THE SYSTEM IN WHICH THEY ARE USED.

1.07 WARRANTY

A. PROVIDE ONE YEAR WARRANTY ON ALL CHEMICAL FEED EQUIPMENT.

PART 2: PRODUCTS

2.01 ACCEPTABLE WATER TREATMENT SUPPLIERS

A. CALCIUM CONTROL, INC.
B. ROCKY MOUNTAIN AQUATECH.
C. MILE HI WATER TEC, INC.

2.02 PRE-STARTUP CLEANING AND FLUSHING

A. PROVIDE A PRE-STARTUP CLEANER FOR THE FLUSHING AND CLEANING OF ALL NEW WATER SYSTEMS TO REMOVE OIL AND FOREIGN MATTER FROM THE PIPING AND EQUIPMENT PRIOR TO THE FINAL FILLING OF THE SYSTEMS. THIS CHEMICAL SHALL NOT BE INJURIOUS TO PERSON, PIPING, PIPE JOINT COMPOUNDS, PACKAGING, COILS, VALVES, PUMPS, AND THEIR MECHANICAL SEALS, TUBES, OR OTHER PART OF THE SYSTEM. THIS CHEMICAL SHALL NOT DAMAGE OR ERODE GALVANIZED COMPONENTS OR EQUIPMENT (I.E. COOLING TOWER).
B. THE WATER TREATMENT COMPANY SHALL FURNISH COMPLETE INSTRUCTIONS DICTATING THE QUANTITIES OF CLEANER TO USE, METHODS, AND DURATION OF THE OPERATIONS. THE WATER TREATMENT FIRM MUST SUBMIT TO THE MECHANICAL CONTRACTOR A COMPLETE ANALYSIS AND REPORT REGARDING CLEANING, FLUSHING, AND LEVEL OF INHIBITOR FOR EACH CLOSED LOOP SYSTEM.

2.03 CHEMICAL FEED EQUIPMENT FOR CLOSED SYSTEMS

A. PROVIDE CHEMICAL BYPASS POT FEEDERS, RATED AT 175 PSIG, FOR THE FOLLOWING CLOSED SYSTEMS:

1. HEATING WATER.
2. CHILLED WATER.
3. CONDENSOR WATER.

2.04 CLOSED SYSTEM WATER TTREATMENT CHEMICALS

A. PROVIDE A NON-CHROMATE, LIQUID NITRATE BASED CORROSION INHIBITOR FOR THE PREVENTION OF CORROSION IN CLOSED SYSTEMS, TO ACHIEVE 700 PPM TOTAL NITRATE LEVEL.

2.05 COOLING TOWER CHEMICAL TREATMENT

A. PROVIDE CHEMICAL TREATMENT, INCLUDING PASSIVATION, TO PREVENT "WHITE RUST" OF GALVANIZED METAL COMPONENTS.
B. PASSIVATION SHOULD INCLUDE EIGHT WEEKS OF COOLING TOWER OPERATION WITH WATER OF NEUTRAL PH, CALCIUM HARNESS OF 100 TO 300 PPM ($CaCO_3$) AND ALKALINITY OF 100 TO 300 PPM ($CaCO_3$). APPLY A CORROSION INHIBITOR TREATMENT OF THE PHOSPHATE/POLYMER/PHOSPHONATE TYPE.

2.06 OPEN CONDENSER WATER SYSTEM TREATMENT CHEMICALS

A. PROVIDE AN ORGANIC PHOSPHORATE BASED SCALE INHIBITOR CONTAINING CORROSION INHIBITORS AND A POLYMER BASED DISPERSANT. THE TREATMENT SHALL BE IN LIQUID FORM AND BE SUITABLE FOR FEEDING INTO THE SYSTEM DIRECTLY FROM THE SHIPPING CONTAINER. THIS CHEMICAL TREATMENT SHALL NOT CONTAIN CHROMATE OR PHOSPHATE. ACID FOR PH CONTROL WILL NOT BE CONSIDERED.
B. PROVIDE LIQUID BIOCIDES OF TWO CHEMICALLY DIFFERENT TYPES OF FORMULATION TO BE USED ON AN ALTERNATING BASIS AND TO BE EFFECTIVE AGAINST ALL NORMALLY ENCOUNTERED ALGAE AND SLIME GROWTHS.

WATER TREATMENT (CONT.)

2.07 OPEN CONDENSER WATER TREATMENT SYSTEM

A. PROVIDE AN AUTOMATIC CONDENSER WATER CONTROL SYSTEM FOR INHIBITOR FEED, BLOWDOWN, AND BIOCIDE FEEDS. INHIBITOR APPLICATION SHALL BE METER ACTIVATED, BLOWDOWN SHALL BE CONDUCTIVITY ACTIVATED, AND BIOCIDE SHALL BE AUTOMATICALLY FED ON AN ALTERNATING BASIS WITH BLOWDOWN LOCKED OUT TO ENSURE PROPER BIOCIDE RETENTION TIME IN THE RECIRCULATING WATER.
B. CONTROL SYSTEM SHALL INCORPORATE SOLID STATE INTEGRATED CIRCUITS AND DIGITAL LED DISPLAYS IN A PAINTED ENCLOSURE. INCLUDE PREWIRED, PRE-PIPED WATER SAMPLE ASSEMBLY
C. TOTAL DISSOLVED SOLIDS CONTROL FOR CONDUCTIVITY SHALL INCLUDE:
1. LED DIGITAL CONDUCTIVITY READOUT DISPLAY (MICROHMCM).
2. TEMPERATURE COMPENSATED SENSOR PROBE, COMPATIBLE WITH SAMPLE STREAM MANIFOLD.
3. CONDUCTIVITY RANGE: 0-2000 MMHOS 0-5000 MMHOS.
4. TEST SWITCH FOR SOLENOID BLEED VALVE
5. ILLUMINATED LIGHT TO INDICATE WHEN BLEED VALVE IS OPERATED.
6. ADJUSTABLE HYSTERESIS OR DEAD BAND (INTERNAL).
7. FLOW SWITCH TO DEACTIVATE FEED AND BLEED WHEN THERE IS NO FLOW.

D. INHIBITOR FEED CONTROL BASED ON MAKE-UP VOLUME SHALL INCLUDE:

1. PROGRAMMABLE PRECISION RESET TIMER.
2. TEST SWITCH FOR INHIBITOR PUMP.
3. ILLUMINATED LIGHT TO INDICATE WHEN INHIBITOR PUMP IS ACTIVATED.

E. BIOCIDE PROGRAMMER SHALL INCLUDE:

1. 24 HOUR TIMER WITH 14 OR 28 DAY SKIP FEATURE TO PERMIT BIOCIDE ACTIVATION ANY TIME OF THE DAY.
2. PRECISION SOLID STATE BLEED LOCK-OUT TIME AND BIOCIDE PUMP TIMER, CLOCK CONTROLLED.
3. SOLID STATE ALTERNATOR TO ENABLE THE USE OF TWO DIFFERENT FORMULATIONS.
4. INDICATORS TO SHOW THE STATUS OF THE BIOCIDE OPERATIONS. INDICATORS SHALL BE ILLUMINATED WHENEVER A BIOCIDE FUNCTION IS ACTIVE.

F. PROVIDE A WATER METER OF SUFFICIENT SIZE ON SYSTEM MAKE-UP, WIRED TO CONTROL SYSTEM.
G. PROVIDE THREE CHEMICAL FEED PUMPS TO INJECT CHEMICALS DIRECT FROM THE SHIPPING DRUMS INTO THE CONDENSER WATER.
H. PROVIDE A BLOWDOWN CONTROL ASSEMBLY OF SUFFICIENT SIZE INCLUDING A CAST IRON PIPE STRAINER WITH 20 MESH SCREEN, AND SOLENOID VALVE.
I. PROVIDE A PVC PIPING MANIFOLD SYSTEM INCLUDING A FLOW SWITCH, CONDUCTIVITY PROBE, AND SAMPLE PETCOCK. THE MANIFOLD SYSTEM SHALL BE ATTACHED TO THE SIDE OF THE CONTROLLER, PREWIRED, AND PREPIPED.

2.08 OPEN CONDENSER WATER SIDESTREAM FILTER SYSTEM

A. GENERAL: FILTER SYSTEM SHALL CONSIST OF PRESSURE VESSEL WITH PERMANENT MEDIA (SAND), PREFILTER WITH REMOVABLE BASKET, PUMP, CONTROL VALVES, OPERATING CONTROLS.

B. COMPONENTS

1. PRESSURE VESSEL: 30" DIAMETER CYLINDER, 16 GAUGE 304 STAINLESS STEEL, REMOVABLE TOP JOINED WITH STAINLESS STEEL COMPRESSION BAND. INCLUDE AUTOMATIC AIR VENT, MANUAL AIR VENT, PRESSURE GAUGE ON TOP OF FILTER.
2. MEDIA: SHARP SILICA SAND WITH MINIMUM 90% PASSING THROUGH 20 MESH SCREEN.
3. OVERDRAIN AND UNDERDRAIN ASSEMBLIES: PVC.
4. PRESTRAINER: 6" DIAMETER, BRONZE, WITH CLAMP_ON CLEAR LEXAN LID, CORROSION RESISTANT NORYL BASKET.
5. PUMP: ALL BRONZE CONSTRUCTION WITH SEMI_OPEN FACE IMPELLER. PUMP MOTOR: TEFC, SUITABLE FOR OUTDOOR SERVICE.
6. INTERCONNECTING PIPING: FACTORY ASSEMBLED, SCHEDULE 80 PVC, WITH BRONZE BODIED SIGHT GLASS FOR FIELD INSTALLATION ON BACKWASH LINE.
7. FURNISH TWO INTERLINKED 3_WAY BALL VALVES WITH ELECTRIC ACTUATOR. VALVES SHALL HAVE TWO POSITIONS: ONE TO ALLOW LIQUID TO BE FILTERED, THE OTHER FOR REVERSE OF LIQUID FLOW FOR CLEANING OF FILTER MEDIA. VALVES: BRONZE CONSTRUCTION, CHROME_PLATE BALLS, TEFLON SEATS.
8. MOUNT COMPONENTS ON COMMON ABS BASE.

C. AUTOMATIC BACKWASH SYSTEM

1. FACTORY PIPED AND WIRED.
2. ENCLOSED PRESSURE SWITCH: NEMA_4, ADJUSTABLE FROM 0 TO 30 PSIG.
3. BACKWASH AND MOTOR CONTROLS: NEMA_4 ENCLOSURE, FUSIBLE DISCONNECT SWITCH (OPERABLE WITHOUT OPENING PANEL), THERMAL OVERLOAD PROTECTION FOR PUMP MOTOR, ADJUSTABLE BACKWASH TIMER, PUSH_BUTTON SWITCH FOR MANUAL BACKWASH CONTROL, INDICATING DEVICE FOR FILTER STATUS.

D. EACH UNIT SHALL BE FULLY ASSEMBLED (EXCEPT MEDIA), TESTED, ADJUSTED AT FACTORY.

2.09 COUPON RACK

A. A TWO TIER CORROSION COUPON RACK SHALL BE PROVIDED TO MONITOR THE CHEMICAL TREATMENT PROGRAM IN THE CONDENSER WATER, CHILLED WATER, AND HOT WATER SYSTEMS. THE RACK SHALL BE CONSTRUCTED OF SCHEDULE 80 WITH TWO COUPON HOLDERS. THE INLET AND OUTLET SHALL BE 3/4" NPT WITH A 0-10 GPM FLOW INDICATOR. METALLURGY OF THE TWO COUPON PER RACK SHALL BE STEEL AND COPPER.

2.10 WATER TREATMENT CONTROL TESTING EQUIPMENT

A. PROVIDE TESTING CHEMICALS TO PROPERLY ANALYZE THE OPEN CONDENSER WATER FOR ORGANIC PHOSPHORATE AND THE CLOSED WATER SYSTEM FOR NITRATE. FURNISH THE NECESSARY TEST KITS FOR THESE TESTS.
B. PROVIDE A MYRON-L TDS METER, THREE RANGE, 0-50, 0-500, AND 0_5,000 MMHOS/CM AUTO-TEMP COMPENSATION 50-160 F, 9 VOLT TRANSISTOR BATTERIES, AND BUILT-IN CELL.
C. FURNISH A SUPPLY OF LOG SHEETS ON WHICH TO RECORD THE TEST RESULTS AND A BOUND COPY OF FULL TEST INSTRUCTIONS.

PART 3: EXECUTION

3.01 INSTALLATION

A. AT CONTRACTOR'S OPTION, THE WATER TREATMENT COMPANY MAY PERFORM ALL SERVICES SPECIFIED IN GLYCOL SYSTEM SECTION.
B. THE WATER TREATMENT SUBCONTRACTOR SHALL SUBMIT A COMPLETE REPORT, INCLUDING ANALYSIS, TO THE MECHANICAL CONTRACTOR. INCLUDE A COPY IN THE OPERATION AND MAINTENANCE MANUALS.

MECHANICAL INSULATION

SUBMITTALS
1. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR INSULATION.

2. SUBMITTALS SHALL INDICATE COMPLETE MATERIAL DATA PROPOSED AND THICKNESS OF MATERIAL FOR INDIVIDUAL SERVICES.

QUALITY ASSURANCE
1. INSULATING MATERIALS AND FINISHES SHALL COMPLY WITH APPLICABLE CODES.

2. DETERMINE THAT CODE AUTHORITIES WILL APPROVE ANY PRODUCT INSTALLED.

JOB CONDITIONS
1. PERFORM WORK AT AMBIENT AND EQUIPMENT TEMPERATURES AS RECOMMENDED BY MANUFACTURER.

ACCEPTABLE MANUFACTURERS
1. CERTAINTEED
2. KNAUF
3. OWENS-CORNING
4. JOHNS MANVILLE

GENERAL
1. ADHESIVES AND INSULATION MATERIALS: COMPOSITE FIRE AND SMOKE HAZARD RATINGS MAXIMUM 25 FOR FLAME SPREAD AND 50 FOR SMOKE DEVELOPED. ADHESIVES SHALL BE WATERPROOF.

MECHANICAL INSULATION (CONT.)

MATERIALS AND COMPONENTS
1. PIPE INSULATION
A. TYPE A: HEAVY DENSITY ONE_PIECE FIBERGLASS, FACTORY APPLIED VAPOR BARRIER JACKET, DOUBLE SURFACE ADHESIVE SELF_SEALING LAP, "K" FACTOR 0.23 AT 75 F MEAN TEMPERATURE.

B. INSULATION EXPOSED TO WEATHER: PROTECT INSULATION WITH WEATHERPROOF METAL JACKET. JACKET SHALL BE FACTORY APPLIED ALUMINUM, 0.016" THICK, WITH LAMINATED VAPOR BARRIER AND "Z" GROOVE WATERTIGHT SEAL. SEAL EACH JOINT WITH SNAP STRAPS CONTAINING PERMANENT PLASTIC SEALING COMPOUND. SECURE WITH 1/2" WIDE STAINLESS STEEL BANDS. INSULATE FITTINGS WITH MITERED SECTIONS OF SAME MATERIAL. SEAL JOINTS WITH SEALING COMPOUND AND PREFORMED ALUMINUM BANDS.

2. HOT EQUIPMENT INSULATION
A. TYPE A (80 F - 350 F): SEMI-RIGID, 3 LB. DENSITY FIBERGLASS BOARD, "K" FACTOR 0.23 AT 75 F MEAN OPERATING TEMPERATURE. SECURE INSULATION WITH WELD PINS OR STICK CLIPS ON FLAT SURFACES. POINT ALL JOINTS, FINISH WITH WIRE MESH AND INSULATING CEMENT. COVER WITH GLASS CLOTH.

3. COLD EQUIPMENT INSULATION
A. TYPE A: 1" THICK, 3 LB. DENSITY FIBERGLASS BOARD WITH FACTORY APPLIED VAPOR BARRIER FACING, "K" FACTOR 0.22 AT 75 F MEAN TEMPERATURE, VAPOR TRANSMISSION RATE 0.02 PERMS. SECURE WITH 1/2" STAINLESS STEEL BANDS, WELD PINS, OR STICK CLIPS SPACED 12" APART. POINT ALL VOIDS AND JOINTS, SEAL ALL BREAKS AND JOINTS WITH VAPOR BARRIER MASTIC AND HEAT SEALED TAPE. FINISH WITH TWO COATS OF VAPOR BARRIER MASTIC BETWEEN GLASS CLOTH COVER.

PREPARATION
1. SURFACE SHALL BE CLEAN AND DRY PRIOR TO INSTALLATION. INSULATION SHALL BE DRY BEFORE AND DURING APPLICATION. FINISH WITH SYSTEMS AT OPERATING TEMPERATURES.

INSTALLATION
1. INSULATION SHALL BE CONTINUOUS THROUGH INSIDE WALLS. PACK AROUND PIPES WITH FIREPROOF SELF_SUPPORTING INSULATION MATERIAL, FULLY SEALED.

2. FINISH INSULATION NEATLY AT HANGERS, SUPPORTS, OTHER PROTRUSIONS, AND WHERE THE INSULATION BREAKS FOR SERVICE OR ACCESS REQUIREMENTS.

3. DO NOT INSULATE THE FOLLOWING UNLESS SPECIFIED:
A. DRAIN PIPING DOWNSTREAM OF SYSTEM DRAIN VALVE.
B. RELIEF VALVE AND DISCHARGE PIPING.
C. RADIATION PIPING INSIDE RADIATION COVER.
D. UNIONS AND FLANGED VALVES ON HOT LINES (65 F TO 250 F).
E. STEAM CONTROL VALVE BODIES.
F. BONNET ON SCREWED VALVE BODIES.
G. STEAM TRAPS.
H. EXPANSION JOINTS, FLEXIBLE CONNECTIONS.
I. REMOVABLE PLATES ON CHECK VALVES.

4. DO NOT COVER PIPING UNTIL TESTED.

5. REMOVE AND REAPPLY INSULATION IF, IN OPINION OF ARCHITECT, IT HAS NOT BEEN INSTALLED IN FIRST CLASS WORKMANLIKE MANNER.

6. LOCATE INSULATION SEAMS IN LEAST VISIBLE LOCATIONS.

7. CLEAN INSULATION FINISHES AFTER INSTALLATION, LEAVING CLEAN SURFACE FOR PAINTING. REPLACE SURFACES IF DAMAGED DURING CONSTRUCTION. REAPPLY TAPE FOUND PEELING DURING CONSTRUCTION OR GUARANTEE PERIOD.

8. WHERE REMOVED FOR NEW CONNECTION OR REMODELING, REPLACE EXISTING INSULATION TO MATCH EXISTING THICKNESS, DENSITY, FINISH.

9. REPAIR SEPARATION OF JOINTS OR CRACKING OF INSULATION DUE TO THERMAL MOVEMENT OR POOR WORKMANSHIP.

INSTALLATION OF PIPE INSULATION
1. SEAL LONGITUDINAL LAPS WITH VAPOR BARRIER ADHESIVE OR WITH FACTORY APPLIED DOUBLE SURFACE PRESSURE SENSITIVE ADHESIVE SYSTEM. SEAL END JOINTS WITH 3" WIDE BUTT STRIPS SECURED WITH VAPOR BARRIER ADHESIVE. SEAL ALL SEAMS ON COLD WATER PIPING WITH BENJAMIN FOSTER 30_35 SEAL FAST MASTIC.

INSTALLATION OF INSULATION ON FITTINGS AND VALVES
1. INSULATE FITTINGS AND VALVES WITH FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET AND 25/50 UL RATED PVC FITTING COVERS (ZESTON OR EQUAL).

2. WHERE INSTALLATION OF PVC FITTING COVERS IS PROHIBITED BY LOCAL AUTHORITIES, INSULATE FITTINGS AND VALVES WITH MOLDED FIBERGLASS FITTINGS OR FIRMLY COMPRESSED FOIL-FACED FIBERGLASS BLANKET. SECURE IN PLACE WITH 20 GAUGE CORROSION RESISTANT WIRE AND APPLY SMOOTHING COAT OF INSULATING CEMENT. FINISH WITH LAYER OF GLASS CLOTH EMBEDDED BETWEEN TWO COATS OF VAPOR BARRIER MASTIC. LAP GLASS FABRIC 2" ONTO ADJACENT INSULATION.

3. INSULATION ON FITTINGS AND VALVES SHALL BE SAME THICKNESS AS ON PIPE.

4. TROWEL INSULATION CEMENT TO NEAT BEVEL AT UNIONS, FLANGES, AND WHENEVER INSULATION TERMINATES. ALLOW ROOM TO REMOVE FLANGE BOLTS, DISCONNECT UNIONS, ETC.

INSTALLATION OF HOT EQUIPMENT INSULATION
1. CUT, CONTOUR, AND MITER INSULATION BOARD AND APPLY WITH EDGES TIGHTLY BUTTED, JOINTS STAGGERED WHERE TWO OR MORE LAYERS ARE NECESSARY, SECURED WITH 1/2" X 0.015" GALVANIZED STEEL BANDS ON 12" CENTERS OR WITH WELD PINS OR STICK CLIPS WITH WASHERS ON 18" CENTERS.

INSTALLATION OF COLD EQUIPMENT INSULATION
1. CUT AND MITER INSULATION BOARD TO FIT CONTOUR OF VESSEL AND APPLY WITH EDGES TIGHTLY BUTTED, JOINTS STAGGERED WHERE TWO OR MORE LAYERS ARE NECESSARY, SECURED WITH 1/2" X 0.015" GALVANIZED STEEL BANDS ON 12" CENTERS.

2. SEAL ALL JOINTS, BREAKS, PUNCTURES IN FACING WITH FIRE RETARDANT VAPOR BARRIER ADHESIVE AND 4" WIDE FACING MATERIAL TAPE.

3. WHERE MAINTENANCE ACCESS FOR DISASSEMBLY IS REQUIRED ON PUMPS, CHILLERS, ETC., INSTALL INSULATION SO REMOVAL OF INSULATION FROM PARTS IS NOT REQUIRED.

4. IF CHILLER HAS FACTORY APPLIED INSULATION, PROVIDE INSULATION ON ALL COLD PARTS NOT FACTORY INSULATED SUCH AS CHILLER WATER BOXES, CHILLER COOLING LINES, ETC.

PIPE INSULATION CHART

PIPE CLASSIFICATION		PIPE SIZE	INSULATION THICKNESS
			TYP A - INSULATION
HEATING HOT WATER	LOW PRESS./TEMP. (250F-201F)	TO 2"	1-1/2"
		2-1/2" - 6"	2"
		8" & LARGER	3-1/2"
	LOW TEMP. (200F-120F)	ALL	1-1/2"
CHILLED WATER	---	ALL	1-1/2"
COLD EQUIPMENT INSULATION	CHILLER EVAP.	ALL	1"
	CHILLED WATER PUMP.	ALL	1"
	AIR SEPARATOR	ALL	1"
	EXPANSION TANK	ALL	1"

GLYCOL SYSTEM

WORK INCLUDED
1. FILL TANK, PRESSURE SENSOR, PRESSURE RELIEF VALVE, CHECK VALVE.

2. INHIBITED PROPYLENE GLYCOL SOLUTION.

3. FEED PUMP.

4. SOLUTION TESTER.

SUBMITTALS AND SHOP DRAWINGS
1. FURNISH SHOP DRAWINGS AND MANUFACTURER'S SUBMITTAL DATA FOR GLYCOL AND EQUIPMENT.

WARRANTY
1. REPLACE GLYCOL SOLUTION LOST FROM SYSTEM DURING FIRST YEAR OF OPERATION.

ACCEPTABLE MANUFACTURERS
1. ARCO
2. DOW CHEMICAL

INHIBITED PROPYLENE GLYCOL SOLUTION
1. CORROSION PROTECTION: LESS THAN OR EQUAL TO 5 MIL PER YEAR WHEN LABORATORY TESTED TO ASTM D1384.

GLYCOL FEEDER SYSTEM
1. TANK: POLYETHYLENE, 55 GALLON CAPACITY, SUITABLE FOR 180 F OPERATING TEMPERATURE, WITH HINGED COVER, LEVEL GAUGE, LEVEL MARKINGS ON SIDE OF TANK IN GALLONS, AND LOW WATER LEVEL SWITCH WITH DRY CONTACTS FOR REMOTE ALARM AND PUMP SHUT-OFF.

2. PUMP: POSITIVE DISPLACEMENT ROTARY GEAR TYPE, ALL BRONZE CONSTRUCTION, 1.5 GPM AT 100 PSIG, 1750 RPM, ADJUSTABLE PRESSURE SWITCH, ADJUSTABLE TIME DELAY RELAY.

3. TRANSFER PUMP: HAND OPERATED ROTARY TYPE, 8'-0" LONG 1" HOSE WITH 3/4" NONSPARKING NOZZLE, 1" TELESCOPING SUCTION PIPE, BUNG ADAPTOR WITH 2" THREAD.

SOLUTION TESTER
1. PORTABLE REFRACTOMETER TYPE.

INSTALLATION
1. PERFORM LABORATORY GLYCOL SOLUTION STRENGTH TESTS BEFORE SYSTEM IS TURNED OVER TO OWNER AND AT END OF FIRST YEAR OF OPERATION. REPLENISH AS REQUIRED.

2. SUBMIT A COPY OF LABORATORY REPORT TO OWNER.

HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. AIR VENT.
B. EXPANSION TANK.
C. AIR SEPARATOR.
D. RELIEF VALVE.
E. END SUCTION DIFFUSER
F. PRESSURE REDUCING VALVE.
G. FLOW SWITCH.

1.02 SUBMITTALS

A. FURNISH MANUFACTURER'S SUBMITTAL DATA FOR:
1. AIR VENT
2. EXPANSION TANK.
3. AIR SEPARATOR.
4. RELIEF VALVE.
5. PUMP INLET FLOW STRAIGHTENING FITTING.
6. PRESSURE REDUCING VALVE.
7. FLOW SWITCH.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. EXPANSION TANK
1. ARMSTRONG
2. AMTROL
3. BELL & GOSSETT
4. TACO

B. AIR SEPARATOR
1. AMTROL
2. ARMSTRONG
3. BELL & GOSSETT
4. TACO ACT

C. RELIEF VALVE
1. BELL & GOSSETT
2. MCDONNELL & MILLER, INC.
3. WATTS REGULATOR CO.

D. END SUCTION DIFFUSER
1. AMTROL
2. ARMSTRONG
3. BELL & GOSSETT
4. TACO

H. PRESSURE REDUCING VALVE
1. ARMSTRONG
2. BELL & GOSSETT
3. TACO
6. WATTS REGULATOR CO.

2.02 MANUAL AIR VENT

A. COIN OR KEY OPERATED TYPE SIMILAR TO BELL & GOSSETT #4V.

2.03 AUTOMATIC AIR VENT

A. FLOAT ACTUATED, CAST IRON BODY, POSITIVE SHUT-OFF AGAINST NEGATIVE PRESSURE, SUITABLE FOR MAXIMUM OPERATING PRESSURE OF 150 PSIG AND MAXIMUM OPERATING TEMPERATURE OF 250 F, SIMILAR TO BELL & GOSSETT MODEL 107A.

2.04 EXPANSION TANK

A. CLOSED TYPE, WELDED STEEL RATED FOR WORKING PRESSURE OF 125 PSIG, CLEANED, PRIME COATED, SUPPLIED WITH STEEL SUPPORT SADDLES, TAPPINGS FOR INSTALLATION OF ACCESSORIES, GAUGE GLASS SET CONSISTING OF BRASS COMPRESSION STOPS AND GUARD.

2.05 AIR SEPARATOR

A. TANGENTIAL AIR SEPARATOR: CAST IRON OR STEEL TANK, REMOVABLE GALVANIZED STEEL STRAINER, PERFORATED STAINLESS STEEL AIR COLLECTOR TUBE, ASME RATED FOR 125 PSIG WORKING PRESSURE.

2.06 END SUCTION DIFFUSER

A. ANGLE TYPE CAST IRON BODY AND COVER WITH SUITABLE NPT, FLANGED, OR GROOVED PIPE CONNECTIONS, STRAIGHTENING VANES, ORIFICE CYLINDER, 16 MESH BRONZE START-UP STRAINER, AND EPDM O-RING SEALS, SUITABLE FOR 175 PSIG WORKING PRESSURE AND 300 F OPERATING TEMPERATURE. PROVIDE EXTRA SET OF O-RING SEALS FOR START-UP STRAINER REMOVAL.

2.07 PRESSURE REDUCING VALVE

A. ALL BRONZE, SPRING AND DIAPHRAGM, MANUAL ADJUSTMENT FOR OUTLET WATER PRESSURE, INTEGRAL STRAINER, FEMALE THREAD CONNECTIONS, SIMILAR TO BELL & GOSSETT MODEL #12.

2.08 FLOW SWITCH

A. SIMILAR TO MCDONNELL_MILLER NO. FS4_3.

PART 3 EXECUTION

3.01 AIR VENT

A. PROVIDE 1/4" VALVES AT THE HIGH POINTS OF ALL MAINS AND RISERS FOR SYSTEM VENTING. PROVIDE 1/4" OVERFLOW TO NEAREST DRAIN.

B. PROVIDE VENT TUBING TO NEAREST DRAIN FOR AUTOMATIC AIR VENTS AND AIR VENTS IN CONCEALED LOCATIONS.

C. PROVIDE ACCESS TO ALL AIR VENTS.

3.02 END SUCTION DIFFUSER

A. SUPPORT FITTINGS WITH FLOOR MOUNTED PIPE AND FLANGE SUPPORTS. REMOVE START-UP STRAINER AFTER 30 DAYS OPERATION.

3.03 FLOW SWITCH

A. INSTALL IN HORIZONTAL SECTION OF PIPING.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

TORIAN PLUM SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: MAB
CHECKED: KVB

MECHANICAL SPECIFICATIONS

M3.1

DIVISION 230000 - MECHANICAL SNOW MELT SPECIFICATIONS

SNOW MELT SYSTEM REQUIREMENTS

1.01 WORK INCLUDED

A. ALL LABOR, MATERIALS, TRANSPORTATION, EQUIPMENT, AND SERVICES TO INSTALL A HYDRONIC SNOW MELTING SYSTEM.

1.02 SUBMITTALS

A. MANUFACTURER'S SUBMITTAL DATA SHALL CONSIST OF SHOP DRAWINGS, AND/OR DESCRIPTIONS OF MATERIALS, DETAILS OF INSTALLATION, CAPACITY RATINGS, AND CONTROL SEQUENCING.

1.03 SINGLE SOURCE RESPONSIBILITY

A. COMPONENTS OF THE BURIED TUBING SYSTEM SHALL BE PROVIDED BY ONE MANUFACTURER, INCLUDING TUBE, FITTINGS, MANIFOLDS, CONTROLS, AND OTHER ANCILLARY ITEMS REQUIRED FOR A COMPLETE INSTALLATION.

B. BOILERS, PUMP, EXPANSION TANK AIR SEPARATOR, ETC., SHALL BE APPROVED BY SYSTEM MANUFACTURER.

1.04 MANUFACTURER'S WARRANTY

A. TUBE SHALL CARRY A TWENTY-FIVE (25) YEAR NON-PRORATED WARRANTY AGAINST FAILURE DUE TO DEFECT IN MATERIAL AND WORKMANSHIP OR EXPOSURE TO STRESS CRACKING AGENTS. MANIFOLDS AND OTHER ANCILLARY COMPONENTS SHALL BE WARRANTED FOR 24 MONTHS FROM DATE OF OWNER ACCEPTANCE OF PROJECT.

1.05 SCOPE OF WORK

A. THE SNOWMELT SYSTEM CONTROL PANEL, OUTDOOR SENSOR, AND SNOW/ICE SENSOR SHALL BE FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER. THE BAS CONTRACTOR SHALL INSTALL THE COMPLETE SNOWMELT CONTROL SYSTEM AND SHALL FURNISH ALL CONTROL DEVICES, VALVES, WIRING, AND TUBING NOT FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER.

SNOW MELT SYSTEM PRODUCTS

2.01 TUBE

A. TUBE SHALL BE CROSS-LINKED POLYETHYLENE, WITH MAXIMUM WORKING PRESSURE/TEMPERATURE OF 160 PSI AT 73.4 F, 100 PSI AT 180 F, 80 PSI AT 200 F.

B. THE TUBE SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM STANDARD SPECIFICATION F876-01. THE TUBE SHALL BE LISTED TO ASTM BY INDEPENDENT THIRD PARTY TESTING LABORATORY.

C. THE TUBE SHALL HAVE AN OXYGEN DIFFUSION BARRIER CAPABLE OF LIMITING OXYGEN DIFFUSION THROUGH THE TUBE TO NO GREATER THAN 0.10 g / M^3 / DAY AT 104 F WATER TEMPERATURE.

D. THE TUBE SHALL BE A MAXIMUM OF 3/4" DIAMETER IN ACCORDANCE WITH ASTM STANDARD SPECIFICATION AS ABOVE.

E. THE MINIMUM BEND RADIUS FOR COLD BENDING OF THE TUBE SHALL NOT BE LESS THAN SIX (6) TIMES THE OUTSIDE DIAMETER. BENDS WITH A RADIUS LESS THAN STATED SHALL REQUIRE THE USE OF A BEND SUPPORT AS SUPPLIED BY THE TUBE MANUFACTURER.

2.02 MANIFOLDS

A. MULTIPLE CONNECTION MANIFOLDS SHALL BE OF CAST BRASS CONSTRUCTION, MANUFACTURED OF ALLOYS TO PREVENT DEZINCIFICATION, AND SHALL HAVE INTEGRAL CIRCUIT BALANCING VALVES. MANIFOLDS SHALL BE ABLE TO VENT AIR FROM THE SYSTEM AND SHALL BE PROVIDED WITH SUPPORT BRACKETS AND TUBE BEND SUPPORTS. MANIFOLD CIRCUITS SHALL BE ISOLATED FROM SUPPLY AND RETURN TUBING WITH VALVES THAT ARE SUITABLE FOR ISOLATION AND BALANCING.

2.03 FITTINGS

A. FITTINGS SHALL BE MANUFACTURED OF DEZINCIFICATION RESISTANT BRASS. THESE FITTINGS SHALL BE SUPPLIED BY THE TUBE MANUFACTURER. THE FITTINGS SHALL CONSIST OF A COMPRESSION FITTING WITH INSERT COMPRESSION RING AND A COMPRESSION NUT.

2.04 ACCESS COVERS

A. REMOVABLE ACCESS COVERS SHALL BE OF REINFORCED CONCRETE FORMED IN PLACE OR PRE-CAST CONCRETE OVER PIPE CONNECTIONS, FITTINGS, AND DISTRIBUTION MANIFOLDS. THEY SHALL BE BOTH INCONSPICUOUS AND HEAVY ENOUGH TO PREVENT UNAUTHORIZED REMOVAL. TAPERED FORMS FOR COVERS SHALL BE FURNISHED. COVERS SUBJECT TO VEHICULAR TRAFFIC SHALL BE TRAFFIC RATED.

2.05 SNOWMELT CONTROLS

A. PROVIDE A MICROPROCESSOR BASED CONTROL PANEL THAT ACTIVATES THE SNOW MELTING SYSTEM BASED ON SIGNALS FROM A SNOW SENSOR AND AN OUTDOOR AIR TEMPERATURE SENSOR. THE CONTROL PANEL SHALL INCLUDE THE FOLLOWING FEATURES:

1. SELECTABLE LCD DISPLAY OF SLAB SURFACE TEMPERATURE, SURFACE TEMPERATURE SETTING, MELT SEQUENCE TIME REMAINING, ACCUMULATED HOURS OF USE, AND PERCENT HEAT OUTPUT. CONTROL PANEL SHALL BE CAPABLE OF ENABLING OR DISABLING THE SYSTEM AS NECESSARY.
2. STATUS LIGHTS INDICATING POWER ON, REMOTE ENABLE SIGNAL PRESENT, WARM WEATHER CUT-OFF, MELTING MODE ACTIVATED, WATER DETECTED, COLD WEATHER CUT-OFF, IDLING MODE ACTIVATED, PUMP ACTIVATED, SYSTEM MELTING, AND SENSOR FAULT.
3. SLAB SURFACE MELTING TEMPERATURE SETPOINT ADJUSTMENT.
4. SLAB SURFACE IDLING TEMPERATURE SETPOINT ADJUSTMENT.
5. MOISTURE SENSOR SENSITIVITY SETPOINT ADJUSTMENT.
6. MELTING SYSTEM MINIMUM ON TIME ADJUSTMENT.
7. COLD WEATHER CUT-OFF TEMPERATURE SETPOINT ADJUSTMENT.
8. TEST BUTTON TO INITIATE TEST SEQUENCE.

B. PROVIDE AN OUTDOOR AIR TEMPERATURE SENSOR CONSISTING OF A 10,000 OHM THERMISTOR PROTECTED WITHIN A WHITE U.V. RESISTANT PVC PLASTIC ENCLOSURE.

C. PROVIDE A SNOW/ICE SENSOR WHICH SITS FLUSH WITH THE SLAB SURFACE AFTER BEING MOUNTED INTO A SENSOR SOCKET. THE SENSOR SHALL MEASURE SLAB SURFACE TEMPERATURE AND SENSOR CORE TEMPERATURE AND SHALL DETECT MOISTURE ON THE SENSOR SURFACE. THE SENSOR SOCKET SHALL BE CONSTRUCTED OF DIE CAST BRASS.

SNOW MELT SYSTEM INSTALLATION

3.01 INSTALLATION

A. HYDRONIC RADIANT HEAT TUBING LOOPS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.

B. ALL FITTINGS AND MANIFOLDS SHOULD BE ACCESSIBLE THROUGH ACCESS COVERS FOR MAINTENANCE. TUBING LOOPS SHALL BE INSTALLED WITHOUT SPLICES, AS A MINIMUM, FROM THE POINT AT WHICH THE TUBING ENTERS THE MANIFOLD TO THE POINT AT WHICH IT EXITS THE MANIFOLD.

C. INSTALLATION SHALL FOLLOW THE MANUFACTURER'S SHOP DRAWINGS FOR TUBING LAYOUT, TUBE SPACING, MANIFOLD CONFIGURATION, MANIFOLD LOCATION, AND CONTROLS. ALL NOTES ON THE SHOP DRAWINGS SHALL BE FOLLOWED.

D. DISTRIBUTION MANIFOLDS SHALL BE ATTACHED TO SUPPLY AND RETURN MAINS AT ACCESS COVER LOCATIONS. A MINIMUM OF ONE SUPPLY AND ONE RETURN MANIFOLD IS REQUIRED AND FOR ALTERNATE EXPANSION/CONSTRUCTION JOINTS.

E. PIPING SHALL BE ATTACHED TO REINFORCING STEEL USING WIRE TIES. ALL LOOPS SHALL BE FORM A CONTINUOUS CONDUIT WITHOUT JOINTS FROM SUPPLY TO RETURN MANIFOLDS.

F. NO PIPE SHALL EXTEND THROUGH EXPANSION, CONSTRUCTION, OR WORKING JOINTS IN CONCRETE SLAB. COORDINATE EXPANSION JOINTS INSTALLED DURING, OR CUT AFTER, CONCRETE POUR WITH TUBING LAYOUT.

G. ALL PIPE CONNECTIONS, FITTINGS, AND DISTRIBUTION MANIFOLDS SHALL BE FREE OF CONCRETE AND ARRANGED TO BE EASILY SERVICED BY REMOVAL OF POURED-IN-PLACE CONCRETE ACCESS COVERS.

H. COORDINATE SYSTEM FLUSHING AND GLYCOL FILL WORK WITH WATER TREATMENT CONTRACTOR.

I. ALL PIPING CONNECTIONS SHALL BE FIELD WRAPPED WITH INSULATION. WRAP AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

3.02 TESTING

A. THE TUBING SYSTEM SHALL BE PRESSURIZED WITH WATER OR AIR TO A PRESSURE OF 60 PSIG 24 HOURS PRIOR TO ENCASEMENT IN THE CONCRETE SLAB. THE TUBING SYSTEM SHALL REMAIN AT THIS PRESSURE DURING THE SLAB INSTALLATION AND FOR A MINIMUM OF 24 HOURS THEREAFTER TO ENSURE SYSTEM INTEGRITY.

3.03 SYSTEM STARTUP

A. AT STARTUP TIME, THE CONTRACTOR SHALL FOLLOW THE MANUFACTURER'S RECOMMENDATIONS FOR SYSTEM WATER AND TEMPERATURE BALANCING, RECORD BALANCE SETTINGS AT EACH MANIFOLD LOCATION, AND INCLUDE A COMPLETE RECORD OF THESE SETTINGS IN THE OPERATION AND MAINTENANCE MANUALS.

B. VERIFY CONTROL OPERATION IS IN ACCORDANCE WITH SEQUENCE SPECIFIED.

3.04 SEQUENCE OF CONTROL

A. SNOWMELT SYSTEM CONTROL

B. THE SNOWMELT SYSTEM SHALL BE CONTROLLED BY A MICROPROCESSOR BASED CONTROL PANEL FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER. THE OUTDOOR TEMPERATURE SENSOR AND SNOW/ICE SENSOR SHALL ALSO BE FURNISHED BY THE SNOWMELT SYSTEM MANUFACTURER.

C. THE CONTROL PANEL SHALL CONTINUOUSLY MONITOR THE SNOW/ICE SENSOR LOCATED IN THE SLAB. WHEN SNOW, ICE, OR WATER ARE DETECTED THE MELTING MODE SHALL BE INITIATED, UNLESS THE WARM WEATHER OR COLD WEATHER CUT-OFF CONTROLS HAVE BEEN ACTIVATED.

D. IF THE OUTDOOR AIR TEMPERATURE IS ABOVE 40 deg.F (ADJUSTABLE), THE SNOWMELT SYSTEM SHALL ENTER THE WARM WEATHER CUT-OFF MODE. IT SHALL REMAIN THERE UNTIL THE OUTDOOR AIR TEMPERATURE DROPS BELOW THE MELTING TEMPERATURE SETPOINT. THE WARM WEATHER CUT-OFF MODE SHALL DEACTIVATE THE SNOWMELT SYSTEM.

E. THE MELTING MODE SHALL BE CAPABLE OF BEING ACTIVATED EITHER THROUGH THE SNOW/ICE SENSOR OR THROUGH A REMOTE ENABLE SIGNAL FROM THE BAS. WHEN THE MELTING MODE IS ACTIVATED, THE PUMP SHALL BE ENERGIZED AND THE HEAT RELAY SHALL CYCLE ON AND OFF, USING PULSE WIDTH MODULATION (PWM) CONTROL, TO MAINTAIN THE SLAB SURFACE AT THE MELTING TEMPERATURE SETPOINT.

F. THE SLAB SHALL BE MAINTAINED AT AN IDLING TEMPERATURE WHEN THE SNOWMELT SYSTEM IS NOT IN THE MELTING MODE. CONTROL OPERATION IS SIMILAR TO THE MELTING MODE EXCEPT THE SLAB IS MAINTAINED AT A LOWER IDLING TEMPERATURE SETPOINT.

G. IF A SENSOR FAULT OCCURS, A WARNING LIGHT SHALL BE ACTIVATED AT THE CONTROL PANEL.

H. DESIRED SLAB SURFACE MELTING TEMPERATURE, SLAB SURFACE IDLING TEMPERATURE, AND COLD WEATHER CUT-OFF TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE AT THE CONTROL PANEL.

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MECHANICAL SPECIFICATIONS

COLORADO REGISTERED PROFESSIONAL ENGINEER 35133 11.09.23

M3.2

EXISTING

PANEL "BP" VOLTAGE 120 / 208 V 3 PH 4 W

FLUSH — MAIN 400/3 MLO —

SURFACE X BUS 400A FEED THRU — A.I.C. 10,000A

	TYPE	DESCRIPTION	BKR	CIR	LOAD (VA/PHASE) A		CIR	LOAD (VA/PHASE) B		CIR	LOAD (VA/PHASE) C		CIR	BKR	DESCRIPTION	TYPE
		SPARE	20/3	1	0	0							2	20/3	SPARE	
		-		3				0	0				4		-	
		-		5							0	0	6		-	
		SPARE	50/3	7	0	3867							8	50/3	SNOW MELT PUMP	M
		-		9				0	3867				10		-	M
		-		11							0	4867	12		-	MG
	G	BASEBOARD HEAT	20/2	13	1000	1000							14	20/2	BASEBOARD HEAT	G
	G	-		15				1000	500				16		-	G
	G	BOILER	20	17							500	50	18	20	SNOW MELT CNT PNL	G
*	G	B-2	20	19	1344	500							20	20	BOILER EPO	L
	L	L - BOLLARDS	20	21				178	500				22	20	L - PLAZA	L
	G	FIREPIT - PLAZA	20	23							100	1176	24	20	L - POOL NITCHE	M
	R	R - PLAZA	20	25	360	720							26	20	GLYCOL PUMP	R
	R	R - PLAZA	20	27				720	100				28	20	R - BOILER ROOM	L
		SPARE	20	29							0	100	30	20	L - BOILER ROOM	L
	G	HEAT TAPE	40/2	31	2220	2200							32	40/2	HEAT TAPE	G
	G	-		33				2220	2200				34		-	G
	G	HEAT TAPE	30/2	35							1140	1140	36	30/2	HEAT TAPE	G
	G	-		37	1140	1140							38		-	G
	G	LIGHTING CONTROL	20	39				200	500				40	20	L - POOL PERIMETER	L
	G	PLAZA	20	41							200	200	42	20	HEAT TAPE CONTROL	G
		SPARE	20	43	0	0							44	20	SPARE	
		SPARE	20	45				0	0				46	20	SPARE	
		SPARE	20	47							0	0	48	20	SPARE	
		SPARE	20	49	0	0							50	20	SPARE	
**	M	SNOW MELT PUMP P-2	60/3	51				3866	0				52		SPACE	
	M	-		53							3866	0	54		SPACE	
	M	-		55	3866	0							56		SPACE	
		SPACE		57				0	0				58		SPACE	
		SPACE		59							0	0	60		SPACE	
		SPACE		61	0	0							62		SPACE	
		SPACE		63				0	0				64		SPACE	
		SPACE		65							0	0	66		SPACE	
		SPACE		67	0	0							68		SPACE	
		SPACE		69				0	0				70		SPACE	
		SPACE		71							0	0	72		SPACE	
		SPACE		73	0	0							74		SPACE	
		SPACE		75				0	0				76		SPACE	
		SPACE		77							0	0	78		SPACE	
		SPACE		79	0	0							80		SPACE	
		SPACE		81				0	0				82		SPACE	
		SPACE		83							0	0	84		SPACE	
					19357			15851			13339					

LOAD TYPE	CONNECTED KVA A	B	C	TOTAL ALL	FACTOR	DEMAND KVA A	B	C	TOTAL ALL
LIGHTING/CONTINUOUS	0.5	1.3	0.1	1.9	125%	0.6	1.6	0.1	2.3
RECEPTACLE (10KVA OR LESS)	1.1	0.7	0.0	1.8	100%	1.1	0.7	0.0	1.8
RECEPTACLE (OVER 10KVA)	0.0	0.0	0.0	0.0	100%	0.0	0.0	0.0	0.0
HVAC/MOTOR	7.7	7.7	8.9	24.4	100%	7.7	7.7	8.9	24.4
MOTOR(LARGEST)	0.0	0.0	0.0	0.0	125%	0.0	0.0	0.0	0.0
KITCHEN EQUIPMENT	0.0	0.0	0.0	0.0	100%	0.0	0.0	0.0	0.0
MISCELLANEOUS	10.0	6.1	4.3	20.5	100%	10.0	6.1	4.3	20.5
TOTAL KVA	19.4	15.9	13.3	48.5	TOTAL KVA	19.5	16.2	13.4	49.0
					TOTAL AMPERES	162.4	134.8	111.4	162.4

LEGEND: L = LIGHTING R = RECEPTACLE M = HVAC / MOTOR K = KITCHEN G = MISCELLANEOUS

* CIRCUIT REVISED THIS CONTRACT.

** PROVIDE NEW SQUARE D BREAKER.

MECHANICAL EQUIPMENT SCHEDULE

DESIGNATION	DESCRIPTION	VOLTAGE	PH	HP	kVA	FLA (MCA)	CONDUCTORS	CONDUIT	SWITCH	CB	FUSE SIZE/TYPE	REMARKS
B-1	BOILER	120	1	-	-	9.2	2-#12; 1-#12 GND	1/2"	STO	20/1	-	-
P-1	PUMP	208	3	10	-	-	3-#4; 1-#10 GND	1-1/4"	60/3	60/3	50A FRN-R	-

ELECTRICAL SYMBOLS LEGEND

ALL SYMBOLS INDICATED IN THE LEGEND MAY NOT NECESSARILY BE USED ON PLANS.

CIRCUITING

SYMBOL	DESCRIPTION
	CIRCUITING DESIGNATION - OPEN 277/480V., SOLID 120/208V.
	CIRCUITING - RUN CONCEALED IN WALL OR CEILING
	CIRCUITING - RUN CONCEALED IN FLOOR OR GRADE
	CONDUIT RISER - TURNED UP, TURNED DOWN
	CIRCUITING - CONTINUED AS DESIGNATED
	CIRCUITING - END CAP

LINETYPES and LINEWEIGHTS

	NEW CIRCUITING - CONTINUOUS AND BOLD
	NEW CIRCUITING - UNDER FLOOR OR GRADE - LARGER DASHED AND BOLD
	EXISTING CIRCUITING - CONTINUOUS AND THIN
	DEMOLITION CIRCUITING - LARGER DASHED AND THIN
	NEW AND RELOCATED DEVICES AND FIXTURES - CONTINUOUS AND BOLD
	EXISTING DEVICES AND FIXTURES - CONTINUOUS AND THIN
	DEMOLITION DEVICES AND FIXTURES - SMALLER DASHED AND THIN

GENERAL

SYMBOL	DESCRIPTION
#	REVISION DELTA
#	DRAWING NOTE
#	MECHANICAL EQUIPMENT
#	KITCHEN EQUIPMENT

TELECOMMUNICATION SYMBOLS

SYMBOL	DESCRIPTION
	TELEPHONE OUTLET, SINGLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
	TELEPHONE/DATA OUTLET, DOUBLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
	DATA OUTLET, SINGLE GANG BOX, 3/4" CONDUIT STUB TO ACCESSIBLE CEILING
W	FLOOR DATA OUTLET - (S) SURFACE, (F) FLUSH
W	FLOOR TELEPHONE/DATA OUTLET - (S) SURFACE, (F) FLUSH
W	CABLE TV OUTLET - (S) SURFACE, (F) FLUSH

POWER SYMBOLS

SYMBOL	DESCRIPTION
J	FLOOR MOUNTED JUNCTION BOX
J	JUNCTION BOX
J	JUNCTION BOX W/ BLANK COVER
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	HALF SWITCHED DUPLEX RECEPTACLE
	DEDICATED DUPLEX RECEPTACLE
	CEILING MOUNTED DUPLEX RECEPTACLE
	FOURPLEX RECEPTACLE
	DEDICATED FOURPLEX RECEPTACLE
	CLG. MOUNTED FOURPLEX RECEPTACLE
	SPECIAL RECEPTACLE - SEE DRAWING NOTES
	FLOOR MOUNTED DEVICE
	FLUSH FLOOR COMBINATION FLOOR BOX
	NON FUSED DISCONNECT SWITCH
	FUSED DISCONNECT SWITCH
	MOTOR STARTER
M	MOTOR
	ONE, TWO, and THREE BUTTON PUSH SWITCH
P	POWER POLE
T	TIME CLOCK
C	CONTACTOR
M	METER
P	PANEL BOARD
C	CLOCK
	PULLBOX
C/T	CURRENT TRANSFORMER
T	TRANSFORMER
WH	WATER HEATER

LIGHTING SYMBOLS

SYMBOL	DESCRIPTION
	RECESS MOUNTED FLUORESCENT STRIP
	SURFACE MOUNTED FLUORESCENT STRIP
	SURFACE MOUNTED 1' x 4' FLUORESCENT
	SURFACE MOUNTED 2' x 4' FLUORESCENT
	SURFACE MOUNTED 2' x 2' FLUORESCENT
	RECESS MOUNTED 2' x 4' FLUORESCENT
	RECESS MOUNTED 1' x 4' FLUORESCENT
	CEILING MOUNTED SINGLE FACE EXIT SIGN W/ "FROG EYE"
	CEILING MOUNTED EXIT SIGN
	WALL MOUNT (ANY FIXTURE TYPE)
	EMERGENCY BATTERY PACK, "FROG-EYE"
	EMERGENCY, REMOTE HEAD, SINGLE & DOUBLE
	DOWNLIGHT/PENDANT FIXTURE
	WALL MOUNTED FIXTURE
	WALLWASH DOWNLIGHT
	PORCELAIN KEYLESS LAMPHOLDER
	TRACK LIGHTING
	TRACK LIGHTING, HEAD
	SINGLE ARM SITE LIGHTING - ADDITIONAL ARMS AS REQUIRED
	BUILDING EXTERIOR WALL MOUNTED

SWITCHES

SYMBOL	DESCRIPTION
S	SWITCH, SINGLE POLE
S2	SWITCH, DOUBLE POLE
S3	SWITCH, THREE WAY
S4	SWITCH, FOUR WAY
SD	SWITCH, DIMMER
SK	SWITCH, KEYED
SP	SWITCH, WITH PILOT LIGHT
STO	SWITCH, THERMAL OVERLOAD
SM	SWITCH, MOTOR CONTROL
SV	SWITCH, VARIABLE SPEED CONTROL
SSU	SWITCH, WITH TYPE S FUSE HOLDER (INCLUDE FUSE)
	WALL MOUNTED OCCUPANCY SENSOR
	CEILING MOUNTED OCCUPANCY SENSOR

FIRE ALARM SYMBOLS

SYMBOL	DESCRIPTION
	CEILING MOUNTED FIRE SPEAKER/STROBE
	CEILING MOUNTED STROBE
P	CEILING MOUNTED FIRE SPEAKER
	REMOTE INDICATOR LAMP
	MANUAL PULL STATION
FS	FLOW SWITCH
TS	TAMPER SWITCH
PS	PRESSURE SWITCH
	CEILING/WALL MOUNTED STROBE
FH	FIRE HORN
FHS	FIRE HORN WITH STROBE
DH	MAGNETIC DOOR HOLD OPEN
FACP	FIRE ALARM CONTROL PANEL
ANN	ANNUNCIATOR PANEL
FD	DUCT DETECTOR
	FIRE SMOKE DAMPER
H	HEAT DETECTOR
S	SMOKE DETECTOR
FF	FIREFIGHTER'S PHONE JACK/ WALL PHONE

MISCELLANEOUS SYMBOLS

SYMBOL	DESCRIPTION
CR	CARD READER
RTS	REMOTE TEST SWITCH
TC	TIME CLOCK
P	PHOTOCELL
S	MUSIC OR PAGING SPEAKER
T	THERMOSTAT, LINE VOLTAGE
M	SECURITY MOTION SENSOR, WALL MOUNTED
M	SECURITY MOTION SENSOR, CEILING MOUNTED
EPO	EMERGENCY POWER OFF
B	BELL
B	DOORBELL BUZZER
TV	TELEVISION CABLE OUTLET
	SECURITY CAMERA
I	INTERCOM PUSH BUTTON
MIC	MICROPHONE JACK
	COMBINATION CLOCK/SPEAKER BOX

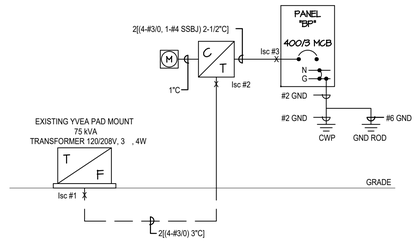
ONE LINE DIAGRAM SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
PANEL "LA"	PANEL BOARD	100A FRN-R	FUSED DISCONNECT SWITCH WITHIN SWITCHBOARD
C/T	CURRENT TRANSFORMER ENCLOSURE	100/3	SPARE SWITCH WITHIN SWITCHBOARD
P/B	PULL BOX	SPACE	SPACE WITHIN SWITCHBOARD
100/3 100A FRN-R	FUSED DISCONNECT SWITCH	100/3	CIRCUIT BREAKER
100/3	NON-FUSED DISCONNECT SWITCH		SERVICE WEATHER HEAD
T/F	TRANSFORMER (PLAN VIEW)		CURRENT TRANSFORMER
T/F	PAD MOUNTED TRANSFORMER (ONE-LINE)		GROUNDING CONNECTION
	TRANSFER SWITCH	M	MOTOR
	OVERHEAD POLE MOUNTED TRANSFORMER BANK	G	GENERATOR
		M	METER

ABBREVIATIONS

AC	ABOVE COUNTER	C.W.P.	COLD WATER PIPE	EWH	ELECTRIC WATER HEATER	IG	ISOLATED GROUND DEVICE	N.O.	NORMALLY OPEN	SM	SURFACE MOUNT
A.F.F.	ABOVE FINISHED FLOOR	(E)	EXISTING	FF PT	FLUSH FLOOR POKE THRU	MC	MECHANICAL CONTRACTOR	NTS	NOT TO SCALE	T/D	TELEPHONE AND DATA OUTLET
AFCI	ARC FAULT CIRCUIT INTERRUPTER	EPO	EMERGENCY POWER OFF	GC	GENERAL CONTRACTOR	(N)	NEW	(PART)	PARTIAL CIRCUIT	TYP	TYPICAL
BLDG.	BUILDING	EM	EMERGENCY POWER CIRCUIT	GND	GROUND	N.C.	NORMALLY CLOSED	RL	RELOCATED	UF	UNDER FLOOR
CLG.	CEILING MOUNTED	EWC	ELECTRIC WATER COOLER	GFCI/GFI	GROUND FAULT CIRCUIT INTERRUPTER	NIC	NOT IN CONTRACT	RTS	REMOTE TEST SWITCH	WP	WEATHERPROOF - NEMA 3R
						NL	NIGHT LIGHT			WF	WALL PHONE +54" A.F.F.

2018 INTERNATIONAL BUILDING CODE 2018 INTERNATIONAL ENERGY CONSERVATION CODE
2018 INTERNATIONAL FIRE CODE 2023 NATIONAL ELECTRIC CODE



ONE-LINE DIAGRAM

SCALE: N.T.S.

NOTE: ALL CONDUCTORS ARE COPPER UNLESS NOTED OTHERWISE.

Isc CALCULATION - 3 PHASE

Point #1 - At The Utility Transformer

Isc = 24,400

Point #2 - At the CT Compartment

f = [1.732 X length X Isc(prev)] / [# runs X wire factor X voltage]
f = 1.732 X 190 X 24,400 / 2 X 13,923 X 208
f = 1.386

M = 1/(1+f)
M = 0.419

Isc = Isc(prev) x M
Isc = 10,225

Point #3 - At Panel "BP"

f = [1.732 X length X Isc(prev)] / [# runs X wire factor X voltage]
f = 1.732 X 10 X 10,225 / 2 X 12,843 X 208
f = 0.033

M = 1/(1+f)
M = 0.968

Isc = Isc(prev) x M
Isc = 9,897

Point #4 - At Boiler "B-2"

f = [1.732 X length X Isc(prev)] / [# runs X wire factor X voltage]
f = 1.732 X 25 X 9,897 / 1 X 617 X 480
f = 1.447

M = 1/(1+f)
M = 0.409

Isc = Isc(prev) x M
Isc = 4,045

Point #5 - At Pump "P-2"

f = [1.732 X length X Isc(prev)] / [# runs X wire factor X voltage]
f = 1.732 X 35 X 9,897 / 1 X 981 X 480
f = 1.274

M = 1/(1+f)
M = 0.440

Isc = Isc(prev) x M
Isc = 4,352

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

TORIAN PLUM SNOW MELT UPGRADES

STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

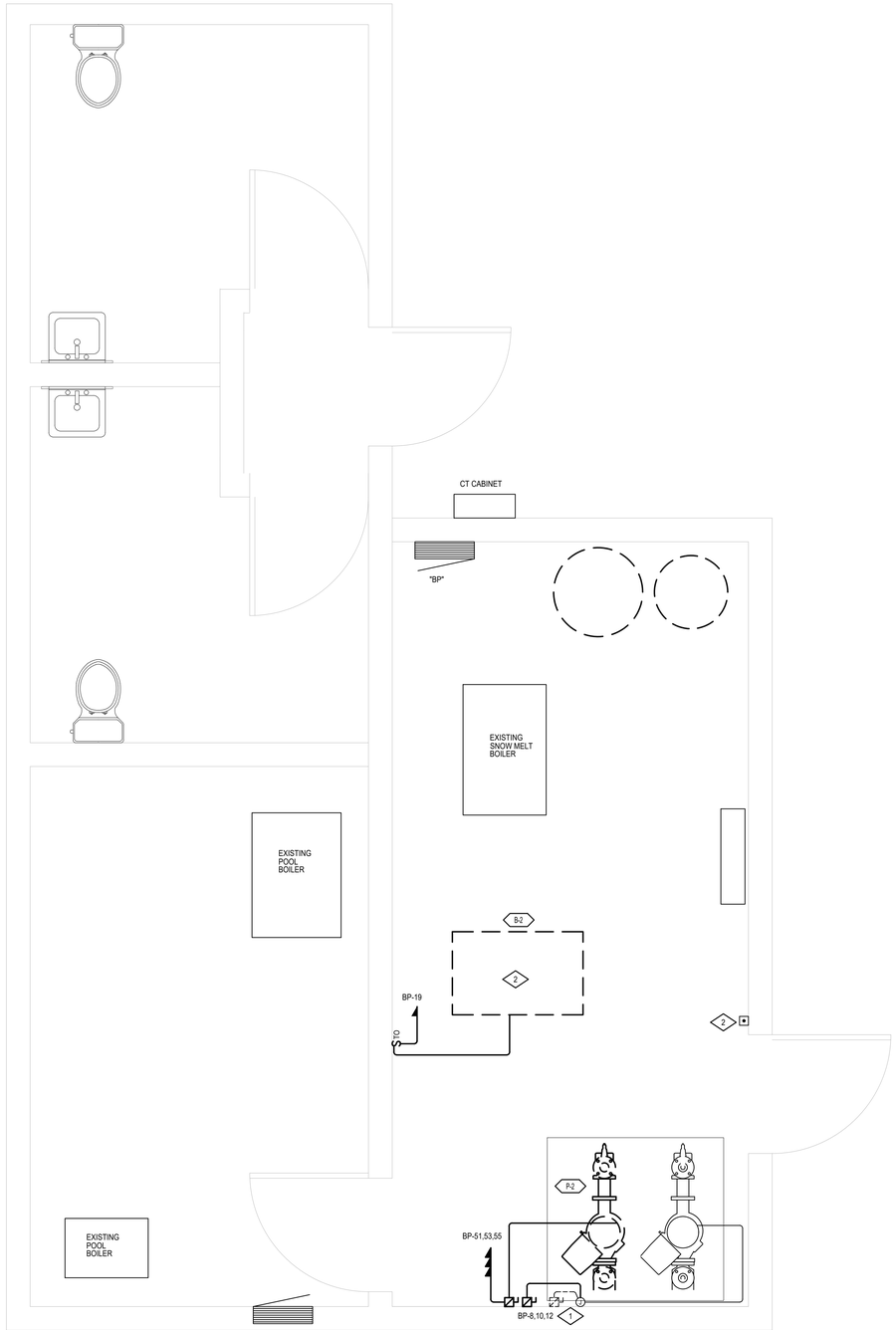
MEP JOB: 22336

DESIGNED: KSP

CHECKED: RCC

ELECTRICAL LEGEND, ONE-LINE AND SCHEDULES

E1.0



DRAWING NOTES

1. RELOCATE EXISTING PUMP DISCONNET TO MAINTAIN NEC REQUIRED WORKING CLEARANCES. EXTEND WIRE AND CONDUIT AS NECESSARY.
2. CONNECT NEW BOILER TO EXISTING EMERGENCY POWER OFF (EPO) BUTTON.

N

BOILER ROOM EQUIPMENT PLAN

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

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CHECKED: RCC

ELECTRICAL BOILER ROOM PLAN

COLORADO REGISTERED
ROBERT C. CRAWFORD
35656
11.08.23
PROFESSIONAL ENGINEER

E2.0

DIVISION 26 - ELECTRICAL SPECIFICATIONS

BASIC ELECTRICAL REQUIREMENTS

GENERAL

1. PRIOR TO SUBMITTING BIDS, THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE TO VERIFY EXISTING ELECTRICAL EQUIPMENT CONDITIONS AND DIFFICULTIES THAT WILL AFFECT EXECUTION OF THE WORK. FIELD VERIFY QUANTITIES OF EXISTING LIGHT FIXTURES, ELECTRICAL DEVICES, COMMUNICATION DEVICES, FIRE ALARM DEVICES, AND ELECTRICAL EQUIPMENT. NOTIFY THE ARCHITECT AND ENGINEER OF ANY EXISTING CONDITIONS, WHICH MODIFY THE SCOPE OF WORK AS SHOWN ON THE CONSTRUCTION DOCUMENTS. SUBMISSION OF A BID PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND LATER CLAIMS FOR MOBILIZATION, LABOR, EQUIPMENT, AND/OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WILL NOT BE RECOGNIZED.

2. ELECTRICAL CONTRACTOR SHALL FULLY COORDINATE WITH OWNER REPRESENTATIVES. ALL ELECTRICAL WORK PERFORMED UNDER THIS CONTRACT SHALL CONFORM WITH LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE, UNIFORM BUILDING CODE OR INTERNATIONAL BUILDING CODE, LOCAL BUILDING AND FIRE DEPARTMENT REQUIREMENTS. PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS OF OWNER REPRESENTATIVES.

3. ELECTRICAL CONTRACTOR SHALL MAINTAIN ON THE JOB AN UP TO DATE SET OF WORKING DRAWINGS, MARKED UP TO SHOW ELECTRICAL SYSTEMS AS INSTALLED. PROVIDE ARCHITECT WITH ONE SET OF REPRODUCIBLES WITH "AS BUILT" PROJECT RECORD AFTER COMPLETION OF PROJECT. INFORMATION CLEARLY INDICATED. INCLUDE DISCREPANCIES IN FEEDER SIZES, EQUIPMENT SIZES AND LOCATIONS, AND DEVICE TYPES AND LOCATIONS.

4. ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LOCAL FEES, PERMITS, AND SERVICES OF INSPECTION AUTHORITIES REQUIRED BY ELECTRICAL WORK FOR THIS ELECTRICAL CONSTRUCTION.

5. REFER TO ARCHITECTURAL AND MECHANICAL EQUIPMENT DRAWINGS FOR EXACT LOCATIONS OF ELECTRICAL DEVICES AND LIGHT FIXTURES. DO NOT SCALE FROM THE ELECTRICAL PLANS. ADDITIONAL ELECTRICAL REQUIREMENTS ON ARCHITECTURAL PLANS, KITCHEN EQUIPMENT PLANS, AND MECHANICAL PLANS SHALL BE INCLUDED IN THE ELECTRICAL CONTRACTOR'S BID.

6. THE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF ELECTRICAL WORK. LOCATIONS ARE APPROXIMATE AND SHALL BE SUBJECT TO MINOR MODIFICATIONS AS DIRECTED BY THE GENERAL CONTRACTOR AND OWNER REPRESENTATIVES. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE EXACT FITTING OF ALL MATERIALS, EQUIPMENT, ETC., IN THE BUILDING AND TENANT SPACE. ALL DIMENSIONS SHALL BE VERIFIED ON THE JOB. ELECTRICAL CONTRACTOR SHALL CUT, CHANNEL, CHASE, AND/OR DRILL FLOORS, WALLS, PARTITIONS, CEILINGS, OR OTHER SURFACES AS REQUIRED FOR INSTALLATION, SUPPORT, ANCHORAGE, ETC., OF WORK. PROVIDE X-RAY OF FLOOR PRIOR TO CORE DRILLS. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUBSEQUENT PATCHING WORK.

7. EXISTING EQUIPMENT IS SHOWN FOR REFERENCE PURPOSES AND SHALL REMAIN. EXISTING EQUIPMENT NOT SHOWN SHALL ALSO REMAIN. EXISTING EQUIPMENT TO REMAIN SHALL BE PROTECTED FROM DAMAGE.

8. WORK SHOWN AS EXISTING CONDITIONS WAS TAKEN FROM OWNER FURNISHED DRAWINGS AND/OR VERIFIED DURING FIELD SURVEY. MEP IS NOT RESPONSIBLE FOR THE ACCURACY OF ANY INFORMATION OR THE ADEQUACY, SAFETY AND CONFORMANCE TO CURRENT PREVAILING CODES OF ANY WORK SHOWN AS EXISTING ON THESE DOCUMENTS.

9. IT IS THE INTENT OF THESE DOCUMENTS TO RESULT IN A COMPLETE ELECTRICAL INSTALLATION IN COMPLETE ACCORDANCE WITH APPLICABLE CODES AND ORDINANCES. THE DRAWINGS ARE DIAGRAMMATIC IN CHARACTER AND DO NOT NECESSARILY INDICATE EVERY REQUIRED JUNCTION BOX, PULL BOX, FITTING, ETCETERA. ITEMS NOT SPECIFICALLY MENTIONED IN THE SPECIFICATION OR NOTED ON THE DRAWINGS, BUT WHICH ARE OBVIOUSLY NECESSARY TO MAKE A COMPLETE WORKING INSTALLATION, SHALL BE INCLUDED.

10. DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY. WHATEVER IS CALLED FOR IN EITHER IS BINDING AS THOUGH CALLED FOR IN BOTH. THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.

11. IF CONFLICTS ARE DISCOVERED IN CONTRACT DOCUMENTS AS WORK PROGRESSES, A SET OF PRINTS MARKED WITH RED PENCIL SHOWING RECOMMENDED MODIFICATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.

12. IN THE EVENT THAT DISCREPANCIES EXIST OR REQUIRED ITEMS OR DETAILS HAVE BEEN OMITTED, NOTIFY THE ARCHITECT IN WRITING OF SUCH DISCREPANCY OR OMISSION AT LEAST THREE DAYS PRIOR TO BID DATE. FAILURE TO DO SO SHALL BE CONSTRUED AS WILLINGNESS TO SUPPLY NECESSARY MATERIALS AND LABOR REQUIRED FOR THE PROPER COMPLETION OF THIS WORK. FOR DISCREPANCIES WHICH ARE NOT REPORTED BY CONTRACTOR THE MOST STRINGENT REQUIREMENT SHALL APPLY.

13. IN THE EVENT THAT ADDITIONAL INFORMATION IS REQUIRED DURING CONSTRUCTION, REQUEST SUCH INFORMATION FROM THE ARCHITECT IN WRITING PRIOR TO PERFORMING RELATED WORK. THE REQUEST FOR INFORMATION SHALL INCLUDE AN EXPLANATION OF THE INFORMATION REQUIRED INCLUDING REFERENCES TO RELATED PORTIONS OF THE DOCUMENTS AND CONTRACTOR'S RECOMMENDATIONS.

14. THE TERM "PROVIDE" SHALL MEAN FURNISH AND INSTALL ITEMS OR SYSTEMS IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

15. INSTALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS UNLESS LOCAL CODES OR REGULATIONS TAKE PRECEDENCE.

16. PROVIDE APPURTENANCES AND CONSUMABLES AS REQUIRED.

17. WORK SHALL CONFORM TO BASE BUILDING SPECIFICATIONS EXCEPT AS AMENDED BY THESE SPECIFICATIONS. CONTRACTOR SHALL VERIFY EXISTING CIRCUITS PRIOR TO STARTING WORK.

18. COMPLY WITH THE LATEST EDITION OF NATIONAL ELECTRICAL CODE, APPLICABLE STATE AND LOCAL CODES, ORDINANCES AND OSHA REQUIREMENTS.

19. WHERE A CONFLICT EXISTS BETWEEN ANY PREVAILING CODES AND WORK INDICATED ON THESE DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.

20. PAY FOR ALL ELECTRICAL PERMITS, LICENSES AND CONSTRUCTION FEES.

21. EXAMINE SITE AND PREMISES PRIOR TO SUBMISSION OF BID. NO ADDITIONAL COMPENSATION WILL BE MADE FOR EXTRA EXPENSE INCURRED DUE TO FAILURE TO EXAMINE EXISTING SITE CONDITIONS.

22. DEMOLITION OR ABANDONING ANY ELECTRICAL AND COMMUNICATIONS CONDUIT, WIRING, CABLING, OR DEVICE MEANS TO REMOVE IN ITS ENTIRETY. REMOVE UNUSED CONDUITS FROM CEILING SPACES IN AREAS OF WORK. ABANDONED OUTLET JUNCTION BOXES ARE TO BE REMOVED AND COVERED WITH NEW GYPSUM BOARD. ABANDONED POKE THRU OUTLETS SHALL HAVE COVER PLATES AND BE FILLED WITH FIRE RATED FOAM SEALANT TO MAINTAIN FIRE RATING OF FLOOR.

23. ELECTRICAL CONTRACTOR SHALL RE-USE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING WHERE POSSIBLE. RE-USE EXISTING PREFABRICATED LIGHTING SYSTEM CONDUIT AND WIRING WHERE POSSIBLE. RE-ROUTE AND EXTEND AS NECESSARY FOR THIS TENANT FINISH CONSTRUCTION. PROVIDE ADDITIONAL NEW CONDUIT, WIRING, COMPONENTS, AND CONNECTIONS AS REQUIRED FOR COMPLETE AND OPERATIONAL SYSTEMS, TYPICAL.

24. SCHEDULE SERVICE INTERRUPTIONS IN WRITING WITH OWNER AND BUILDING OCCUPANTS ONE (1) WEEK IN ADVANCE.

25. COORDINATE WORK AND POWER OUTAGES WITH BUILDING MANAGEMENT, AFFECTED TENANTS, AND OTHER TRADES.

26. COORDINATE BUILDING ELECTRICAL SERVICE REVISIONS AND ADDITIONS WITH LOCAL UTILITY COMPANY.

27. EQUIPMENT REMOVED IS THE PROPERTY OF THE OWNER AND SHALL BE RETURNED TO THE OWNER FOR DISPOSITION. SALVAGE ALL REMOVED EQUIPMENT FOR OWNER AND STORE IN OWNER DESIGNATED LOCATION. EQUIPMENT NOT RETAINED BY THE OWNER SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.

28. ALL MATERIALS SHALL BE NEW AND BEAR THE "UL" LABEL.

29. PROVIDE SUBMITTALS (ELECTRONIC PDF FORMAT) ON ALL PROPOSED MATERIALS. SUBMITTALS SHALL CLEARLY INDICATE COMPLETE MODEL NUMBERS OF MATERIALS OR EQUIPMENT PROPOSED. SUBMITTALS SHALL BE SUBMITTED WITHIN 10 DAYS OF AWARD OF CONTRACT FOR REVIEW. SUBMITTALS SHALL BE PROVIDED IN A TIMELY MANNER WITH LEAD TIMES FOR MATERIALS AND ADEQUATE TIME FOR ENGINEER REVIEW TAKEN INTO ACCOUNT. CONTRACTOR IS RESPONSIBLE FOR ANY ADDITIONAL COSTS ASSOCIATED WITH EXPEDITING MATERIAL DELIVERIES OR SUBSTITUTIONS OF MATERIALS FROM WHAT WAS SPECIFIED IN THE PLANS OR SPECIFICATIONS.

30. REMOVE ALL REFUSE AND WASTE MATERIAL FROM BUILDING DAILY.

31. LEFT OVER OR REMOVED EQUIPMENT REQUIRING HAZARDOUS WASTE REMOVAL SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR UPON COMPLETION OF THE CONSTRUCTION PROJECT AND DISPOSED OF PER EPA REQUIREMENTS.

32. PROVIDE TEST EQUIPMENT AND CONDUCT NECESSARY TESTING TO DETERMINE CONFORMITY WITH EQUIPMENT SPECIFICATIONS. PERFORM TESTS UNDER OBSERVATION OF OWNER'S REPRESENTATIVE. CORRECT DEFECTS AND RETEST. COMPLETE TESTS TO SATISFACTION OF OWNER'S REPRESENTATIVE.

33. PROVIDE UPDATED, COMPLETE AND ACCURATE TYPED PANELBOARD CIRCUIT DIRECTORIES AT THE COMPLETION OF WORK. CLEARLY LABEL ALL SPACES AND SPARES IN PENCIL. CLEAN EXPOSED PANELBOARD SURFACES AND CHECK TIGHTNESS OF ELECTRICAL CONNECTIONS. REPLACE DAMAGED CIRCUIT BREAKERS AS REQUIRED AND PROVIDE FILLER PLATES FOR VACANT SPACES.

34. PROVIDE UPDATED LABELING OF ALL NEW AND RELOCATED ELECTRICAL EQUIPMENT IN SCOPE OF WORK INCLUDING, BUT NOT LIMITED TO, ENGINE GENERATOR SYSTEMS, TRANSFER SWITCHES, TRANSFORMERS, SWITCHGEAR, SWITCHBOARDS, PANELBOARDS, MOTOR CONTROL CENTERS, AND DISCONNECTS TO INDICATE THE AMPERE RATING, VOLTAGE RATING, PHASE, CONDUCTOR COLOR CODING WITHIN THE EQUIPMENT AND APPLICABLE AIC RATING.

35. GUARANTEE ELECTRICAL INSTALLATION AND ALL WORK UNDER THIS DIVISION (EXCLUDING LAMPS) FOR A PERIOD OF TWO YEARS FROM DATE OF FINAL ACCEPTANCE BY OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP, FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT. REPLACE WORK FOUND DEFECTIVE WITHIN THIS PERIOD PROMPTLY AT NO COST TO OWNER.

36. GUARANTEE ELECTRICAL INSTALLATION AND ALL WORK UNDER THIS DIVISION (EXCLUDING LAMPS) FOR A PERIOD OF TWO YEARS FROM DATE OF FINAL ACCEPTANCE BY OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP, FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT. REPLACE WORK FOUND DEFECTIVE WITHIN THIS PERIOD PROMPTLY AT NO COST TO OWNER.

MATERIALS AND EQUIPMENT

1. WIRE AND CABLE SHALL BE MINIMUM NUMBER 12 AWG COPPER WITH THHN OR THWN INSULATION. NUMBER 10 AWG AND SMALLER WIRE EXCEPT FOR MOTOR CIRCUITS SHALL BE SOLID. LARGER WIRE AND MOTOR CIRCUIT FEEDERS SHALL BE STRANDED. MOTOR CONNECTIONS SHALL BE WITH STRANDED CONDUCTORS. WIRE AND CABLE SHALL BE AS MANUFACTURED BY SOUTHWIRE, OR APPROVED EQUIVALENT.

2. ALL CONDUCTORS SHALL BE THHN/THWN INSULATED COPPER UNLESS OTHERWISE NOTED ON THE DRAWINGS. #12 AWG FOR 120 VOLT, 20 AMPERE CIRCUITS, 75 FEET OR LESS; #12 AWG FOR 277 VOLT, 20 AMPERE CIRCUITS, 150 FEET OR LESS TO FIRST DEVICE. TYPE THHN OR THWN INSULATION. PROVIDE WIRE COLOR CODING AS REQUIRED BY THE NATIONAL ELECTRICAL CODE. ALL WIRING SHALL BE RUN CONCEALED AND IN EMT CONDUIT. ALL HOMERUNS SHALL BE IN EMT CONDUIT. ALL EMPTY CONDUITS INDICATED ON THE DRAWINGS SHALL BE SUPPLIED WITH NYLON PULL LINES.

3. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT. WRITTEN APPROVAL FROM DESIGN ENGINEER AND PROPERTY MANAGEMENT FOR THE USE OF "MC" AND "AC" TYPE CABLING. IF APPROVED, "MC" AND "AC" TYPE CABLE SHALL BE PERMITTED FOR USE IN BRANCH CIRCUIT WIRING FROM JUNCTION BOXES TO DEVICES ONLY. ALL HOME RUNS SHALL BE RUN IN CONDUIT. "MC" AND "AC" CABLING SHALL BE INSTALLED PER NATIONAL ELECTRICAL CODE AND LOCAL BUILDING DEPARTMENT REQUIREMENTS. USE APPROVED TYPE COUPLINGS AND CONNECTORS. PROVIDE CONDUIT SUPPORTS AS REQUIRED BY THE NATIONAL ELECTRICAL CODE AS A MINIMUM. PRE-MANUFACTURED CABLE ASSEMBLIES SHALL NOT BE PERMITTED.

4. INTERIOR CONDUIT SHALL BE ELECTRICAL METALLIC TUBING WITH SET SCREW FITTINGS.

5. EXTERIOR CONDUIT SHALL BE RIGID METAL CONDUIT, GALVANIZED, WITH THREADED FITTINGS.

6. CONDUIT IN AREAS SUBJECT TO MECHANICAL INJURY SHALL BE RIGID METAL CONDUIT, GALVANIZED, WITH THREADED FITTINGS.

7. CONDUIT SUBJECT TO VIBRATION OR WHERE USED FOR MECHANICAL EQUIPMENT CONNECTIONS SHALL BE PVC JACKETED FLEXIBLE METAL CONDUIT.

8. OUTLET AND JUNCTION BOXES SHALL BE OF PRESSED STEEL AND AS MANUFACTURED BY STEEL CITY, APPLETON, OR RACO. OUTLET BOXES SHALL BE DOUBLE GANG BOX WITH SINGLE OR DOUBLE GANG TRIM RINGS AS REQUIRED.

9. WIRING DEVICES SHALL BE SPECIFICATION GRADE; 20 AMP FOR GENERAL APPLICATION, 20 AMP OR GREATER FOR DEDICATED CIRCUITS AND AS REQUIRED BY CIRCUIT LOAD. LEVITON #5362 RECEPTACLES, 5362-16 (ORANGE) ISOLATED GROUND RECEPTACLES, and #1221 SWITCHES (OR EQUAL). COLOR TO MATCH EXISTING BUILDING STANDARD OR PROVIDE (WHITE) UNLESS OTHERWISE NOTED.

10. FIRE RESISTIVE WALLS AND OPENINGS MAY HAVE OPENINGS FOR STEEL ELECTRICAL OUTLET BOXES NOT EXCEEDING 16 SQUARE INCHES IN AREA, PROVIDED THE AGGREGATE AREA OF SUCH OPENINGS IS NOT MORE THAN 100 SQUARE INCHES FOR ANY 100 SQUARE FEET OF WALL, TYPICAL.

11. ALL 15 AMPERE AND 20 AMPERE, 125 VOLT AND 250 VOLT NON-LOCKING RECEPTACLES INSTALLED IN DAMP OR WET LOCATIONS SHALL BE LISTED AS WEATHER-RESISTANT PER 2011 NEC, ARTICLE 406.9 (A) AND (B). ALL RECEPTACLES MOUNTED IN WET LOCATIONS AS REFERENCED ABOVE SHALL HAVE AN "IN-USE" WEATHERPROOF COVER.

12. ALL 125 VOLT, SINGLE PHASE, 15 AND 20 AMPERE RECEPTACLES SHALL HAVE GFCI PROTECTION FOR PERSONNEL IN THE FOLLOWING AREAS: BATHROOMS, KITCHENS (AREAS WITH A SINK AND PERMANENT FACILITIES FOR FOOD PREPARATION AND COOKING), ROOFTOPS, OUTDOORS AND WITHIN 6 FEET FROM THE OUTSIDE EDGE OF SINKS.

13. EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE. A SEPARATE EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED WITH ALL FEEDER AND BRANCH CIRCUITS CONDUCTORS. GROUND WIRES SHALL BE COPPER.

14. FUSES SHALL BE AS INDICATED AND AS MANUFACTURED BY COOPER-BUSSMANN.

15. CIRCUIT BREAKERS SHALL BE THERMAL-MAGNETIC, QUICK-MAKE, QUICK-BREAK, TRIP-FREE AND TRIP INDICATING. MULTI-POLE CIRCUIT BREAKERS SHALL BE EQUIPPED WITH AN INTERNAL COMMON TRIP MECHANISM. CIRCUIT BREAKERS SHALL BE OF SAME MANUFACTURER AS PANELBOARD OR DISCONNECTING DEVICE.

16. MOTOR AND CIRCUIT DISCONNECTS SHALL BE HEAVY DUTY, FUSIBLE OR NON-FUSIBLE AS INDICATED.

EXECUTION

1. ELECTRICAL CONTRACTOR SHALL USE #10 AWG CU WIRE WHEN LENGTH OF CONDUCTOR EXCEEDS 75 FEET FOR 120 VOLT, 20 AMP CIRCUITS AND 150 FEET FOR 277 VOLT, 20 AMP CIRCUITS. SIZE CONDUCTORS FOR MINIMUM VOLTAGE DROP ALLOWED PER THE NATIONAL ELECTRICAL CODE.

2. ELECTRICAL CONTRACTOR SHALL USE #8 AWG CU WIRE WHEN LENGTH OF CONDUCTOR EXCEEDS 150 FEET FOR 120 VOLT, 20 AMP CIRCUITS AND 300 FEET FOR 277 VOLT, 20 AMP CIRCUITS. SIZE CONDUCTORS FOR MINIMUM VOLTAGE DROP ALLOWED PER THE NATIONAL ELECTRICAL CODE.

3. NEUTRALS, RACEWAYS, AND NON-CURRENT CARRYING PARTS OF ELECTRICAL EQUIPMENT AND ASSOCIATED ENCLOSURES SHALL BE GROUNDED IN FULL ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. PROVIDE HARD WIRED GROUND CONNECTIONS TO ALL DEVICES AND SEPARATE INSULATED GROUND WIRE CONTINUOUS IN EACH CIRCUIT (#12 AWG CU MINIMUM "GREEN" TRACER GROUND).

4. ALL FLOOR AND WALL PENETRATIONS WHERE ELECTRICAL DEVICES AND RACEWAY HAVE BEEN REMOVED MUST BE REPAIRED AND SEALED TO MAINTAIN THE REQUIRED FIRE RATING. CONDUITS PENETRATING FIRE RATED WALLS OR CEILINGS SHALL BE FIRE STOPPED WITH A U.L. LISTED FIRE STOPPING COMPOUND SEALANT TO MAINTAIN THE REQUIRED FIRE RATING. FIRE RATED FLOOR AND WALL PENETRATIONS IMMEDIATELY.

5. ELECTRICAL CONTRACTOR SHALL PROVIDE PRODUCT LITERATURE INFORMATION ON SITE FOR FIELD INSPECTOR REGARDING FIRE RATING OF FLOOR BOXES AND POKE THRU DEVICES.

6. ALL CONDUITS PENETRATING A ONE HOUR FIRE RATED WALL OR CEILING SHALL BE FIRE STOPPED WITH A U.L. LISTED FIRE STOPPING COMPOUND SEALANT.

7. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF LIGHTING FIXTURES IN MECHANICAL ROOMS/SPACES WITH MECHANICAL DUCT WORK INSTALLER PRIOR TO ROUGH IN. LOCATE BELOW DUCT WORK (8'-0" A.F.F. MIN.) CENTERED IN ROOM AS MUCH AS POSSIBLE. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY ALL MECHANICAL EQUIPMENT LOCATIONS AND REQUIREMENTS WITH MECHANICAL PLANS, MECHANICAL CONTRACTOR, AND ACTUAL MECHANICAL EQUIPMENT SUPPLIED. INCLUDE ALL REQUIRED OUTLETS, HEAVY DUTY DISCONNECT SWITCHES, FUSES, CONTROLS, CONTROL WIRING AND ALL CONNECTIONS IN THE ELECTRICAL BID.

8. COORDINATE ALL INTERCONNECTIONS TO AND BETWEEN NEW AND EXISTING SYSTEMS INCLUDING, BUT NOT LIMITED TO: POWER, LIGHTING, FIRE ALARM AND DETECTION, TELEPHONE AND INTERCOM.

9. COORDINATE LOCATIONS OF DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.

10. COORDINATE WITH MECHANICAL CONTRACTOR FOR LOCATIONS OF EQUIPMENT CONNECTIONS PRIOR TO ROUGH-IN.

11. ALL NEW LIGHT SWITCHES, RECEPTACLE OUTLETS, TELEPHONE OUTLETS, FIRE ALARM DEVICES, AND COMMUNICATION/DATA OUTLETS SHALL MEET THE REQUIREMENTS FOR AMERICANS WITH DISABILITIES (A.D.A.) AND ANSI A117.1 REQUIREMENTS FOR MOUNTING HEIGHTS AND ORIENTATIONS, TYPICAL UNLESS OTHERWISE NOTED. RECEPTACLES SHALL BE A MINIMUM OF 15" A.F.F. AT BOTTOM OF DEVICE AND SWITCHES A MAXIMUM OF 48" A.F.F. AT TOP OF DEVICE, TYPICAL UNLESS OTHERWISE NOTED.

12. COORDINATE LOCATIONS OF MECHANICAL EQUIPMENT CONTROL PANELS WITH DIVISION 23. CIRCUITS FOR CONTROL PANEL POWER IS INDICATED ON PANELBOARD SCHEDULES.

13. REMOVE CONDUCTORS AND CONDUIT BACK TO SOURCE FOR EQUIPMENT WHICH IS TO BE REMOVED UNLESS EXISTING WIRING AND CONDUIT CAN BE REMOVED TO ACCESSIBLE JUNCTION BOX AT CONTRACTORS OPTION TO FEED NEW EQUIPMENT. MAINTAIN CIRCUIT CONTINUITY OF REMAINING DEVICES AND EQUIPMENT. CONTRACTOR IS TO PHASE WORK TO MAINTAIN CONTINUITY OF CIRCUITS IN AREAS WHICH ARE IN ANOTHER PHASE.

14. EXTEND EXISTING CIRCUITRY TO RECONNECT TO RELOCATED ITEMS AS INDICATED OR UNLESS OTHERWISE NOTED.

15. PROVIDE BLANK COVER PLATES ON WALLS TO REMAIN FOR REMOVED OR RELOCATED DEVICES. COVER PLATES SHALL MATCH EXISTING.

16. ALL JUNCTION BOX COVERS SHALL BE INDELIBLY LABELED WITH PANEL DESIGNATION AND BRANCH CIRCUIT NUMBER OF EACH WIRE WITHIN THE JUNCTION BOX.

17. CONDUIT SHALL BE CONCEALED WHERE LOCATED IN FINISHED AREAS, OR ON EXTERIOR OF BUILDING. CONDUITS IN UNFINISHED OR UTILITY AREAS MAY BE EXPOSED.

18. DO NOT DRILL OR SHOOT CONCRETE ANCHORS INTO THE BOTTOM OF CONCRETE STRUCTURAL TEES.

19. MINIMUM WORKING CLEARANCES PER THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE SHALL BE PROVIDED AROUND AND IN FRONT OF ALL ELECTRICAL EQUIPMENT.

20. ALL CIRCUIT BREAKER LUGS SHALL BE RATED FOR A MINIMUM OF 75 DEGREE CELSIUS.

21. ALL NEW AND MODIFIED ELECTRICAL EQUIPMENT, SUCH AS SWITCHBOARDS, PANELBOARDS, INDUSTRIAL CONTROL PANELS, METER SOCKET ENCLOSURES, AND MOTOR CONTROL CENTERS THAT ARE LIKELY TO REQUIRE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE WHILE ENERGIZED SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

MEP ENGINEERING INC.
CLIENT CENTRIC CONSULTING
6402 S. Troy Circle, Suite 100 (W) 303.936.1633
Centennial, CO 80111 (F) 303.934.3299
info@mep-eng.com www.mep-eng.com

TORIAN PLUM SNOW MELT UPGRADES
STEAMBOAT SPRINGS, COLORADO

ISSUE	DATE
CONSTRUCTION DOCUMENTS	11/10/23

MEP JOB: 22336
DESIGNED: KSP
CHECKED: RCC

ELECTRICAL SPECIFICATIONS

REGISTERED PROFESSIONAL ENGINEER
STATE OF COLORADO
RYAN C. CUMMINGS
35656
11.08.23

E3.0

STRUCTURAL NOTES

Governing Codes and Standards:

A. 2018 International Building Code (and local amendments)
B. "Minimum Design Loads for Buildings and Other Structures" - ASCE 7-16
C. "Steel Construction Manual" - AISC Fourteenth Edition
D. "Building Code Requirements for Structural Concrete" - ACI318-14

Design Loads

1. Building Risk Category:
   A. II

2. Handrail Load:
   A. Point Load 200 lb
   B. Distributed Load 50 lb/ft

Project General Notes

A. Material and design specifications cited herein shall be those conforming with the version of the applicable specification or code most recently adopted by the permitting authorities. These structural notes are to be used as a supplement to the specifications, unless noted otherwise.

B. Refer to the architectural documents for all dimensions not shown on the structural contract documents. Do no scale the structural contract documents.

C. The general contractor shall verify all dimensions, elevations, and conditions with architectural, mechanical, electrical, plumbing, and civil drawings and notify the architect/engineer of any discrepancies or inconsistencies.

D. The size, weights and locations of all equipment pads, roof mounted mechanical units, and penetrations required for mechanical, electrical, and plumbing work shall be verified by the contractor. All penetrations are subject to approval by the architect/engineer.

E. Any contractor inducing loads on the structure not specified on the contract documents must obtain approval from the architect/engineer prior to erection. Field alterations for any structural member shall not be executed without approval from the architect/engineer

F. Architect/engineer's approval shall be secured for all substitutions.

G. The structure and all of its parts must be adequately braced against wind, lateral earth, and seismic forces until the permanent lateral-force resisting systems have been constructed and all of its parts have been installed.

H. Shop drawings, vendor drawings, or any material prepared and submitted by the contractor or subcontractor are not considered part of the structural contract documents. Any engineering design provided by others and submitted for review shall bear the seal of an engineer registered in the state where the project is being built.

I. During construction the contractor may encounter existing conditions which were not known during design or are at variance with the project documentation. Such conditions may interfere with new construction, require protection and/or support of existing work, or may consist of damaged or deterioration of structural materials/components which could jeopardize the structural integrity of the building. The contractor shall notify the engineer of record of all discoveries he believes may interfere with proper execution of the work or jeopardize the integrity of the building prior to proceeding with work related to such discoveries.

J. The structural engineer shall not have control or charge of and shall not be responsible for construction means, methods, techniques, sequences, procedures, nor site safety.

K. The structural drawings have been prepared using available information regarding the existing conditions. No attempt has been made to verify any existing conditions against information provided by others. The contractor shall compare the existing documents and notify the architect of any differences before proceeding with work.

L. Items, in the opinion of the contractor, that appear to be deficiencies, omissions, contradictions, or ambiguities in the plans and / or specifications shall be brought to the attention of the structural engineer. Plans and / or specifications will be corrected or written interpretations of the alleged deficiency, omission, contradiction or ambiguity will be made by the structural engineer. Work shall not proceed in these areas before a response in received from the structural engineer.

M. All products and materials used by the contractor shall be installed in strict accordance with the manufacturer's instructions.

N. The general contractor shall determine from the local building official when the permit is obtained whether any letters of construction compliance will be requested from the structural engineer, if so, the contractor shall notify the engineer in writing before the start of construction.

O. Exterior roofs, flashing, ledges, concrete, & other surfaces shall slope min. ¼:12 to prevent water ponding. Landings shall also slope max. ¼:12 to prevent slipping. Covered garages or carports floor surface shall slope min. ⅛:12 to provide positive drainage to drain, unless surfaced with asphalt.

P. All work connected with this project by any trade involved shall be of the highest quality attainable in accordance with the professional practice of the trade.

Concrete - Cast-in-Place

A. Structural concrete shall be type 1, and have a minimum 28 day strength of 4,000 psi, exterior concrete slabs shall be type 1 and have a minimum 28 day strength of 5,000 psi. All concrete shall have a min 6% (+/- 1.5%) entrained air for durability and a 4" (+/- 1") slump. The maximum aggregate size shall be 3/4". Concrete shall not be placed on frozen ground and shall be protected from freezing for a minimum of 7 days. During cold weather the methods and specifications set forth in ACI318-14 shall be followed to prevent frost damage.

B. All concrete work shall conform to the requirements of ACI318-14 and 301, latest edition.

C. All exposed edges shall have a 3/4" chamfer.

D. Concrete shall be adequately consolidated/vibrated during placement to ensure it is thoroughly placed around all reinforcing steel and embedded fixtures.

E. Unless noted otherwise, slabs, footings, and walls shall not have any horizontal 'cold joints.' All construction joints shall be detailed or reviewed by the engineer of record.

F. Interior concrete slab finish shall be steel trowel finished and exterior concrete slabs shall be broom finished.

G. All concrete shall be normal weight aggregate unless noted otherwise.

H. Concrete topping for metal decks shall not include any add mixtures containing chloride salts.

I. All lightweight aggregate concrete shall have a maximum unit weight of 110 pcf.

Concrete Reinforcing Steel:

A. Reinforcing bars shall conform to ASTM spec. A615-79 and shall be grade 60.

B. At splices, lap bars a minimum of 38 diameters. At corners and intersections, make horizontal continuous or provide matching corner bars. Around openings in walls and slabs, provide (2) #5 bars extending a minimum of 2 feet beyond the edge of any openings in concrete walls and slabs which are greater than 1'-6" in any direction. Continuous top bars in walls shall be spliced at mid-span. Continuous bottom bars in walls shall be spliced at supports.

C. Welded wire fabric shall conform to ASTM 185 and shall be lapped one full mesh at splices and tied together.

D. Concrete reinforcing steel shall conform with ASTM A615 deformed grade 60 (weldable reinforcement shall be ASTM A706, grade 60) unless noted otherwise.

E. Place 2'-0" x 2'-0" bars at corners and intersections for walls and foundations equal in size and number to horizontal reinforcing, unless notes otherwise.

F. All reinforcing steel shall be detailed, fabricated and placed in accordance with ACI detailing manual 315.

G. All reinforcing steel shall be accurately and securely placed.

H. Minimum cover from concrete surfaces to reinforcing steel shall conform to ACI318-14, 7.7 unless a greater cover is reqired and shall be:
   1. 3" to bottom of footing/grade beams cast against earth
   2. 2" to earth face or exposed face of wall for No. 6 bar & greater
   3. 1½" to earth face or exposed face of wall for No. 5 bar & smaller
   4. 1½" to inside face of wall
   5. 1½" to inside faces of main beams and columns
   6. 1" to top and bottom of concrete slab surfaces of slab-on-grade

I. Start first rebar 3" in from the edge, where slab rebar is called out as On-Center (O.C.) spacing.

J. All welded wire fabric shall maintain a minimum lap splice of 6".

K. Install rebar chairs with appropriate material for anticipated concrete exposure.

L. Concrete foundation walls shall be dampproofed on the exterior surface with either bituminous material, acrylic modified cement (3 lb/sq. yard), or surface-bonding mortar (⅛" thick), per IBC 1805.2.2

Post Installed Anchors

A. Expansion anchors shall be ICC-approved (zinc plated in accordance with ASTM B633, hot-dipped galvanized in accordance with ASTM A153, AISI 304 stainless steel) and conform with FS-S-325, group II, type 4, class 1.

B. Expansion bolts called for on the drawings shall be Simpson "Wej-All", "Strong-Bolt 2" or approved wedge type anchors with the following minimum embedment's: ¾" diameter bolts - 3⅝", ⅝" diameter bolts - 2¾", ½" diameter bolts - 2¼".

C. Adhesive anchors shall be ICC-approved and shall consist of all-thread anchor rod, nut washer and adhesive capsule. Anchor rods shall comply with ASTM A307. (not used at PT slabs).

D. All epoxy shall be Simpson "Set-XP" and shall be installed per the "Anchoring and Fastening Systems for Concrete and Masonry" Simpson Catalog #C-A-2018 by a qualified personnel.

E. Heavy duty screw anchors shall be stainless steel: Simpson Titen HD or approved equal.

Structural Steel and Miscellaneous Iron

A. Structural steel shall be detailed and fabricated in accordance with the latest version of the AISC manual of steel construction.

B. All bolts, including anchor bolts, shall conform to ASTM spec. A307.

C. Structural steel rolled shapes, including plates and angles, shall be ASTM spec. A570, gr. 50ksi.

D. Field welded connections must be inspected by the engineer of record.

E. Fillet welds indicated on the plans shall be of E70xx electrodes and shall be the minimum size specified in the AISC manual of steel construction, table J2.4. All other welds shall be made with E70xx electrodes.

F. All welding shall conform to AWS specifications and shall be performed by a certified welder under AWS specifications.

G. Steel shall be thoroughly cleaned of mill scale prior to application of the primer in accordance with SSPC SP-3.

H. All steel plates and angles in contact with concrete and exposed to weather shall have a protective coating

I. Shop and erection drawings shall be submitted for engineers review prior to fabrication. Fabricator proceeds at his own risk without receipt of above review.

J. The contractor shall coordinate with the mechanical location of all openings

K. All fabrication, erection, identification and painting of structural steel shall conform to AISC specifications.

L. Anchor rods are to be located by means of a template. Do not hand set or wet set.

M. Anchor rods and embedded items shall be set in accordance with the code of standard, practice section 7.5.

N. All bolts shall be snug tight, unless noted otherwise on the plans.

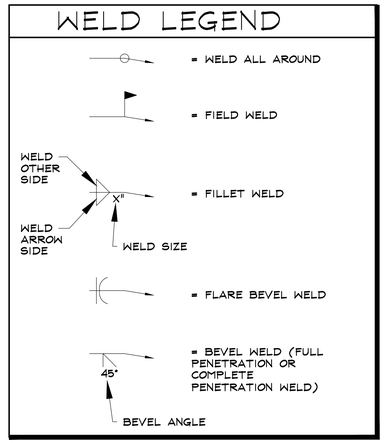
O. Anchor bolts shall conform with ASTM A307 or F1554 and shall be provided with plate washers and heavy hex nuts. Bolts in contact w/ pressure treated material or are exterior bolts shall be galvanized in accordance with ASTM A153, class C. Nuts shall be over-tapped to class 2A fit before galvanizing, in accordance with ASTM A563. Bolt heads or nuts bearing on sloping flanges shall be equipped with beveled washers.

STRUCTURAL SHEET SCHEDULE

ABBREVIATIONS LIST

ABV	ABOVE	MAX	MAXIMUM
ALT	ALTERNATE/ALTERNATING	MECH	MECHANICAL
ARCH	ARCHITECT/ARCHITECTURAL	MIN	MINIMUM
BO	BOTTOM OF	OC	ON CENTER
BOT	BOTTOM	OSB	ORIENTED STRAND LUMBER
℄	CENTER LINE	PERP	PERPENDICULAR
CMU	CONCRETE MASONRY UNIT	PL	PLATE
COL	COLUMN	PLUM	PLUMBING
CONC	CONCRETE	PLYWD	PLYWOOD
CONT	CONTINUOUS	PSL	PARALLEL STRAND LUMBER
DBL	DOUBLE	REINF	REINFORCEMENT/REINFORCING
DF	DOUGLAS FIR	REQ	REQUIRED
DIA	DIAMETER	SBW	STEP BOTTOM OF WALL
⌀	DIAMETER	SCH	SCHEDULE
DWG	DRAWING	SCHED	SCHEDULE
EA	EACH	SIM	SIMILAR
ELEV	ELEVATION	SPF	SPRUCE-PINE-FIR
EOR	ENGINEER OF RECORD	STRUCT	STRUCTURE/STRUCTURAL
EW	EACH WAY	T&B	TOP AND BOTTOM
EXT	EXTERIOR	T&G	TONGUE AND GROOVE
FTG	FOOTING	THRU	THROUGH
GL	GLUE-LAMINATED BEAM	TRTD	PRESERVATIVE TREATED
GT	GIRDER TRUSS	TYP	TYPICAL
IBC	INTERNATIONAL BUILDING CODE	UNO	UNLESS NOTED OTHERWISE
IRC	INTERNATIONAL RESIDENTIAL CODE	VIF	VERIFY IN FIELD
INT	INTERIOR	w/	WITH
LSL	LAMINATED STRAND LUMBER	WD	WOOD
LVL	LAMINATED VENEER LUMBER	WWF	WELDED WIRE FABRIC

WELD LEGEND



COLORADO LICENSED
RYAN PAUL MALONE
61802
PROFESSIONAL ENGINEER
02/06/23

STEAMBOAT ENGINEERING AND DESIGN, INC.
2740 Acre Lane Suite 'E' Steamboat Springs, CO 80487
Phone: 970 . 871 . 9101 Fax: 970 . 871 . 9089
E-mail: Jake@seadinc.com

SKI TIME TURNAROUND
SKI TIME SQUARE DRIVE
STEAMBOAT SPRINGS, COLORADO
A HANDRAIL DESIGN FOR:
CITY OF STEAMBOAT SPRINGS

ISSUE DATES

12 . 21 . 22	CONCEPTUAL DESIGN
01 . 06 . 23	COORDINATION SET
01 . 16 . 23	100% DESIGN SET
02 . 06 . 23	BID DOCUMENTS

DRAWN BY: RPM
REVIEWED BY: JEM
PROJECT # 22084

STRUCTURAL NOTES

S-0

SITE PLAN NOTES

1. NOT A CERTIFIED PLAT - BASED ON A SURVEY BY BASELINE ENGINEERING DATED: 12.20.22

2. Re: BASELINE ENGINEERING PLANS FOR FULL SITE PLAN DRAWINGS

3. CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHOP DRAWINGS BASED ON CONDITIONS PRESENT IN FIELD FOR SEAD APPROVAL PRIOR TO FABRICATION OF RAILINGS

GUARDRAIL PAINTING NOTES

1. NO FIELD WELDING OF RAILING AFTER FINISHES ARE APPLIED.

2. COLOR OF NEW RAILING SHALL MATCH EXISTING RAILING PRESENT @ TORIAN PLUM

3. STEEL RAILING SHALL BE COATED WITH A MINIMUM OF 2.0 MILS OF APPROVED CARDINAL PAINT PRIMER PRIOR TO FINISH COATING, SEAD TO APPROVE ALL SUBSTITUTIONS

4. STEEL TOP COATING SHALL BE MINIMUM 2.5 MILS OF APPROVED CARDINAL PAINT, SEAD TO APPROVE ALL SUBSTITUTIONS

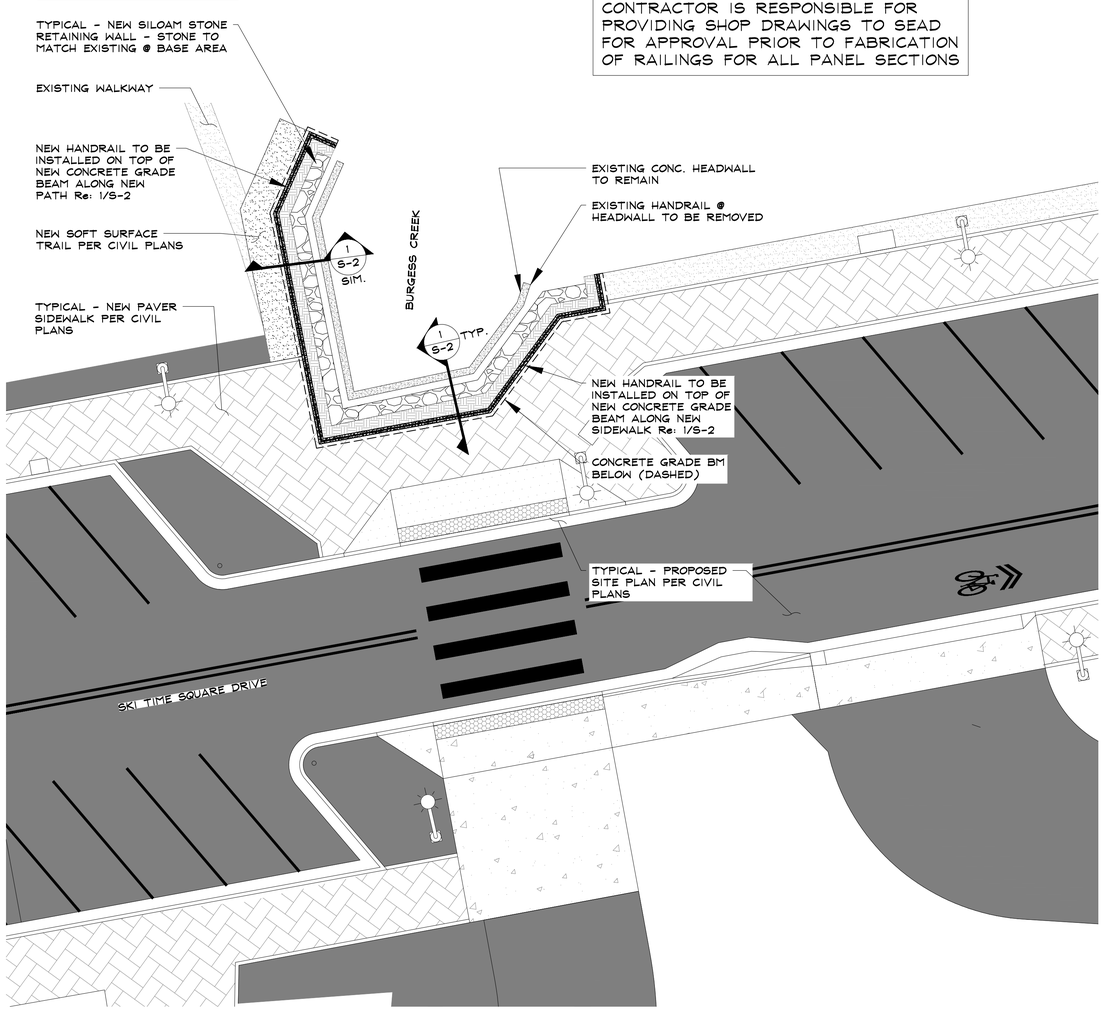
5. FOLLOW ALL INSTRUCTIONS ON CARDINAL PAINT PRODUCT TECHNICAL DATA SHEETS & INDUSTRY BEST PRACTICES

NOTE:

SILOAM STONE WALL SHALL NOT EXCEED 3'-6" TALL

NOTE:

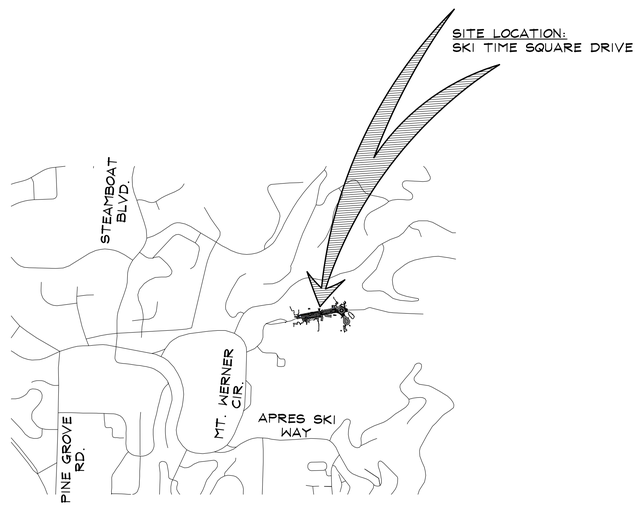
CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHOP DRAWINGS TO SEAD FOR APPROVAL PRIOR TO FABRICATION OF RAILINGS FOR ALL PANEL SECTIONS



2 SITE PLAN

SCALE: 1" = 10'-0"

SITE LOCATION:
SKI TIME SQUARE DRIVE



1 VICINITY MAP

1" = 1000'

COLORADO LICENSED
RYAN PAUL MILLER
61802
PROFESSIONAL ENGINEER
02/08/23

STEAMBOAT ENGINEERING AND DESIGN, INC.
2740 Acre Lane Suite 'E' Steamboat Springs, CO 80487
Phone: 970 . 871 . 9101 Fax: 970 . 871 . 9089
E-mail: Jake@seadinc.com

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DRAWN BY: RPM
REVIEWED BY: JEM
PROJECT # 22084

SITE PLAN & VICINITY MAP

S-1

GUARDRAIL PAINTING NOTES

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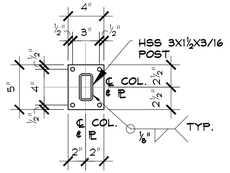


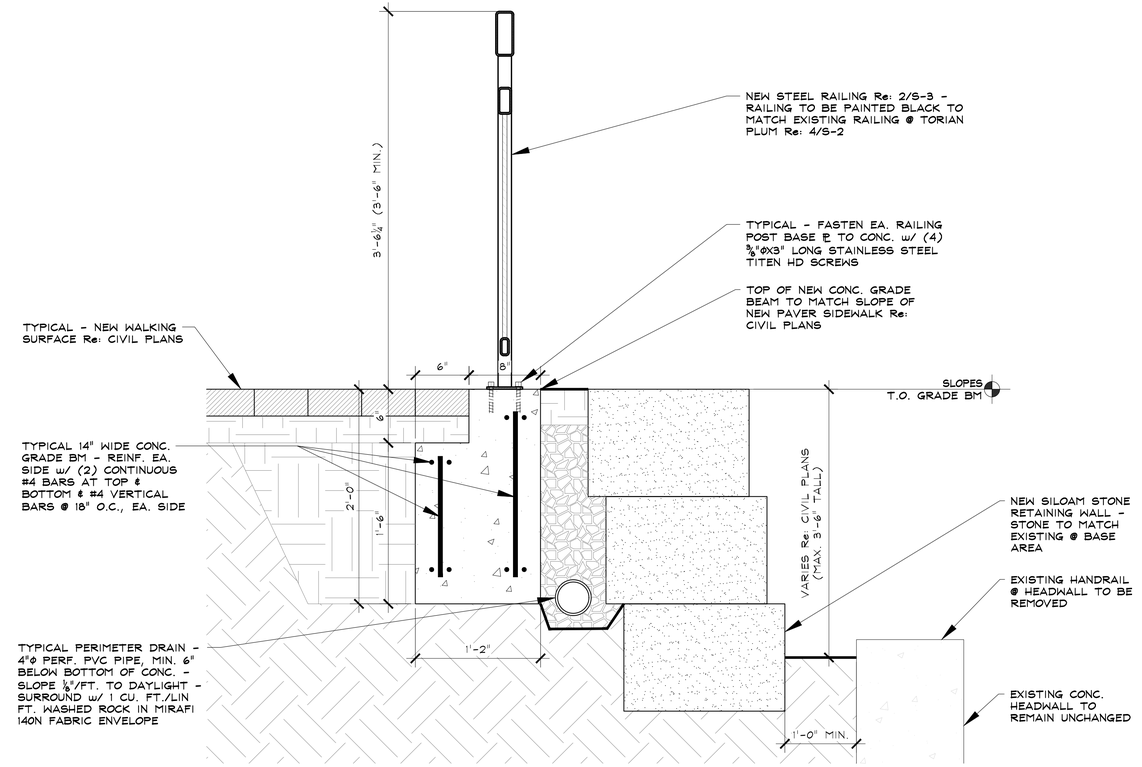
3 TYPICAL POST BASE PLATE

CONTRACTOR TO VERIFY QUANTITY IN FIELD
PROVIDE 7/16"ø HOLES FOR ⅜"ø BOLTS
¼" THICK STEEL ℄

SCALE: 1½" = 1'-0"

4 PROPOSED RAILING COLOR

SCALE: N.T.S.

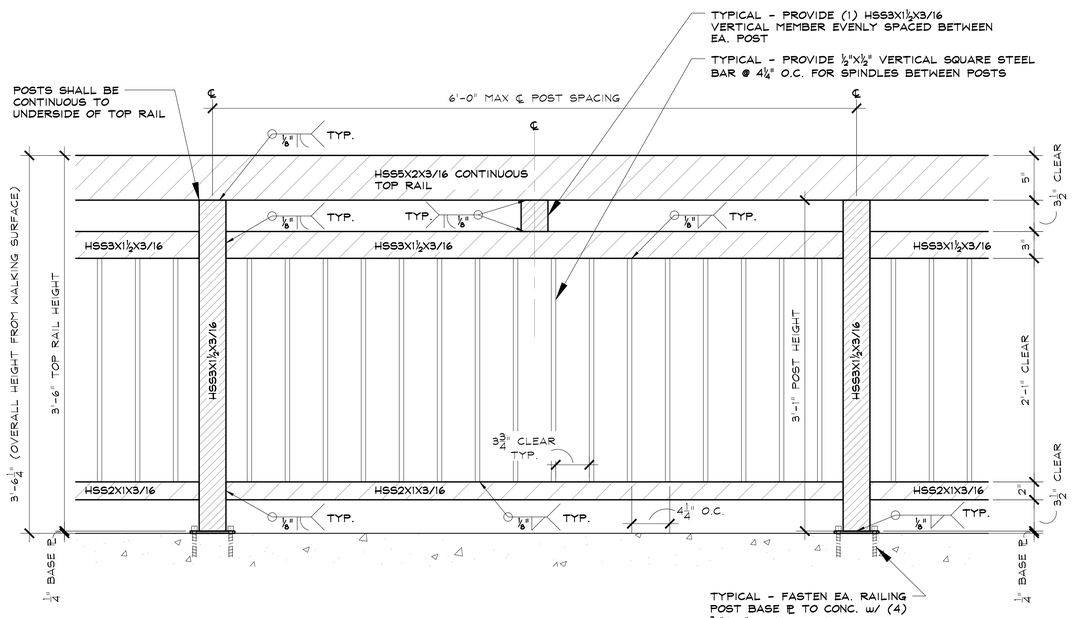


1 TYPICAL RAILING SECTION

SCALE: 1½" = 1'-0"

NOTE:

CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHOP DRAWINGS TO SEAD FOR APPROVAL PRIOR TO FABRICATION OF RAILINGS FOR ALL PANEL SECTIONS



2 TYPICAL RAILING ELEVATION

NOTE: THIS ELEVATION IS TYPICAL FOR ALL PANEL SECTIONS

SCALE: 1½" = 1'-0"

COLORADO LICENSED
RYAN PAUL MALONE
61802
PROFESSIONAL ENGINEER
02/08/23

STEAMBOAT ENGINEERING AND DESIGN, INC.
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Phone: 970 . 871 . 9101 Fax: 970 . 871 . 9089
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TYPICAL RAILING SECTIONS & ELEVATIONS

S-2