Appendix B12

Fire System Basis of Design
1-Q24-063-Will Serve-Fire

Canyon Peak Power Arapahoe County 1041/USR Application Q24-063

Stanley Consultants

From: victoriaflamini@bennettfirerescue.org
To: Reed, Michael; CalebConnor@BennettFireRescue.org
Cc: "Steve Yarrington"; "Thomas Flexon"; "Shawn Donovan"; "Christian Shuback"; Crain, Casey; Solan, John; Austin, Grant; "Jonathan Howard"
Subject: RE: Arapahoe County 1041/USR case Q24-063 - Fire Water System - Basis of Design
Date: Thursday, December 5, 2024 8:31:55 AM
Attachments: image004.png
image005.png
image006.png
image007.png
image008.png
image009.png
image010.png
image011.png
image012.png
image013.png
image015.png
image016.png
image017.png

Hi Michael,

Apologies as I have not been able to review what you sent on the 29th in entirety yet. I don't believe Caleb likely has gotten through it all yet either. Certainly, will try to get back to it for the overview. In my prelim scan of it, it does look like your team has contemplated a great deal of critical items, so that is a good start.

As to the Arapahoe County comment, you are correct – usually we would provide comments based on the referral after your application – but I wonder if they are looking for some type of "will serve" indication that we would be able to serve it if it moves forward. Who is the planner you are working with over there? Maybe I can reach out to clarify what they are needing at this point in the process.

Let me know if you have any questions!

Victoria

Victoria Flamini
Fire Marshal
Life Safety Division
303 644 3572 x 1673
303 815 8350
720 893 7673
355 4th Street
Bennett, CO 80102
BennettFireRescue.org

contact the sender at the number listed.

From: Reed, Michael <ReedMichael@stanleygroup.com>
Sent: Thursday, December 5, 2024 8:22 AM
To: CalebConnor@BennettFireRescue.org; Victoria Flamini <VictoriaFlamini@BennettFireRescue.org>
Cc: Steve Yarrington <steve.yarrington@MountainPeakPower.com>; Thomas Flexon <thomas.flexon@kindle-energy.com>; Shawn Donovan <Shawn.Donovan@kindle-energy.com>; Christian Shuback <christian.shuback@kindle-energy.com>; Crain, Casey <CrainCasey@stanleygroup.com>; Solan, John <SolanJohn@stanleygroup.com>; Austin, Grant <AustinGrant@stanleygroup.com>; Jonathan Howard <Jonathan.Howard@kindle-energy.com>
Subject: RE: Arapahoe County 1041/USR case Q24-063 - Fire Water System - Basis of Design

Hello,

Meant to include the following attachment from Arapahoe County Development Application Manual.

As we are doing final checks on our 1041/Us By Special Review application, the following was listed in Development Application Manual. But this instruction was not consistent with guidance provided by Arapahoe County Planning Dept contact nor in Checklists for the complete application submittal.

10. Letter from the appropriate fire district stating the ability to serve the proposal.

The instructions we were provided with stated we had to engage Bennett-Watkins but that you would be part of referral agency once our application was submitted. So in essence, your engagement begins once you receive your portion of 1041/USR application…and then the above would apply.

Do you have any insight on this? Would you be able to provide such a letter at this point? Please don't hesitate to reach out to me if you have any questions or concerns on this. Thanks.

Michael R. Reed, PE, PMP, Sr. Project Manager, Mechanical Engr. Mgr.
STANLEYCONSULTANTS, 8000 S. Chester St, Suite 400, Centennial, CO 80112
T: 303.925.8346 | M: 720.838.5309 | stanleyconsultants.com

From: Reed, Michael
Sent: Thursday, December 5, 2024 8:07 AM
To: CalebConnor@BennettFireRescue.org; Victoria Flamini <VictoriaFlamini@BennettFireRescue.org>
Cc: Steve Yarrington <steve.yarrington@MountainPeakPower.com>; Thomas Flexon <thomas.flexon@kindle-energy.com>; Shawn Donovan <Shawn.Donovan@kindle-energy.com>; Christian Shuback <christian.shuback@kindle-energy.com>; Crain, Casey <CrainCasey@stanleygroup.com>; Solan, John <SolanJohn@stanleygroup.com>; Austin, Grant

<AustinGrant@stanleygroup.com>; Jonathan Howard <Jonathan.Howard@kindle-energy.com>
Subject: RE: Arapahoe County 1041/USR case Q24-063 - Fire Water System - Basis of Design

Hi Caleb/Victoria,

Touching base to see if you've had a chance to look over what we sent the prior week. I certainly realize it was sent during the holiday.

We are preparing our application to the County here soon, so if you'd like to have chat about anything, please let us know. Thanks.

Michael R. Reed, PE, PMP, Sr. Project Manager, Mechanical Engr. Mgr.
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From: Reed, Michael
Sent: Friday, November 29, 2024 10:09 AM
To: CalebConnor@BennettFireRescue.org; Victoria Flamini <VictoriaFlamini@BennettFireRescue.org>
Cc: Steve Yarrington <steve.yarrington@MountainPeakPower.com>; Thomas Flexon <thomas.flexon@kindle-energy.com>; Shawn Donovan <Shawn.Donovan@kindle-energy.com>; Christian Shuback <christian.shuback@kindle-energy.com>; Crain, Casey <CrainCasey@stanleygroup.com>; Solan, John <SolanJohn@stanleygroup.com>; Austin, Grant <AustinGrant@stanleygroup.com>; Jonathan Howard <Jonathan.Howard@kindle-energy.com>
Subject: Arapahoe County 1041/USR case Q24-063 - Fire Water System - Basis of Design

Hi Caleb/Victoria,

We hope you were able to enjoy the holiday yesterday. Attached is preliminary Basis of Design for the planned Canyon Peak Power project.

If you recall from our meeting, Canyon Peak is a peaking power plant that will be a copy of another peaking plant (Mountain Peak) currently under construction in Weld County. Canyon Peak is currently in the Arapahoe County 1041/Use By Special review process (case Q24-063). We expect to submit our application here soon.

We expect to submit portions of the he attached as part of the application to address fire water system and fire suppression strategies. Currently, no equipment planned for Canyon Peak require any firefighting, any equipment requiring fire suppression come with vendor installed fire suppression systems. Inside the Controls Trailer where plant operators are located, there will be a Fire Alarm Control Panel and a Clean Agent System that will protect critical control system and network hardware/infrastructure. The attached provides a thorough background on the fire water system and includes references to Mountain Peak design and vendor documentation. We expect to carry over the same design approach to Canyon Peak.

Once you've had a chance to review the provided basis of design, we'd like to schedule some follow up discussions so we can address any questions or comments you may have.

Thanks.

Michael R. Reed, PE, PMP, Sr. Project Manager, Mechanical Engr. Mgr.
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Section 1 Canyon Peak Fire Water Basis of Design

1.1 Project Description

The Canyon Peak Power Project ("Project") is a planned installation of a greenfield natural gas-fired peaking power generation facility at the existing site of the Brick Center Substation. The Brick Center Substation is located on a 20-acre site at 5050 N County Rd 129, Bennett, CO 80102, 1 mile south of the intersection of County Road 129 and County Road 30. The entire property and substation are owned by CORE Electric Cooperative ("CORE"). The Project also includes the installation of approximately 3.92-mile of a 10-inch natural gas supply line to provide natural gas to the Project site.

The Project is being developed by Canyon Peak Power LLC ("Canyon Peak") an affiliate of Kindle Energy LLC. The power general facility is comprised of six General Electric ("GE") LM2500 Xpress power generation units with a cumulative generating capacity of 165 MW (gross). The Project will be located on property owned by CORE leased to Canyon Peak and will exclusively serve CORE's members. The Project will be interconnected to CORE's existing 115 kV distribution system located at the existing Brick Center Substation located on the property. The Project will support CORE's transition to more renewable based power sources for their cooperative members.

The Project will be comprised of power generation units outfitted with selective catalytic reduction units and oxidation catalysts to control NOx and CO emissions. The project also intends to construct a control room building; an administrative/maintenance building; a storm water detention pond; drive aisles to allow for 360-degree access around the property; a fire suppression loop; and once operational, parking for employees on the south side of the property.

Stanley Consultants is currently in the early stages of design for the Canyon Peak Power (CPP) facility for Kindle Energy. At the same time, Stanley is the Engineer of Record for a similar project, Mountain Peak Power, which is currently being constructed in Weld County, Colorado. The following basis of design utilizes the Mountain Peak Power (MPP) facility to provide a starting point for Canyon Peak design development with the Bennet-Watkins Fire Rescue. References to the MPP project will be used in the following sections to describe the expected fire water system for CPP.

For reference, the MPP site has an west to east layout, whereas CPP has a north to south layout. Essentially, CPP will be a 90-degree clockwise rotation of MPP layout.

The site design temperatures are taken from historical ASHRAE data, and for CPP for site maximum and minimum design temperatures are -20 F minimum, and 105 F maximum. The temperatures are taken into account when specifying equipment and piping.

1.2 Design Flow Rate

For the design flow of the firewater system, Stanly used the requirements of Design Flow: 500 GPM for hydrant hose, per NFPA 850-2020, 7.2.1, which is to account for a flow of 500 GPM for hose stream demand, as well as any additional users.

7.2.1* The water supply for the permanent fire protection installation should be based on providing a 2-hour supply for all of the following:

(1) Either of the following, whichever is greater:
   (a) The largest fixed fire suppression system demand
   (b) Any fixed fire suppression system demands that could reasonably be expected to operate simultaneously during a single event [e.g., turbine underfloor protection in conjunction with other fire protection system(s) in the turbine area, coal conveyor protection in conjunction with protection for related coal handling structures during a conveyor fire, adjacent transformers not adequately separated according to 6.1.4]
(2) The hose stream demand of not less than 500 gpm (1893 L/min)
(3) Incidental water usage for non–fire protection purposes

The fire sprinklers that are being proposed for this project were supplied by Ruhrpumpen and are located inside the fire pump enclosure. The manufacturer has specified a consumption rate of 154.381 GPM for the system.

1.3 Fire Water Tank Sizing

Per NFPA 850-2020, 7.2.6.2. a two-hour supply of fire water is needed, which lead to an initial sizing of 78,526 gallons of water required. This paragraph also stats that the fire water tank should be fully replenished within 8 hours of a fire event.

As there is no permanent source of water at the facility, and the facility will rely on water tanker trucks to replenish the supply, the capacity of the fire water storage tank was doubled in size, resulting in a fire water storage tank working capacity of 157,051 gallons. This extends the refill period to 16 hours on a volume per time ratio basis.

7.2.6.2 Where tanks are used, they should be filled from a source capable of replenishing the 2-hour supply for the fire protection requirement in an 8-hour period. The 8-hour (time) requirement for refilling can be permitted to be extended if the initial supply exceeds the minimum storage requirement on a volume per time ratio basis. It normally is preferred for the refilling operation to be accomplished on an automatic basis.

To account for service water requirements, an additional 5,000 gallons was added to the fire water storage tank working capacity. The resulting required working capacity of 162,051 gallons. This was upsized to the next 5,000-gallon increment, or 165,000 gallons.

Pittsburgh tank was selected to field fabricate the fire water tank for MPP and are preliminarily expected to provide the fire water tank for CPP. The resulting size of the tank being 32'-0" in diameter and 32'-0" in height and is designed in accordance with AWWA D-100 and NPFA 22. As the firewater is not detrimental to the environment, no secondary containment was required.

The tank will be coated both internally and externally for corrosion protection. For freeze protection, the firewater tank will be insulated with 1 ½" thick insulation, as well as aluminum jacketing. Pittsburgh tank also sized and is supplying an electric heater system to keep the tank from freezing, per NFPA 22.

1.4 Fire Water Pump Selection

For the firewater pumps, Ruhrpumpen was selected to provide the pumps. One electric-motor driven (150 HP, Marathon Model 40STS) pump capable off supplying the required flow of 1,000 GPM was supplied (Model ZW 8x5x10 (F)). In addition, one diesel engine (175 HP, Clarke Model JU6H UFADN0) driven pump (Model ZW 8x5x14 (F)) was installed to act as an emergency back-up in the event of power failure. A third pump, an electric motor (1.5 HP) jockey pump (Model: VSE 1 17-20) capable of supplying 10 GPM at 135 PSIG was installed. The purpose of the jockey pump is to ensure the firewater loop pressure is maintained to adequately supply the required users if needed.

The three firewater pumps are housed in an enclosure with 2-hour fire rated walls.

1.5 Fire Water Loop Design

The above-grade firewater piping is specified as carbon steel piping, which is to be electrically heat traced and insulation for freeze protection. The transition from above-grade to below-grade piping is specified as electrically heat-traced and insulated ductile iron. These materials were chosen to ensure any accidental strikes would not compromise the integrity of the firewater system. The below-grade piping has been specified as high-density polyethylene (HDPE). Valving and hydrants are ductile iron.

The firewater loop is designed to be bi-directional, with post-indicating isolation valves after every other hydrant. This would help ensure the system remains usable if there were a single break in the underground piping. The hydrants are spaced so that there is no more than 200' between hydrants, allowing full coverage of the power generating equipment.

1.6 Site Fire Hazards

The following is a discussion of the major equipment on site and the relevant fire hazards associated with each.

- LM2500 Xpress Combustion Turbine – Generators
  - Each unit is fueled with natural gas
  - Each turbine contains a synthetic lube oil reservoir
  - Each generator contains a mineral lube oil reservoir
  - Each unit is protected with a Stat-X Condensed Aerosol Generator fire extinguishing system
  - The generator skid also includes the generator breaker
- Exhaust System
  - Each unit is provided with an exhaust system that provides waste heat recovery for combustion air preheating and an emissions reduction system.
  - There are no significant quantities of combustible materials located in the exhaust system.
- Unitary Control House Module
  - The unitary control house contains
    - The turbine-generator control system
    - The unit motor control center
    - The unit uninterruptable power supply (Ni-Cad batteries)
  - There are no significant quantities of combustible materials located in the controls enclosures.
  - Fire extinguishers and fire detection equipment are provided as required by code.
- Generator Step-Up Transformers
  - Each transformer is filled with mineral oil
  - Transformers are spaced at least 50 feet from nearby structures in accordance with NFPA 850.
  - Transformer spill containment basins are provided with an elevated layer of rock located between two layers of grating (a "rock sandwich") per NFPA 850.
- Fuel Gas Conditioning Equipment
  - A common fuel gas conditioning skid is provided near the site entrance of the fuel gas supply. This skid includes

        - Dual electric heaters
        - Pressure regulation trains
    - Each unit has a dedicated filter/heater skid. This skid includes
        - A single electric heater
        - A coalescing filter
    - The equipment on each skid is explosion proof and a Class 1, Division 2 classified area extends for 15 feet in all directions.
    - Skid vents have a Class 1, Division 1 area for 5 feet and a Class 1, Division 2 area for 15 feet. All vents are elevated at least 10 feet above grade.
- 19% Aqueous Ammonia Storage and Forwarding
    - 19% aqueous ammonia is used for emissions control for each unit
    - Ammonia is stored in a 20,000 gallon tank
    - The tank, its spill containment, unloading equipment, and forwarding pumps are monitored for accidental spills by ammonia detection equipment
- Fire Protection System
    - See the discussion above
    - The fire pump enclosure contains a diesel fuel storage tank to supply the diesel fire pump. This storage tank is protected by the enclosure sprinkler system.
- Compressed Air System
    - There are no significant quantities of combustible materials located in the compressed air system.
- Plant Control Trailer
    - The plant control trailer houses the following
        - Control room / offices / meeting room
        - Plant control system
        - Uninterruptable power supply (valve regulated lead-acid batteries)
        - Plant Fire Alarm Control Panel (FACP)
        - Fire extinguishers and fire detection equipment are provided as required by code.
        - Clean agent fire suppression system for electrical and controls equipment
- Miscellaneous Plant Electrical Equipment
    - Unitary DC power supply (valve regulated lead-acid batteries)
        - Located adjacent to the Control House Module at each unit
    - Miscellaneous low and medium voltage switchgear and low voltage switchboards as necessary to support plant equipment.

ATTACHMENTS

Attachment 1 – Preliminary Site General Arrangement – Canyon Peak Power

Attachment 2 – Site Weather Information

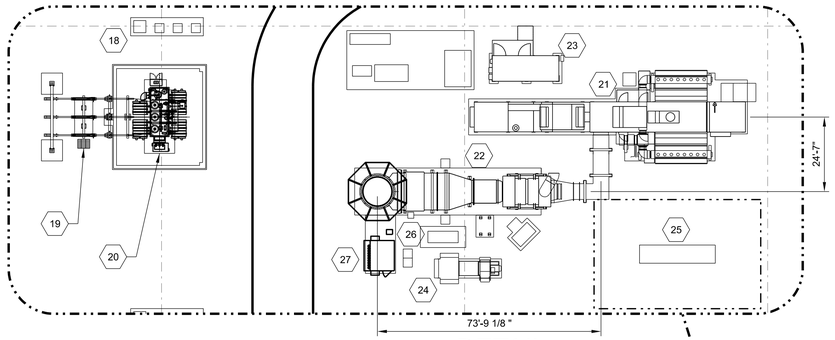
Attachment 3 – Pipe Specifications – Carbon Steel, HDPE (underground), Ductile Iron

Attachment 4 – Fire Water System Flow Calculation + Fire Tank Sizing Calculation

Attachment 5 – Ruhrpumpen Fire Water Pump Skid – from Mountain Peak Power

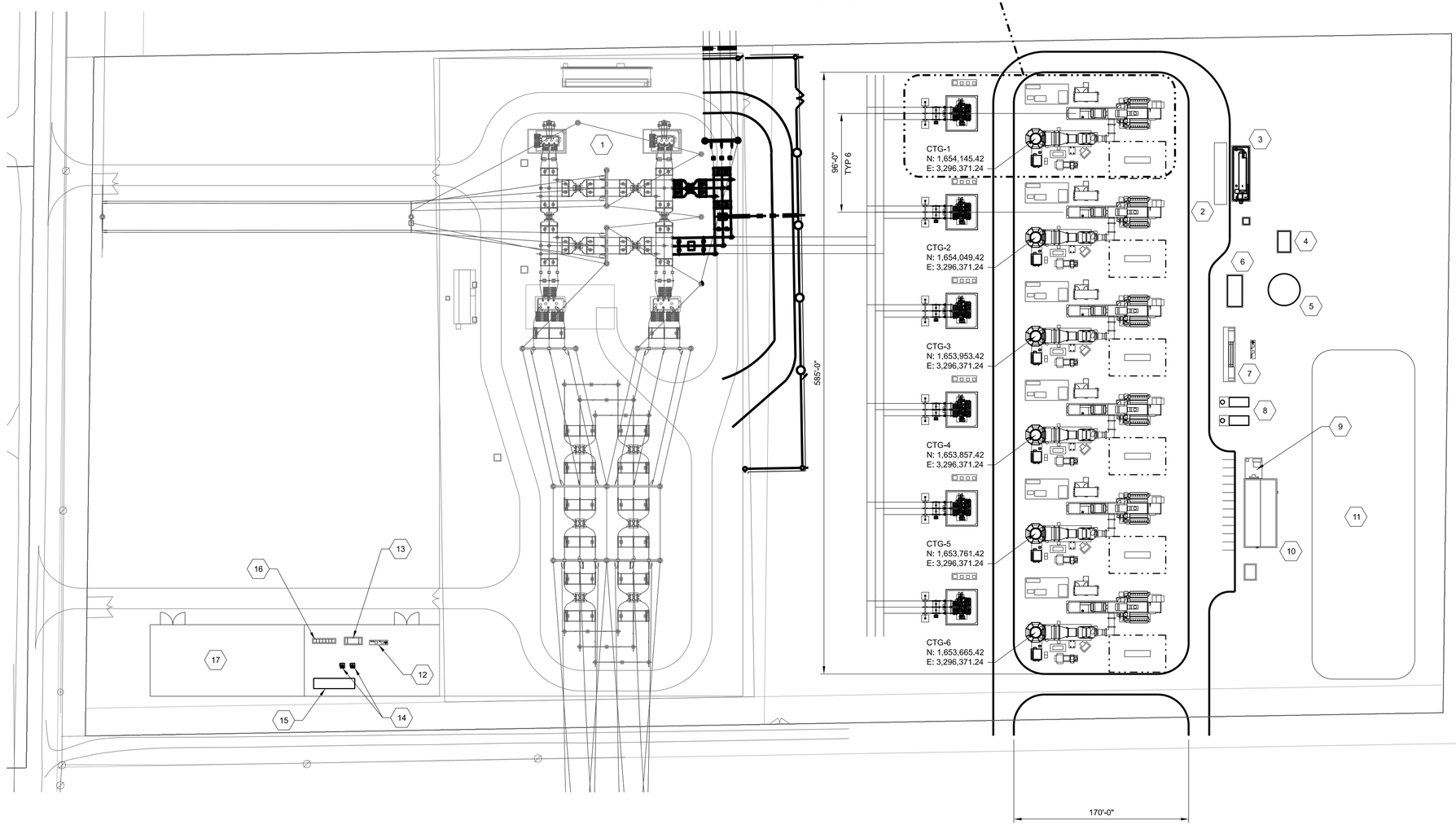
Attachment 6 – Basis of Design Drawings & Documents – Mountain Peak Power

Attachment 1



DETAIL

SCALE: 1" = 25' - 0"



PLAN VIEW

SCALE: 1" = 60' - 0"

NORTH

EQUIPMENT LIST:

1. EXISTING BRICK CENTER SUBSTATION
2. AMMONIA UNLOADING
3. AMMONIA STORAGE & FORWARDING
4. OIL STORAGE SHED
5. FIRE WATER / SERVICE WATER TANK
6. FIRE PUMP ENCLOSURE
7. SECONDARY UNIT SUBSTATION (SUS)
8. AIR COMPRESSOR SKIDS
9. TRANSFORMER & TRANSFER SWITCH
10. CONTROL TRAILER
11. DETENTION POND
12. DRY-TYPE TRANSFORMERS & PANELBOARDS
13. SUS TRANSFORMER
14. FUEL GAS CHROMATOGRAPH
15. FUEL GAS CONDITIONING SKID
16. HEATER CONTROL PANEL
17. FUEL GAS REGULATING & METERING YARD
18. GROUNDING TRANSFORMER BANK
19. HV DISCONNECT & CABLE RISER
20. GENERATOR STEP-UP TRANSFORMER
21. COMBUSTION TURBINE GENERATOR
22. SCR / CO CATALYST
23. CONTROL MODULE
24. TEMPERING AIR FAN
25. FUEL GAS HEATING / FILTRATION SKID
26. AMMONIA INJECTION SKID
27. CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS)

GENERAL NOTES:

1. THIS DRAWING IS CONCEPTUAL AND IS FOR PLANNING PURPOSES ONLY. ALL INFORMATION IS SUBJECT TO CHANGE DURING DETAILED DESIGN, AFTER RECEIPT OF FINAL VENDOR INFORMATION.
2. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
3. COORDINATES SHOWN ARE BASED ON RECORD DRAWING CG01 REV 4, DATED 02/12/2024. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS AS-BUILT INFORMATION.
4. ESTIMATED AVERAGE PLANT FINISHED GRADE ELEVATION IS ROUGHLY 5770' +/-. THIS ELEVATION IS SUBJECT TO CHANGE DURING DETAILED DESIGN AND AFTER RECEIPT OF REVISED SURVEY INFORMATION.

PRELIMINARY ISSUE
FOR REVIEW
NOT FOR CONSTRUCTION

JULY 15, 2024

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
C	REVISED PER CLIENT COMMENTS	-	-	-	07/22/24
B	REVISED PER CLIENT COMMENTS	-	-	-	07/15/24
A	ISSUED FOR REVIEW	-	-	-	06/25/24

Stanley Consultants INC.

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KINDLE ENERGY
CORE BANQUET - PRELIMINARY ENGINEERING
ARAPAHOE COUNTY, COLORADO

BANQUET - PRELIMINARY GENERAL ARRANGEMENT LM2500 EXPRESS OPTION

DESIGNED	M. McGINNIS
DRAWN	M. McGINNIS
CHECKED	
APPROVED	
APPROVED	
DATE	

SCALE: AS NOTED

NO. 31324.07

REV. C

G1101x

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

CADD D3-R5

Attachment 3

Stanley Consultants INC.

PIPE CLASS SPECIFICATION - ACS2

MAWP	TEMP, °F	100	200	300	400	500	600	650	700	750	775
	PRESS, PSIG	200	200	200	200	170	140	125	110	95	87

PIPE	MATERIAL, ASTM	1/2" - 26"	A53 GR B TYPE E OR S
		28" - 48"	API5L GR B TYPE E OR S
	NOMINAL PIPE SIZES AND SCHEDULE	1/2" - 2"	XS
		2-1/2" - 38"	STD
		40" - 48"	XS

JOINT	TYPE	THREADED	SOCKET WELD	BUTT WELD	FLANGED
	USE FOR PIPE SIZES	1/2" - 2"	1/2" - 2"	2-1/2" - 48"	NONE
FITTINGS	MATERIAL, ASTM	A105	A105	A234 WPB	
	PRESS CL, ASME B16.11	2000	3000		
	MINIMUM WALL THICKNESS			MATCH PIPE	
	WELDING END			ASME B16.25	
	UNIONS	GROUND JOINT	GROUND JOINT	NONE	

FLANGES	MATERIAL, ASTM	A105 OR A516 GR 70
	PRESS CL, ASME B16.5, B16.47A	150
	FACING	1/16" RF SERRATED
	GASKETS ASME B16.20 ASME B16.21	WITH WELD NECK FLANGES: 304 SS SPIRAL WOUND FLEXITALLIC FLEXICARB STYLE CG OR EQUAL, UNLESS SPECIFIED OTHERWISE. WITH SLIP-ON FLANGES: 1/16" SYNTHETIC FIBER WITH NBR BINDER, KLINGER C-4400 OR EQUAL, UNLESS SPECIFIED OTHERWISE.
	BOLTS & NUTS	A193 GR B7 STUD BOLTS & A194 GR 2H HEAVY HEX NUTS

GENERAL NOTES & COMMENTS:

1. BACKING RINGS NOT PERMITTED.
2. BUTT WELD END PREPARATIONS
   A. NOMINAL PIPE WALL THICKNESSES 0.375" AND LESS: CONFORM TO ASME B16.25, FIGURE 2, DETAIL (A).
   B. NOMINAL PIPE WALL THICKNESS GREATER THAN 0.375": CONFORM TO ASME B16.25, FIGURE 2, DETAIL (A), OR FIGURE 5 OR 6 AS APPLICABLE.
3. FURNISH FLAT FACED FLANGES AND USE FULL-FACED GASKETS WHERE REQUIRED FOR CONNECTION TO CAST IRON FLANGES.
4. 300°F AND BELOW: FLANGES SHALL BE WELD NECK OR SLIP-ON.
   ABOVE 300°F: FLANGES SHALL BE WELD NECK.
5. BUTT WELD FITTINGS MAY BE WPB SEAMLESS OR WPBW WELDED.
6. ALL THREADED PIPE SHALL BE SEAMLESS (TYPE S).

NO.	REVISION	DATE	DESIGN	CHECK	APVD	
						ASME CLASS 150
2	SCHEDULE CHANGES	1-Oct-08	DDB	MSW	MAE	TYPE E OR S CARBON STEEL
1	REV. GASKET & NOTES 2, 4	5-Jan-05	JSM	JC	MAE	NO.
0	REVISION 0	9-Dec-04	JSM	JC	MAE	**ACS2**

M-1801

Stanley Consultants INC.

PIPE CLASS SPECIFICATION - APE1

MAWP	TEMP, °F	40	60	73	100	120	140				
	PRESS, PSIG	150	150	150	130	115	100				

PIPE	MATERIAL	PE4710, HDB = 1600 PSI (73°F), HDB = 1000 PSI (140°F)	
	CELL CLASS	ASTM D3350 445574 C/E	
	PIPE SIZE AND DR	IPS 1/2" - 3"	ASTM D3035, DR 11
		IPS 4" - 36"	ASTM F714, DR 11
JOINT	TYPE	SOCKET OR BUTT FUSION IN ACCORDANCE WITH ASTM D2657 AND MANUFACTURER'S STANDARD. FLANGE CONNECTIONS TO EQUIPMENT AND VALVES ONLY.	

FITTINGS	TYPE (NOTE 3)	SOCKET	BUTT	ELECTROFUSION	FLANGE ADAPTORS
	STANDARD	ASTM D2683	ASTM D3261	ASTM F1055	ASTM F2880
	USE FOR SIZES	1/2" - 4"	1/2" - 36"	1/2" - 36"	3/4" - 36"

FLANGES	TYPE	MOLDED FROM SAME TYPE POLYETHYLENE MATERIAL AS PIPE AND FITTINGS WITH STEEL BACK-UP FLANGE CONFORMING TO ASME B16.5 AND B16.47A 150 LB FLANGE DIMENSIONS.
	BOLTING	ASME 150 LB DIMENSIONS, ASTM A307 BOLTS, STUDS AND HEX HEAD NUTS. INSTALL WASHER UNDER BOLT HEADS AND NUTS.
	GASKETS	PTFE, FULL FACE, 1/8" MINIMUM THICKNESS, GARLOCK GYLON STYLE 3500 OR EQUAL, UNLESS SPECIFIED OTHERWISE.

GENERAL NOTES & COMMENTS:

1. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND PPI STANDARDS.
2. PRESSURE AND TEMPERATURE RATINGS ARE BASED ON POTABLE WATER, PROCESS WATER, OR GLYCOL SERVICES. FOR OTHER SERVICES SEE MANUFACTURER'S RECOMMENDATIONS.
3. FITTINGS SHALL BE RATED FOR INTERNAL PRESSURE SERVICE AT LEAST EQUAL TO THE FULL SERVICE PRESSURE RATING OF THE MATING PIPE. FITTING MATERIAL AND CELL CLASS SHALL MATCH PIPE MATERIAL AND CELL CLASS.
4. USE FOR NONFLAMMABLE AND NONTOXIC LIQUID SERVICE ONLY. NOT FOR COMPRESSED AIR OR GAS SERVICE. FOR NON-SHOCK, NON-CYCLING WATER SERVICE.
5. FOR POTABLE WATER SERVICE, MATERIALS IN CONTACT WITH WATER SHALL BE CERTIFIED IN ACCORDANCE WITH NSF/ANSI STANDARD 14 - PLASTIC PIPING SYSTEM COMPONENTS AND NSF/ANSI STANDARD 61 - DRINKING WATER SYSTEM COMPONENTS - HEALTH EFFECTS.
6. WATERWORKS SERVICE (POTABLE WATER, WASTEWATER, AND RECLAIMED WATER) SHALL BE CERTIFIED IN ACCORDANCE WITH ANSI/AWWA C901 AND C906.
7. FOLLOW IGSHPA STANDARDS FOR GROUND LOOP APPLICATIONS. UTILIZE FACTORY INSTALLED "U-BEND". MECHANICAL FITTINGS SHALL NOT BE BURIED. ALL MECHANICAL JOINTS SHALL BE ACCESSIBLE.

NO.	REVISION	DATE	DESIGN	CHECK	APVD	
2	GENERAL	31-Mar-17	JJO	JC	MAE	150 PSI AT 73 °F POLYETHYLENE PIPE
1	FORMAT & GENERAL	28-Apr-06	AGP	DDB	MAE	NO.
0	REVISION 0	14-Dec-04	AAM	AGP	MAE	**APE1**

M-1761

Stanley Consultants INC.

PIPE CLASS SPECIFICATION - ADI2

MAW	TEMP, °F	120									
	PRESS, PSIG	150									

PIPE	MATERIAL	DUCTILE IRON ANSI/AWWA C151/A21.51
	SIZES (INCLUSIVE)	3" THRU 48"
	MINIMUM THICKNESS (1)	LAYING CONDITION TYPE 2 TRENCH, DEPTH OF COVER AS SHOWN ON DRAWINGS ANSI/AWWA C150/A21.50
JOINT	TYPE (2)(3)	MECHANICAL OR PUSH-ON TYPE ANSI/AWWA C111/A21.11
FITTINGS	TYPE	ANSI/AWWA C110/A21.10 OR ANSI/AWWA C153/A21.53
	MATERIAL	DUCTILE IRON
	RATED WORKING PRESSURE	250 PSI MINIMUM ANSI/AWWA C110/A21.10 OR C153/A21.53
	GASKETS (3)	SBR ANSI/AWWA C111/A21.11
	BOLTS AND NUTS	TEE-HEAD BOLTS AND HEX NUTS ANSI/AWWA C111/A21.11

GENERAL NOTES & COMMENTS:

1. CHOOSE NEXT LARGER DEPTH WHEN DEPTH OF COVER FALLS BETWEEN DEPTHS LISTED IN TABLE.
2. PROVIDE RESTRAINED GLANDS, TIED JOINTS OR THRUST BLOCKS AT ALL CHANGES OF DIRECTION.
3. PROVIDE EPDM GASKET MATERIAL FOR TEMPERATURES OVER 120 °F WHERE SPECIFIED OR NOTED ON DRAWINGS. ADI2 PIPE CLASS SPECIFICATION WITH EPDM GASKETS RATED AT 225° F AND 100 PSI.
4. PROVIDE ANSI/AWWA C105/A21.5 POLYETHYLENE ENCASEMENT FOR CORROSION PROTECTION OF BURIED DUCTILE IRON PIPE, FITTINGS, AND APPURTENANCES WHERE SPECIFIED OR NOTED ON DRAWINGS.
5. PROVIDE CEMENT-MORTAR LINING AND SEAL COAT PER ANSI/AWWA C104/A21.4.

						150 PSIG AT 120°F
						DUCTILE IRON PIPE
						NO.
0	REVISION 0	14-Dec-04	AAM	AGP	MAE	**ADI2**
NO.	REVISION	DATE	DESIGN	CHECK	APVD	

M-1735

Attachment 2

2021 ASHRAE Handbook — Fundamentals (IP)

DENVER INTL, CO, USA

WMO: **725650**

Lat: **39.833N** Lon: **104.658W** Elev: **5414** StdP: **12.04** Time Zone: **-7.00 (NAM)** Period: **94-19** WBAN: **03017**

Annual Heating, Humidification, and Ventilation Design Conditions

	Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest Month WS/MCDB				MCWS/PCWD to 99.6% DB		WSF	
		99.6%	99%	99.6%			99%			0.4%		1%					
				DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(1)	12	-0.2	5.8	-7.7	4.4	11.8	-3.3	5.6	20.2	29.7	42.3	26.3	36.9	7.6	230	0.635	(1)

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

	Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB		
			0.4%		1%		2%		0.4%		1%		2%				
			DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(2)	7	27.5	94.8	59.8	92.3	59.7	89.6	59.5	64.8	81.0	63.7	80.5	62.5	79.6	9.3	20	(2)

	Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Extreme Max WB	
	0.4%			1%			2%			0.4%		1%		2%			
	DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(3)	60.6	96.9	68.1	59.0	91.3	67.9	57.3	85.9	67.5	32.7	80.4	31.7	80.3	30.8	79.4	69.3	(3)

Extreme Annual Design Conditions

	Extreme Annual WS				Extreme Annual Temperature				n-Year Return Period Values of Extreme Temperature								
					Mean		Standard Deviation		n=5 years		n=10 years		n=20 years		n=50 years		
	1%	2.5%	5%		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
	(a)	(b)	(c)		(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(4)	27.1	23.7	19.9	DB	-10.3	99.3	5.6	2.1	-14.4	100.8	-17.6	102.0	-20.8	103.1	-24.8	104.6	(4)
(5)				WB	-10.9	67.5	5.4	1.0	-14.8	68.2	-18.0	68.7	-21.0	69.3	-25.0	70.0	(5)

Monthly Climatic Design Conditions

				Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
				(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(6)	Temperatures, Degree-Days and Degree-Hours	DBAvg		51.2	31.9	32.7	41.3	47.5	56.7	67.9	75.0	72.8	64.6	51.1	40.2	31.0	(6)
(7)		DBStd		18.14	11.11	11.55	10.65	9.47	8.82	7.36	5.22	5.15	8.47	10.29	11.06	11.45	(7)
(8)		HDD50		2579	565	489	301	154	39	1	0	0	9	111	320	590	(8)
(9)		HDD65		5874	1027	904	734	525	279	53	4	8	107	437	743	1053	(9)
(10)		CDD50		3009	3	4	33	80	248	539	775	707	446	145	27	2	(10)
(11)		CDD65		827	0	0	0	1	22	141	313	250	94	6	0	0	(11)
(12)		CDH74		10097	0	1	11	51	433	1941	3561	2662	1254	179	4	0	(12)
(13)		CDH80		4536	0	0	0	4	117	876	1820	1215	477	27	0	0	(13)
(14)	Wind	WSAvg		10.0	9.6	10.0	10.8	11.6	10.4	10.2	9.6	9.4	9.3	9.6	9.5	9.6	(14)
(15)	Precipitation	PrecAvg		15.3	0.4	0.5	0.8	1.9	2.3	1.9	2.1	1.9	1.5	1.0	0.5	0.5	(15)
(16)		PrecMax		21.6	0.9	1.4	2.7	5.6	4.5	4.0	5.1	4.4	7.5	2.5	2.2	2.1	(16)
(17)		PrecMin		7.9	0.0	0.0	0.0	0.2	0.6	0.4	0.3	0.2	0.0	0.2	0.1	0.0	(17)
(18)		PrecStd		3.4	0.2	0.3	0.6	1.1	1.2	1.1	1.4	1.1	1.5	0.6	0.4	0.4	(18)
(19)	Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB	64.4	67.7	75.3	79.1	88.3	97.1	98.6	95.9	93.1	83.2	73.6	64.3		(19)
(20)			MCWB	42.7	44.1	47.3	50.2	56.6	58.3	60.6	59.7	58.8	53.1	47.1	42.6		(20)
(21)		2%	DB	58.5	61.8	70.2	74.9	83.2	92.6	95.6	93.1	89.0	79.2	68.4	58.0		(21)
(22)			MCWB	40.3	41.7	45.6	48.7	54.8	58.5	60.4	59.6	57.2	51.5	45.5	40.1		(22)
(23)		5%	DB	53.2	56.6	65.4	70.9	79.0	89.2	93.1	90.3	85.7	74.8	63.5	53.1		(23)
(24)			MCWB	38.0	39.4	43.9	47.5	53.9	58.1	60.5	59.7	56.1	50.1	43.6	37.9		(24)
(25)		10%	DB	48.1	50.8	60.4	66.3	74.3	85.4	90.2	87.3	81.9	69.3	58.1	47.9		(25)
(26)			MCWB	35.7	36.6	42.0	46.3	52.9	58.0	60.6	59.9	55.7	48.4	41.2	35.7		(26)
(27)	Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB	44.2	45.0	48.9	53.2	60.7	65.5	66.5	66.0	63.4	55.8	48.4	43.5		(27)
(28)			MCDB	61.8	65.3	71.1	70.3	78.6	82.7	82.4	80.7	80.1	76.7	69.9	62.3		(28)
(29)		2%	WB	41.0	42.3	46.6	50.4	58.1	63.0	65.2	64.3	61.0	53.2	46.2	40.8		(29)
(30)			MCDB	56.8	60.4	67.1	68.8	74.4	79.9	81.2	80.6	77.8	72.3	66.8	57.3		(30)
(31)		5%	WB	38.4	39.8	44.6	48.8	56.1	61.3	64.1	63.2	59.2	51.3	44.1	38.3		(31)
(32)			MCDB	52.3	55.4	63.6	67.2	72.7	78.7	80.7	80.2	77.0	70.4	62.2	51.8		(32)
(33)		10%	WB	36.1	37.2	42.4	47.1	54.3	59.8	63.0	62.1	57.7	49.5	41.9	35.8		(33)
(34)			MCDB	47.6	50.1	58.8	64.5	70.5	78.3	80.2	78.8	75.3	67.1	57.1	47.6		(34)
(35)	Mean Daily Temperature Range		MDBR	23.5	23.9	25.9	25.4	25.1	27.9	27.5	27.0	27.3	25.8	25.1	23.3		(35)
(36)		5% DB	MCDBR	28.9	31.8	32.6	32.8	31.9	33.2	31.1	30.5	31.6	32.7	31.7	29.3		(36)
(37)			MCWBR	15.7	16.6	15.4	14.3	11.9	10.6	8.7	8.6	10.2	13.3	15.2	16.2		(37)
(38)		5% WB	MCDBR	28.1	30.1	31.0	30.0	28.2	28.4	26.6	26.2	27.4	29.1	30.3	28.1		(38)
(39)			MCWBR	15.8	16.2	15.2	13.8	12.0	11.1	9.0	8.7	10.0	12.7	15.1	16.1		(39)
(40)	Clear-Sky Solar Irradiance	taub		0.237	0.245	0.265	0.296	0.315	0.324	0.351	0.342	0.306	0.267	0.249	0.239		(40)
(41)		taud		2.623	2.614	2.560	2.483	2.489	2.479	2.441	2.457	2.536	2.633	2.603	2.608		(41)
(42)		Ebn at Noon		307	318	318	311	305	301	292	292	299	304	298	298		(42)
(43)		Edh at Noon		21	24	29	33	34	34	36	34	29	24	21	20		(43)
(44)	All-Sky Solar Radiation	RadAvg		803	1108	1499	1797	2005	2291	2204	1967	1677	1224	878	704		(44)
(45)		RadStd		35	62	109	124	158	105	93	58	82	75	48	40		(45)

Historical Trends

		DBAvg	Heating		Cooling			Degree-Days				
			99% DB	99% DP	1% DB	1% WB	1% DP	HDD50	HDD65	CDD50	CDD65	
		(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	
(46)	Station Only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	+160	N/A	(46)
(47)	Regional (28 neighbors)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	+104	N/A	(47)

Nomenclature: See separate page

DENVER/STAPLETON CO	
Latitude = 39.75 N	WMO No. 724690
Longitude =104.80 W	Elevation = 5332 feet
Period of Record = 1973 to 1995	Average Pressure = 24.66 inches Hg

Design Criteria Data

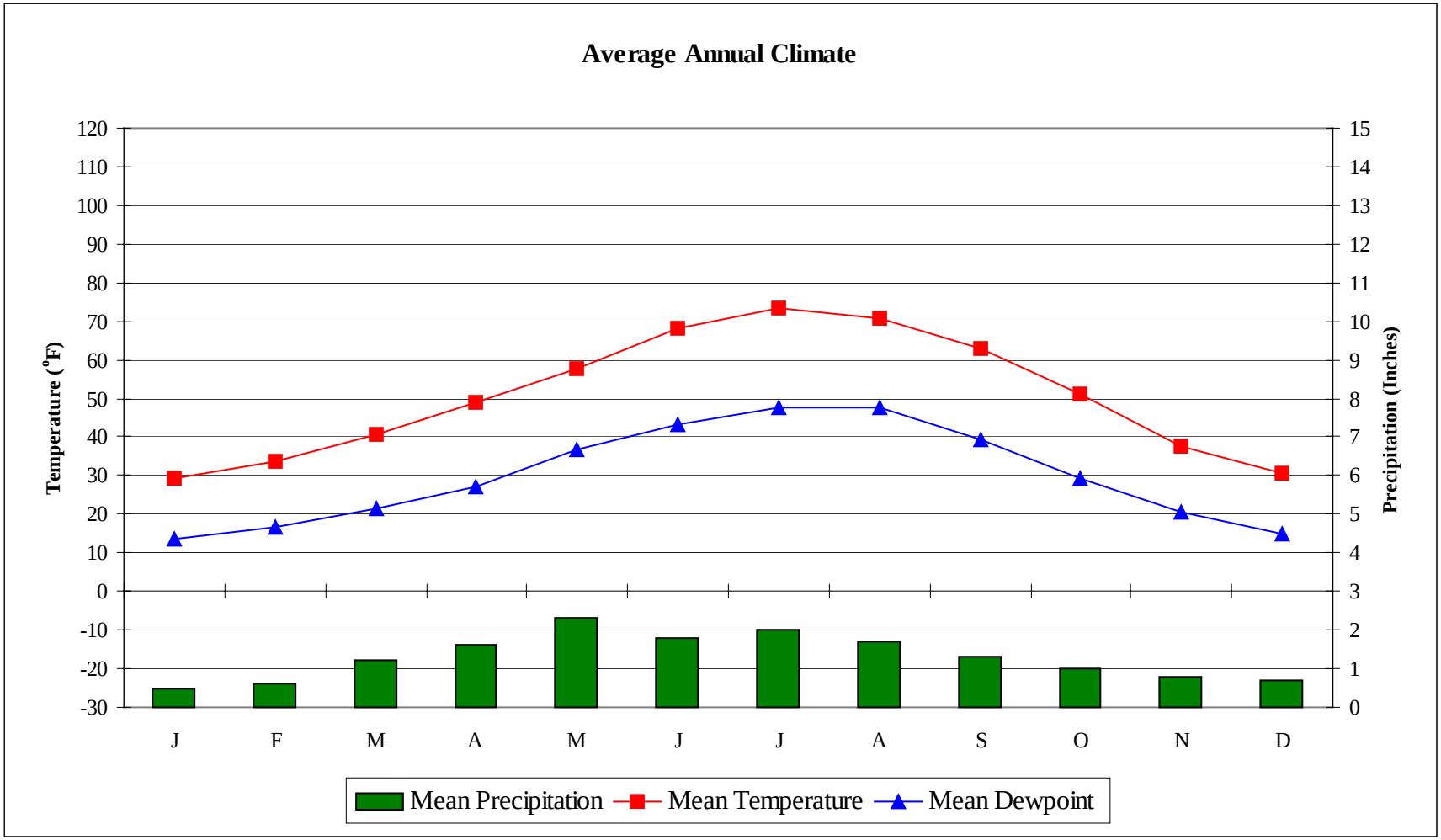
		Mean Coincident (Average) Values			
Dry Bulb Temperature (T)	**Design Value (^oF)**	Wet Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	97	60	37	9.7	S
0.4% Occurrence	93	60	41	9.1	SE
1.0% Occurrence	91	60	42	9.0	N
2.0% Occurrence	88	59	46	8.9	E
Mean Daily Range	25	-	-	-	-
97.5% Occurrence	12	11	9	6.1	S
99.0% Occurrence	4	3	6	5.9	S
99.6% Occurrence	-2	-3	4	5.2	S
Median of Extreme Lows	-9	-10	3	6.4	S
		Mean Coincident (Average) Values			
Wet Bulb Temperature (T_{wb})	**Design Value (^oF)**	Dry Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	68	83	95	9.0	N
0.4% Occurrence	64	81	78	8.5	N
1.0% Occurrence	63	80	74	8.5	N
2.0% Occurrence	62	79	71	8.5	N
		Mean Coincident (Average) Values			
Humidity Ratio (HR)	**Design Value (gr/lb)**	Dry Bulb Temperature (^oF)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	104	71	0.58	7.4	NNW
0.4% Occurrence	94	68	0.52	7.2	N
1.0% Occurrence	87	68	0.49	7.1	S
2.0% Occurrence	81	68	0.45	7.5	S
Air Conditioning/		$T \geq 93^oF$	$T \geq 80^oF$	$T_{wb} \geq 73^oF$	$T_{wb} \geq 67^oF$
Humid Area Criteria	# of Hours	45	641	0	6

Other Site Data

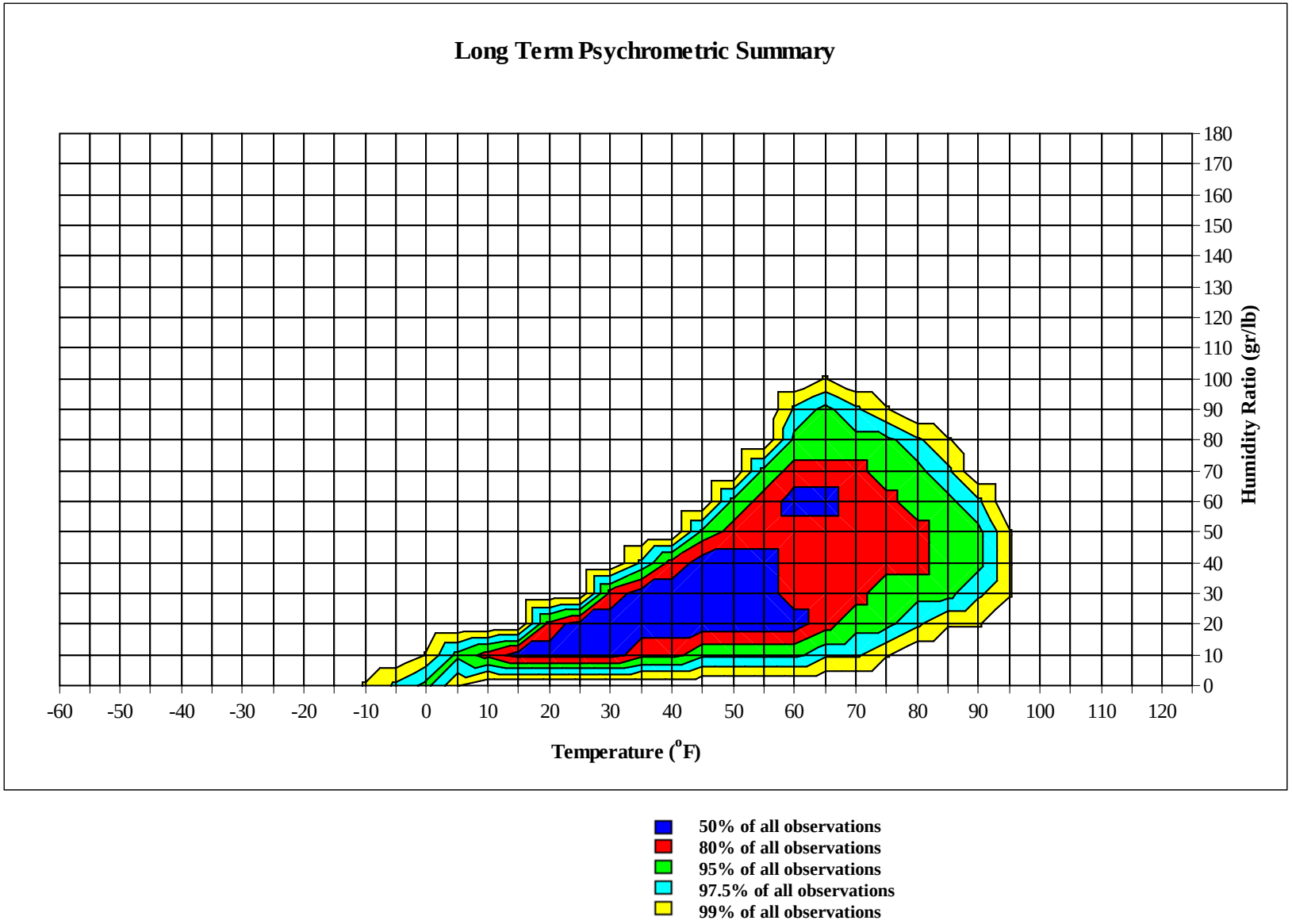
Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75^oF-RH 60% Latent + Sensible
6	2.3	N/A	0.0 + 0.7
Ground Water Temperature (^oF) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft^2)	Average Annual Freeze-Thaw Cycles (#)
52.7	52	18	105

*Note: Temperatures at greater depths can be estimated by adding 1.5^oF per 100 feet additional depth.

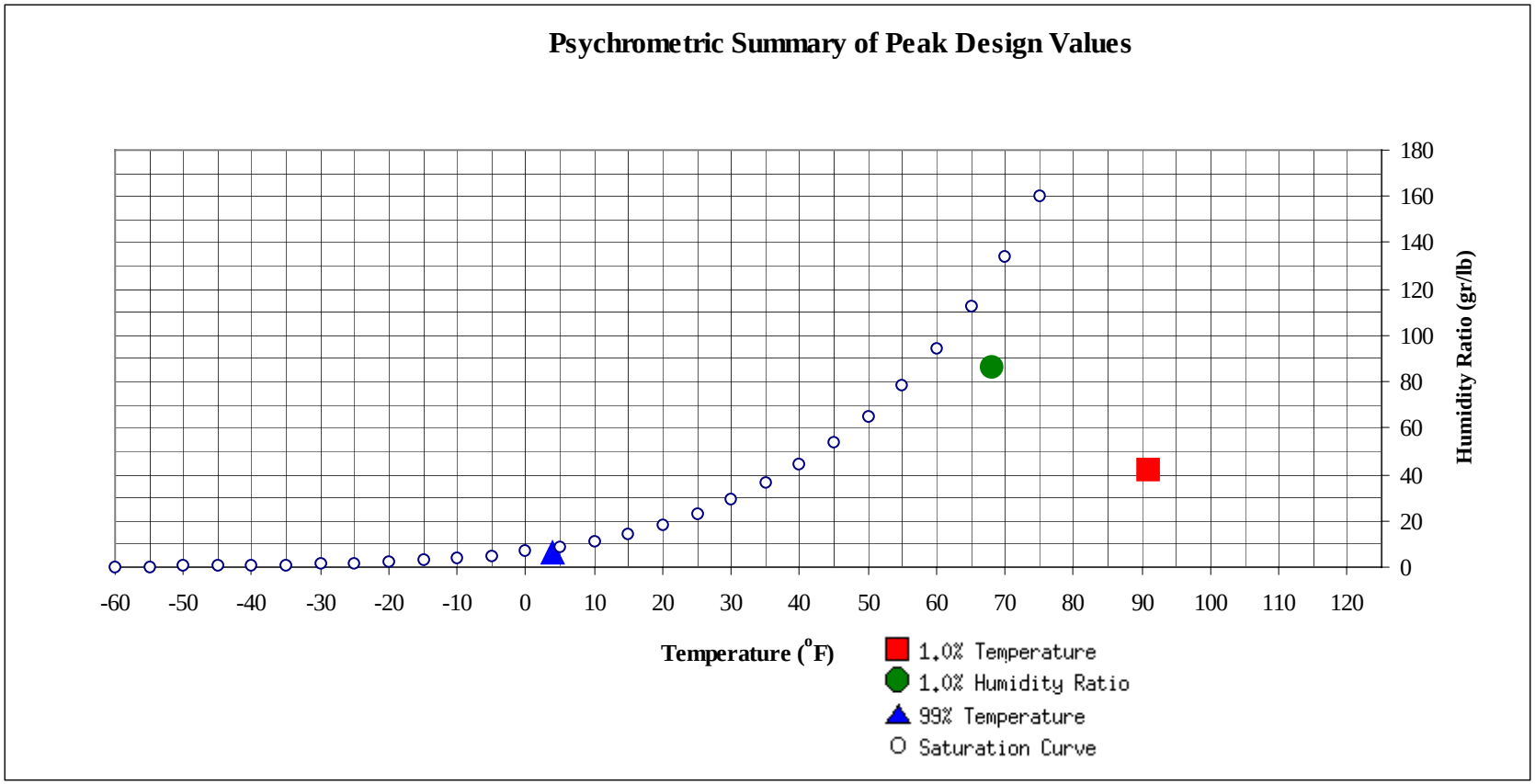
DENVER/STAPLETON CO WMO No. 724690



DENVER/STAPLETON CO WMO No. 724690



DENVER/STAPLETON CO WMO No. 724690



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
99% Dry Bulb	4	6.1	1.9

	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
1.0% Humidity Ratio	86.8	68.1	61.3	57.9	29.9

	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
1.0% Dry Bulb	91	42.2	59.6	28.5

DENVER/STAPLETON CO WMO No. 724690

Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)

Period of Record = 1973 to 1995

Temperature Range (°F)	January					February					March				
	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB
	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)
100 / 104															
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79												2	0	2	48.5
70 / 74		0		0	46.2		1		1	46.2		7	1	8	46.9
65 / 69		1	0	1	43.4		5	0	5	44.5		17	4	21	44.2
60 / 64		5	0	5	41.7		11	2	13	42.1	0	25	9	34	42.6
55 / 59	0	15	2	17	39.7	0	25	6	31	40.0	2	32	17	51	40.6
50 / 54	1	24	5	30	37.4	2	27	12	41	37.7	7	32	26	65	38.6
45 / 49	6	30	14	50	35.1	6	29	19	54	35.4	13	34	34	81	36.3
40 / 44	10	34	25	69	32.5	12	30	29	71	32.9	29	30	41	100	34.2
35 / 39	22	33	36	91	29.8	30	26	41	97	30.2	57	28	44	129	31.6
30 / 34	35	30	43	108	26.8	46	23	40	109	27.7	64	21	37	122	28.6
25 / 29	51	24	40	115	23.5	49	18	29	96	24.2	40	11	19	70	24.9
20 / 24	45	20	30	95	19.5	35	12	20	67	20.1	19	6	9	34	20.2
15 / 19	25	12	19	56	15.2	17	5	9	31	15.4	9	3	4	16	15.9
10 / 14	18	9	15	42	10.5	11	5	5	21	10.8	4	1	2	7	10.9
5 / 9	15	6	11	32	5.8	6	2	5	13	6.0	2	0	1	3	6.3
0 / 4	11	3	7	21	0.9	4	1	3	8	1.3	1		0	1	1.8
-5 / -1	5	0	1	6	-2.8	3	1	2	6	-3.2	0			0	-1.3
-10 / -6	3	0	1	4	-7.2	2	0	1	3	-7.4					
-15 / -11	1		0	1	-12.1	1	1	0	2	-11.9					
-20 / -16	0			0	-16.5	1	0	0	1	-15.6					
-25 / -21						0			0	-22.0					

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

DENVER/STAPLETON CO WMO No. 724690

Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)

Period of Record = 1973 to 1995

Temperature Range (°F)	April					May					June				
	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB
	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)
100 / 104												0	0	0	61.2
95 / 99												4	1	5	60.1
90 / 94							1		1	55.6		20	4	24	58.9
85 / 89		1	0	1	54.0		4	1	5	55.4	0	36	11	47	58.3
80 / 84		4	1	5	51.6		18	4	22	54.4	1	42	21	64	58.2
75 / 79		13	3	16	50.2	0	34	11	45	53.2	5	43	31	79	57.1
70 / 74		23	7	30	48.7	1	41	20	62	52.1	16	38	42	96	55.7
65 / 69	1	30	14	45	46.9	7	43	30	80	50.6	37	26	46	109	54.2
60 / 64	4	30	24	58	45.2	20	35	42	97	49.2	58	15	40	113	52.7
55 / 59	10	32	32	74	43.2	40	27	47	114	47.5	62	8	24	94	50.4
50 / 54	26	34	37	97	41.4	63	19	44	126	45.3	40	5	15	60	47.3
45 / 49	40	27	38	105	39.0	57	13	27	97	42.3	16	2	5	23	43.7
40 / 44	55	17	34	106	36.1	38	7	15	60	38.6	5	1	1	7	40.4
35 / 39	47	15	25	87	32.8	15	3	5	23	34.3	0	0		0	37.0
30 / 34	34	9	17	60	29.4	6	1	2	9	31.2					
25 / 29	14	4	6	24	25.0	0		0	0	27.1					
20 / 24	5	1	3	9	20.3	0			0	24.0					
15 / 19	2	0	0	2	15.6										
10 / 14	1	0	0	1	11.4										
5 / 9	0			0	7.7										
0 / 4	0			0	1.4										
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

DENVER/STAPLETON CO WMO No. 724690

Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)

Period of Record = 1973 to 1995

Temperature Range (°F)	July					August					September				
	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB
	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)
100 / 104		1	0	1	61.3										
95 / 99		10	1	11	60.2		2	0	2	60.5		0		0	59.3
90 / 94		37	9	46	60.3		19	3	22	59.9		5	0	5	59.1
85 / 89	0	55	19	74	60.2		51	12	62	59.8		20	3	23	57.4
80 / 84	2	56	29	87	59.9	0	64	22	86	59.6		44	9	53	55.9
75 / 79	10	42	43	95	59.1	4	50	37	90	59.1	0	43	20	63	55.0
70 / 74	29	27	53	109	58.0	20	32	54	107	57.8	3	38	31	72	53.6
65 / 69	73	13	57	143	56.7	56	18	63	138	56.6	16	32	42	90	52.4
60 / 64	91	5	30	126	55.4	90	8	42	141	54.9	42	21	45	109	50.9
55 / 59	36	1	7	44	53.1	59	3	12	74	52.2	56	15	37	109	48.7
50 / 54	7	0	1	8	49.4	17	1	3	21	49.1	55	11	27	94	45.7
45 / 49	1	0		1	46.2	1		0	1	44.2	36	5	14	55	42.4
40 / 44											18	3	6	27	38.7
35 / 39											8	1	3	12	34.5
30 / 34											3	1	1	5	30.8
25 / 29											1	1	0	2	24.5
20 / 24											0		0	0	21.1
15 / 19											0			0	17.3
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

DENVER/STAPLETON CO WMO No. 724690

Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)

Period of Record = 1973 to 1995

Temperature Range (°F)	October Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	November Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	December Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
100 / 104															
95 / 99															
90 / 94															
85 / 89		1		1	53.4										
80 / 84		10	1	11	52.3										
75 / 79		24	3	27	50.7		2	0	2	48.5					
70 / 74	0	32	6	38	49.2		8	0	8	47.2		1		1	45.8
65 / 69	1	38	14	53	47.7	0	14	1	15	45.7		4	0	4	44.2
60 / 64	5	37	21	63	46.0	0	20	4	24	43.6	0	11	1	12	42.0
55 / 59	12	31	36	79	44.1	2	25	9	36	41.2	0	16	4	20	40.2
50 / 54	31	26	50	107	42.1	6	30	16	52	39.0	2	25	7	34	37.7
45 / 49	52	18	46	116	39.7	11	29	25	65	36.7	6	28	13	47	35.2
40 / 44	59	12	32	103	36.6	27	25	38	90	34.1	14	32	25	71	32.5
35 / 39	46	9	20	75	33.3	39	27	40	106	31.4	25	36	35	96	29.8
30 / 34	27	7	13	47	29.7	51	27	41	119	28.3	37	33	45	115	26.9
25 / 29	11	1	4	16	25.4	45	18	34	97	24.6	53	23	44	120	23.7
20 / 24	2	1	1	4	20.2	31	8	18	57	20.3	45	15	27	86	19.7
15 / 19	1	0	0	1	15.9	13	4	8	25	15.4	27	10	19	56	15.4
10 / 14	1	0	0	1	11.0	8	1	4	13	11.1	15	6	9	30	10.8
5 / 9	0		0	0	7.8	4	1	2	7	6.3	8	4	9	21	6.2
0 / 4						1	0	1	2	1.5	8	2	5	15	1.6
-5 / -1						1		0	1	-2.8	3	1	2	6	-2.7
-10 / -6						0		0	0	-6.4	2	2	1	5	-7.7
-15 / -11											1	1	2	4	-12.5
-20 / -16											1	0	1	2	-16.4
-25 / -21											0	0		0	-21.1

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

DENVER/STAPLETON CO WMO No. 724690

Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

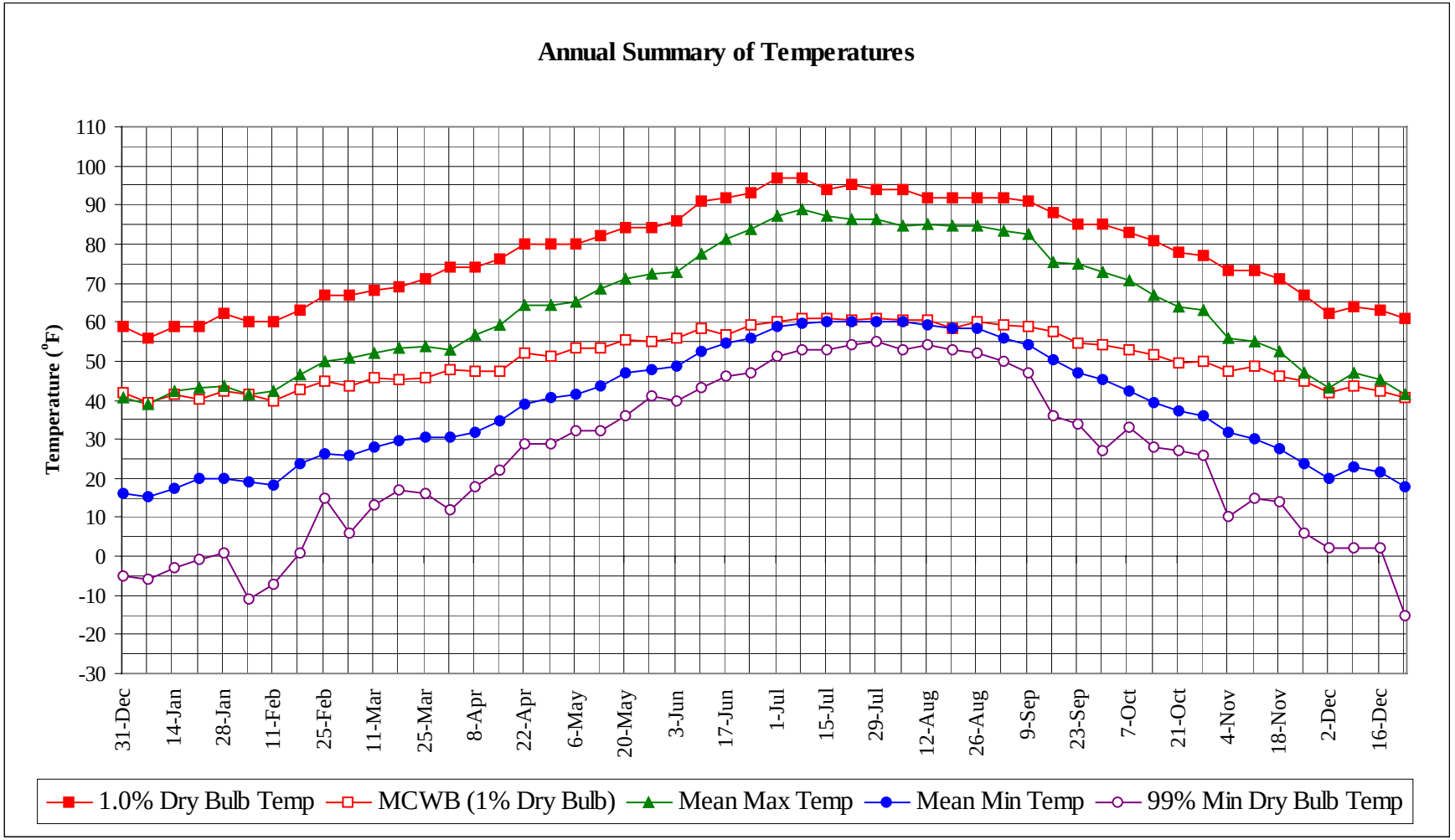
Period of Record = 1973 to 1995

Annual Totals

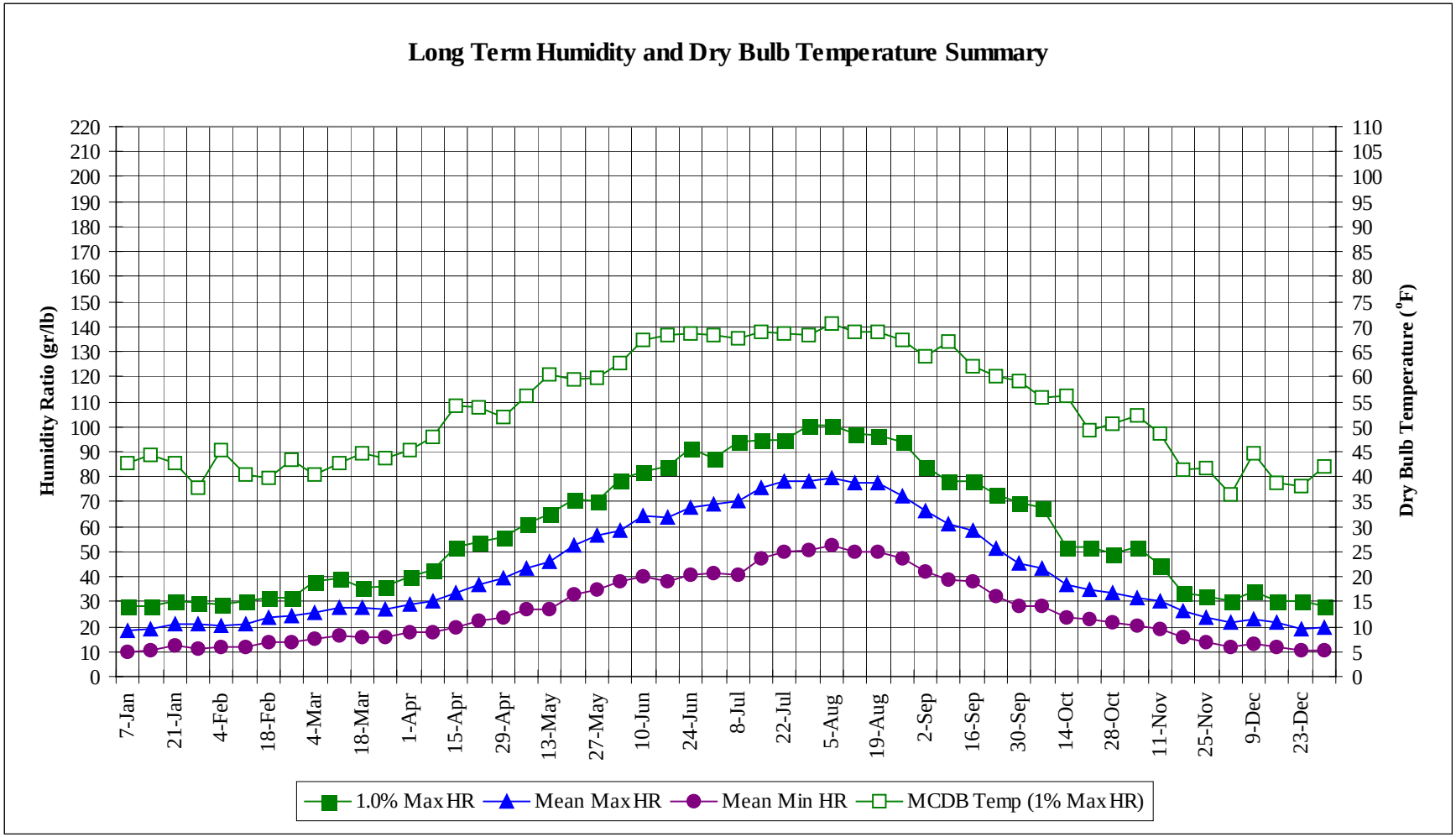
Temperature Range (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
100 / 104		1	0	1	61.2
95 / 99		16	2	18	60.2
90 / 94		80	15	95	59.7
85 / 89	0	164	45	209	59.2
80 / 84	3	233	85	321	58.1
75 / 79	19	249	146	414	56.5
70 / 74	69	244	211	524	54.7
65 / 69	189	242	268	699	52.9
60 / 64	305	224	256	785	50.6
55 / 59	276	232	230	738	46.5
50 / 54	256	238	241	735	42.5
45 / 49	245	218	235	698	38.7
40 / 44	268	195	247	710	34.9
35 / 39	292	182	253	727	31.3
30 / 34	307	155	241	703	28.0
25 / 29	267	100	181	548	24.1
20 / 24	185	64	109	358	19.9
15 / 19	96	35	60	191	15.4
10 / 14	59	23	36	118	10.7
5 / 9	36	13	28	77	6.0
0 / 4	25	6	16	47	1.2
-5 / -1	12	3	6	21	-2.9
-10 / -6	7	2	4	13	-7.4
-15 / -11	4	1	2	7	-12.2
-20 / -16	2	0	1	3	-16.1
-25 / -21	0	0		0	-21.3

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

DENVER/STAPLETON CO WMO No. 724690



DENVER/STAPLETON CO WMO No. 724690

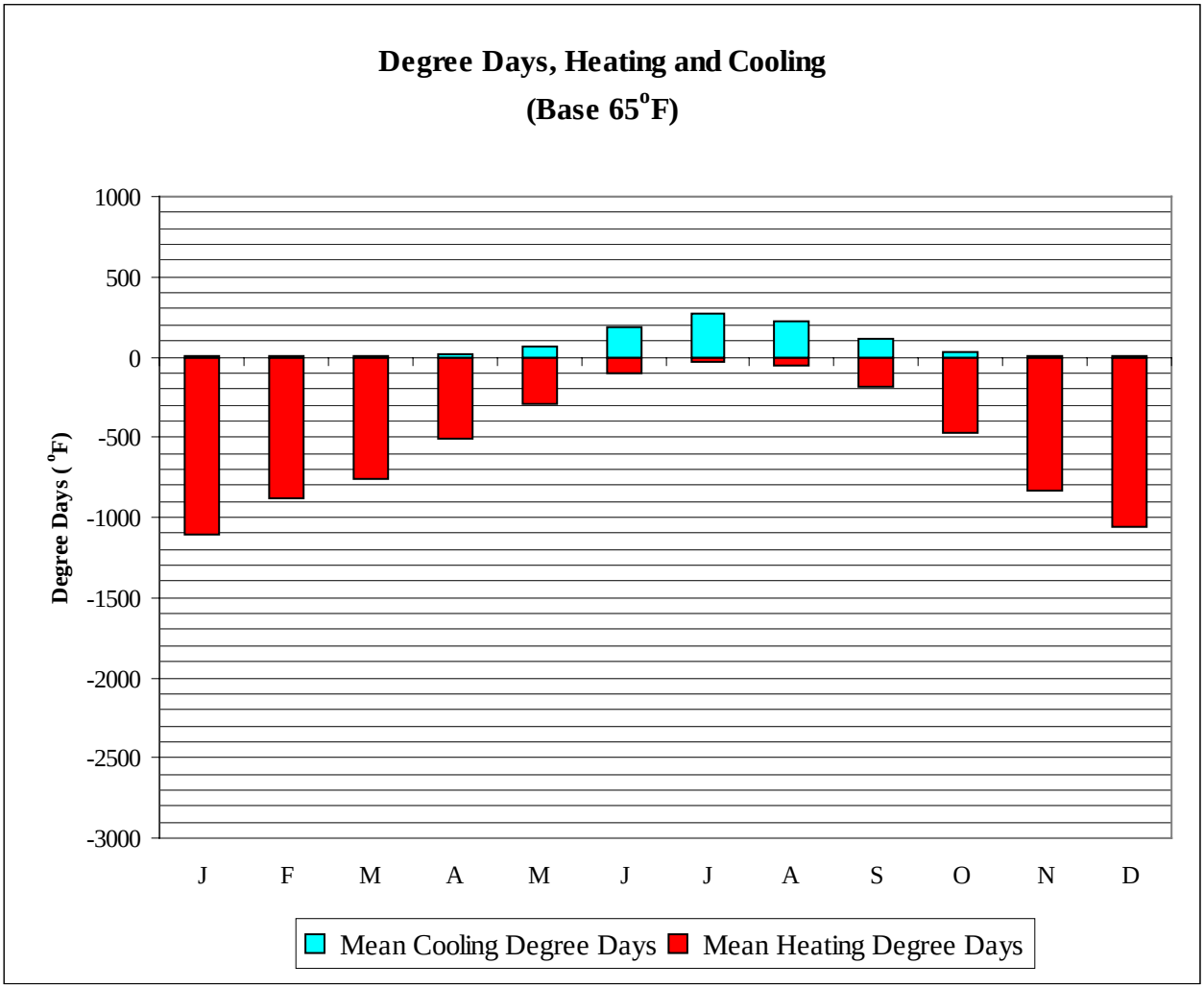


DENVER/STAPLETON CO WMO No. 724690

Long Term Dry Bulb Temperature and Humidity Summary

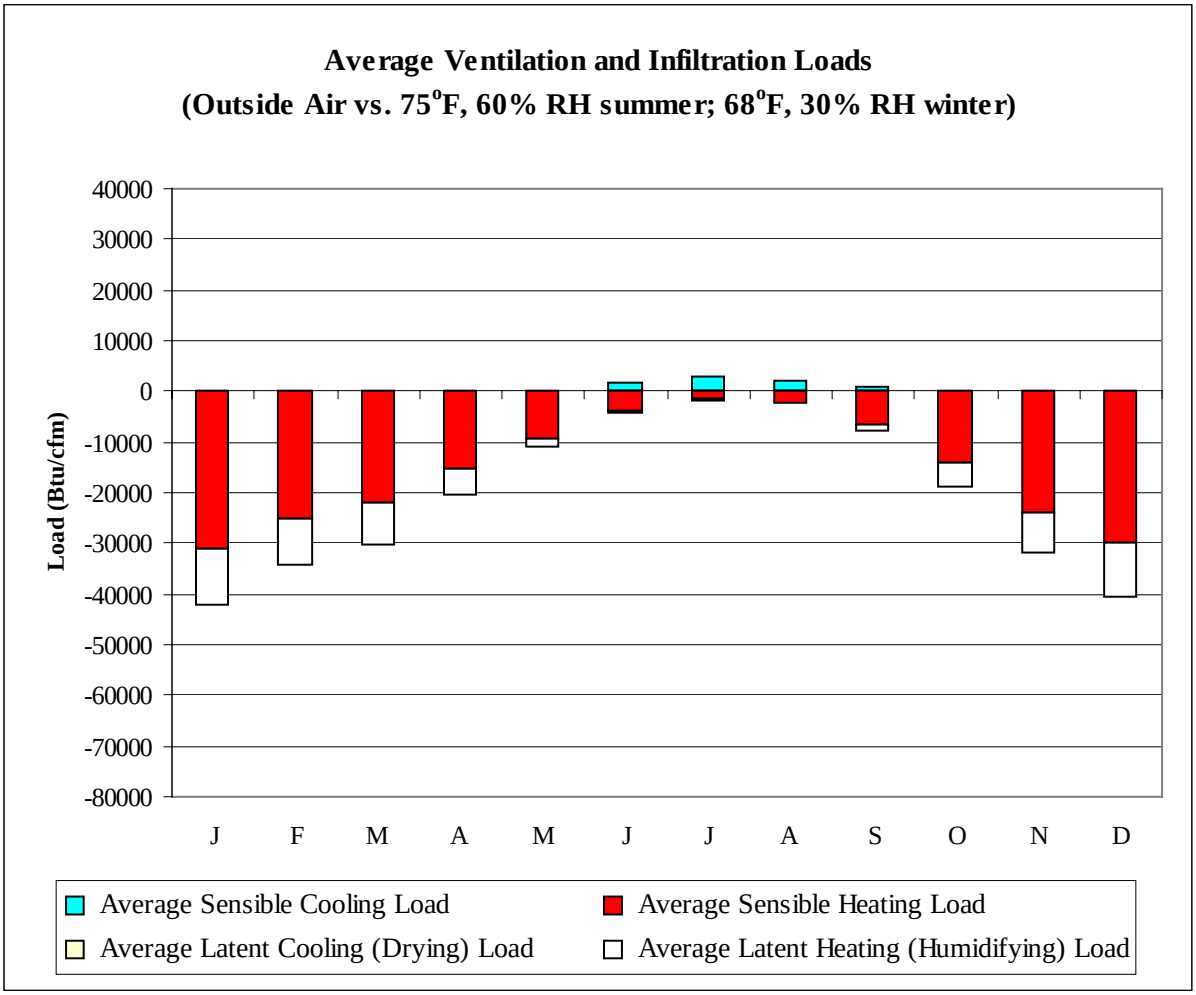
Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	56.0	39.2	39.0	15.1	-6.0	28.0	42.7	18.2	9.9
14-Jan	59.0	41.7	42.2	17.5	-3.0	28.0	44.4	19.3	10.3
21-Jan	59.0	40.4	43.0	19.7	-1.0	30.1	42.6	21.3	12.3
28-Jan	62.0	42.1	43.8	20.1	1.0	29.4	37.7	20.9	11.3
4-Feb	60.0	41.4	41.6	19.2	-11.0	28.7	45.2	20.4	11.8
11-Feb	60.0	39.6	42.5	18.1	-7.0	30.1	40.4	21.0	11.7
18-Feb	63.0	42.9	46.7	23.9	1.0	31.5	39.9	23.4	13.5
25-Feb	67.0	45.0	50.0	26.1	15.0	31.5	43.5	24.2	13.6
4-Mar	67.0	43.8	51.0	26.0	6.0	37.8	40.4	25.8	15.2
11-Mar	68.0	45.9	51.9	27.8	13.0	39.2	42.9	27.4	16.4
18-Mar	69.0	45.4	53.4	29.4	17.0	35.7	44.7	27.3	16.0
25-Mar	71.0	45.9	53.9	30.3	16.0	36.4	43.8	26.7	15.6
1-Apr	74.0	47.7	53.0	30.5	12.0	39.9	45.3	28.6	17.4
8-Apr	74.0	47.4	56.7	31.9	18.0	42.7	47.8	30.5	17.7
15-Apr	76.0	47.2	59.2	34.9	22.0	51.8	54.1	33.6	19.9
22-Apr	80.0	51.9	64.2	39.1	29.0	53.9	53.7	37.0	22.7
29-Apr	80.0	51.1	64.2	40.5	29.0	56.0	51.8	39.1	23.7
6-May	80.0	53.2	65.3	41.5	32.0	60.9	56.3	43.4	27.2
13-May	82.0	53.5	68.6	43.5	32.0	65.1	60.5	46.1	27.0
20-May	84.0	55.4	71.0	47.0	36.0	70.7	59.5	52.8	33.2
27-May	84.0	54.9	72.3	47.9	41.0	70.0	59.7	56.8	34.9
3-Jun	86.0	55.9	72.8	48.8	40.0	79.1	62.7	58.7	37.8
10-Jun	91.0	58.3	77.5	52.4	43.0	81.9	67.4	64.2	39.8
17-Jun	92.0	56.6	81.3	54.4	46.0	84.0	68.4	63.6	38.0
24-Jun	93.0	59.5	83.9	56.0	47.0	91.0	68.5	68.0	40.4
1-Jul	97.0	60.1	87.2	58.8	51.0	87.5	68.2	69.2	41.5
8-Jul	97.0	60.8	88.9	59.8	53.0	93.8	67.6	70.2	40.5
15-Jul	94.0	61.0	87.0	60.1	53.0	94.5	68.8	75.5	47.4
22-Jul	95.0	60.4	86.4	59.9	54.0	94.5	68.6	78.1	50.0
29-Jul	94.0	60.8	86.2	60.1	55.0	100.8	68.3	78.3	50.8
5-Aug	94.0	60.6	84.7	59.9	53.0	100.8	70.5	79.2	52.8
12-Aug	92.0	60.7	85.0	59.1	54.0	97.3	68.8	77.3	49.9
19-Aug	92.0	58.5	84.5	58.4	53.0	96.6	69.1	77.3	50.2
26-Aug	92.0	60.2	84.6	58.2	52.0	93.8	67.4	72.5	47.6
2-Sep	92.0	59.2	83.3	55.9	50.0	84.0	64.0	66.5	41.9
9-Sep	91.0	59.0	82.6	54.3	47.0	78.4	67.0	61.3	38.7
16-Sep	88.0	57.4	75.3	50.3	36.0	78.4	62.2	58.7	38.3
23-Sep	85.0	54.4	74.8	46.8	34.0	72.8	60.0	51.0	31.9
30-Sep	85.0	54.0	72.9	45.3	27.0	69.3	59.2	45.2	28.4
7-Oct	83.0	53.1	70.6	42.4	33.0	67.9	55.9	43.1	28.1
14-Oct	81.0	51.8	67.1	39.3	28.0	51.8	56.0	36.8	23.6
21-Oct	78.0	49.4	63.9	37.2	27.0	51.8	49.3	35.1	22.8
28-Oct	77.0	49.9	63.2	35.8	26.0	49.0	50.6	33.6	21.4
4-Nov	73.0	47.5	56.1	31.9	10.0	51.8	52.1	31.4	20.1
11-Nov	73.0	48.7	55.0	30.3	15.0	44.8	48.6	30.5	18.8
18-Nov	71.0	46.1	52.5	27.6	14.0	33.6	41.5	26.0	15.8
25-Nov	67.0	44.7	47.0	23.8	6.0	32.2	41.6	23.4	13.6
2-Dec	62.0	42.1	43.3	20.1	2.0	30.1	36.5	21.6	11.8
9-Dec	64.0	43.4	47.1	22.9	2.0	34.3	44.5	23.0	13.3
16-Dec	63.0	42.4	45.3	21.5	2.0	30.1	38.7	21.4	11.8
23-Dec	61.0	40.5	41.3	18.0	-15.0	30.1	38.2	19.4	10.6
31-Dec	59.0	41.8	40.5	16.1	-5.0	28.0	42.0	19.5	10.8

DENVER/STAPLETON CO WMO No. 724690



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1103
FEB	1	884
MAR	4	762
APR	22	512
MAY	62	289
JUN	185	99
JUL	272	32
AUG	222	49
SEP	117	191
OCT	34	470
NOV	4	829
DEC	0	1062
ANN	924	6282

DENVER/STAPLETON CO WMO No. 724690



	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	0	-30990	0	-11112
FEB	0	-25092	0	-9057
MAR	2	-22105	0	-8121
APR	67	-15349	0	-5127
MAY	309	-9330	0	-1786
JUN	1736	-3679	2	-588
JUL	2842	-1579	28	-181
AUG	1987	-2192	24	-158
SEP	897	-6396	0	-1206
OCT	130	-14266	0	-4493
NOV	2	-23757	0	-8084
DEC	0	-29926	0	-10746
ANN	7972	-184661	54	-60659

Average Annual Solar Radiation – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

City: BOULDER
State: CO
WBAN No: 94018
Lat(N): 40.02
Long(W): 105.25
Elev(ft): 5361

Stn Type: Primary
SHADING GEOMETRY IN DIMENSIONLESS UNITS
Window: 1
Overhang: 0.534
Vert Gap: 0.321

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day), Percentage Uncertainty = 9

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Global	750	1030	1390	1750	1960	2160	2120	1890	1580	1200	830	670	1450
	Std Dev	52	51	96	115	152	164	116	115	119	95	46	41	54
	Minimum	660	880	1170	1510	1530	1810	1780	1590	1250	990	730	610	1340
	Maximum	850	1110	1570	1940	2270	2460	2350	2100	1760	1340	900	740	1520
	Diffuse	280	380	520	630	710	670	650	580	450	340	290	250	480
Clear Day	Global	950	1310	1830	2330	2650	2770	2680	2390	1950	1440	1020	840	1850
NORTH	Global	200	260	350	440	550	630	580	460	350	270	210	180	370
	Diffuse	200	260	350	420	480	490	480	430	350	270	210	180	340
Clear Day	Global	170	230	310	410	590	720	650	460	320	250	190	160	370
EAST	Global	550	710	910	1110	1200	1320	1340	1220	1020	820	590	490	940
	Diffuse	250	330	430	520	570	570	570	520	420	340	270	220	420
Clear Day	Global	750	960	1240	1460	1570	1590	1560	1460	1270	1020	780	680	1190
SOUTH	Global	1370	1410	1300	1110	890	810	850	1020	1270	1460	1370	1330	1180
	Diffuse	360	430	500	540	540	520	520	510	460	410	370	330	460
Clear Day	Global	2060	2100	1920	1470	1080	920	980	1270	1690	2000	2050	2010	1630
WEST	Global	520	680	840	980	1020	1070	1010	970	920	780	570	480	820
	Diffuse	250	330	440	530	580	590	570	520	430	340	270	220	420
Clear Day	Global	750	960	1240	1460	1570	1590	1560	1460	1270	1020	780	680	1190

Average Annual Solar Heat and Illumination – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

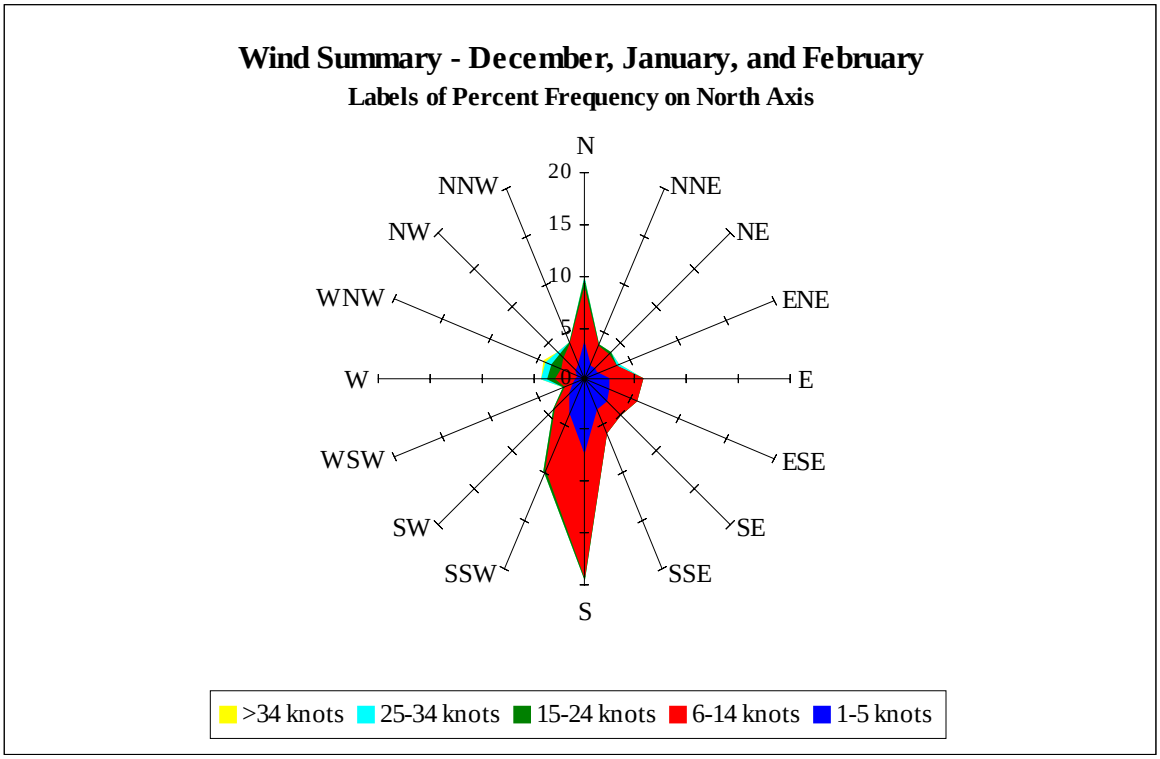
AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING, Percentage Uncertainty = 9

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Unshaded	480	700	980	1260	1420	1580	1550	1380	1130	830	540	420	1020
NORTH	Unshaded	140	180	240	300	360	400	370	310	240	190	150	120	250
	Shaded	120	170	220	270	320	360	340	280	220	170	130	110	230
EAST	Unshaded	370	500	650	790	860	950	960	880	730	580	410	330	670
	Shaded	340	450	570	690	730	800	810	760	640	520	370	300	580
SOUTH	Unshaded	1030	1040	900	710	540	470	500	640	850	1050	1030	1010	810
	Shaded	1010	970	710	450	340	330	330	370	600	930	1000	990	670
WEST	Unshaded	360	470	590	690	720	760	710	690	650	550	390	330	580
	Shaded	330	420	520	600	610	640	610	590	570	490	360	300	500

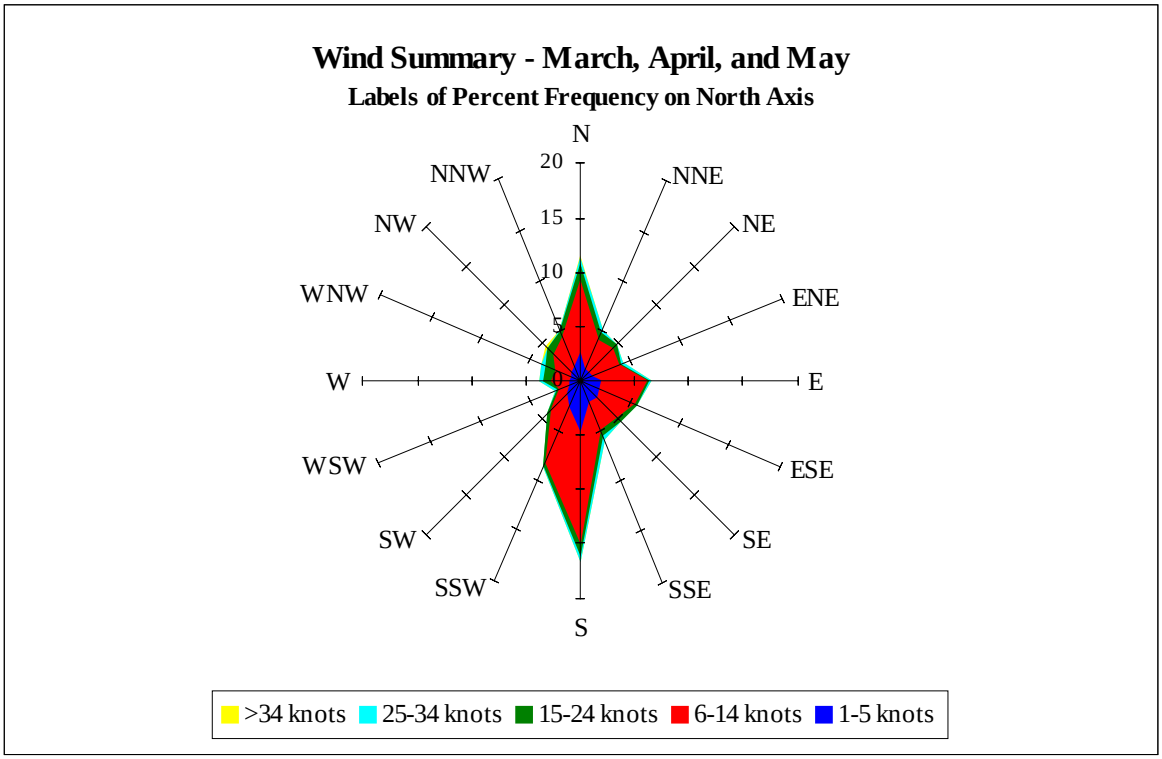
AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9

		March					June				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	42	73	82	65	27	51	84	101	95	68
	M.Cloudy	28	51	59	44	18	34	63	78	67	46
NORTH	M.Clear	10	13	15	13	8	18	14	16	16	14
	M.Cloudy	10	15	17	14	7	14	16	17	17	14
EAST	M.Clear	81	56	15	13	8	86	70	29	16	14
	M.Cloudy	38	37	17	14	7	46	51	26	17	14
SOUTH	M.Clear	44	74	85	67	28	11	31	46	41	20
	M.Cloudy	24	46	55	39	14	11	27	38	32	17
WEST	M.Clear	10	13	24	68	70	11	14	16	52	79
	M.Cloudy	10	15	21	40	29	11	16	17	38	47
M.Clear	(% hrs)	38	38	32	30	29	59	60	51	36	28

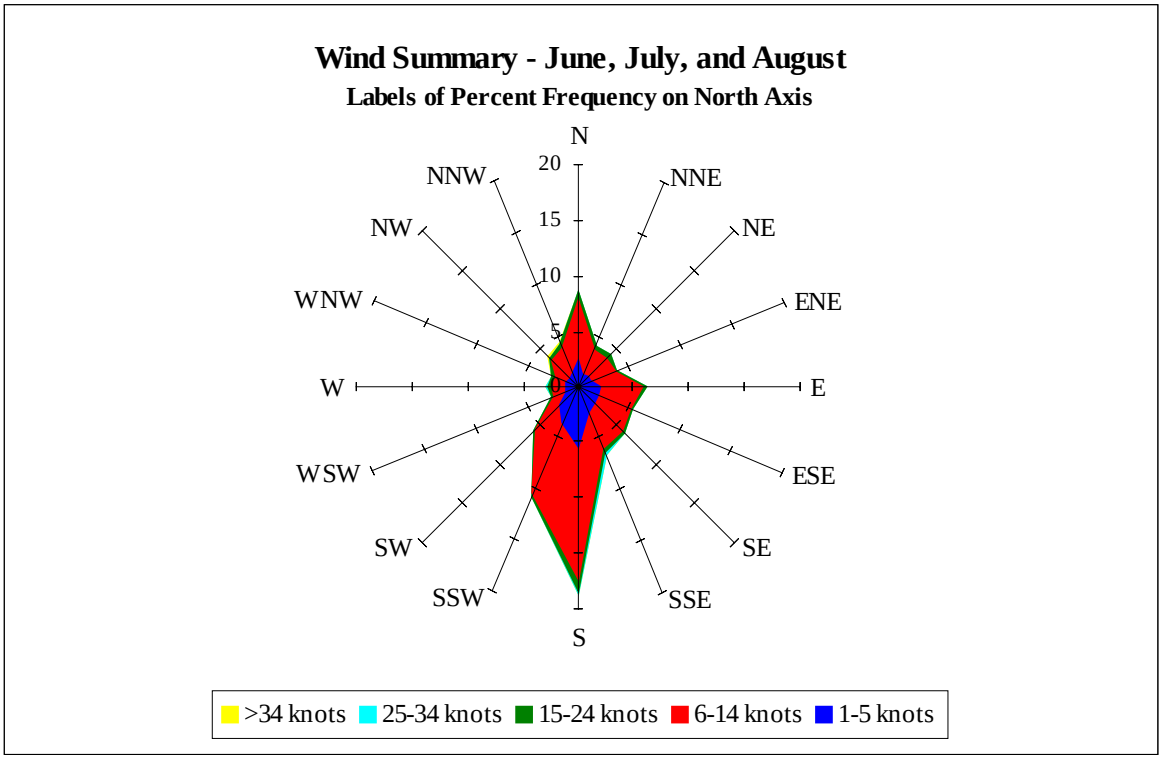
		Sept					Dec				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	31	69	84	77	47	16	43	48	29	2
	M.Cloudy	18	45	60	52	31	10	29	34	20	2
NORTH	M.Clear	8	13	14	14	10	5	10	10	8	1
	M.Cloudy	7	14	16	15	11	5	10	11	8	1
EAST	M.Clear	77	71	26	14	10	47	41	10	8	1
	M.Cloudy	28	41	23	15	11	18	24	11	8	1
SOUTH	M.Clear	24	59	75	69	39	44	87	94	67	5
	M.Cloudy	12	35	50	42	23	17	44	50	31	2
WEST	M.Clear	8	13	14	54	77	5	10	23	52	8
	M.Cloudy	7	14	16	35	39	5	10	17	25	3
M.Clear	(% hrs)	57	58	57	50	44	41	44	44	42	43



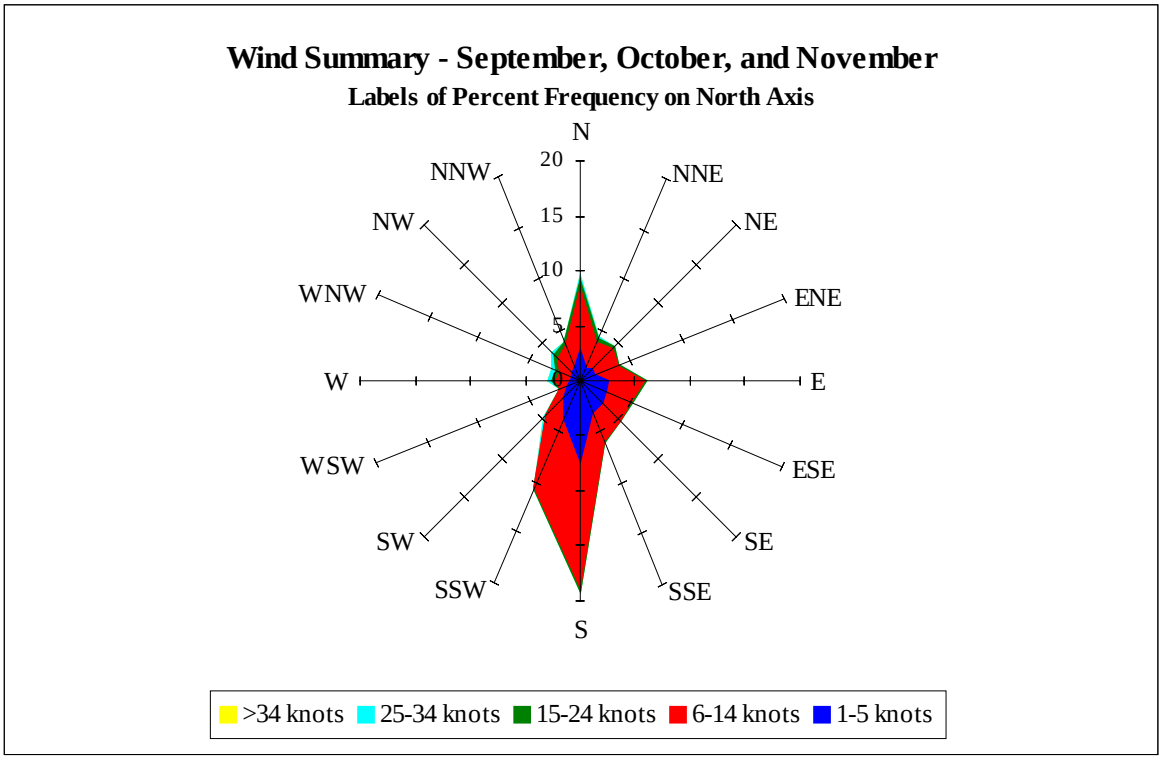
Percent Calm = 7.06



Percent Calm = 4.15



Percent Calm = 4.61



Percent Calm = 6.55

Attachment 4

Stanley Consultants INC.
A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

CALCULATION NUMBER:	31324.ME607.FP.A
CALCULATION NAME:	Design Conditions - Fire Water
REVISION	0, Final
ORIGINATOR:	Trenton Clerkin
ORIGINATOR DATE:	7/22/2024
CHECKED BY:	
CHECKED DATE:	
APPROVED BY:	
APPROVED DATE:	
PROJECT NUMBER:	31324
CLIENT:	Kindle Energy
PROJECT:	Mountain Peak Power Station

CALCULATION SHEET

Design Conditions

DESCRIPTION

Document and determine the design conditions of the system. Pipe class specifications will be selected based on design pressure and temperature as well as fluid characteristics.

Note that design conditions were evaluated based on basis of design equipment. Actual equipment purchased may have different operating and design conditions.

DATA

ATTACHMENTS

ATT-1 Site Weather Conditions
ATT-2 Stanley, Pipe Class Specification – ACS2, dated 2008-10-01
ATT-3 Stanley, Pipe Class Specification – APE1, dated 2017-03-31
ATT-4 Stanley, Pipe Class Specification – ADI2, dated 2014-12-04
ATT-5 Stanley, P&IDs - Fire Water, MF104 series Drawings, redlines to IFB version submitted on 2024-04-18
ATT-6 RuhrPumpen Quotation 2091356 - Rev 2, Dated 04/05/2024

REFERENCES

REF-1 ASME B31.1 Power Piping Code, including section 137.4.5
REF-2 NFPA 20 Stationary Pumps for Fire Protection
REF-3 Stanley, MPP Project Design Criteria

ASSUMPTIONS

ASS-1 Operating Temperature of Insulated tank and connected lines to be 65°F

COMPUTATION

LTR	*PARAMETER*	*VALUES*	*UNITS*	*FORMULA*	*NOTES & REFERENCES*
					inputs
					calculations
					results
A	Site Elevation	4960	ft		REF-3
B	Site Barometric Pressure	12.23	psia		ATT-1
C	Site Temperature Low	-29	°F		ATT-1
D	Site Temperature High	105	°F		ATT-1
	PIPE CODE A				
	Firewater tank to suction of pumps, to below grade piping				
E	System Static Pressure	135	psig		Jockey Pump rating, ATT-6
F	System Design Pressure	150	psig		FW System limited to HDPE Pipe MAOP.
G	System Operating Temperature	65	°F		ASS-1
A_OP	Operating Pressure	135	psig	=E	
A_DP	Design Pressure	150	psig	=F	Set to 150 psig
A_TP	Test Pressure	225	psig	=A_DP*1.5	REF-1. Hydrostatic test is 1.5x design pressure
A_OT	Operating Temperature	65	°F	=G	
A_DT	Design Temperature	73	°F	=73	FW System limited to HDPE Pipe temperature rating at Design Pressure.

RESULT

Pipe Code Condition	A		
Operating Temperature	65	°F	
Design Temperature	73	°F	
Operating Pressure	135	psig	
Design Pressure	150	psig	
Test Pressure	225	psig	
Pipe Class Specification	ACS2		ATT-2 P&ID line numbering needs updated to ASC2

		ASME #	A53 GR B TYPE E OR S			
		Material	Carbon Steel			
		Weld Root	Type 1			
		Interior Cleaning	Standard			
		Interior Coating	Standard			
		Exterior Paint	Low Temperature Primer			Note: low temp for < 350 °F, high temp for > 400 °F
		Insulation Material	Fiber Glass			
		Insulation Class	A			
		Remarks	Heat Trace			Heat Trace and insulate for freeze protection

PIPE CODE B

Fire water tank fill pipe

H	System Static Pressure	0	psig			Not normally in use or filled
I	System Design Pressure	150	psig			FW System limited to HDPE Pipe MAOP.
J	System Operating Temperature	105	°F			Set to maximum site ambient
B_OP	Operating Pressure	0	psig	H		
B_DP	Design Pressure	150	psig	I		
B_TP	Test Pressure	225	psig	=B_DP*1.5		REF-1. Hydrostatic test is 1.5x design pressure
B_OT	Operating Temperature	105	°F	J		
B_DT	Design Temperature	120	°F	=120		Set to 120°F. to exceed max site temperature

RESULT

	Pipe Code Condition	B	
	Operating Temperature	105	°F
	Design Temperature	120	°F
	Operating Pressure	0	psig
	Design Pressure	150	psig
	Test Pressure	225	psig
	Pipe Class Specification	ACS2	ATT-2
	ASME #	A53 GR B TYPE E OR S	
	Material	Carbon Steel	
	Weld Root	Type 1	
	Interior Cleaning	Standard	
	Interior Coating	Standard	
	Exterior Paint	Low Temperature Primer	Note: low temp for < 350 °F, high temp for > 400 °F
	Insulation Material	None	
	Insulation Class	-	
	Remarks		

PIPE CODE C

Underground HDPE Fire Water loops from Ductile Iron to hydrants

K	System Static Pressure	135	psig			Match Pipe Code A
L	System Design Pressure	150	psig			Match Pipe Code A
M	System Operating Temperature	65	°F			Match Pipe Code A
C_OP	Operating Pressure	135	psig	=K		Match Pipe Code A
C_DP	Design Pressure	150	psig	=L		Match Pipe Code A
C_TP	Test Pressure	225	psig	=C_DP*1.5		REF-1. Hydrostatic test is 1.5x design pressure
C_OT	Operating Temperature	65	°F	=M		
C_DT	Design Temperature	73	°F	=73		Max HDPE Temperature rating at Design Pressure.

RESULT

	Pipe Code Condition	C	
	Operating Temperature	65	°F
	Design Temperature	73	°F
	Operating Pressure	135	psig
	Design Pressure	150	psig
	Test Pressure	225	psig

	Pipe Class Specification	APE1			ATT-4
	ASME #	PE4710, HDB			
	Material	Polyethylene			
	Weld Root	N/A			
	Interior Cleaning	Standard			
	Interior Coating	None			
	Exterior Paint	N/A			Note: low temp for < 350 °F, high temp for > 400 °F
	Insulation Material	None			
	Insulation Class	-			
	Remarks				

PIPE CODE D

Above and Below grade firewater ductile iron piping from pumphouse to HDPE loop tie-point.

N	System Static Pressure	135	psig		Match Pipe Code A
O	System Design Pressure	150	psig		ATT 5
P	System Operating Temperature	65	°F		ASS-1
D_OP	Operating Pressure	135	psig	=E	
D_DP	Design Pressure	150	psig	=F	ATT 5
D_TP	Test Pressure	225	psig	=D_DP*1.5	REF-1. Hydrostatic test is 1.5x design pressure
D_OT	Operating Temperature	65	°F	=P	
D_DT	Design Temperature	73	°F	=A_DT	Match Pipe Code A

RESULT

	Pipe Code Condition	D	
	Operating Temperature	65	°F
	Design Temperature	73	°F
	Operating Pressure	135	psig
	Design Pressure	150	psig
	Test Pressure	225	psig

	Pipe Class Specification	ADI2	ATT-5
	ASME #	ANSI/AWWA C151/A21.51	
	Material	Ductile Iron	
	Weld Root	N/A	
	Interior Cleaning	Standard	
	Interior Coating	None	
	Exterior Paint	None	Note: low temp for < 350 °F, high temp for > 400 °F
	Insulation Material	None	
	Insulation Class	-	
	Remarks	Elastomer Coating	

Stanley Consultants INC.
A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

CALCULATION NUMBER:	31324.ME607.FP.C2.2
CALCULATION NAME:	Fire Water Tank Sizing
REVISION	0, Final
ORIGINATOR:	Trenton Clerkin
ORIGINATOR DATE:	6/20/2024
CHECKED BY:	John Solan
CHECKED DATE:	6/21/2024
APPROVED BY:	
APPROVED DATE:	
PROJECT NUMBER:	31324
CLIENT:	Kindle Energy
PROJECT:	Mountain Peak Power Station

CALCULATION SHEET

Fire Water Tank Sizing

DESCRIPTIONS

Document and determine the sizing criteria that is used in the tank specification and design considerations that need documented for important design considerations.

DATA

ATTACHMENTS

ATT-1 MPP General Design Factors

ATT-2 Email from Jonathan Hernández Maya, RuhrPumpen, dated 6/14/2024

REFERENCES

REF-1 NFPA 22 - Standard for Water Tanks for Private Fire Protection, 2023 Edition

REF-2 NFPA 850 - Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2020 Edition

ASSUMPTIONS

ASS-1 N/A

COMPUTATION

LTR	PARAMETER	VALUES	UNITS	FORMULAS	NOTES & REFERENCES
					inputs
					calculations
					results
	STORAGE TANK				
A	Site Elevation	4960	ft		ATT-1
B	Barometric Pressure	12.23	psia		ATT-1
C	Fire Water Flow for (1) Hydrant Hose	500	gpm		500 GPM for hydrant hose, per NFPA 850-2020, 7.2.6.2
D	Fire Water Flow for (1) Fixed Sprinkler system	154.38	gpm		Diesel Fire Pump Sprinkler System, ATT-2
E	Time of Reserves	2	hrs		NFPA 850 requires 2 hour use duration, NFPA 850-2020, 7.2.6.2.
F	Fire Oil Volume for (1) Hydrant Hose	78,526	gallons (net)		Capacity based on largest fixed suppression system and 500 gpm flow stream, per NFPA 850-2020, 7.2.1
G	Total Fire Water Volume Accounting For Lack of City Water	157,051	gallons (net)		Doubled water volume due to lack of city water supply and in accordance with NFPA 850-2020, 7.2.6.2
H	Fire Water Capacity for Service Water	5000	gallons (net)		Additional Volume for service water
I	Total Fire Water Tank Useful Volume Required	162,051	gallons (net)		
J	Number of Tanks	1	qty		
K	Minimum Tank Volume per Each Tank	162,051	gallons (net)		
L	Selected Tank Size	165,000	gallons (net)		Selected based upon 5k gal tank size increments. Larger sized tanks allowable depending on economics
	RESULT				
RES_1	Tank Capacity	165,000	gallons (net)		

I. GENERAL DESIGN FACTORS

A. Facility Locations:

Tesla Substation

a. Address: Route 55, 1 Mile North of Route 20, Keenesburg, CO

b. Coordinates: (approximate)

(1) Latitude: 40.146011 deg

(2) Longitude: -104.548263 deg

B. Site Conditions

Elevation: ASL +4960 feet (approximate)

Barometer:

psia.: 12.23

In. Hg. Abs: 24.9

C. Weather Data

ENVIRONMENTAL CRITERIA			
WIND			
WIND VELOCITY (MPH)	114		
WIND EXPOSURE CATEGORY	C		
WIND IMPORTANCE FACTOR (I)	1.15		
SEISMIC			
SEISMIC DESIGN CATEGORY	III		
SEISMIC SITE CLASS	B		
SEISMIC S_S	15%		
SEISMIC S_1	4.9%		
SEISMIC IMPORTANCE FACTOR (I)	1.25		
MISCELLANEOUS			
ROOF LIVE LOAD (PSF)	30	**GROUND SNOW LOAD (PSF)**	30
TERRAIN CATEGORY	TBD	**SNOW IMPORTANCE FACTOR**	1.1
Ce	1.0	**Ct**	1.2

D. Design Conditions

Outdoor Design Temperatures

a. Minimum: -29°F

b. Maximum: 105°F

Indoor Design Temperatures – Administration Spaces

c. Minimum: 68°F

d. Maximum: 75°F

0.4% Cooling Design Condition:

e. Ambient Dry Bulb Temperature: 90.9°F

f. Mean Coincident Wet Bulb Temperature: 58.7°F

0.4% Evaporation Design Condition:

g. Wet Bulb Temperature: 63.4°F

h. Mean Coincident Dry Bulb Temperature: 78.5°F

99.6% Heating Design Condition:

i. Dry Bulb Temperature: 1.4°F

ASHRAE Extreme Wind Speeds

j. 1% Wind: 28.2 MPH

k. 2.5% Wind: 24.8 MPH

l. 5% Wind: 21.0 MPH

From: Hernandez Maya, Jonathan
To: Solan, John
Cc: Clerkin, Trenton; Reed, Michael
Subject: RE: Sprinkler system flow rate
Date: Friday, June 14, 2024 9:29:32 AM
Attachments: image003.png

***** EXTERNAL EMAIL - Use caution and verify authenticity before trusting any contents. *****

Hello John,

I hope this message finds you well, this is the Flow of the hole sprinkler systems per sprinkler.

Calculated Flow	154.381	GPM/SPRINKLER

Kind Regards,

Jonathan Hernández Maya
Project Manager
email: jhernandezm@ruhrpumpen.com
Phone: +52 8333029820

Monterrey, Nuevo León. México

From: Solan, John <SolanJohn@stanleygroup.com>
Sent: Thursday, June 13, 2024 1:19 PM
To: Hernandez Maya, Jonathan <jhernandezm@ruhrpumpen.com>
Cc: Clerkin, Trenton <ClerkinTrenton@stanleygroup.com>; Reed, Michael <ReedMichael@stanleygroup.com>
Subject: Sprinkler system flow rate

exercise caution and report suspicious messages immediately. Do not open links or attachments from unknown senders or unexpected emails.

Jonathan,
What is the total sprinkler system flow for the diesel side of the pump package? I need to account for it in my calculations.

Thanks
-John

John Solan, Principal Mechanical Engineer
STANLEYCONSULTANTS, P.O. Box 192, East Glastonbury, CT 06025-0192
T: 303.649.7830 | stanleyconsultants.com
Schedule a meeting
* Registered in the States of North Carolina, Colorado, Connecticut, Rhode Island, and Alaska

Attachment 5

RUHRPUMPEN

Specialist for Pumping Technology

Quotation:

2091356 - Rev 2

Customer:

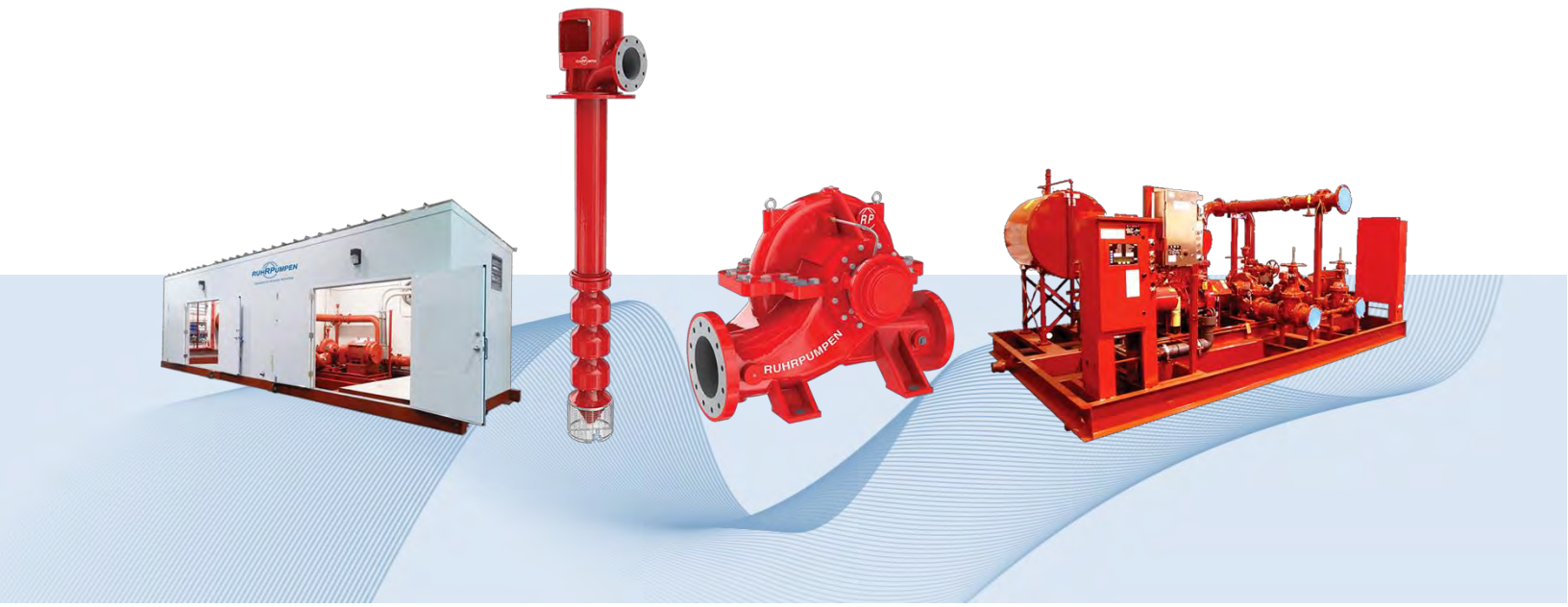
STANLEY CONSULTANTS

End User:

United Power

Project:

2091356 - Rev 2 / Fire Pumps- Mountain Peak Power Plant



CORPORACION EG

Table of Contents

Technical

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	ZW 8x5x10 (F) / 1
Item number	001	Pump speed	3550 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*ZW 8x5x10 (F)*
	Pump
	Description: BB1, between bearings/1 stage/axially split, HI design pump
	Materials
1	Cast Iron - Stainless Steel fitted
	Firepump Certification
	UL listed & FM approved pump (certified)
	Construction
	Case material: Cast Iron
	Impeller Construction: 316 Stainless Steel
	Shaft Material: Carbon Steel
	Shaft Sleeves material: 316 Stainless Steel
1	Case Wear Ring Material: 316 Stainless Steel
	Impeller Wear Ring: Not included
	Pump Rotation: Counter-Clockwise Pump Rotation viewed from driven end
	Case Modifications
1	Suction and Discharge Flange Design: 250# RF
1	Casing drain: Threaded and plugged
1	Casing vent: Threaded and plugged
	Air Release Valves
1	Air Release Valve - Threaded model 3410AR UL/FM approved 1" Manufacturer: Cla-Val or similar Claval Part No.: 21056731D RP Part Number: 72012425
1	Gauge connections: Threaded and plugged gauge connection on suction and discharge flanges
	Suction Gauge
1	Suction Gauge Compound Gauge - Glycerine Filled - size 4"
	Discharge Gauge
1	Discharge Gauge Pressure Guage – UL/FM listed, Dry Type, Size 3 ½”
	Circulation Relief Valves
1	Circulation Relief Valve UL/FM approved 3/4" (20 - 200 PSI) Manufacturer: Cla-Val or similar Cla-Val Part No.: 20881504A RP Part Number: Pending
	Additional Accesories
	Flowmeter
1	Flowmeter Tornatech size 6", Grooved, FM Approved.
	Hose Valve Header
1	Hose Valve Header 6" - 4 Valve 150#Flanged Part Number: 72012061
	Bearing Housing
1	Lubrication type: Grease Lube
	Bearing housing modifications
1	Bearing Lip seals
	Instrumentation
1	No instrumentation required
	Shaft sealing
2	Packing

Scope of Supply

Qty	Description
2	Seal flush plan - single: Plan 7311 Recirculation from pump case through orifice (built into gland) to seal.
	Seal flush piping material - Single SFP: Primary SFP - SS tubing
	Driver
	Driver type: Motor drive
	UL Electric Driver
	Driver sizing specification: Maximum Power
	Driver Service Factor USED
	Electric Driver
1	150 hp / 3550 rpm. Electric motor induction type. Horizontal. 480 V / 3 Phase / 60 Hz. ODP enclosure. Additional driver description included in this quotation. Manufactured by: Marathon or equal manufacturer (Ruhrpumpen choice of manufacturer)
	-space heater 220v
	Controller
	Control Panel
	Manufacturer: Tornatech (Standard) or similar
	Frecuency: 60 HZ
	Service: UL Listed / FM Approved Control Panel
1	Control Panel Selection: Control Panel GPA / 150HP / 440V#480V
1	Enclosure: NEMA 2
	Controller - Contacts and Alarms
	Electric Controller - Contacts and Alarms
	Tornatech Contacts & Alarms
	Type B: Additional digital text indications
1	B11: Built in alarm panel (120VAC supervisory power) providing indication for: Audible alarm & silence push button for Motor run, Phase reversal, Loss of phase, Pilot lights for Loss of phase reversal and Supervisory power available
1	B11B: Built in alarm panel same as above but 220- 240VAC supervisory power
	Type D: Miscellaneous
1	D26: ModBus provision
1	D26A: Modbus TCP/IP provision
	Baseplate
	Baseplate
1	Baseplate design: Steel baseplate
1	Driver mounting: Driver mounted by RP
	Coupling
1	Coupling model: Coupling UL listed
1	Coupling guard: Coupling guard - OSHA compliant
	Testing
	Performance Testing
1	Certified Performance Test (non-witnessed) - Hydraulic Institute acceptance grade "1U"
	Hydrostatic Testing
1	Hydrostatic Pressure Test (non-witnessed)
	Firepump
1	Ultrasound test (connection welds)
1	Ultrasound test for Case
1	Ultrasound test for impeller
1	Ultrasound test for shaft
1	Liquid penetrant (case, cover, non-witness)
1	Liquid penetrant (impeller, non-witness)
	Paint
1	Ruhrpumpen coating system for fire protection equipment: corrosivity category C2 / SSPC-SP10 surface preparation / EP top coat / color code RAL 3001 ("red") / exterior surfaces only [stainless steel parts (if any) not coated]
	Documentation
	Documentation
	Documentation
1	RP Standard documentation package 2

Scope of Supply

Qty	Description
	Product Line Marketing Information Please see our product brochure for general information about this product line (some available features shown in brochure may not have been offered in above scope of supply) https://www.ruhrpumpen.com/en/products/between-bearing-pumps/zw-pump

Pump Performance Datasheet

Customer	: STANLEY CONSULTANTS	Quote number	: 2091356 - Rev 2
Customer reference	:	Size	: ZW 8x5x10 (F)
Item number	: 001	Stages	: 1
Service	: Electric Fire Pump 1000GPM	Based on curve number	: 75063_ZW_8x5x10_F_2.60.03ULFM
Quantity	: 1	Date last saved	: 04/03/2024 1:09 PM

Operating Conditions

Flow, rated	: 1,000.0 USgpm
Differential head / pressure, rated (requested)	: 289.0 ft
Differential head / pressure, rated (actual)	: 290.8 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

NFPA Limits

Speed, rated	: 3550 rpm
Impeller diameter, rated	: 8.74 in
Impeller diameter, maximum	: 10.04 in
Impeller diameter, minimum	: 8.46 in
Flow, rated	: 1,000.0 USgpm
Head, rated	: 290.8 ft
Power, rated	: 134 hp
Power required at 150% flow	: 143 hp
Peak power	: 155 hp
Efficiency, rated	: 54.4 %
Flow at 150%	: 1,500.0 USgpm
Head at 150%, actual/limit	: 261.3 / 187.9 ft
Head at shutoff, actual/limit	: 326.3 / 404.6 ft

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

Material selected	: Cast Iron - 316SS Fitted

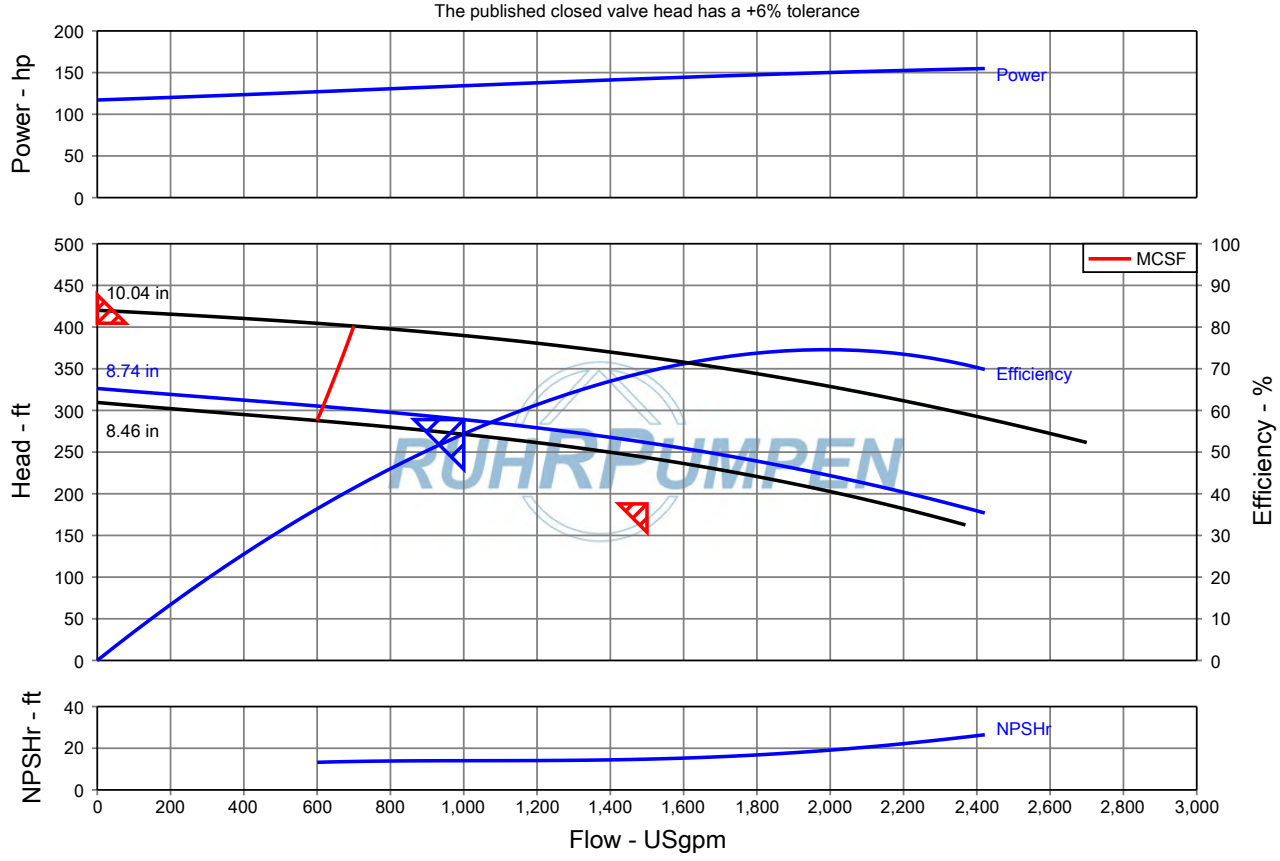
Pressure Data

Maximum discharge pressure	: 141.2 psi.g
Maximum allowable working pressure	: 141.2 psi.g
Maximum allowable suction pressure	: 0.00 psi.g
Hydrostatic test pressure	: 250.0 psi.g

Driver & Power Data (@Rated density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.15 (used)
Power, hydraulic	: 72.96 hp
Power, rated	: 134 hp
Power, maximum, rated diameter	: 155 hp
Minimum recommended motor rating	: 150 hp / 112 kW

Performance based on test acceptance - HI / ISO 9906 Grade 1U tolerances
The published closed valve head has a +6% tolerance



Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	ZW 8x5x14 (F) / 1
Item number	002	Pump speed	2350 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*ZW 8x5x14 (F)*
	Pump
	Description: BB1, between bearings/1 stage/axially split, HI design pump
	Materials
1	Cast Iron - Stainless Steel fitted
	Firepump Certification
	UL listed & FM approved pump (certified)
	Construction
	Case material: Cast Iron
	Impeller Construction: 316 Stainless Steel
	Shaft Material: Carbon Steel
	Shaft Sleeves material: 316 Stainless Steel
1	Case Wear Ring Material: 316 Stainless Steel
	Impeller Wear Ring: Not included
	Pump Rotation: Clockwise Pump Rotation viewed from driven end
	Case Modifications
1	Suction and Discharge Flange Design: 250# RF
1	Casing drain: Threaded and plugged
1	Casing vent: Threaded and plugged
	Air Release Valves
1	Air Release Valve - Threaded model 3410AR UL/FM approved 1" Manufacturer: Cla-Val or similar Claval Part No.: 21056731D RP Part Number: 72012425
1	Gauge connections: Threaded and plugged gauge connection on suction and discharge flanges
	Suction Gauge
1	Suction Gauge Compound Gauge - Glycerine Filled - size 4"
	Discharge Gauge
1	Discharge Gauge Pressure Guage – UL/FM listed, Dry Type, Size 3 ½”
	Additional Accesories
	Main Relief Valve
1	Main Relief Valve UL FM approved 6" - 150# Flanged Manufacturer: Cla-Val or similar Cla-Val Part No.: 29956741D RP Part Number: 72006535
	Waste Cone
1	Waste Cone 6"x8" - 150# FF Manufacturer: Cla-Val or similar Cla-Val Part No.: 21011413D RP Part Number: Pending
	Bearing Housing
1	Lubrication type: Grease Lube
	Bearing housing modifications
1	Bearing Lip seals
	Instrumentation
1	No instrumentation required
	Shaft sealing
2	Packing
2	Seal flush plan - single: Plan 7311 Recirculation from pump case through orifice (built into gland) to seal.

Scope of Supply

Qty	Description
	Seal flush piping material - Single SFP: Primary SFP - SS tubing
	Driver
	Driver type: UL & FM Diesel Engine
	Manufacturer: Clarke Engines
	Elevation (feet): 4960
1	Motor: Model JU6H-UFADMG. 175 hp [130.5 kW] @2350 rpm. T3 emission level.
1	Flex Exhaust: Flexible Adapter Size: 5" 150#
1	Jacket Water Heater: 115/120 VAC
1	Electric Systems: 12 Volt System
1	Battery Kit: 12 V / Dry Batteries + Racks and Cables
1	Driveline: UL Driveshaft w/ Guard & Companion Falange
1	Baseplate: Standard
	Cooling Loop
1	250 PSI Fresh Water (Non-Corrosive)
	Special Options
1	Non-Sparking Guard (Aluminum with SS Hardware)
1	Metalic Flexible Connector
1	Exhaust System: Silencer, Industrial, CS, Standard, EI/EO
1	Maintenance Kits: 3 Year Warranty with Kits
	Diesel Tank & Accesories
	Manufacturer: Other manufacturer
	Certification: UL - 142 Listed
	Wall: Double Wall
1	Capacity: Diesel Tank Newberry or Ruhrpumpen choice: -UL-142 listed -Double Wall -650 Gal. capacity -Accessories and valves as per NFPA-20 included -Fill pipe -Painted Red as per manufacturer standard.
1	Coating & Paint: Painted Finish (Primer & Red Paint)
1	Standard Accesories: "Z" Emergency vent
1	Leak Sensor, UL Listed, Size 1" threaded NPT, material 304 SS
	Optional Accesories
1	NPT Locakable Fuel Cap, Screend Tank Vent, Fuel Guage NPT, NPT Lockable Drain Valve, Fuel Fill Pipe and NPT Lockable Fuel Valve
1	Accessories Instalation: Accessories Installed by RP
	Additional Tank Accesories
1	Mounting Stand (Supplied Loose)
	Diesel tank & Accessories will be supplied loose
	Controller
	Control Panel
	Manufacturer: Tornatech (Standard) or similar
	Frecuency: 60 HZ
	Service: UL Listed / FM Approved Control Panel
1	Control Panel Selection: Control Panel GPD / 12VDC / 120V
1	Enclosure: NEMA 2
	Controller - Contacts and Alarms
	Diesel Controller - Contacts and Alarms
	Tornatech Contacts & Alarms
	Type A: Individual engine alarm contacts (DPT)
1	A8: AC failure alarm contacts
	Type B: Pump room alarm contacts (DPDT)
1	B1: Low fuel level alarm contacts
1	B9: Fuel tank leak alarm contact
	Type C: Operational Modifications
1	C7: Engine block heater circuit (same voltage as battery charger primary)

Scope of Supply

Qty	Description
1	C13: Louver activation circuit
	Type D: Miscellaneous
1	D7A: Low fuel level float switch supplied as separate item (1.1/4")
1	D25: Mounting stand (steel, painted)
1	D32: Modbus RTU provision
1	D32A: Modbus TCP/IP provision
	Testing
	Performance Testing
1	Certified Performance Test (non-witnessed) - Hydraulic Institute acceptance grade "1U"
	Hydrostatic Testing
1	Hydrostatic Pressure Test (non-witnessed)
	Firepump
1	Ultrasound test (connection welds)
1	Ultrasound test for Case
1	Ultrasound test for impeller
1	Ultrasound test for shaft
1	Liquid penetrant (case, cover, non-witness)
1	Liquid penetrant (impeller, non-witness)
	Paint
1	Ruhrpumpen coating system for fire protection equipment: corrosivity category C2 / SSPC-SP10 surface preparation / EP top coat / color code RAL 3001 ("red") / exterior surfaces only [stainless steel parts (if any) not coated]
	Documentation
	Documentation
	Documentation
1	RP Standard documentation package 2
	Product Line Marketing Information
	Please see our product brochure for general information about this product line (some available features shown in brochure may not have been offered in above scope of supply)
	https://www.ruhrpumpen.com/en/products/between-bearing-pumps/zw-pump

Pump Performance Datasheet

Customer	: STANLEY CONSULTANTS	Quote number	: 2091356 - Rev 2
Customer reference	:	Size	: ZW 8x5x14 (F)
Item number	: 002	Stages	: 1
Service	: Desel Fire Pump 1000GPM	Based on curve number	: 75065_ZW_8x5x14_F_2.60.04ULFM_6
Quantity	: 1	Date last saved	: 04/03/2024 1:12 PM

Operating Conditions

Flow, rated	: 1,000.0 USgpm
Differential head / pressure, rated (requested)	: 289.0 ft
Differential head / pressure, rated (actual)	: 290.6 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

NFPA Limits

Speed, rated	: 2350 rpm
Impeller diameter, rated	: 13.11 in
Impeller diameter, maximum	: 14.17 in
Impeller diameter, minimum	: 11.50 in
Flow, rated	: 1,000.0 USgpm
Head, rated	: 290.6 ft
Power, rated	: 105 hp
Power required at 150% flow	: 128 hp
Peak power	: 134 hp
Efficiency, rated	: 70.8 %
Flow at 150%	: 1,520.0 USgpm
Head at 150%, actual/limit	: 238.7 / 187.9 ft
Head at shutoff, actual/limit	: 334.2 / 404.6 ft

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

Material selected	: Cast Iron - 316SS Fitted

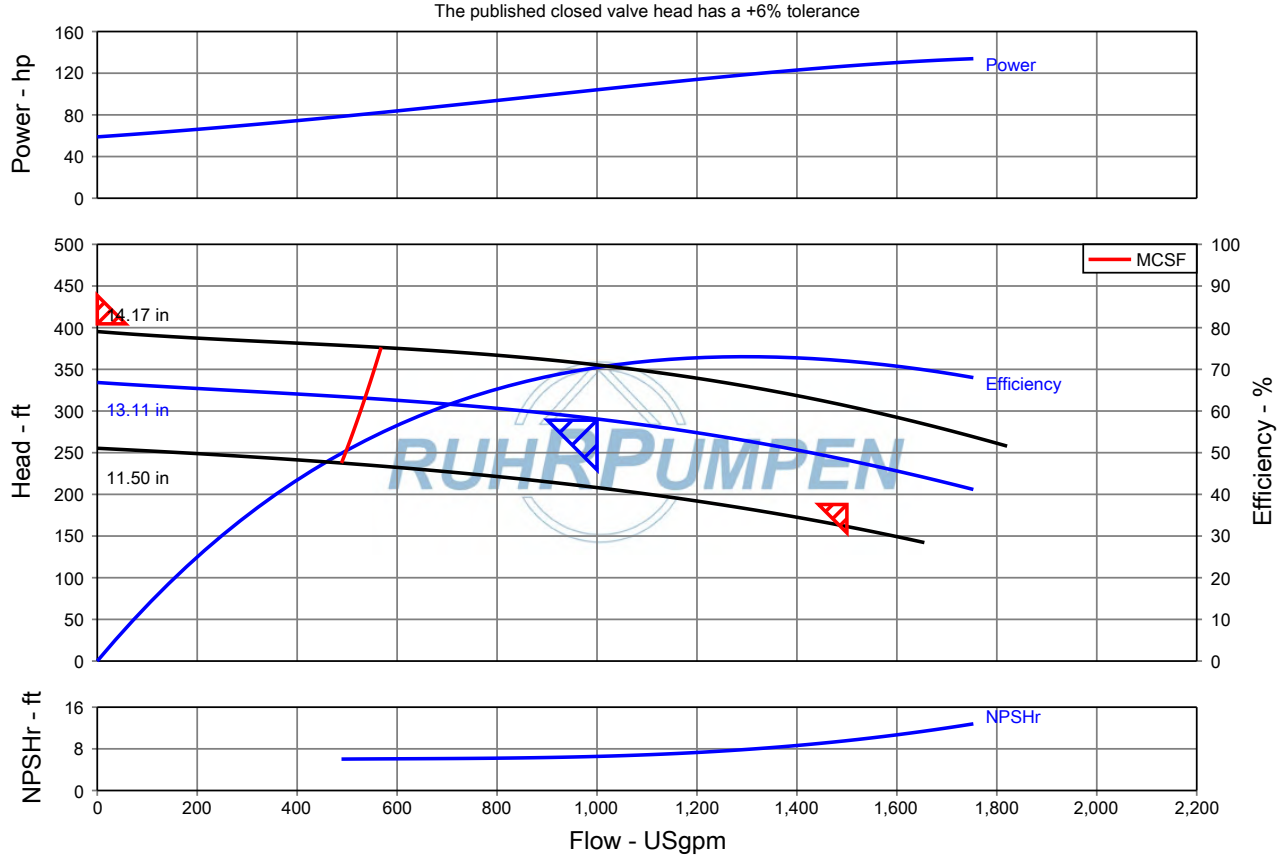
Pressure Data

Maximum discharge pressure	: 144.6 psi.g
Maximum allowable working pressure	: 144.6 psi.g
Maximum allowable suction pressure	: 0.00 psi.g
Hydrostatic test pressure	: 250.0 psi.g

Driver & Power Data (@Rated density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 74.42 hp
Power, rated	: 105 hp
Power, maximum, rated diameter	: 134 hp
Minimum recommended motor rating	: 150 hp / 112 kW

Performance based on test acceptance - HI / ISO 9906 Grade 1U tolerances
The published closed valve head has a +6% tolerance



Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	Jockey pump 10GPM / -
Item number	003	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*Jockey pump 10GPM*
	Preliminary Data
	Design
	Design
1	"Vertical Inline multistage WDM or Ruhrpumpen choice: -Model: VSE 1 17-20 -10 GPM @ 135 psi -Standard materials as per manufacturer standard. -With mechanical Seal -Coupled to electric motor 1.5 HP @ 3450 rpm - 480 V / 3 Ph / 60 Hz -TEFC enclosure
1	Control Panel Tornatech or Ruhrpumpen choice: -Model JPLT -UL Listed -1.5 HP -480 V / 60 Hz / 3 Ph -NEMA 2 Enclosure -Painted red as per manufacturer standard - (A6) Loss of power alarm contact
1	Compound gauge on suction nozzle. -Process connection 1/4"" NPT -Dial Size 4in
1	Pressure gauge on discharge nozzle -Process connection 1/4"" NPT -Dial Size 3 1/2 in -Pressure range according to NFPA-20
1	Pressure relief valve CLA-VAL or similar -Model 55L -UL/FM -Size 3/4 in -Supplied Loose

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	Pump House / -
Item number	004	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*Pump House*
	Preliminary Data
	Design
	Design
1	ETL-Listed Ruhrpumpen pre-engineered packaged system, inclusive of One (1) Electric motor driven Fire Pump, One (1) Diesel Engine driven Fire Pump, One (1) Jockey pump. System with a rated capacity of 1000 gallon per minute, and a rated pressure of 140 psig. Preliminary Dimensions: Lenght: 438 Width: 124 Height: 128 Package Type: Pump House Maximum Working Pressure: 250 PSI Electrical Requirements (customer facilities) Feeders Required: Total Feeders: 2. (A) 1 = 480VAC/60Hz // (B) 480VAC/60Hz Enclosure # Exterior Dimensions: 8'-0" wide x 31'-8" long x 9'-4" low eave, shed style roof with a 1:12 slope # 2 hr fire rated walls and roof as follows: # 4 – layers 5/8" Type X drywall # Not ULC rated system, system has not been tested (Industry standard) # Rated one direction only (from inside to out) # Drywall seams to be staggered, not taped or mudded # Drywall to be located under liner o 22-gauge Pre-painted exterior walls, roof and trim # To be selected from PTW Structural Solutions' standard colours # Walls colour to be confirmed # Roof colour to be confirmed # Trim colour to be confirmed o R-12 fibreglass batt insulation in walls and R-20 fibreglass batt insulation in the roof with 6mil vapour barrier throughout o 24 gauge white fluted aluminum interior liner o Partition walls: # 1 - 8'-0" (full width) x (full/eave) height interior partition wall c/w • 2 hr fire rating o Regular fasteners o Continuous eaves trough and downspouts (1 downspout per side ~ 2 total) o Full length ice-rakes # Doors & Windows: o 2 - 6' x 7' R-4 insulated steel double man doors (20 ga door, 16 ga frame) c/w locking panic hardware, hydraulic door closures in active leafs, barrel bolts on inactive leafs, 24" x 24" wire glass windows in active leafs only, aluminum thresholds, check chains and weather-stripping # 2 - 22 ga double door canopies # Roof\Wall Penetrations: o 2 – wall/pipe penetrations have been allowed for -Baseplate. Open type (grouteable) fabricated steel baseplate. -PAINT SYSTEM FOR PIPE: CORROSION CLASS 3, EP HIGH SOLIDS PRIMER FOR BASEPLATE: CORROSION CLASS 3, EP HIGH SOLIDS PRIMER (2) Suction Piping. 8" Individual pump suction piping, in carbon steel construction with grooved connections, each line inclusive of (1) UL/FM OS&Y type gate valve. (2) Discharge Piping. 6" Individual pump discharge piping, in carbon steel construction with grooved connections, each line inclusive of (1) UL/FM swing type check valve and (1) UL/FM grooved butterfly valve. (1) Main relief valve piping 4" Main relief valve discharge piping, in carbon steel construction with #150 flanged connections, Tee (1), elbow (1), pipe section (1), groove conection (1) , flange (3) , pipe section (1). (1) Circulation relief valve piping 3/4" Pipe, (1) 3/4" Pressure Relief valve (Threadolet, piping in carbon steel construction with, elbow (2), pipe threaded (2). (1) Flow Test Piping (2) Tee 6" (Discharge) and 6" Individual pump test line piping, in carbon steel construction with grooved connections, (4) UL/FM butterfly valve wafer and (2) UL/FM grooved Flow meter . (1) TEST LINE Hose Valve Header

Scope of Supply

Qty	Description
	Individual pump test line piping, in carbon steel construction with grooved connections, (1) UL/FM butterfly valve wafer & (1) Increacer and (1) HVH, Ball Valve 3/4". (3) SENSING LINE 1/2" PIPE (100 in), THD, SS, S40, T-304, (4) VALVE GLOBE, SS, T-304, (8) NIPPLES, SS, T-304, S40, (2) CHECK VALVE, (10 IN)TUBING, SS, T-304, (1) UNION, SS, T-304, (4) HEX PLUG, SS, T-304, (4) ELBOW THD, SS, T-304, (2) MALE CONNECTOR, SS, T-304 1/2"x1/2" NPT, (4) TEE THD SS, T-304. (1) COOLING LOOP INLET 3/4" Engine cooling loop inlet piping, in carbon steel (A53) construction with NPT connections. Inclusive of flexible metalic pipe. (1) COOLING LOOP OUTLET 1-1/4" Engine cooling outlet piping, in carbon steel (A53) construction with NPT connections, flanged to skid edge.. (1) FUEL RETURN LINE Fuel Supply threadolet connection (Check Valve, pipe, elbow) Carbon Steel (1) FUEL SUPPLY LINE Fuel Supply threadolet connection (pipe, elbow) Carbon Steel (1) Sprinklers General Arragment to include pipe, Valves, Gauges, Support, Accesories, Sprinklers (3) FLOOR DRAIN 2" FLANGE #150,2 SIDE OUTLET FLOOR DRAIN. PIPE SCH 40,1 THR ELBOW. 3" FLANGE #150, 2 SIDE OUTLET FLOOR DRAIN. PIPE SCH 40,1 THR ELBOW. (1) Exhaust Thimble For Diesel Engine (1) Wiring for Control, Instrumentation, and Power Cables in the Circuits of the Pump House Package XHHW-2 Single-core and multicore cable types for Power and Control Cables. COPPER Conductor Material Cable with XLPE Insulation. NON Armored Cable. PVC Jacket for Multiconductor cable (TC Cable type when required) and XHHW-2 for single-core cables Electric Motor Cable is XHHW-2 type. NON Armored Cable. PVC Jacket if applicable. 75°C (167°F) Cable Temperature. Colores in accordance with NFPA 70. Instrumentation cable to be defined. In compliance with UL. (1) Conduit KIT. Aluminum Material, Sch 40 Rigid Conduit. Hot Dipped steel galvanized steel core with PVC cover Flexible Conduit Package of Aluminum Rigid Conduit Sch 40 and FlexibleHot Dipped steel galvanized steel core with PVC Jacket for routing and management of power, control and instrumentation wiring, UL Listed. Cooper Crouse Hinds, Rymco, Anaconda, or similar. (1) Fittings and connections Aluminum material for fittings and connections. Condulets, Straight Connectors, Coupling, etc (1) Earthing System RP is responsible for preparing the ground system within the skid, ensuring it is located in two diametrically opposite locations (1) TRANSFORMER 20KVA 480V/60HZ/3F 1G (Only used for Pumphouse or container) Encapsulated dry type three-phase transformer with copper windings, rated at 20KVA (480D -220Y 60,HZ) with Nema 3R protection,compliant with UL standards. It is suitable for operating at a temperature of 75°C (167°F) in an ambient temperature of 40°C. (1) Common Power Distribution Panel (Only used for Pumphouse or container) Common Power Distribution Panel measuring 36x30x10 inches, compliant with UL standards. Rated for 480VAC and 60 Hz. Features Nema 3R protection. Designed to distribute power from the client's supply to main electrical components, including Transformer , Unit Heater(s) , Jockey Pump Controller , Electric Fire Pump Controller . This Power Distribution Panel does not have a main breaker, only individual protection for main electrical components (1) LOAD CENTER (Panelboard) (Only used for Pumphouse or container) Load center for electrical power distribution with dimensions of NEMA 3R. Plug-in or PLUg on Mini circuit breakers, 1PH or 2PH/10kAIC/240-120VAC supply to auxiliary loads UL Listed with NEMA 3R enclosure protection (1) Cable Tray Ladder Type with cover, ALUMINUM FREE COPPER material. (Only used for Pumphouse or container unless otherwise) Cable Tray Ladder Type with cover for routing and managing control and power Wiring in different mechanical support ALUMINUM FREE COPPER material, in complianc (1)LOAD CENTER (Panelboard) (Only used for Pumphouse or container) Load center for electrical power distribution with dimensions of NEMA 3R. Plug-in or PLUg on Mini circuit breakers, 1PH or 2PH/10kAIC/240-120VAC supply to auxiliary loads UL Listed with NEMA 3R enclosure protection (1) Fire Alarm and Control Panel (FACP) in accordance with NFPA 72 (Only used for Pumphouse or container) Conventional Fire Alarm and Control Panel, including SLC and NAC circuits, smoke detectors, fire pull stations, fire alarm spe.aker/strobe, and heat detectors as optional. In compliance with NFPA 72. 720VAC/60HzUL compliant (1) Alarm panel (FPC alarm JB) for Controller Alarms (Only used for Pumphouse or container) Common Jucntion Box Alarm Panel with Nema 3R enclosure. Designed with terminal blocks to receive and centralize alarms from the controllers of this panel. Provides a reliable and secure solution for alarm management. Codes: UL. Include terminal blocks. (1) Gang tamper panel (Only used for Pumphouse or container) Automatic security and alert system to monitor tamper switch positions or manipulations installed on valves. UL certified. Dry-type contacts signal. With Nema 3R protection. DPDT Square-Type Relays and terminal blocks are used to interconnect signals from the tamper switches. Include Led Panel Mount Indicator for each Tamper Switch Signal. (1) Unit Heaters Package (Only used for Pumphouse or container) Unit Heater Package. 5000W/480V/60Hz (1) Ventilation System (Only used for Pumphouse or container) Ventilation System for a Pumphouse package. The ventilation system includes Shutter-Mount Exhaust Fan, Weather Hood, Line Volt Mechanical Thermostat for precise temperature control and a Motorized Damper (Power Closed, Spring Open) for enhanced airflow management. Complies with UL standards. (1) Interior, Exterior and Emergency Lighting Interior, Exterior and Emergency Lighting Lithonia Lighting/CSVT Vapor Tight LED Strip Light for interior Lighting LEVITON/1201-2W as Switch for the control of off/on of the luminaries. UL compliance. Emergency Lights for Damp locations and Exterior Lamps in each Doors (1) DUPLEX GFCI OUTLET DUPLEX GFCI OUTLET 2 POLE, 3 WIRE GROUNDING. 20A. 127VDC/240VDC

Scope of Supply

Qty	Description
	ENGINEERING ANALYSIS -SEISMIC ANALISIS -CENTER OF GRAVITY -BOLT REACTION
1	UL Listed Disconnecting Device by Tornatech or Ruhrpumpen choice: -Model OPD -UL Listed, FM approved -40 HP -65kA -480 V / 60 Hz / 3 Ph -NEMA 2 Enclosure -Painted red as per manufacturer standard
1	UL Listed Disconnecting Device by Tornatech or Ruhrpumpen choice: -Model OPD -UL Listed, FM approved -150 HP -65kA -480 V / 60 Hz / 3 Ph -NEMA 2 Enclosure -Painted red as per manufacturer standard

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	DAP Freight / -
Item number	005	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*DAP Freight*
	Preliminary Data
	Design
	Design
1	DAP Freight from Mexico - 10001 Co Rd 55, Keenesburg, CO 80643. USA Note: Freight offered is an estimation value only. Freight is considered to be pre-paid and add. RP will invoice the actual freight value plus 15% handling fee.

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	DDP Freight / -
Item number	006	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*DDP Freight*
	Preliminary Data
	Design
	Design
1	DAP Freight from Mexico - 10001 Co Rd 55, Keenesburg, CO 80643. USA Note 1: Freight offered is an estimation value only. Freight is considered to be pre-paid and add. RP will invoice the actual freight value plus 15% handling fee.

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	spare parts for 2 years / -
Item number	007	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*spare parts for 2 years*
	Preliminary Data
	Design
	Design
1	Spare parts for ZW 8x5x10 (F) by 2 years: LIP SEAL (2) BALL BEARING (2) GASKET KIT (1) NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).
1	Spare parts for ZW 8x5x14 (F) by 2 years: LIP SEAL (2) BALL BEARING (2) GASKET KIT (1) NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).
1	Spare parts for controller GPA by 2 years: Part Number Description Qty EB1 I/O Board 1 CR4 Power Relay 1 PT1 Pressure transducer 1 NOTE: Consumables are not part of RP scope of supply given the transportation expenses. RP will supply all consumable requirements for their procurement on site (by others). NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).
1	Spare parts for JU6H by 2 years: Part Number Description Qty C03244 Air Cleaner 2 C071972 Belt, Alternator 2 C02736 Fuel Filter (Primary) 1 C04599 Gasket, Oil Pan 1 C04632 Oil Seal, Front 1 C04633 Oil Seal, Rear 1 NOTE: Consumables are not part of RP scope of supply given the transportation expenses. RP will supply all consumable requirements for their procurement on site (by others). NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).
1	Spare parts for controller GPD by 2 years: Part Number Description Qty EB1 I/O Board 1 CB3 Circuit breaker 1 BC1 Battery charger board 1 PT1 Pressure transducer 1 SV1 Solenoid valve 1 NOTE: Consumables are not part of RP scope of supply given the transportation expenses. RP will supply all consumable requirements for their procurement on site (by others). NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).
1	Spare parts for controller JPLT by 2 years: Dwg. identification Description Qty XTR Control Transformer 1 FU1 Control Power Fuses 2 PT1 Pressure Transducer 1 NOTE: Consumables are not part of RP scope of supply given the transportation expenses. RP will supply all consumable requirements for their procurement on site (by others). NOTE: Prices are applicable only if the spare parts are purchased with the equipment (Pump package).

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	Training / -
Item number	008	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

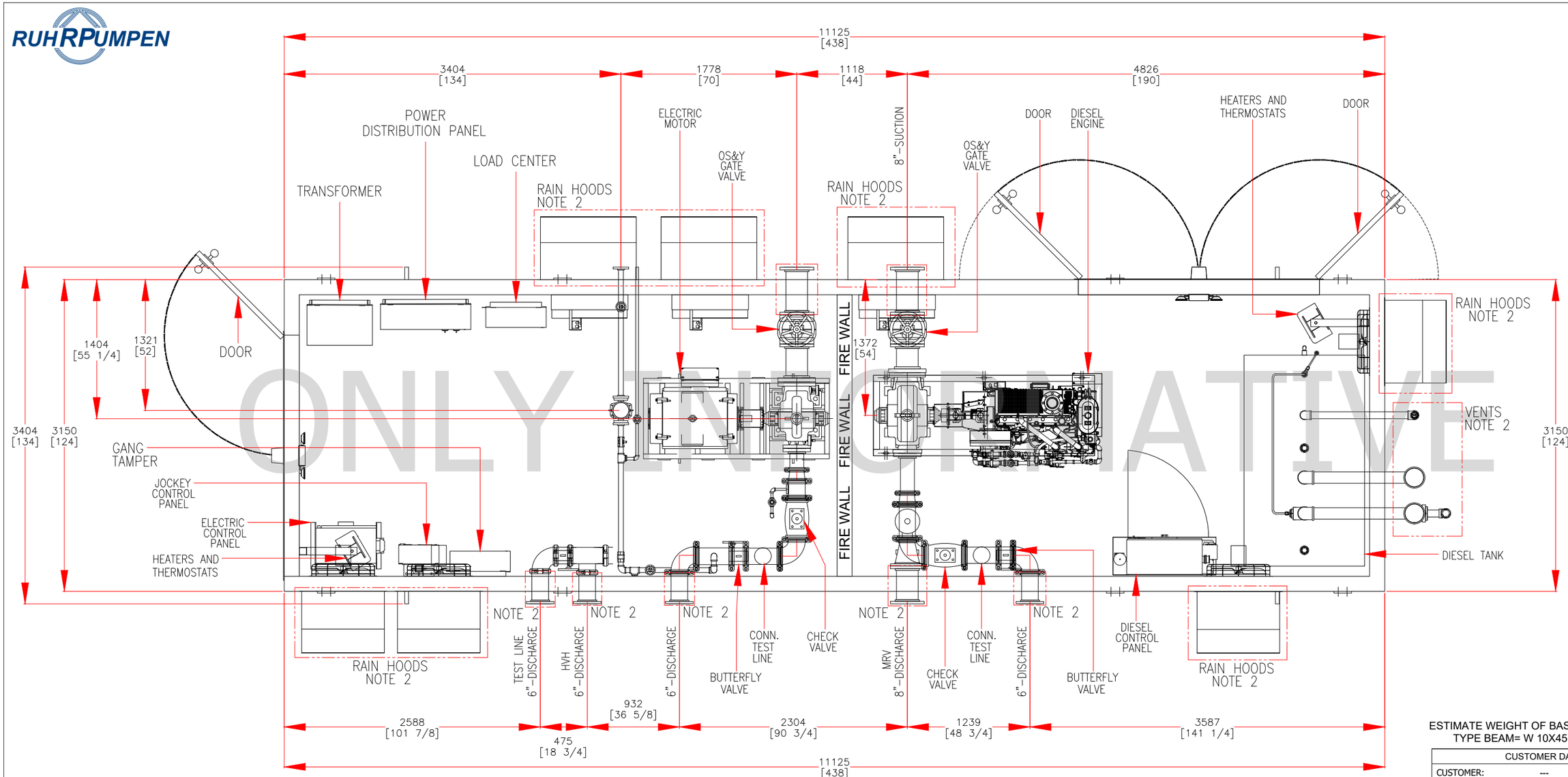
Qty	Description
1	*Training*
	Preliminary Data
	Design
	Design
1	1 day of training course for up to 10 people. Includes 1 field engineer, 8 hours per day, travel expenses and course material. Not included: Permits, accesses. Note: Room with projector is required.

Scope of Supply

Customer	STANLEY CONSULTANTS	Size / Stages	Supervision and Commissioning / -
Item number	009	Pump speed	0 rpm
Customer reference		Quote number	2091356 - Rev 2

Scope of Supply

Qty	Description
1	*Supervision and Commissioning*
	Preliminary Data
	Design
	Design
1	1 day for supervision of commissioning and site testing. Includes 1 field engineer, 8 hours per day, travel expenses. Not included: Tools, accesses, training courses.



PLAN VIEW

ESTIMATE WEIGHT OF BASE: 13,173 Lb.
TYPE BEAM= W 10X45 (10"X8")

CUSTOMER DATA	
CUSTOMER:	---
END USER:	---
SITE:	---
PROJECT:	---
GPS #:	2091356
CUSTOMER P.O.:	---
SERVICE:	HOUSE, FIRE SYSTEM

JOCKEY PUMP	
PUMP:	CR
CONTROLLER:	JP

ELECTRIC PUMP	
PUMP:	ZW 8X5X10 F (CCW)
MOTOR:	WEG (150 HP)
CONTROLLER:	GPA

DIESEL PUMP	
PUMP	ZW 8X5X14 F (CW)
ENGINE:	JU6H-UFADMG
CONTROLLER:	GPD
TANK:	650 Gal. DW

OPERATION CONDITIONS	
CAPACITY:	1000 GPM
T.D.H.:	---
FLUID:	---

DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994

UNLESS OTHERWISE SPECIFIELD

DIMENSIONS ARE IN MILIMETERS [INCHES]
TOLERANCES
AT DISCHARGER FLG
±3.18 [±⅛]
ALL DIMENSIONS ARE ±12.7 [½"]

GENERAL NOTES:
1.-THIS DRAWING IS PRELIMINARY AND INFORMATIVE ONLY, NOT TO BE CONSIDERED FOR CONSTRUCTION.
2.- THESE COMPONENTS ARE SUPPLIED LOOSE.

NOT TO BE CONSIDERED FOR CONSTRUCTION

REV.	DESCRIPTION	DATE	APR.

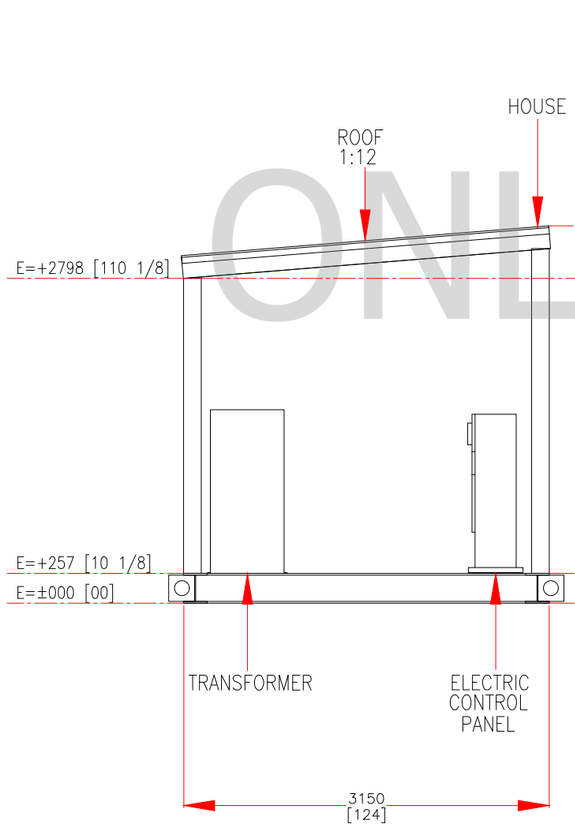
REVISION TABLE

APPROVAL DRAWING NOTES

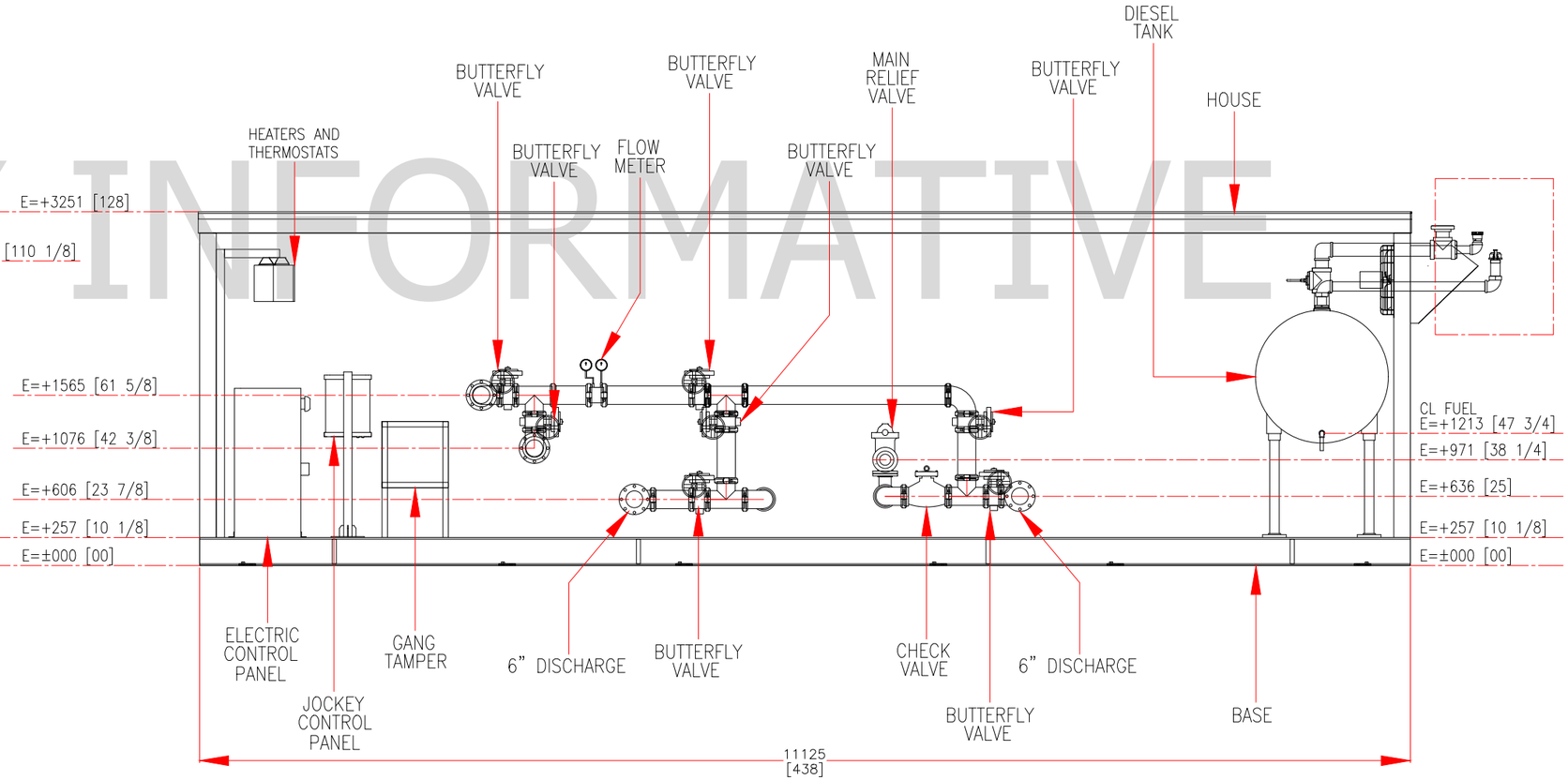
1.-PURCHASER'S COMMENTS AND/OR CORRECTIONS, WITHIN THE SCOPE OF CONTRACT, WILL BE MADE ON THE FIRST COMPLETED CERTIFIED DRAWING SUBMITTED BY RUHRPUMPEN PUMP DIVISION AND RETURNED FOR CORRECTION.
2.- CORRECTIONS, ALTERATIONS, ADDITIONS AND/OR MODIFICATIONS OUTSIDE SCOPE OF CONTRACT OR MADE AFTER FIRST SUBMITTAL, WILL REQUIRE AN ENGINEERING SERVICE CHARGE AND MAY CHANGE PRICE.
3.-ITEMS CONDITIONALLY APPROVED OR NEEDING DEFERRED APPROVAL BY PURCHASER, MUST BE SPECIFICALLY STATED. DELIVERY MAY BE AFFECTED.

DRAWING TITLE
GENERAL ARRANGEMENT DRAWING

DWG BY:	CHKD:	SCALA	DRAWING No:	REV
SEC	N/A	N/A	INFORMATIVE ONLY	A
DATE: 03/21/2024	DATE: N/A	SHEET 1/2		



LEFT VIEW



FRONT VIEW

CUSTOMER DATA	
CUSTOMER:	---
END USER:	---
SITE:	---
PROJECT:	---
GPS #:	2091356
CUSTOMER P.O.:	---
SERVICE:	HOUSE, FIRE SYSTEM

DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994

UNLESS OTHERWISE SPECIFIELD

DIMENSIONS ARE IN MILIMETERS [INCHES]
TOLERANCES
AT DISCHARGER FLG
±3.18 [⅛"]
ALL DIMENSIONS ARE ±12.7 [½"]

GENERAL NOTES:
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NOT TO BE CONSIDERED FOR CONSTRUCTION

REV.	DESCRIPTION	DATE	APR.
	REVISION TABLE		

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DRAWING TITLE

GENERAL ARRANGEMENT DRAWING

DWG BY:	CHKD:	SCALA	DRAWING No:	REV
SEC	N/A	N/A	INFORMATIVE ONLY	A
DATE: 03/21/2024	DATE: N/A	SHEET 2/2		

INCOMING POWER SUPPLY #1 FROM CUSTOMER FACILITY
480VAC/60HZ/3PH

G L1 L2 L3 NOTE1

OPD MODEL
Disconnecting Device
65kA for 40 HP (30kW)

SKID LIMIT

G L1 L2 L3

NOTE2

COMMON POWER DISTRIBUTION PANEL

Distribution Block

NOTE2 CB JOCKEY

CB PRIMARY COIL TRANSFORMER

CB UNIT HEATER 1

CB UNIT HEATER 2

NOTE2

NOTE2

NOTE2

JOCKEY FIRE PUMP
CONTROLLER JPLT MODEL
460V/3PH/60HZ

DS_2

I/O BOARD

I/O ELECTRIC BOARD

INTERFACE PANEL

OL_1

C_1

T1 T2 T3 G

ONLY FOR REPRESENTATION

NOTE2

M

ELECTRIC MOTOR
1.5 HP
460V/3PH/60HZ

PRIMARY: 480VAC/60Hz

SECONDARY: 208-220Y/120VAC

20 KVA
DRY TYPE TRANSFORMER

CB
SECONDARY COIL
TRANSFORMER

Mounted on Common Power Distribution Panel

NOTE2

LOAD CENTER
WITH 120/240VAC CB

DIESEL FIRE PUMP GPD
CONTROLLER

DIESEL FIRE PUMP
ENGINE
DIESEL ENGINE HEATER

BRANCH
CIRCUITS

ELECTRIC HEATER UNIT 1
CONTROL
TH_1
5KW/480V/3PH

ELECTRIC HEATER UNIT 2
CONTROL
TH_2
5KW/480V/3PH

NOTE2

INCOMING POWER SUPPLY #2 FROM CUSTOMER FACILITY
480VAC/60HZ/3PH

G L1 L2 L3 G

NOTE1

OPD MODEL
Disconnecting Device
65kA for 150 HP motor

ELECTRIC FIRE PUMP
CONTROLLER GPA MODEL
480V/3PH/60HZ

L1 L2 L3

IS1

I/O BOARD

VIZITOUCH PANEL

CB_1

$1M_1$

I/O ELECTRIC BOARD
TB1 TB2 TB3 TB4 TB5 TB6

EXPANSION BOARD 1
TB1 TB2 TB3 TB4 TB5

I/O ELECTRIC BOARD
IN1 IN2 IN3 IN4 IN5

NOTE2

T1 T2 T3 G

NOTE2

ONLY FOR REPRESENTATION

M

ELECTRIC MOTOR
150HP
460V/3PH/60HZ

NOTES
1. WIRED BY OTHERS.
2. WIRED BY RP.

SIMBOLOGY

- CIRCUIT BREAKER
- GROUND
- OVERLOAD RELAY
- INDUCTION MOTOR
- DISCONNECTOR SWITCH
- THERMAL SWITCH
- HEATER RESISTANCE
- CONTACTOR

LTR	REVISION	BY	DATE
1	ISSUED FOR APPROVAL	LADN	

APPROVAL DRAWINGS NOTES

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3. ITEMS CONDITIONALLY APPROVED OR NEEDING DEFERRED APPROVAL BY PURCHASER, MUST BE SPECIFICALLY STATED. DELIVERY MAY BE AFFECTED

CUSTOMER DATA

CUSTOMER:	–
USER:	–
LOCATION:	USA
CUSTOMER GPS:	2091356
SERVICE:	PUMP HOUSE

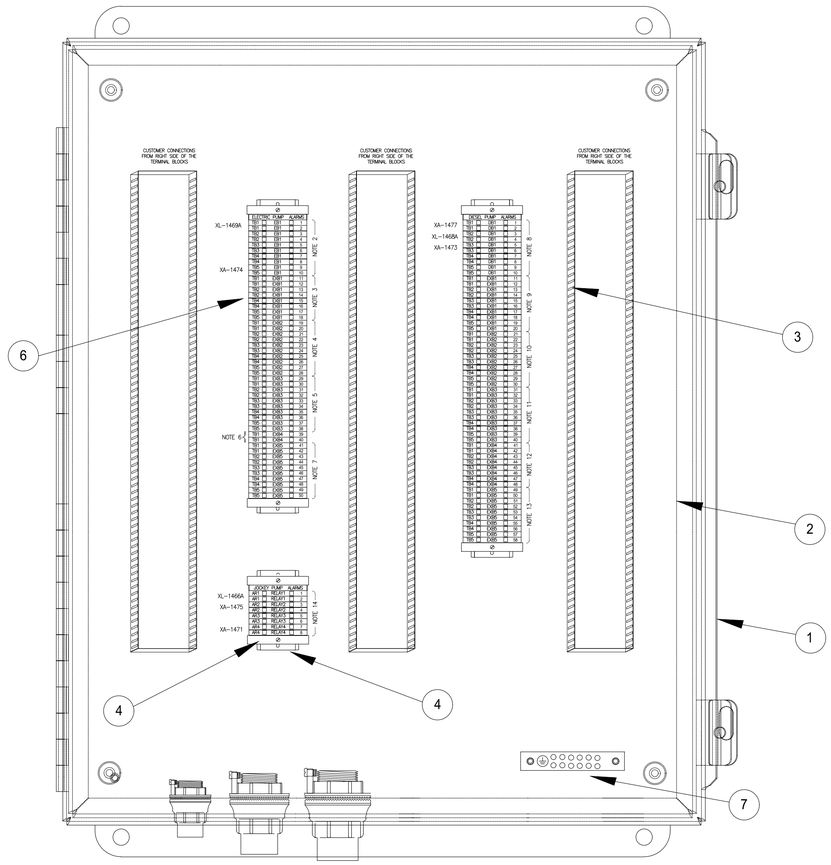
RUHRPUMPEN

PAGE 1 OF 1

DRAWING TITLE: PRELIMINARY ONE LINE DIAGRAM

DWN. BY	CHKD. BY	SCALE	DRAWING No.:	REV
LADN	LADN	NONE	Preliminary One Line Diagram	0
DATE 20/03/2024	DATE 20/03/2024			

Common Junction Box for Dry type Alarms Contacs From Controllers



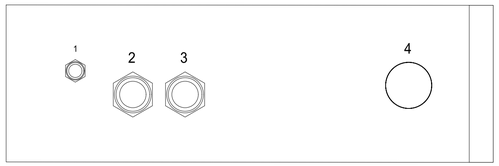
BILL OF MATERIALS

1. DISTRIBUTION CABINET
2. ALUMINUM 16 GAUGE CONDUCTIVE PANEL
3. NON–METALLIC, FIRE RESISTANT CABLE RACEWAY WITH SNAP–ON COVER AND END CAPS, BRAND: PANDUIT OR SIMILAR.
4. ALUMINUM DIN RAIL BRAND: ALLEN BRADLEY OR SIMILAR.
5. DIN RAIL END STOP BRAND: SCHNEIDER OR SIMILAR.
6. MODULAR DIN RAIL –MOUNT– ONE CIRCUIT TERMINAL BLOCK,BRAND: SCHNEIDER OR SIMILAR.
7. GROUND BAR, BRAND: SCHNEIDER OR SIMILAR.

NOTES

1. TERMINAL BLOCKS IN THIS JUNCTION BOX ARE SHOWN DUPLICATED BECAUSE THEY ARE WIRED TO RELAY CONTACTS, ONE TERMINAL IS FOR THE CABLE THAT GO TO THE RELAY AND THE OTHER TERMINAL IS FOR THE CABLE RETURNING FROM RELAY CONTACT.
2. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER I/O ELECTRIC BOARD.
3. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER EXPANSION BOARD 1
4. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER EXPANSION BOARD 2
5. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER EXPANSION BOARD 3
6. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER EXPANSION BOARD 4
7. WIRED FROM TORNATECH GPA ELECTRIC FIRE PUMP CONTROLLER EXPANSION BOARD 5
8. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER I/O DIESEL BOARD.
9. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER EXPANSION BOARD 1.
10. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER EXPANSION BOARD 2.
11. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER EXPANSION BOARD 3.
12. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER EXPANSION BOARD 4.
13. WIRED FROM TORNATECH GPD DIESEL FIRE PUMP CONTROLLER EXPANSION BOARD 5.
14. WIRED FROM TORNATECH JP3 JOCKEY PUMP CONTROLLER
15. WIRED FROM TORNATECH JP3 JOCKEY PUMP CONTROLLER
16. CABLE ENTRY OF THIS PANEL SHALL BE FROM BOTTOM.
17. CUSTOMER CONNECTIONS FROM RIGHT SIDE OF THE TERMINAL BLOCKS.

BOTTOM VIEW



OUTPUTS

1. JOCKEY PUMP CONTROLLER ALARMS 3/4" Ø (ONLY REPRESENTATIVE)
2. ELECTRIC PUMP CONTROLLER ALARMS 1 1/2" Ø. (ONLY REPRESENTATIVE)
3. DIESEL PUMP CONTROLLER ALARMS 1 1/2" Ø. (ONLY REPRESENTATIVE)
4. CUSTOMER CONNECTION BY OTHERS

ONLY INFORMATIVE

CUSTOMER DATA	
CUSTOMER:	–
USER:	–
LOCATION:	USA
CUSTOMER GPS:	2091356
SERVICE:	PUMP HOUSE

LTR	REVISION	BY	DATE
1	ISSUED FOR APPROVAL	LADN	

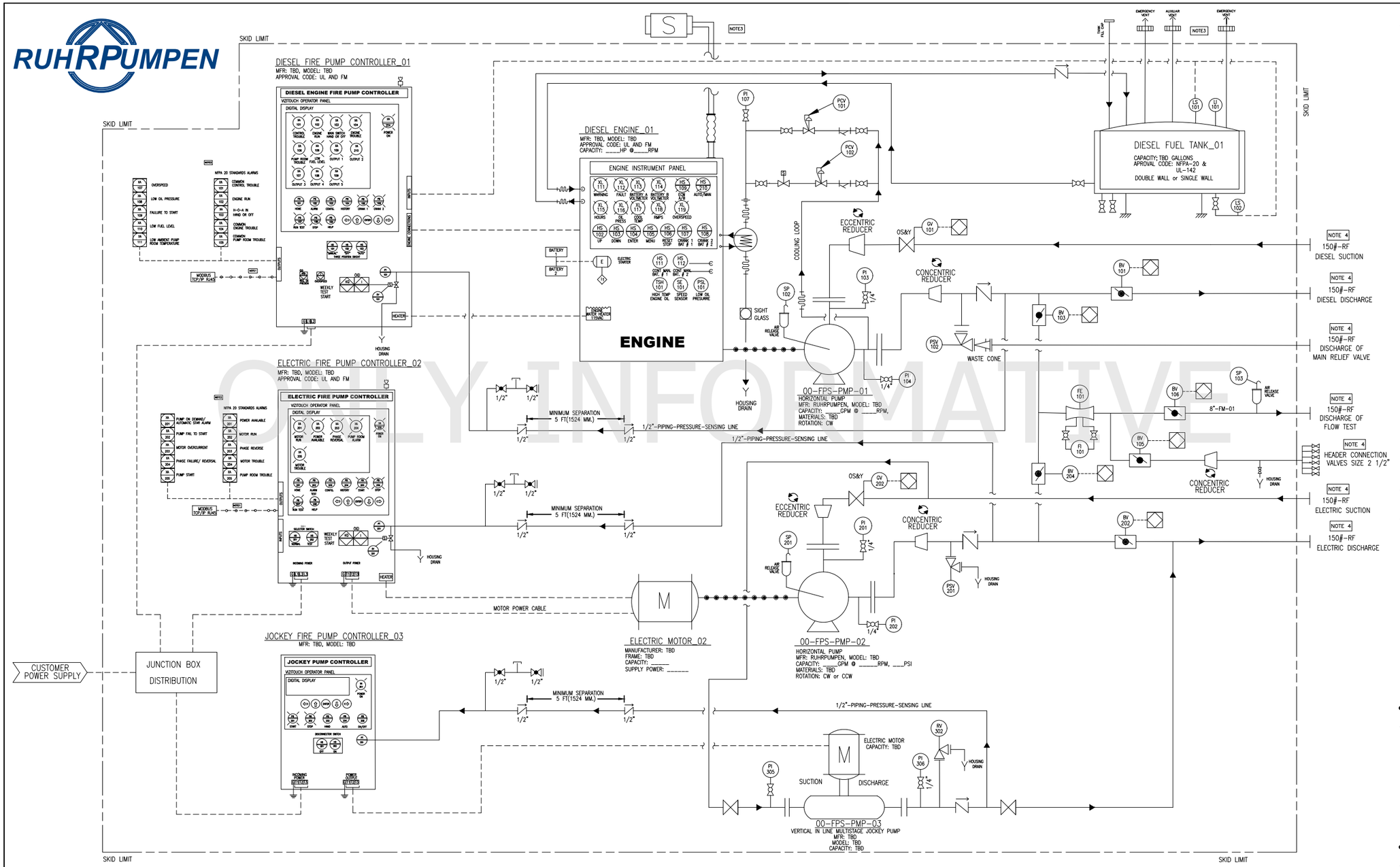
APPROVAL DRAWINGS NOTES

1. PURCHASER'S COMMENTS AND/OR CORRECTIONS, WITHIN THE SCOPE OF CONTRACT, WILL BE MADE DRAWINGS SUBMITTED BY RUHRPUMPEN INC. PUMP DIVISION AND RETURNED FOR CORRECTION.
2. CORRECTIONS, ALTERATIONS, ADDITIONS AND/OR MODIFICATIONS OUTSIDE SCOPE OF CONTRACT, WILL REQUIRE AN ENGINEERING SERVICE CHARGE AND MAY CHANGE PRICE.
3. ITEMS CONDITIONALLY APPROVED OR NEEDING DEFERRED APPROVAL BY PURCHASER, MUST BE SPECIFICALLY STATED. DELIVERY MAY BE AFFECTED

RUHRPUMPEN

DRAWING TITLE: PRELIMINARY ONE LINE DIAGRAM

DWN. BY	CHKD. BY	SCALE	DRAWING No.:	REV
LADN	LADN	NONE	Preliminary One Line Diagram	0
DATE 20/03/2024	DATE 20/03/2024			



P&ID HOUSE DIESEL & ELECTRIC & JOCKEY

DIAGRAM SYMBOLS

- FILTER TYPE "Y"
- BALL VALVE
- CHECK VALVE
- GATE VALVE
- GLOBE VALVE
- SOLENOID VALVE
- AIR RELEASE VALVE
- BUTTERFLY VALVE
- PRESSURE RELIEF VALVE
- PRESSURE REGULATE VALVE
- WASTE CONE
- PUSH BUTTON
- HEAT EXCHANGER
- SILENCER
- VENTURI FLOWMETER
- EXPANSION JOINT
- FLEXIBLE CONNECTION
- SPRINKLER
- PLUG
- OPEN DRAIN
- SIGHT GLASS
- FLAME ARRESTER
- LAMP
- LOCALLY INSTALLED
- TAMPER SWITCH
- ALARM CONTACT
- AUDIBLE ALARM
- REDUCER

PROCESS LINE SYMBOLS

- PROCESS LINE CONNECTION
- SOFTWARE LINE
- ELECTRIC SIGNAL
- ENTRY AND EXIT OF SERVICE
- MECHANICAL LINK
- SKID LIMIT

CUSTOMER DATA

CUSTOMER:	---
END USER:	---
SITE:	---
PROJECT:	---
GPS #:	---
CUSTOMER P.O.:	---
SERVICE:	____GPM @ ___PSI

OPERATION CONDITIONS

CAPACITY:	____GPM
FLUID:	WATER

DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN MILIMETERS [INCHES]
TOLERANCES
AT DISCHARGER FLG
±3.18 [#"]
ALL DIMENSIONS ARE ±12.7 [½"]

NOTES:

1.- WIRED BY OTHERS
2.- ALL SIGNALS AND ALARMS ACCORDING TO NFPA-20
3.- SUPPLIED LOOSE BY RP, INSTALLATION BY OTHERS
4.- THE DIMENSION SHALL BE ACCORDING TO NFPA-20

APPROVAL DRAWING NOTES

1.-PURCHASER'S COMMENTS AND/OR CORRECTIONS, WITHIN THE SCOPE OF CONTRACT, WILL BE MADE ON THE FIRST COMPLETED CERTIFIED DRAWING SUBMITTED BY RUHRPUMPEN PUMP DIVISION AND RETURNED FOR CORRECTION.
2.- CORRECTIONS, ALTERATIONS, ADDITIONS AND/OR MODIFICATIONS OUTSIDE SCOPE OF CONTRACT OR MADE AFTER FIRST SUBMITTAL, WILL REQUIRE AN ENGINEERING SERVICE CHARGE AND MAY CHANGE PRICE.
3.-ITEMS CONDITIONALLY APPROVED OR NEEDING DEFERRED APPROVAL BY PURCHASER, MUST BE SPECIFICALLY STATED. DELIVERY MAY BE AFFECTED.

DRAWING TITLE

PI&D GENERIC FOR HOUSE DIESEL & ELECTRIC & JOCKEY

DWG BY:	CHKD:	SCALA	DRAWING No:	REV
SEC	N/A	N/A	ONLY INFORMATIVE	A
DATE: 08/10/2020	DATE: N/A	SHEET 1/1		

Preliminary Electrical Consumption List

Customer:	0	**GPS. No.**	0	**Date :**	3/4/2024
End User:		**Pump Type :**	-	**Issued By :**	LADN
End User Site:	0	**Quantity :**	-	**Revised By :**	LADN
Location:		**Pump Tag No. :**	Preliminary Electrical Consumption List	**Approved By :**	LADN
Package Type	**Pump House**			**Rev No.**	0

No.	Identification	Description	QTY	Electrical Consumption	Voltage Type	Voltage	Rated Current	Phases	Protection Degree	Comments
				(Kw)		(V)	(A)			
1	Electric Heater Unit 5kW	Electric Heater Unit 5kW	2	5.00	AC	480	6.02	3	-	-
2	TRANSFORMER WITH LOAD CENTER	20kVA Electric Transformer 480Vac 220/120Vac with load center and breakers to protect the transformer primary and secondary coil	1	10.05	AC	480	100.84	3	Nema 3R	-
3	JOCKEY CONTROLLER	JPLT Electric Jockey Pump Controller for 1.5HP	1	1.12	AC	480	1.78	3	Nema 3R	The current nominal representation controller in standby mode. the energy consumption will be the same of the engine operating and at full speed
4	ELECTRIC PUMP CONTROLLER	GPA Electric Motor Pump Controller for 150HP	1	111.90	AC	480	178.00	3	Nema 3R	The current nominal representation controller in standby mode. the energy consumption will be the same of the engine operating and at full speed
5										
6										

TOTAL	128.07

NOTES
1. This is a preliminary Electrical Load List, which can change during the manufacturing process if changes by customer are required.
2. The values are for individual equipment. For example, if an Electric Heater unit demands 5kW each and the quantity is 2, then it will require a total of 10kW for both.
3. Total Feeders: 2. (A) 1 = 480VAC/60Hz // (B) 480VAC/60Hz

RUHRPUMPEN
Specialist for Pumping Technology

TORNATECH

Project: _____

Customer: _____

Engineer: _____

Pump Manufacturer: _____

Technical Data
Submittal Document

GPx Series

Full Service
Electric Fire Pump Controller

Contents:

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.

c UL us FM APPROVED N.Y.C. APPROVED CE

CLARKE®

FIRE PUMP ENGINES

MODELS

JU6H-UFADMG	JU6H-UFADP0	JU6H-UFADR0	JU6H-UFADT0
JU6H-UFAD58	JU6H-UFADP8	JU6H-UFADR8	JU6H-UFADW8
JU6H-UFADNG	JU6H-UFADQ0	JU6H-UFADS8	JU6H-UFADX8
JU6H-UFADN0	JU6H-UFAD88	JU6H-UFADS0	JU6H-UFAD98

FM-UL-cUL APPROVED RATINGS BHP/*KW*

JU6H MODEL ♦	RATED SPEED 1760		2100		2350		2400		US-EPA (NSPS) Available Until ●
UFADMG			**175**	*131*	**175**	*131*			*No Expiration*
UFAD58	**183**	*137*							*No Expiration*
UFADNG	**190**	*142*	**181**	*135*	**183**	*137*	**183**	*137*	*No Expiration*
UFADN0	**197**	*147*	**197**	*147*	**200**	*149*	**200**	*149*	*No Expiration*
UFADP0			**209**	*156*	**211**	*157*	**211**	*157*	*No Expiration*
UFADP8	**220**	*164*							*No Expiration*
UFADQ0			**224**	*167*	**226**	*169*	**226**	*169*	*No Expiration*
UFAD88	**237**	*177*							*No Expiration*
UFADR0			**238**	*177.5*	**240**	*179*	**240**	*179*	*No Expiration*
UFADR8	**250**	*187*							*No Expiration*
UFADS8	**260**	*194*							*No Expiration*
UFADS0			**260**	*194*	**268**	*200*	**268**	*200*	*No Expiration*
UFADT0			**274**	*204*	**275**	*205*	**275**	*205*	*No Expiration*
UFADW8	**282**	*211*							*No Expiration*
UFADX8	**305**	*227.5*							*No Expiration*
UFAD98	**315**	*235*							*No Expiration*

Picture represents JU6H-TRWA Power Tech Plus Engine Series

● USA EPA (NSPS) Tier 3 Emissions Certified Off-Road (40 CFR Part 89) and NSPS Stationary (40 CFR Part 60 Sub Part IIII). Meet EU Stage IIIA emission levels.

♦ All Models available for Export

SPECIFICATIONS

ITEM	JU6H MODELS MG	58	NG	N0	P8	88	P0	Q0	R0	S0	T0	R8	S8	W8	X8	98
Number of Cylinders	6															
Aspiration	TRWA															
Rotation*	CW															
Overall Dimensions – in. (mm)	59.8 (1519) H x 56.7 (1414) L x 36.7 (933) W						60.9 (1547) H x 58.6 (1488) L x 40.0 (1015) W									
Crankshaft Centerline Height – in. (mm)	14 (356)															
Weight – lb (kg)	1747 (791)															
Compression Ratio	19.0:1						17.0:1									
Displacement – cu. in. (L)	415 (6.8)															
Engine Type	4 Stroke Cycle – Inline Construction															
Bore & Stroke – in. (mm)	4.19 x 5.00 (106 x 127)															
Installation Drawing	D628															
Wiring Diagram AC	C07651															
Wiring Diagram DC	C071367, C072146, C071361						C071368, C072146, C071761									
Engine Series	John Deere 6068 Series Power Tech E						John Deere 6068 Series Power Tech Plus									
Speed Interpolation	N/A															

Abbreviations: CW – Clockwise TRWA – Turbocharged with Raw Water Aftercooling N/A - Not Available L – Length W – Width H - Height

*Rotation viewed from Heat Exchanger / Front of engine

CERTIFIED POWER RATING

- Each engine is factory tested to verify power and performance.
- FM-UL power ratings are shown at specific speeds, Clarke engines can be applied at a single rated RPM setting ± 50 RPM.

ENGINE RATINGS BASELINES

- Engines are to be used for stationary emergency standby fire pump service only. Engines are to be tested in accordance with NFPA 25.
- Engines are rated at standard SAE conditions of 29.61 in. (752.1 mm) Hg barometer and 77°F (25°C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m)
- A deduction of 1 percent from engine horsepower rating as corrected to standard SAE conditions shall be made for diesel engines for every 10°F (5.6°C) above 77°F (25°C) ambient temperature.

CLARKE®

FIRE PUMP ENGINES

MODELS

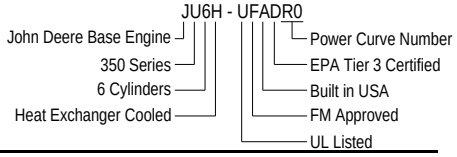
JU6H-UFADMG	JU6H-UFADP0	JU6H-UFADR0	JU6H-UFADT0
JU6H-UFAD58	JU6H-UFADP8	JU6H-UFADR8	JU6H-UFADW8
JU6H-UFADNG	JU6H-UFADQ0	JU6H-UFADS8	JU6H-UFADX8
JU6H-UFADN0	JU6H-UFAD88	JU6H-UFADS0	JU6H-UFAD98

ENGINE EQUIPMENT

EQUIPMENT	STANDARD	OPTIONAL
Air Cleaner	Direct Mounted, Washable, Indoor Service with Drip Shield	Disposable, Drip Proof, Indoor Service Outdoor Type, Single or Two Stage (Cyclonic)
Alarms	Overspeed Alarm & Shutdown, Low Oil Pressure, Low & High Coolant Temperature, Low Raw Water Flow, High Raw Water Temperature, Alternate ECM Warning, Fuel Injection Malfunction, ECM Warning and Failure with Automatic Switching	Low Coolant Level, Low Oil Level, Oil Filter Differential Pressure, Fuel Filter Differential Pressure, Air Filter Restriction
Alternator	12V-DC, 42 Amps with Poly-Vee Belt and Guard	24V-DC, 40 Amps with Poly-Vee Belt and Guard
Coupling	Bare Flywheel	UL Listed Driveshaft and Guard, JU6H-UFAD58/NG/ADMG/ADM8/K0/N0/Q0/R0-CDS30-S1; JU6H-UFADP8/P0/T0/88/R8/S8/S0/W8/X8/98- CDS50-SC at 1760/2100 RPM only
Electronic Control Module	12V-DC, Energized to Stop, Primary ECM always Powered on	24V-DC, Energized to Stop, Primary ECM always Powered on
Engine Heater	115V-AC, 1360 Watt	230V-AC, 1360 Watt
Exhaust Flex Connection	SS Flex, 150# ANSI Flanged Connection, 5" for JU6H-UFAD58/MG/NG/N0/P8/88; SS Flex, 150# ANSI Flanged Connection, 6" for JU6H-UFADP0/Q0/R0/S0/T0/R8/S8/W8/X8/98 (w/ orifice plate)	SS Flex, 150# ANSI Flanged Connection, 6" for JU6H-UFAD58/MG/NG/N0/P8/88; SS Flex, 150# ANSI Flanged Connection, 8" for JU6H-UFADP0/Q0/R0/S0/T0/R8/S8/W8/X8/98 (w/ orifice plate)
Exhaust Protection	Metal Guards on Manifolds and Turbocharger	
Flywheel Housing	SAE #3	
Flywheel Power Take Off	11.5" SAE Industrial Flywheel Connection	
Fuel Connections	Fire Resistant, Flexible, USA Coast Guard Approved, Supply and Return Lines	SS, Braided, cUL Listed, Supply and Return Lines
Fuel Filter	Primary Filter with Priming Pump	
Fuel Injection System	High Pressure Common Rail	
Governor, Speed	Dual Electronic Control Modules	
Heat Exchanger	Tube and Shell Type, 60 PSI (4 BAR), NPT(F) Connections – Sea Water Compatible	
Instrument Panel	Multimeter to Display English and Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure and One (1) Voltmeter with Toggle Switch, Front Opening	
Junction Box	Integral with Instrument Panel; For DC Wiring Interconnection to Engine Controller	
Lube Oil Cooler	Engine Water Cooled, Plate Type	
Lube Oil Filter	Full Flow with By-Pass Valve	
Lube Oil Pump	Gear Driven, Gear Type	
Manual Start Control	On Instrument Panel with Control Position Warning Light	
Overspeed Control	Electronic, Factory Set, Not Field Adjustable	
Raw Water Cooling Loop w/Alarms	Galvanized	Seawater, All 316SS, High Pressure
Raw Water Cooling Loop Solenoid Operation	Automatic from Fire Pump Controller and from Engine Instrument Panel (for Horizontal Fire Pump Applications)	Not Supplied (for Vertical Turbine Fire Pump Applications)
Run – Stop Control	On Instrument Panel with Control Position Warning Light	
Starters	Two (2) 12V-DC	Two (2) 24V-DC
Throttle Control	Adjustable Speed Control by Increase/Decrease Button, Tamper Proof in Instrument Panel	
Water Pump	Centrifugal Type, Poly-Vee Belt Drive with Guard	

Abbreviations: DC – Direct Current, AC – Alternating Current, SAE – Society of Automotive Engineers, NPT(F) – National Pipe Tapered Thread (Female), ANSI – American National Standards Institute, SS – Stainless Steel

MODEL NOMENCLATURE: (10 Digit Models)



CLARKE®

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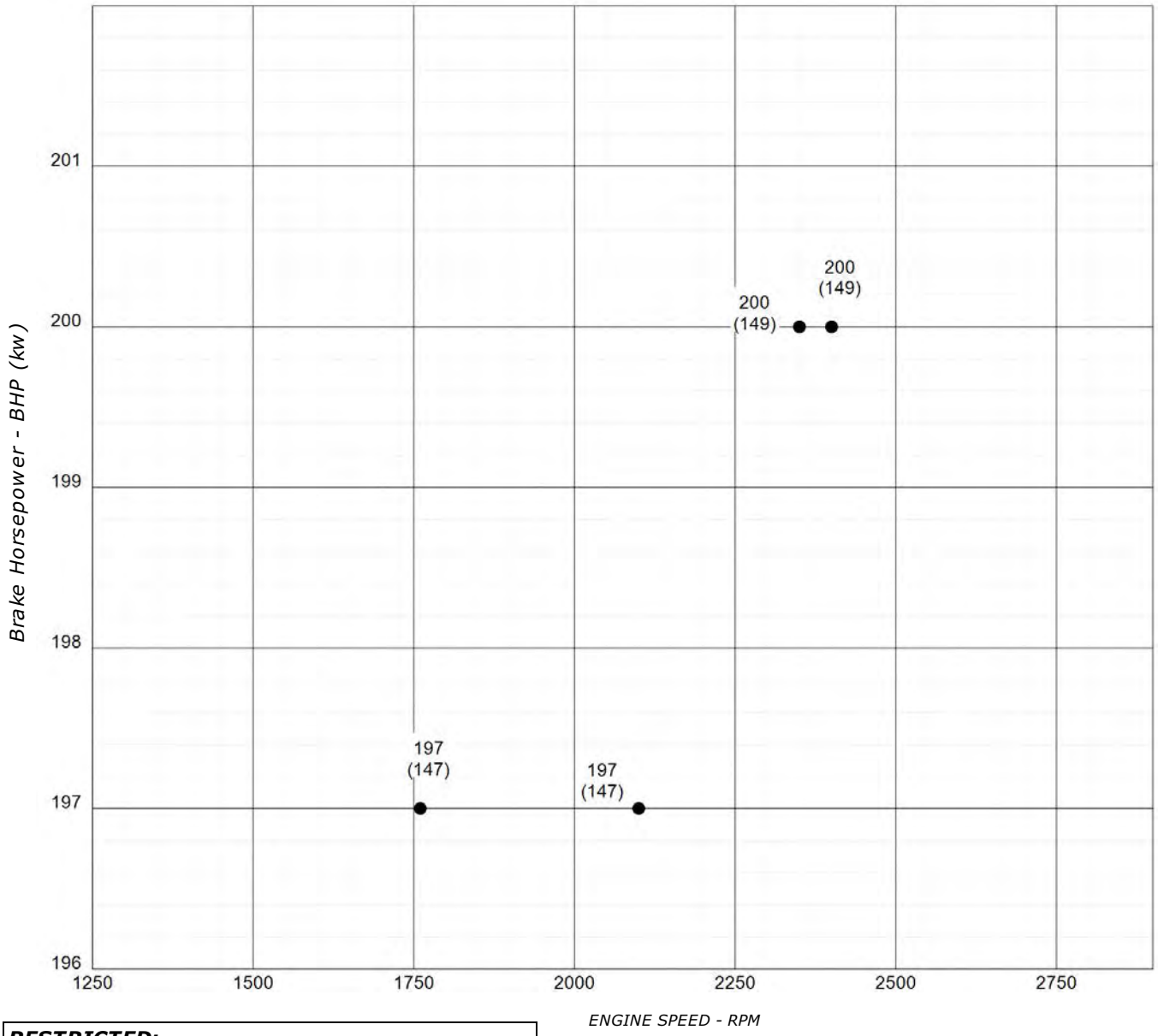
www.clarkefire.com

C133421 revR
19JUN15

CLARKE®

FIRE PUMP MODEL: JU6H-UFADN0
Heat Exchanger Cooled
Raw Water Charge Cooling
Tier 3 Emissions Certified



RESTRICTED:
Use only for Stand-By Fire Pump Applications

NAMEPLATE BHP (MAXIMUM PUMP LOAD)

ENGINE PERFORMANCE:
STANDARD CONDITIONS: (SAE J1349, ISO 3046)
77°F (25°C) AIR INLET TEMPERATURE
29.61 IN. (752.1MM) HG BAROMETRIC PRESSURE
#2 DIESEL FUEL (SEE C13940)

Kevin Kunkler 15SEP08

CREATED	DATE CREATED
KTE	08/14/08

ENGINE MODEL JU6H-UFADN0

DRAWING NO.	REV
C132681	B

Basic Engine Description

Engine Manufacturer	John Deere Co.
Ignition Type	Compression (Diesel)
Number of Cylinders	6
Bore and Stroke - in (mm)	4.19 (106) X 5 (127)
Displacement - in³ (L)	415 (6.8)
Compression Ratio	19.0:1
Valves per cylinder	
Intake	1
Exhaust	1
Combustion System	Direct Injection
Engine Type	In-Line, 4 Stroke Cycle
Fuel Management Control	Electronic, High Pressure Common Rail
Firing Order (CW Rotation)	1-5-3-6-2-4
Aspiration	Turbocharged
Charge Air Cooling Type	Raw Water
Rotation, viewed from front of engine, Clockwise (CW)	Standard
Engine Crankcase Vent System	Open
Installation Drawing	D628
Weight - lb (kg)	1747 (792)

Power Rating	**1760**	**2100**	**2350**
Nameplate Power - HP (kW) [1]	197 (147)	197 (147)	200 (149)

Cooling System	**1760**	**2100**	**2350**
Engine Coolant Heat - Btu/sec (kW)	98 (103)	100 (106)	104 (110)
Engine Radiated Heat - Btu/sec (kW)	14.9 (15.7)	14.9 (15.7)	15.1 (15.9)
Heat Exchanger (Brazed Non-Removeable Bundle) Minimum Flow - [C051386]			
60°F (15°C) Raw H_2O - gal/min (L/min)	13 (49.2)	13 (49.2)	13 (49.2)
100°F (37°C) Raw H_2O - gal/min (L/min)	20 (75.7)	20 (75.7)	20 (75.7)

Heat Exchanger (Brazed Non-Removeable Bundle) Maximum Cooling Raw Water - [C051386]	
Inlet Pressure - psi (bar)	60 (4.1)
Flow - gal/min (L/min)	40 (151)
Typical Engine H_2O Operating Temp - °F (°C)	180 (82.2) - 195 (90.6)
Thermostat	
Start to Open - °F (°C)	180 (82.2)
Fully Opened - °F (°C)	203 (95)
Engine Coolant Capacity - qt (L)	19 (18)
Coolant Pressure Cap - lb/in² (kPa)	15 (103)
Maximum Engine Coolant Temperature - °F (°C)	230 (110)
Minimum Engine Coolant Temperature - °F (°C)	160 (71.1)
High Coolant Temp Alarm Switch - °F (°C)	235 (113) - 241 (116)

Electric System - DC	**Standard**		**Optional**	
System Voltage (Nominal)	12		24	
Battery Capacity for Ambients Above 32°F (0°C)				
Voltage (Nominal)	12	{C07633}	12	{C07633}
Qty. Per Battery Bank	1		2	
SAE size per J537	8D		8D	
CCA @ 0°F (-18°C) per J537	1200		1200	
Reserve Capacity - Minutes per J537	430		430	
Battery Cable Circuit, Max Resistance - ohm	0.0012		0.0012	
Battery Cable Minimum Size				
0-120 in. Circuit Length [2]	00		00	
121-160 in. Circuit Length [2]	000		000	
161-200 in. Circuit Length [2]	0000		0000	
Charging Alternator Maximum Output - Amp,	40	{C071363}	55	{C071365}
Starter Cranking Amps, Rolling - @60°F (15°C)	440	{RE69704/RE70404}	250	{C07819/C07820}

Exhaust System (Single Exhaust Outlet)	**1760**	**2100**	**2350**
Exhaust Flow - ft.³/min (m³/min)	1046 (29.6)	1192 (33.8)	1201 (34)
Exhaust Temperature - °F (°C) (corrected to 77°F)	945 (507)	911 (488)	886 (474)
Maximum Allowable Back Pressure - in H_2O (kPa)	30 (7.5)	30 (7.5)	30 (7.5)
Minimum Exhaust Pipe Dia. - in (mm) ³	5 (127)	5 (127)	5 (127)

Fuel System	**1760**	**2100**	**2350**
Fuel Consumption - gal/hr (L/hr)	10.3 (39)	10.9 (41.3)	10.8 (40.9)
Fuel Return - gal/hr (L/hr)	15.5 (58.7)	15.3 (57.9)	15.1 (57.2)
Fuel Supply - gal/hr (L/hr)	25.8 (97.7)	26.2 (99.2)	25.9 (98)
Fuel Pressure - lb/in² (kPa)	3 (20.7) - 6 (41.4)		
Minimum Line Size - Supply - in.	.50 Schedule 40 Steel Pipe		
Pipe Outer Diameter - in (mm)	0.848 (21.5)		
Minimum Line Size - Return - in.	.375 Schedule 40 Steel Pipe		
Pipe Outer Diameter - in (mm)	0.675 (17.1)		
Maximum Allowable Fuel Pump Suction Lift with clean Filter - in H_2O (mH_2O)	80 (2)		
Maximum Allowable Fuel Head above Fuel pump, Supply or Return - ft (m)	6.6 (2)		
Fuel Filter Micron Size	2 (Secondary)		

Heater System	**Standard**	**Optional**
Engine Coolant Heater		
Wattage (Nominal)	1360	1360
Voltage - AC, 1 Phase	115 (+5% -10%)	230 (+5%, -10%)
Part Number	{C123640}	{C123644}

Air System	**1760**	**2100**	**2350**
Combustion Air Flow - ft.³/min (m³/min)	400 (11.3)	486 (13.8)	500 (14.2)
Air Cleaner	**Standard**		**Optional**
Part Number	{C03396}		{C03327}
Type	Indoor Service Only, with Shield		Canister, Single-Stage
Cleaning method	Washable		Disposable
Air Intake Restriction Maximum Limit			
Dirty Air Cleaner - in H_2O (kPa)	10 (2.5)		10 (2.5)
Clean Air Cleaner - in H_2O (kPa)	6 (1.5)		5 (1.2)
Maximum Allowable Temperature (Air To Engine Inlet) - °F (°C)	130 (54.4)		

Lubrication System	
Oil Pressure - normal - lb/in² (kPa)	40 (276) - 60 (414)
Low Oil Pressure Alarm Switch - lb/in² (kPa) to	30 (207) - 35 (241)
In Pan Oil Temperature - °F (°C)	220 (104) - 245 (118)
Total Oil Capacity with Filter - qt (L)	20.1 (19)

Lube Oil Heater	**Optional**	**Optional**
Wattage (Nominal)	150	150
Voltage	120V (+5%, -10%)	240V (+5%, -10%)
Part Number	{C04430}	{C04431}

Performance	**1760**	**2100**	**2350**
BMEP - lb/in² (kPa)	214 (1480)	179 (1230)	162 (1120)
Piston Speed - ft/min (m/min)	1467 (447)	1750 (533)	1958 (597)
Mechanical Noise - dB(A) @ 1m	C133369 - Reference Noise data on Engine Page at www.clarkefire.com		
Power Curve	C132681 - Reference Power Curve on Engine Page at www.clarkefire.com		

NOTE: This engine is intended for indoor installation or in a weatherproof enclosure. ¹ Derate 3% per every 1000 ft. 304.8m above 300 ft. 91.4m and derate 1% for every 10°F 5.55 °C above 77°F 25°C. ² Positive and Negative Cables Combined Length. ³ Minimum Exhaust Pipe Diameter is based on: 15 feet of pipe, one 90° elbow, and one Industrial silencer. A Back-pressure flow analysis must be performed on the actual field installed exhaust system to assure engine maximum allowable back pressure is not exceeded. See Exhaust Sizing Calculator on www.clarkefire.com. { } indicates component reference part number.

CLARKE®

JU4H, JU4R & JU6H, JU6R ENGINE MODELS
ENGINE MATERIALS AND CONSTRUCTION

Air Cleaner
Type..... Indoor Usage Only
Oiled Fabric Pleats
Material..... Surgical Cotton
Aluminum Mesh

Air Cleaner - Optional
Type..... Canister
Material..... Pleated Paper
Housing..... Enclosed

Camshaft
Material..... Cast Iron
Chill Hardened
Location..... In Block
Drive..... Gear, Spur
Type of Cam..... Ground

Charge Air Cooler (JU6H-60,62,68,74,84, 94, T8, T0, T2, ADK0, AD58, ADNG, ADN0, ADQ0, ADR0, AAQ8, AARG, ADP8, ADP0, ADT0, AD88, ADR8, AD98, ADS0, ADW8, ADX8, AD98 only)
Type..... Raw Water Cooled
Materials (in contact with raw water)
Tubes..... 90/10 CU/NI
Headers ..... 36500 Muntz
Covers ..... 83600 Red Brass
Plumbing ..... 316 Stainless Steel/ Brass
90/10 Silicone

Charge Air Cooler (JU6R-AA67, 59, 61, PF, Q7, RF, S9, 83 only)
Type..... Air to Air Cooled
Materials
Core..... Aluminum

Coolant Pump
Type..... Centrifugal
Drive..... Poly Vee Belt

Coolant Thermostat
Type..... Non Blocking
Qty..... 1

Cooling Loop (Galvanized)
Tees, Elbows, Pipe..... Galvanized Steel
Ball Valves..... Brass ASTM B 124,
Solenoid Valve..... Brass
Pressure Regulator..... Bronze
Strainer..... Cast Iron (1/2" - 1" loops) or
Bronze (1.25" - 2" loops)

Cooling Loop (Sea Water)
Tees, Elbows, Pipe..... 316 Stainless Steel
Ball Valves..... 316 Stainless Steel
Solenoid Valve..... 316 Stainless Steel
Pressure Regulator/Strainer Cast Brass ASTM B176
C87800

Cooling Loop (316SS)
Tees, Elbows, Pipe..... 316 Stainless Steel
Ball Valves..... 316 Stainless Steel
Solenoid Valve..... 316 Stainless Steel
Pressure Regulator/Strainer 316 Stainless Steel

Connecting Rod
Type..... I-Beam Taper
Material..... Forged Steel Alloy

Crank Pin Bearings
Type..... Precision Half Shell
Number..... 1 Pair Per Cylinder
Material..... Wear-Guard

Crankshaft
Material..... Forged Steel
Type of Balance..... Dynamic

Cylinder Block
Type..... One Piece with
Non-Siamese Cylinders
Material..... Annealed Gray Iron

Cylinder Head
Type..... Slab 2 Valve
Material..... Annealed Gray Iron

Cylinder Liners
Type..... Centrifugal Cast, Wet Liner
Material..... Alloy Iron Plateau, Honed

Fuel Pump
Type..... Diaphragm
Drive..... Cam Lobe

Heat Exchanger (USA) - JU4H & JU6H Only
Type..... Tube & Shell
Materials
Tube & Headers..... Copper
Shell..... Copper
Electrode..... Zinc

Heat Exchanger (UK) - JU4H & JU6H Only
Type..... Tube & Bundle

Materials
Tube & Headers..... Copper
Shell..... Aluminum

Injection Pump
Type..... Rotary
Drive..... Gear

Lubrication Cooler
Type..... Plate

Lubrication Pump
Type..... Gear
Drive..... Gear

Main Bearings
Type..... Precision Half Shells
Material..... Steel Backed-Aluminum
Lined

Piston
Type and Material..... Aluminum Alloy with
Reinforced Top Ring Groove
Cooling..... Oil Jet Spray

Piston Pin
Type..... Full Floating - Offset

Piston Rings
Number/Piston..... 3
Top..... Keystone Barrel Faced -
Plasma Coated
Second..... Tapered Cast Iron
Third..... Double Rail Type
w/Expander Spring

Radiator - JU4R & JU6R Only
Type..... Plate Fin
Materials
Core..... Copper & Brass
Tank & Structure..... Steel

Optional
Marine Coating..... Baked Phenolic

Valves
Type..... Poppet
Arrangement..... Overhead Valve
Number/Cylinder..... 1 intake
1 exhaust
Operating Mechanism..... Mechanical Rocker Arm
Type of Lifter..... Large Head
Valve Seat Insert..... Replaceable

Rating Specific Emissions Data

Nameplate Rating Information

Clarke Model	**JU6H-UFADN0**
Power Rating (BHP/kW)	**200/149**
Certified Speed (RPM)	**2350**

Refer to **Rating Data** section on page 2 for emissions output values

Rating Specific Emissions Data - John Deere Power Systems

Rating Data

Rating	6068HFC28C	
Certified Power(kW)	149	
Rated Speed	2350	
Vehicle Model Number	OEM (Clarke Fire Pump-Emergency)	
Units	g/kW-hr	g/hp-hr
NOx	3.34	2.49
HC	0.32	0.24
NOx + HC	N/A	N/A
Pm	0.12	0.09
CO	1.5	1.1

Certificate Data

Engine Model Year	2023
EPA Family Name	PJDXL06.8120
EPA JD Name	350HAK
EPA Certificate Number	PJDXL06.8120-009
CARB Executive Order	
Parent of Family	6068HFG82A
Units	g/kW-hr
NOx	3.79
HC	0.12
NOx + HC	N/A
Pm	0.12
CO	1.2

* The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and we do not guarantee that every production engine will have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, or other conditions beyond our control.

Emissions Results by Rating run on Feb-14-2023

DO NOT SCALE

DATUMS:

-A- - MOUNTING FACE OF FLYWHEEL

-B- - ENGINE CRANKSHAFT HORIZONTAL CENTERLINE

-C- - ENGINE CRANKSHAFT VERTICAL CENTERLINE

- CENTER OF GRAVITY OF ENGINE

- CLOCKWISE ROTATION WHEN VIEWED FROM FRONT OF ENGINE

NOTE:
THE LOOP SHOWN IS BASED ON STANDARD LOOP CONSTRUCTION AND FM SIZING CONDITIONS

FOR ALTERNATE LOOP CONSTRUCTION (STAINLESS STEEL, SEA WATER, AND HIGH PRESSURE) SIZES MAY VARY

DRAWING SUBJECT TO CHANGE WITHOUT NOTICE

CAUTION:

ALL PLUMBING MUST BE SUPPORTED AND/OR ISOLATED SO THAT NO WEIGHT OR STRESS IS APPLIED TO ANY ENGINE COMPONENT

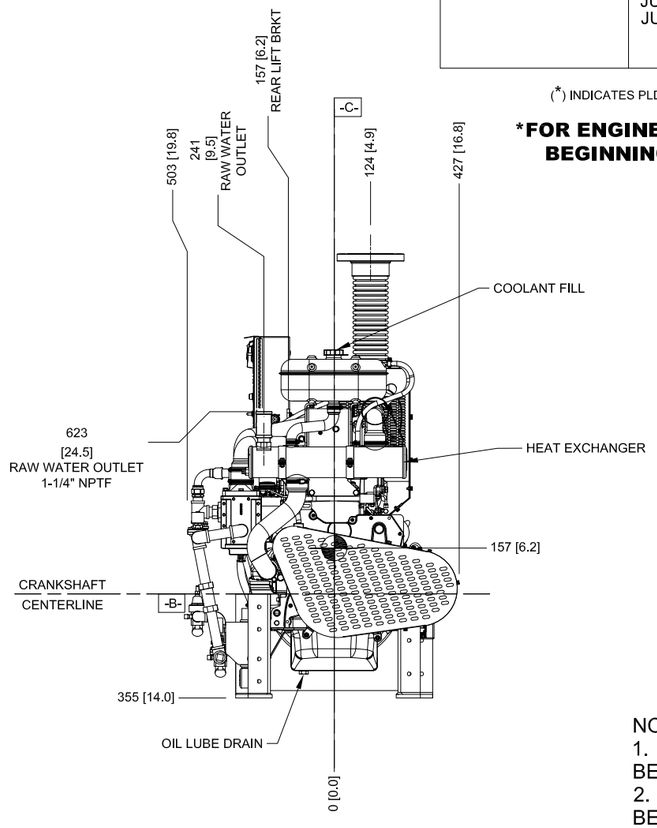
ATTENTION

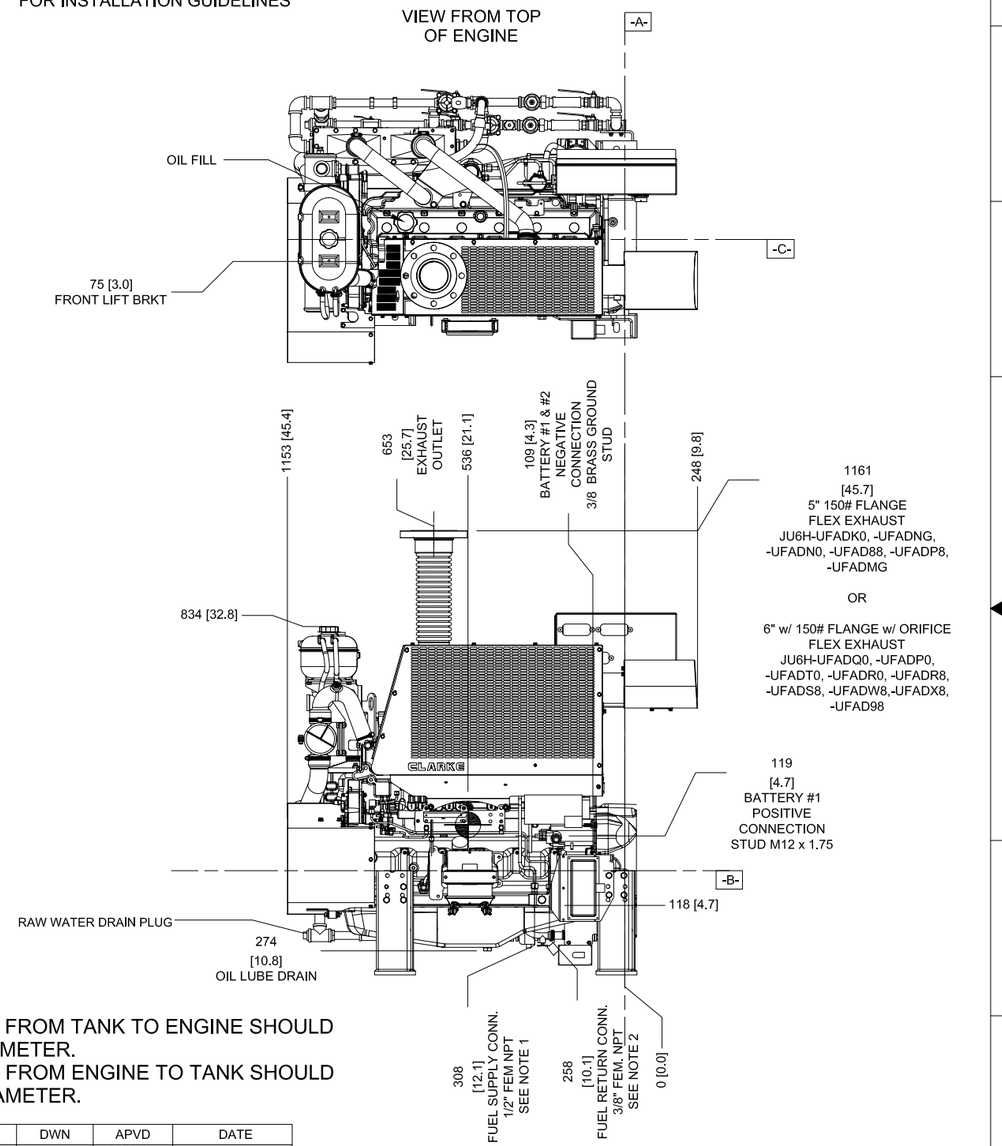
REFER TO THE SPECIFIC MODEL "INSTALLATION AND OPERATION DATA" FOR INSTALLATION GUIDELINES

"TRWA" (TURBOCHARGED w/ RAW WATER AFTERCOOLING) MODELS	JU6H-UFAD88, -UFADK0* JU6H-UFADMG, -UFADN0 JU6H-UFADNG, -UFADP8 (MODELS SHOWN)
	JU6H-UFAD98 -UFADP0 JU6H -UFADQ0, -UFADR0 JU6H-UFADR8, -UFADS8 JU6H-UFADT0, -UFADW8 JU6H-UFADX8 SEE PG. 3 FOR RAW WATER INLET DIMENSIONS

(*) INDICATES PLD ENINGE MODEL ONLY

***FOR ENGINES BUILT IN USA BEGINNING APRIL 2015**





NOTES:
1. FUEL SUPPLY PIPING FROM TANK TO ENGINE SHOULD BE 1/2"MINIMUM PIPE DIAMETER.
2. FUEL RETURN PIPING FROM ENGINE TO TANK SHOULD BE 3/8" MINIMUM PIPE DIAMETER.

REV	DESCRIPTION	ECN#	DWN	APVD	DATE
M	ADDED FLYWHEEL INFORMATION	4071	JGV	MCL	04AUG15
N	REVISED ENGINE FOOT MOUNTING HOLE LOCATIONS PAGE 2	4275	CMM	ASC	01OCT15
P	ADDED GROUND STUD LOCATION	4359	DKP	ASC	11OCT15
Q	ADDED RAW WATER INLET DIMENSION TO PAGE 2. UPDATED COOLING LOOP GEOMETRY ON PAGE 3	4741	MJM	JCA	03FEB16
R	PAGE 3 DATUM A & B WERE INCORRECTLY POSITIONED	4788	RDR	MCL	11NOV16
S	ADDED DIMS TO ENGINE LIFTING BRACKETS	5061	MDM	MCL	21JUN17
T	ADDED GLAND PLATE DETAIL	5236	ECK	MCL	29NOV17
U	REMOVED OBSOLETE MODELS JU6H-UFAD58, UFADS0, UFADM8 UPDATED TOLERANCE, LOGO, & DIMENSION PRECISION	5393	NMM	MCL	24APR18
-	ADDED CNTRLD DWG NOTE, CNTRLD DWG BOX WAS MARKED NO	6309	EJT	MJD	13AUG21

CONTROLLED DRAWING

THIS IS A REGISTERED PART WITH A THIRD PARTY AGENCY FOR USE ON A PRODUCT. NO SUBSTITUTIONS ARE ALLOWED. CONSULT ENGINEERING PRIOR TO AND REGARDING ANY CHANGE.

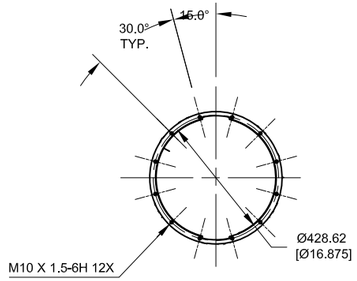
GENERAL TOLERANCES
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] AND MAY VARY ± 9,5 [0,38]

CONTROLLED DRAWING: YES ☒ NO ☐

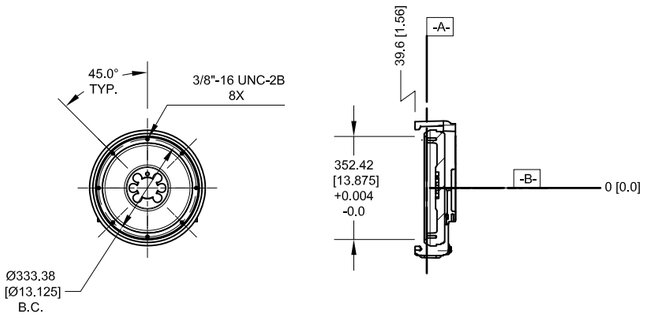
CLARKE®

DRWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	
NAME	INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS
PART NO.	D628
REV	U
SCALE	NTS
UNITS	MM [INCH]
PAGE	1
OF	3

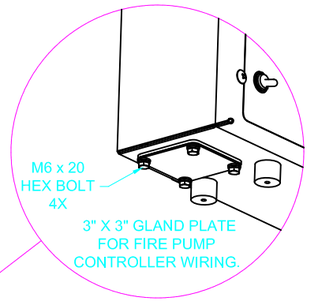
DETAIL DATUM -A-

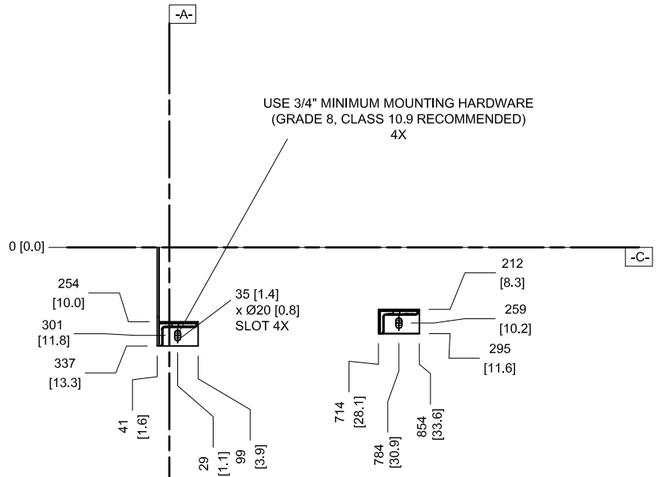


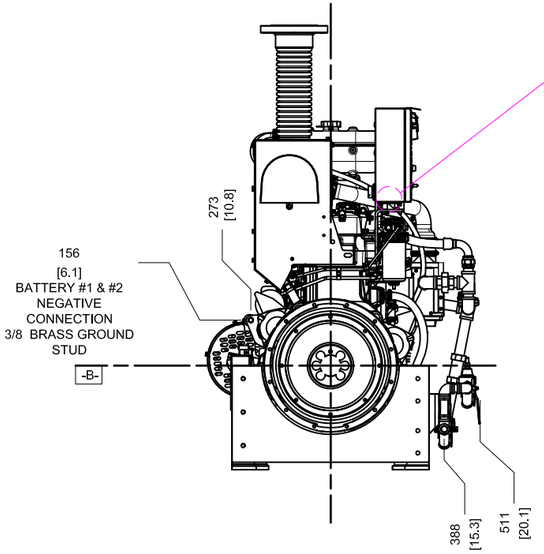
SAE #3
FLYWHEEL HOUSING

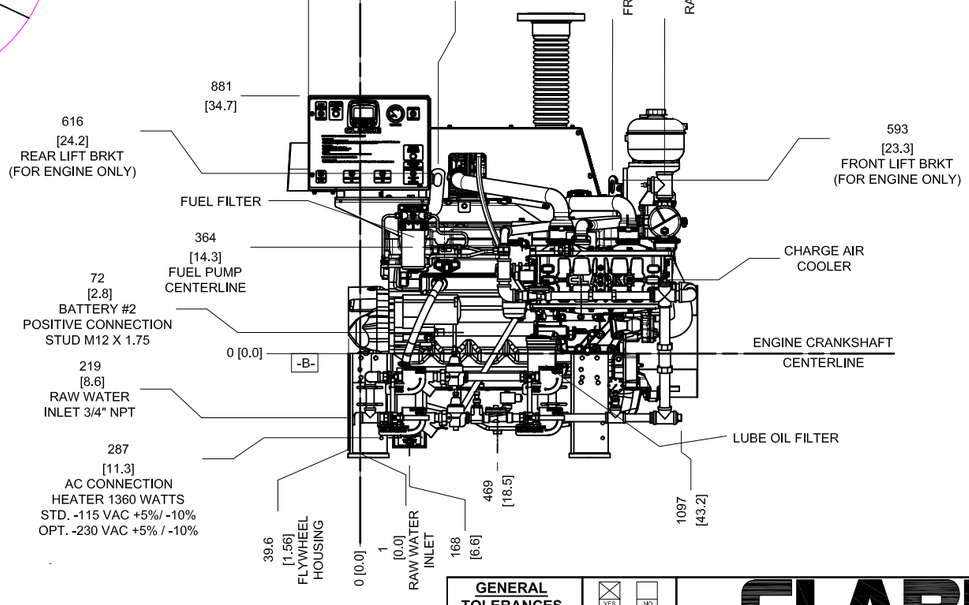


SAE 11.5 FLYWHEEL WITH
129 TEETH AND 8/10 PITCH RING GEAR









DRAWING SUBJECT TO CHANGE WITHOUT NOTICE

***FOR ENGINES BUILT IN USA BEGINNING APRIL 2015**

FOR ENGINE SPECIFIC OPTIONS
SEE www.CLARKEFIRE.com

GENERAL TOLERANCES
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS [INCHES] AND MAY VARY ± 9,5 [0,38]

CONTROLLED DRAWING: YES ☒ NO ☐

CLARKE®

DRWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	

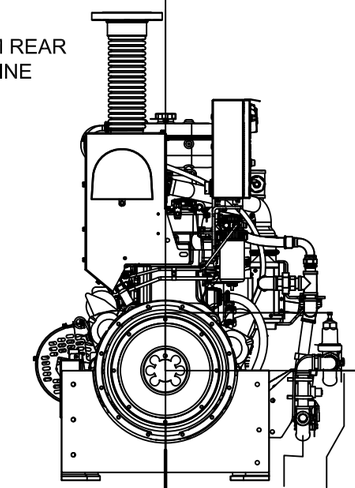
NAME: INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS

PART NO. D628 REV U

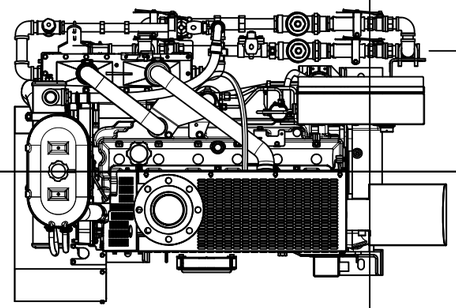
SCALE NTS | UNITS MM [INCH] | PAGE 2 OF 3

DO NOT SCALE

VIEW FROM REAR OF ENGINE



VIEW FROM TOP OF ENGINE



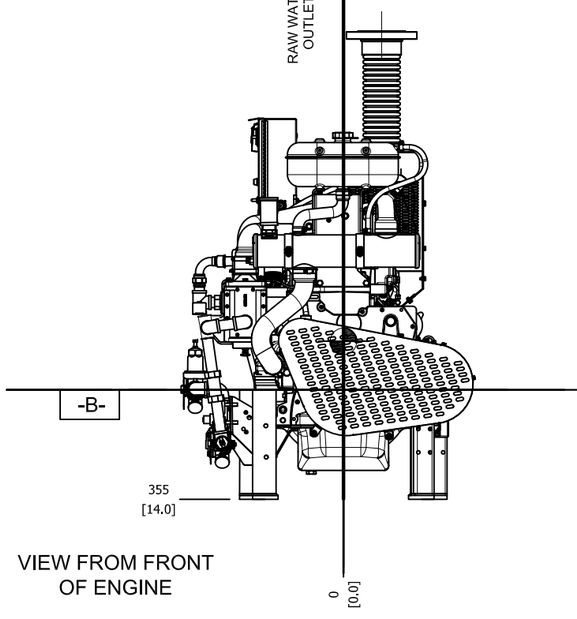
TRWA 1" LOOP w/ 1 ¼" REGULATORS MODELS	JU6H-UFAD98 -UFADP0 JU6H -UFADQ0, -UFADR0 JU6H-UFADR8, -UFADS8 JU6H-UFADT0, -UFADW8 JU6H-UFADX8

FOR ALL OTHER MODELS SEE PAGE 2

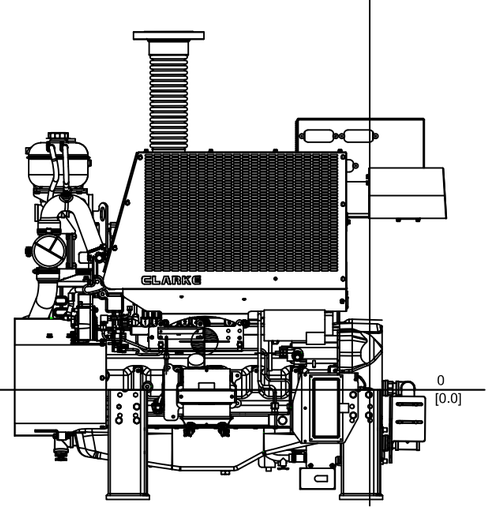
DATUMS

- -A- - MOUNTING FACE OF FLYWHEEL
- -B- - ENGINE CRANKSHAFT HORIZONTAL CENTERLINE
- -C- - ENGINE CRANKSHAFT VERTICAL CENTERLINE
- - CENTER OF GRAVITY OF ENGINE
- - CLOCKWISE ROTATION WHEN VIEWED FROM FRONT OF ENGINE

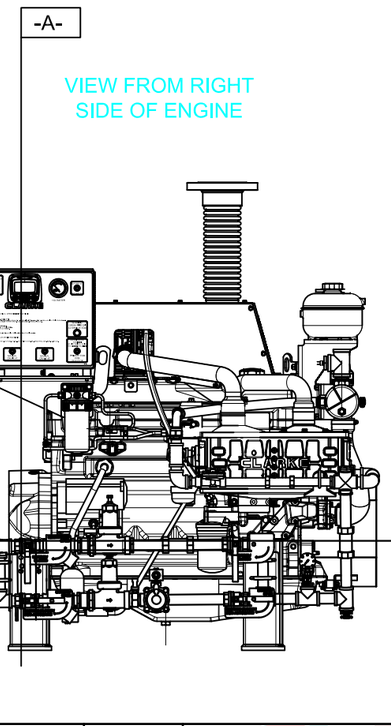
VIEW FROM FRONT OF ENGINE



VIEW FROM LEFT SIDE OF ENGINE



VIEW FROM RIGHT SIDE OF ENGINE



GENERAL TOLERANCES

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CONTROLLED DRAWING (YES / NO)

CLARKE®

DRWN	MWLEMING
DATE	2/25/2009
ENGR	KJKUNKLER
MATERIAL	
ASSEMBLY	

NAME: INSTALLATION DRAWING, FIRE PUMP ENGINE JU6H TIER 3 MODELS

PART NO. D628 REV U

SCALE NTS | UNITS MM [INCH] | PAGE 3 OF 3

TORNATECH

Project: _____

Customer: _____

Engineer: _____

Pump Manufacturer: _____

Technical Data
Submittal Document

Model GPD

Diesel Engine Driven Fire Pump Controller

Contents:

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.

c UL us FM APPROVED N.Y.C. APPROVED CE OPTIONAL

TORNATECH

LISTEN DEVELOP LEAD

Model OPD

UL Listed Disconnecting Device

For UL Listed and FM Approved Electric Fire Pump Applications

Main Characteristics

- UL Listed means of disconnecting the fire pump controller from incoming power
- Completely removes the risk of arc flash in the fire pump controller
- Complete overcurrent protection coordination upstream of the fire pump controller
- Acceptable for installation in the U.S.A
  - UL Listed for fire pump service as per
    - NFPA70 (NEC): 695.4 (B)(2)(a)(2)
    - NFPA20 9.2.3.4.1
  - Alternate Power circuit
    - NFPA70 (NEC): 695.3 (F)(2)
- Acceptable for installation in Canada as per
  - Normal power circuit: CEC 32.206 (5)
  - Alternate power circuit: recommended and acceptable alternative to CEC 32.206 (4)

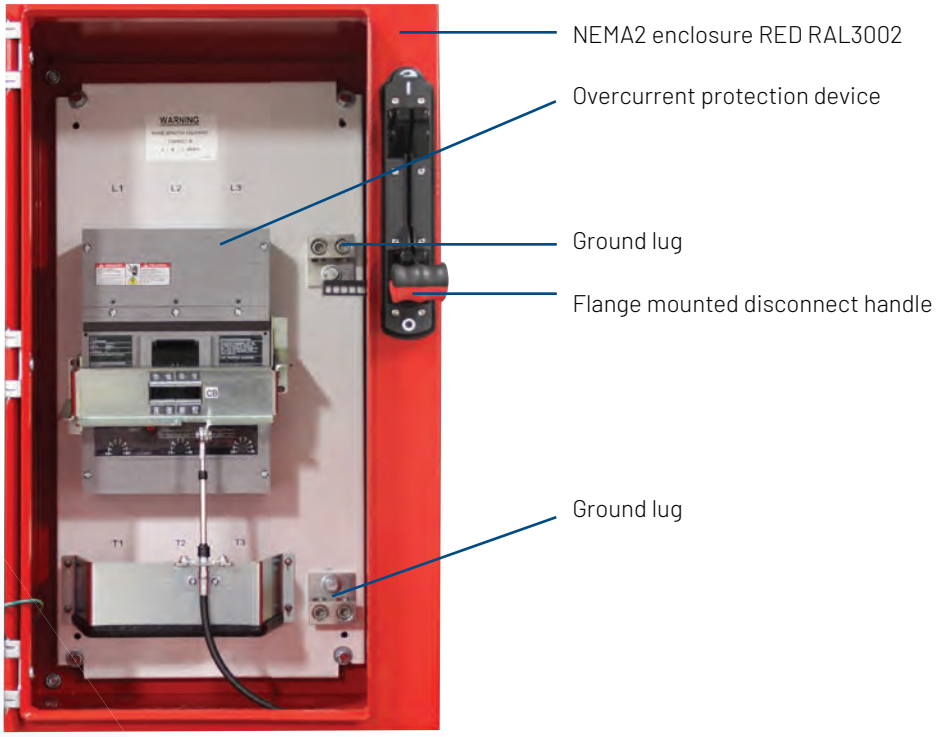
Standard Features

- Suitable as service equipment
- NEMA 2 enclosure
- Flange mounted disconnect handle lockable in the ON (closed) position as per NFPA70 (NEC) 695.4 (B)(3)(a)(2)
- Disconnect markings as per NFPA70 (NEC) 695.4 (B)(3)(c)

NFPA MEMBER 2020 - 2021

c UL US

The Tornatech Model OPD electric fire pump disconnecting device provides a UL listed means of disconnecting and consequently isolating the fire pump controller from incoming power. It also assures complete overcurrent protection coordination upstream of the fire pump controller. The selection of the overcurrent protective device is based on the voltage and horsepower of the electric fire pump motor and the requirements of NFPA70 (NEC) 695.4 (B)(2)(a)(2), NFPA20 9.2.3.4.1 and as a recommended and acceptable alternative for CEC 32-206 (4) and (5).



NFPA70 (NEC) 695.4 (B)(2)(a)(2)

Overcurrent protection shall be provided by an assembly listed for fire pump service and complying with the following:

a. The overcurrent protective device shall not open within 2 minutesat 600 percent of the full-load current of the fire pump motor(s).

b. The overcurrent protective device shall not open with a re-start transient of 24 times the full-load current of the fire pump motor(s).

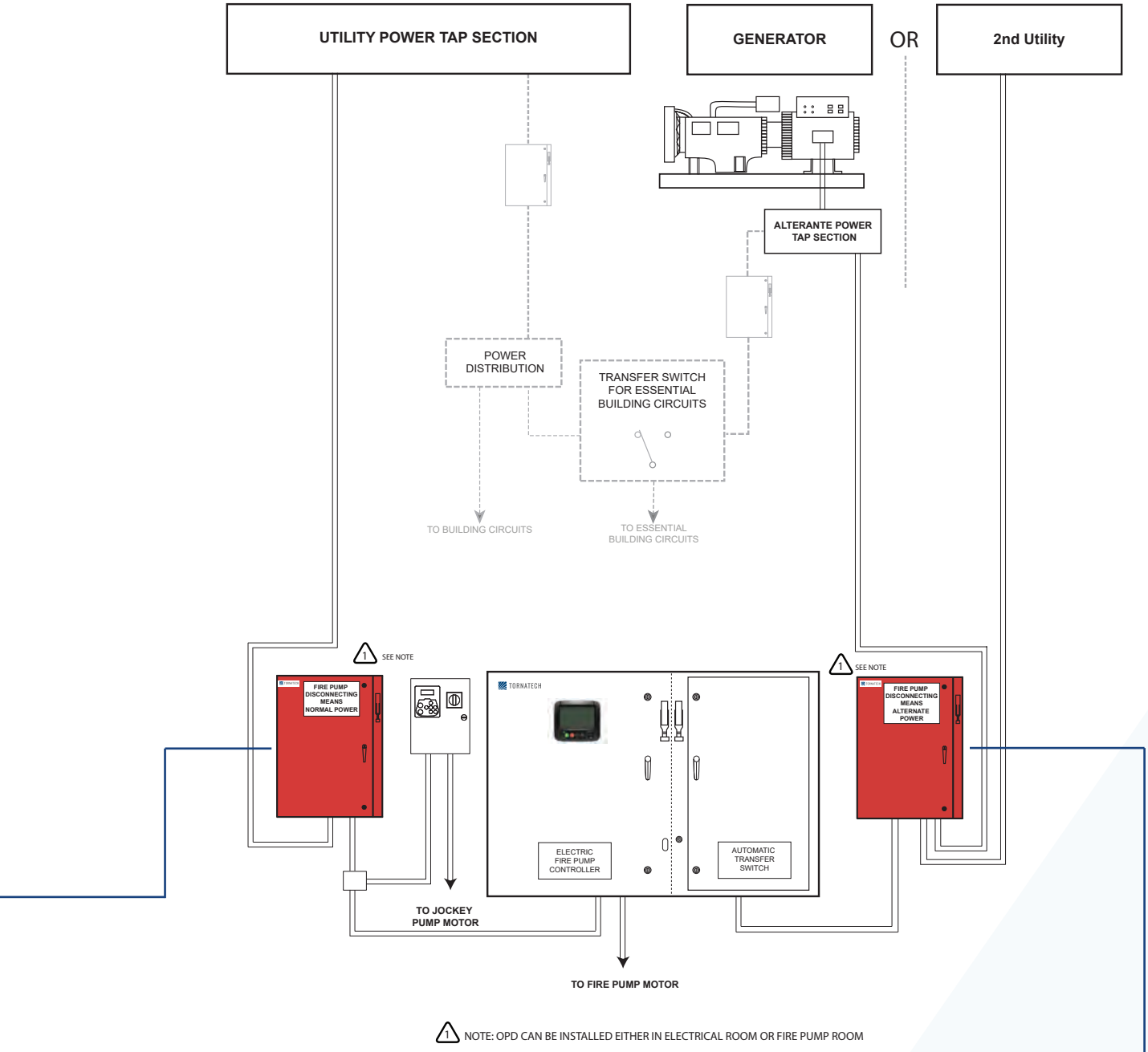
c. The overcurrent protective device shall not open within 10 minutes at 300 percent of the full-load current of the fire pump motor(s).

d. The trip point for circuit breakers shall not be field adjustable.

OR

Recommended and acceptable alternative to: **CEC 32-206 (5)** Where the circuit breaker conforming to this rule is installed in a normal supply circuit upstream of the fire pump controller, the rating or setting of the circuit breaker shall be not less than the overcurrent protection that is provided integral with the fire pump controller

National Fire protection Association. NFPA70 National Electrical Code. 2014 ed. Quincy, Massachusetts: One Batterymarch Park, 2013. 646-48. Print.
National Fire protection Association. NFPA20 Standard for the Installation of Stationary Pumps for Fire Protection. 2013 ed. Quincy, Massachusetts: One Batterymarch Park, 2013. 31. Print.
CSA Group. Canadian Electrical Code, Part 1. 2015 ed. 2015. Section 32.182-183. Print.



NFPA70 (NEC) 695.3 (F) (2)

Overcurrent Device Selection

An instantaneous trip circuit breaker shall be permitted in lieu of the overcurrent devices specified in **695.4 (B) (2) (a) (1)**, provided that it is part of a transfer switch assembly for a fire pump service that complies with **695.4 (B) (2) (a) (2).**

OR

Recommended and acceptable alternative to: **CEC 32.206 (4)** Where the circuit breaker conforming to this Rule is installed in an emergency supply circuit between the emergency power source and the fire pump transfer switch, the rating or setting of the circuit breaker shall comply with Rule 28-200.

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c UL® US

TORNATECH

LISTEN DEVELOP LEAD

Model OPD

UL Listed Disconnecting Device

For UL Listed and FM Approved Electric Fire Pump Applications

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NFPA MEMBER 2020 - 2021

c UL US

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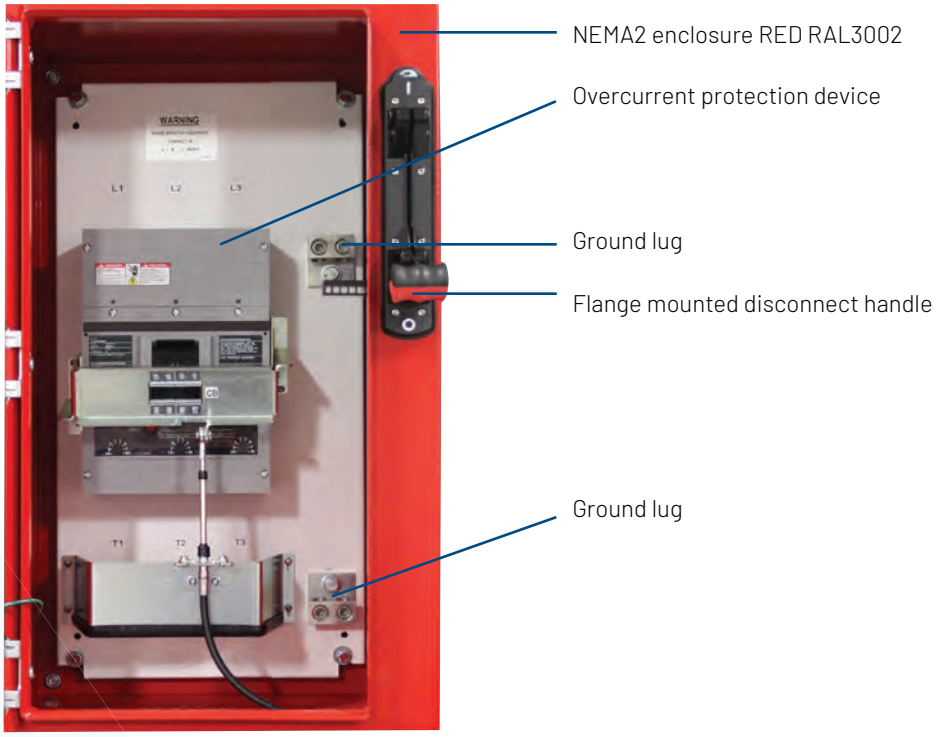

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c. The overcurrent protective device shall not open within 10 minutes at 300 percent of the full-load current of the fire pump motor(s).

d. The trip point for circuit breakers shall not be field adjustable.

OR

Recommended and acceptable alternative to: **CEC 32-206 (5)** Where the circuit breaker conforming to this rule is installed in a normal supply circuit upstream of the fire pump controller, the rating or setting of the circuit breaker shall be not less than the overcurrent protection that is provided integral with the fire pump controller

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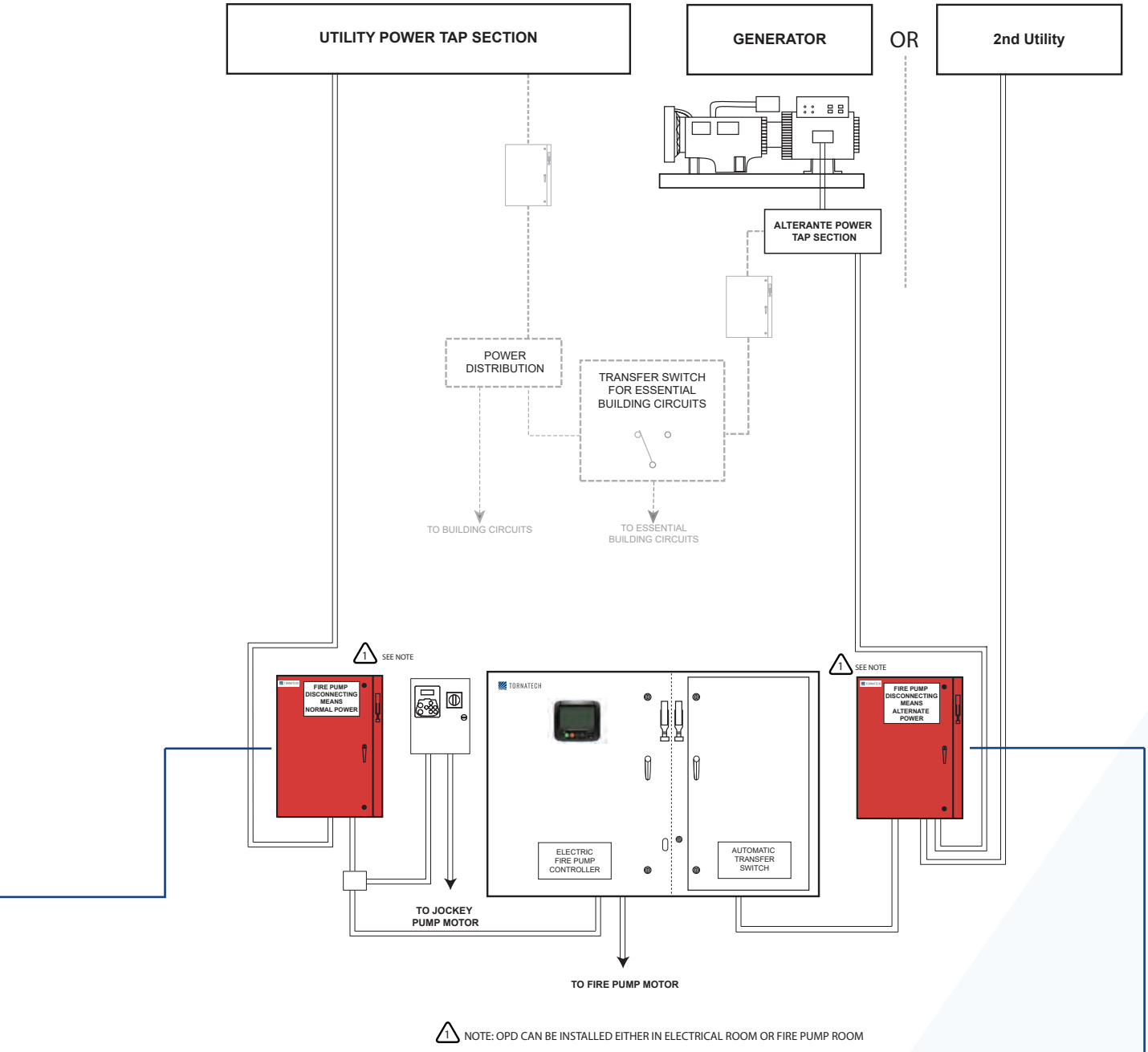

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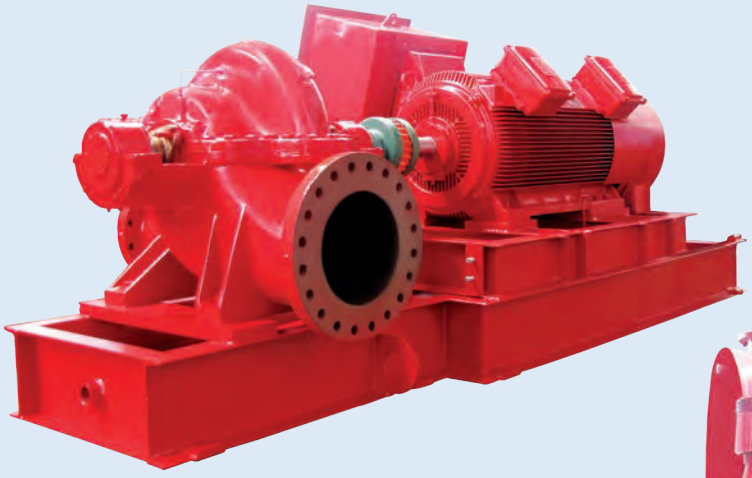
RUHRPUMPEN

Specialist for Pumping Technology



FIRE SYSTEMS

Ruhrpumpen Fire Systems

Fire pumps play a vital role as the first response to a fire situation, saving countless lives and property from destruction. They are usually found in manufacturing and industrial facilities, housing complexes, power plants, schools, hospitals, airports, commercial buildings and offshore oil platforms.

A fire pump is the component responsible for supplying the adequate water pressure to fire sprinklers and hose standpipes in order to control or contain a fire. Ruhrpumpen's centrifugal pumps combine the latest in hydraulic design with decades of application experience to meet today's fire security requirements.

Per NFPA-20, we are able to supply ranges from 25 GPM up to 5000 GPM with net pressures of 40 PSI or more. Our fire pumps are available as single pumping units or complete pre-packaged fire systems (with or without full enclosure).

Single source responsibility and service

The combination of our engineering team, ISO 9001 manufacturing team, outstanding design, and quality construction, all ensure Ruhrpumpen's fire pumps and systems have strong reliability in case of an emergency. Ruhrpumpen's Global Service Network provides all forms of field services (start-up support, inspection, maintenance, and much more) no matter where your site is located.

Time and space saving

Our cost-effective packaged fire systems save you time and space as they can be dimensioned to precisely fit the specified area facilitating its installation. The system is delivered on a single shipment, leaving only pipe and power connections to be completed on site.

Fully customizable

In order to match the specific requirements of any application, our engineering team can design complete pre-packaged fire pump systems that can vary from a fire pump with an electric driver on a skid, to a fully prefabricated unit with environmental enclosures.

Ruhrpumpen is your single source supplier

- Original Equipment
- Spare parts
- Installation and startup support
- Repair and maintenance
- Engineering, training and consulting

Benefits of our pumps:

- Proven reliability
- High efficiency designs ensure lowest operating cost
- Robust design allows for long system life with minimal maintenance
- Optimized total cost of ownership

As per NFPA-20, each pump is tested at our manufacturing facilities to provide detailed performance data and to demonstrate its compliance with the required specifications.

Before it's painted red...

Nothing is left to chance with a Ruhrpumpen fire pump system. It is completely built, tested and certified in our facility, ensuring that the stringent requirements of of governing bodies such as the National Fire Protection Association (NFPA), Factory Mutual (FM), Underwriter's Laboratories (UL) and Electrical Testing Laboratories (ETL) are met.

During the manufacturing and assembly processes, each pump goes through meticulous production controls, inspections and tests. We inspect all fire suppression equipment through advanced testing techniques and precise calibration instruments that enable us to guarantee that their operation complies with the required standards.

- Calculations for bearing life, bolt stress, shaft deflection and shear stress must be submitted and approved by UL & FM.
- Casing hydrostatically tested – two times rated maximum working pressure.
- Performance testing witnessed by UL & FM representatives.
- Quarterly follow-up audits of product and facilities is conducted by both UL & FM.
- Drawings of any component on the Primary Materials list must be approved before any change transpires.

Ruhrpumpen Fire Pumps: the heart of your fire protection system

Construction materials

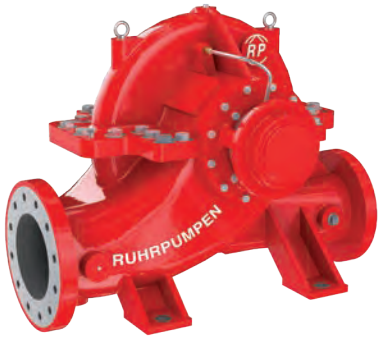
Our fire pump components such as casing, impeller, shaft and bowls, are available in standard and special metallurgies to address specific applications.

Standard materials include:

- Cast iron
- Ductile iron
- Carbon steel

Metallurgies available for sea/ brackish water applications and harsh environments:

- Stainless steel
- Duplex
- Super Duplex
- Nickel-Aluminum-Bronze



Split case fire pump

Horizontal, single and two stage, split case centrifugal pumps

Characteristics

- Flows from 150 to 5000 GPM
- Pressures from 40 to 355 + PSI
- Electric or Diesel driven
- UL-448 listed
- FM-1311 approved
- NFPA-20 design
- Factory tested

Benefits

- Ease of installation and maintenance
- Wide range of applications
- Construction materials for seawater service are available

End suction fire pump

Horizontal, single stage, end suction centrifugal pumps

Characteristics

- Flows from 150 to 400 GPM
- Pressures from 40 to 250 + PSI
- Electric or Diesel driven
- UL-448 listed
- FM-1319 approved
- NFPA-20 design
- Factory tested

Benefits

- Back pull-out design simplifies maintenance and reduces problems associated with pipe strain

Vertical turbine fire pump

Vertical, single and multi-stage, turbine pumps

Characteristics

- Flows from 250 to 5000 GPM
- Pressures from 40 to 519 + PSI
- No priming
- Adaptability to water level
- Electric or Diesel driven
- UL-448 listed
- FM-1312 approved
- NFPA-20 design
- Factory tested

Benefits

- UL listed and FM approved pump for suction lift conditions
- Minimal maintenance
- Can be used where city water is not available and ponds or lakes are the only water supply
- Construction materials for seawater service are available

In-line fire pump

Vertical in-line centrifugal pumps

Characteristics

- Flows from 150 to 1000 GPM
- Only available with electric drive
- Pending UL Listing and FM Approval
- NFPA-20 design
- Factory tested

Benefits

- Top pull-out design simplifies maintenance
- Compact, space-saving design

Jockey pump

Pressure maintenance jockey pumps are available as vertical multi-stage and end suction pumps

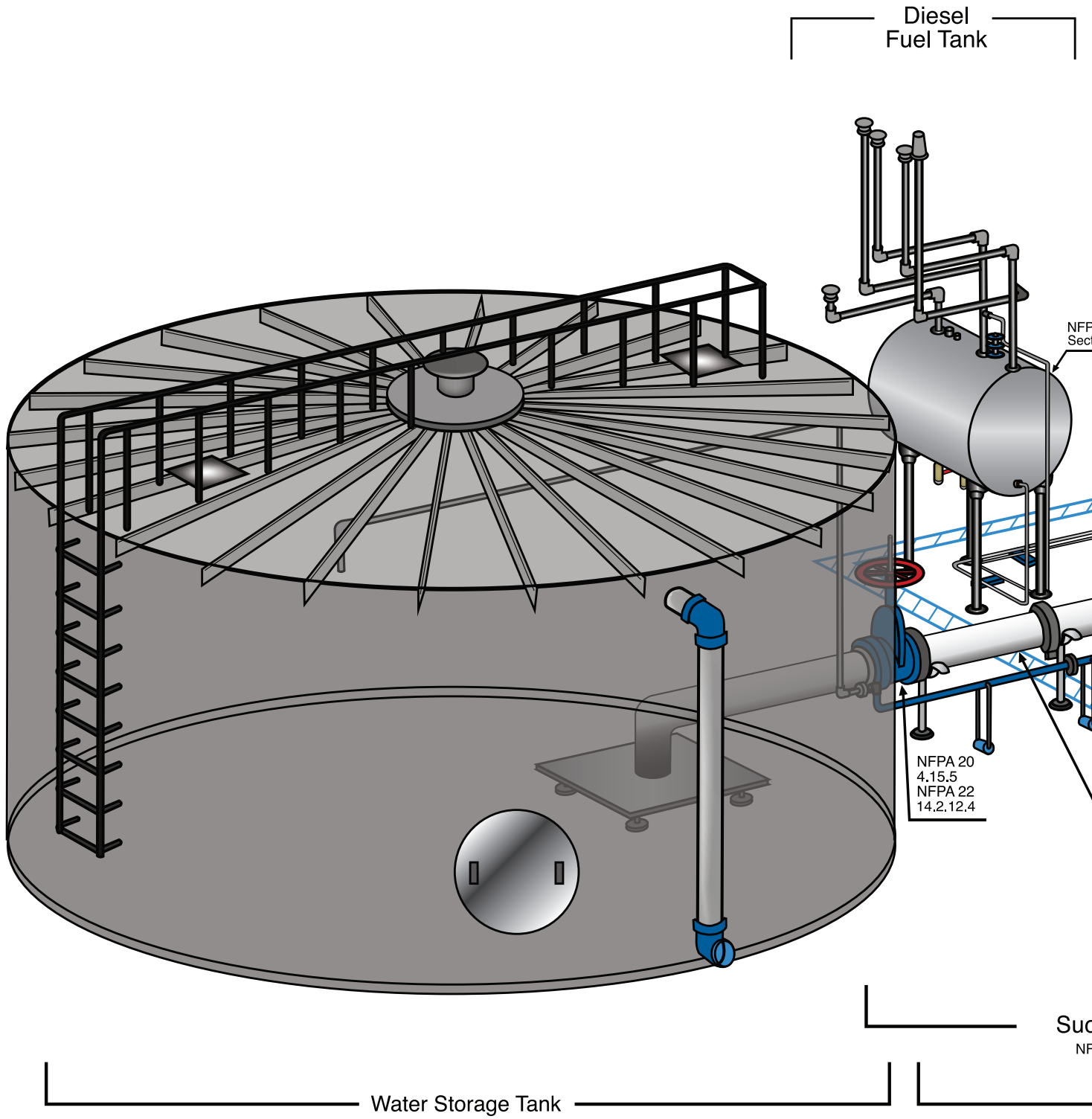
Characteristics

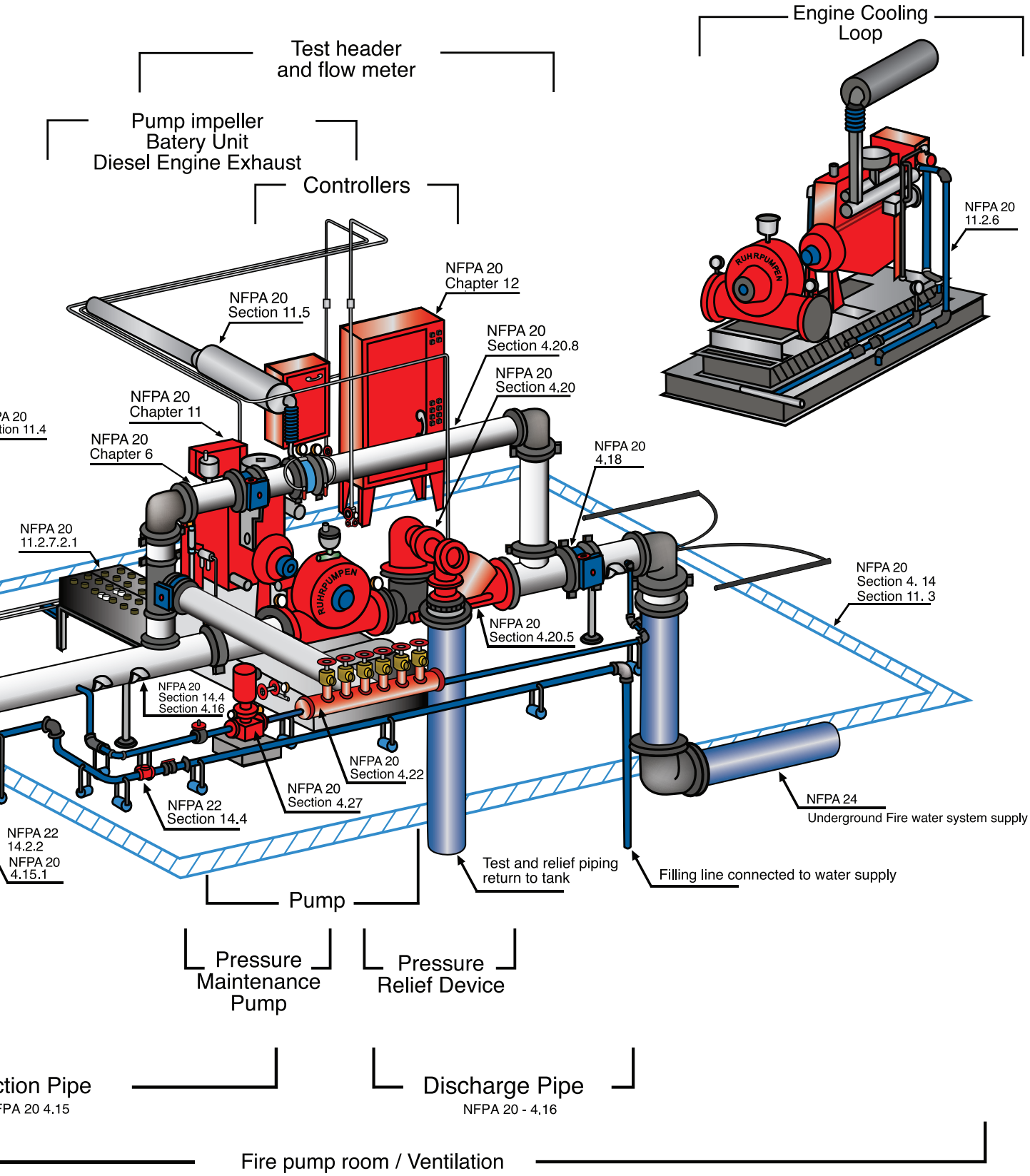
- Jockey pumps are normally sized for 1% flow and a 10 to 20 PSI higher pressure of the fire pump
- Maintains system pressure to prevent the main fire pump from starting when small leaks occur
- Factory tested

Benefits

- Versatility in performance and design
- Low operating cost

Firefighting system arrangement according to NFPA



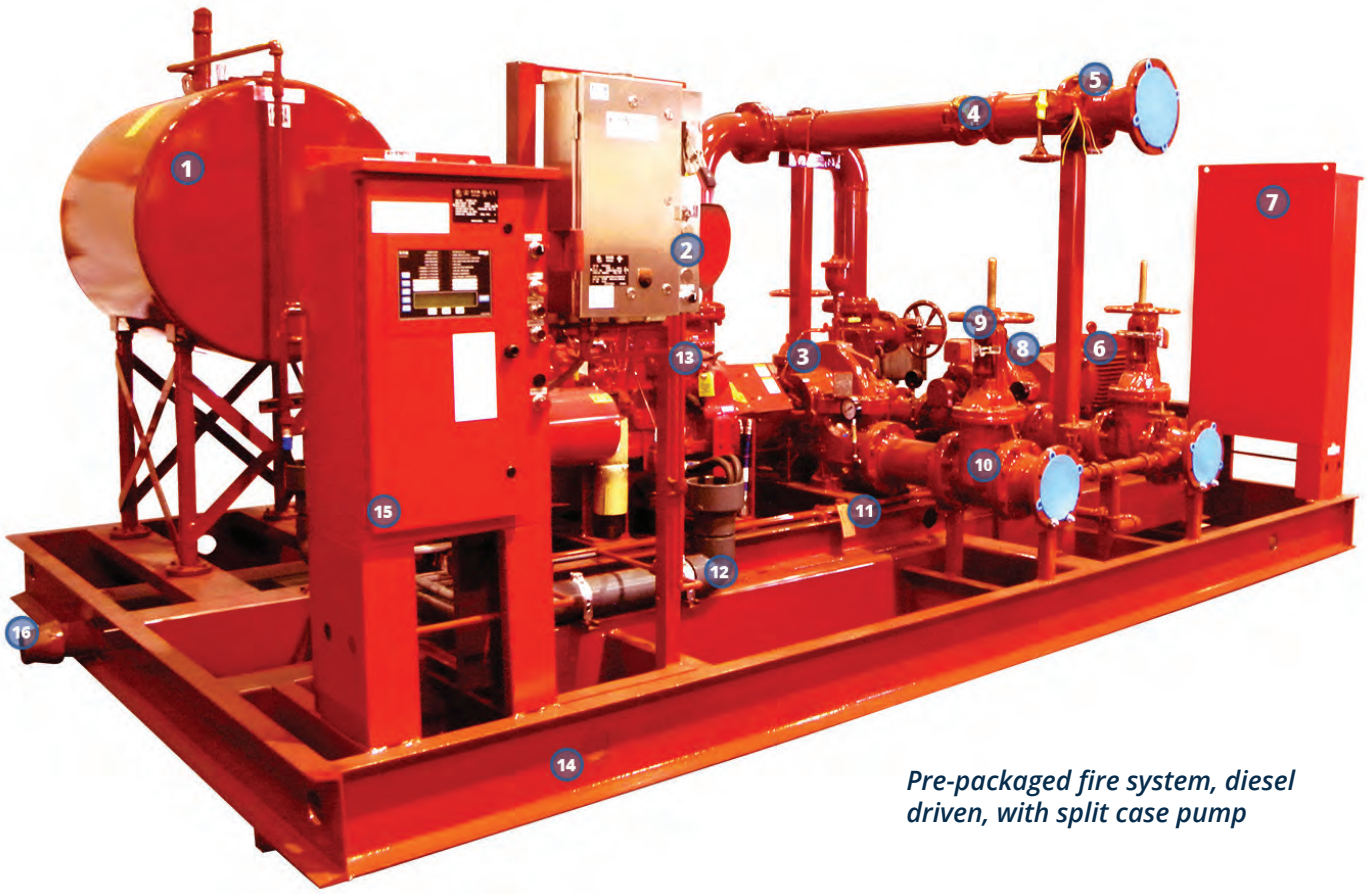


■ Source: NFPA 20 Stationary Fire Pumps Handbook 2019

Packaged Fire Pump Systems

Our fire protection pumping solutions can be found all around the world in a variety of industrial, commercial and residential applications. RP's pre-packaged fire systems are tailored and built to the requirements of the customer ensuring that they meet international and local safety regulations.

Our pre-packaged systems accommodate any of the RP fire pump models, with drivers, control systems and pipework on a common base for a plug-and-play installation. They can be skid mounted, with or without enclosure, and supplied with electric motor or diesel engine.

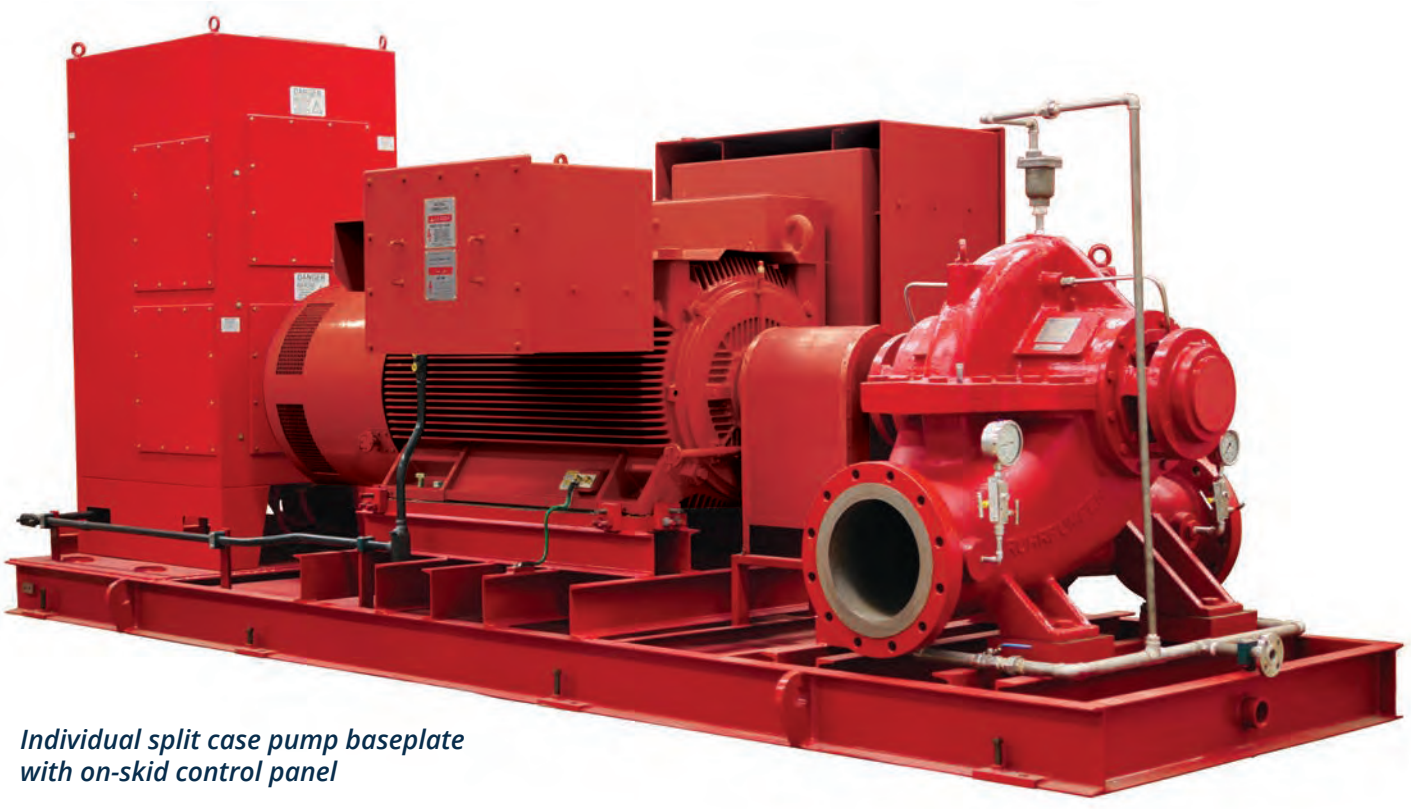


Pre-packaged fire system, diesel driven, with split case pump

1. *UL-142 Double Wall Day Tank*
2. *UL Listed Jockey Pump Controllers*
3. *UL/FM Fire Pump*
4. *FM Flow Meter*
5. *Throttling Valve*
6. *Electric Motor*
7. *UL/FM Electric Control Panel*
8. *Jockey Pump*
9. *Tamper Switches*
10. *UL/FM Listed OS&Y Gate Valves*
11. *Copper Sensing Lines*
12. *Schedule 8-CPVC Containment Piping for Fuel Piping*
13. *UL/FM Listed Diesel Engine*
14. *ASTM A36 Structural Steel Skid*
15. *UL/FM Diesel Control Panel*
16. *Floor Drain System*

Other (optional) features of Ruhrpumpen's Pre-Packaged Fire Systems:

- Our marine fire suppression systems offer high performance coating systems for corrosive or coastal environments
- Stainless piping for seawater or brackish water applications
- NFPA-20 compliant mobile pre-packaged fire systems are available
- ABS certification for offshore platform fire pump packages and fire skid units
- Leveling bolts
- Custom alarm panels



Individual split case pump baseplate with on-skid control panel

NFPA-20 compliant Fire Pump Houses

Completely pre-assembled and fully enclosed packages for a trouble-free and quick installation

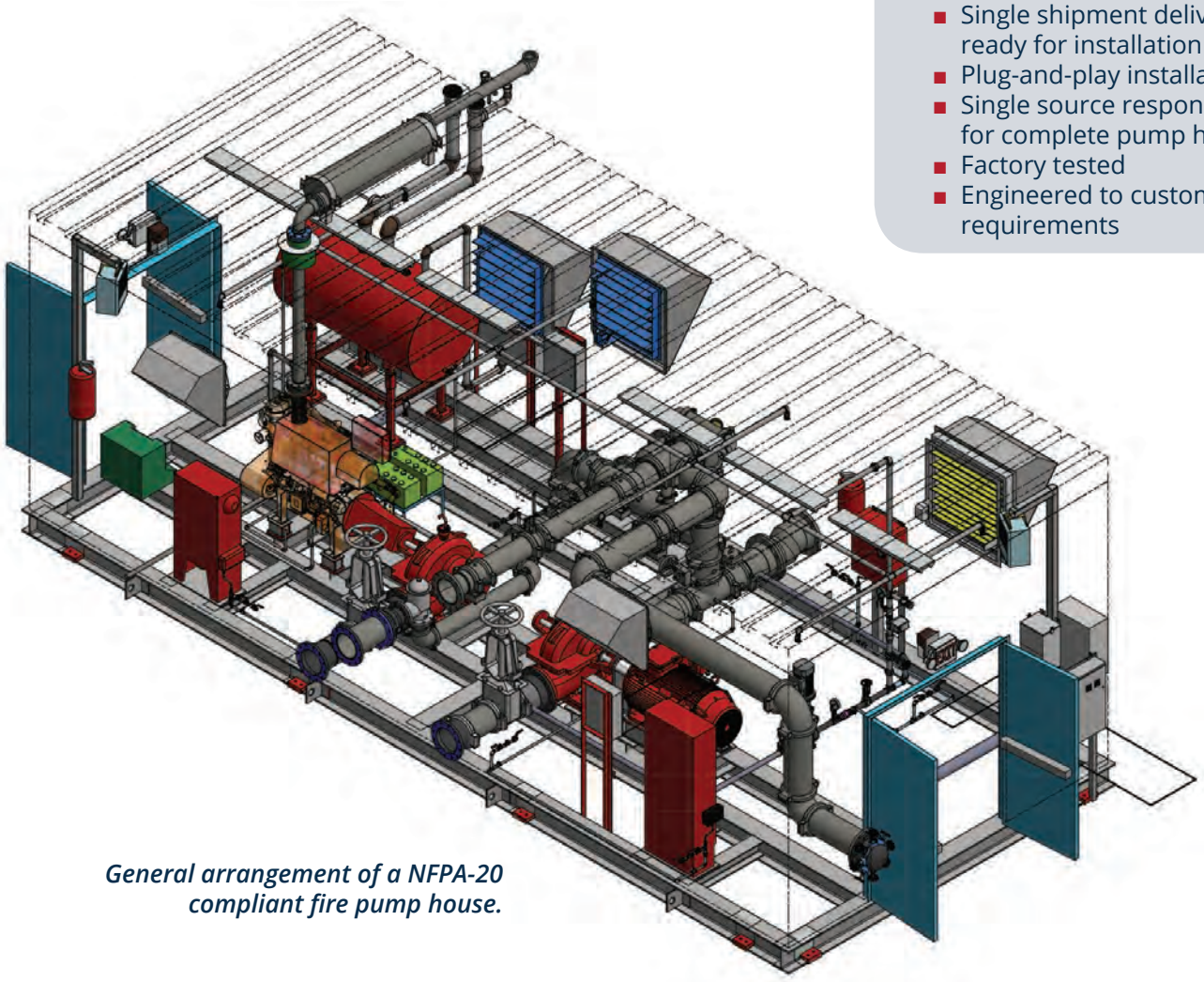
Our packaged systems can be contained on a weather-proof, non-combustible enclosure engineered and constructed per NFPA-20 and including:

- Heating and ventilation
- Approved or listed source of heat
- Normal and emergency lighting
- Drainage
- Convenience outlet

Optional features:

- Pre-wired and pre-piped
- Pre-piped sprinkler systems for pump house interior
- Exhaust fan
- Mini power zone
- Wall or floor access for piping
- Containment piping
- Architectural finishes
- Safety equipment
- Grating floor deck design
- Seismic calculations with PE Stamps
- Open skid design
- Diamond plate floor deck design

- UL Listed and FM Approved pumps
- ETL listed
- Single shipment delivery, ready for installation
- Plug-and-play installation
- Single source responsibililty for complete pump house
- Factory tested
- Engineered to customer requirements



General arrangement of a NFPA-20 compliant fire pump house.

Control Panels

When there's an emergency, it's better to count on a reliable fire pump controller. Ruhrpumpen can offer electric, diesel and jockey control panels; which are available for configurations with one or more drivers, and programming for fully automatic or manual operation types.

Electric and diesel control panels are UL/ULC listed and approved by FM and CSA, as well as meeting or exceeding the requirements of NFPA-20 and NFPA-70.

Electric panels

Low voltage configurations include:

- Across the line
- Soft start
- Delta open / closed
- Primary resistor
- Auto-transformer
- Part winding

Medium voltage configuration:

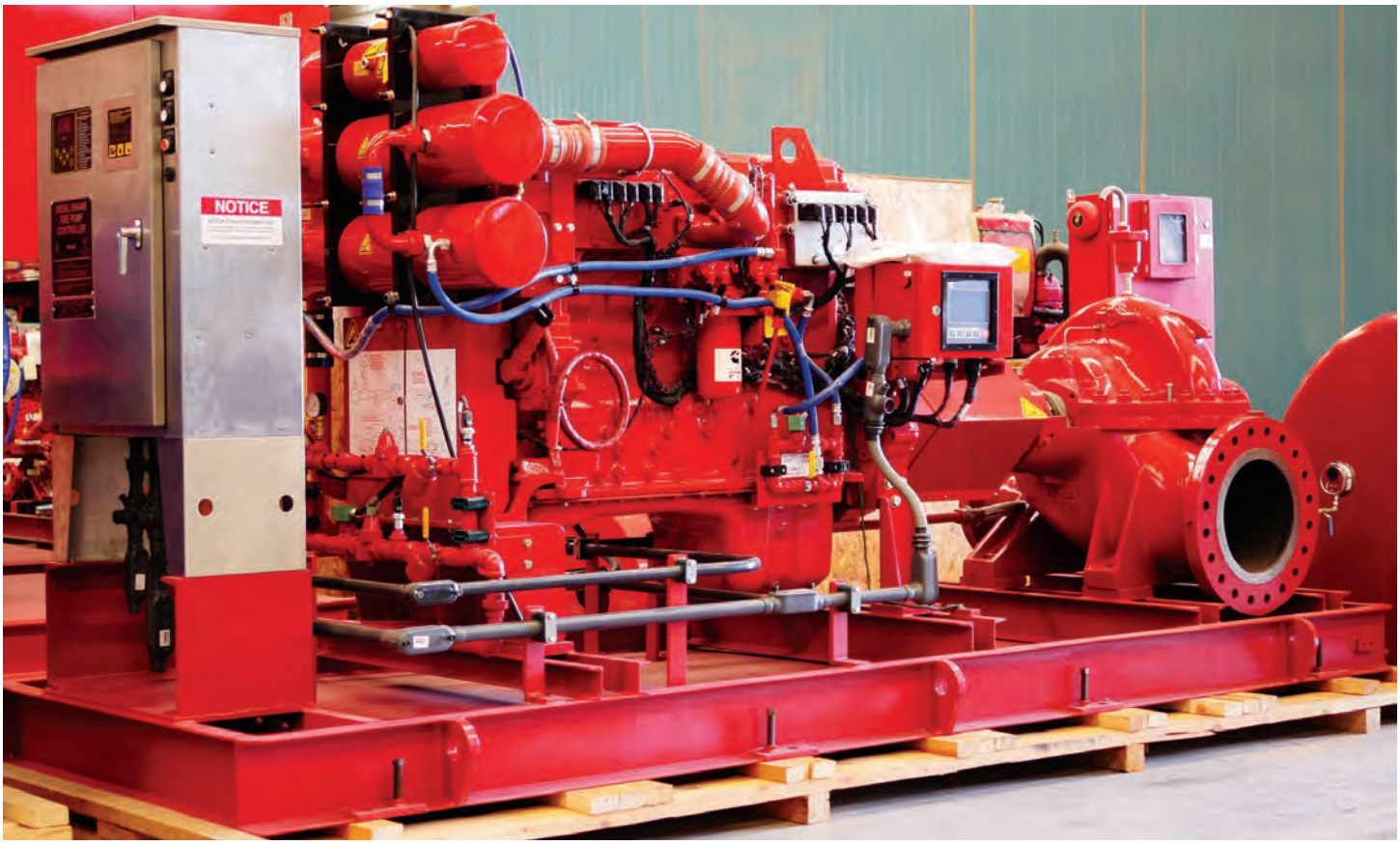
- Across the line

Diesel panels

Diesel control panels are available for 12 volt (120, 220/240 VAC) diesel fire pump engines.

Jockey panels

Single or three phase jockey fire pump panels designed for 50 & 60 Hz in a variety of voltages.



Attachment 6

0-FW-TNK-001
FIRE WATER TANK
125,000 GALLON

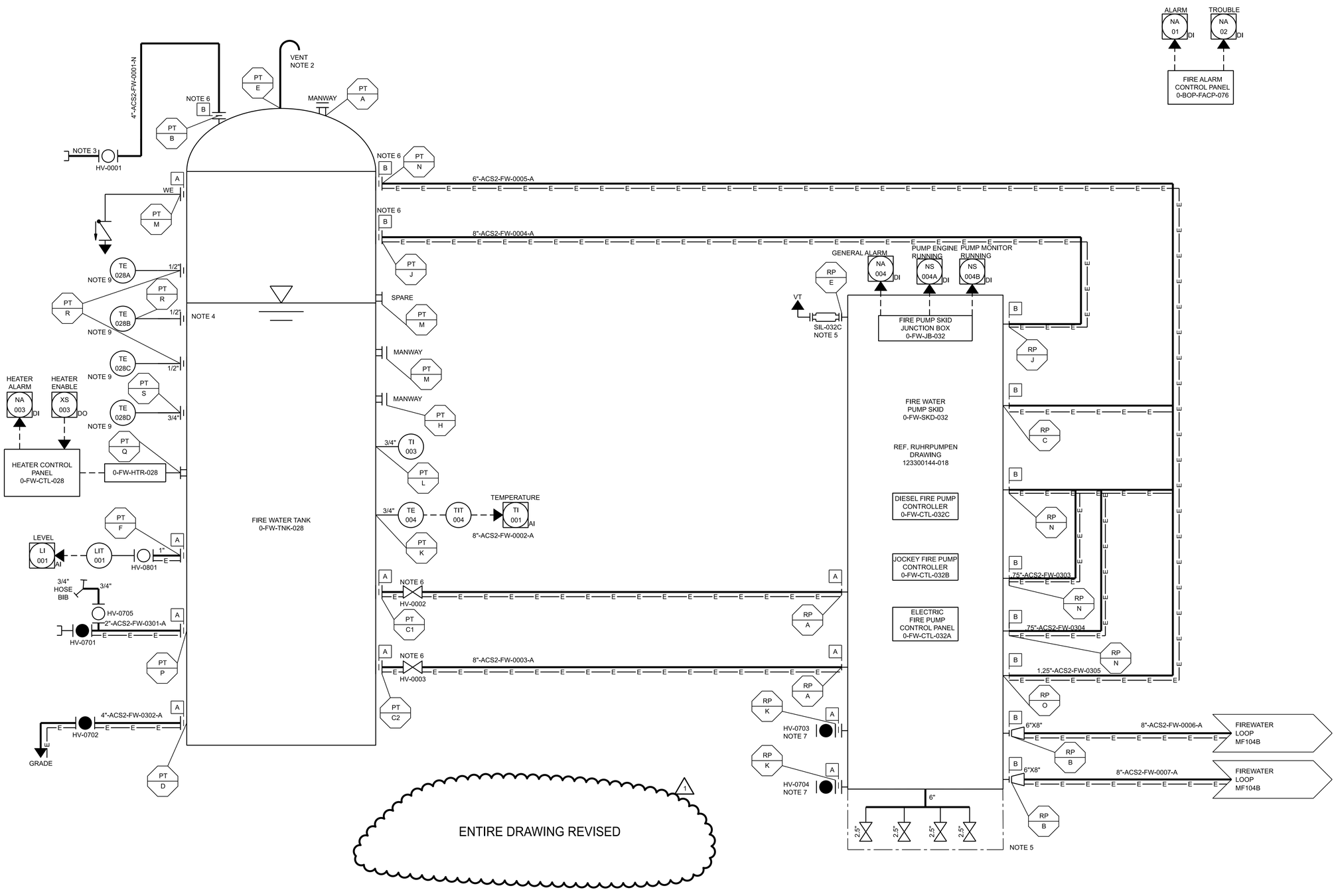
160,000 GALLON (FIRE WATER)
5,000 GALLON (SERVICE WATER)
165,000 GALLON (TOTAL)

0-FW-SKD-032
FIRE WATER PUMP SKID

0-FW-PMP-032A
ELECTRIC PUMP:
1000 GPM @ 291 FT TDH
150 HP , 480/3PH/60HZ

0-FW-PMP-032B
JOCKEY PUMP:
10 GPM @ 135 PSIG
1.5HP , 480V/3PH/60HZ

0-FW-PMP-032C
DIESEL PUMP
1000 GPM @ 190 FT TDH
175 HP DIESEL ENGINE



ENTIRE DRAWING REVISED

NOTES:

1. ALL COMPONENTS INCLUDING VALVES AND INSTRUMENTATION HAVE THE PREFIX "0-FW-" PRIOR TO THEIR TAGS ON THIS DRAWING, UNLESS OTHERWISE NOTED.
2. PROVIDE WITH BIRD SCREEN.
3. CONNECTION FOR TANKER TRUCK REFILL CONNNECTION. DRAIN COMPLETELY WHEN FREEZING CONDITIONS ARE PRESENT. PROVIDE 4" FNPT BY MALE CAMLOCK FITTING.
4. STAND PIPE TO ABOVE FIRE WATER RESERVE.
5. SUPPLIED BY EQUIPMENT VENDOR
6. PROVIDE INSULATING FLANGE KIT
7. SKID FLOOR DRAINS. VALVES ARE NORMALLY CLOSED. DRAIN TO SUITABLE CONTAINER FOR DISPOSAL.
8. OVERFLOW FLAPPER
9. HEATER TEMPERATURE INSTRUMENT TO BE WIRED TO HEATER PANEL IN ACCORDANCE WITH TANK HEATER DRAWINGS

PIPE CODE

PIPE CODE	PIPE SPEC	INSULATION CLASS
A	ACS2	FIBERGLASS A
B	ACS2	FIBERGLASS A
C	APE1	NONE
D	ADI2	ELASTOMER
*	SEE SYSTEM P&ID	

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	REVISE CONNECTION SIZE	MRM	DT	JPS	11/6/24

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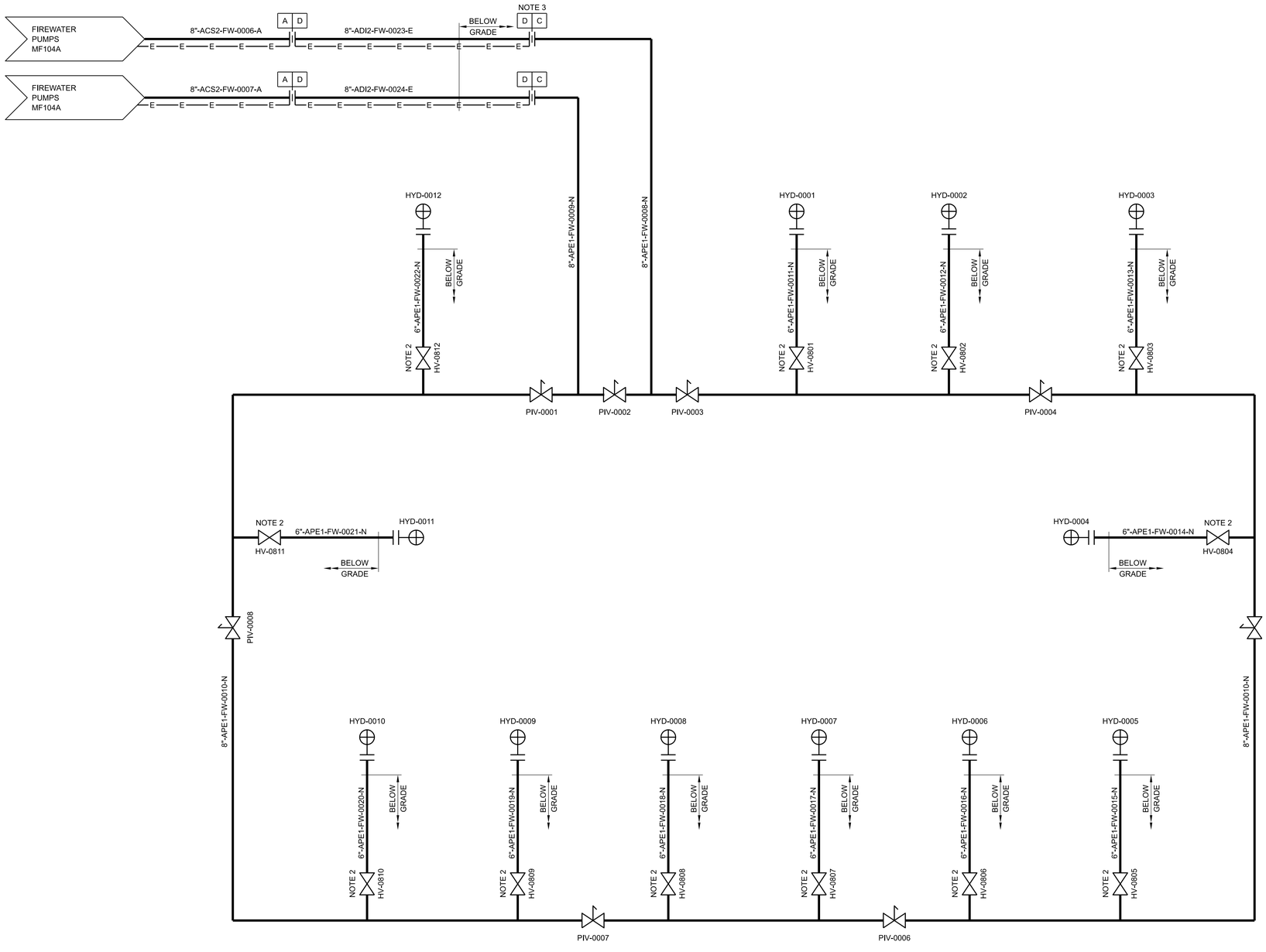
MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

PIPING & INSTRUMENTATION DIAGRAM FIREWATER SYSTEM STORAGE & DISTRIBUTION

DESIGNED	J.P. SOLAN
DRAWN	M. MCGINNIS
CHECKED	D. TENNANT
APPROVED	M. REED
APPROVED	J.P. SOLAN
DATE	11/6/24

SCALE: NO SCALE
NO. 31324
REV. 1
MF104A

CADD D3-R5



NOTES:

1. ALL COMPONENTS INCLUDING VALVES AND INSTRUMENTATION HAVE THE PREFIX "0-FW-" PRIOR TO THEIR TAGS ON THIS DRAWING, UNLESS OTHERWISE NOTED.
2. FOR HYDRANT, VALVE AND VALVE BOX DETAIL, SEE SPECIFICATION SECTION 33 11 00
3. REFERENCE UNDERGROUND PIPING DRAWINGS FOR MATERIAL TRANSITION DETAILS

PIPE CODE

PIPE CODE	PIPE SPEC	INSULATION CLASS
A	ACS2	FIBERGLASS A
B	ACS2	NONE
C	APE1	NONE
D	ADI2	ELASTOMER
*	SEE SYSTEM P&ID	

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
		-	-	-	-
		-	-	-	-

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

PIPING & INSTRUMENTATION DIAGRAM FIREWATER SYSTEM DISTRIBUTION & HYDRANT LOOP

DESIGNED	J.P. SOLAN
DRAWN	M. MCGINNIS
CHECKED	D. TENNANT
APPROVED	M. REED
APPROVED	J.P. SOLAN
DATE	07/26/24

SCALE: NONE

NO. 31324 — REV. 0

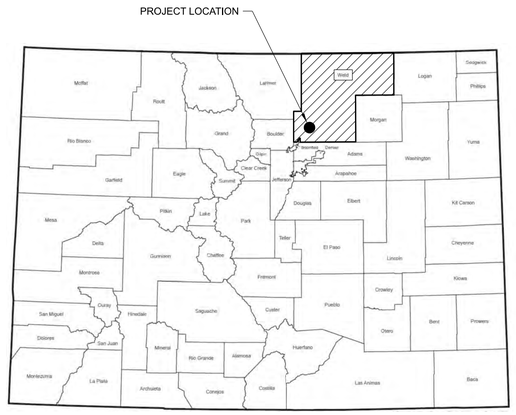
MF104B

MOUNTAIN PEAK POWER STATION PROJECT

MOUNTAIN PEAK POWER, LLC

NORTHWEST OF WELD CR 20 & WELD CR 55
WELD COUNTY, COLORADO

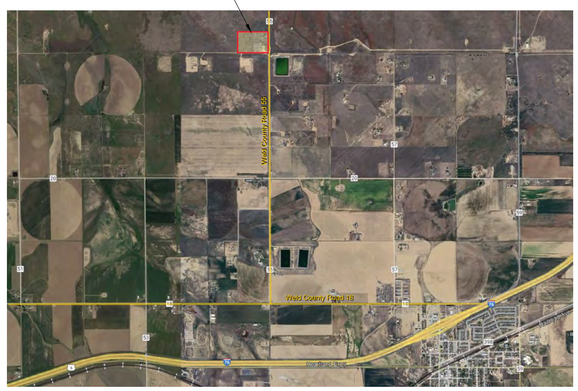
MECHANICAL CONTRACTOR PACKAGE



LOCATION MAP

NOT TO SCALE

NORTH



VICINITY MAP

NOT TO SCALE

NORTH

SHEET INDEX

DWG NO.	DESCRIPTION 1	DESCRIPTION 2	DESCRIPTION 3
MU001	MECHANICAL	UNDERGROUND PIPING DETAILS	
MU002	MECHANICAL	CATHODIC PROTECTION DETAILS	
MU100	MECHANICAL	UNDERGROUND PIPING PLAN	KEY PLAN
MU111	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 11
MU112	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 12
MU113	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 13
MU114	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 14
MU115	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 15
MU121	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 21
MU122	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 22
MU123	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 23
MU124	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 24
MU125	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 25
MU131	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 31
MU132	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 32
MU133	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 33
MU134	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 34
MU135	MECHANICAL	UNDERGROUND PIPING PLAN	AREA 35
PG001	MECHANICAL	PIPE CLASS SPECIFICATIONS	
PG002	MECHANICAL	PIPE CLASS SPECIFICATIONS	
PG003	MECHANICAL	STANDARDS AND DETAILS	
PG004	MECHANICAL	STANDARDS AND DETAILS	

DWG NO.	DESCRIPTION 1	DESCRIPTION 2	DESCRIPTION 3
GG101	GENERAL ARRANGEMENT		
GG102	GENERAL ARRANGEMENT	COMBUSTION TURBINE GENERATOR	
MF001	PIPING & INSTRUMENTATION DIAGRAM	LEGEND	SHEET 1
MF002	PIPING & INSTRUMENTATION DIAGRAM	LEGEND	SHEET 2
MF101A	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 1
MF101B	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 2
MF101C	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 3
MF101D	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 4
MF101E	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 5
MF101F	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	UNIT 6
MF101G	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE GENERATOR	COMMON
MF102A	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	DISTRIBUTION
MF102B	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 1
MF102C	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 2
MF102D	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 3
MF102E	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 4
MF102F	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 5
MF102G	PIPING & INSTRUMENTATION DIAGRAM	NATURAL GAS SYSTEM	UNIT 6
MF103A	PIPING & INSTRUMENTATION DIAGRAM	COMPRESSED AIR SYSTEM	COMPRESSORS
MF103B	PIPING & INSTRUMENTATION DIAGRAM	COMPRESSED AIR SYSTEM	DISTRIBUTION
MF103C	PIPING & INSTRUMENTATION DIAGRAM	COMPRESSED AIR SYSTEM	DISTRIBUTION
MF104A	PIPING & INSTRUMENTATION DIAGRAM	FIREWATER SYSTEM	STORAGE & DISTRIBUTION
MF104B	PIPING & INSTRUMENTATION DIAGRAM	FIREWATER SYSTEM	DISTRIBUTION & HYDRANT LOOP
MF105A	PIPING & INSTRUMENTATION DIAGRAM	AMMONIA SYSTEM	STORAGE & FORWARDING
MF105B	PIPING & INSTRUMENTATION DIAGRAM	AMMONIA SYSTEM	DISTRIBUTION
MF106A	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 1
MF106B	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 2
MF106C	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 3
MF106D	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 4
MF106E	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 5
MF106F	PIPING & INSTRUMENTATION DIAGRAM	TURBINE EXHAUST SYSTEM	UNIT 6
MF107A	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 1
MF107B	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 2
MF107C	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 3
MF107D	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 4
MF107E	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 5
MF107F	PIPING & INSTRUMENTATION DIAGRAM	COMBUSTION TURBINE DRAINS	UNIT 6
FP100	MECHANICAL	FIRE PROTECTION PLAN	

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL GENERAL COVER SHEET

DESIGNED	M. McGINNIS
DRAWN	M. McGINNIS
CHECKED	J. SOLAN
APPROVED	J. SOLAN
APPROVED	M.R. REED
DATE	09/11/24

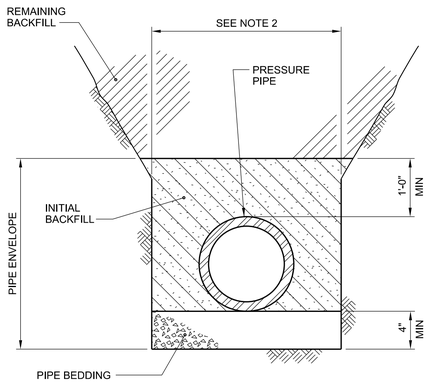
SCALE: N.T.S.

NO. 31324.07

REV. 0

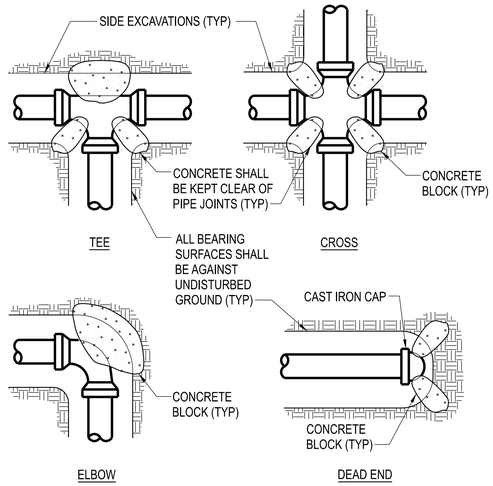
MG001

CADD D3-R5



TYPICAL TRENCH CROSS-SECTION

PRESSURE PIPE BEDDING
DETAIL CS-25



TYPICAL THRUST BLOCK INSTALLATION DETAILS

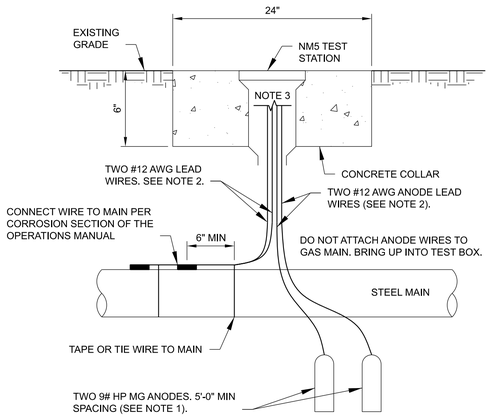
BEARING AREAS EACH DIRECTION OF THRUST FOR HORIZONTAL BENDS (in²)				
PIPE SIZE (in)	TEES & DEADENDS	90° ELBOWS	45° ELBOWS	22 1/2° ELBOWS
≤ 3	140	202	108	62
6	496	713	388	202
8	884	1256	682	341
10	1380	1968	1054	542
12	1969	2821	1535	775
14	2697	3844	2077	1054
16	3519	5022	2712	1380
18	4448	6355	3441	1752
19	4760	7362	3844	1968
NOTE: ASSUME SOIL BEARING CAPACITY OF 18.5lb/in². IF REQUIRED BEARING AREA IS LESS THAN 71.3 in², USE RESTRAINED JOINTS FOR THRUST RESTRAINT PER MANUFACTURER'S RECOMMENDATIONS.				

NOTES

1. ELEVATIONS AND ALIGNMENT OF THE PIPING SHALL BE AS SHOWN ON THE DRAWINGS.
2. MAXIMUM TRENCH WIDTH = PIPE OUTSIDE DIAMETER PLUS 2'. CONSULT THE ENGINEER SHOULD ADDITIONAL WIDTH BE REQUIRED TO PROVIDE ADEQUATE ROOM FOR JOINING THE PIPING IN THE TRENCH, INSPECTING THE PIPING JOINTS, OR PLACEMENT AND COMPACTION OF THE PIPE ZONE BEDDING AND BACKFILL MATERIALS.
3. FOR CARBON STEEL PIPE: IF HARD UNYEILDING MATERIALS OR ORGANIC MATERIALS ARE ENCOUNTERED IN THE TRENCH BOTTOM, THE TRENCH SHALL BE OVEREXCAVATED AN ADDITIONAL 4" BELOW THE BEDDING ZONE AND THE MATERIAL REPLACED WITH BEDDING MATERIAL COMPACTED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR DENSITY. REFERENCE NOTE 6 FOR BEDDING MATERIAL.
4. FOR PLASTIC PIPE: IF HARD UNYEILDING MATERIALS OR STONES LARGER THAN 1 ½" DIAMETER ARE ENCOUNTERED IN THE TRENCH BOTTOM, THE TRENCH SHALL BE OVEREXCAVATED AN ADDITIONAL 4" BELOW THE BEDDING ZONE AND THE MATERIAL REPLACED WITH BEDDING MATERIAL COMPACTED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR DENSITY. REFERENCE NOTE 6 FOR BEDDING MATERIAL.
5. IF THE TRENCH BOTTOM IS UNSTABLE, THE TRENCH SHALL BE OVEREXCAVATED TO A DEPTH DETERMINED BY THE GEOTECHNICAL ENGINEER AND THE MATERIAL REPLACED WITH SAND (ASTM D2487 TYPE SW) COMPACTED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR DENSITY. IN THE EVENT OF AN EXCESSIVELY LARGE EXCAVATION, CONSULT THE ENGINEER FOR ALTERNATE REPLACEMENT MATERIALS.
6. UTILIZE SAND (ASTM D2487, TYPE SW) FOR THE PIPE ENVELOPE AS INDICATED ON THE DETAILS. SAND SHALL BE FREE OF DEBRIS, ROCKS AND PEBBLES. BEDDING SHALL BE LOOSELY COMPACTED. INITIAL BACKFILL SHALL BE COMPATED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR DENSITY WITH THE MOISURE CONTENT MAINTAINED NEAR (+/- 3%) OPTIMUM. HAND TAMPERS OR VIBRATORY COMPACTORS SHALL BE USED FOR COMPACTION IN THE PIPE ENVELOPE.
7. FINAL BACKFILL MATERIALS SHALL BE AS REQUIRED BY THE GEOTECHNICAL INVESTIGATION REPORT.

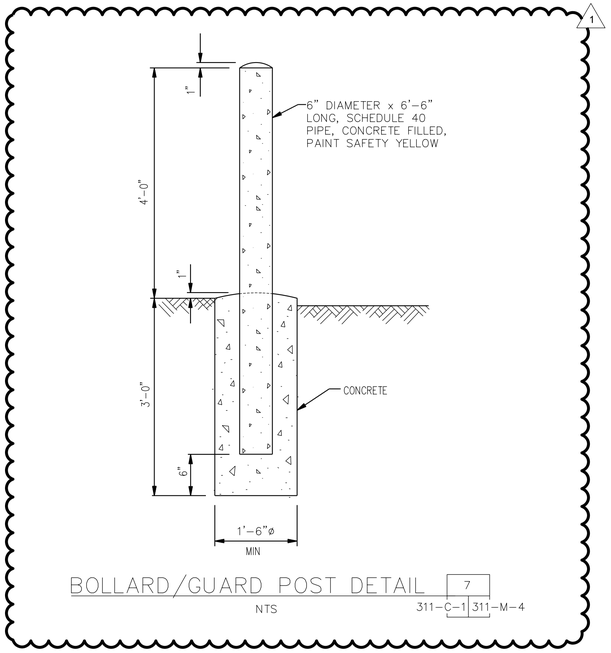
DETAIL 1

ANODE MONITORING TEST STATION



DETAIL 1 NOTES

1. ANODES TO BE INSTALLED 3' TO 5' FROM PIPE. ANODES MAY BE INSTALLED VERTICALLY OR HORIZONTALLY TO A DEPTH OF EQUAL TO THE MIDDLE OF PIPE OR DEEPER. ANODES MAY BE INSTALLED OPPOSITE EACH OTHER ON BOTH SIDES OF TAPE.
2. ALLOW FOR TWO FEET OF SLACK IN ALL LEAD WIRES IN TEST STATION.
3. CONTACT WILL CHERRY FOR TEST STATION WIRING.
4. CONTACT JAKE WEESE TO INSTALL JUMPER BETWEEN ANODE AND PIPE WIRES.



BOLLARD/GUARD POST DETAIL 7

NTS

311-C-1 | 311-M-4

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	ADDED BOLLARD DETAIL	MRM	CA	JPS	10/25/24

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8000 South Chester Street, Suite 400, Centennial, Colorado 80112-3516
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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING DETAILS

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

DESIGNED	J.P. SOLAN
DRAWN	M. McGINNIS
CHECKED	M.R. REED
APPROVED	M.R. REED
APPROVED	J.P. SOLAN
DATE	08/28/24

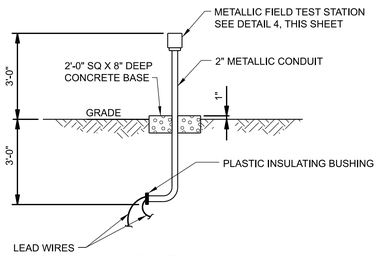
SCALE: N.T.S.

NO. 31324

REV. 1

MU001

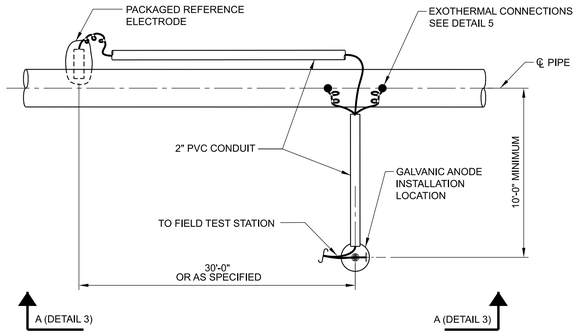
CADD D3-R5



ELEVATION

TYPICAL ABOVE GROUND FIELD TEST STATION INSTALLATION

DETAIL 1

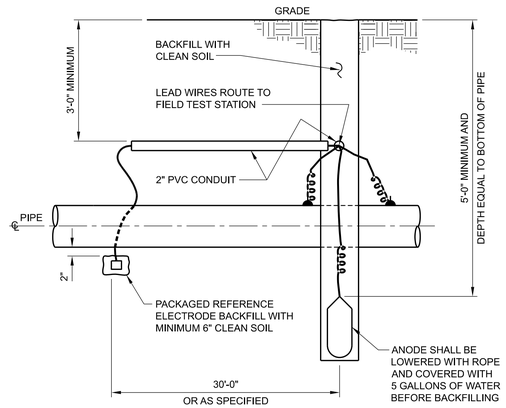


PLAN VIEW

GALVANIC ANODE AND UNDERGROUND REFERENCE

ELECTRODE INSTALLATION FOR UNDERGROUND PIPE

DETAIL 2

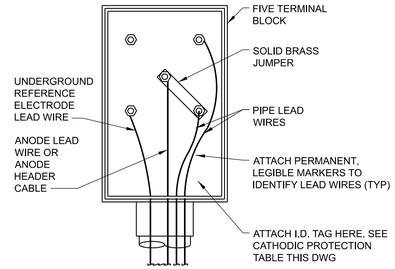


PACKAGED REFERENCE ELECTRODE

BACKFILL WITH MINIMUM 6" CLEAN SOIL

SECTION A-A

DETAIL 3



TYPICAL ABOVE GROUND TEST STATION

TERMINATION DETAIL FOR PIPE SYSTEM

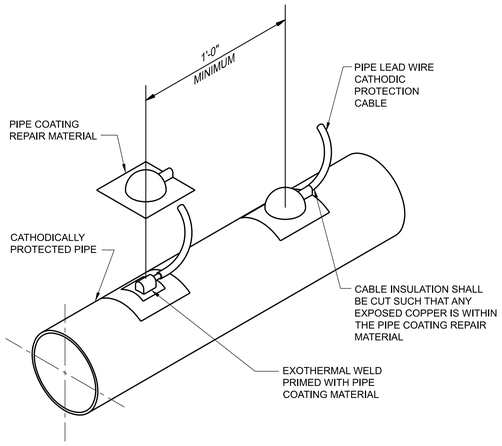
DETAIL 4

GENERAL NOTES

1. ALL LEAD WIRES SHALL BE INSTALLED WITH A MINIMUM OF 18 INCHES OF SLACK IN EACH PLACE INDICATED TO PREVENT BREAKAGE OF WIRE BECAUSE OF BACKFILL SETTLEMENT.
2. UNDERGROUND MARKING TAPE SHALL BE INSTALLED 18 INCHES BELOW GRADE DIRECTLY OVER ALL CATHODIC PROTECTION CONDUIT AND CABLES. UNDERGROUND MARKING TAPE NOT INDICATED ON THE DRAWINGS FOR CLARITY.
3. THE SUBCONTRACTOR SHALL MAINTAIN A MINIMUM OF 6 INCHES SEPARATION BETWEEN CATHODICALLY PROTECTED PIPING AND ALL OTHER NON-PIPING METALS, INCLUDING BUT NOT LIMITED TO THE GROUNDING SYSTEM, THRUST BLOCK FORMING MATERIAL (IF METALLIC), AND CONCRETE REINFORCING STEEL. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT SEPARATION FROM CONCRETE REINFORCING STEEL IS MAINTAINED WHILE CONCRETE IS BEING POURED AROUND THE METALLIC PIPE.
4. ALL LEAD WIRES #8 AWG MINIMUM, TYPE CP.

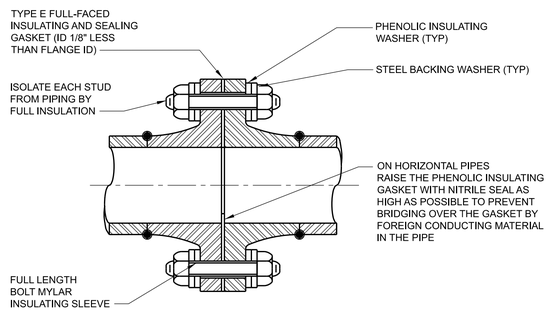
Cathodic Protection Table				
Test Station Number	Number of Anodes	Pipe Description	Drawing Number	Test Station Above Grade Flush
T08	1	6" Valve	MU112	F
T10	1	8" Valve	MU112	F
T15	1	6" Valve	MU113	F
T16	1	6" Valve	MU113	F
T17	1	8" Valve	MU114	F
T04	1	8" Pipe	MU115	F
T21	1	6" Valve	MU115	F
T24	1	6" Valve	MU121	F
T01	1	4" Pipe	MU121	F
T02	1	6" Pipe	MU123	F
T03	1	8" Pipe	MU125	F
T25	1	6" Valve	MU125	F
T45	1	8" Valve	MU131	F
T46	1	8" Valve	MU131	F
T47	1	6" Valve	MU132	F
T48	1	8" Valve	MU132	F
T49	1	6" Valve	MU133	F
T50	1	6" Valve	MU134	F
T51	1	6" Valve	MU134	F
T52	1	6" Valve	MU135	F
T53	1	8" Pipe	MU112	F

Note 1: Test station type A= Above grade post mount, F=Flush mounted at grade.



EXOTHERMAL CONNECTION TO PIPE

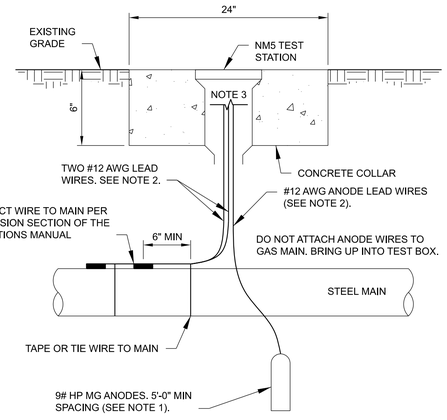
DETAIL 5



NATURAL GAS

INSULATED FLANGE FOR CATHODIC PROTECTION

DETAIL 6

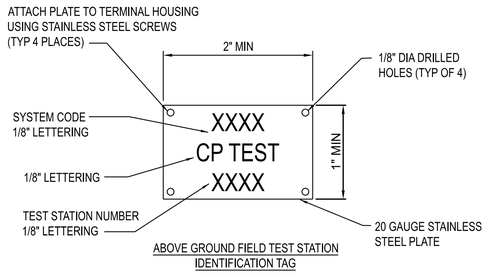


ANNODE MONITORING TEST STATION

DETAIL 7

DETAIL 7 NOTES

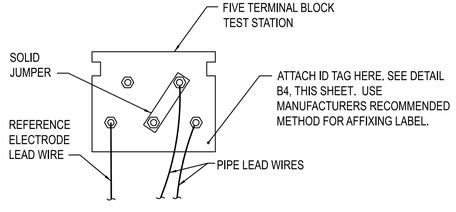
1. ANODES TO BE INSTALLED 3' TO 5' FROM PIPE. ANODES MAY BE INSTALLED VERTICALLY OR HORIZONTALLY TO A DEPTH OF EQUAL TO THE MIDDLE OF PIPE OR DEEPER. ANODES MAY BE INSTALLED OPPOSITE EACH OTHER ON BOTH SIDES OF TAPE.
2. ALLOW FOR TWO FEET OF SLACK IN ALL LEAD WIRES IN TEST STATION.



ABOVE GROUND FIELD TEST STATION

IDENTIFICATION TAG

DETAIL 8



PIPE SYSTEM FLUSH MOUNTED BELOW GRADE

TEST STATION TERMINATION DETAIL

DETAIL 9

NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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www.stanleyconsultants.com

MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL
CATHODIC PROTECTION DETAILS

DESIGNED	S. WORCESTER
DRAWN	M. McGINNIS
CHECKED	S. WORCESTER
APPROVED	M.R. REED
APPROVED	J.P. SOLAN
DATE	09/12/24

SCALE: N.T.S.

NO. 31324

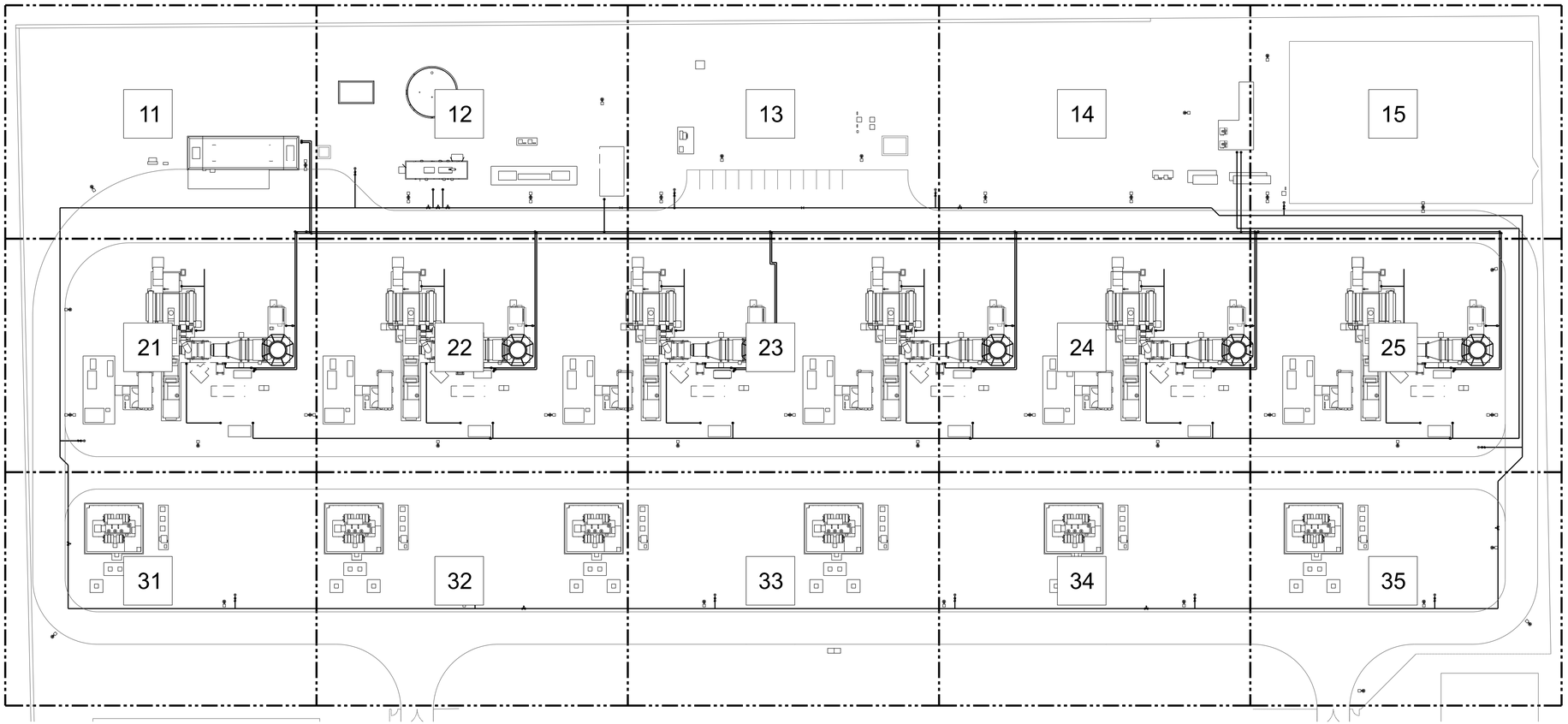
REV. 0

MU002

CADD D3-R5

DRAWING LIST

MU111	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 11
MU112	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 12
MU113	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 13
MU114	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 14
MU115	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 15
MU121	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 21
MU122	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 22
MU123	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 23
MU124	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 24
MU125	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 25
MU131	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 31
MU132	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 32
MU133	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 33
MU134	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 34
MU135	MECHANICAL - UNDERGROUND PIPING PLAN	AREA 35



NO.	REVISIONS	DSGN	CHKD	APVD	DATE

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN KEYPLAN

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1"=40'-0"

NO. 31324.07

REV. 0

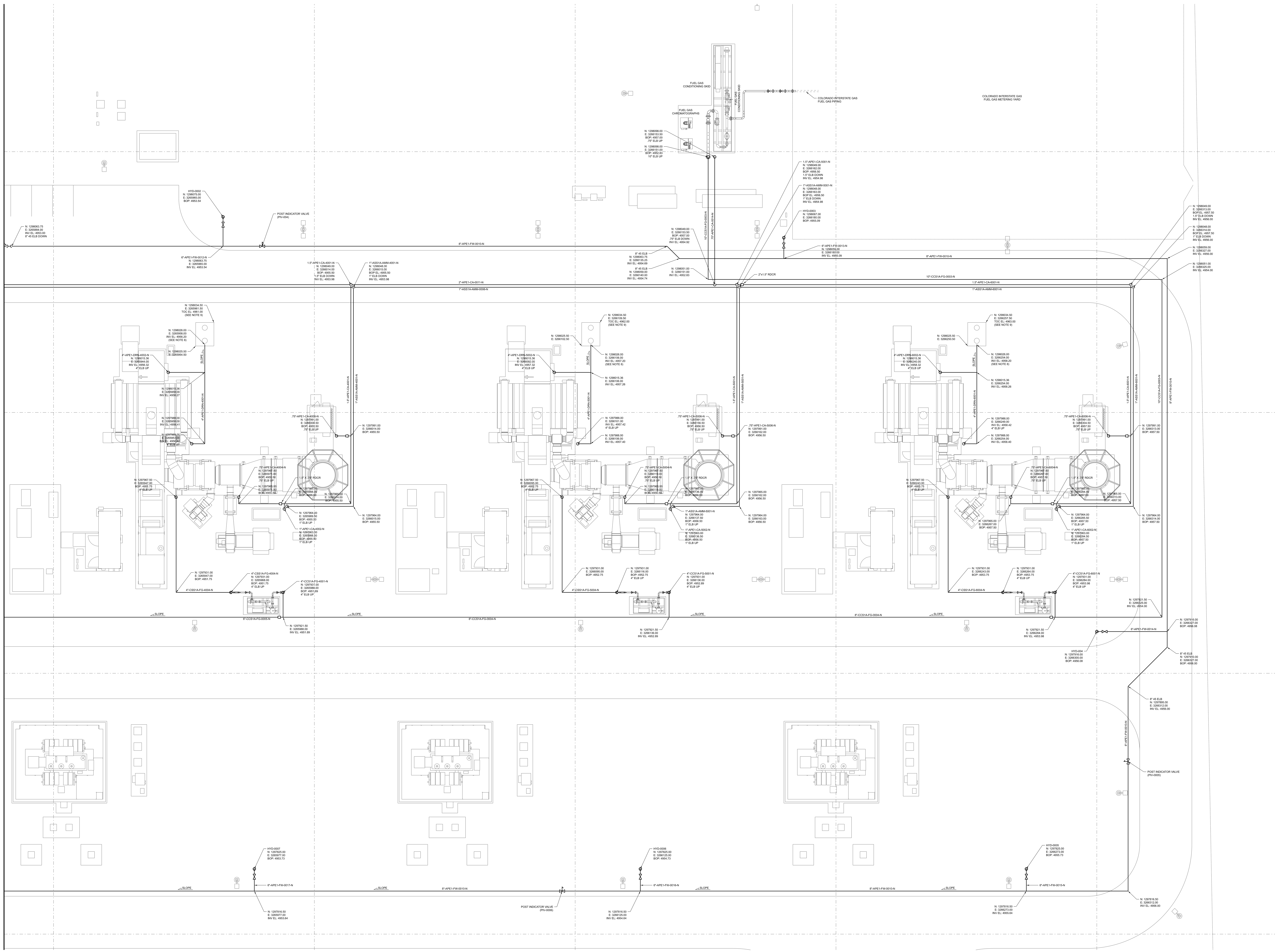
MU100

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

CADD D3-R5


FUEL GAS CONDITIONING SKID
FUEL GAS CONDITIONING SKID
FUEL GAS CHROMATOGRAPHS
COLORADO INTERSTATE GAS FUEL GAS PIPING
COLORADO INTERSTATE GAS FUEL GAS METERING YARD
N: 1298098.00 E: 3266153.50 BOP: 4957.00 .75" ELB UP
N: 1298098.00 E: 3266151.00 BOP: 4952.83 10" ELB UP
1.5"-APE1-CA-5001-N N: 1298049.00 E: 3266162.00 BOP: 4956.50 1.5" ELB DOWN INV EL: 4954.98
1"-ASS1A-AMM-5001-N N: 1298048.00 E: 3266163.00 BOP EL: 4956.50 1" ELB DOWN INV EL: 4954.98
HYD-0003 N: 1298067.00 E: 3266180.00 BOP: 4955.09
HYD-0002 N: 1298075.00 E: 3265965.00 BOP: 4953.54
POST INDICATOR VALVE (PIV-004)
N: 1298063.75 E: 3265884.00 INV EL: 4953.00 8" 45 ELB DOWN
6"-APE1-FW-0012-N N: 1298063.75 E: 3265965.00 INV EL: 4953.54
8"-APE1-FW-0010-N
10"-CCS1A-FG-0003-N
.75"-APE1-CA-0014-N
N: 1298049.00 E: 3266153.50 BOP: 4957.00 .75" ELB DOWN INV EL: 4954.92
8" 45 ELB N: 1298063.75 E: 3266135.25 INV EL: 4954.69
8" 45 ELB N: 1298059.00 E: 3266140.00 INV EL: 4954.74
N: 1298051.00 E: 3266151.00 INV EL: 4952.83
2"x1.5" RDCR
6"-APE1-FW-0013-N N: 1298059.00 E: 3266180.00 INV EL: 4955.09
N: 1298049.00 E: 3266313.00 BOP EL: 4957.50 1.5" ELB DOWN INV EL: 4956.00
N: 1298048.00 E: 3266314.00 BOP EL: 4957.50 1" ELB DOWN INV EL: 4956.00
N: 1298059.00 E: 3266327.00 INV EL: 4956.00
N: 1298051.00 E: 3266325.00 INV EL: 4954.00
1.5"-APE1-CA-4001-N N: 1298049.00 E: 3266014.00 BOP: 4955.50 1.5" ELB DOWN INV EL: 4953.98
1"-ASS1A-AMM-4001-N N: 1298048.00 E: 3266015.00 BOP EL: 4955.50 1" ELB DOWN INV EL: 4953.98
2"-APE1-CA-0011-N
1"-ASS1A-AMM-0006-N
10"-CCS1A-FG-0003-N
1.5"-APE1-CA-6001-N
1"-ASS1A-AMM-6001-N
N: 1298034.50 E: 3265961.50 TOC EL: 4961.00 (SEE NOTE 9)
N: 1298026.00 E: 3265958.00 INV EL: 4956.20 (SEE NOTE 8)
N: 1298025.50 E: 3265954.50
SLOPE
4"-APE1-DRN-4002-N N: 1298015.36 E: 3265944.00 INV EL: 4956.32 4" ELB UP
N: 1298015.36 E: 3265958.00 INV EL: 4956.27
4"-APE1-DRN-4001-N
N: 1297988.00 E: 3265958.00 INV EL: 4956.41
N: 1297988.00 E: 3265953.00 INV EL: 4956.42 4" ELB UP
1.5"-APE1-CA-4001-N
1"-ASS1A-AMM-4001-N
.75"-APE1-CA-4006-N N: 1297991.00 E: 3266008.50 BOP: 4955.50 .75" ELB UP
N: 1297991.00 E: 3266014.00 BOP: 4955.50
.75"-APE1-CA-4004-N N: 1297967.50 E: 3265971.00 BOP: 4955.50 .75" ELB UP
N: 1297965.00 E: 3265971.00 BOP: 4955.50
1.5" X .75" RDCR
N: 1297965.00 E: 3265988.50 BOP: 4955.50
N: 1297965.00 E: 3266014.00 BOP: 4955.50
N: 1297967.50 E: 3265947.00 BOP: 4951.75 4" ELB UP
N: 1297964.00 E: 3265989.50 BOP: 4955.50 1" ELB UP
1"-APE1-CA-4002-N N: 1297963.00 E: 3265988.50 BOP: 4955.50 1" ELB UP
N: 1297964.00 E: 3266015.00 BOP: 4955.50
N: 1297931.00 E: 3265947.00 BOP: 4951.75
4"-CSS1A-FG-4004-N N: 1297931.00 E: 3265968.00 BOP: 4951.75 4" ELB UP
4"-CCS1A-FG-4001-N N: 1297931.00 E: 3265988.00 BOP: 4951.89 4" ELB UP
4"-CSS1A-FG-4004-N
6"-CCS1A-FG-0005-N
N: 1297921.50 E: 3265988.00 INV EL: 4951.89
N: 1298034.50 E: 3266109.50 TOC EL: 4962.00 (SEE NOTE 9)
N: 1298025.50 E: 3266102.50
N: 1298026.00 E: 3266106.00 INV EL: 4957.20 (SEE NOTE 8)
4"-APE1-DRN-5002-N N: 1298015.36 E: 3266092.00 INV EL: 4957.32 4" ELB UP
N: 1298015.36 E: 3266106.00 INV EL: 4957.26
4"-APE1-DRN-5001-N
N: 1297988.00 E: 3266101.00 INV EL: 4957.42 4" ELB UP
N: 1297988.00 E: 3266106.00 INV EL: 4957.40
1.5"-APE1-CA-5001-N
1"-ASS1A-AMM-5001-N
.75"-APE1-CA-5006-N N: 1297991.00 E: 3266156.50 BOP: 4956.50 .75" ELB UP
.75"-APE1-CA-5006-N N: 1297991.00 E: 3266162.00 BOP: 4956.50
.75"-APE1-CA-5004-N N: 1297967.50 E: 3266119.00 BOP: 4956.50 .75" ELB UP
N: 1297965.00 E: 3266119.00 BOP: 4956.50
1.5" X .75" RDCR
N: 1297965.00 E: 3266136.50 BOP: 4956.50
N: 1297965.00 E: 3266162.00 BOP: 4956.50
N: 1297967.50 E: 3266095.00 BOP: 4952.75 4" ELB UP
1"-ASS1A-AMM-5001-N N: 1297964.00 E: 3266137.50 BOP: 4956.50 1" ELB UP
1"-APE1-CA-5002-N N: 1297963.00 E: 3266136.50 BOP: 4956.50 1" ELB UP
N: 1297964.00 E: 3266163.00 BOP: 4956.50
N: 1297931.00 E: 3266095.00 BOP: 4952.75
N: 1297931.00 E: 3266116.00 BOP: 4952.75 4" ELB UP
4"-CCS1A-FG-5001-N N: 1297931.00 E: 3266136.00 BOP: 4952.89 4" ELB UP
4"-CSS1A-FG-5004-N
8"-CCS1A-FG-0004-N
N: 1297921.50 E: 3266136.00 INV EL: 4952.89
N: 1298034.50 E: 3266257.50 TOC EL: 4963.00 (SEE NOTE 9)
N: 1298025.50 E: 3266250.50
N: 1298026.00 E: 3266254.00 INV EL: 4958.20 (SEE NOTE 8)
4"-APE1-DRN-6002-N N: 1298015.36 E: 3266240.00 INV EL: 4958.32 4" ELB UP
N: 1298015.36 E: 3266254.00 INV EL: 4958.26
4"-APE1-DRN-6001-N
N: 1297988.00 E: 3266249.00 INV EL: 4958.42 4" ELB UP
N: 1297988.00 E: 3266254.00 INV EL: 4958.40
1.5"-APE1-CA-6001-N
1"-ASS1A-AMM-6001-N
10"-CCS1A-FG-0003-N
8"-APE1-FW-0010-N
.75"-APE1-CA-6006-N N: 1297991.00 E: 3266304.50 BOP: 4957.50 .75" ELB UP
N: 1297991.00 E: 3266313.00 BOP: 4957.50
.75"-APE1-CA-6004-N N: 1297967.50 E: 3266267.00 BOP: 4957.50 .75" ELB UP
1.5" X .75" RDCR
N: 1297965.00 E: 3266284.50 BOP: 4957.50
N: 1297965.00 E: 3266313.00 BOP: 4957.50
N: 1297967.50 E: 3266243.00 BOP: 4953.75 4" ELB UP
N: 1297965.00 E: 3266267.00 BOP: 4957.50
N: 1297964.00 E: 3266285.50 BOP: 4957.50 1" ELB UP
1"-APE1-CA-6002-N N: 1297963.00 E: 3266284.50 BOP: 4957.50 1" ELB UP
N: 1297964.00 E: 3266314.00 BOP: 4957.50
N: 1297931.00 E: 3266243.00 BOP: 4953.75
N: 1297931.00 E: 3266264.00 BOP: 4953.75 4" ELB UP
4"-CCS1A-FG-6001-N N: 1297931.00 E: 3266284.00 BOP: 4953.98 4" ELB UP
4"-CSS1A-FG-6004-N
8"-CCS1A-FG-0004-N
N: 1297921.50 E: 3266325.00 INV EL: 4954.00
N: 1297921.50 E: 3266284.00 INV EL: 4953.98
N: 1297916.00 E: 3266327.00 BOP: 4956.08
6"-APE1-FW-0014-N
HYD-004 N: 1297916.00 E: 3266300.00 BOP: 4956.08
8" 45 ELB N: 1297910.00 E: 3266327.00 BOP: 4956.00
8" 45 ELB N: 1297895.00 E: 3266312.00 INV EL: 4956.00
8"-APE1-FW-0010-N
POST INDICATOR VALVE (PIV-0005)
HYD-0007 N: 1297825.00 E: 3265977.00 BOP: 4953.73
6"-APE1-FW-0017-N
N: 1297816.50 E: 3265977.00 INV EL: 4953.64
HYD-0006 N: 1297825.00 E: 3266125.00 BOP: 4954.73
6"-APE1-FW-0016-N
8"-APE1-FW-0010-N
POST INDICATOR VALVE (PIV-0006)
N: 1297816.50 E: 3266125.00 INV EL: 4954.64
HYD-0005 N: 1297825.00 E: 3266273.00 BOP: 4955.73
6"-APE1-FW-0015-N
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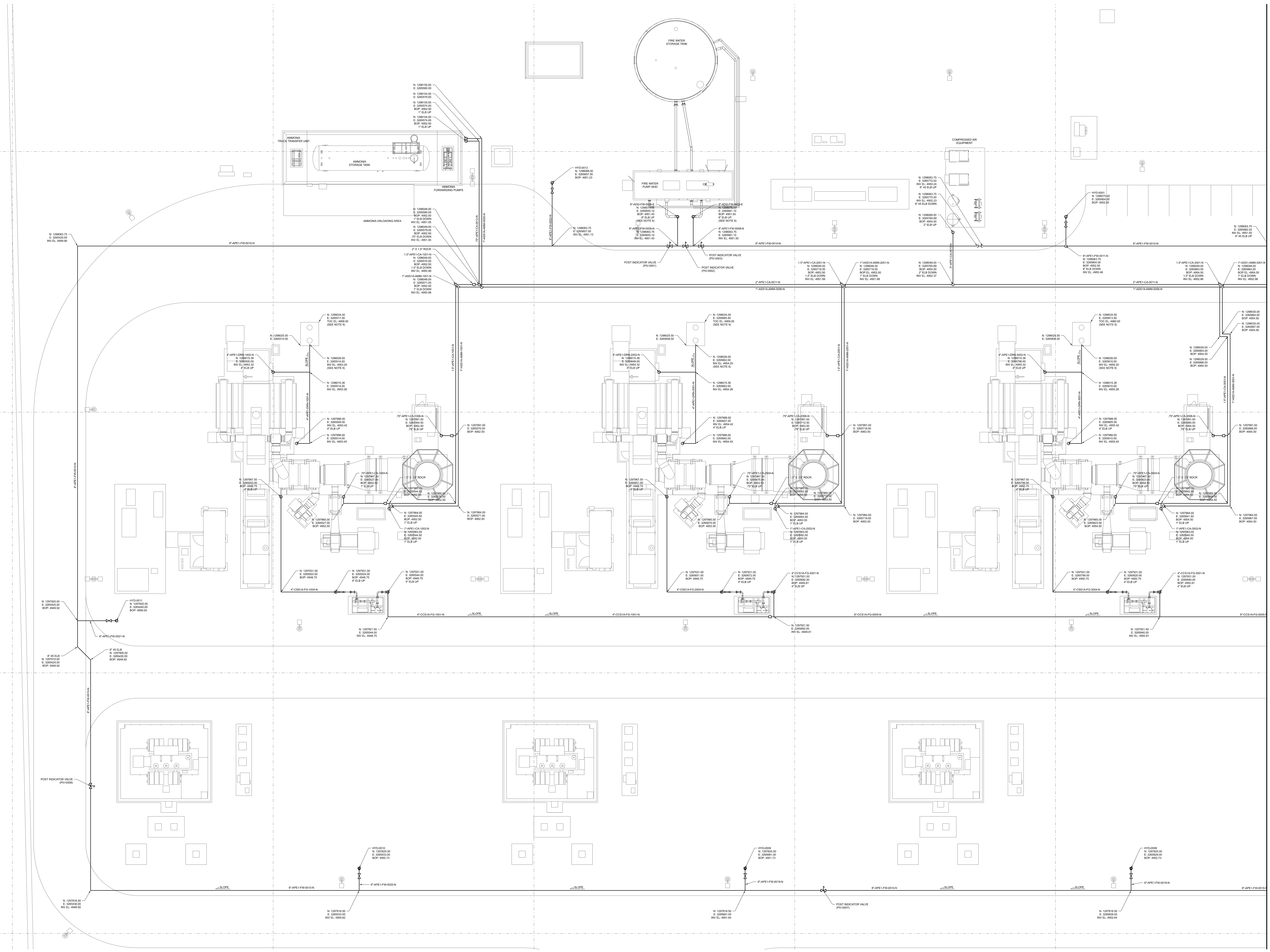
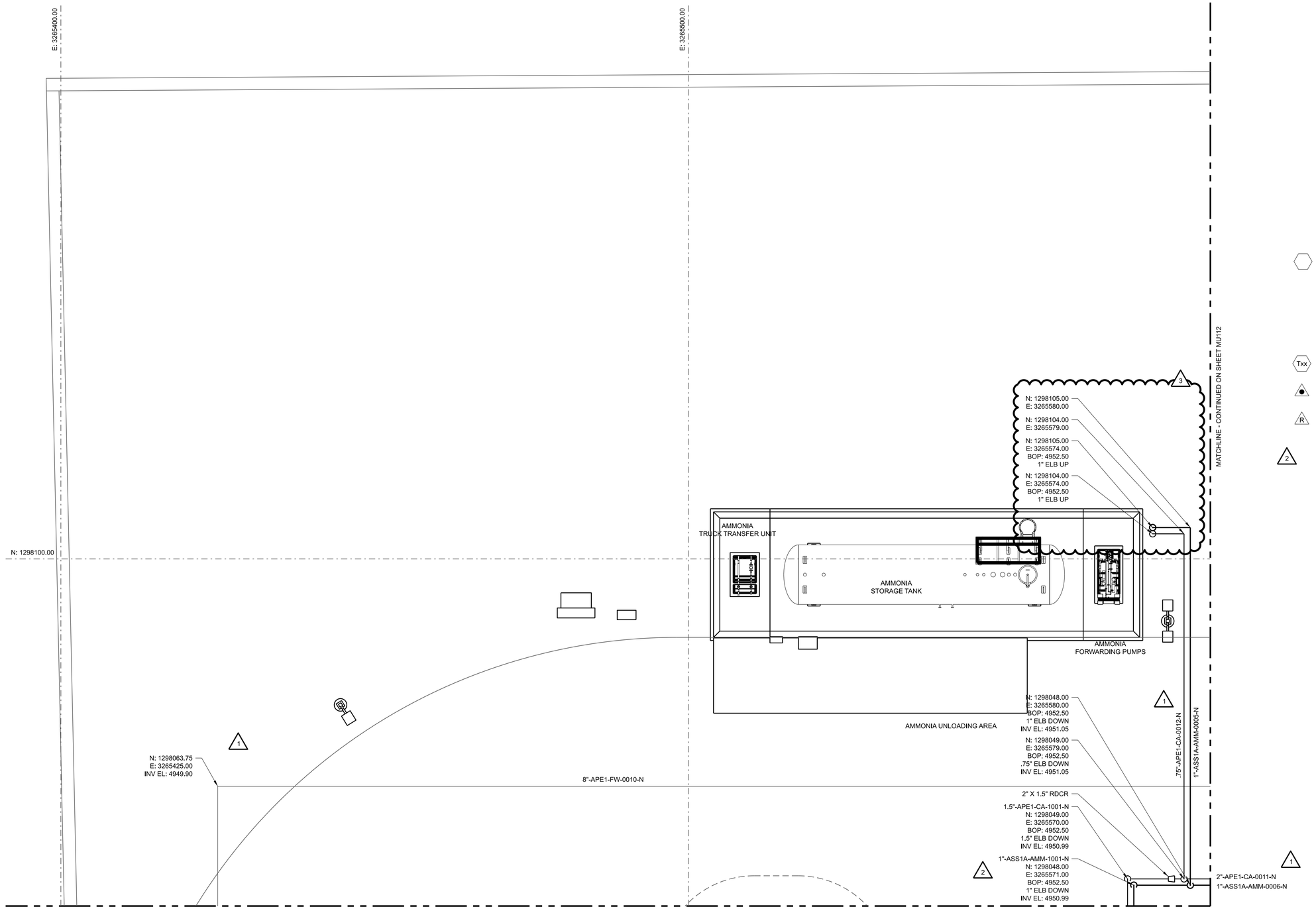
N: 1297816.50 E: 3266312.00 INV EL: 4956.00
SLOPE


AMMONIA
TRUCK TRANSFER UNIT
AMMONIA
STORAGE TANK
AMMONIA
FORWARDING PUMPS
AMMONIA UNLOADING AREA
FIRE WATER
STORAGE TANK
FIRE WATER
PUMP SKID
COMPRESSED AIR
EQUIPMENT
N: 1298105.00
E: 3265580.00
N: 1298104.00
E: 3265579.00
N: 1298105.00
E: 3265574.00
BOP: 4952.50
1" ELB UP
N: 1298104.00
E: 3265574.00
BOP: 4952.50
1" ELB UP
N: 1298048.00
E: 3265580.00
BOP: 4952.50
1" ELB DOWN
INV EL: 4951.05
N: 1298049.00
E: 3265579.00
BOP: 4952.50
.75" ELB DOWN
INV EL: 4951.05
2" X 1.5" RDCR
1.5"-APE1-CA-1001-N
N: 1298049.00
E: 3265570.00
BOP: 4952.50
1.5" ELB DOWN
INV EL: 4950.99
1"-ASS1A-AMM-1001-N
N: 1298048.00
E: 3265571.00
BOP: 4952.50
1" ELB DOWN
INV EL: 4950.99
.75"-APE1-CA-0012-N
1"-ASS1A-AMM-0005-N
N: 1298063.75
E: 3265425.00
INV EL: 4949.90
8"-APE1-FW-0010-N
HYD-0012
N: 1298088.00
E: 3265607.00
BOP: 4951.23
6"-APE1-FW-0022-N
N: 1298063.75
E: 3265607.00
INV EL: 4951.13
8"-ADI2-FW-0024-E
N: 1298075.00
E: 3265655.10
BOP: 4951.45
8" ELB UP
(SEE NOTE 8)
8"-ADI2-FW-0023-E
N: 1298076.00
E: 3265661.10
BOP: 4951.50
8" ELB UP
(SEE NOTE 8)
8"-APE1-FW-0009-N
N: 1298063.75
E: 3265655.10
INV EL: 4951.45
8"-APE1-FW-0008-N
N: 1298063.75
E: 3265661.10
INV EL: 4951.50
POST INDICATOR VALVE
(PIV-0001)
POST INDICATOR VALVE
(PIV-0002)
POST INDICATOR VALVE
(PIV-0003)
N: 1298063.75
E: 3265772.02
INV EL: 4950.24
8" 45 ELB UP
N: 1298063.75
E: 3265770.00
INV EL: 4952.23
8" 45 ELB DOWN
N: 1298069.00
E: 3265760.69
BOP: 4954.00
2" ELB UP
2"-APE1-CA-0010-N
N: 1298049.00
E: 3265760.69
BOP: 4954.00
2" ELB DOWN
INV EL: 4952.37
HYD-0001
N: 1298075.00
E: 3265804.00
BOP: 4952.50
6"-APE1-FW-0011-N
N: 1298063.75
E: 3265804.00
BOP: 4952.50
6" ELB DOWN
INV EL: 4950.46
N: 1298063.75
E: 3265882.02
INV EL: 4951.00
8" 45 ELB UP
1.5"-APE1-CA-2001-N
N: 1298049.00
E: 3265718.00
BOP: 4953.50
1.5" ELB DOWN
INV EL: 4951.99
1"-ASS1A-AMM-2001-N
N: 1298048.00
E: 3265719.00
BOP EL: 4953.50
1" ELB DOWN
INV EL: 4951.99
1.5"-APE1-CA-3001-N
N: 1298049.00
E: 3265863.00
BOP: 4954.50
1.5" ELB DOWN
INV EL: 4952.96
1"-ASS1-AMM-3001-N
N: 1298048.00
E: 3265864.00
BOP EL: 4954.50
1" ELB DOWN
INV EL: 4952.96
2"-APE1-CA-0011-N
1"-ASS1A-AMM-0006-N
N: 1298034.50
E: 3265517.50
TOC EL: 4958.00
(SEE NOTE 9)
N: 1298025.50
E: 3265510.50
N: 1298026.00
E: 3265514.00
INV EL: 4953.20
(SEE NOTE 8)
4"-APE1-DRN-1002-N
N: 1298015.36
E: 3265500.00
INV EL: 4953.32
4" ELB UP
N: 1298015.36
E: 3265514.00
INV EL: 4953.26
SLOPE
4"-APE1-DRN-1001-N
N: 1297988.00
E: 3265509.00
INV EL: 4953.42
4" ELB UP
N: 1297988.00
E: 3265514.00
INV EL: 4953.40
1.5"-APE1-CA-1001-N
1"-ASS1A-AMM-1001-N
.75"-APE1-CA-1006-N
N: 1297991.00
E: 3265564.50
BOP: 4952.50
.75" ELB UP
N: 1297991.00
E: 3265570.00
BOP: 4952.50
.75"-APE1-CA-1004-N
N: 1297967.50
E: 3265527.00
BOP: 4952.50
1" ELB UP
1.5" X .75" RDCR
N: 1297965.00
E: 3265544.50
BOP: 4952.50
N: 1297965.00
E: 3265570.00
BOP: 4952.50
N: 1297967.50
E: 3265503.00
BOP: 4948.75
4" ELB UP
N: 1297965.00
E: 3265527.00
BOP: 4952.50
N: 1297964.00
E: 3265545.50
BOP: 4952.50
1" ELB UP
1"-APE1-CA-1002-N
N: 1297963.00
E: 3265544.50
BOP: 4952.50
1" ELB UP
N: 1297964.00
E: 3265571.00
BOP: 4952.50
N: 1297931.00
E: 3265503.00
BOP: 4948.75
N: 1297931.00
E: 3265524.00
BOP: 4948.75
4" ELB UP
N: 1297931.00
E: 3265544.00
BOP: 4948.75
4" ELB UP
4"-CSS1A-FG-1004-N
N: 1297921.50
E: 3265544.00
INV EL: 4948.75
4"-CCS1A-FG-1001-N
SLOPE
N: 1298034.50
E: 3265665.50
TOC EL: 4959.00
(SEE NOTE 9)
N: 1298025.50
E: 3265658.50
N: 1298026.00
E: 3265662.00
INV EL: 4954.20
(SEE NOTE 8)
4"-APE1-DRN-2002-N
N: 1298015.36
E: 3265648.00
INV EL: 4954.32
4" ELB UP
N: 1298015.36
E: 3265662.00
INV EL: 4954.26
4"-APE1-DRN-2001-N
N: 1297988.00
E: 3265657.00
INV EL: 4954.42
4" ELB UP
N: 1297988.00
E: 3265662.00
INV EL: 4954.40
1.5"-APE1-CA-2001-N
1"-ASS1A-AMM-2001-N
.75"-APE1-CA-2006-N
N: 1297991.00
E: 3265712.50
BOP: 4953.50
.75" ELB UP
N: 1297991.00
E: 3265718.00
BOP: 4953.50
.75"-APE1-CA-2004-N
N: 1297967.50
E: 3265675.00
BOP: 4953.50
.75" ELB UP
1.5" X .75" RDCR
N: 1297965.00
E: 3265692.50
BOP: 4953.50
N: 1297965.00
E: 3265718.00
BOP: 4953.50
N: 1297967.50
E: 3265651.00
BOP: 4949.75
4" ELB UP
N: 1297965.00
E: 3265675.00
BOP: 4953.50
N: 1297964.00
E: 3265693.50
BOP: 4953.50
1" ELB UP
1"-APE1-CA-2002-N
N: 1297963.00
E: 3265692.50
BOP: 4953.50
1" ELB UP
N: 1297964.00
E: 3265719.00
BOP: 4953.50
N: 1297931.00
E: 3265651.00
BOP: 4949.75
N: 1297931.00
E: 3265672.00
BOP: 4949.75
4" ELB UP
4"-CCS1A-FG-2001-N
N: 1297931.00
E: 3265692.00
BOP: 4949.81
4" ELB UP
4"-CSS1A-FG-2004-N
N: 1297921.50
E: 3265692.00
INV EL: 4949.81
6"-CCS1A-FG-0005-N
N: 1298034.50
E: 3265813.50
TOC EL: 4960.00
(SEE NOTE 9)
N: 1298025.50
E: 3265806.50
N: 1298026.00
E: 3265810.00
INV EL: 4955.20
(SEE NOTE 8)
4"-APE1-DRN-3002-N
N: 1298015.36
E: 3265796.00
INV EL: 4955.32
4" ELB UP
N: 1298015.36
E: 3265810.00
INV EL: 4955.26
4"-APE1-DRN-3001-N
N: 1297988.00
E: 3265805.00
INV EL: 4955.42
4" ELB UP
N: 1297988.00
E: 3265810.00
INV EL: 4955.40
N: 1298030.00
E: 3265864.00
BOP: 4954.50
N: 1298030.00
E: 3265867.00
BOP: 4954.50
N: 1298029.00
E: 3265863.00
BOP: 4954.50
N: 1298029.00
E: 3265866.00
BOP: 4954.50
1.5"-APE1-CA-3001-N
1"-ASS1A-AMM-3001-N
.75"-APE1-CA-3006-N
N: 1297991.00
E: 3265860.50
BOP: 4954.50
.75" ELB UP
N: 1297991.00
E: 3265866.00
BOP: 4954.50
.75"-APE1-CA-3004-N
N: 1297967.50
E: 3265823.00
BOP: 4954.50
.75" ELB UP
1.5" X .75" RDCR
N: 1297965.00
E: 3265840.50
BOP: 4954.50
N: 1297965.00
E: 3265866.00
BOP: 4954.50
N: 1297967.50
E: 3265799.00
BOP: 4950.75
4" ELB UP
N: 1297965.00
E: 3265823.00
BOP: 4954.50
N: 1297964.00
E: 3265841.50
BOP: 4954.50
1" ELB UP
1"-APE1-CA-3002-N
N: 1297963.00
E: 3265840.50
BOP: 4954.50
1" ELB UP
N: 1297964.00
E: 3265867.00
BOP: 4954.50
N: 1297931.00
E: 3265799.00
BOP: 4950.75
N: 1297931.00
E: 3265820.00
BOP: 4950.75
4" ELB UP
4"-CCS1A-FG-3001-N
N: 1297931.00
E: 3265840.00
BOP: 4950.81
4" ELB UP
4"-CSS1A-FG-3004-N
N: 1297921.50
E: 3265840.00
INV EL: 4950.81
8"-APE1-FW-0010-N
N: 1297920.00
E: 3265425.00
BOP: 4949.92
HYD-0011
N: 1297920.00
E: 3265440.00
BOP: 4950.00
6"-APE1-FW-0021-N
8" 45 ELB
N: 1297910.00
E: 3265425.00
BOP: 4949.92
8" 45 ELB
N: 1297905.00
E: 3265430.00
BOP: 4949.92
POST INDICATOR VALVE
(PIV-0008)
HYD-0010
N: 1297825.00
E: 3265533.00
BOP: 4950.73
6"-APE1-FW-0020-N
N: 1297816.50
E: 3265430.00
INV EL: 4949.92
N: 1297816.50
E: 3265533.00
INV EL: 4950.62
HYD-0009
N: 1297825.00
E: 3265681.00
BOP: 4951.73
6"-APE1-FW-0019-N
N: 1297816.50
E: 3265681.00
INV EL: 4951.64
POST INDICATOR VALVE
(PIV-0007)
HYD-0008
N: 1297825.00
E: 3265829.00
BOP: 4952.73
6"-APE1-FW-0018-N
N: 1297816.50
E: 3265829.00
INV EL: 4952.64



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISE STUB-UP LOCATIONS	MRM	DST	JPS	10/03/24
2	ADD CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE ROUTING & TAGGING	MRM	DT	JPS	08/28/24

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www.stanleyconsultants.com

MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 11

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

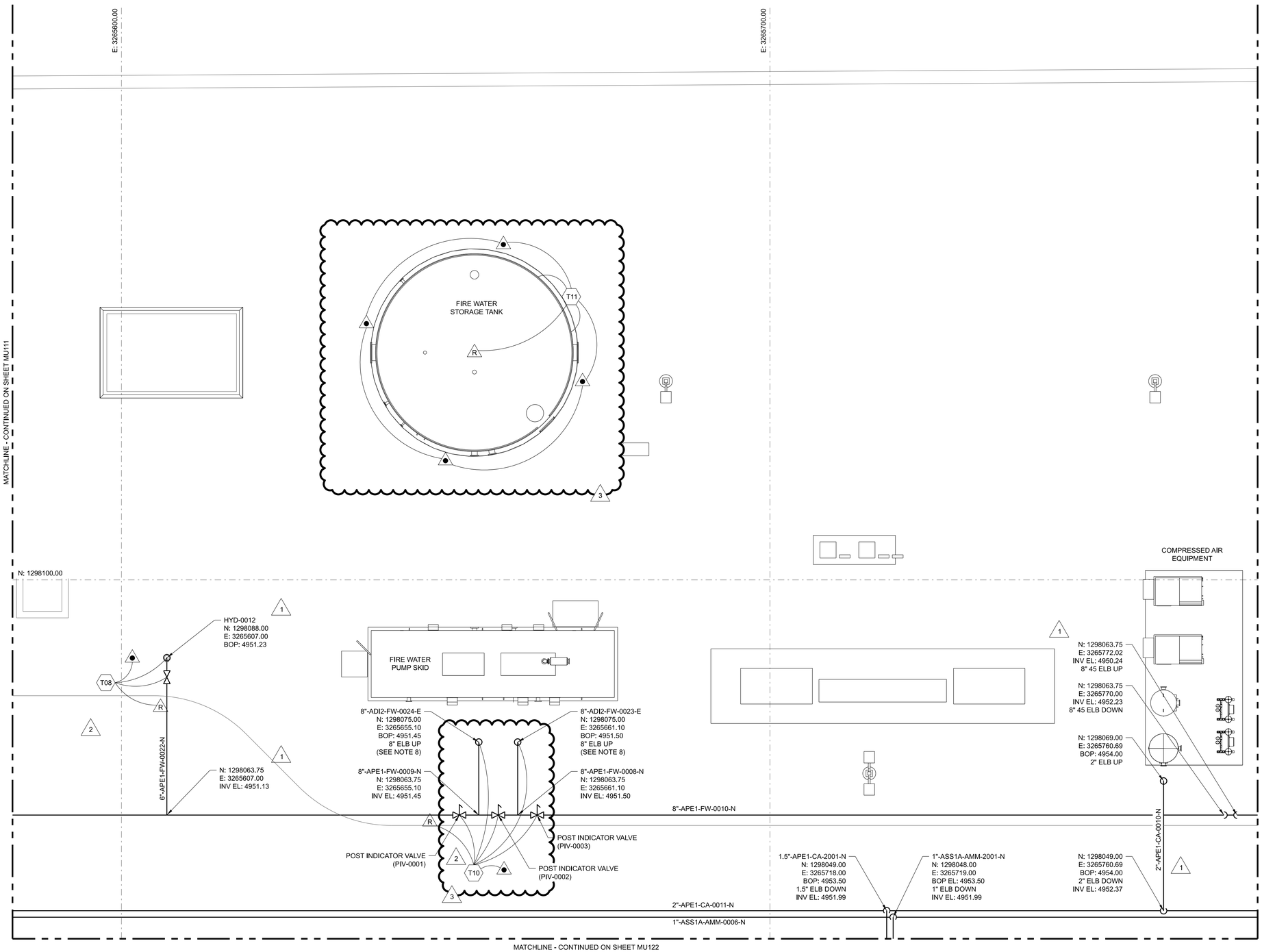
SCALE: 1/8"=1'-0"

NO. 31324.07

REV. 3

MU111

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. EXTEND DUCTILE IRON SPOOL PIECE BELOW FROST DEPTH. TRANSITION TO HDPE IMMEDIATELY PRIOR TO, OR IMMEDIATELY AFTER ELBOW, DEPENDING UPON AVAILABLE SPACE.
9. FOUR ANODES TO BE LOCATED APPROXIMATELY 90 DEGREES APART, AND WITHIN 2'-0" OF EDGE OF TANK. (3)

TEST STATION LIST

T08: CONNECTED TO A 6" DIAMETER PIPE.

T10: CONNECTED TO A 8" DIAMETER PIPE.

T11: CONNECTED TO FIREWATER STORAGE TANK. (SEE NOTE 9) (3)

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE
- 2

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	ADDED C.P. TO TANK	MRM	SW	JPS	09/20/24
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE FW PIPE ROUTING	MRM	DT	JPS	08/28/24

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www.stanleyconsultants.com

MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 12

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 3
MU112

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R5

E: 3265800.00

E: 3265900.00

MATCHLINE - CONTINUED ON SHEET MU112

MATCHLINE - CONTINUED ON SHEET MU114

N: 1298100.00

HYD-0001
N: 1298075.00
E: 3265804.00
BOP: 4952.50

T15

R

6"-APE1-FW-0011-N
N: 1298063.75
E: 3265804.00
BOP: 4952.50
6" ELB DOWN
INV EL: 4950.46

8"-APE1-FW-0010-N

N: 1298063.75
E: 3265882.02
INV EL: 4951.00
8" 45 ELB UP

N: 1298063.75
E: 3265884.00
INV EL: 4953.00
8" 45 ELB DOWN

1.5"-APE1-CA-3001-N
N: 1298049.00
E: 3265863.00
BOP: 4954.50
1.5" ELB DOWN
INV EL: 4952.96

1"-ASS1-AMM-3001-N
N: 1298048.00
E: 3265864.00
BOP EL: 4954.50
1" ELB DOWN
INV EL: 4952.96

2"-APE1-CA-0011-N

1"-ASS1A-AMM-0006-N

HYD-0002
N: 1298075.00
E: 3265965.00
BOP: 4953.54

T16

R

6"-APE1-FW-0012-N
N: 1298063.75
E: 3265965.00
INV EL: 4953.54

MATCHLINE - CONTINUED ON SHEET MU123

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T15: CONNECTED TO A 6" DIAMETER PIPE.

T16: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE FW PIPE ROUTING	MRM	DT	JPS	08/28/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 13

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07 — REV. 2

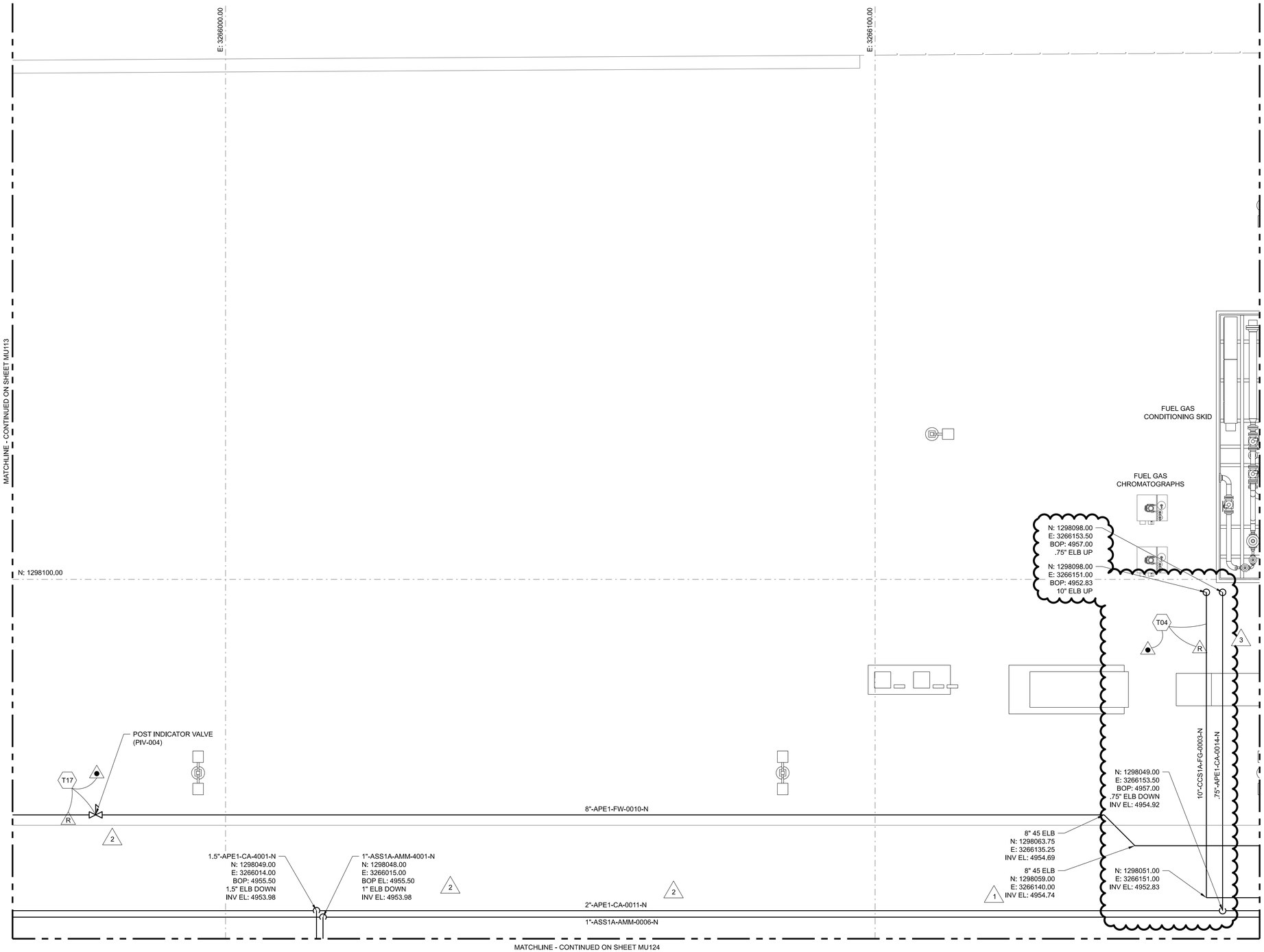
MU113

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T04: CONNECTED TO A 10" DIAMETER PIPE. 3

T17: CONNECTED TO A 8" DIAMETER PIPE.

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

2

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISE UNDERGROUND PIPING	MRM	SW	JPS	09/20/24
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE FW PIPE ROUTING	MRM	DT	JPS	08/28/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

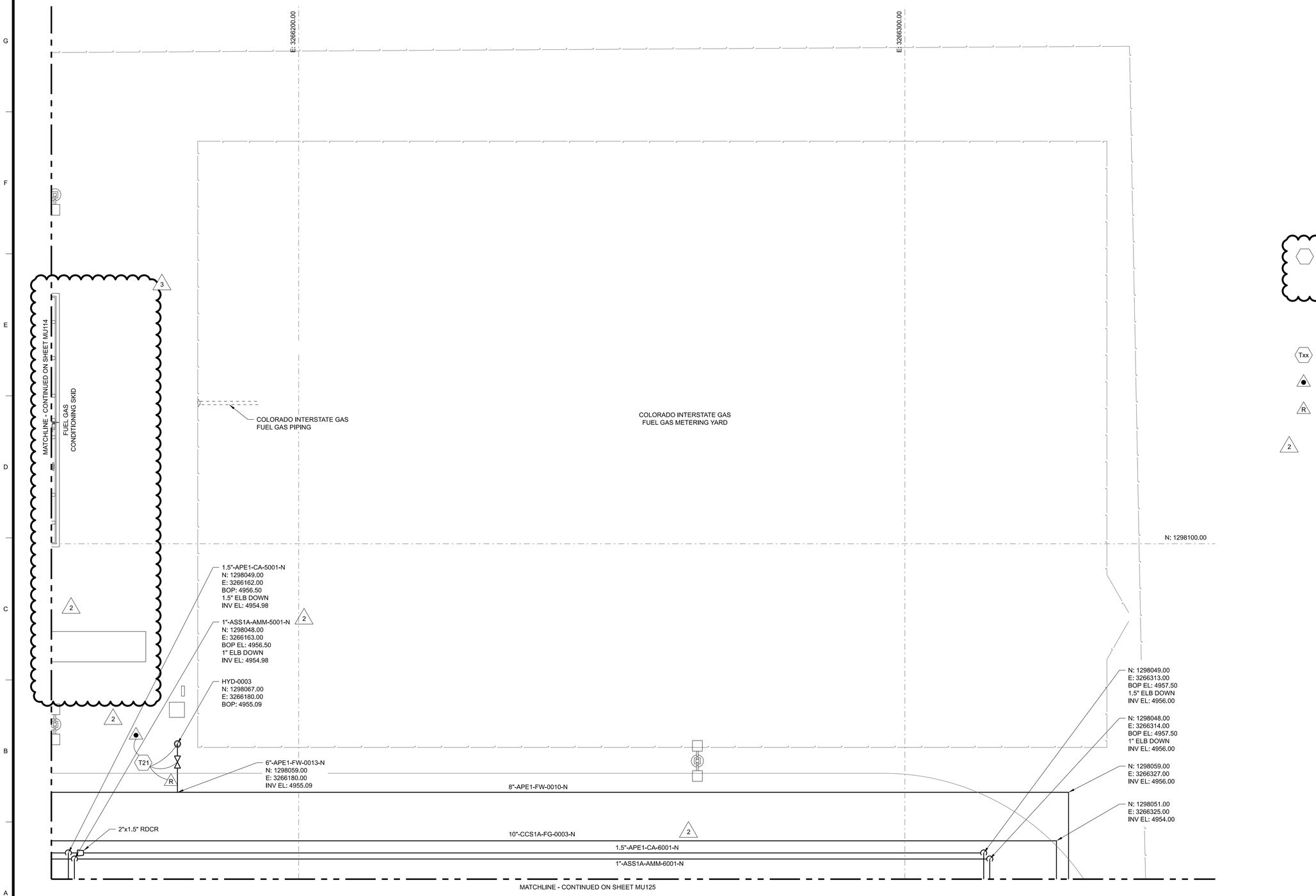
MECHANICAL UNDERGROUND PIPING PLAN AREA 14

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 3
MU114

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T21: CONNECTED TO A 6" DIAMETER PIPE.

3

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

2

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISED UNDERGROUND PIPING	MRM	SW	JPS	09/20/24
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REMOVE HOLD FROM FW PIPING	MRM	DT	JPS	08/28/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

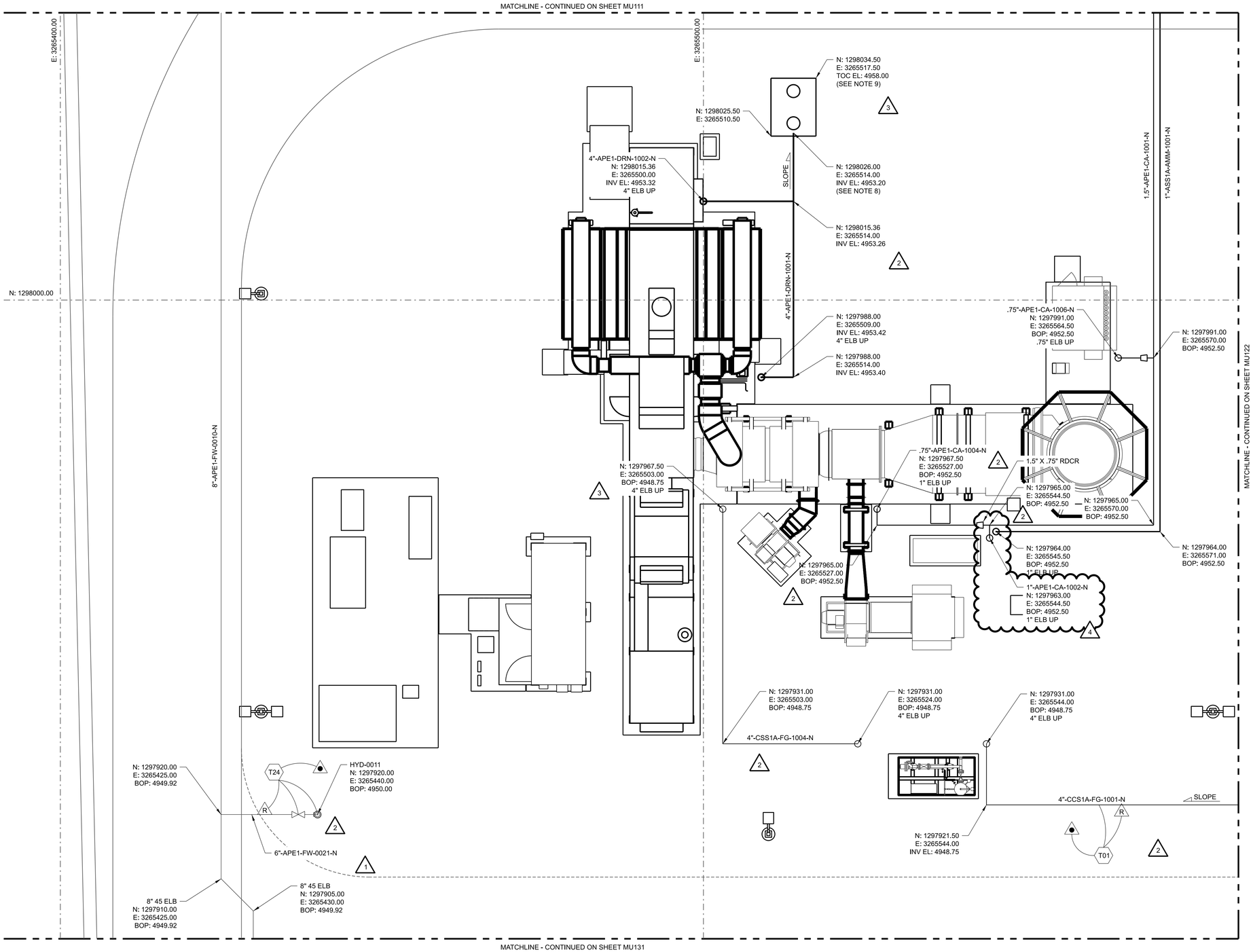
MECHANICAL UNDERGROUND PIPING PLAN AREA 15

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 3
MU115

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
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5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. CORE DRILL PRECAST VAULT AT REQUIRED LOCATION. PROVIDE LINK-SEAL (OR OTHER ENGINEER APPROVED PRODUCT) TO MAINTAIN A WATER TIGHT SEAL.
9. TOP OF CONCRETE ELEVATION GIVEN IS TO THE TOP OF THE CONTAINMENT BOX, EXCLUDING 10" THICK LID.
10. DO NOT INSTALL INCLUDED BAFFLE WALLS IN DRAIN SUMP.

△3

TEST STATION LIST

T01: CONNECTED TO A 4" DIAMETER PIPE.

T24: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

- ⬡ Txx — CATHODIC PROTECTION TEST STATION NUMBER
- ◈ — CATHODIC PROTECTION ANODE
- ⬡ R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

△2

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
4	REVISED STUB-UP LOCATION	MRM	DST	JPS	10/03/24
3	REVISED UNDERGROUND PIPING	MRM	MRR	JPS	09/20/24
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

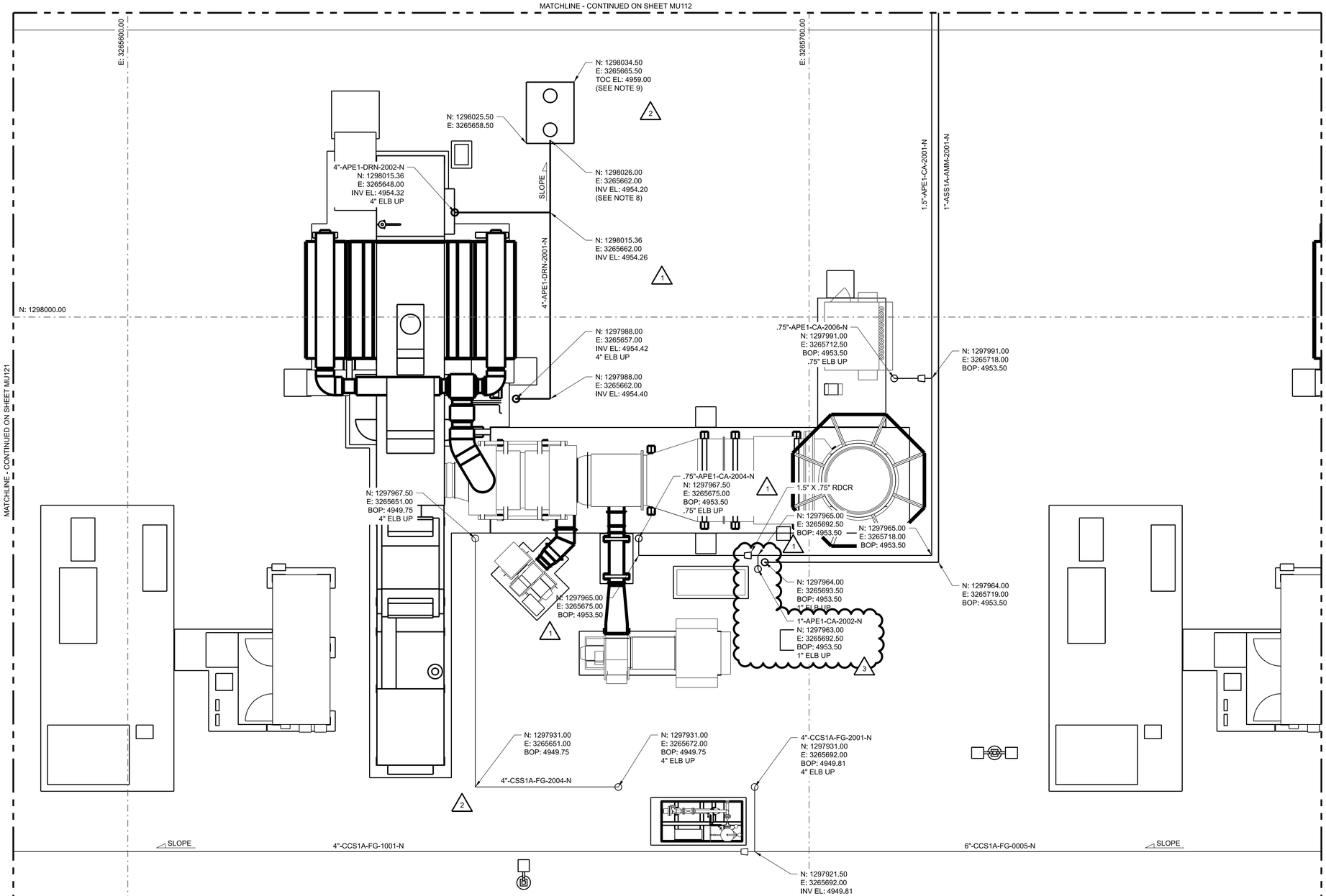
MECHANICAL UNDERGROUND PIPING PLAN AREA 21

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 4
MU121

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. CORE DRILL PRECAST VAULT AT REQUIRED LOCATION. PROVIDE LINK-SEAL (OR OTHER ENGINEER APPROVED PRODUCT) TO MAINTAIN A WATER TIGHT SEAL.
9. TOP OF CONCRETE ELEVATION GIVEN IS TO THE TOP OF THE CONTAINMENT BOX, EXCLUDING 10" THICK LID.
10. DO NOT INSTALL INCLUDED BAFFLE WALLS IN DRAIN SUMP.

TEST STATION LIST

LEGEND

- TXX — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISED STUB-UP LOCATION	MRM	DST	JPS	10/03/24
2	REVISED UNDERGROUND PIPING	MRM	MRR	JPS	09/20/24
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

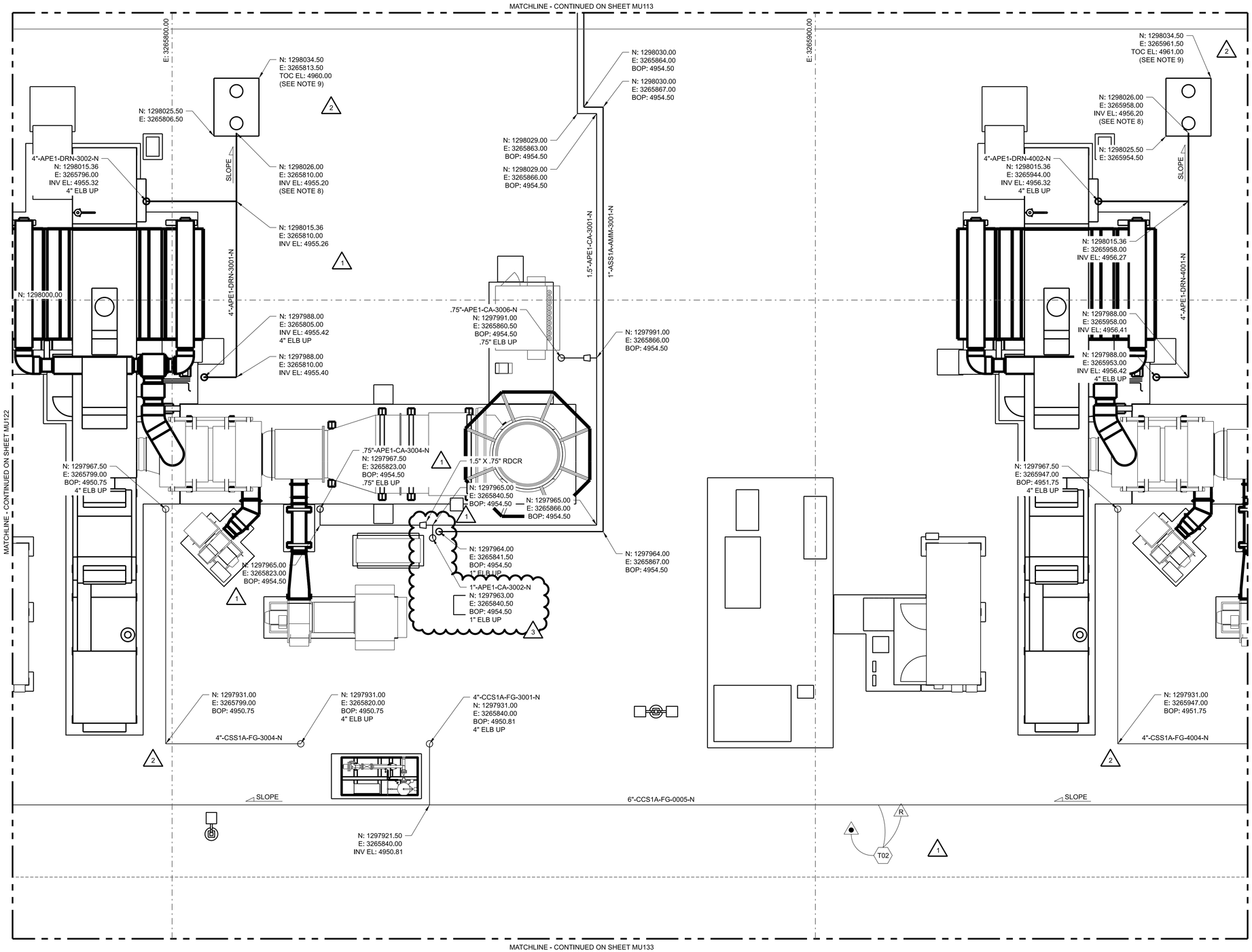
MECHANICAL UNDERGROUND PIPING PLAN AREA 22

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 3
MU122

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R5



NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. CORE DRILL PRECAST VAULT AT REQUIRED LOCATION. PROVIDE LINK-SEAL (OR OTHER ENGINEER APPROVED PRODUCT) TO MAINTAIN A WATER TIGHT SEAL.
9. TOP OF CONCRETE ELEVATION GIVEN IS TO THE TOP OF THE CONTAINMENT BOX, EXCLUDING 10" THICK LID.
10. DO NOT INSTALL INCLUDED BAFFLE WALLS IN DRAIN SUMP.

TEST STATION LIST

T02: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISED STUB-UP LOCATION	MRM	DST	JPS	10/03/24
2	REVISED UNDERGROUND PIPING	MRM	MRR	JPS	09/20/24
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 23

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07 | REV. 3

MU123

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU114

MATCHLINE - CONTINUED ON SHEET MU123

MATCHLINE - CONTINUED ON SHEET MU125

MATCHLINE - CONTINUED ON SHEET MU134

E: 3266000.00

E: 3266100.00

1.5"-APE1-CA-4001-N

1"-ASS1A-AMM-4001-N

N: 1298000.00

.75"-APE1-CA-4006-N
N: 1297991.00
E: 3266008.50
BOP: 4955.50
.75" ELB UP

N: 1297991.00
E: 3266014.00
BOP: 4955.50

.75"-APE1-CA-4004-N
N: 1297967.50
E: 3265971.00
BOP: 4955.50
.75" ELB UP

1.5" X .75" RDCR

N: 1297965.00
E: 3265971.00
BOP: 4955.50

N: 1297965.00
E: 3265988.50
BOP: 4955.50

N: 1297965.00
E: 3266014.00
BOP: 4955.50

N: 1297964.00
E: 3265989.50
BOP: 4955.50
1" ELB UP

1"-APE1-CA-4002-N
N: 1297963.00
E: 3265988.50
BOP: 4955.50
1" ELB UP

N: 1297964.00
E: 3266015.00
BOP: 4955.50

N: 1298034.50
E: 3266109.50
TOC EL: 4962.00
(SEE NOTE 9)

N: 1298025.50
E: 3266102.50

4"-APE1-DRN-5002-N
N: 1298015.36
E: 3266092.00
INV EL: 4957.32
4" ELB UP

SLOPE

N: 1298026.00
E: 3266106.00
INV EL: 4957.20
(SEE NOTE 8)

N: 1298015.36
E: 3266106.00
INV EL: 4957.26

4"-APE1-DRN-5001-N

N: 1297988.00
E: 3266101.00
INV EL: 4957.42
4" ELB UP

N: 1297988.00
E: 3266106.00
INV EL: 4957.40

N: 1297967.50
E: 3266095.00
BOP: 4952.75
4" ELB UP

.75"-APE1-CA-5006-N
N: 1297991.00
E: 3266156.50
BOP: 4956.50
.75" ELB UP

.75"-APE1-CA-5004-N
N: 1297967.50
E: 3266119.00
BOP: 4956.50
.75" ELB UP

1.5" X .75" RDCR

N: 1297965.00
E: 3266119.00
BOP: 4956.50

N: 1297965.00
E: 3266136.50
BOP: 4956.50

1"-ASS1A-AMM-5001-N
N: 1297964.00
E: 3266137.50
BOP: 4956.50
1" ELB UP

1"-APE1-CA-5002-N
N: 1297963.00
E: 3266136.50
BOP: 4956.50
1" ELB UP

4"-CSS1A-FG-4004-N
N: 1297931.00
E: 3265968.00
BOP: 4951.75
4" ELB UP

4"-CCS1A-FG-4001-N
N: 1297931.00
E: 3265988.00
BOP: 4951.89
4" ELB UP

6"-CCS1A-FG-0005-N

SLOPE

N: 1297921.50
E: 3265988.00
INV EL: 4951.89

8"-CCS1A-FG-0004-N

N: 1297931.00
E: 3266095.00
BOP: 4952.75

4"-CSS1A-FG-5004-N

N: 1297931.00
E: 3266116.00
BOP: 4952.75
4" ELB UP

4"-CCS1A-FG-5001-N
N: 1297931.00
E: 3266136.00
BOP: 4952.89
4" ELB UP

SLOPE

N: 1297921.50
E: 3266136.00
INV EL: 4952.89

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
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6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. CORE DRILL PRECAST VAULT AT REQUIRED LOCATION. PROVIDE LINK-SEAL (OR OTHER ENGINEER APPROVED PRODUCT) TO MAINTAIN A WATER TIGHT SEAL.
9. TOP OF CONCRETE ELEVATION GIVEN IS TO THE TOP OF THE CONTAINMENT BOX, EXCLUDING 10" THICK LID.
10. DO NOT INSTALL INCLUDED BAFFLE WALLS IN DRAIN SUMP.

TEST STATION LIST

LEGEND

- TXX — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
3	REVISED STUB-UP LOCATIONS	MRM	DST	JPS	10/03/24
2	REVISED UNDERGROUND PIPING	MRM	MRR	JPS	09/20/24
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

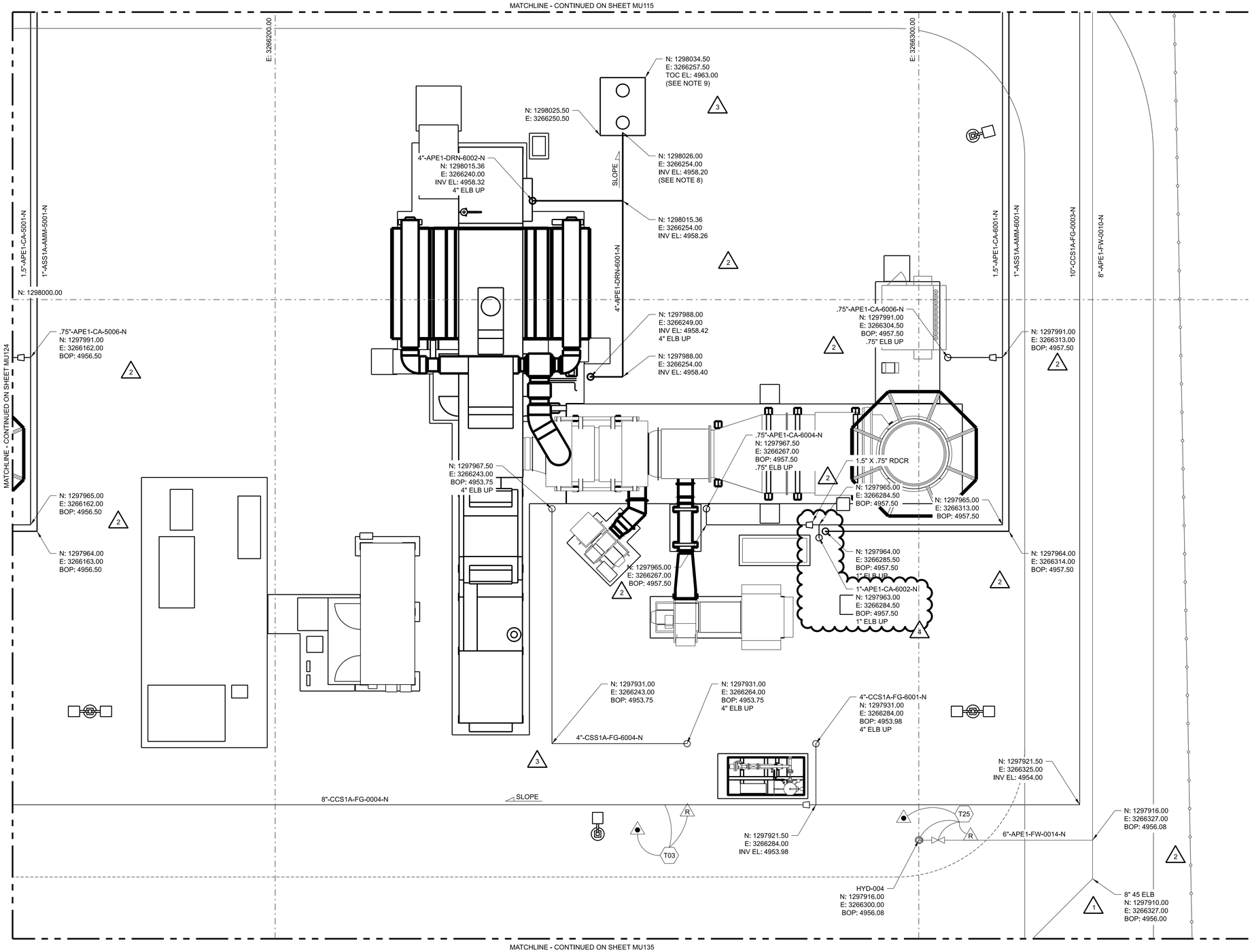
MECHANICAL UNDERGROUND PIPING PLAN AREA 24

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 3
MU124

AT FULL SIZE
0 1 2 3 IN
0 1 2 3 4 5 6 7 8 cm

CADD D3-R5



NOTES:

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6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.
8. CORE DRILL PRECAST VAULT AT REQUIRED LOCATION. PROVIDE LINK-SEAL (OR OTHER ENGINEER APPROVED PRODUCT) TO MAINTAIN A WATER TIGHT SEAL.
9. TOP OF CONCRETE ELEVATION GIVEN IS TO THE TOP OF THE CONTAINMENT BOX, EXCLUDING 10" THICK LID.
10. DO NOT INSTALL INCLUDED BAFFLE WALLS IN DRAIN SUMP.

TEST STATION LIST

T03: CONNECTED TO A 8" DIAMETER PIPE.

T25: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
4	REVISED STUB-UP LOCATION	MRM	DST	JPS	10/03/24
3	REVISED UNDERGROUND PIPING	MRM	MRR	JPS	09/20/24
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 25

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07

REV. 4

MU125

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU121

E: 3265400.00

E: 3265500.00

N: 1297900.00

8"-APE1-FW-0010-N

POST INDICATOR VALVE
(PIV-0008)

R

T45

2

HYD-0010
N: 1297825.00
E: 3265533.00
BOP: 4950.73

T46

2

R

6"-APE1-FW-0020-N

SLOPE

8"-APE1-FW-0010-N

N: 1297816.50
E: 3265430.00
INV EL: 4949.92

1

N: 1297816.50
E: 3265533.00
INV EL: 4950.62

N: 1297800.00

MATCHLINE - CONTINUED ON SHEET MU132

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
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6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T45: CONNECTED TO A 8" DIAMETER PIPE.

T46: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

2

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE FW PIPE ROUTING	MRM	DT	JPS	08/28/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 31

DESIGNED J. SOLAN
DRAWN M. McGINNIS
CHECKED D. TENNANT
APPROVED J. SOLAN
APPROVED M. REED
DATE 07/26/24

SCALE: 1/8"=1'-0"
NO. 31324.07
REV. 2
MU131

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU122

MATCHLINE - CONTINUED ON SHEET MU131

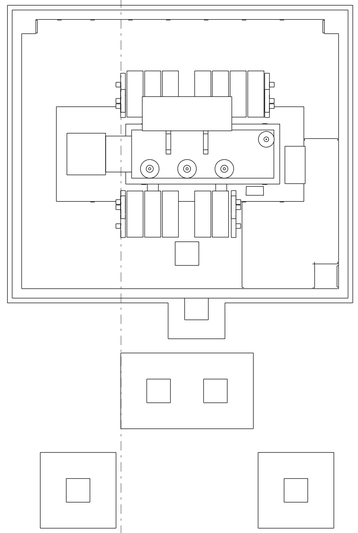
MATCHLINE - CONTINUED ON SHEET MU133

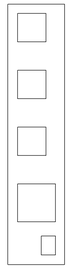
N: 1297900.00

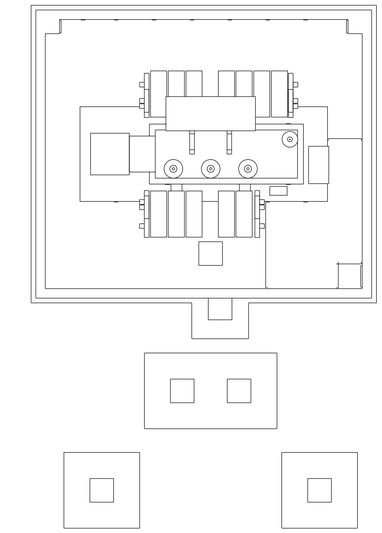
N: 1297800.00

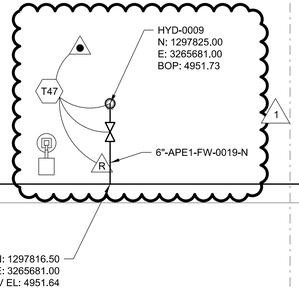
E: 3265600.00

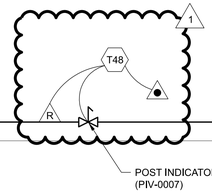
E: 3265700.00











SLOPE

8"-APE1-FW-0010-N

SLOPE

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T47: CONNECTED TO A 6" DIAMETER PIPE.

T48: CONNECTED TO A 8" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

1

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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www.stanleyconsultants.com

MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 32

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07

REV. 1

MU132

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU123

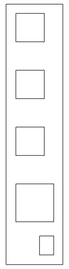
MATCHLINE - CONTINUED ON SHEET MU132

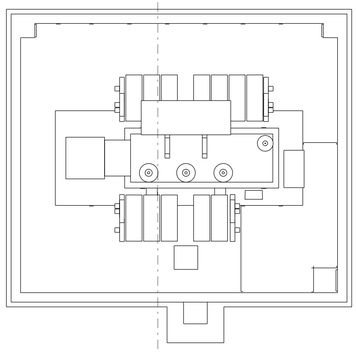
MATCHLINE - CONTINUED ON SHEET MU134

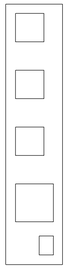
N: 1297900.00

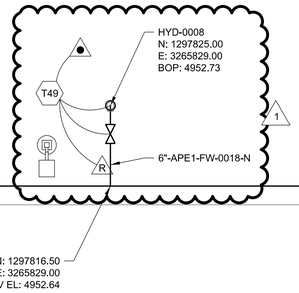
E: 3265800.00

E: 3265900.00









SLOPE

8"-APE1-FW-0010-N

SLOPE

N: 1297800.00

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T49: CONNECTED TO A 8" DIAMETER PIPE.

LEGEND

- Txx — CATHODIC PROTECTION TEST STATION NUMBER
- CATHODIC PROTECTION ANODE
- R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE
- 1

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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www.stanleyconsultants.com

MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 33

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07

REV. 1

MU133

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU124

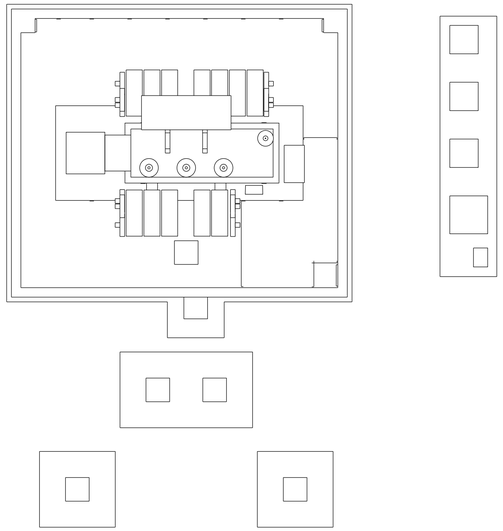
N: 1297900.00

E: 3266000.00

E: 3266100.00

MATCHLINE - CONTINUED ON SHEET MU133

MATCHLINE - CONTINUED ON SHEET MU135



HYD-0007
N: 1297825.00
E: 3265977.00
BOP: 4953.73

T50

1

R

6"-APE1-FW-0017-N

SLOPE

8"-APE1-FW-0010-N

N: 1297816.50
E: 3265977.00
INV EL: 4953.64

HYD-0006
N: 1297825.00
E: 3266125.00
BOP: 4954.73

T51

1

R

6"-APE1-FW-0016-N

SLOPE

POST INDICATOR VALVE
(PIV-0006)

N: 1297816.50
E: 3266125.00
INV EL: 4954.64

N: 1297800.00

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T50: CONNECTED TO A 6" DIAMETER PIPE.

T51: CONNECTED TO A 6" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

1

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
1	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL UNDERGROUND PIPING PLAN AREA 34

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

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

NO. 31324.07

REV. 1

MU134

CADD D3-R5

MATCHLINE - CONTINUED ON SHEET MU125

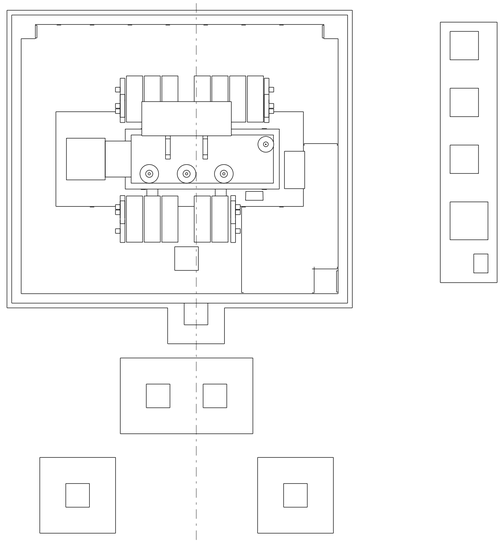
MATCHLINE - CONTINUED ON SHEET MU134

N: 1297900.00

N: 1297800.00

E: 3266100.00

E: 3266300.00



8"-APE1-FW-0010-N

SLOPE

HYD-0005
N: 1297825.00
E: 3266273.00
BOP: 4955.73

T52

2

R

6"-APE1-FW-0015-N

N: 1297816.50
E: 3266273.00
INV EL: 4955.64

1

8" 45 ELB
N: 1297895.00
E: 3266312.00
INV EL: 4956.00

8"-APE1-FW-0010-N

T53

R

2

POST INDICATOR VALVE
(PIV-0005)

1

N: 1297816.50
E: 3266312.00
INV EL: 4956.00

NOTES:

1. UNLESS DIMENSIONED, FEATURES SHOWN ARE APPROXIMATE.
2. COORDINATES SHOWN ARE BASED ON SURVEY DOCUMENTED ON DRAWING "L23-110-TO STANLEY CONSULTANTS_231027" PROVIDED BY LAMBERT LAND CONSULTING ON 10-27-2023. STANLEY CONSULTANTS HAS NOT VERIFIED THE ACCURACY OF THIS SURVEY.
3. UNLESS OTHERWISE NOTED, FACE OF FLANGE ELEVATIONS ARE 1'-0" ABOVE FINISHED GRADE.
4. APPROXIMATE TEST STATION LOCATIONS ARE SHOWN WITH A HEXAGON SHAPE.
5. EACH TEST STATION WILL HAVE A GALVANIC HI-POTENTIAL MAGNESIUM ANODE THAT WILL BE CONNECTED THROUGH THE TEST STATION AND BONDED TO THE PIPELINE. THE UNDERGROUND COPPER-COPPER SULFATE REFERENCE ELECTRODE WILL MONITOR THE PIPE POTENTIAL AT THE TEST STATION.
6. TEST STATIONS WILL BE MONITORED MONTHLY TO CONFIRM THE PIPELINE IS BEING PROTECTED BY THE ANODES AND NOT CORRODING. AFTER THREE MONTHS OF MONITORING THE PIPELINE, THE TEST STATIONS SHOULD BE MONITORED EVERY THREE MONTHS TO CONFIRM THE PIPELINE POTENTIALS.
7. FOR CATHODIC PROTECTION TEST STATION INSTALLATION DETAILS REFERENCE DRAWING 31324-MU002.

TEST STATION LIST

T52: CONNECTED TO A 6" DIAMETER PIPE.

T53: CONNECTED TO A 8" DIAMETER PIPE.

LEGEND

Txx — CATHODIC PROTECTION TEST STATION NUMBER

CATHODIC PROTECTION ANODE

R — CATHODIC PROTECTION UNDERGROUND REFERENCE ELECTRODE

2

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
2	ADDED CATHODIC PROTECTION	MRM	SW	JPS	09/11/24
1	REVISE FW PIPE ROUTING	MRM	DT	JPS	08/28/24

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL
UNDERGROUND PIPING PLAN
AREA 35

DESIGNED	J. SOLAN
DRAWN	M. McGINNIS
CHECKED	D. TENNANT
APPROVED	J. SOLAN
APPROVED	M. REED
DATE	07/26/24

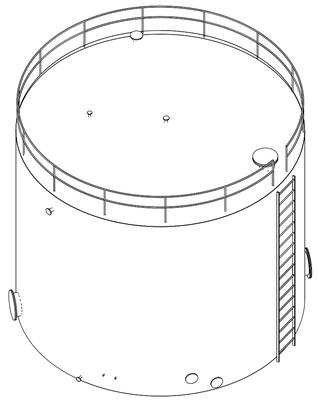
SCALE: 1/8"=1'-0"

NO. 31324.07

MU135

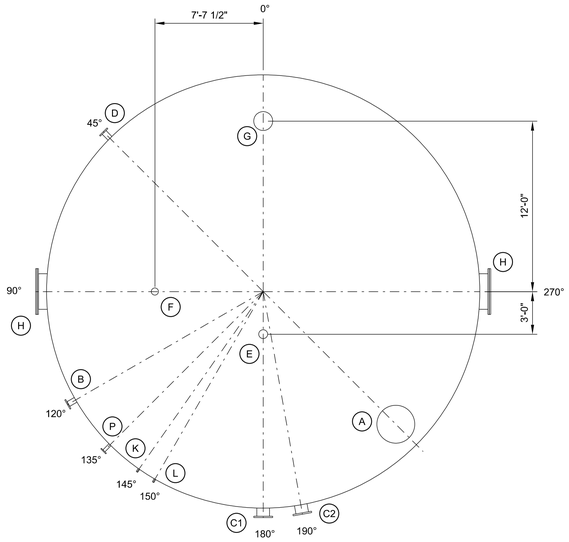
REV. 2

CADD D3-R5



ISOMETRIC VIEW

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



PLAN VIEW

SCALE: 3/16" = 1'-0"

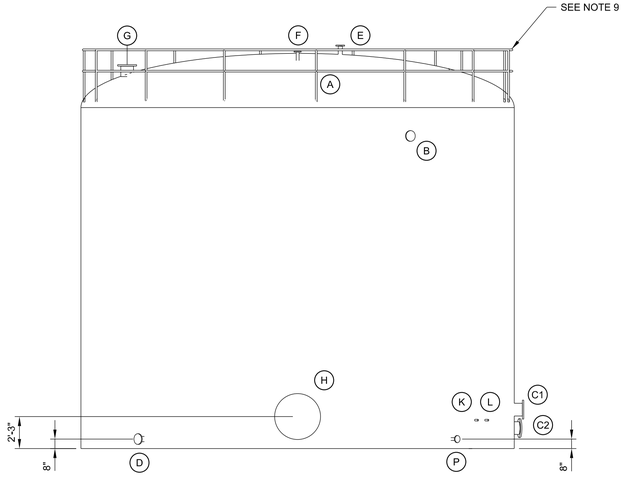
NOTES:

1. EQUIPMENT TAG: 0-FW-TNK-001 (TANK) 0-FW-HTR-028 (HEATER).
2. ALL CONNECTIONS TO EXTEND 8" BEYOND TANK SHELL OUTSIDE DIAMETER TO FACE OF FLANGE UNLESS OTHERWISE NOTED.
3. CONNECTION ORIENTATION AS SHOWN IS PRELIMINARY.
4. USE PLAN VIEW FOR CONNECTION ORIENTATION.
5. SEE TANK DATA SHEET FOR REQUIRED ACCESS PROVISIONS.
6. LOCATE DRAIN AS LOW AS POSSIBLE ON SHELL.
7. SPECS AND DIMENSIONS LABELED AS "x" ARE TO BE SIZED AND PROVIDED BY CONTRACTOR.
8. THERMOWELLS TO BE LOCATED PER NFPA 22 FOR FIRE WATER TANKS.
9. INSTALL HANDRAIL AROUND PERIMETER OF TANK

APPURTENANCE SCHEDULE

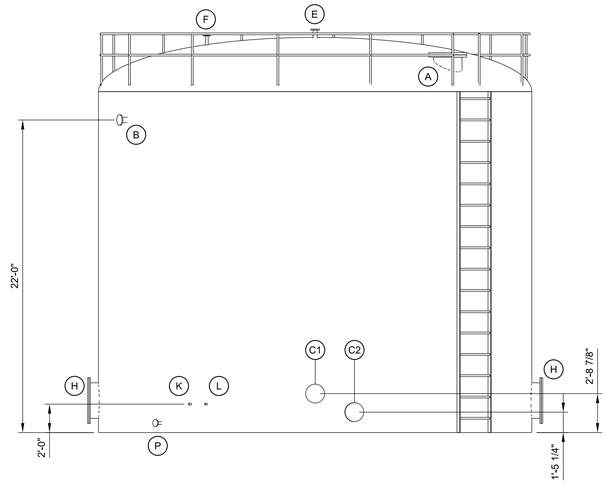
MK	QTY	SIZE	TYPE	DESCRIPTION
A	1	24"	FLANGED	MANHOLE
B	1	4"	CL 300 RF FLG	TANK INLET
C1	1	8"	CL 150 RF FLG	ELECTRIC FIRE WATER PUMP SUCTION
C2	1	8"	CL 150 RF FLG	DIESEL FIRE WATER PUMP SUCTION
D	1	4"	CL 150 RF FLG	DRAIN
E	1	TBD	CL 150 FF FLG	ROOF VENT WITH BIRD SCREEN
F	1	2"	CL 150 FF FLG	LEVEL TRANSMITTER
G	1	10"	CL 150 FF FLG	NFPA 22 OVERFLOW
H	2	30"	FLANGED	MANHOLE
K	1	1"	NPT	TEMPERATURE ELEMENT
L	1	1"	NPT	TEMPERATURE INDICATOR
M	X	4"	CL XXX RF FLG	SPARE
N	X	6"	TBD	IMMERSION HEATER-LOCATE AS LOW AS POSSIBLE ON TANK SHELL, AWAY FROM PUMP SUCTION CONN
P	1	2"	CL 150 RF FLG	SERVICE WATER SUPPLY

D



LEFT VIEW

SCALE: 3/16" = 1'-0"



FRONT VIEW

SCALE: 3/16" = 1'-0"

AT FULL SIZE

0 1 2 3 IN

0 1 2 3 4 5 6 7 8 cm

NO.	REVISIONS	DSGN	CHKD	APVD	DATE
D	REVISED CONNECTIONS				
C	ADDED SERVICE WATER FLANGE				
B	REVISED CONNECTIONS				

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MOUNTAIN PEAK POWER, LLC
MOUNTAIN PEAK POWER STATION
WELD COUNTY, COLORADO

MECHANICAL GUIDE DETAIL FIRE WATER / SERVICE WATER TANK

DESIGNED J. SOLAN
DRAWN M. McGINNIS
CHECKED
APPROVED
APPROVED
DATE

SCALE: 3/16"=1'-0"
NO. 31324.07
REV. D
M21-0007

CADD D3-R5