STATE OF COLORADO

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TR 1447 - ECOSA Pumpback System

Norma Townley <Norma.Townley2@newmont.com> Wed, Feb 26, 2025 at 3:03 PM
To: Elliott Russell - DNR <elliott.russell@state.co.us>
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Elliott attached please find our Technical Revision 147 – ECOSA Pumpback System. If you have any questions please reach out to Antonio.Matarrese@Newmont.com or Katie.Blake@Newmont.com. Thank you.

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NORTH AMERICA

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February 26, 2025

ELECTRONIC DELIVERY

Mr. Elliott Russell
Environmental Protection Specialist
Colorado Department of Natural Resources
Division of Reclamation, Mining and Safety
Office of Mined Land Reclamation
1313 Sherman Street, Room 215
Denver, Colorado 80203

Re: Permit No. M-1980-244; Cripple Creek & Victor Gold Mining Company; Cresson Project; Technical Revision 147 – ECOSA Pumpback System

Dear Mr. Russell:

Newmont Corporation's Cripple Creek and Victor Gold Mining Company (CC&V) hereby provides this Technical Revision (TR) 147 to Permit M-1980-244, to construct a pumpback system in Grassy Valley to intercept, convey, and collect mine impacted groundwater from the East Cresson Overburden Storage Area (ECOSA). Enclosed with this submission is:

1. Attachment 1: Aquifer Testing Report
2. Attachment 2: ECOSA Pumpback System Design Summary Report

The technical revision payment fee in the amount of $1,006 was made electronically via the DRMS webpage on February 25, 2025.

Should you require further information, please do not hesitate to contact Antonio Matarrese at 719-851-4185 or Antonio.Matarrese@Newmont.com or myself at Katie.Blake@Newmont.com.

Sincerely,

DocuSigned by:
Katie Blake
5A3D013B629844B...

Katie Blake
Sustainability & External Relations Manager
Cripple Creek & Victor Gold Mining Co

Ec: E. Russell - DRMS
P. Lennberg – DRMS
Z. Trujillo - DRMS
J. McBryde – Teller County
J. Gonzalez – CC&V
K. Blake – CC&V
N. Townley – CC&V
A. Matarrese – CC&V

Background
The ECOSA facility was originally permitted in 2008 through Amendment 9 to Mining Permit M-1980-244 by the Division of Reclamation, Mining, and Safety (DRMS). In 2018, DRMS approved Technical Revision (TR) 97 for the installation of groundwater monitoring well GVMW-25. In August 2021, as part of the quarterly DRMS water monitoring program, CC&V collected a water sample from monitoring well GVMW-25. Upon receipt of the analytical results, CC&V submitted an exceedance report to DRMS, detailing exceedances for Beryllium, Cadmium, Fluoride, Manganese, pH, Sulfate, and Zinc. Following this report, DRMS requested CC&V collect monthly water quality samples from five monitoring wells in Grassy Valley: GVMW-25, GVMW-8A, GVMW-8B, GVMW-22A, and GVMW-22B. The results from October 2021 through January 2022 were submitted to DRMS, at which point DRMS informed CC&V, starting in February 2022, only monitoring well GVMW-25 would require monthly reporting, as no exceedances were observed at the other monitoring locations.

CC&V continued monthly sampling and reporting for GVMW-25, noting increases in parameter concentrations in August 2022, similar to those observed in August 2021. Upon receipt of the August 2022 monitoring data, DRMS notified CC&V on September 30, 2022, of the need to update the Grassy Valley Monitoring Plan, to be submitted as Technical Revision 132. The Monitoring Plan has been further expanded in response to the Additional Information Required and Issuance of Corrective Action, Grassy Valley Groundwater and Surface Water Monitoring Report September 2023, dated November 22, 2023.

CC&V continues to provide DRMS with Monthly Reports in accordance with the approved *Quality Assurance Project Plan and Field Sampling Guidance (QAPP)* for Grassy Valley Monthly Monitoring dated February 11, 2025. The Grassy Valley Monthly Monitoring currently includes:

- Monthly sampling/monitoring of 5 surface water locations
- Monthly sampling/monitoring of 34 groundwater locations
- Monthly sampling/monitoring of 5 stormwater detention ponds (i.e. EMP's)
- Monthly sampling/monitoring of seepage locations

Since 2022, CC&V has undertaken multiple technical revisions (TRs) to enhance groundwater monitoring and seepage mitigation for ECOSA. TR-132 (October 2022) updated the ECOSA Monitoring Plan and committed to a long-term mitigation strategy. TR-138 (June 2023) proposed additional monitoring and interception wells but was withdrawn after discussions with the Division. TR-141 (December 2023) introduced Phase I of the short-term mitigation plan, including new monitoring wells, which were installed in August 2024. TR-144 (May 2024) proposed improvements to surface seepage collection was approved in September 2024. These efforts demonstrate CC&V's ongoing commitment to groundwater management and regulatory compliance.

In December 2024, CC&V and DRMS entered into a Stipulated Agreement regarding the ECOSA. The agreement established specific activities to further protect groundwater and surface water systems. This TR is submitted as part of those agreed-upon activities to enhance groundwater capture and collection.

Approach
The East Cresson Overburden Storage Area (ECOSA) Pumpback System was designed as an integrated approach for seepage mitigation and groundwater management within Grassy Valley. The system is designed to intercept and transfer impacted groundwater from strategically selected extraction wells to on-site temporary storage tanks, ensuring safe handling and transportation to the Valley Leach Facilities (VLFs).

Key Design Components:

- Groundwater Collection & Conveyance: The system includes five extraction wells (GVMW-25, -27, -28, -34, and -35B), selected based on flow capacity and location. Additional details on well selection can be found in the subsequent section and in Appendix 1 - Aquifer Testing Report. The extracted groundwater will be transported via a pressurized and gravity-fed conveyance pipeline network to designated storage tanks that will be emptied as-needed and hauled to the VLFs via water truck.
    - GVMW-25 will not be initially operated as a pumpback well. Due to its downgradient location relative to the other pumpback wells, it will be used for monitoring to evaluate the system's effectiveness. However, the necessary infrastructure will be installed to allow future operation as a pumpback well, if deemed necessary based on system performance.

- Pipeline Design: The system includes two pipeline alignments, one from the southern wells (Alignment 1) and one from the northern wells (Alignment 2). A double-contained HDPE pipeline was selected for its superior corrosion resistance and ability to withstand the site's environmental conditions. The pipeline is buried at a depth of 5 feet—exceeding standard requirements—to provide additional protection against freezing temperatures. Cleanouts, air relief valves (ARVs), and trenchless installation methods have been incorporated to enhance system reliability and maintenance accessibility.

- Wellhead Equipment & Pumping System: The system will be equipped with stainless steel submersible groundwater pumps featuring Variable Frequency Drives (VFDs) to regulate flow and minimize pump cycling. Each well will be fitted with corrosion-resistant CPVC piping, pressure transducers, and flow meters, allowing precise control and monitoring. Insulated AquaShield enclosures and heat trace are installed at wellheads to ensure protection and continuous operation in extreme weather conditions. Well containment areas are designed to hold 110% of the uphill pipeline capacity and precipitation from a 100 year 24 hour storm.

- Storage Tanks & Containment: Two 10,000-gallon crosslinked HDPE storage tanks will be used to collect and temporarily store extracted groundwater. The tanks are designed with 110% secondary containment capacity to accommodate both tank volume and precipitation from a 100-year, 24-hour storm event. Interconnected piping allows redundancy, ensuring operational continuity even if one tank is out of service. The storage tanks are equipped with level transducers for continuous monitoring, interlock systems to prevent overtopping, and fiber optic communication for real-time remote monitoring. Additionally, alarm set points can be integrated to provide automated notifications to operations personnel when the tanks reach specified capacity thresholds, ensuring timely removal of stored water.

- Electrical & Control Systems: Electrical power is supplied by Black Hills Energy, with new overhead transmission lines and step-down transformers extending service to the well sites. Each well pump is controlled via a Programmable Logic Controller (PLC) system, allowing both automated and manual operation. The pumps operate in AUTO mode, where activation and shutdown are based on real-time well level data received from pressure transducers. In manual operation, an ON/OFF control panel is provided at each well, allowing operators to directly start or stop pumps as needed. Additionally, each wellhead is equipped with a flow meter, pressure transmitter, and alarm system to provide continuous performance data. These parameters are logged and transmitted to existing CC&V control software via fiber optic communication, ensuring real-time oversight and remote management capabilities.

This pumpback design establishes a robust, efficient, and environmentally compliant groundwater management system. The proposed infrastructure prioritizes operational reliability, maintainability, and regulatory adherence, ensuring a sustainable solution for mitigating seepage at ECOSA.

Conceptual Model and Well Selection

The wells selected for the pumpback system were based on data from drilling, initial monitoring, and aquifer testing. Aquifer testing evaluated the new groundwater monitoring wells in Grassy Valley to determine suitable candidates for groundwater interception and pumpback. Based on hydraulic conductivity (K), transmissivity (T), and saturated thickness, five wells were selected for the ECOSA Pumpback System: GVMW-25, GVMW-27, GVMW-28, GVMW-34, and GVMW-35B.

Data collected during the drilling and initial monitoring of the Grassy Valley monitoring wells (installed in 2024) led to a refinement of CC&V's conceptual hydrogeologic model for Grassy Valley. The initial model was primarily based on geophysical surveys, which suggested that increased constituent concentrations observed at GVMW-25 resulted from seepage migrating west to east through a low-resistivity/high-conductivity zone along the southern portion of ECOSA. To investigate this hypothesis, five new monitoring wells (GVMW-29 through GVMW-33) were installed in 2024. However, data obtained during drilling and subsequent monitoring challenged this assumption.

Three wells (GVMW-29, GVMW-31, and GVMW-32) were found to be dry or functionally dry, indicating limited groundwater presence in those locations. The remaining two wells (GVMW-30 and GVMW-33) exhibited shallow water columns and consistently pumped dry at minimal extraction rates during sampling, suggesting low recharge capacity. In contrast, GVMW-27 and GVMW-28, located closer to the thalweg of the valley, demonstrated substantial water columns, higher recharge rates, and similar water quality to GVMW-25.

These findings prompted a revision of the conceptual hydrogeologic model, indicating seepage is more likely migrating north to south along the thalweg of Grassy Valley, rather than west to east as initially hypothesized. This updated conceptual model, based on drilling data, monitoring results, and aquifer testing, directly informed the design of the pumpback system and the selection of extraction wells.

Well Selection Justification & Key Findings

1. GVMW-25
    - Pre-existing well with observed hydrologic connectivity to ECOSA
    - Recommended for inclusion based on historical monitoring results and observed water column levels

  - Anticipated to have similar physical properties to GVMW-27 which are favorable for effective pumpback
2. GVMW-27
   - Weathered schist lithology with a saturated thickness of 19.1 feet
   - Pumping test indicated a transmissivity (T) of 22 to 57.64 ft²/day and a hydraulic conductivity (K) of 1.15 to 3.01 ft/day
   - Step-drawdown and 72-hour pumping test results confirmed a stable yield at 0.75 gpm
3. GVMW-28
   - Saturated thickness: 39.68 feet
   - Step-drawdown test results showed a T of 4.323 ft²/day and K of 0.114 ft/day
   - Demonstrates moderate hydraulic conductivity
4. GVMW-34
   - Installed within the northwestern low-resistivity zone identified during geophysical survey
   - Slug testing indicated K of 0.8 – 1.43 ft/day and saturated thickness of 26.31 feet
   - Selected for inclusion based to reduce constituent loading to groundwater in the northern section of Grassy Valley
5. GVMW-35B
   - Installed within the northwestern low-resistivity zone identified during geophysical survey
   - Saturated thickness: 40.21 feet, screened in lean clay lithology
   - Slug testing indicated moderate K of 0.13 – 0.25 ft/day, supporting its inclusion in the pumpback system

The revised conceptual hydrogeologic model, which reflects the new data and insights gained from drilling, monitoring, and aquifer testing, influenced the well selection process for the ECOSA Pumpback System. The updated model, which suggests a north-to-south flow of seepage along the thalweg of Grassy Valley, led to the identification of wells with optimal hydraulic properties and strategic placement to maximize seepage interception. The selected wells—GVMW-25, GVMW-27, GVMW-28, GVMW-34, and GVMW-35B—are expected to provide effective groundwater capture, with primary extraction points located in areas with higher transmissivity and hydraulic conductivity. This well selection not only aligns with the revised hydrogeologic understanding but also ensures a robust, long-term pumpback system capable of addressing groundwater management in Grassy Valley.

Pumpback System Augmentation

In order to implement a pumpback system in Colorado, CC&V must adhere to specific legal and regulatory frameworks designed to prevent injury to senior water rights. The primary mechanisms to achieve this are through Plans for Augmentation and Substitute Water Supply Plans (SWSP). CC&V will develop a Plan for Augmentation and Water Court application that details how, when, and where replacement water will be supplied to the affected stream system. The Water Court evaluates the plan to ensure it prevents injury to existing water rights and, if satisfactory, issues a decree approving the augmentation plan.

CC&V's augmentation will include operational pumpback at the five wells detailed in this proposal. Depletions and replacement requirements will be determined based on the volume of water pumped as measured by the flow meters installed at each well location. CC&V's augmentation plan application will also request a process to add more wells to the pumpback system in the future.

CC&V will request an SWSP approval from the State Engineer's Office pursuant to C.R.S. 37-92-308(4) to authorize operation of the pumpback system while the Plan for Augmentation application is pending with the Water Court. CC&V will be unable to operate the pumpback system until the SWSP is approved by the State Engineer's Office.

Schedule
CC&V will initiate the Water Court application for a Plan for Augmentation and the SWSP application before end of March, 2025. Upon DRMS approval, CC&V will initiate the contractor procurement process, which is anticipated to take approximately one to three months. This timeframe accounts for the complexity of the project, allowing contractors adequate time to develop comprehensive proposals and for CC&V to conduct a thorough review of submissions, select a contractor, and finalize all contractual agreements. Following contractor selection, construction activities are expected to be completed within a three- to four-month period.

Monitoring
Compliance monitoring will continue at all well locations in accordance with the approved QAPP. Established monitoring wells converted to pumpback operation will be sampled using grab techniques collected from dedicated sample ports installed at each wellhead during operation. This sampling approach differs from low-flow, volumetric, and purge-and-return methods, as pumpback wells will be continuously pumped. Pumpback wells will be inspected on a monthly basis, and if actively pumping at the time of inspection, a grab sample will be collected. In cases where a well is not operational during the initial inspection, CC&V will conduct a follow-up inspection later in the month to attempt sample collection, where feasible. This monitoring protocol ensures representative water quality data collection while accounting for variations in pump operation.

The effectiveness of the pumpback system at intercepting seepage from the ECOSA will be assessed through the routine monthly monitoring at well location GVMW-25. This well has been selected due to its extensive historical dataset, the ECOSA seepage signature that has been detected in groundwater at this location, and its downgradient position relative to other pumpback wells, making it a reliable indicator of pumpback system performance. Post-implementation monitoring data will be compared to historical conditions to identify trends, such as changes in groundwater levels at individual wells, changes in the groundwater gradient within Grassy Valley, and changes in contaminant concentration trends or reductions in peak concentrations, which could indicate system effectiveness. Pumpback infrastructure will be installed at GVMW-25 to allow future operation as a pumpback well, but it will only be operated if deemed necessary based on system performance and in collaboration with DRMS.

Conclusion
The ECOSA Pumpback System represents a comprehensive and strategically designed solution for groundwater management and seepage mitigation in Grassy Valley. Through the integration of targeted extraction wells, advanced monitoring infrastructure, and a robust conveyance system, this plan ensures effective groundwater capture while maintaining compliance with regulatory requirements. The well selection process, informed by initial monitoring data and aquifer testing, maximizes the system's efficiency and long-term viability.

CC&V remains committed to regulatory adherence and environmental stewardship by implementing a structured monitoring framework, ensuring system performance is continuously evaluated. Monitoring in accordance with the approved QAPP will provide reliable data to assess the operational effectiveness of the system. Additionally, CC&V will collaborate with DRMS on further monitoring well placement and ensure compliance with all legal obligations under the Plan for Augmentation and SWSP processes.

Upon regulatory approval, CC&V will proceed with contractor selection, system construction, and implementation. The ECOSA Pumpback System is expected to serve as a sustainable groundwater management measure, reinforcing CC&V's commitment to responsible mining practices and long-term water resource protection.

NORTH AMERICA

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Attachment 1

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ECOSA - Cripple Creek and Victor Gold
Mine, Teller County, Colorado

Aquifer Testing Report

East Cresson Overburden Storage Area
(ECOSA) Seepage Mitigation Design
PO Number: 3002859211

Cripple Creek and Victor Gold Mine
Teller County, Colorado

Cripple Creek and Victor Gold Mining
Company, LLC

February 19, 2025

Newmont
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Table of Abbreviations and Acronyms

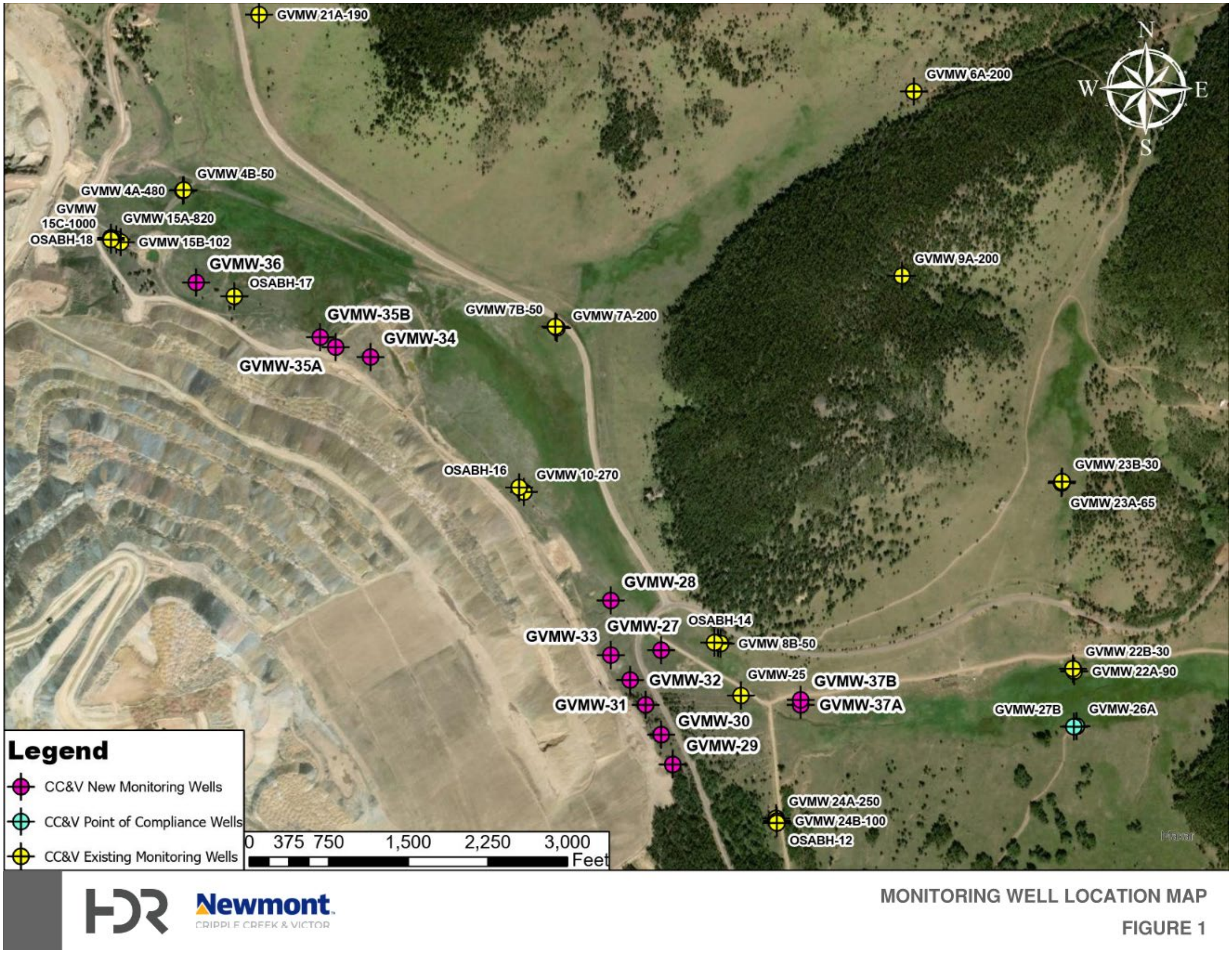
Authentic	Authentic Drilling, Inc.
bgs	below ground surface
btoc	below top of casing
cm/s	centimeters per second
CC&V	Cripple Creek and Victor Gold Mine
DRMS	Division of Reclamation, Mining, and Safety
ECOSA	East Cresson Overburden Storage Area
gpm	gallons per minute
HDR	HDR Engineering, Inc.
K	hydraulic conductivity
Newmont	Cripple Creek and Victor Gold Mining Company, LLC
T	transmissivity
TR	Technical Revision
USCS	Unified Soil Classification System
VLF2	Valley Leach Facility 2

1. Introduction

The purpose of this Aquifer Testing Report is to document slug tests and pump tests of recently installed groundwater monitoring wells at the Cripple Creek and Victor Gold Mine (CC&V) located in Teller County, Colorado. The groundwater monitoring system is intended to support the East Cresson Overburden Storage Area (ECOSA) Seepage Mitigation Design project. The ECOSA is an active overburden storage facility located approximately two miles north of Victor, CO and approximately two miles east of Cripple Creek.

HDR Engineering, Inc. (HDR) was contracted by the Cripple Creek and Victor Gold Mining Company, LCC (Newmont) to conduct slug testing and pump testing of newly installed groundwater monitoring wells at CC&V (HDR, 2024). HDR additionally retained Authentic Drilling, Inc. (Authentic) to provide on-site pump testing activities, while HDR conducted the slug tests, logged data from the pump tests, and oversaw all pump testing activities conducted by Authentic. All on-site personnel completed site-specific safety training and orientation. Additionally, daily safety meetings were conducted by the on-site project team prior to commencing work.

Figure 1. ECOSA/Grassy Valley Monitoring Well Location Map



2. Background Information

2.1 Site Description

The ECOSA is an active overburden storage facility located on the northeast edge of the CC&V mine site. The area known as Grassy Valley is located immediately to the north and east of the ECOSA facility (WSP Golder, 2023). Seepage has been observed at the toe of the facility near Grassy Valley (Collier Geophysics, 2023).

2.2 Geology and Hydrogeology

The Cripple Creek basin is a steep-walled volcanic subsidence basin surrounded by Precambrian granite. The basin is filled with fragmented rocks, of both volcanic and clastic origin, which are Miocene in age, and which are collectively referred to as “breccia” (Hamm, J.C., 1972). The hydrogeology of the Grassy Valley area is characterized in terms of three hydrogeological units: Diatreme, Granodiorite/Phonolite, and the Alluvium/Colluvium (Brown, 2001).

Grassy Valley is underlain by colluvium and granitic bedrock with groundwater present in both the bedrock and the colluvium (WSP Golder, 2023). Groundwater levels for wells screened within the colluvium ranged from 6 to 30 feet below ground surface (bgs), and flow rates ranged from 0.1 to 1.5 gallons per minute (gpm) (Piteau Associates, 2023a and 2023b). Recent water quality results from monitoring well GVMW-25 (**Figure 1**), indicate hydrologic connection between the ECOSA and Grassy Valley, although there have been no observed effects to surface or ground water outside of the CC&V permit boundary (Newmont, 2023).

The colluvium mainly consists of sandy unconsolidated gravel, fill sand, black sandy peat, overburden, and alluvium with a mix of breccia and moderate clay (Ligocki, 1998, White, 1997). A large portion of the subsurface bedrock structures in the ECOSA/Grassy Valley area are known to be the Cripple Creek Diatreme, which consists of igneous brecciated rock (Kelley et al., 1998) and phonolite. Most of the ECOSA and a large portion of Grassy Valley is located within the footprint of the diatreme, however, the northwest portion of Grassy Valley is situated on primarily Precambrian granodiorite.

Groundwater in the ECOSA area infiltrates through the surface mine operations towards and through the diatreme and has the potential to flow towards the historic Carlton Tunnel (Brown, 2001). The diatreme is a highly permeable hydrogeologic unit. Slug test data from ECOSA wells indicates a hydraulic conductivity (K) of 6 x 10^{-5} to 1 x 10^{-4} centimeters per second (cm/s). The K of the diatreme is likely dominated by many well-connected fractures (Brown, 2001), and historic mine workings. The granodiorite/phonolite has low K. The upper 30 feet of such rocks usually have slightly higher permeability because of weathering; however, weathering seldom extends below this depth (Brown, 2001). Slug test data from ECOSA wells indicates the K of the shallow, weathered granodiorite/phonolite is in the range of 1 x 10^{-6} to 1 x 10^{-5} cm/s. K in the deeper, unweathered granodiorite/phonolite is in the range of 6 x 10^{-7} to 51 x 10^{-6} cm/s. The K of this unit is likely to be dominated by fractures (Brown, 2001).

The northwest portion of Grassy Valley consists of sandy, unconsolidated gravel colluvium from 0 to 5 feet bgs, and black sandy peat to 5 to 15 feet bgs (White, 1997). According to geologic logs, bedrock in this area consists of pre-Cambrian biotite schist, which is weakly oxidized and has moderate fractures (White, 1997, Ward et al., 2001). Pump testing during drilling at GVMW-4A

(**Figure 1**) showed groundwater flows from 10 to 70 gpm. From 110 to 245 feet bgs, the groundwater flow ranged from 10 to 25 gpm. From 300 to 440 feet bgs, the groundwater flow ranged from 60 to 70 gpm (White, 1997).

The central portion of Grassy Valley consists of Valley Fill colluvial material from ground surface to 20 to 35 feet bgs (Ligocki, 1998). At GVMW-7A, bedrock consists of granodiorite, with medium-grained granite. Pump testing during drilling at GVMW-7A showed groundwater flow rates from 1 to 4 gpm. The GVMW-7A geologic log showed groundwater encountered at 205 feet bgs and groundwater flow rates ranging from 35 to 50 gpm. At 220 feet bgs, groundwater flow rates ranged from 45 to 50 gpm, and at 270 feet bgs, groundwater flow ranged from 35 to 40 gpm (Ligocki, 1998).

The southeast portion of Grassy Valley consists of Valley Fill colluvium and overburden material from 0 to 20 feet bgs (Ligocki, 1998). The underlying bedrock consists of porphyritic phonolite. At GVMW-8A (**Figure 1**), there was a medium- grained aphanitic dike from 20 to 30 feet bgs. From 85 to 140 feet bgs, the geologic logs show weak sericite and potassic alteration and 2 to 3% pyrite. From 105 to 110 feet bgs and 150 to 225 feet bgs, trace amounts of fluorite were found. From 205 to 250 feet bgs, the logs indicated groundwater occurring within the fractured bedrock. At 200 feet bgs, groundwater flow was 5 gpm (Ligocki, 1998).

2.3 Recent Monitoring Well Installations (2024)

Recent groundwater quality results from monitoring well GVMW-25, screened in alluvium and bedrock from 69 to 79 feet bgs, indicate a hydrologic connection between ECOSA and Grassy Valley. In August 2021, as part of CC&V's water quality monitoring program, CC&V collected a water sample from GVMW-25. Upon receipt of the analytical results, CC&V provided an exceedance notification to the Division of Reclamation, Mining and Safety (DRMS) specifying exceedances for several parameters in the sample collected. CC&V hypothesized that the seasonally influenced concentrations of constituents observed at monitoring well GVMW-25 were caused by stored porewater within the ECOSA facility being flushed into shallow groundwater towards the Grassy Valley during the monsoon rain events. In 2022 and 2023, CC&V observed increases in parameter concentrations with similar pattern to the increases observed in August 2021, post-monsoon season.

CC&V discussed a seepage mitigation plan with DRMS, which includes a phased approach. Phase I of the seepage mitigation plan included the installation of monitoring wells along the toe of ECOSA within Grassy Valley to increase CC&V's ability to monitor groundwater, characterize groundwater flow paths, and intercept and collect impacted shallow groundwater. CC&V ultimately proposed the installation of thirteen (13) groundwater monitoring wells within Grassy Valley in locations that correspond to low resistivity zones identified during a geophysical survey (Collier Geophysics, 2023).

In July and August 2024, 13 groundwater monitoring wells (GVMW-27, GVMW-28, GVMW-29, GVMW-30, GVMW-31, GVMW-32, GVMW-33, GVMW-34, GVMW-35A, GVMW-35B, GVMW-36, GVMW-37A, and GVMW-37B) were installed as part of Phase I of the ECOSA Seepage Mitigation Design Project (**Table 1** and **Figure 1**) (HDR, 2024). The colluvium encountered during installation of the new monitoring wells was found to be dry in some locations (GVMW-29, GVMW-31, GVMW-32), except where groundwater was identified directly above competent bedrock (GVMW-28, GVMW-30, GVMW-33, GVMW-34, GVMW-35B, GVMW-36). Groundwater was also identified in monitoring wells installed in the weathered bedrock (GVMW-27, GVMW-37B). GVMW-35A and GVMW-37A were installed as deep bedrock wells and were screened in fractured, competent bedrock (HDR, 2024).

GVMW-27 and GVMW-28 were installed closer to the thalweg of Grassy Valley to better characterize groundwater flow paths for the potential downgradient migration of seepage. GVMW-29, GVMW-30, GVMW-31, GVMW-32, and GVMW-33 were installed in a northwest-southeast trending line within the observed shallow low resistivity zone in the southeastern portion of the ECOSA. GVMW-34, GVMW-35A, and GVMW-35B were installed within the observed shallow low resistivity zone in the northwestern portion of the ECOSA. GVMW-35A and GVMW-35B were installed near one another to intersect both the shallow and deep low resistivity zones observed at that location. GVMW-36 was installed at an additional small, shallow resistivity zone. GVMW-37A and GVMW-37B were installed downgradient of GVMW-25, due to the elevated concentrations of metals observed in GVMW-25 (HDR, 2024). The monitoring wells were constructed in a manner that allows for pump installation and conversion to interception wells, if necessary.

Table 1. Monitoring Well Construction Details

Well ID	Well Diameter (inches)	Screen Interval (feet, btoc)	Static Depth to Water (feet, btoc)	Well Depth (feet, btoc)	Water Column (feet)	Screened Lithologic Unit[1]	Notes[2]
GVMW-27	4	64.42-74.42	53.45	74.42	20.97	Weathered schist	
GVMW-28	4	61.40-71.40	31.72	71.40	39.68	Lean clay	
GVMW-29	4	27.98-37.98	DRY	37.98	DRY	Lean clay	Dry
GVMW-30	4	40.25-50.25	39.90	50.25	10.35	Lean clay	
GVMW-31	4	42.71-62.71	61.65	62.71	1.06	Lean clay	Functionally dry
GVMW-32	4	56.93-66.93	65.82	66.93	1.11	Lean clay	Functionally dry
GVMW-33	4	74.05-84.05	60.82	84.05	23.23	Fat clay	
GVMW-34	4	75.06-85.06	58.75	85.06	26.31	Fat-to-lean clay	
GVMW-35A	4	322.02-342.02	268.55	342.02	73.47	Unweathered granodiorite	
GVMW-35B	4	62.71-72.71	32.5	72.71	40.21	Lean clay	
GVMW-36	4	27.43-37.43	14.35	37.43	23.08	Lean clay/Lean silt	
GVMW-37A	4	182.10-202.10	31.59	202.10	170.51	Unweathered granite and schist	
GVMW-37B	4	65.13-75.13	31.10	75.13	44.03	Weathered schist	

[1] Boring logs containing properties of screened lithologic units are included as **Appendix A**.

[2] Functionally dry wells are defined as those with water columns of <2 feet.

3. Field Methods

3.1 Slug Testing

Slug testing was performed for wells to estimate K. Wells that were dry or functionally dry (water column of <2 feet) could not be slug tested. GVMW-35A was not tested because the well had not yet been developed at the time slug tests were being performed. GVMW-35A was developed via air lifting prior to performing pump tests. Slug tests were conducted between September 16 and September 21, 2024, on the following monitoring wells: GVMW-27, GVMW-28, GVMW-30, GVMW-33, GVMW-34, GVMW-35B, GVMW-36, GVMW-37A, and GVMW-37B (**Table 2**).

The tests were conducted by introducing a physical slug into the water column of the tested wells and monitoring the change in water level. For slug testing, a 3-inch diameter watertight slug, varying in length from 2 feet to 5 feet, was utilized. Slug-in tests were completed by dropping the slug into the water column as quickly as possible and measuring the falling water level that followed. Slug-out tests were completed after each slug-in test by removing the slug from the water column as quickly as possible and measuring the rising water level that followed. Water level measurements were recorded at 1-second intervals by a transducer suspended on a communications cable near the bottom of the well. Slug test data were downloaded at the end of each working day and saved locally to a laptop. All non-dedicated down-well equipment used during slug testing was decontaminated between sample locations by rinsing with an Alconox/distilled water solution followed by a potable water rinse and a final rinse with deionized water.

The change in water level in response to each slug-in and slug-out test was analyzed to estimate K. Slug test details are provided in **Table 2**, and slug test results are described in **Section 4.1**.

3.2 Pump Testing

Following a thorough review of wells after completion of slug testing and in consultation with CC&V, four wells were selected for pump testing. Of these four wells, two wells, GVMW-27 and GVMW-35A, were selected for step-drawdown testing and constant rate pump testing; and two wells, GVMW-28 and GVMW-36, were selected for step-drawdown testing only. The determining factors for selecting these wells are as follows:

- **GVMW-27 – Constant rate pump test and step-drawdown test.** This well was selected because of its high hydraulic conductivity based on slug test results, it has sufficient saturated thickness for sustained pumping, and it is spatially located southeast of the ECOSA towards the thalweg of Grassy Valley.
- **GVMW-28 – Step-drawdown test only.** This well was selected because of its moderately high hydraulic conductivity based on slug test results, it has sufficient saturated thickness for sustained pumping, and it is spatially located near the eastern midpoint of the ECOSA in an area being considered for mitigative measures.
- **GVMW-35A – Constant rate pump test and step-drawdown test.** This well was selected to determine the hydraulic properties of deep bedrock groundwater near the northeastern edge of the ECOSA, and it has sufficient saturated thickness for sustained pumping.
- **GVMW-36 – Step-drawdown test only.** This well was selected to determine the hydraulic properties of shallow groundwater near in the northeast edge of the ECOSA, and it has sufficient saturated thickness for sustained pumping.

HDR conducted these pump tests using a consistent methodology, incorporating guidance from ASTM D4050-91. The methodologies for the step-drawdown tests and constant rate aquifer pump tests are described in detail in **Section 3.2.1** and **Section 3.2.2**, respectively. The specific details of pump test implementation at GVMW-27, GVMW-28, GVMW-35A, and GVMW-36 are described in **Section 3.2.3**, **Section 3.2.4**, **Section 3.2.5**, and **Section 3.2.6**, respectively, and these details are summarized in **Table 3**.

Step-drawdown tests were completed at GVMW-27, GVMW-28, and GVMW-36. At GVMW-35A, a complete step-drawdown test was attempted but could not be completed because rapid drawdown of the water column was observed at the lowest achievable pumping rate, and it was decided in the field to forego the step-drawdown test and perform the constant rate pump test only.

An 18-hour constant rate pump test was completed at GVMW-27, followed by a full 72-hour constant rate pump test based on the constant rate drawdown capacity of the well. An 11-hour constant rate pump test was completed at GVMW-35A, followed by another 29-hour constant rate pump test based on the constant rate drawdown capacity of the well. Pump test results are described in **Section 4.2**.

3.2.1 Step-Drawdown Test Methodology

Step-drawdown tests were performed on the designated pumping wells to establish a pumping rate for long-term tests. Additional water level measurements were also recorded in the designated observation wells. Each of the designated pumping wells was intended to be pumped at four successively higher rates as determined by field conditions. Selection of the rates considered the depth to static water level, the depth to the top of the screen interval, the depth of pump intake (a safe distance to prevent the pump from cavitating), and the approximate specific capacity of the well from well development records.

Each test step was performed for a duration of approximately one hour (or more, in some cases) until water level stabilization was achieved (approximately four hours total). The hour-long duration of each step was intended to allow sufficient time for drawdown to stabilize or reach asymptotic conditions. Water levels were measured automatically throughout the step drawdown test with a pressure transducer installed in the pumping well and checked periodically with a water level meter. The pressure transducers utilized were capable of sustaining a head equal to the depth of pump intake plus a sufficient distance below the pump to avoid any pump turbulence. Manual water level measurements were made to the nearest 0.01 foot and recorded in a field logbook or log form.

Prior to commencement of the step drawdown test, the static water level was measured. This static water level was used for drawdown calculations. During each step, water level measurements were performed at equal time steps that were short enough to record drawdown during the first few minutes of each step. Rates of discharge were monitored throughout the test with the use of digital totalizing flow meter, and these rates were adjusted by Authentic to maintain the specified discharge rate as head decreased.

3.2.2 Pump Test (Constant Rate) Methodology

The wells that would receive a constant rate pump test, along with the pumping rates for constant rate pump tests, were selected based on the results of the step-drawdown tests. The selected rates were deemed sustainable for the duration of the drawdown phase of the test and attempted to avoid drawing water levels below the tops of well screens or too close to depths of pump intake (which would result in pump cavitation).

The aquifer pumping tests were intended to consist of a 72-hour drawdown pumping phase during which water levels were monitored at select observation wells and the pumping well, while the pumping well was purged at a constant rate for the duration of the test. The drawdown phase was then followed by a recovery phase (non-pumping), during which water levels were monitored after the pump was shut down. At least one observation well was located outside of the anticipated influence of the pumping well to monitor ambient water level fluctuations during the drawdown and recovery phases of the test.

Water levels were monitored with pressure transducers and manually with a water level meter. Pressure transducers were installed in the pumping well and designated observation wells. The pressure transducer installed in the pumping well was capable of sustaining head equal to the depth of the pump intake plus a sufficient distance below the pump to avoid any pump turbulence. The pressure transducers installed in the observation wells were capable of sustaining head greater than the anticipated drawdown. Prior to and after each test, transducers were checked by raising and lowering each transducer a measured distance in the well. Transducer readings were additionally verified with a manual water level meter throughout the drawdown and recovery phases of each test.

Water levels in the pumping wells were measured both manually and with a transducer set to record at linear time intervals. Critical early time drawdown data were obtained manually by frequently measuring the water level in the pumping well during the first 10 minutes of the test, and every minute with the transducer. Following the first 10 minutes of the test, pressure transducers continued to collect data in one-minute intervals. The frequency of manual water level measurements was decreased to one measurement per minute until one hour of pumping had elapsed, followed by one measurement every five minutes until two hours of pumping had elapsed, one measurement every 10 minutes until four hours of pumping had elapsed, and finally one measurement every hour until the test had completed. Water levels in designated observation wells were monitored throughout each test with pressure transducers at one-minute intervals for all phases of testing.

Water was withdrawn from the well at a regulated rate throughout each test. Short-term discharge was measured on an hourly basis and compared to the mean discharge to ensure a variation of no more than 10 percent. Long-term discharge variation (i.e., from the beginning of the test to completion) was attempted to be kept within 5 percent. Discharge was measured and recorded frequently during early stages of the test (approximately every five minutes) and adjusted if necessary. A digital totalizing flow meter and graduated measuring cup were used for measuring discharge flow rates and total volume of water discharged (flow meter does not measure rates <0.5 gpm). When discharge was determined to be stable, the discharge rate was checked at a frequency of once every hour. Care was taken to minimize rate fluctuations to those necessary to maintain a constant rate during the initial 10 to 20 minutes of the drawdown phase of the test, when time-drawdown data are critical to curve-matching methods of data analysis.

The recovery of water levels following the pumping phase was measured and recorded for the same amount of time as the duration of the pumping phase (e.g., a 72-hour pump test was immediately followed by a 72-hour recovery monitoring period). The linear frequency of measuring water levels was similar to the frequency employed during the pumping phase.

Discharge water was piped into a frac tank staged at the test location. Water stored in the frac tank was pumped out by Authentic or a CC&V-provided water truck on a regular basis to enable uninterrupted groundwater pumping of the well for the duration of each test. Pump test discharge water was transported by Authentic or CC&V to the Valley Leach Facility 2 (VLF2) for disposal.

Following the completion of pump testing, the tanks were cleaned out by Authentic and excess sediment was collected for disposal at VLF2.

3.2.3 Pump Test Implementation: GVMW-27

A step drawdown test was performed at GVMW-27 on October 24, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm and caused minimal drawdown. After 90 minutes of pumping at 0.1 gpm, the pumping rate was increased to 0.2 gpm. The water level in GVMW-27 decreased slightly over the course of this second step. After 60 minutes of pumping at 0.2 gpm, the pumping rate was again increased to approximately 2.5 gpm. The water level in GVMW-27 gradually decreased for after 5 minutes of pumping at 2.5 gpm, and the pumping rate was increased again to 3 gpm. After 60 minutes of pumping at 3 gpm, the pumping rate was increased again to 4.5 gpm. The water level in GVMW-27 experienced minimal drawdown after 5 minutes of pumping at 4.5 gpm, and the pumping rate was increased again to 5 gpm. The water level in GVMW-27 decreased significantly after 6 minutes; at that point, the pumping rate was decreased back to 4.5 gpm. One minute later, the water level in GVMW-27 was below the depth of the transducer. A rate of 1.5 gpm was selected for a 72-hour constant rate pump test. The well was allowed to recharge fully prior to initiating the constant rate pump test. Full recovery data were logged following the completion of this pump test.

The first intended 72-hour constant rate pump test at GVMW-27 was performed on October 25, 2024, with a selected pumping rate of 1.5 gpm. The selected observation wells for the constant rate pump test were GVMW-8B-50, GVMW-25, GVMW-28, and GVMW-30. The water level in GVMW-27 dropped approximately 2 feet during the first 10 minutes of the pump test, and then dropped approximately 1.5 feet more during the next 90 minutes of pumping. About 16.5 hours after commencing the pump test, the water level in GVMW-27 had experienced approximately 10 feet of drawdown. 18 hours after commencing the pump test, the water level in GVMW-27 had experienced approximately 15 feet of drawdown. At this point, there was approximately 0.3 feet of head above the pressure transducer, and the pump test was ended. Full recovery data were logged following the completion of this pump test.

A second pump test was conducted for 72 hours at GVMW-27 on October 26, 2024. The selected observation wells were the same as for the 18-hour constant rate pump test. To avoid purging the well dry during this pump test, a pumping rate of 0.75 gpm was selected. The water level in GVMW-27 dropped approximately 1.5 feet during the first 10 minutes of the pump test, and then dropped approximately 0.5 feet more during the next 90 minutes of pumping. After 18 hours of pumping, the water level in GVMW-27 had experienced approximately 4 feet of total drawdown. The pump test ran for a complete 72 hours and at the completion of the pump test, the water level in GVMW-27 had experienced approximately 6.5 feet of total drawdown. Full recovery data were logged following the completion of this pump test.

3.2.4 Pump Test Implementation: GVMW-28

A step drawdown test was performed at GVMW-28 on October 3, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm; 60 minutes of pumping at 0.1 gpm caused approximately 3 feet of drawdown. After 60 minutes of pumping at 0.1 gpm, the pumping rate was increased to 0.3 gpm. The water level in GVMW-28 decreased another 6 feet over the course of this second step. After 60 minutes of pumping at 0.3 gpm, the pumping rate was again increased to approximately 0.5 gpm. After 90 minutes of pumping at 0.5 gpm, the water level in GVMW-28 had decreased another 16 feet. The pumping rate was then increased again to 0.7 gpm. After 41 minutes of pumping at 0.7 gpm, the water level in GVMW-28 dropped another 8 feet, at which point it was below the depth of the pressure transducer. Full recovery data were logged following the completion of this pump test.

Ultimately, a constant rate pump test was not performed at GVMW-28.

3.2.5 Pump Test Implementation: GVMW-35A

A step drawdown test was not completed at GVMW-35A (justification provided in **Section 3.2**).

The first intended 72-hour constant rate pump test was performed at GVMW-35A on October 13, 2024, with a selected pumping rate 0.21 gpm. The selected observation wells for the constant rate pump test were GVMW-34, GVMW-35B, GVMW-7B-50, and OSABH-17. The water level in GVMW-35A dropped approximately 3 feet during the first 10 minutes of the pump test, and then dropped approximately 18 feet more during the next 90 minutes of pumping. After 8.5 hours of pumping, the water level in GVMW-35A had dropped a total of 31 feet. At this point, the pumping rate was adjusted to 0.24 gpm. Over the course of the next 2.5 hours (i.e., a total of 11 hours of pumping), the water level in GVMW-35A had dropped another 19 feet (i.e., a total of approximately 50 feet of drawdown). At this point, the pump test was ended as there was approximately 1 foot of head above the pressure transducer. Full recovery data were logged following the completion of this pump test.

The second intended 72-hour constant rate pump test was performed at GVMW-35A on October 14, 2024, following complete water level recovery. The selected observation wells were the same as for the 11-hour constant rate pump test. The selected pumping rate was 0.20 gpm, but the actual pumping rate during the test varied significantly. The water level in GVMW-35A dropped approximately 3.5 feet during the first 10 minutes of the pump test, and then dropped approximately 9.5 feet more during the next 90 minutes of pumping. After approximately 16.5 hours of pumping, water level had dropped a total of 33 feet. During these first 16.5 hours of pumping, the pumping rate was adjusted several times to account for rate drops, and ultimately ranged from 0.18 to 0.25 gpm. This led to variability in the rate of drawdown throughout the pump test. After 29 total hours of pumping, the water level in GVMW-35A had dropped a total of 43 feet. At this point, the pump test was ended as there was approximately 1 foot of head above the pressure transducer. Full recovery data were logged following the completion of this pump test.

3.2.6 Pump Test Implementation: GVMW-36

A step drawdown test was performed at GVMW-36 on October 2, 2024. The purpose was to evaluate drawdown in the well to determine a sufficient pumping rate for a 72-hour pump test. The initial pumping rate for the step drawdown test was set to 0.1 gpm, but in reality, this rate varied from 0.08 to 0.18 gpm which led to variability in the rate of drawdown. After 60 minutes of pumping at 0.1 gpm, the water level in GVMW-36 had dropped approximately 12 feet, and the pumping rate was then increased to 0.2 gpm. After 28 minutes, the water level in GVMW-36 had dropped approximately 18 feet in total, and the pump was lowered an additional 5 feet to a depth directly above the bottom of the well. After an additional 15 minutes, the water level in GVMW-36 had dropped approximately 22 feet in total, and the well was purged dry. After the well was dry, the pump was shut off and was kept in place for the duration of the recovery period. Full recovery data were logged following the completion of this pump test.

Ultimately, a constant rate pump test was not performed at GVMW-36.

Table 2. Slug Test Details

Well ID	Test Date	Slug Used In Test	Test Type	Number Of Tests	Initial Depth To Groundwater (feet, bgs)	Total Well Depth (feet, bgs)	Saturated Thickness (feet)
GVMW-27	9/19/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	51.03	72	20.97
		Slug #2 – Length 3.5’, Diameter 3”	Slug-In & Slug Out				
GVMW-28	9/18/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	28.82	68.5	39.68
GVMW-30	9/19/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	37.65	48	10.35
	9/21/2024						
GVMW-33	9/19/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	57.77	81	23.23
	9/21/2024						
GVMW-34	9/18/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	55.69	82	26.31
	9/20/2024						
GVMW-35B	9/17/2024	Slug #1 – Length 3.5’, Diameter 3”	Slug-In & Slug Out	4	29.79	70	40.21
	9/18/2024	Slug #2 – Length 2’, Diameter 3”					
GVMW-36	9/16/2024	Slug #1 – Length 2’, Diameter 3”	Slug-In & Slug Out	4	11.92	35	23.08
	9/17/2024	Slug #2 – Length 5’, Diameter 3”	Slug-In & Slug Out				
GVMW-37A	9/20/2024	Slug #1 – Length 3.5’, Diameter 3”	Slug-In & Slug Out	4	29.49	200	170.51
		Slug #2 – Length 5’, Diameter 3”	Slug-In & Slug Out				
GVMW-37B	9/20/2024	Slug #1 – Length 3.5’, Diameter 3”	Slug-In & Slug Out	4	28.97	73	44.03

Table 3. Pump Test Details

Well ID	Test Date	Test Type	Length of Test (hours)	Pumping Rate (gpm)	Notes
GVMW-27	10/24/2024	Step Drawdown Test	4	0.1, 0.2, 3, 5	
GVMW-27	10/25/2024	Constant Rate	18	1.5	Well nearly dry after 18 hours of pumping (0.3 feet of head above pressure transducer)
GVMW-27	10/26/2024	Constant Rate	72	0.75	
GVMW-28	10/3/2024	Step Drawdown Test	4	0.1, 0.3, 0.5, 0.7	
GVMW-35A	10/13/2024	Constant Rate	11	0.21, 0.24	Well nearly dry after 11 hours of pumping (1 foot of head above pressure transducer)
GVMW-35A	10/14/2024	Constant Rate	29	0.2, 0.22	Well nearly dry after 29 hours of pumping (1 foot of head above pressure transducer)
GVMW-36	10/2/2024	Step Drawdown Test	2	0.1, 0.2	Well dry after 2 hours of pumping

4. Aquifer Testing Results

4.1 Slug Testing

The resulting slug test data were analyzed using Aqtesolv® v4.5. Each of the four tests at each well were analyzed using two separate equation solutions, if appropriate: Bouwer and Rice (1976) and KGS (Hyder et al., 1994). Both solutions are appropriate for use in wells that are fully or partially submerged, as well as in confined and unconfined aquifers. The groundwater height in GVMW-30 during testing was below the top of screen and was classified as partially penetrating; therefore, corrections were applied to address vadose zone drainage, and early data representing filter pack drainage were not fitted during the slug test analyses. Additionally, initial spikes in observed displacement are attributed to logistical challenges of physical slug testing, and were filtered out as they do not represent formation response.

The saturated thickness of the aquifer at each location was assumed to extend from the static water table to the bottom of the well, and set to the values provided in **Table 2**. An anisotropy ratio of 1 (unitless) was assigned to the aquifer at each well location. Early 'noisy' data were not fitted during the analysis. The summary of slug test analyses is provided in **Table 4**.

4.1.1 Bouwer-Rice Solution (1976)

Bouwer and Rice (1976) developed a semi-analytical method for the analysis of an overdamped slug test in a fully or partially penetrating well in an unconfined of confined aquifers. The Bouwer-Rice method assumes that the aquifer being tested has an infinite areal extent, and that the aquifer is homogeneous, of uniform thickness, and unconfined. This method also assumes that the tested well is fully or partially penetrating, that groundwater flow to the well is quasi-steady state (i.e., storage is negligible), and that the volume of water being tested is injected into or discharged from the well instantaneously.

Table 4 shows slug test results using the Bouwer-Rice solution. The geometric mean K values for weathered bedrock ranged from 0.0092 to 7.62 feet per day. The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was 1.12 feet per day.

4.1.2 KGS Model (Hyder et al., 1994)

The KGS model is an estimation tool utilized for an overdamped slug test in an unconfined or confined aquifer. The KGS model assumes that the aquifer being tested has an infinite areal extent, is homogeneous and of uniform thickness, has an initially horizontal potentiometric surface, and is unconfined. The model also assumes that the tested well is fully or partially penetrating, that groundwater flow is unsteady, that groundwater is released instantaneously from storage with decline of hydraulic head, and that the volume of water being tested is injected into or discharged from the well instantaneously.

Table 4 shows slug test results using the KGS model. The geometric mean K values for weathered bedrock ranged from 0.0011 to 10.58 feet per day. The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was 0.25 feet per day.

4.2 Pump Testing

The resulting pump test data were analyzed using the Cooper and Jacob (1946) straight-line method and the Theis (1935) solution, if appropriate. The details of these methods are described in **Section 4.2.1** and **Section 4.2.2**, respectively. **Section 4.2.3** discusses data interpretation of the following pump tests:

- GVMW-27 – 72-hour Constant Rate Pump Test
- GVMW-27 – Step-Drawdown Test
- GVMW-28 – Step-Drawdown Test
- GVMW-35A – 11-hour Constant Rate Pump Test
- GVMW-36 – Step-Drawdown Test

The 18-hour constant rate pump test at GVMW-27 is not discussed further in this report as the test was deemed incomplete as a full 72-hour pump test was later completed on the same well, using a lower pumping rate. The dataset obtained from the 72-hour pump test is considered a more useful tool for assessing transmissivity (T) and K at GVMW-27. The 29-hour constant rate pump test at GVMW-35A is not discussed further in this report as the variability of pumping rates and drawdown rates makes it difficult to reach a conclusion regarding T and K values at that monitoring well. There was less variability of pumping rates and drawdown rates during the 11-hour constant rate pump test, and so data from that pump test will instead be used to assess aquifer hydraulic parameters at GVMW-35A.

4.2.1 Cooper and Jacob (1946) Straight-Line Method

The Cooper and Jacob (1946) straight-line method (also referred to as the modified non-equilibrium equation) was applied to drawdown data from pump test wells as well as the observation wells. The Cooper and Jacob method is a widely used graphical technique for the determination of aquifer hydraulic properties. Analysis with the Cooper and Jacob method involves matching a straight line to drawdown data plotted as a function of the logarithm of time since pumping began. The time drawdown curve for data collected during pumping and recovery periods becomes a straight line on a semi-log diagram. The slope of the line on the semi-log diagram is used to calculate T; this is a graphical method used to estimate the hydraulic parameters. The drawdown curves with straight-line fits for early-time, mid-time, and late-time pumping are shown in **Appendix B**.

The assumptions for applying the Cooper and Jacob method include the following:

- All layers are horizontal and extend infinitely in the radial direction
- The aquifer is homogeneous and isotropic
- Groundwater flow can be described by Darcy's Law
- Groundwater density and viscosity are constant
- Groundwater flow is horizontal and directed radially towards the well
- The pumping rate is constant
- The extraction well and observation wells are screened over 80% of the Surficial Aquifer thickness
- Drawdown is small compared to the aquifer saturated thickness (<25%)
- Head losses through the well screen and pump intake are negligible

4.2.2 Theis (1935) Solution

The drawdown curves were also analyzed using Aqtesolv® v4.5, the industry standard program for aquifer test analysis, and tested against multiple solutions. The Theis solution was applied to the drawdown data from the pump tests. The Theis solution involves matching a straight line to drawdown data collected during a pump test. The solution assumes a line source for the pumped well and therefore neglects wellbore storage. To allow for the used of the Theis solution in unconfined aquifers, C.E. Jacob developed a procedure (Jacob, 1944) that corrects drawdown data for the reduction in an unconfined aquifer's saturated thickness. **Appendix B** contains log-log plots of drawdown data versus time, fitted Theis curves, and the resulting T.

Assumptions for applying the Theis solution include the following:

- The aquifer has infinite areal extent
- The aquifer is homogeneous and of uniform thickness
- The control well is fully or partially penetrating
- The aquifer is unconfined
- Flow is unsteady
- Water is released instantaneously from storage with decline of hydraulic head
- The diameter of a pumping well is very small so that storage in the well can be neglected
- There is no delayed gravity response in the aquifer
- Low velocity is proportional to the tangent of the hydraulic gradient, instead of the sine
- Flow is horizontal and uniform in a vertical section through the axis of the well
- Drawdown is small relative to the saturated thickness of the aquifer

4.2.3 Interpretation of Pump Test Data

The resulting T and K for pump test data using both the Cooper and Jacob straight-line method and the Theis solution are shown in **Table 5**. Drawdown data with straight-line fits and fitted Theis curves, along with the resulting T, are shown in **Appendix B**.

GVMW-27 – 72-hour Constant Rate Pump Test

Using the Cooper and Jacob straight-line method to evaluate data from the 72-hour constant rate pump test at GVMW-27, T was determined to 22 feet^2/day and K was determined to be 1.15 feet/day for early-time pumping. Due to an increase in drawdown rate following 11.5 hours of pumping during this test, mid- and late-time pumping results using the Cooper and Jacob method are not discussed (see below).

Using the Theis solution for data from the same pump test, T was determined to be 57.64 feet^2/day and K was determined to be 3.01 feet/day.

There is an observable increased drawdown rate following the first 11.5 hours of the 72-hour pump test in GVMW-27. This change in rate indicates a lower permeable boundary condition a short distance from the well and this likely exists in multiple directions from the well. The lower permeability boundary condition is likely competent bedrock. Therefore, the measured T values are considered to be representative for a very limited radius around the well. The aquifer pumping appears to be limited more by the horizontal and vertical extent of the saturated weathered bedrock than by the T of the aquifer. Continued pumping in all tested wells, even with the low pumping rates, would likely result in the wells going dry.

GVMW-27 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-27, T was determined to 29.51 feet^2/day and K was determined to be 1.55 feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-27 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

GVMW-28 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-28, T was determined to be 4.323 feet^2/day and K was determined to be 1.14 x 10^{-1} feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-28 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

GVMW-35A – 11-hour Constant Rate Pump Test

Using the Cooper and Jacob straight-line method to evaluate data from the 11-hour constant rate pump test at GVMW-35A, T was determined to be 0.57 feet^2/day for early-time pumping and 0.37 feet^2/day for mid-time pumping. K was determined to be 7.41 x 10^{-3} feet/day for early-time pumping and 4.81 x 10^{-3} feet/day for mid-time pumping. As late-time pumping rates for GVMW-35A were around 0.24 gpm (whereas, early- and mid-time pumping rates were 0.21 gpm), the Cooper and Jacob results for late-time pumping are not discussed.

Using the Theis solution for data from the same pump test, T was determined to be 1.036 feet^2/day and K was determined to be 1.35 x 10^{-2} feet/day.

GVMW-36 – Step-Drawdown Test

Using the Theis solution to evaluate data from the step-drawdown test at GVMW-36, T was determined to be 0.5233 feet^2/day and K was determined to be 2.33 x 10^{-2} feet/day. The Cooper and Jacob straight-line method was not applied to the GVMW-36 step-drawdown test data, as this solution was not developed for a step-drawdown test and does not consider all steps in the test as an aggregate.

Table 4. Summary of Slug Test Results

Well ID	Test ID	Initial Displacement (H_0) (ft)	Calculation of K - Solution and K Value				Screened Lithology
			Bouwer-Rice (1976)	Geometric Mean of K Values (ft/day)	KGS (Hyder et al., 1994)	Geometric Mean of K Values (ft/day)	
GVMW-27	Slug In 1	1.45	6.89	7.62	11.98	10.58	Weathered schist
	Slug In 2	3.49	8.46		10.85		
	Slug Out 1	1.25	7.27		9.48		
	Slug Out 2	2.19	7.88		10.17		
GVMW-28	Slug In 1	1.15	0.73	0.65	0.55	0.77	Lean clay
	Slug In 2	1.28	0.83		0.85		
	Slug Out 1	1.35	0.52		0.57		
	Slug Out 2	1.36	0.57		1.29		
GVMW-30	Slug In 1	1.38	0.13	0.089	0.216	0.094	Lean clay
	Slug In 2	0.92	0.06		0.037		
	Slug Out 1	1.09	0.14		0.125		
	Slug Out 2	1.11	0.05		0.080		
GVMW-33*	Slug In 1	1.24	0.024	0.016	0.026	0.010	Fat clay
	Slug In 2	1.28	0.025		0.027		
	Slug Out 1	1.27	0.011		0.003		
	Slug Out 2	1.29	0.010		0.005		
GVMW-34*	Slug In 1	1.20	0.88	0.80	3.02	1.43	Fat-to-lean clay
	Slug In 2	1.16	0.86		2.23		
	Slug Out 1	1.28	0.66		0.71		
	Slug Out 2	1.27	0.80		0.87		
GVMW-35B*	Slug In 1	2.40	0.16	0.25	0.48	0.13	Lean Clay
	Slug In 2	1.19	0.41		0.47		
	Slug Out 1	2.50	0.16		0.06		

Well ID	Test ID	Initial Displacement (H_0) (ft)	Calculation of K - Solution and K Value				Screened Lithology
			Bouwer-Rice (1976)	Geometric Mean of K Values (ft/day)	KGS (Hyder et al., 1994)	Geometric Mean of K Values (ft/day)	
	Slug Out 2	1.28	0.38		0.02		
GVMW-36*	Slug In 1	1.22	0.018	0.0092	0.021	0.0011	Lean clay/lean silt
	Slug In 2	3.54	0.017		0.021		
	Slug Out 1	1.26	0.004		0.000		
	Slug Out 2	3.79	0.006		0.000		
GVMW-37A*	Slug In 1	3.15	1.198	1.12	0.108	0.25	Unweathered granite and schist
	Slug In 2	3.24	0.966		0.532		
	Slug Out 1	2.37	1.189		0.098		
	Slug Out 2	3.55	1.127		0.686		
GVMW-37B	Slug In 1	2.40	1.50	1.44	0.16	1.22	Weathered schist
	Slug In 2	3.55	1.28		1.98		
	Slug Out 1	2.52	1.59		2.48		
	Slug Out 2	3.76	1.40		2.92		

* Full recovery was not achieved between tests

Table 5. Summary of Pump Test Results

Well ID	Test	Pumping Rate (gpm)	Analytical Solution	Saturated Thickness (feet)	T (feet^2/day)	K (feet/day)	Approximate Total Drawdown (feet)	Screened Lithology
GVMW-27	72-hour Constant Rate	0.75	Theis with boundary	19.1	57.64	3.01	6.5	Weathered schist
GVMW-27	72-hour Constant Rate	0.75	Cooper Jacob Straight Line (early-time pumping)	19.1	22	1.15	6.5	Weathered schist
GVMW-27	Step Drawdown	0.1, 0.5, 3, 5	Theis Unconfined	19.1	29.51	1.55	15.5	Weathered schist
GVMW-28	Step Drawdown	0.1, 0.3, 0.5, 0.7	Theis Unconfined	37.75	4.323	1.14×10^{-1}	33.0	Lean clay
GVMW-35A	11-hour Constant Rate	0.21	Theis with boundary	76.93	1.036	1.35×10^{-2}	50.0	Unweathered granodiorite
GVMW-35A	11-hour Constant Rate	0.21	Cooper Jacob Straight Line (early-time pumping)	76.93	0.57	7.41×10^{-3}	50.0	Unweathered granodiorite
GVMW-35A	11-hour Constant Rate	0.21	Cooper Jacob Straight Line (mid-time pumping)	76.93	0.37	4.81×10^{-3}	50.0	Unweathered granodiorite
GVMW-36	Step Drawdown	0.1, 0.2	Theis Unconfined	22.47	0.5233	2.33×10^{-2}	22.0	Lean clay/lean silt

5. Summary and Recommendations

5.1 Slug Testing

- Using the Bouwer-Rice solution equation, the geometric mean K values for weathered bedrock were determined to range from 0.0092 to 7.62 feet per day (3.25 x 10^{-6} to 2.54 x 10^{-3} cm/s). These K values are representative of silt and loess (Domenico and Schwartz, 1990). The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was determined to be 1.12 feet per day (3.95 x 10^{-4} cm/s). This K value is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

- Using the KGS model solution equation, the geometric mean K values for weathered bedrock were determined to range from 0.0011 to 10.58 feet per day (3.88 x 10^{-7} to 3.73 x 10^{-3} cm/s). These K values are representative of silt and loess (Domenico and Schwartz, 1990). The geometric mean K for fractured competent bedrock, based on a single well (GVMW-37A), was determined to be 0.25 feet per day (8.82 x 10^{-5} cm/s). This K value is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

5.2 Pump Testing

5.2.1 GVMW-27

- The saturated thickness of the aquifer is 19.1 feet, and the lithology of the saturated zone is weathered schist.

- Hydraulic communication was not observed between GVMW-27 and the selected observation wells (GVMW-8B-50, GVMW-25, GVMW-28, and GVMW-30) during the 72-hour constant rate pump test.

- The highest pump rate was 1.5 gpm during the 18-hour pump test, but this resulted in the well almost purging dry. A pump rate of 0.75 gpm during the 72-hour pump test resulted in approximately 6.5 feet of total drawdown.

- The T value, based on the step drawdown and constant rate drawdown test results, ranged between 22 and 57.64 feet^2/day. This range of T values equates to a range of K values between 1.15 and 3.01 feet per day (4.06 x 10^{-4} to 1.06 x 10^{-3} cm/s). This range in K values is representative of weathered granite (Domenico and Schwartz, 1990).

- The change in rate observed after the first 11.5 hours of the 72-hour pump test indicates a lower permeable boundary condition a short distance from the well. This lower permeability boundary condition is likely competent bedrock. The measured T values are therefore representative for a very limited radius around the well. The aquifer pumping appears to be limited more by the horizontal and vertical extent of the saturated weathered bedrock than by the T of the aquifer. Continued pumping in this well, even with the low pumping rates, would likely result in the well going dry.

5.2.2 GVMW-28

- The saturated thickness of the aquifer is 37.75 feet, and the lithology of the saturated zone is lean clay.
- The T value, based on the step drawdown test results, was 4.323 feet^2/day which equates to a K value of 1.14 x 10^{-1} feet/day (4.02 x 10^{-5} cm/s). This K value is representative of silt and loess (Domenico and Schwartz, 1990).
- Continued pumping in this well, even with the low pumping rates, would likely result in the well going dry.

5.2.3 GVMW-35A

- The saturated thickness of the aquifer is 76.93 feet, and the lithology of the saturated zone is unweathered granodiorite.
- Hydraulic communication was not observed between GVMW-35A and the selected observation wells (GVMW-34, GVMW-35B, GVMW-7B-50, and OSABH-17) during the 72-hour constant rate pump test.
- The highest average pump rate was 0.24 gpm during the late-time pumping stage of the 11-hour pump test. The targeted pumping rate and the rate used for analyses was 0.21 gpm, which was achieve during early- and mid-time pumping. This pumping rate was still too fast to allow for the completion of a 72-hour pump test.
- The T value, based on the step drawdown and constant rate drawdown test results, ranged between 0.37 and 1.036 feet^2/day. This range of T values equates to a range of K values between 4.81 x 10^{-3} and 1.34 x 10^{-2} feet/day (1.70 x 10^{-6} to 4.73 x 10^{-6} cm/s). This range in K values is representative of fractured igneous and metamorphic rock (Domenico and Schwartz, 1990).

5.2.4 GVMW-36

- The saturated thickness of the aquifer is 22.47 feet, and the lithology of the saturated zone is lean clay/lean silt.
- The T value, based on the step drawdown test results, was 0.5233 feet^2/day which equates to a K value of 2.33 x 10^{-2} feet/day (8.22 x 10^{-6} cm/s). This K value is representative of silt and loess (Domenico and Schwartz, 1990).

5.3 Recommendations

It is recommended that any pumping associated with the ECOSA groundwater interception and collection system design considers the saturated thicknesses of the wells tested and presented in this report. Wells with greater saturated thicknesses will have larger groundwater volumes available to remove and will therefore pump the longest. The design should also consider anticipating the pumping wells may need to cycle on and off to allow for the possibility for wells to purge dry (i.e., design should incorporate submersible pumps with float controls and tanks at the wellhead to accumulate low pumping discharge over time).

Based on the results of this report, it is further recommended that monitoring wells GVMW-25, GVMW-27, GVMW-28, GVMW-34, and GVMW-35B be included in groundwater interception and collection system design. GVMW-25 is a pre-existing monitoring well (i.e., installed prior to 2024) and should be included in the design per recommendation of CC&V. GVMW-27 and GVMW-28 both have the sufficient saturated thicknesses and reasonable T and K values, based on slug and pump testing, to be considered for long term pumping as described in the preceding paragraph. GVMW-34 and GVMW-35B were also added to the design per recommendation of CC&V. GVMW-35A, GVMW-37A, and GVMW-37B can also be considered for groundwater interception and collection system design based on their saturated thicknesses, T values, and K values. GVMW-30, GVMW-33, and GVMW-36 should not be considered for system design; although they have sufficient saturated thicknesses, their T and K values determined by slug and pump testing are too low to be appropriate for long term pumping.

Appendix A

Boring Logs and Well Construction Diagrams

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GVMW-27

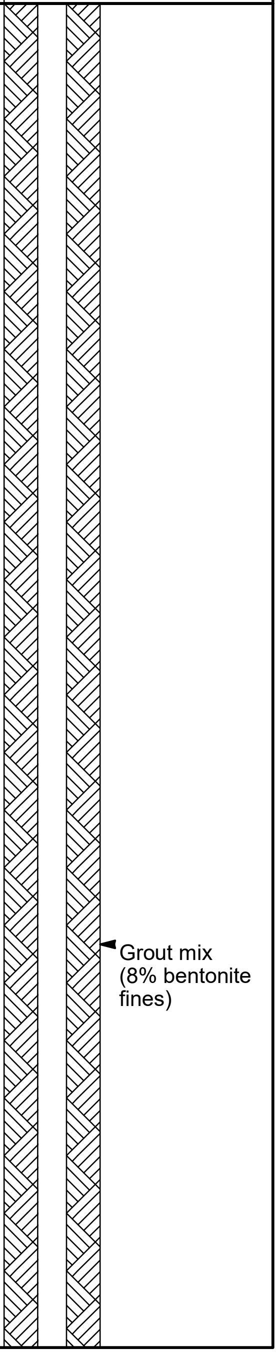
PAGE 1 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/17/24 17:15 **COMPLETED** 08/22/24 10:00
WELL LOCATION -105.1217 N 38.7412 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9894.36 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 51.03 ft / Elev 9843.33 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				OL		ORGANIC SOIL (OL), black, soft, low plasticity, wet, subrounded, homogeneous, low toughness, low dry strength, trace fine to coarse sand, and roots, no staining
1.0	SONIC 1	100		CL		LEAN CLAY (CL), brown, medium stiff to very stiff, low plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, trace fine gravel, rock fragments, trace oxidation staining, intermittent layers of breccia/phonolite (weathered bedrock)
10.0	SONIC 2	100		CL		GRAVELLY LEAN CLAY (CL), dark brown to very dark grayish brown, soft to very stiff, medium plasticity, moist to wet, subangular, mottled, medium toughness, medium dry strength, some fine to coarse sand, little cobbles, rock fragments, iron oxide staining, trace sulphur fines, green mineral inclusions (porphyritic), intermittent layers of breccia/phonolite (weathered bedrock)
19.5	SONIC 3	100		CL		GRAVELLY LEAN CLAY (CL), reddish brown to brown, soft to medium stiff, medium plasticity, wet, angular, mottled, medium toughness, medium dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of breccia (weathered bedrock)
22.5				CL		GRAVELLY LEAN CLAY (CL), light yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some fine sand, and rock fragments, iron oxide staining, forms in clods/clumps, fissile, friable, intermittent layers of breccia (weathered bedrock)
28.0				CL		GRAVELLY LEAN CLAY (CL), yellowish gray to brownish gray, stiff to very stiff, low plasticity, dry, angular, mottled, medium toughness, medium dry strength, some fine sand, and rock fragments, iron oxide staining, fissile, intermittent layers of breccia/phonolite (weathered bedrock)
30.0	SONIC 4	100		CL		GRAVELLY LEAN CLAY WITH SAND (CL), light yellowish brown to olive, stiff to very stiff, low plasticity, dry to moist, subangular, fine to coarse grained, mottled, high toughness, high dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
35	SONIC 5	100				
37.5						SILTY SANDSTONE, highly weathered, laminated, pale yellow to yellowish brown, coarse, quartz and feldspar, hard to very hard, dry, iron oxide staining, trace red/green
40.0						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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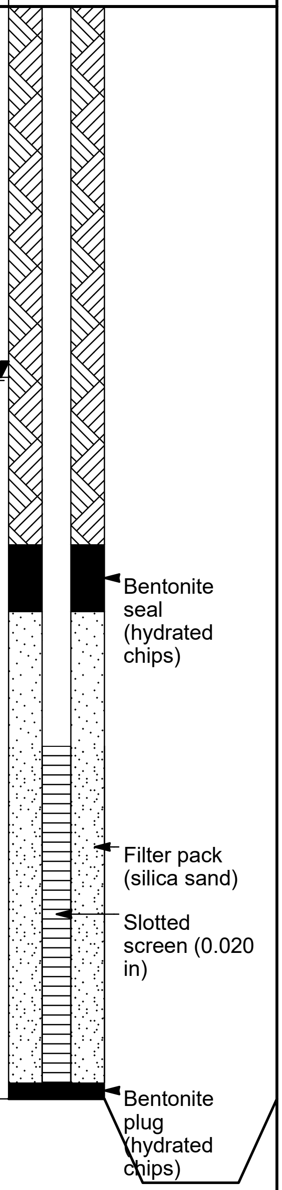
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC 6	100				mineral inclusions (porphyritic), intermittent layers of breccia/phonolite SILTY SANDSTONE, moderately weathered to slightly weathered, laminated, light brownish gray to dark yellowish brown, coarse, quartz and feldspar, medium hard to very hard, dry to damp, iron oxide staining, trace red/green mineral inclusions (porphyritic), intermittent layers of breccia/phonolite
45	SONIC 7	100				
50	SONIC 8	100			50.0	CLAYEY SCHIST, highly weathered to slightly weathered, foliated, light brownish gray to dark yellowish brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard to very hard, damp to wet, iron oxide staining, trace red/green mineral inclusions (porphyritic) - BRECCIA/PHONOLITE
55						
60	SONIC 9	100				
65	SONIC 10	100				
	SONIC 11	100				
70	SONIC 12	100			70.0	SCHIST, unweathered, foliated, light brownish gray to dark yellowish brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard, dry, no staining, trace red/green mineral inclusions (porphyritic) - BRECCIA/PHONOLITE (competent bedrock)
					72.5	Bottom of borehole at 72.5 feet.

WELL DIAGRAM



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GVMW-28

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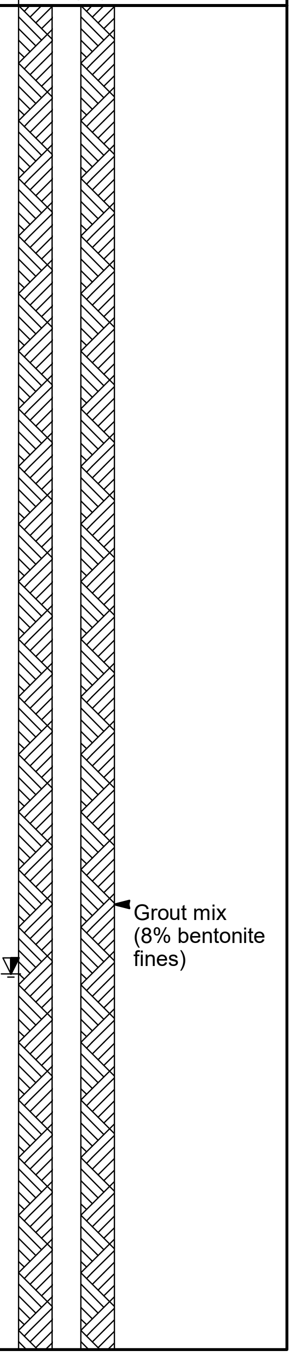
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/02/24 08:05 **COMPLETED** 08/04/24 13:30
WELL LOCATION -105.123 N 38.7422 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9908.19 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 28.82 ft / Elev 9879.37 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		OL	3.0	COBBLES ORGANIC SOIL (OL), very dark brown (10YR 2/2), loose, non plastic, dry to moist, subangular, fine to medium grained, homogeneous, low toughness, low dry strength, trace roots, some cobbles, no staining, cobbles are primarily volcaniclastic material (phonolite)
5				CL	6.0	COBBLES GRAVELLY LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/6), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, iron oxide staining, cobbles are primarily volcaniclastic material (phonolite)
10	SONIC 2	100		CH	13.0	COBBLES FAT CLAY (CH), reddish brown (5YR 4/4), stiff, high plasticity, wet, subangular, fine to medium grained, mottled, high toughness, high dry strength, some sand, some silt, iron oxide staining, cobbles are primarily granodiorite and show preferential weathering of plag phenocrysts
15 20 25	SONIC 3 SONIC 4	100 100		CL	29.0	LEAN CLAY (CL), reddish brown (5YR 4/4) to yellowish brown (10YR 5/6), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, trace cobbles, iron oxide staining, one extremely massive, unaltered granodiorite boulder from 22-26 feet bgs
30	SONIC 5	100		CL	32.0	LEAN CLAY (CL), dark yellowish brown to light olive brown (2.5Y 5/6), loose, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some sand, some silt, trace cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
35 40				CL		LEAN CLAY (CL), dusky red to very dark dusky red (2.5YR 2.5/4), loose, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some sand, some silt, trace cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-28

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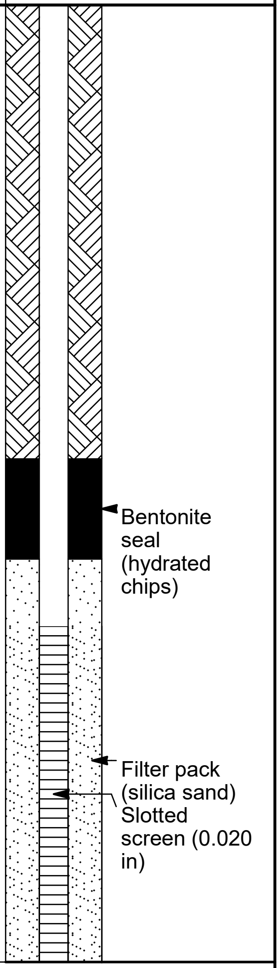
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
40	SONIC 6	100		CL	
48.0	SONIC 7	100		CL	FAT CLAY (CL), very dark grayish brown (10YR 3/2) to brown (10YR 4/3), stiff, high plasticity, wet to moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
56.0				CL	LEAN CLAY (CL), very dark grayish brown (10YR 3/2) to brown (10YR 4/3), medium stiff, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
58.0	SONIC 8	100		CL	LEAN CLAY (CL), dark yellowish brown to light olive brown (2.5Y 5/6), stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles of phonolite are completely weathered and crumble to the touch
65	SONIC 9	100			
68.0					PORPHYRITIC PHONOLITE, unweathered, massive, pale grayish brown, finely crystalline, plagioclase, kspar, hard to very hard, dry, no staining
68.5					Bottom of borehole at 68.5 feet.

WELL DIAGRAM



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GVMW-29

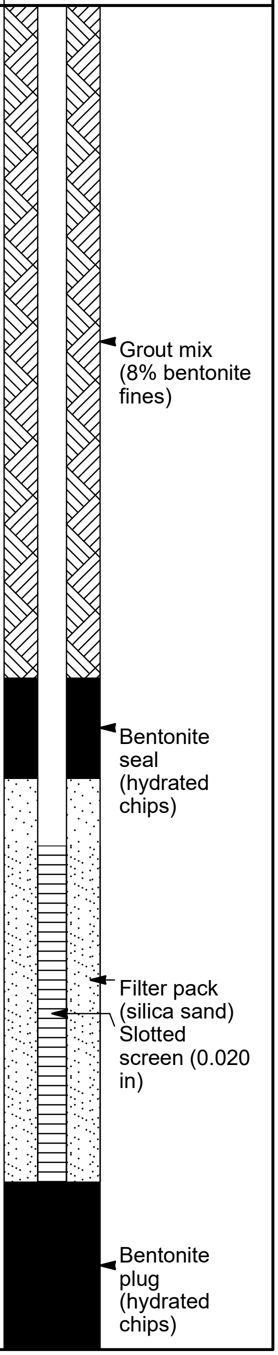
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/10/24 10:40 **COMPLETED** 07/10/24 14:40
WELL LOCATION -105.1214 N 38.7389 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9999.59 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
AFTER DRILLING --- Dry
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		CL	4.0	LEAN CLAY (CL), yellowish brown to light brown, stiff, low plasticity, moist, fine to medium grained, mottled, medium toughness, medium dry strength, some silt, and sand, iron oxide staining, cohesive fines
5				CL	5.0	LEAN CLAY (CL), dark grayish brown to dark yellowish brown, stiff, low plasticity, wet, fine to medium grained, mottled, medium toughness, medium dry strength, little silt, and sand, iron oxide staining, cohesive fines
10				CL	10.0	LEAN CLAY (CL), yellowish red to reddish brown, stiff, low plasticity, saturated, fine to medium grained, mottled, medium toughness, medium dry strength, little silt, and sand, iron oxide staining, cohesive fines
	SONIC 2	100		GW	14.0	WELL GRADED GRAVEL (GW), pale brown to pale orange, dense, non plastic, dry, subangular, mottled, high toughness, high dry strength, some fine to medium sand, clay, and cobbles, no staining, non-cohesive fines (weathered bedrock)
15				GW	18.0	WELL GRADED GRAVEL (GW), pale brown to yellowish brown, dense, non plastic, dry, subangular, mottled, high toughness, high dry strength, some fine to medium sand, clay, and cobbles, trace oxidation staining, non-cohesive fines (weathered bedrock)
20				CL	20.0	LEAN CLAY (CL), light olive brown, very stiff, low plasticity, moist, fine grained, laminated, high toughness, high dry strength, trace sand, iron oxide staining, cohesive fines (weathered bedrock)
	SONIC 3	100		CL	24.0	LEAN CLAY (CL), pale brown to pale orange, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, trace cobbles, and rock fragments, iron oxide staining, cohesive fines (weathered bedrock)
25 30				CL	34.0	LEAN CLAY (CL), pale brown to olive, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, trace cobbles, and rock fragments, iron oxide staining, cohesive fines, some black mottling (weathered bedrock)
35	SONIC 4	100		CL	35.0	GRAVELLY LEAN CLAY (CL), yellowish red to light brown, very stiff, low plasticity, moist, subangular, fine grained, laminated, high toughness, high dry strength, some sand, cobbles, and rock fragments, iron oxide staining, cohesive fines (weathered bedrock)
40					40.0	BRECCIA, unweathered, massive, brownish yellow to dark yellowish orange, fine, very hard, dry, no staining, (competent bedrock)

Bottom of borehole at 40.0 feet.

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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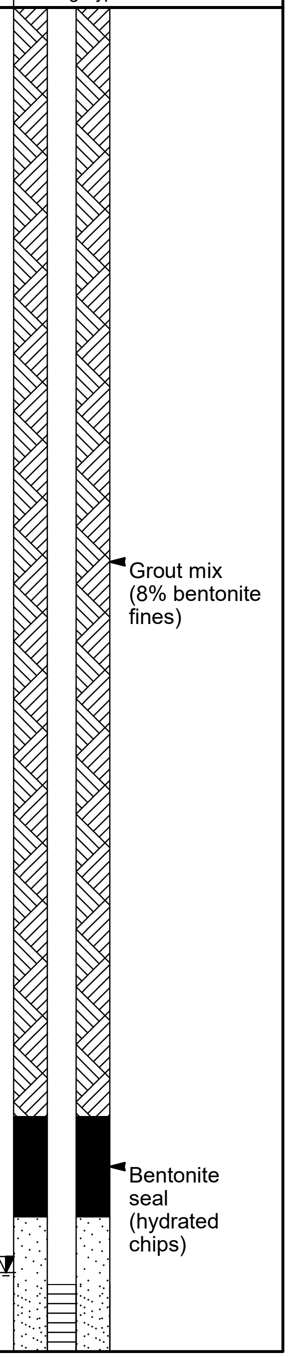
GVMW-30

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/12/24 15:30 **COMPLETED** 07/17/24 14:00
WELL LOCATION -105.1217 N 38.7395 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9983.69 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 37.65 ft / Elev 9946.04 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		SP	2.0	POORLY GRADED SAND (SP), brownish yellow to dark yellowish orange (10YR 6/6), loose, non plastic, moist, subangular, fine grained, homogeneous, low toughness, low dry strength, trace silt, no staining
				CL	4.0	SANDY LEAN CLAY (CL), reddish brown to yellowish brown (5YR4/4), medium stiff, low plasticity, moist to dry, subangular, fine to medium grained, mottled, low toughness, low dry strength, no staining
5 10 15	SONIC 2	100		CH	16.0	SANDY FAT CLAY (CH), reddish brown to yellowish brown (5YR4/4), stiff, high plasticity, moist to dry, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, trace gravel, no staining
				SC	18.0	CLAYEY SAND (SC), yellowish brown to light yellowish brown (10YR 5/4), loose, non plastic, dry, subangular, fine to coarse grained, homogeneous, low toughness, low dry strength, some cobbles, some gravel, no staining
20				CH	20.0	FAT CLAY (CH), yellowish red to light brown (5YR 5/6), stiff to very stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, high toughness, high dry strength, some sand, iron oxide staining
25	SONIC 3	100		CH	28.0	FAT CLAY (CH), yellowish brown to light yellowish brown (10YR 5/4), stiff to very stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, high toughness, high dry strength, some sand, some gravel, iron oxide staining, evaporites present
30				CL	30.0	SANDY LEAN CLAY (CL), yellowish brown to light yellowish brown (10YR 5/4), stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, iron oxide staining
35 40	SONIC 4	100		CL		SANDY LEAN CLAY (CL), yellowish brown to light yellowish brown (10YR 5/4), stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, some gravel, iron oxide staining

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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HDR Inc
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

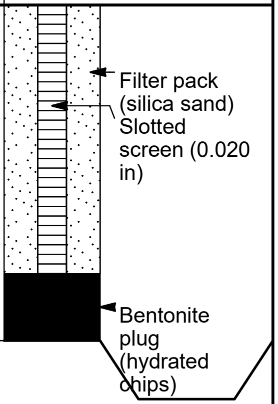
GVMW-30

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC 5	100		CL	44.0	
45				CL	48.0	LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), medium stiff, low plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some gravel, some cobbles, some sand
50					50.0	SANDSTONE, unweathered, massive, pale yellow to pale grayish yellow, finely crystalline, quartz, plagioclase, mica, very hard, dry

Bottom of borehole at 50.0 feet.

WELL DIAGRAM



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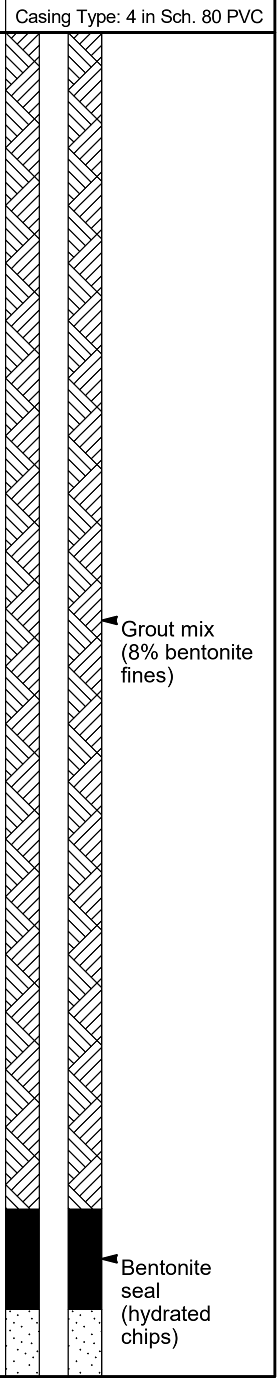
Englewood, CO 80112

GVMW-31

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/14/24 07:30 **COMPLETED** 07/15/24 09:30
WELL LOCATION -105.1221 N 38.7401 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9962.48 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 58.94 ft / Elev 9903.54 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		ML	1.0	SANDY SILT (ML), pale brown to pale orange (10YR 8/2), soft, low plasticity, moist to dry, subangular, fine grained, homogeneous, low toughness, low dry strength, no staining
5				CL	6.0	LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), stiff to very stiff, low plasticity, moist to dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some sand, some gravel, no staining
10				CL	10.0	LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), stiff to very stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
15 20 25	SONIC 2 SONIC 3	100 100		CH	26.0	FAT CLAY (CH), pale brown to pale orange (10YR 8/2), stiff to very stiff, high plasticity, moist to wet, subangular, fine to coarse grained, mottled, high toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
30				SC	30.0	CLAYEY SAND (SC), dark grayish brown to dark yellowish brown (10YR 4/2), loose, non plastic, dry, subangular, coarse grained, homogeneous, low toughness, low dry strength, some clay, some gravel, no staining, evaporites
	SONIC 4	100		CL	32.0	LEAN CLAY (CL), reddish brown moderate brown (5YR 4/4), medium stiff, medium plasticity, moist, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no staining
				CH	33.0	FAT CLAY (CH), reddish brown moderate brown (5YR 4/4), medium stiff, high plasticity, moist to wet, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no staining
35				CL	36.0	LEAN CLAY (CL), reddish brown moderate brown (5YR 4/4), medium stiff, low plasticity, moist, subangular, medium to coarse grained, mottled, medium toughness, medium dry strength, some sand, some gravel, no
40				SC	40.0	

WELL DIAGRAM



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HDR Inc
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

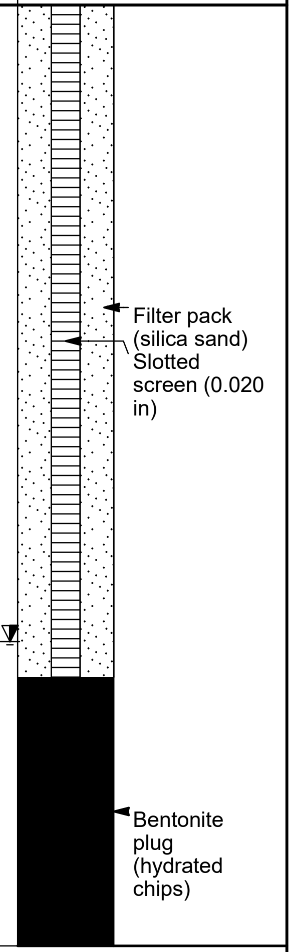
GVMW-31

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40						staining
				GC		CLAYEY SAND (SC), yellowish brown to dark yellowish brown (10YR 5/4), loose, non plastic, dry, subangular, coarse grained, homogeneous, low toughness, low dry strength, some gravel, some cobbles, no staining, evaporites
45	SONIC 5	100			44.0	CLAYEY GRAVEL (GC), pale brown to pale orange (10YR 8/2), loose, non plastic, dry, subangular, fine to medium grained, low toughness, low dry strength, some sand, some clay, no staining LEAN CLAY (CL), pale brown to pale orange (10YR 8/2), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some gravel, some sand, no staining
50				CL		
55	SONIC 6	100				
60					60.0	SANDSTONE, unweathered, pale yellow grayish yellow, finely crystalline, quartz, plagioclase, mica, very hard to hard, dry, iron oxide staining
65	SONIC 7	100			68.0	

Bottom of borehole at 68.0 feet.

WELL DIAGRAM



HDR Inc
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

GVMW-32

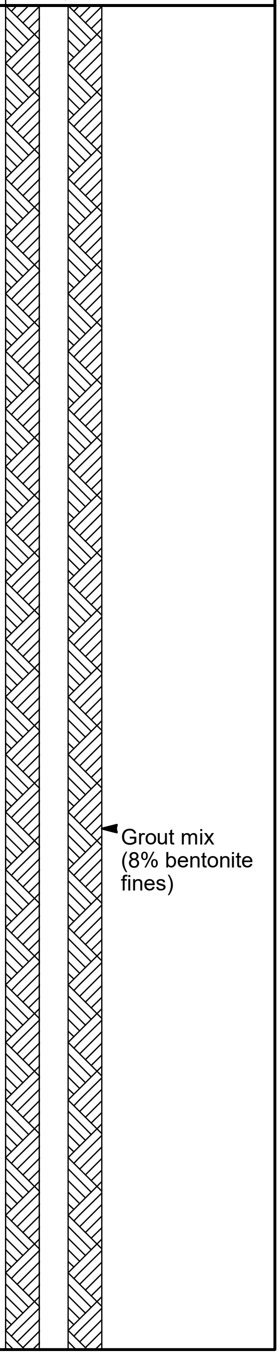
PAGE 1 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/18/24 08:00 **COMPLETED** 07/20/24 10:40
WELL LOCATION -105.1225 N 38.7406 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9951.82 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY K. Malone **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 62.89 ft / Elev 9888.93 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0 5 10	SONIC 1	100		CH		FAT CLAY (CH), pale reddish brown to yellowish brown (10YR 5/4), medium stiff, medium plasticity, moist to wet, fine to medium grained, mottled, high toughness, high dry strength, some sand, trace cobbles, some gravel, no staining, calcification
15 20	SONIC 2	100				
25	SONIC 3	100				
					27.0	SANDY LEAN CLAY (CL), pale reddish brown to pale orange (10YR 8/2), stiff to very stiff, medium plasticity, moist, fine grained, mottled, medium toughness, medium dry strength, some gravel, no staining, calcification
30 35 40	SONIC 4	100		CL		

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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HDR Inc
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Englewood, CO 80112

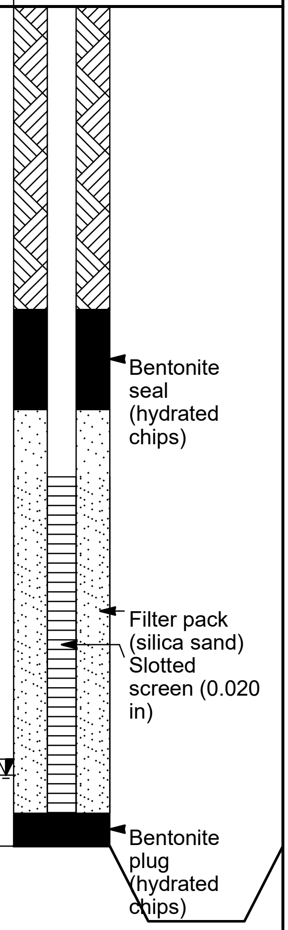
GVMW-32

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40 45	SONIC 5	100		CL		
50 55	SONIC 6	100		CL	50.0	LEAN CLAY (CL), pale reddish brown to yellowish brown (10YR 5/4), loose to medium stiff, low plasticity, moist, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, some cobbles, iron oxide staining, calcification
60	SONIC 7	100				
65					64.0 65.0	SANDSTONE, unweathered, massive, brownish yellow to dark yellowish orange, finely crystalline, quartz, plagioclase, hard, dry, no staining, some siltstone cobbles, laminated

Bottom of borehole at 65.0 feet.

WELL DIAGRAM



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Englewood, CO 80112

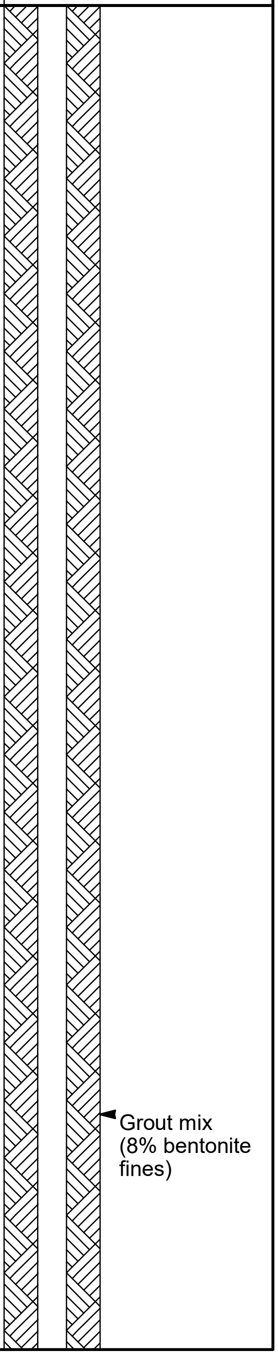
GVMW-33

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/20/24 14:10 **COMPLETED** 08/01/24 14:05
WELL LOCATION -105.123 N 38.7411 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9946.16 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 57.77 ft / Elev 9888.39 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		SW	4.0	POORLY GRADED SAND (SW), yellowish brown to brown (10YR 5/4), loose, non plastic, dry, subangular, fine grained, homogeneous, low toughness, low dry strength, some cobbles, trace gravel, no staining
5				CL	11.0	LEAN CLAY (CL), yellowish brown to pink (5YR 7/3), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, trace cobbles, no staining
10 15 20 25	SONIC 2 SONIC 3	100 100		CL	29.0	GRAVELLY LEAN CLAY (CL), yellowish brown to brown (10YR 5/4), very dense, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, no staining
30	SONIC 4	100		CH	32.0	FAT CLAY (CH), dark reddish brown to grayish brown (5YR 3/2), stiff, high plasticity, moist to wet, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some cobbles, some sand, no staining
35 40				CL	40.0	GRAVELLY LEAN CLAY (CL), yellowish brown to brown (10YR 5/4), very dense, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, no staining

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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Englewood, CO 80112

GVMW-33

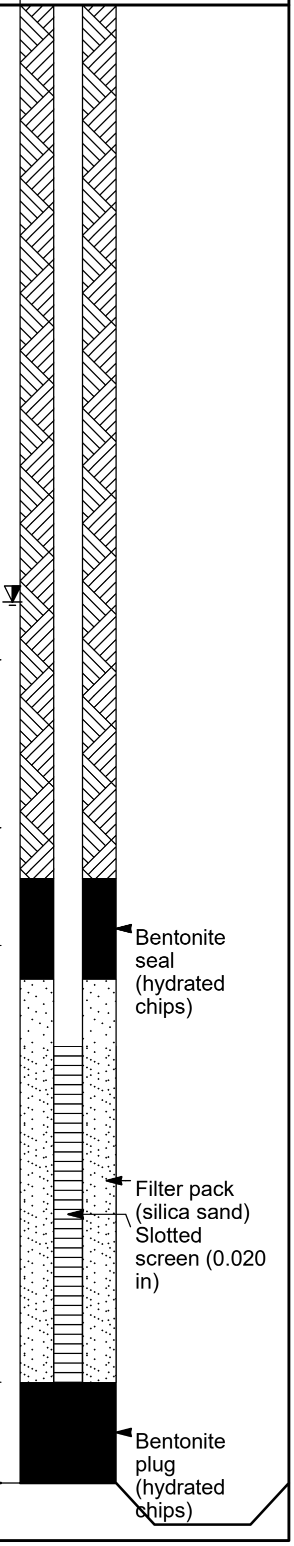
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
SONIC 5	100	
SONIC 6	100	
SONIC 7	100	
SONIC 8	100	
SONIC 9	100	
SONIC 10	100	
SONIC 11	100	
SONIC 12	100	
SONIC 13	100	

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	CL	59.5	LEAN CLAY (CL), reddish brown to yellowish brown (2.5YR 4/3), medium stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, some cobbles, some sand, some gravel, iron oxide staining, cobbles are primarily volcaniclastic material
	CH	64.5	FAT CLAY (CH), dark yellowish brown to red (10 YR 4/6), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, high toughness, high dry strength, some gravel, some sand, trace cobbles, iron oxide staining
	CL	68.0	LEAN CLAY (CL), yellow to light gray (10YR 7/6), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, with cobbles, trace sand, trace silt, iron oxide staining, cobbles are primarily volcaniclastic and are coarse-grained, have phenocrysts of pyroxene, feldspar, amphibole
	CH	81.0	FAT CLAY (CH), dark reddish brown (5YR 3/4) to light gray (10YR 7/6), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, medium toughness, high dry strength, with cobbles, iron oxide staining, large phenocrysts of plagioclase and pyroxene (1-1.5 cm in diameter)
		84.0	BRECCIA, unweathered, massive, dark reddish brown, finely crystalline, plagioclase xenocrysts, very hard, dry, no staining

Bottom of borehole at 84.0 feet.

WELL DIAGRAM



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Englewood, CO 80112

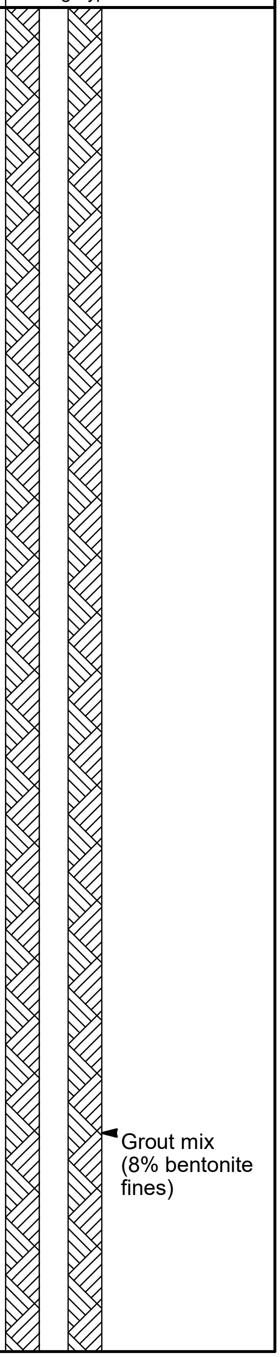
GVMW-34

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/05/24 07:45 **COMPLETED** 08/09/24 11:30
WELL LOCATION -105.1292 N 38.7471 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10009.52 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 55.69 ft / Elev 9953.83 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC	100		CL	1.0	LEAN CLAY (CL), dark yellowish brown (10YR 4/4), loose, non plastic, dry, subangular, fine to medium grained, homogeneous, low toughness, low dry strength, with cobbles, some sand, some silt, no staining, fill fill
				CL	6.0	LEAN CLAY (CL), brown to dark yellowish brown (10YR 4/6), medium stiff, low plasticity, moist to dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, trace gravel, trace sand, no staining, cobbles are granodiorite and phonolite
10	SONIC	100		CH	20.0	FAT CLAY (CH), brown to dark yellowish brown (10YR 4/6), stiff, high plasticity, moist to wet, subangular, fine grained, mottled, medium toughness, high dry strength, some cobbles, trace gravel, trace sand, no staining, cobbles are granodiorite and phonolite
20	SONIC	100		CL	30.0	LEAN CLAY (CL), greenish gray to light brownish gray (10YR 6/1), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some gravel, iron oxide staining
30	SONIC	100		CL	36.0	SANDY LEAN CLAY (CL), greenish gray to light brownish gray (10YR 6/1), loose, low plasticity, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some gravel, trace cobbles, iron oxide staining, some weathered phenocrysts of plagioclase, pyroxene, amphibole
				CL		
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-34

CLIENT Cripple Creek and Victor Gold Mining Company, LLC

PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling

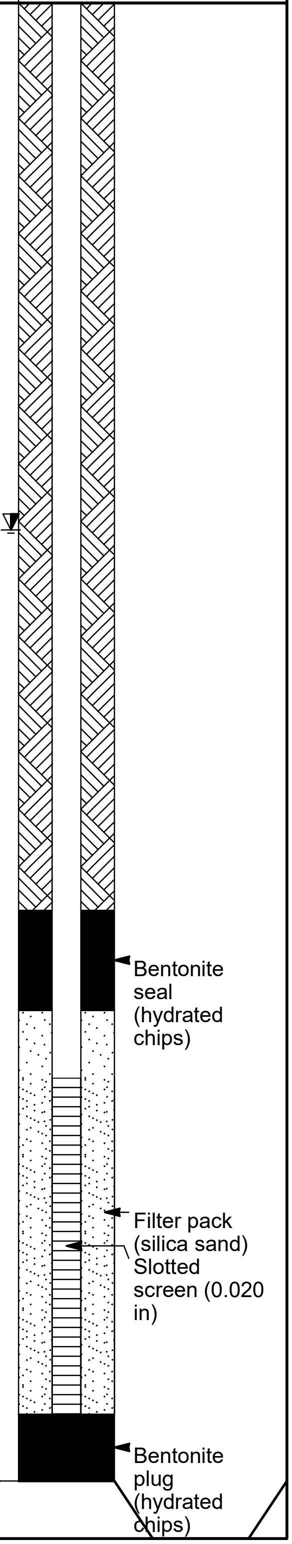
PROJECT NUMBER 10399263

PROJECT LOCATION Cripple Creek, CO

SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
SONIC	100	
SONIC	100	
SONIC	100	
SONIC	100	
SONIC	100	
SONIC	100	
SONIC	100	

DEPTH (ft)	U.S.C.S.	MATERIAL DESCRIPTION
40 – 61.0	CL	LEAN CLAY (CL), light brownish gray to yellowish red (5YR 4/6), loose to medium stiff, low plasticity, dry to moist, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some gravel, trace cobbles, iron oxide staining, some weathered phenocrysts of plagioclase, pyroxene, amphibole *(continued)*
61.0 – 66.0	CL	LEAN CLAY (CL), dark yellowish brown to dark red (2.5YR 4/6), medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some sand, some silt, iron oxide staining
66.0 – 75.0	CL	LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/4), stiff, medium plasticity, moist, subangular, fine to coarse grained, mottled, low toughness, medium dry strength, some silt, some sand, trace cobbles, iron oxide staining, cobbles are primarily phonolite
75.0 – 82.0	CH	FAT CLAY (CH), dark yellowish brown to yellowish brown (10YR 5/4), stiff, high plasticity, wet to moist, subangular, fine to medium grained, mottled, medium toughness, high dry strength, some silt, some sand, some cobbles, iron oxide staining, cobbles are primarily phonolite
82.0 – 84.0		PORPHYRITIC PHONOLITE, unweathered, massive, pale brownish gray to light gray, finely crystalline, plagioclase, pyroxene, amphibole, hard to very hard, dry, no staining

Bottom of borehole at 84.0 feet.



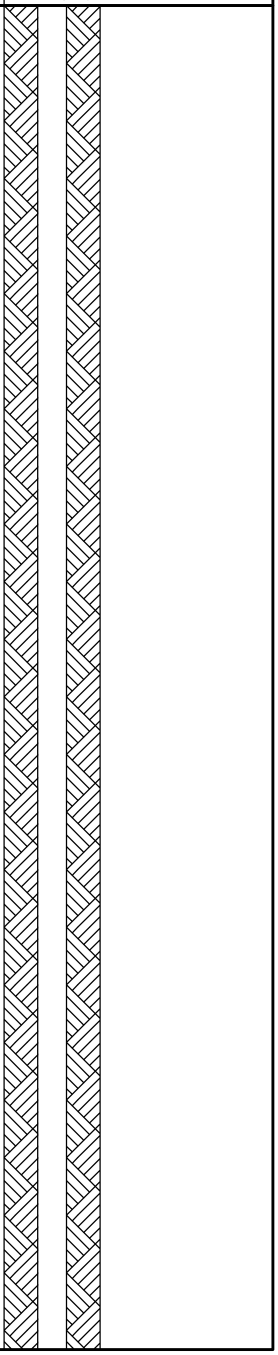
GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 07/15/24 12:00 **COMPLETED** 07/31/24 10:00
WELL LOCATION -105.1301 N 38.7473 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10021.6 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Reverse Circulation
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 266.53 ft / Elev 9755.07 ft
NOTES Samples passed through a #343 sieve

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	✋ GB 1			CL	▨	LEAN CLAY (CL), yellowish brown to dark yellowish brown, stiff, medium plasticity, moist, subangular, mottled, medium toughness, high dry strength, some gravel, sand, and silt, little cobbles/rock fragments
5	✋ GB 2					
5.5				CL	▨	GRAVELLY LEAN CLAY (CL), light reddish brown to brownish yellow, soft, medium plasticity, dry to moist, subangular, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of phonolite (weathered bedrock)
10	✋ GB 3					
15	✋ GB 4					
20	✋ GB 5					
25	✋ GB 6					
27.0				CH	▨	FAT CLAY (CH), reddish brown to brown, stiff, high plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, trace cobbles, and rock fragments, trace oxidation staining, intermittent layers of phonolite (weathered bedrock)
30	✋ GB 7					
35	✋ GB 8					
37.0				ML	▨	
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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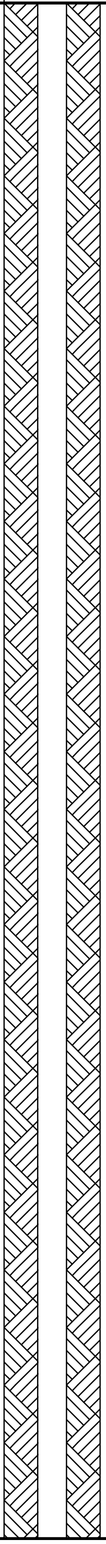
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
40	GB 9			ML		GRAVELLY SILT (ML), reddish yellow to brownish yellow, soft, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of granodiorite (weathered bedrock)	
45	GB 10						
50	GB 11						
				CL	54.0	GRAVELLY LEAN CLAY (CL), light brownish gray to light yellowish brown, stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, little cobbles, and rock fragments, iron oxide staining, friable, intermittent layers of phonolite (weathered bedrock)	
55	GB 12						
60	GB 13						
65	GB 14						
70	GB 15				70.0	SCHIST, highly weathered to moderately weathered, foliated, light blueish gray to pale brown, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, damp to wet, iron oxide staining, brittle, trace clayey fines, multi-compositional mineral inclusions (porphyritic) - BRECCIA/PHONOLITE	
75	GB 16						
80	GB 17						
85							



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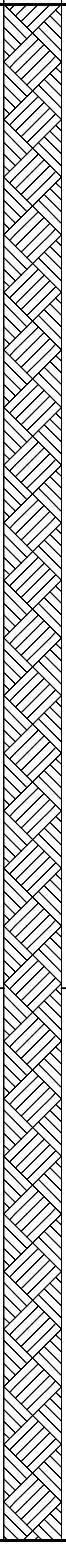
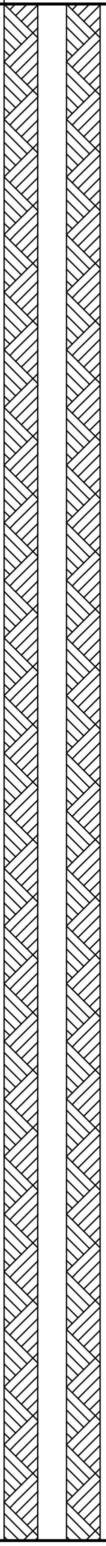
HDR Inc
369 Inverness Pkwy, Ste 325
Englewood, CO 80112

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
90	✋ GB 18						
95	✋ GB 19						
100	✋ GB 20						
105	✋ GB 21						
110	✋ GB 22						
115	✋ GB 23						
120	✋ GB 24					115.0 GRANITE, slightly weathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, iron oxide staining, trace green/yellow mineral inclusions (porphyritic), intermittent layers of phonolite - GRANODIORITE	
125	✋ GB 25						
130	✋ GB 26						
	✋						





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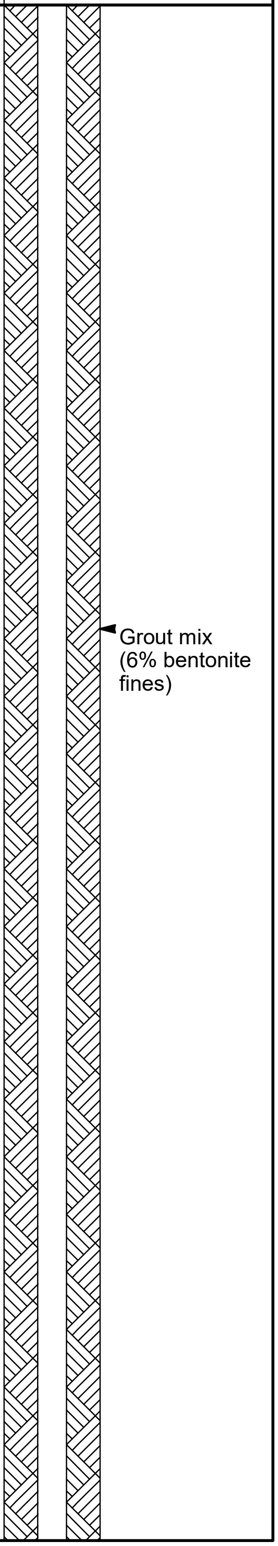
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
135	GB 27				▨		
140	GB 28				▨		
145	GB 29				▨		
150	GB 30				▨		
155	GB 31				▨		Grout mix (6% bentonite fines)
160	GB 32				▨		
165	GB 33				▨		
170	GB 34				▨		
175	GB 35				▨		
					▨		



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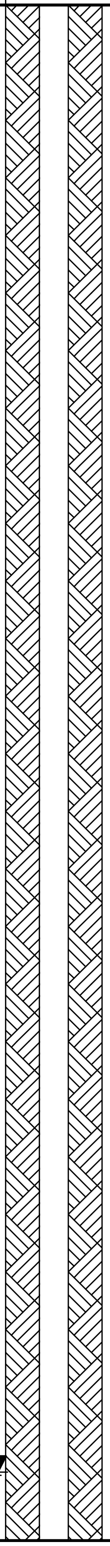
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
180	GB 36						
185	GB 37						
190	GB 38						
195	GB 39						
200	GB 40						
205	GB 41						
210	GB 42					205.0 GRANITE, unweathered, massive, light blueish gray to dark gray, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace white/green/yellow mineral inclusions (porphyritic) - GRANODIORITE	
215	GB 43						
220	GB 44						
	GB 45						

(Continued Next Page)

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER		RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
225	✋							
230	✋	GB 46						
235	✋	GB 47						
240	✋	GB 48						
245	✋	GB 49						
250	✋	GB 50						
255	✋	GB 51						
260	✋	GB 52						
265	✋	GB 53					265.0	
	✋	GB 54						⊻



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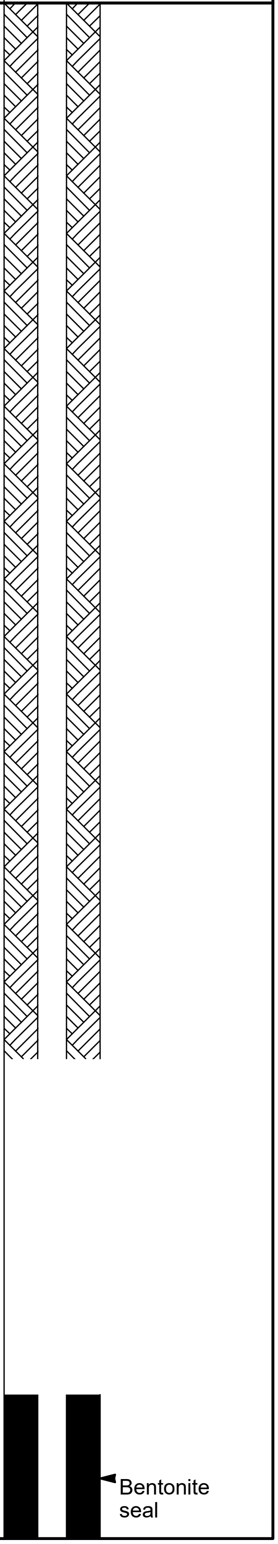
GVMW-35A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
270	✋					DIORITE, unweathered, massive, dark greenish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace green mineral inclusions (porphyritic), hydrothermal alteration veins - GRANODIORITE
275	✋ GB 55					
280	✋ GB 56					
285	✋ GB 57					
290	✋ GB 58					290.0
295	✋ GB 59					GRANITE, unweathered, massive, light blueish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, trace green/yellow mineral inclusions (porphyritic) - GRANODIORITE
300	✋ GB 60					
305	✋ GB 61					
310	✋ GB 62					
	✋ GB 63					

WELL DIAGRAM



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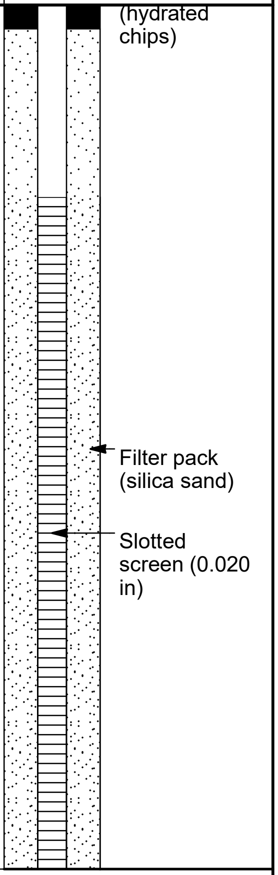
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
315	✋				▨	
320	✋ GB 64				▨	
325	✋ GB 65				▨	
330	✋ GB 66				▨	
335	✋ GB 67				▨	
340	✋ GB 68				▨	340.0

Bottom of borehole at 340.0 feet.

WELL DIAGRAM



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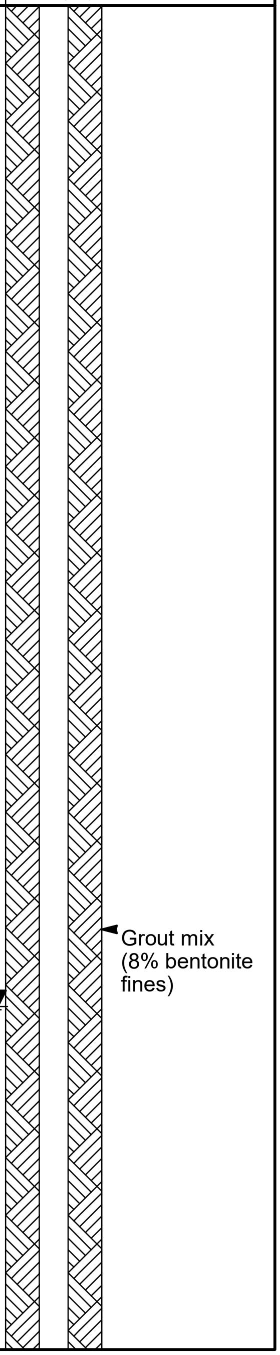
GVMW-35B

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/10/24 08:10 **COMPLETED** 08/11/24 16:05
WELL LOCATION -105.1305 N 38.7475 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10018.51 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY M. Barickman **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 29.79 ft / Elev 9988.72 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0–5.5	SONIC 1	100		CL	▨	LEAN CLAY (CL), dark yellowish brown to yellowish brown (10YR 5/4), stiff, medium plasticity, moist, subangular, mottled, medium toughness, high dry strength, some cobbles, some sand, some silt, no staining, cobbles are primarily volcaniclastic material
5.5–20.0	SONIC 2	100		CL	▧	LEAN CLAY (CL), red to reddish gray (5YR 6/4), loose to medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material
20.0–27.0	SONIC 3 SONIC 4	100 100		CL	▧	LEAN CLAY (CL), reddish yellow to brownish red (10YR 6/8), loose to medium stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material
27.0–37.0	SONIC 5 SONIC 6 SONIC 7	100 100 100		CH	▨	FAT CLAY (CH), reddish brown to brown (7.5YR 5/2), stiff, high plasticity, moist to wet, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material, and have slightly oxidized rims ▽
37.0–40				ML	▥	

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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GVMW-35B

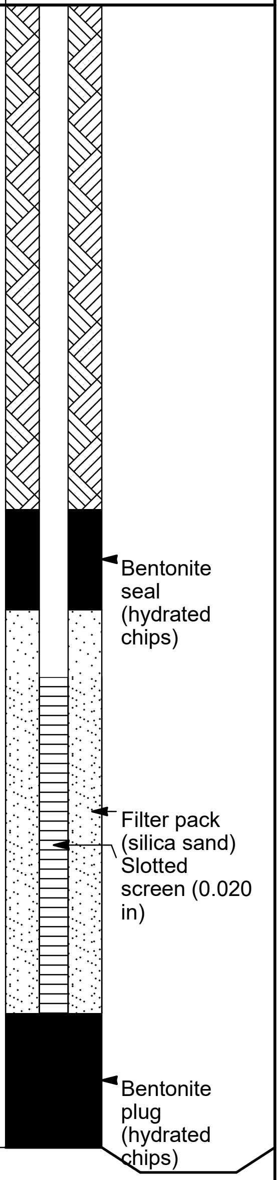
PAGE 2 OF 2

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	SONIC 8	100		ML		SILT (ML), brownish yellow to reddish yellow (7.5YR 7/8), loose, non plastic, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, trace sand, some clay, iron oxide staining, cobbles are highly weathered granodiorite and ranges from 3 to 7 cm in diameter
45	SONIC 9	100				
50	SONIC 10	100			54.0	
55	SONIC 11	100		CL		LEAN CLAY (CL), pale yellowish brown to brownish yellow (10YR 6/8), medium stiff to stiff, medium plasticity, moist, subangular, fine to medium grained, mottled, medium toughness, medium dry strength, some cobbles, iron oxide staining, cobbles are primarily weathered volcaniclastic material, and have slightly oxidized rims
60 65	SONIC 12	100				
	SONIC 13	100			70.0	
70	SONIC 14	100			74.0	SCHIST, unweathered, massive, greenish black to dark olive gray, finely crystalline, phenocrysts of garnet, hard to very hard, dry, no staining, slickenlines visible

Bottom of borehole at 74.0 feet.

WELL DIAGRAM



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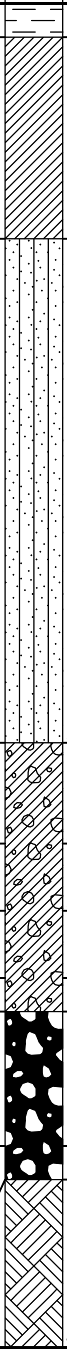
GVMW-36

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/12/24 11:15 **COMPLETED** 08/15/24 10:30
WELL LOCATION -105.1337 N 38.7486 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 10025.62 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 11.92 ft / Elev 10013.70 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0–10	SONIC	100	
10–18	SONIC	100	
18–22	SONIC	100	
22–26	SONIC	100	
26–30	SONIC	100	
30–35	SONIC	100	
35–40	SONIC	100	

DEPTH (ft)	U.S.C.S.
0–1.0	OL
1.0–7.0	CL
7.0–22.0	ML
22.0–25.0	CL
25.0–27.0	CL
27.0–29.0	CL
29.0–30.0	CL
30.0–34.0	CL
34.0–35.0	CL-ML
35.0–40.0	



MATERIAL DESCRIPTION

ORGANIC SOIL (OL), very dark brown, soft, low plasticity, dry to moist, subangular, homogeneous, low toughness, low dry strength, trace roots, and cobbles, iron oxide staining, non-cohesive fines, intermittent layers of breccia/phonolite

LEAN CLAY WITH GRAVEL (CL), yellowish brown to dark yellowish brown, medium stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little sand, trace silt, some cobbles, trace oxidation staining, intermittent layers of breccia/phonolite (weathered bedrock)

SILT WITH SAND (ML), light reddish brown to yellowish brown, soft, low plasticity, dry, subangular, mottled, low toughness, low dry strength, some cobbles, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

SILTY GRAVELLY LEAN CLAY WITH SAND (CL), brownish yellow to dark yellowish orange, soft, low plasticity, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, trace mica, some cobbles, and rock fragments, iron oxide staining, trace red mineral inclusions (porphyritic), intermittent layes of granodiorite (weathered bedrock)

GRAVELLY LEAN CLAY (CL), yellowish brown to brown, medium stiff to stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, trace fine to coarse sand, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

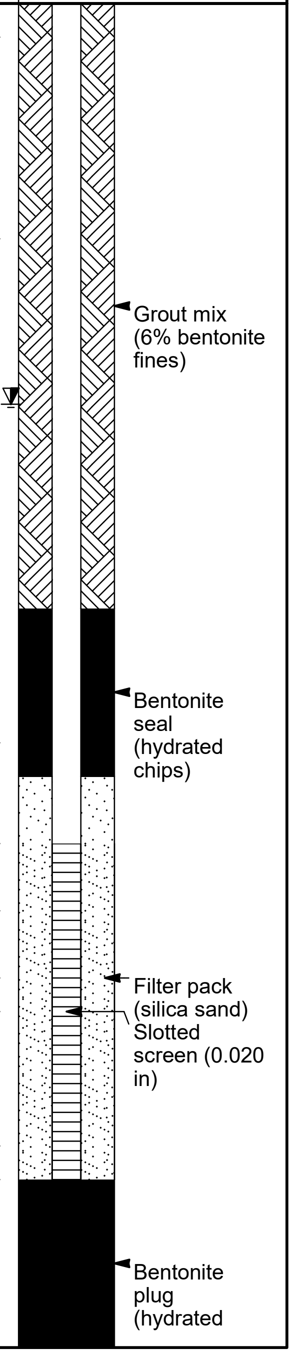
SILTY GRAVELLY LEAN CLAY WITH SAND (CL), light yellowish brown to pale brown, soft, dry, subangular, fine to coarse grained, mottled, low toughness, low dry strength, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft, medium plasticity, moist to wet, subangular, mottled, low toughness, low dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)

GRAVELLY LEAN CLAY WITH SAND (CL), yellowish

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
						brown to brown, soft to stiff, medium plasticity, moist to wet, subangular, fine to coarse grained, mottled, medium toughness, medium dry strength, trace cobbles, and rock fragments, iron oxide staining, micaceous, intermittent layers of granodiorite (weathered bedrock)	chips)
						SILTY GRAVELLY LEAN CLAY (CL-ML), yellowish red to light brown, stiff to hard, low plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, trace fine sand, some cobbles, and rock fragments, iron oxide staining, intermittent layers of granodiorite (weathered bedrock)	
						SCHIST, slightly weathered to unweathered, foliated, light blueish gray to dark blueish gray, finely crystalline, biotite/muscovite/chlorite/talc, hard to very hard, dry, trace oxidation staining, red/green mineral inclusions (porphyritic), pulverized fines - PHONOLITE (competent bedrock)	

Bottom of borehole at 40.0 feet.

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GVMW-37A

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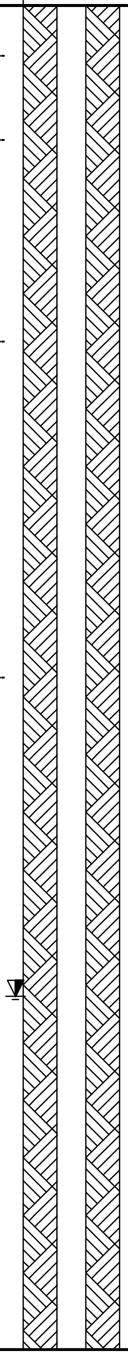
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/01/24 08:45 **COMPLETED** 08/04/24 09:30
WELL LOCATION -105.1181 N 38.7401 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9842.81 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Reverse Circulation
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▼ **AFTER DRILLING** 29.49 ft / Elev 9813.32 ft
NOTES Samples passed through a #343 sieve

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB 1			CL-ML		ORGANIC SOIL (CL-ML), dark brown to very dark grayish brown, soft, low plasticity, wet, mottled, low toughness, low dry strength, trace fine sand, and roots, micaceous, trace oxidation staining
1.5				CL		GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, little fine to medium sand, trace roots, and rock fragments, iron oxide staining, micaceous
4.0				CL		GRAVELLY LEAN CLAY (CL), brown, stiff to very stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, some rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
5	GB 2					
10.0	GB 3			CL		GRAVELLY LEAN CLAY (CL), yellowish brown to dark brown, soft to very stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, and rock fragments, trace oxidation staining, green mineral inclusions, intermittent layers of granodiorite (weathered bedrock)
15	GB 4					
20.0	GB 5			CL		GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, moist to wet, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of breccia/sandstone (weathered bedrock)
25	GB 6					
30	GB 7					
35	GB 8					
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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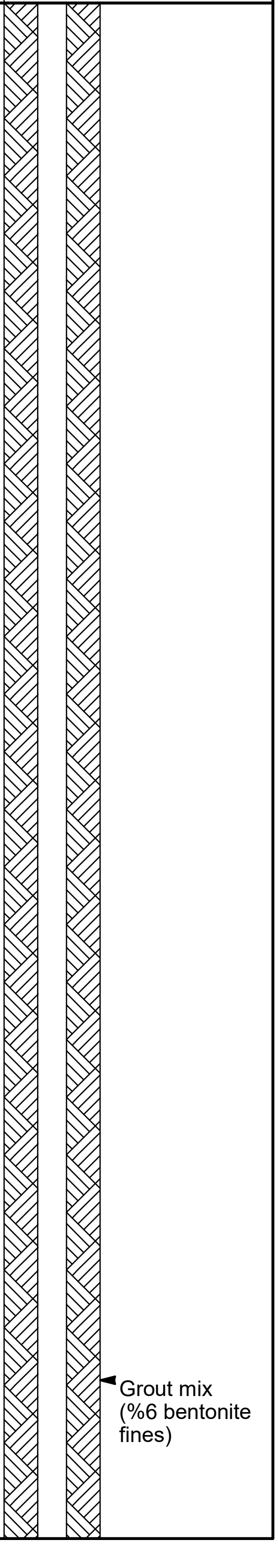
CLIENT Cripple Creek and Victor Gold Mining Company, LLC **PROJECT NAME** Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263 **PROJECT LOCATION** Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40	GB 9					
45	GB 10			CL		
50	GB 11					50.0 CLAYEY SANDSTONE, highly weathered to moderately weathered, laminated, dark yellowish brown to brown, coarse, quartz and feldspar, medium hard to hard, damp to wet, iron oxide staining, intermittent layers of granodiorite
55	GB 12					
60	GB 13					
65	GB 14					
70	GB 15					
75	GB 16					
80	GB 17					
85						85.0

WELL DIAGRAM



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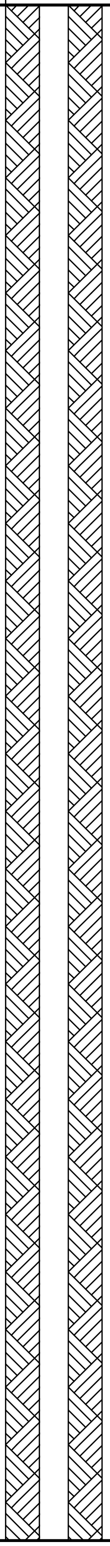
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
	✋ GB 18				△ △	SCHIST, slightly weathered, foliated, light blueish gray to dark gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to medium hard, damp to wet, iron oxide staining, intermittent layers of granodiorite - BRECCIA/PHONOLIT*E*	
90							
	✋ GB 19						
95							
	✋ GB 20						
100							
	✋ GB 21						
105							
	✋ GB 22						
110							
	✋ GB 23						
115							
	✋ GB 24						
120							
	✋ GB 25						
125							
	✋ GB 26						
130							
	✋						



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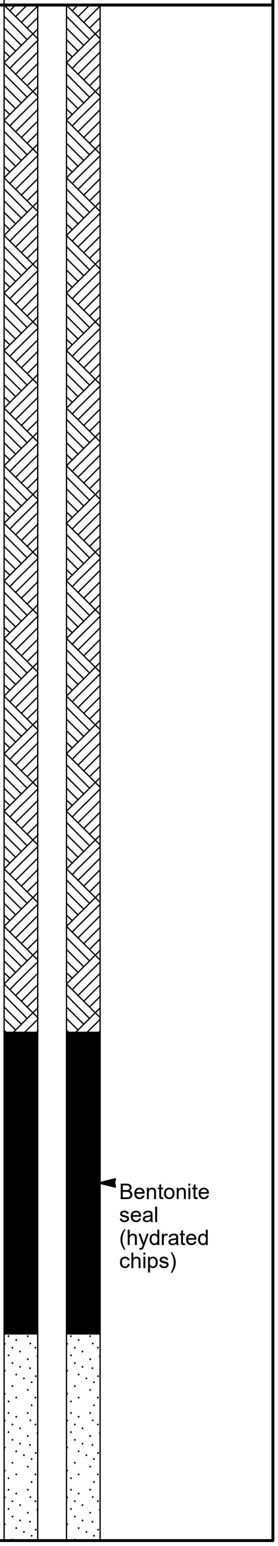
GVMW-37A

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	MATERIAL DESCRIPTION
135	✋ GB 27				
140	✋ GB 28				140.0
145	✋ GB 29				GRANITE, slightly weathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, little oxidation staining, intermittent layers of phonolite
150	✋ GB 30				150.0
155	✋ GB 31				DIORITE, slightly weathered, massive, dark greenish gray to black, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, trace oxidation staining - GRANDODIORITE 155.0
160	✋ GB 32				GRANITE, unweathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, iron oxide staining, - GRANODIORITE
165	✋ GB 33				
170	✋ GB 34				
175	✋ GB 35				
	✋				

WELL DIAGRAM



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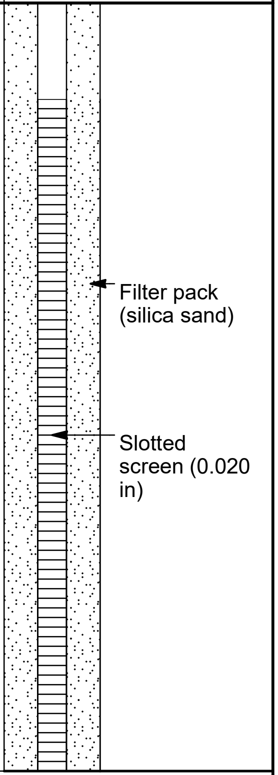
CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
180	GB 36					
185	GB 37				185.0	
190	GB 38					SCHIST, slightly weathered, foliated, light blueish gray to dark greenish gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, hard to very hard, damp to wet, iron oxide staining, intermittent layers of granodiorite - PHONOLITE
195	GB 39				195.0	
200	GB 40				200.0	GRANITE, unweathered, massive, light blueish gray to pale red, coarsely crystalline, quartz/feldspar/mica/amphibole, hard to very hard, damp to wet, no staining, - GRANODIORITE

Bottom of borehole at 200.0 feet.

WELL DIAGRAM



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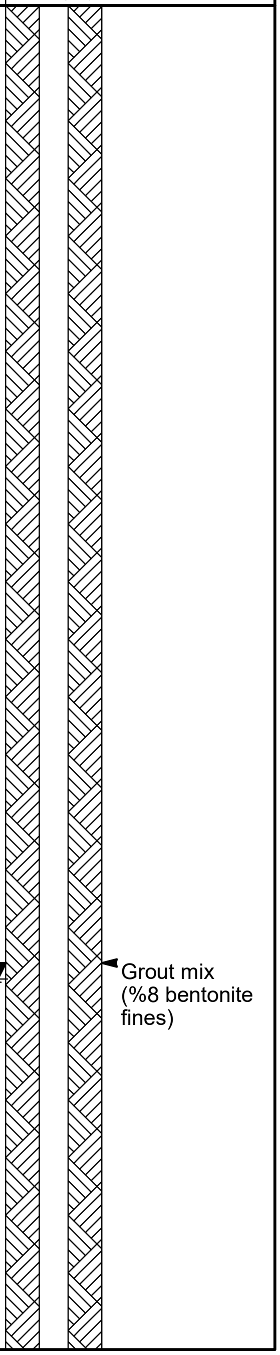
GVMW-37B

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO
DATE STARTED 08/16/24 10:30 **COMPLETED** 08/17/24 15:30
WELL LOCATION -105.1181 N 38.7402 E
DRILLING CONTRACTOR Boart Longyear
GROUND ELEVATION 9842.84 ft amsl **HOLE DIAMETER** 10 inches
DRILLING METHOD Sonic
GROUND WATER LEVELS:
LOGGED BY F. Davis Ray **CHECKED BY** G. Kelly
▽ **AFTER DRILLING** 28.97 ft / Elev 9813.87 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SONIC 1	100		OL		ORGANIC SOIL (OL), dark brown to very dark grayish brown, soft, low plasticity, wet, mottled, low toughness, low dry strength, trace fine sand, and roots, micaceous, trace oxidation staining (drill added water)
1.5				CL		GRAVELLY LEAN CLAY (CL), yellowish brown to brown, soft to medium stiff, low plasticity, dry, subangular, mottled, low toughness, low dry strength, little fine to medium sand, trace roots, and rock fragments, iron oxide staining, micaceous
4.0				CL		GRAVELLY LEAN CLAY (CL), brown, stiff to very stiff, low plasticity, dry, subangular, mottled, medium toughness, medium dry strength, some rock fragments, iron oxide staining, intermittent layers of breccia/sandstone (weathered bedrock)
10.0	SONIC 2	100		CL		GRAVELLY LEAN CLAY (CL), yellowish brown to dark brown, soft to very stiff, medium plasticity, dry to moist, subangular, mottled, medium toughness, medium dry strength, little fine to coarse sand, and rock fragments, trace oxidation staining, green mineral inclusions, intermittent layers of granodiorite (weathered bedrock)
20.0	SONIC 3	100		CL		GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, moist to wet, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of breccia/sandstone (weathered bedrock)
25	SONIC 4	100				
30	SONIC 5	100				
40						

WELL DIAGRAM

Casing Type: 4 in Sch. 80 PVC



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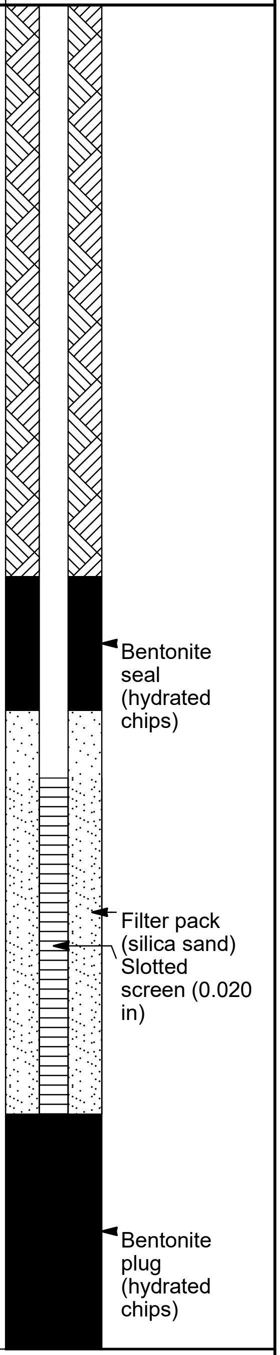
GVMW-37B

CLIENT Cripple Creek and Victor Gold Mining Company, LLC
PROJECT NAME Newmont - ECOSA/Grassy Valley Drilling
PROJECT NUMBER 10399263
PROJECT LOCATION Cripple Creek, CO

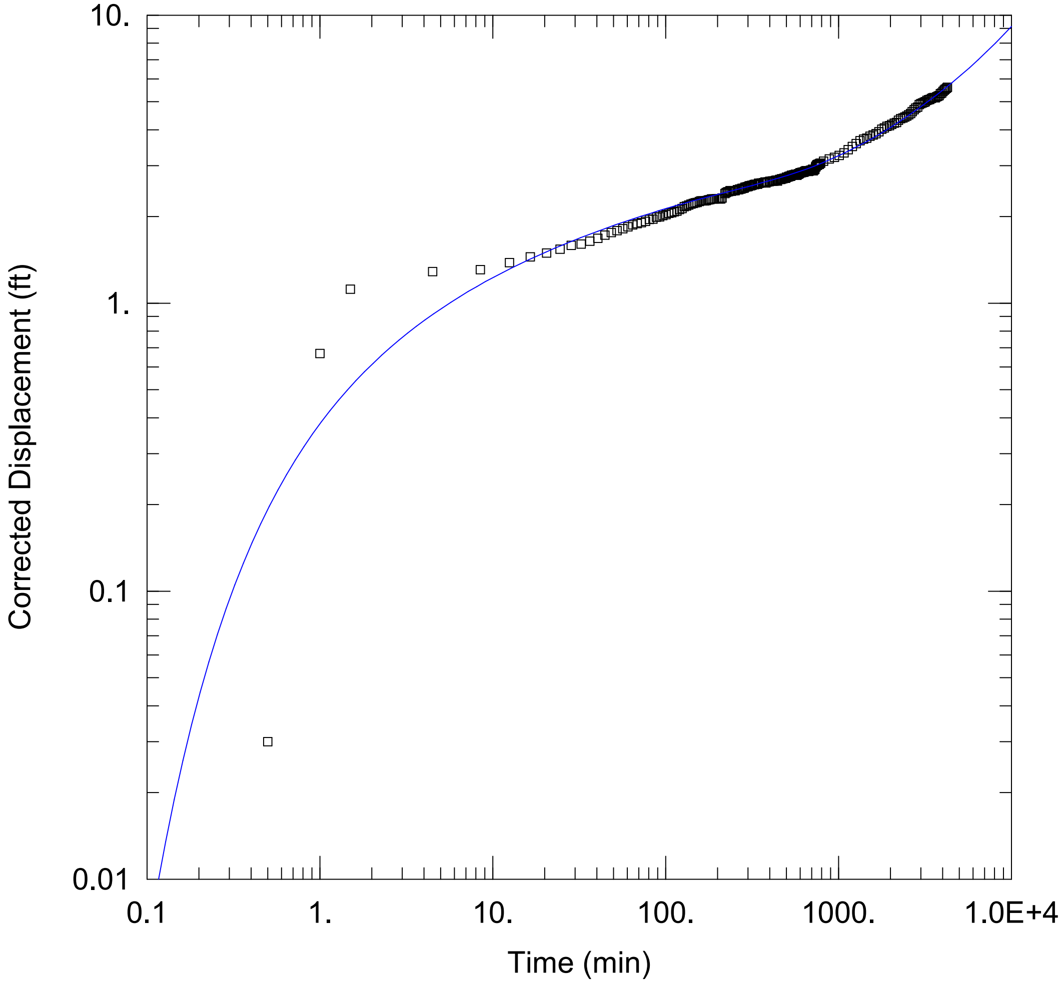
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
40						
45	SONIC 6	100		CL		
	SONIC 7	100				
50					50.0	GRAVELLY LEAN CLAY (CL), dark yellowish brown to light brownish gray, soft to very stiff, low plasticity, dry to moist, subangular, laminated, medium toughness, medium dry strength, some fine to coarse sand, cobbles, and rock fragments, iron oxide staining, mottled, forms in clods/clumps, fissile, friable, intermittent layers of sandstone (weathered bedrock)
55	SONIC 8	100		CL		
	SONIC 9	100				
60					60.0	LEAN CLAY WITH GRAVEL (CL), dark yellowish brown to brown, very stiff to hard, low plasticity, moist to wet, subangular, mottled, high toughness, high dry strength, some rock fragments, trace oxidation staining, intermittent layers of sandstone (weathered bedrock)
	SONIC 10	100		CL	62.0	CLAYEY SCHIST, highly weathered to moderately weathered, foliated, brownish yellow to dark brownish gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, damp to wet, iron oxide staining, friable, fissile, red/black/white mineral inclusions (porphyritic), intermittent layers of sandstone - BRECCIA/PHONOLITE
65	SONIC 11	100				
70					73.0	SCHIST, slightly weathered to unweathered, foliated, light yellowish brown to gray, finely crystalline, biotite/feldspar/amphibole/pyroxene, medium hard to hard, dry, few clayey zones, trace oxidation staining, intermittent layers of sandstone - BRECCIA/PHONOLITE (competent bedrock)
75	SONIC 12	100				
80					80.0	Bottom of borehole at 80.0 feet.

WELL DIAGRAM



Appendix B

Drawdown data with straight-line fits and fitted Theis curves



NEWMONT MINE

Data Set: C:\...\GVMW27_72H_Test_Boundary_Theis.aqt
Date: 12/11/24 Time: 15:10:08

PROJECT INFORMATION

Company: HDR
Client: ECOSA
Location: Cripple Creek, CO
Test Well: GVMW-27

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-27 - 72H	0	0

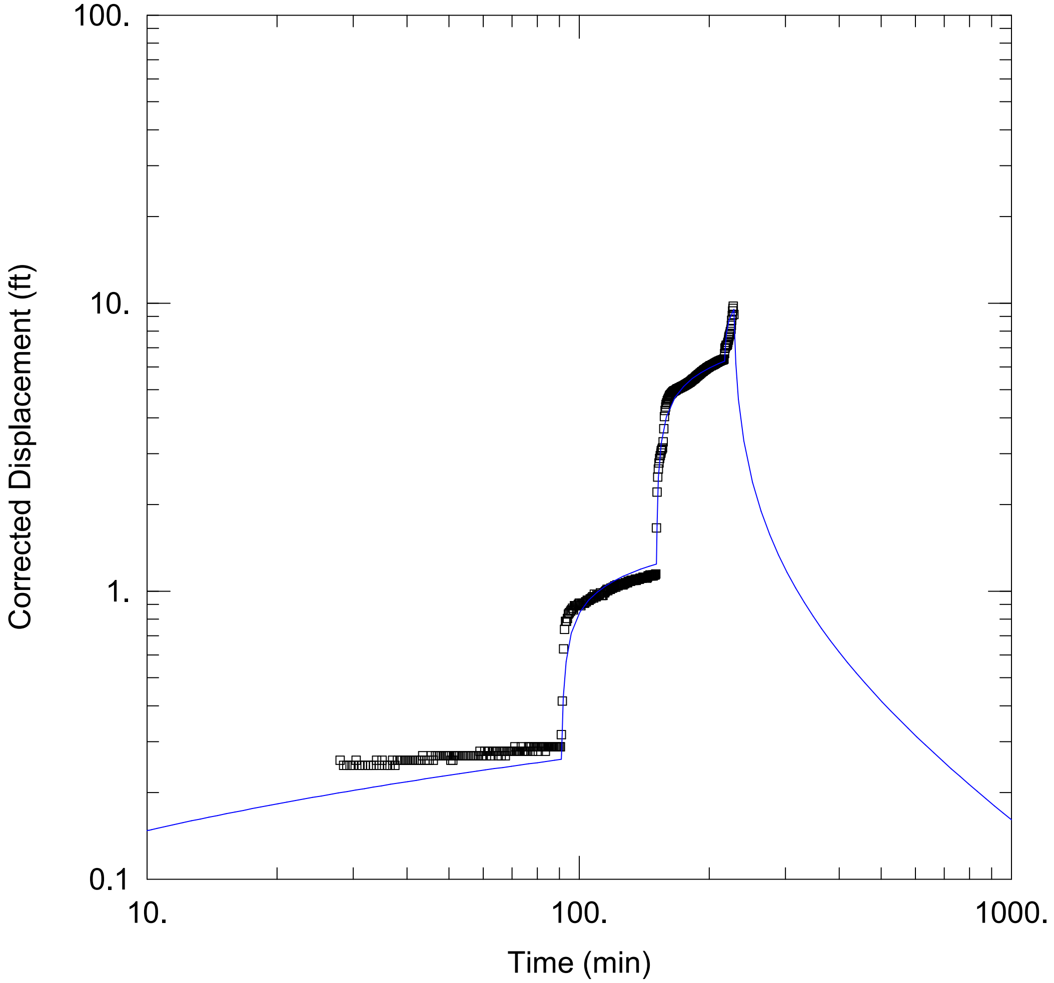
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-27 - 72H	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 57.64 ft^2/day
S = 1.695
Kz/Kr = 1.
b = 21. ft



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-27_Step test_Theis.aqt
Date: 11/25/24 Time: 11:48:10

PROJECT INFORMATION

Company: HDR
Client: ECOSA
Location: Cripple Creek, CO
Test Well: GVMW-27 SDD

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-27 SDD	0	0

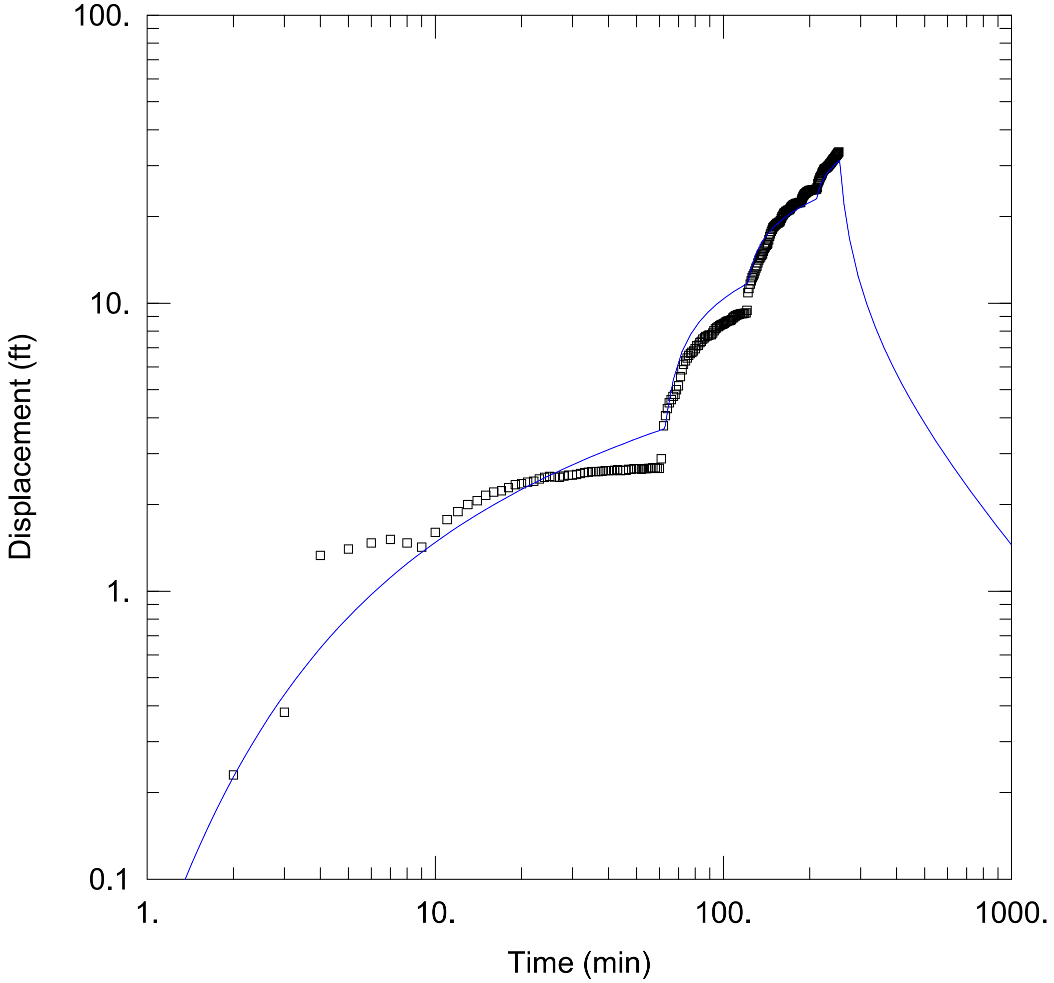
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-27 SDD	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 29.51 ft^2/day
Kz/Kr = 5.135E+4
S = 1.
b = 21. ft



WELL TEST ANALYSIS

Data Set: C:\Users\mreeves\Downloads\GVMW28_SD_Test_norecovery.aqt
Date: 12/11/24 Time: 15:14:17

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-28
Test Date: 10/24

AQUIFER DATA

Saturated Thickness: 38. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-28	0	0

Observation Wells

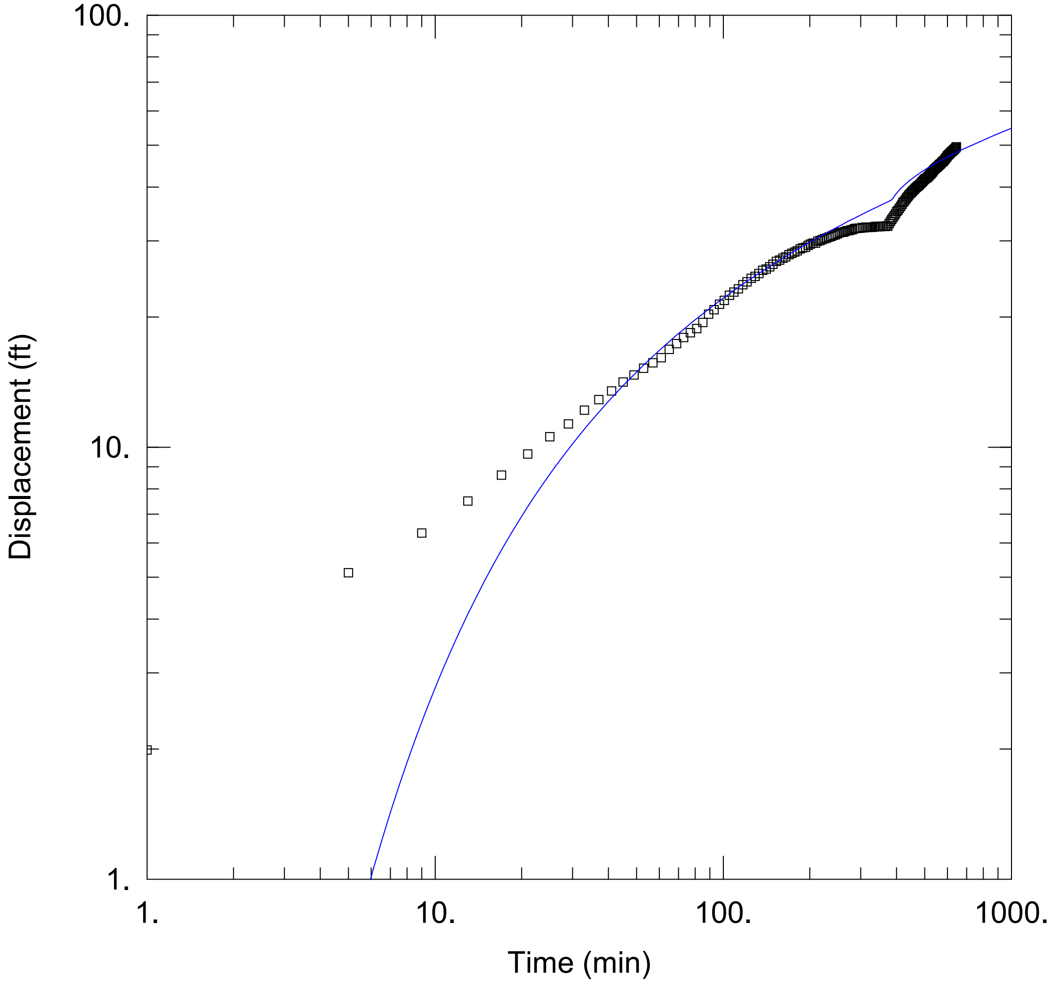
Well Name	X (ft)	Y (ft)
□ MW-28	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Step Test)

T = 4.323 ft^2/day
Sw = 0.
P = 1.528

S = 1.
C = 1. min^2/ft^5



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-35A 11hrTest_Theis_boundary.aqt
Date: 11/25/24 Time: 10:31:00

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-35A
Test Date: 10/24

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-35A	0	0

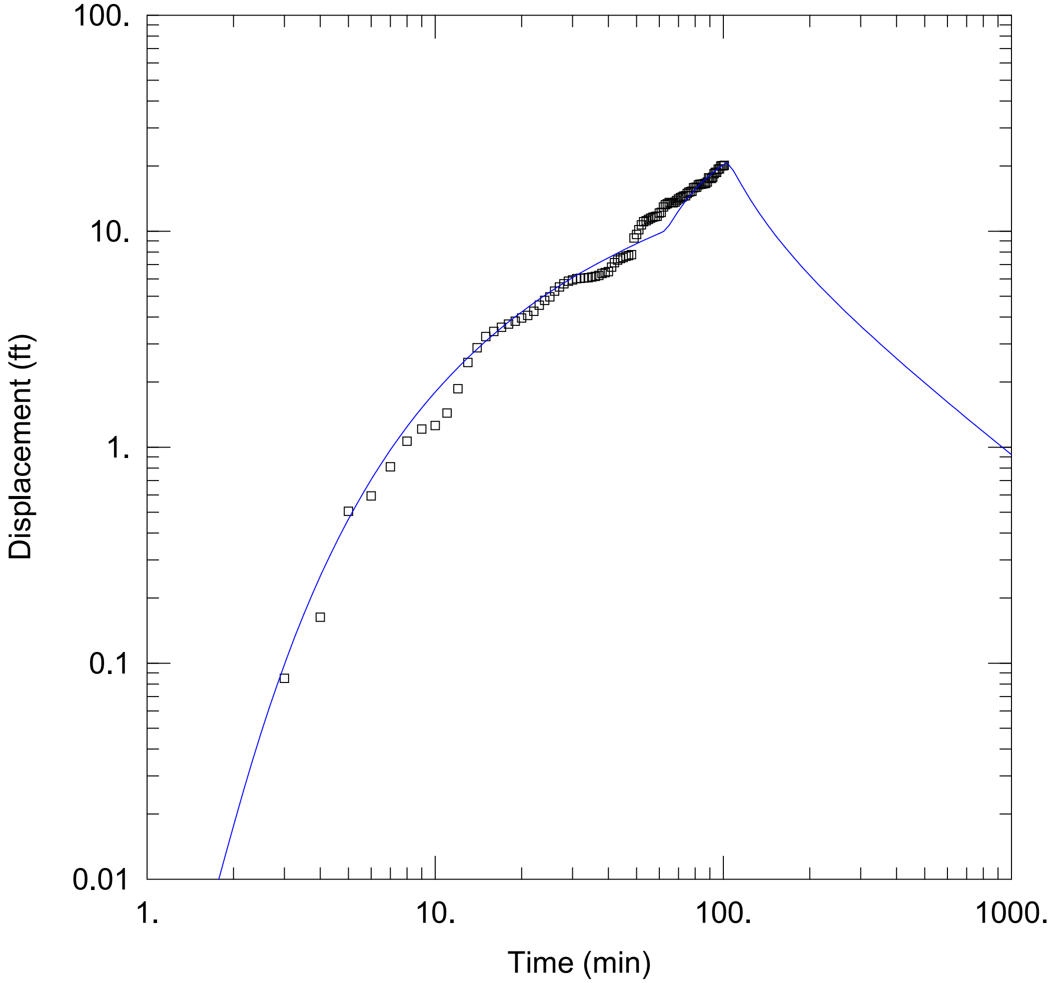
Observation Wells

Well Name	X (ft)	Y (ft)
□ GVMW-35A	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.036 ft^2/day
S = 1.
Kz/Kr = 0.001
b = 76.93 ft



WELL TEST ANALYSIS

Data Set: C:\...\GVMW-36 Step test_Theis.aqt
Date: 11/25/24 Time: 11:27:09

PROJECT INFORMATION

Company: HDR
Client: Newmont
Location: CC
Test Well: MW-36
Test Date: 10/24

AQUIFER DATA

Saturated Thickness: 22.47 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
GVMW-36	0	0

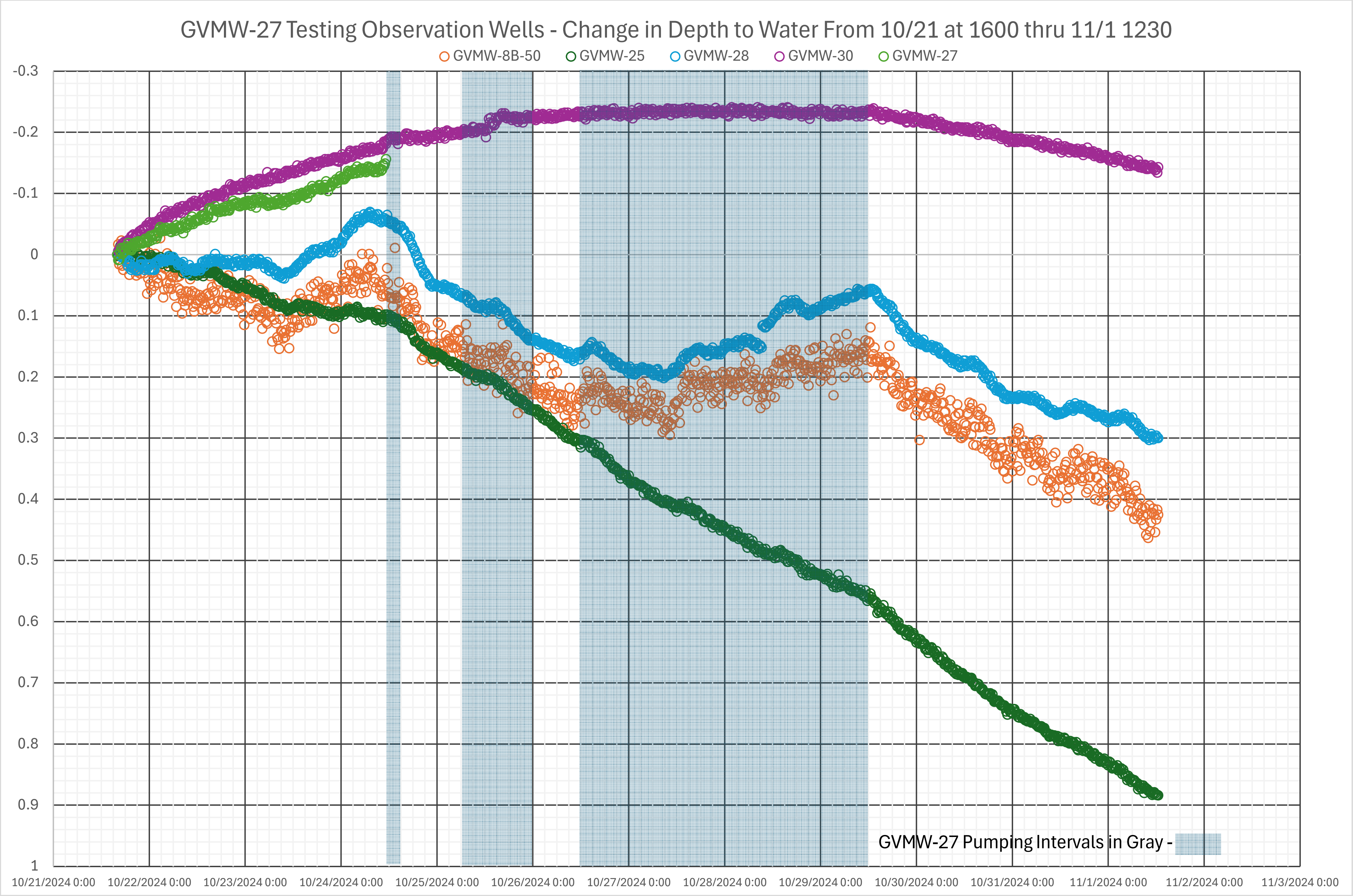
Observation Wells

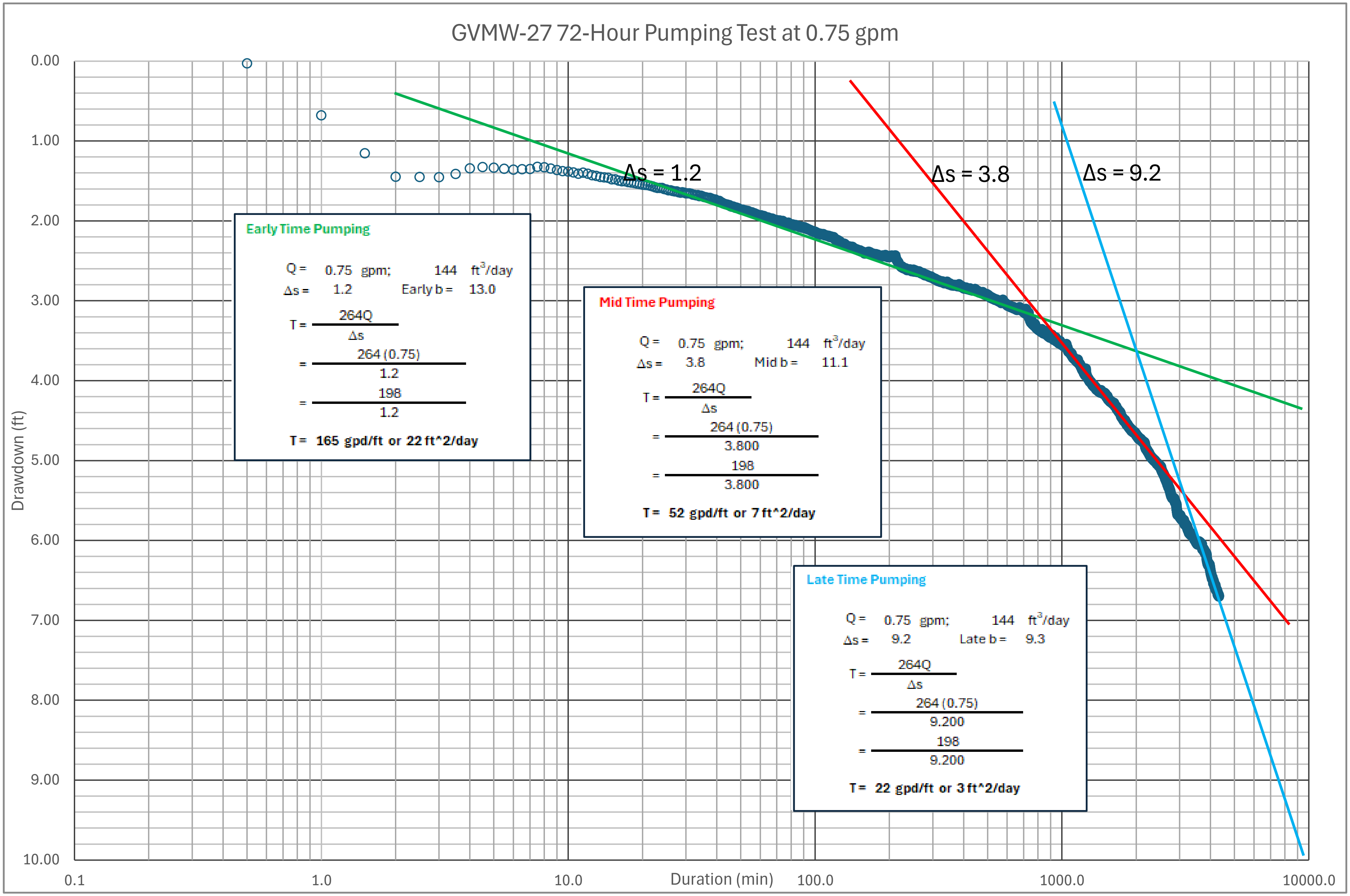
Well Name	X (ft)	Y (ft)
□ GVMW-36	0	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis (Step Test)

T = 0.5233 ft^2/day
S = 0.4552
Sw = 0.
C = 1. min^2/ft^5
P = 1.5


GVMW-27 Testing Observation Wells - Change in Depth to Water From 10/21 at 1600 thru 11/1 1230
GVMW-8B-50
GVMW-25
GVMW-28
GVMW-30
GVMW-27
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
10/21/2024 0:00
10/22/2024 0:00
10/23/2024 0:00
10/24/2024 0:00
10/25/2024 0:00
10/26/2024 0:00
10/27/2024 0:00
10/28/2024 0:00
10/29/2024 0:00
10/30/2024 0:00
10/31/2024 0:00
11/1/2024 0:00
11/2/2024 0:00
11/3/2024 0:00
GVMW-27 Pumping Intervals in Gray -



Early Time Pumping

Q = 0.75 gpm; 144 ft^3/day

Δs = 1.2 Early b = 13.0

$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{1.2}$$

$$= \frac{198}{1.2}$$

T = 165 gpd/ft or 22 ft^2/day

Mid Time Pumping

Q = 0.75 gpm; 144 ft^3/day

Δs = 3.8 Mid b = 11.1

$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{3.800}$$

$$= \frac{198}{3.800}$$

T = 52 gpd/ft or 7 ft^2/day

Late Time Pumping

Q = 0.75 gpm; 144 ft^3/day

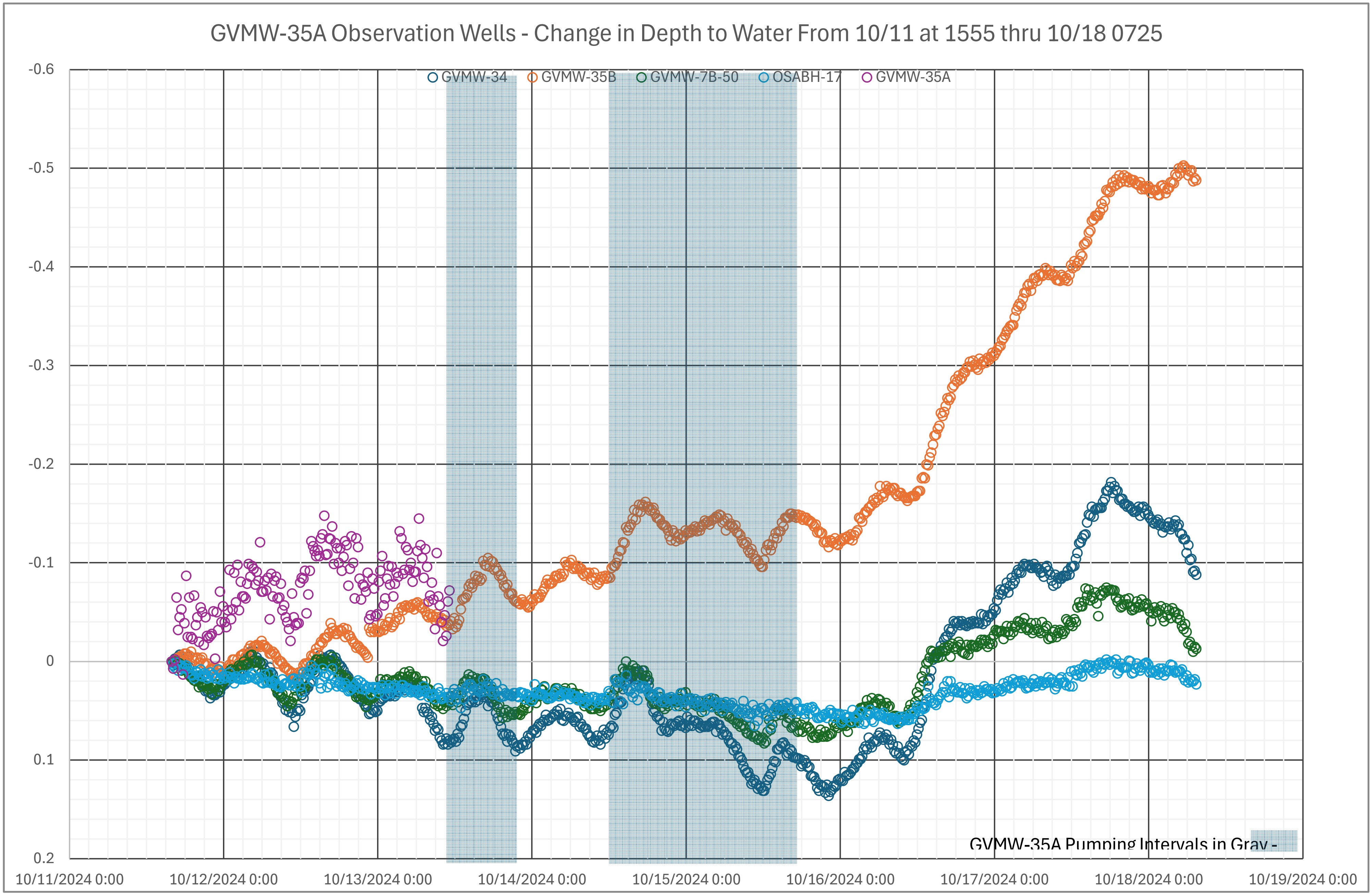
Δs = 9.2 Late b = 9.3

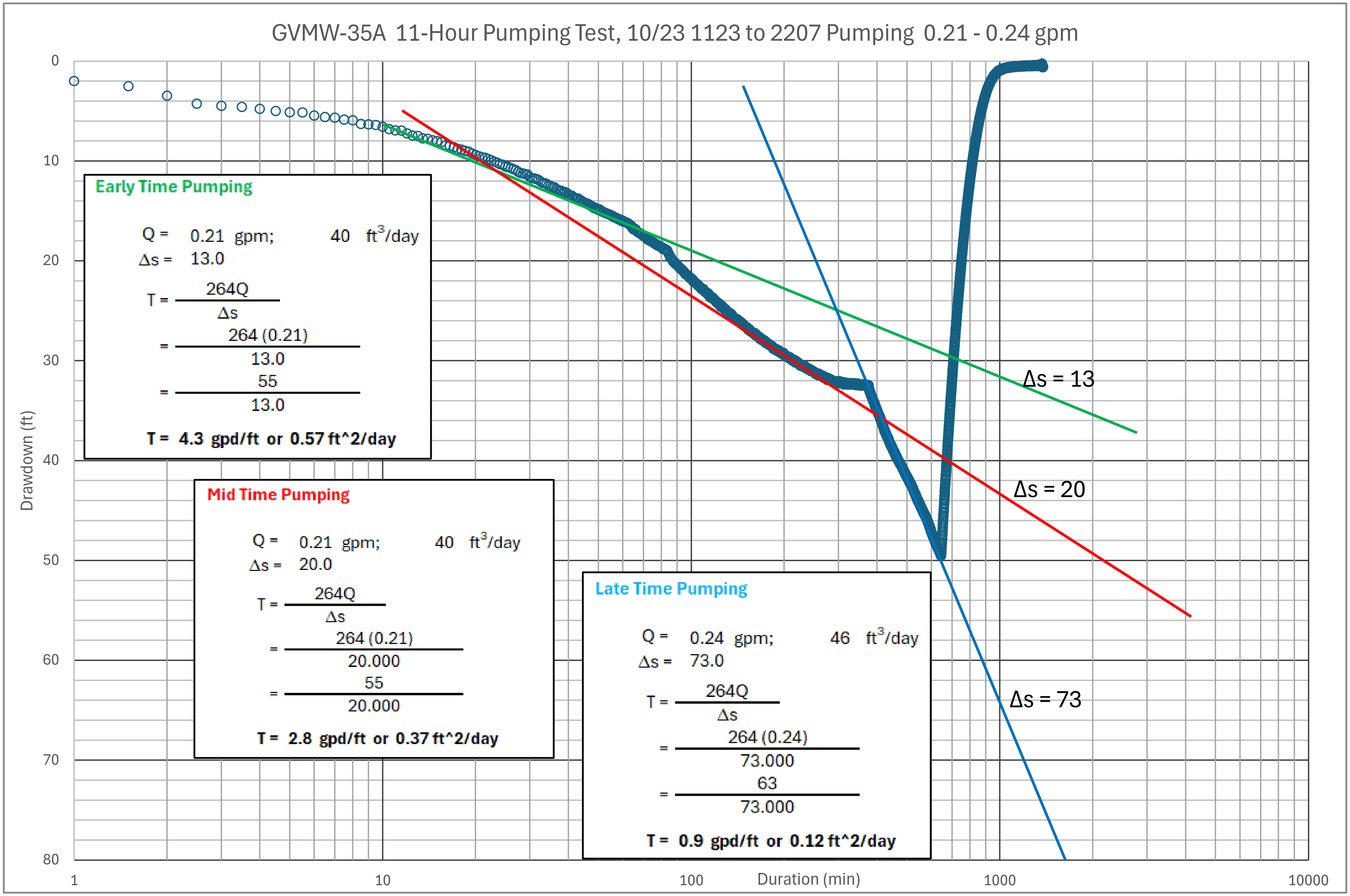
$$T = \frac{264Q}{\Delta s}$$

$$= \frac{264\,(0.75)}{9.200}$$

$$= \frac{198}{9.200}$$

T = 22 gpd/ft or 3 ft^2/day


GVMW-35A Observation Wells - Change in Depth to Water From 10/11 at 1555 thru 10/18 0725
GVMW-34
GVMW-35B
GVMW-7B-50
OSABH-17
GVMW-35A
-0.6
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
10/11/2024 0:00
10/12/2024 0:00
10/13/2024 0:00
10/14/2024 0:00
10/15/2024 0:00
10/16/2024 0:00
10/17/2024 0:00
10/18/2024 0:00
10/19/2024 0:00
GVMW-35A Pumping Intervals in Gray -


GVMW-35A 11-Hour Pumping Test, 10/23 1123 to 2207 Pumping 0.21 - 0.24 gpm
Drawdown (ft)
0
10
20
30
40
50
60
70
80
Duration (min)
1
10
100
1000
10000
Early Time Pumping
Q = 0.21 gpm; 40 ft^3/day
Δs = 13.0
T = 264Q / Δs
= 264 (0.21) / 13.0
= 55 / 13.0
T = 4.3 gpd/ft or 0.57 ft^2/day
Mid Time Pumping
Q = 0.21 gpm; 40 ft^3/day
Δs = 20.0
T = 264Q / Δs
= 264 (0.21) / 20.000
= 55 / 20.000
T = 2.8 gpd/ft or 0.37 ft^2/day
Late Time Pumping
Q = 0.24 gpm; 46 ft^3/day
Δs = 73.0
T = 264Q / Δs
= 264 (0.24) / 73.000
= 63 / 73.000
T = 0.9 gpd/ft or 0.12 ft^2/day
Δs = 13
Δs = 20
Δs = 73

Newmont™
NORTH AMERICA

CRIPPLE CREEK & VICTOR
PO Box 191
100 N. 3rd Street
Victor CO 80860

Attachment 2

East Cresson Overburden Storage Area (ECOSA) Pumpback System Design Summary Report

ECOSA Seepage Mitigation

ECOSA Grassy Valley, CC&V
February 25, 2025

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Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

ARV	Air Relief Valve
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BHE	Black Hills Energy
BGS	Below Ground Surface
CPVC	Chlorinated Polyvinyl Chloride
ECOSA	East Cresson Overburden Storage Area
EPDM	Ethylene-Propylene Diene Monomer
F	Fahrenheit
FIT	Flow Indicating Transmitter
gpm	gallons per minute
HDPE	High Density Polyethylene
HOA	Hand/Off/Auto
lb/ft^3	pounds per cubic foot
LF	Linear Feet
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPSH	Net Positive Suction Head
NPT	National Pipe Thread
OSHA	Occupational Safety and Health Administration
P&ID	Piping and Instrumentation Diagram
PID	Proportional, Integral, Derivative
PLC	Programmable Logic Controller
psi	pounds per square inch
PVC	polyvinyl chloride
SCADA	Supervisory Control and Data Acquisition
SQE	Grundfos Pump Designation
VFD	Variable Frequency Drive
VLF	Valley Leach Facilities

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1 Introduction

HDR is providing the design of the East Cresson Overburden Storage Area (ECOSA) Pumpback System Management design. The purpose of the ECOSA Pumpback System is to intercept and convey impacted groundwater from the wells to storage tanks where it will be removed by water trucks and transported to the Valley Leach Facilities (VLFs). The proposed system consists of five wells, two pipeline segments, and two tanks.

Wells GVMW-25, -27, -28, -34 and -35B were selected due to the flow rates into the wells and their locations relative to the flows. A number of wells were drilled, but not selected for pumping due to being dry or not being able to produce adequate flow for pumping.

This 60% conceptual design report provides a summary of the pipeline, wellhead equipment, storage tank, electrical, and control design. Each section includes the basis of design for each system, material and equipment selection details, design specific parameters, operational requirements, and relevant technical considerations. **Table 1-1** summarizes design conditions and requirements that are common to the various design components of the ECOSA Pumpback System.

Table 1-1. ECOSA Pumpback System Design Conditions and Requirements

Design Conditions	Design Requirement
Extracted groundwater is corrosive	Corrosion resistant materials selected for wetted components
Freezing winter temperatures	Include heating of all components associated with the pumpback system; pipelines depth of cover below the frost line
Power outages and service interruption	Add adequate insulation, spare material, and redundancy

2 Conveyance Pipeline Design

2.1 Basis of Design

The groundwater conveyance pipeline system was designed with the conditions and requirements shown in **Table 2-1**.

Table 2-1. Conveyance Pipeline Basis of Design

Design Conditions	Design Requirement
Extracted groundwater is corrosive and has a pH of as low as 2.75.	Corrosion resistant pipeline material

Design Conditions	Design Requirement
Freezing winter temperature	Adequate bury depth
Leakage from extracted groundwater must be prevented	Double containment will be considered for pipeline.
Air pocket removal	Air relief valves (ARVs) are required where high points occur.
Maintenance and cleaning of pipelines	Clean out tees will be placed at tie-point tees.
Public road crossing	Trenchless installation methodology will be considered in pipeline design and material selection.

2.2 Design Parameters

HDPE pipe was selected to transport impacted groundwater from the extraction wells to the storage tank site in accordance with the conveyance pipeline basis of design outlined in **Table 2-1**. It is a low cost and highly corrosion resistant material that can be installed with double-containment and maintained with cleanouts.

Two-inch DR17 HDPE was selected for the conveyance pipeline and four-inch DR21 HDPE was selected for the containment pipeline. The HDPE double containment conveyance pipeline will be buried at a depth of 5’. This is more conservative than the recommended 36” to provide additional protection from the freezing soil conditions. Cleanouts will be placed at every tie point for maintenance. **Table 2-2** summarizes selected design parameters for wellhead pipe and conveyance pipeline.

Table 2-2. Conveyance Pipeline Design Parameters

Design Parameter	Value
Materials of Construction	Conveyance Pipeline: 2” HDPE DR17 Containment Pipeline Containment: 4” HDPE DR21
Total Length of Pipe	2” HDPE DR17: 4500 LF Total – Conveyance 4” HDPE DR21: 4500 LF Total - Containment 6” HDPE DR21: 50 LF Total – Jack and Bore
Road Crossing	Trenchless Installation (Jack and Bore)
Pressure	Max: 35 psi Min: 0 psi

2.3 Pipeline Alignments

Alignment 1 – GVMW-25 to Storage Tank Site

Alignment 1 is a pressurized pipeline that begins at well GVMW-25. The pipeline meets with branches from wells GVMW-27 and GVMW-28 before continuing to the storage tank site (Storage Tank 1). It is approximately 1,355 LF long, runs uphill over the entire length of the pipeline, buried for the full length, and does not have any high points along the pipeline alignment requiring ARVs. Where the alignment passes underneath Lazy Susan Ranch Road, the 2” HDPE line will be encased in a 6” HDPE line which will be installed via jack and boring. ARVs are provided at each wellhead at the above grade discharge section before the pipeline continues underground.

The alignment discussed in this section is shown in **Figure 2-1**. See detailed alignment drawings on sheet C300 and C304 in **Appendix A.**

Alignment 2 – GVMW-35B to Storage Tank Site

Alignment 2 is a gravity fed pipeline that begins at well GVMW-35B.The pipeline meets with a branch from well GVMW-34 before continuing to storage tank site (Storage Tank 2). It is approximately 2,900 LF long, runs downhill over the entire length of the pipeline, buried for the full length, and does not have high points along the pipeline alignment requiring ARVs. The pipe will run parallel to an existing water line along the service road maintaining 8 feet of lateral clearance. ARVs are provided at each wellhead at the above grade discharge section before the pipeline continues underground.

The alignment discussed in this section is shown in drawing C100 in **Appendix A** along with detailed alignment drawings on sheet C301, C302, C303, and C304.

3 Wellhead Equipment Design

This section includes design details of wellhead equipment (e.g., submersible groundwater pumps), piping, appurtenances and major instruments. For equipment data, quotes, and data sheets, see **Appendix A.** For Wellhead mechanical drawings, see drawing **M100** in **Appendix A**.

3.1 Submersible Groundwater Pumps

In this section, the basis of design, hydraulic evaluation, size and material selection, control and monitoring requirement of the submersible groundwater pumps have been discussed in details.

3.1.1 Basis of Design

Table 3-1 summarizes the general design conditions/criteria and requirements associated with the well pump design.

Table 3-1. Design Basis for Submersible Groundwater Pumps

Design Conditions/Criteria	Design Requirement
Extracted groundwater is corrosive and has a pH of as low as 2.75.	Pumps must be made from available corrosion resistant materials
Low well replenishment rates ranging from 0.1 gpm to 1.5 gpm	System must turn on/off at setpoints. Constant well level cannot be used to control because smallest pump size exceeds replenishment rate
Low flows required due to reduce pump starts	Pumps equipped with Variable Frequency Drives (VFDs). Selected pumps have lowest flow range available
Well casing is 4" PVC Sch(80) with an internal diameter of 3.75"	Limits options to 3” diameter submersible groundwater pumps
Pumps must develop enough pressure to fill tanks while other pumps active	Pump must have a pressure range from 34’ to 143’ depending on serviced well and pipeline flows
Well vacates quickly when pump at full speed.	Off setpoint must be controlled with switch as added dry running protection
Pressure transmitter redundancy and monitoring	High level indicating switch at well static water level
Submersible motor must be adequately cooled	Pump setting at 18" from bottom of well to bottom of motor per manufacturer recommendation
Ambient air pressure of 10.1 psi	Well pumps with low Net Positive Suction Head (NPSH)
Average ambient air temperature of 40 Deg F	Account the influence of temperature in hydraulic modeling and design of the pumpback system components

Design Conditions/Criteria	Design Requirement
Average ambient water temperature of 40 Deg F	Account the influence of temperature in hydraulic modeling and design of the pumpback system components

3.1.2 Hydraulic Evaluation

Alignment 1 wells GVMW-25, -27, and -28, located below the tank storage site are pressure fed to the storage tank fill elevation. Each has an additional local high point at the pump discharge before the wellhead piping is directed underground to meet the pipeline.

Alignment 2 wells GVMW-35B and -34, located above the tank storage site are gravity fed to the storage tank fill elevation. Each has a single high point located at the pump discharge.

The pump impeller is assumed to be 3.5 feet from the bottom of the well according to the pump manufacturer's recommendations. Ambient pressure is assumed to be 10.1 psi with an average ambient temperature of 40 degrees Fahrenheit. For this evaluation, density of water (62.36 lb/ft^3) with a low pH of 2.75 and a high pH of 10 was used for the analysis.

The pumps are expected to run from the static water level until the pumps are shut off by the low well level switch. The low head scenario occurs when the pump will be developing the least head when the well is full and suction pressures are highest. The high head scenario occurs when the pump is developing the most head when the well is empty and suction pressures are at their lowest. The high head scenario is assumed to be when the well level is 3 feet above the pump impeller, at the approximate location of the off switch.

Pump speed is assumed to be controlled to maintain the lowest flow rate to ensure the least amount of pump starts. The highest pressures and flows are assumed to occur momentarily while the soft starter (integrated in the SQE motor) ramps up to full speed and are expected to decrease quickly once the VFD control loop takes over.

See **Table 3-2** for extraction well pump hydraulic details including well conditions, depths, and assumptions for each well. **Appendix B** describes the hydraulic conditions and provides selected details.

Table 3-2. Hydraulic Evaluation Parameters for Submersible Groundwater Pumps

	Well	Surface Elevation	Well Depth (ft. bgs)	Static Water Level (ft. bgs)	Flow (gpm)	Low Head (ft.)	High Head (ft.)
Alignment 1	GVMW-25	9864’	79’	45.6’	1.5	113	143
	GVMW-27	9921’	74.3’	55.5’	1.5	88	99
	GVMW-28	9911’	71.5’	36’	1.5	56	87
	Storage Tank 1 Fill	9938’	N/A	N/A	N/A	N/A	N/A
Alignment 2	GVMW-35B	10011’	84.6’	32.5’	1.5	61	86
	GVMW-34	10021’	72.9’	60’	1.5	34	77
	Storage Tank 2 Fill	9938’	N/A	N/A	N/A	N/A	N/A

3.1.3 Pump Control and Status Monitoring Criteria

Table 3-3 summarizes the pump control and status monitoring criteria.

Table 3-3. Submersible Groundwater Pump Control and Status Monitoring Criteria

Design Conditions/Criteria	Design Requirement
Interlock to prevent tank overflow if full	System interconnection, interlock
Alarm if tank full and pump on	Alarm added to system
Pump off controlled by low level switch	Off setpoint must be controlled with switch as added dry running protection
HOA (Hand/Off/Auto)	HOA switch/panel to be provided
Local and Auto Speed Control at Well Pump	VFD required for full pump range
Well Level Reported to SCADA	Pressure Transducer required on wells. Must report to SCADA and the PLC for VFD control
Well Flow Reported to SCADA	FIT on each wellhead. Must report to SCADA and the PLC for VFD control
Wellhead Pressure Reported to SCADA	PIT on each wellhead. Must report to SCADA and the PLC for VFD control
Float switch high report to SCADA	Status output to SCADA
Pump Status to SCADA	On/Off/Auto Status to SCADA
Pump Fail to SCADA	Pump Fail Status to SCADA

The pump supplier will not be providing the VFD or other pump control elements beyond switches and transducers. The pressure sensor will be a PVC LMK809 or equivalent, will measure well level and will be affixed to ¼” rigid CPVC piping adjacent to the pump or affixed to the pump column. Readings from this sensor will start the pump.

Two PVC switches will be placed along the pump column. The first will be set at the well static water level and will be used to verify correct operation of the well level pressure transducer. The second will be placed three feet above the top of the pump inlet to stop the pump and prevent dry running. This was added due to concerns that the well level pressure transmitter would not be able to turn the pump off if seepage is vacated from the well at full speed.

Pump speed can be set manually or controlled with a PID. See detail Drawings I101, I102 and I103 in **Appendix A** for Piping and Instrumentation Diagrams.

3.1.4 Pump Selection

All extraction well pumps are 3” Grundfos 05SQE-180 pumps. These were selected because of their small size, corrosion resistant materials of construction, VFD compatibility, and low flows. The pumps have an operating range of 1.5 to 7.5 gpm. The pumps are capable running as low as 30% of maximum speed. **Table 3-4** summarizes design parameters for the submersible groundwater pumps.

Size

Most pumps listed for 4” well encasement pipe assume the nominal 4” internal diameter of schedule 40 CPVC pipe (3.998”) versus the internal diameter of 4” schedule 80 CPVC pipe (3.786”) meaning that pumps with larger diameters, such as the AY Macdonald 2 Series and Xylem G-Slimline with their 3.75” maximum diameters, would not adequately fit into the pipe.

Material

The Grundfos 05SQE-180 pump is made with 304 stainless steel and PVC wetted components. The pH rating for the SQE pumps is 5 to 9. Corrosion resistant pumps in the required diameter are not available from reputable pump manufacturers. Spare pumps kept in inventory are recommended due to this limitation.

Pump Column Piping and Discharge Head

The pump supplier shall provide a CPVC well discharge and sole plate to a centerline of 1’ above the top of concrete. Discharge head shall have three taps supporting ¼” CPVC piping leading from the discharge head to the pressure switch and pressure transducer or the transducer shall be affixed to the column via cable.

CPVC or corrosion resistant hose column material will be provided by the pump installation contractor or the pump supplier for the one-inch pump column. Quarter inch rigid CPVC piping will also be supplied by the pump installer to support the pressure switches and transducer if CPVC column piping is used. Adequate cabling must be provided if a hose type pump column is provided.

Hose pump column is ideal due to the convenience of changing out pumps and sensors if maintenance is required. However, CPVC is more corrosion resistant.

Table 3-4. Design Parameters for Submersible Groundwater Pumps

Design Parameters	Values
Nominal Size	3”
Pump Model	5 SQE05A-180
Pump Material	304 Stainless Steel, PVC
Max Flow Capacity	8 gpm
Head Capacity	34’ to 143’
Speed Control	VFD
Min Speed	30%
Discharge Size	1-inch NPT
Outside Diameter	2.9”
Weight	12 lbs
Manufacturer	Grundfos
Well Level Sensor	LMK809
Column Material	CPVC
Well Level Switches	High and Low

3.2 Wellhead Piping, Appurtenances, and Instrumentation

3.2.1 Basis of Design

Table 3-5 summarizes the design conditions and requirements associated with the well head piping and equipment design.

Table 3-5. Design Basis for Wellhead Piping, Appurtenances, and Instrumentation

Design Conditions	Design Requirement
Corrosion Resistance	Valves and piping CPVC. The pressure transmitter uses 316 stainless steel on wetted components
Freezing Winter Temperatures	Enclosure with powered heating requirements for normal operation
Power outages	Extra insulation from enclosure, spare material availability and cost
Pressure output to SCADA and PLC	Pressure analog measurement with 4-20 mA output
Flow output to SCADA and PLC	Flow analog measurement with 4-20 mA output
Flow Totalizing with local output	Flow meter must totalize
Air and Vacuum Relief	Air and vacuum relief valves added to wellhead high point

Design Conditions	Design Requirement
Well containment retention area must hold 110% uphill pipeline capacity and precipitation from a 100 year 24 hour storm	Retention area included in design

3.2.2 Design Parameters

One, and two-inch schedule 80 CPVC was selected for use for above ground piping at the wellheads and tanks because of its rigidity and compatibility with required appurtenances.

To protect wellhead equipment against winter temperatures, insulated and heated AquaShield enclosures are provided for insulation at all wellheads. Heat tracing and insulation wraps will be provided where above ground piping meets the tank.

Wellhead pipe material is Sch (80) CPVC pipe. The valves and appurtenances have a one-inch nominal size. When the pipe is buried, the CPVC pipe is increased to two inches to match the HDPE pipeline.

Each wellhead is equipped with 1” CPVC check and isolating ball valves. Two ARI D-040L 1/2” CPVC air/vac relief valves on a shared tree were chosen for corrosion resistance and redundancy. Isolation ball valves are also provided on the drain branch and air vacuum/release valves.

Flow is indicated, totalized and transmitted using a Rosemount 8750W magnetic flowmeter. Pressure is indicated and transmitted using a Rosemount 2088 pressure indicator and transmitter located at the wellhead.

Each wellhead will be outfitted with an AquaShield heated enclosure for insulation. Heat tracing is provided on sections where the pipeline rises above ground to service the tanks. **Table 3-6** summarizes design parameters for the wellhead piping, appurtenances and instrumentation.

Table 3-6. Design Parameters for Wellhead Piping, Appurtenances, and Instrumentation

Design Parameters	Values
Wellhead Pipe and Valve Material	CPVC
Flow Capacity	1.5-7.5 gpm
Containment	Well Containment retention area sized to hold 110% uphill pipeline capacity and precipitation from a 100-year 24 hour storm. Different containment retention areas are provided on Well 25 and well 27 due to elevation. Same smaller containment provided on Well 28, 34b, 35.
Nominal Size and Thread	1”-NPT
Air/Vac Relief Valve	ARI D-040L 1/2” PVC Air/Vacuum Relief Valves or equivalent.
Flow Meter	1” Rosemount 8750W Magnetic Flowmeter or equivalent.
Pressure Transmitter	Emerson Rosemount 2088 or equivalent.
Enclosure	Heated AquaSHIELD enclosure or equivalent.

4 Storage Tank Design

Flow extracted from wells GVMW-25, -27, and -28 will be conveyed to a 10,000-gallon HDPE storage tank (Storage Tank 1). The estimated maximum flow pumped from these wells is 1.7 gpm. A 10,000-gallon capacity storage tank will provide 4 days of storage. A second 10,000-gallon capacity storage tank (Storage Tank 2) will be installed in the same area and adjacent to the first tank, where extracted flow from wells GVMW-34 and 35B will be stored. The estimated total maximum flow from these two wells is 1.1 gpm.

The two storage tanks will have interconnected piping . Note that instead of using a single storage tank, two individual tanks were used for collecting and storing the extracted water from all the wells. This provides the system redundancy i.e., in a situation where one tank needs to be taken out of service, the other tank can still be in operation. See Sheet C500 in **Appendix A** for details on the storage tanks.

4.1.1 Basis of Design

The seepage storage tank will be designed in accordance with ASTM, ASME, NFPA, and OSHA requirements. **Table 4-1** summarizes the design requirements of the storage Tanks.

Table 4-1. Design Basis for Storage Tanks

Design Conditions/Criteria	Design Requirement
Tank overflow should be avoided	System interconnection, interlock
Alarm notification from tank	Alarm added to system
Both tank levels should be reported to SCADA	Level transmitters on tanks

Design Conditions/Criteria	Design Requirement
Both tank temperature should be reported to SCADA	Tank temperature reading to SCADA
Tank heat trace status should be reported to SCADA	Tank heat trace reading to SCADA
Tank containment must hold 110% Tank capacity and Precipitation from a 100 year 24-hour storm event in the area.	Containment included for both tanks

4.1.2 Design Parameters

Table 4-2 provides a summary of key parameters of the storage tank design.

Table 4-2. Design Parameters Storage Tanks

Design Parameters	Values
Tank Material	Crosslinked HDPE
Capacity	10,000 Nominal gallons
Containment	Each tank will be installed in its own containment to hold 110% of the tank capacity and precipitation from a 100 year 24-hour storm event in the area
Inlet Size	3-inch
Outlet Size	3-inch
Overlfow	6-inch overflow is installed on the tank leading to a containment sump
Drain	3-icnh drain routing to a containment sump
Manway Size	24” Top Manway and 30” Side Manway
Drain Size	3-inch
Vent Size	4-inch with a vinyl bug screen
Tank Diameter	12 ft
Tank Height	13.5 ft
Insulation	Urethane foam insulation/fiberglass topcoat with UV resistant finish coat
Heating	Heating panels with adjustable temperature controller
Manufacturer	• Poly Processing Company • Snyder Industries, Inc. • Peabody, or • Approved equal
Static Head	Full tank height
Level Indication	Ultrasonic transmitter will be installed in a port located on the top of the tank for level indication.
Anchoring	Tank will be equipped with appropriate tie-down system to be designed complying with seismic design considerations and provided by the tank manufacturer

Design Parameters	Values
Fittings	• All exterior fittings on the side of the tanks shall be supported with pipe supports • Discharge piping shall include isolation valve directly at the tank's nozzle flange • Gaskets shall be Viton® or Hypalon®, not EPDM

5 Electrical and Control Design

This section describes the electrical system and control systems to be designed for the well facility. The single line diagram for the well and Storage Tank Site is shown on drawing E601 in **Appendix A.** The locations for the major components of the electrical system are shown on drawing E100.

5.1.1 Proposed Electrical Service

The electrical service to the wells will be provided by Black Hills Energy (BHE) from the power pole next to the existing Grassy Valley Pump Station. A power service coordination with BHE has been started. It is anticipated a new overhead transmission line will be extended from the existing power pole to the wells with 250ft maximum spacing apart between the pole as shown in **Figure 5-2**. A pole mounted stepdown transformer from 15KV to 240/120V will be provided to feed the well and miscellaneous loads.

It is anticipated that a 240/120V, 1-phase, 100A rated meter main load center will be needed at each well and tank site. The electrical equipment will be housed in weatherproof NEMA 3R enclosure at each well site and tank site. Manual Transfer Switch (two breakers with kirk-key interlock configuration) and portable generator connection for temporary power will be provided at each site’s panelboard in the event of power outage from the utility. The major electrical equipment and manufacturers are listed for the electrical portions of this project are stated in **Table 5-1**.

Table 5-1. Major Electrical Equipment and Manufacturers

Equipment	Manufacturer
Meter Main Load Center	Eaton, Square D
VFD	Allen Bradley PowerFlex 4M
PLC	Allen Bradley CompactLogix 5370 L3
Generator Receptacle	Appleton
Pole Mounted Lighting	Lithonia

5.1.2 Proposed Well Pump Control

Well pumps will be provided with HAND/OFF/AUTO switch for different modes of operation.

Under AUTO mode, the pump will activate based on the well level as detected by the pressure transducer. The well pump will be shut off based on the well level detected by the pressure transducer, with a low-level float switch serving as a backup in case the pressure transducer or PLC becomes unavailable to prevent dry operation. Pump speed will be controlled by a VFD and managed through SCADA, considering the well discharge flow rate, wellhead pressure, and storage tank level. If the storage tank level exceeds a specified limit, the pumps will shut off to avoid causing overflow.

For manual operation, the VFD features an ON/OFF button, allowing the operator to start or stop the pump as needed. Once the ON button is pressed, the pump will run continuously until the OFF button is pressed or the water level falls below the low-level float switch, triggering a shutdown. No manual speed control is provided in HAND mode.

Each well will be equipped with a flow meter to monitor and record flow data, transmitting data logging totalizer information to the PLC.

If the storage tank is full, the line pressure exceeds the expected value, or the flow meter indicates no flow, the pump will not operate in HAND mode.

A high-level float switch will be installed at each well to send a high well level alarm to the PLC in case the pressure transducer is unavailable.

5.1.3 Well and Tank Facility Monitoring System

Each well site and tank site will communicate with SCADA via a fiber optic cable. An exposed-rated single-mode fiber optic cable will be installed aerially from the existing Grassy Valley Pump Station Control Panel along utility power poles and dropped at each site. A patch panel will be provided at each site, containing the necessary fiber equipment, a 120V receptacle, and a network switch. For sites within 100 meters, Cat 6 cable will be used for communication connections instead of fiber optic cable. Communication to and from Grassy Valley Pump Station to SCADA has been established via radio.

Each well sites and tank site will be equipped with a control panel containing an Allen-Bradley CompactLogix 5370 L3 PLC, terminals, I/O cards and associated components.

Each pump VFD will include Ethernet/IP communication card to send pump, drive, and well related information to SCADA. The transmitted data of each site to SCADA will include monitoring information such as well level, pump status, well output flow, totalized flow, tank level, and tank temperature, etc.

6 Summary of Design

The preliminary recommendations based on the evaluation performed are summarized below.

Pumping and Conveyance:

- Double contained HDPE buried to a depth exceeding 5’ was selected for the conveyance pipeline material for its low cost and high corrosion resistance. Double containment of the pipeline construction provides an extra layer of protection against leaks and spills, crucial for environmental safety and compliance.
- For above-grade piping, insulated and heat traced CPVC piping has been selected considering its corrosion resistance and relatively lower cost than SST.
- Heated CPVC made enclosures will be used to protect wellhead equipment

Storage:

- The extracted seepage solution will be pumped into two 10,000 gallon storage HDPE tanks. These tanks will provide a minimum of 4 days retention of the solution. The tanks will be installed inside containment and equipped with level sensors to provide continuous level indication.

Electrical and Control:

- The electrical service to the wells will be provided by BHE from the power pole next to the existing Grassy Valley Pump Station. 240/120V, 1-phase, 100A rated meter main load center will be needed at each well and tank site.
- Each well will be equipped with a flow meter to monitor and record flow data, transmitting data logging totalizer information to the PLC. Pump speed will be controlled by a VFD and managed through SCADA. Operators will be able to manually to start or stop the pump as needed.
- Each well site and tank site will communicate with SCADA via a fiber optic cable, and equipped with a control panel containing an Allen-Bradley CompactLogix 5370 L3 PLC, terminals, I/O cards and associated components. Each pump VFD will include Ethernet/IP communication card to send pump, drive, and well related information to SCADA.

Appendix A. 60% Design Drawings

Contract Drawings For

EAST CRESSON OVERBURDEN STORAGE AREA (ECOSA) SEEP MANAGEMENT

PUMPBACK SYSTEM DESIGN

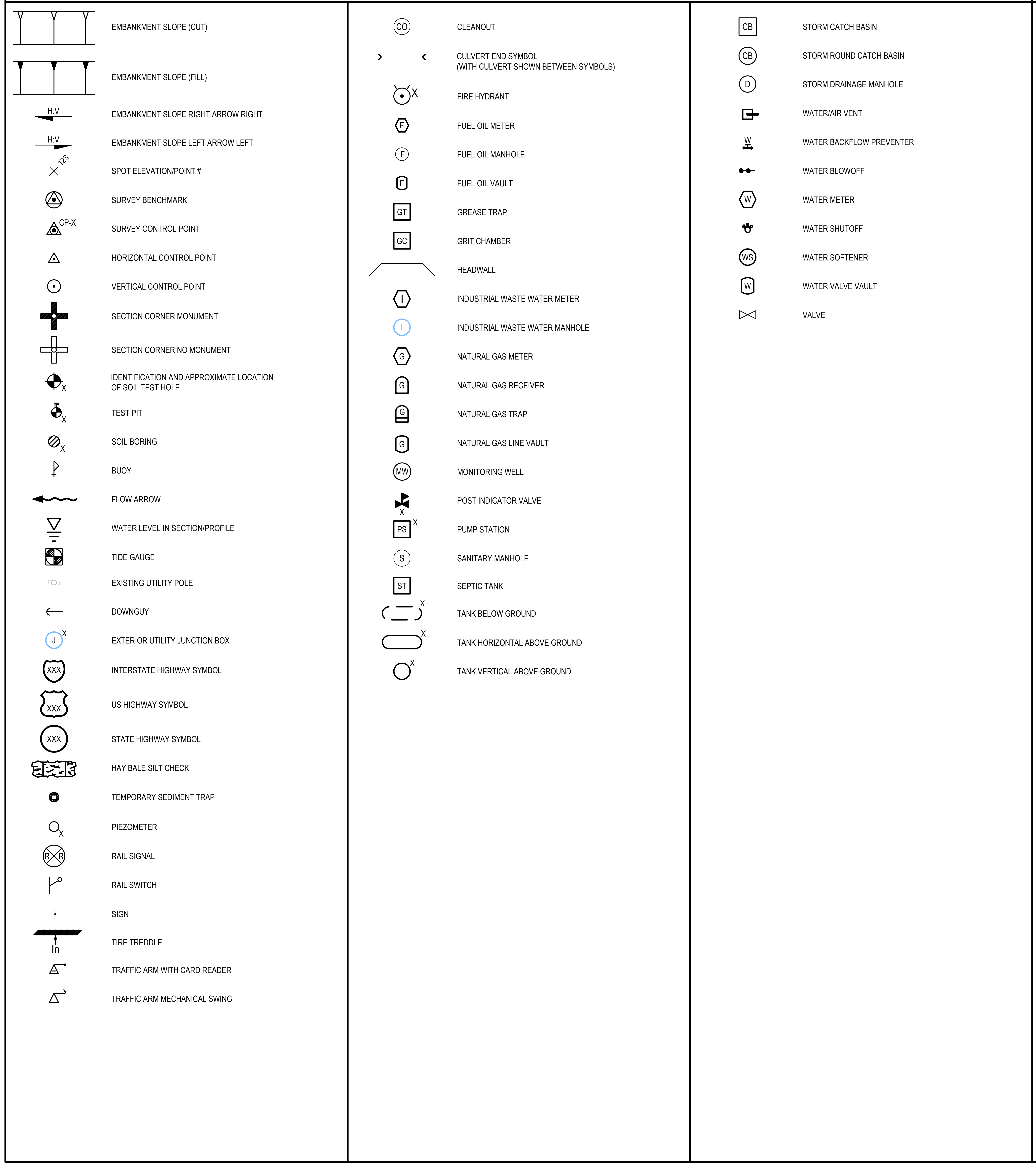
Project No.
10399263

Cripple Creek, CO
February 2025

SHEET INDEX TABLE

SHEET NO.	SHEET NUMBER	SHEET TITLE
1	C001	COVER SHEET
2	C002	CIVIL LEGEND AND SYMBOLS
3	C100	SITE OVERVIEW
4	C101	STORAGE TANK SITE LAYOUT
5	C300	25 TO TANK-1 STA 0+00 TO 13+70
6	C301	35B TO TANK-2 STA 0+00 TO 9+00
7	C302	35B TO TANK-2 STA 9+00 TO 18+00
8	C303	35B TO TANK-2 STA 18+00 TO 27+30
9	C304	WELL SITES TO MAIN ALIGNMENT TIE POINTS
10	C401	STORAGE TANK SITE PLAN
11	C402	WELL SITE PLAN & DETAILS
12	C500	TANK PLAN AND SECTIONS
13	M100	MECHANICAL DETAILS
14	E001	ELECTRICAL SYMBOLS AND ABBREVIATIONS
15	E100	ELECTRICAL OVERALL SITE PLAN
16	E101	ELECTRICAL TANK SITE PLAN
17	E102	TYPICAL WELL AND TANK ELECTRICAL PLAN
18	E501	ELECTRICAL DETAILS
19	E601	SINGLE LINE DIAGRAM
20	E602	ELEVATION, PANEL AND LIGHT FIXTURE SCHEDULE
21	E603	PUMP CONTROL PANEL WIRING PLAN
22	I001	GENERAL LEGEND
23	I101	P&ID GVMW-25 AND -27
24	I102	P&ID GVMW-35B AND -34
25	I103	P&ID GVMW-28 & STORAGE TANK SITE
26	I104	NETWORK TOPOLOGY DIAGRAM

CIVIL MAPPING SYMBOLOGY

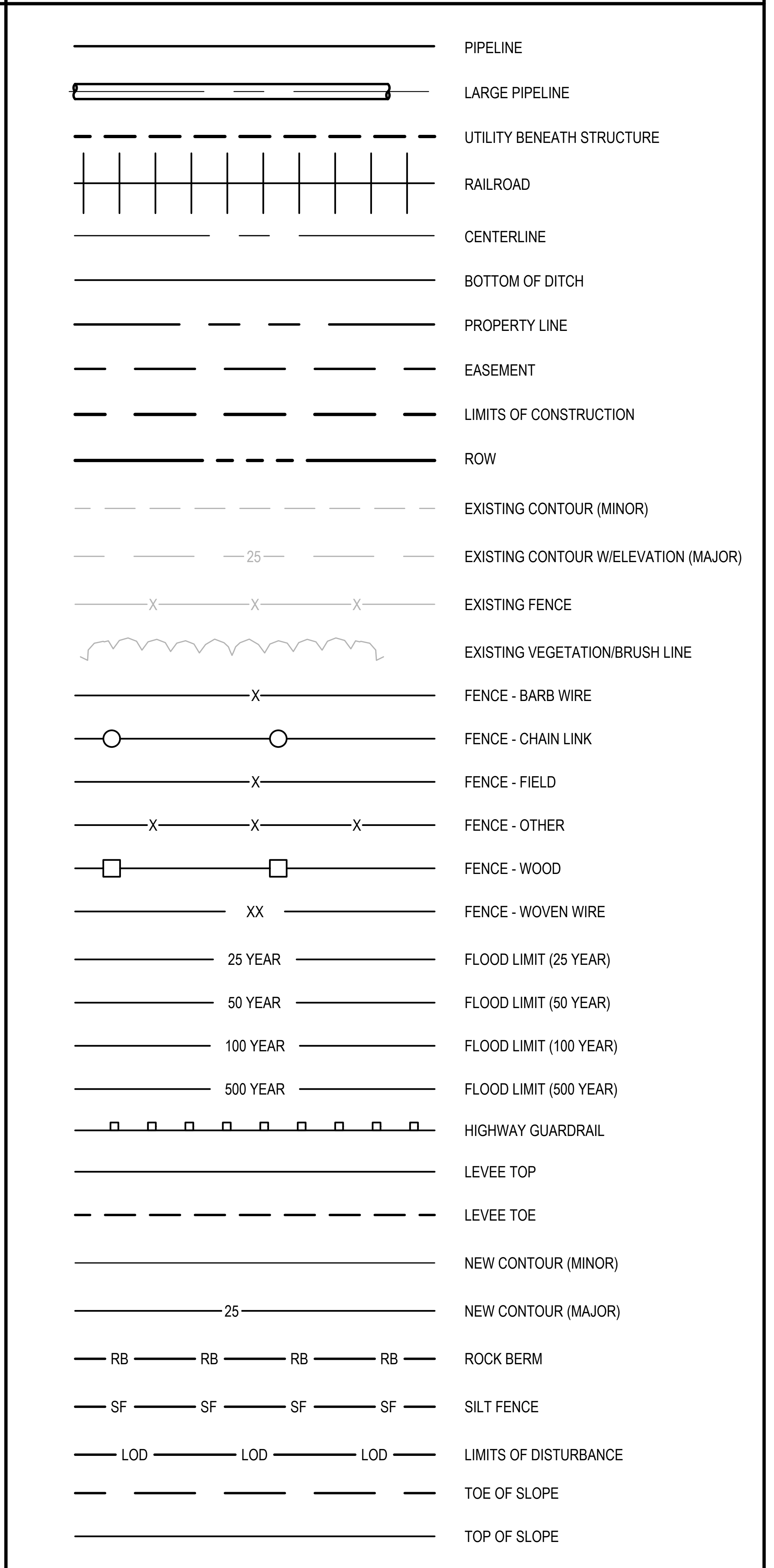


- EMBANKMENT SLOPE (CUT)
- EMBANKMENT SLOPE (FILL)
- EMBANKMENT SLOPE RIGHT ARROW RIGHT
- EMBANKMENT SLOPE LEFT ARROW LEFT
- SPOT ELEVATION/POINT #
- SURVEY BENCHMARK
- SURVEY CONTROL POINT
- HORIZONTAL CONTROL POINT
- VERTICAL CONTROL POINT
- SECTION CORNER MONUMENT
- SECTION CORNER NO MONUMENT
- IDENTIFICATION AND APPROXIMATE LOCATION OF SOIL TEST HOLE
- TEST PIT
- SOIL BORING
- BUOY
- FLOW ARROW
- WATER LEVEL IN SECTION/PROFILE
- TIDE GAUGE
- EXISTING UTILITY POLE
- DOWNGUY
- EXTERIOR UTILITY JUNCTION BOX
- INTERSTATE HIGHWAY SYMBOL
- US HIGHWAY SYMBOL
- STATE HIGHWAY SYMBOL
- HAY BALE SILT CHECK
- TEMPORARY SEDIMENT TRAP
- PIEZOMETER
- RAIL SIGNAL
- RAIL SWITCH
- SIGN
- TIRE TREDDLE
- TRAFFIC ARM WITH CARD READER
- TRAFFIC ARM MECHANICAL SWING

- CLEANOUT
- CULVERT END SYMBOL (WITH CULVERT SHOWN BETWEEN SYMBOLS)
- FIRE HYDRANT
- FUEL OIL METER
- FUEL OIL MANHOLE
- FUEL OIL VAULT
- GREASE TRAP
- GRIT CHAMBER
- HEADWALL
- INDUSTRIAL WASTE WATER METER
- INDUSTRIAL WASTE WATER MANHOLE
- NATURAL GAS METER
- NATURAL GAS RECEIVER
- NATURAL GAS TRAP
- NATURAL GAS LINE VAULT
- MONITORING WELL
- POST INDICATOR VALVE
- PUMP STATION
- SANITARY MANHOLE
- SEPTIC TANK
- TANK BELOW GROUND
- TANK HORIZONTAL ABOVE GROUND
- TANK VERTICAL ABOVE GROUND

- STORM CATCH BASIN
- STORM ROUND CATCH BASIN
- STORM DRAINAGE MANHOLE
- WATER/AIR VENT
- WATER BACKFLOW PREVENTER
- WATER BLOWOFF
- WATER METER
- WATER SHUTOFF
- WATER SOFTENER
- WATER VALVE VAULT
- VALVE

UTILITY/CIVIL LINE SYMBOLOGY



- PIPELINE
- LARGE PIPELINE
- UTILITY BENEATH STRUCTURE
- RAILROAD
- CENTERLINE
- BOTTOM OF DITCH
- PROPERTY LINE
- EASEMENT
- LIMITS OF CONSTRUCTION
- ROW
- EXISTING CONTOUR (MINOR)
- EXISTING CONTOUR W/ELEVATION (MAJOR)
- EXISTING FENCE
- EXISTING VEGETATION/BRUSH LINE
- FENCE - BARB WIRE
- FENCE - CHAIN LINK
- FENCE - FIELD
- FENCE - OTHER
- FENCE - WOOD
- FENCE - WOVEN WIRE
- FLOOD LIMIT (25 YEAR)
- FLOOD LIMIT (50 YEAR)
- FLOOD LIMIT (100 YEAR)
- FLOOD LIMIT (500 YEAR)
- HIGHWAY GUARDRAIL
- LEVEE TOP
- LEVEE TOE
- NEW CONTOUR (MINOR)
- NEW CONTOUR (MAJOR)
- ROCK BERM
- SILT FENCE
- LIMITS OF DISTURBANCE
- TOE OF SLOPE
- TOP OF SLOPE

GENERAL NOTES:

1. THIS IS A STANDARD CIVIL SYMBOLOGY SHEET. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MITIGATION

CRIPPLE CREEK, CO

MARK	DATE	DESCRIPTION
60%	01/06/2025	ISSUED FOR REVIEW

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024
PROJECT MANAGER	J. VAIL
PROJECT DESIGNER	F. SHARIF
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

CIVIL LEGEND AND SYMBOLS

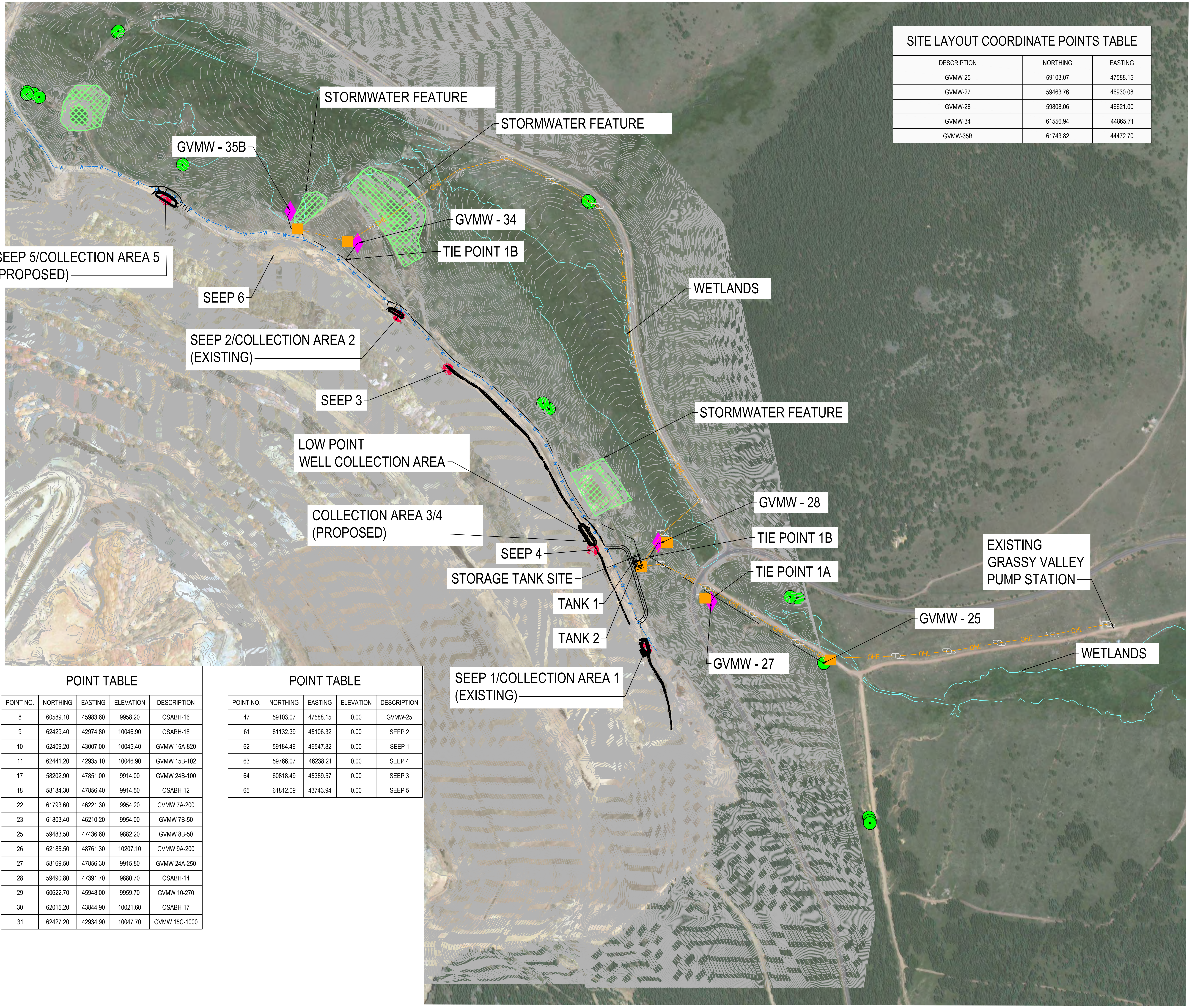
SCALE NA

SHEET NUMBER

C002

FILE NAME 10399263-01CS1000.DWG

60% DESIGN



SITE LAYOUT COORDINATE POINTS TABLE

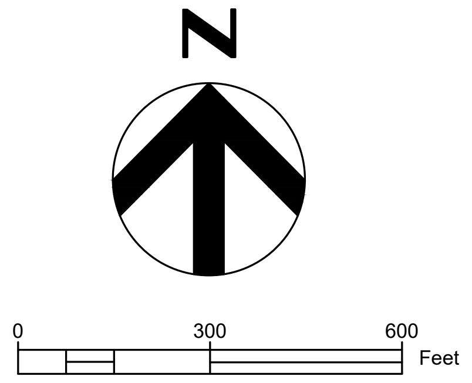
DESCRIPTION	NORTHING	EASTING
GVMW-25	59103.07	47588.15
GVMW-27	59463.76	46930.08
GVMW-28	59808.06	46621.00
GVMW-34	61556.94	44865.71
GVMW-35B	61743.82	44472.70

POINT TABLE

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
8	60589.10	45983.60	9958.20	OSABH-16
9	62429.40	42974.80	10046.90	OSABH-18
10	62409.20	43007.00	10045.40	GVMW 15A-820
11	62441.20	42935.10	10046.90	GVMW 15B-102
17	58202.90	47851.00	9914.00	GVMW 24B-100
18	58184.30	47856.40	9914.50	OSABH-12
22	61793.60	46221.30	9954.20	GVMW 7A-200
23	61803.40	46210.20	9954.00	GVMW 7B-50
25	59483.50	47436.60	9882.20	GVMW 8B-50
26	62185.50	48761.30	10207.10	GVMW 9A-200
27	58169.50	47856.30	9915.80	GVMW 24A-250
28	59490.80	47391.70	9880.70	OSABH-14
29	60622.70	45948.00	9959.70	GVMW 10-270
30	62015.20	43844.90	10021.60	OSABH-17
31	62427.20	42934.90	10047.70	GVMW 15C-1000

POINT TABLE

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
47	59103.07	47588.15	0.00	GVMW-25
61	61132.39	45106.32	0.00	SEEP 2
62	59184.49	46547.82	0.00	SEEP 1
63	59766.07	46238.21	0.00	SEEP 4
64	60818.49	45389.57	0.00	SEEP 3
65	61812.09	43743.94	0.00	SEEP 5



LEGEND

- ● EXISTING WELL
- ◆ PROPOSED WELL
- ● SEEP
- ○ OVERHEAD POWER POLE
- —W— GRASSY VALLEY WATER LINE
- — - — PROPOSED PIPING CENTERLINE
- ▨ EXISTING STORMWATER STRUCTURE
- ■ ELECTRICAL EQUIPMENT
- —— WETLAND BOUNDARY

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ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

SITE OVERVIEW

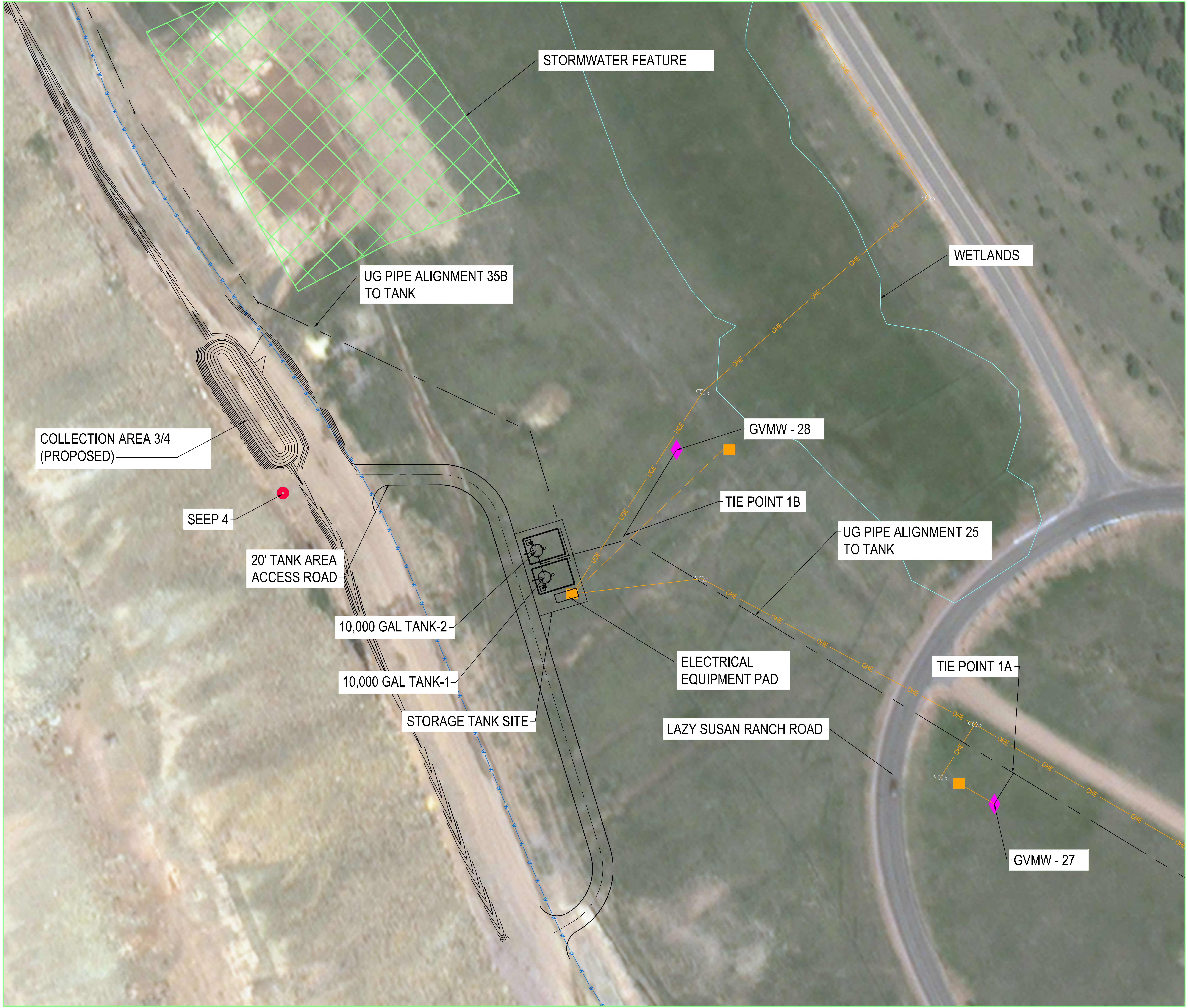
SCALE	1" = 300'

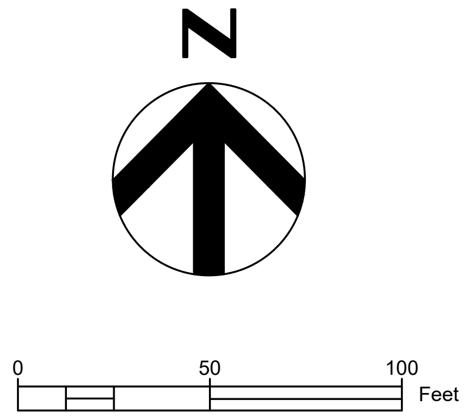
SHEET NUMBER

C100

FILE NAME	10399263-01CS1000.DWG

60% DESIGN





LEGEND

- ● EXISTING WELL
- ◆ PROPOSED WELL
- ● SEEP
- OVERHEAD POWER POLE
- —W— GRASSY VALLEY WATER LINE
- — - — PROPOSED PIPING CENTERLINE
- ▨ EXISTING STORMWATER STRUCTURE
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ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

STORAGE TANK SITE LAYOUT

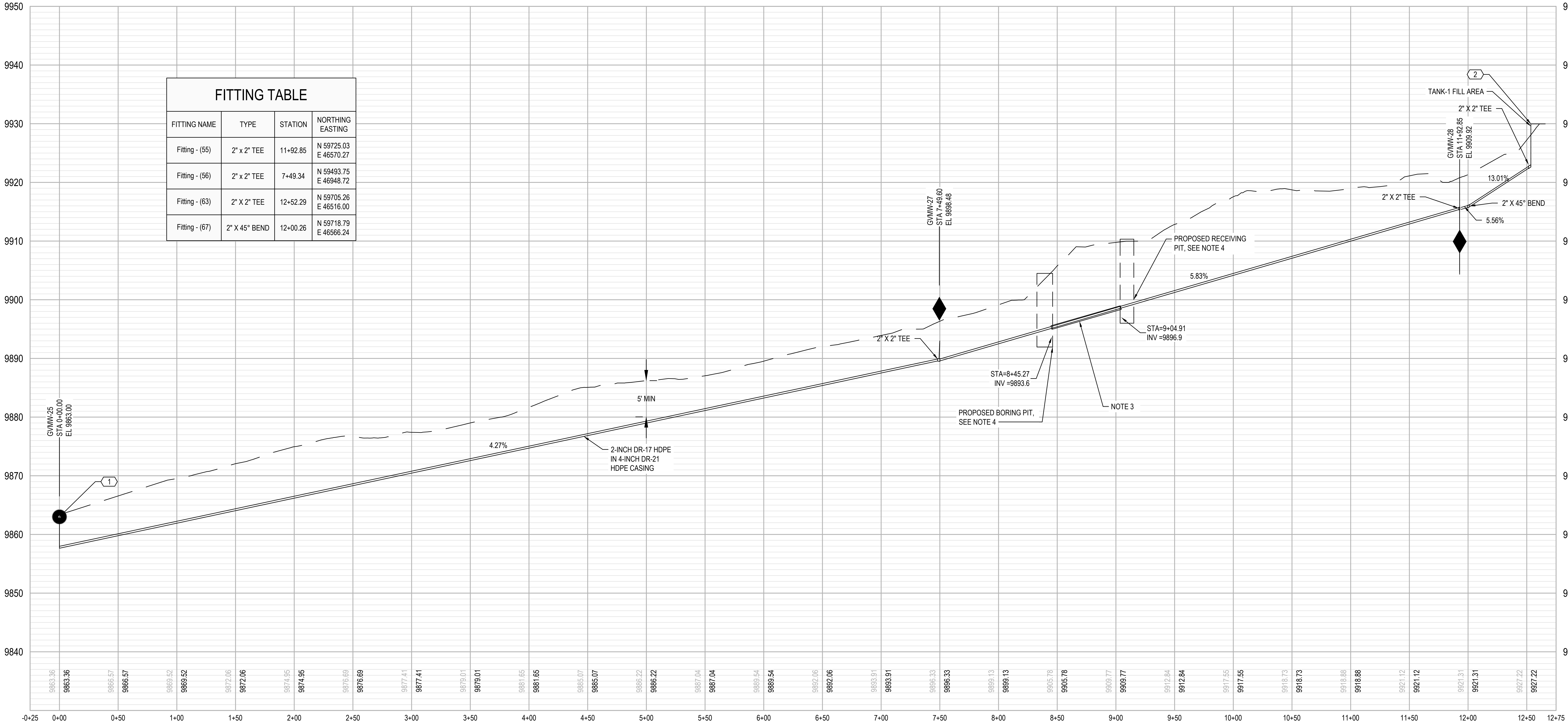
SCALE	1" = 300'

SHEET NUMBER

C101

FILE NAME	10399263-01CS1000.DWG

60% DESIGN



FITTING TABLE

FITTING NAME	TYPE	STATION	NORTHING EASTING
Fitting - (55)	2" x 2" TEE	11+92.85	N 59725.03 E 46570.27
Fitting - (56)	2" x 2" TEE	7+49.34	N 59493.75 E 46948.72
Fitting - (63)	2" X 2" TEE	12+52.29	N 59705.26 E 46516.00
Fitting - (67)	2" X 45° BEND	12+00.26	N 59718.79 E 46566.24

SCALE:
H: 1" = 50'
V: 1" = 10'

1. SEE MECHANICAL DETAIL 1 ON SHEET MY100 FOR TYPICAL WELL PUMP CONSTRUCTION
2. SEE MECHANICAL DETAIL 2 ON SHEET MY100 FOR TYPICAL TRANSITION TO PVC
3. INSTALL 2-INCH HDPE PIPE IN 6 INCH HDPE PIPE CASING
4. INSTALL 5' X 5' JACK AND BORE PITS FOR TRENCHLESS INSTALLATION OF THE NEW PIPE UNDERNEATH LAZY SUSAN RANCH ROAD

PROJECT FOR

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

25 TO TANK-1 STA 0+00 TO 13+70

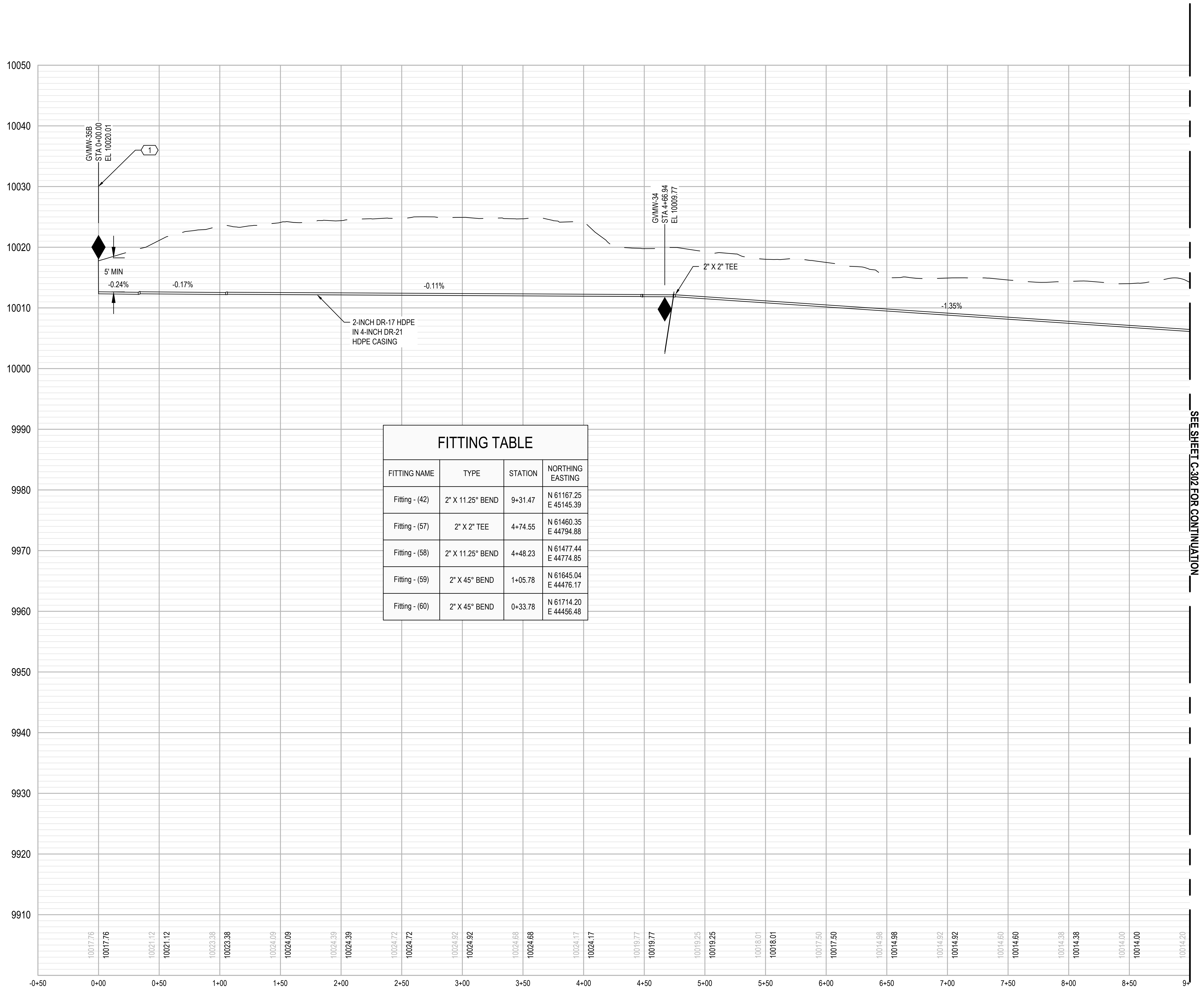
SCALE AS SHOWN

SHEET NUMBER

C300

FILE NAME 10399263-01CS1000.DWG

60% DESIGN



FITTING TABLE

FITTING NAME	TYPE	STATION	NORTHING EASTING
Fitting - (42)	2" X 11.25° BEND	9+31.47	N 61167.25 E 45145.39
Fitting - (57)	2" X 2" TEE	4+74.55	N 61460.35 E 44794.88
Fitting - (58)	2" X 11.25° BEND	4+48.23	N 61477.44 E 44774.85
Fitting - (59)	2" X 45° BEND	1+05.78	N 61645.04 E 44476.17
Fitting - (60)	2" X 45° BEND	0+33.78	N 61714.20 E 44456.48

SCALE:
H: 1" = 50'
V: 1" = 10'

1. SEE MECHANICAL DETAIL 1 ON SHEET MY100 FOR TYPICAL WELL PUMP CONSTRUCTION

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MITIGATION

CRIPPLE CREEK, CO

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MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

35B TO TANK-2 STA 0+00 TO 9+00

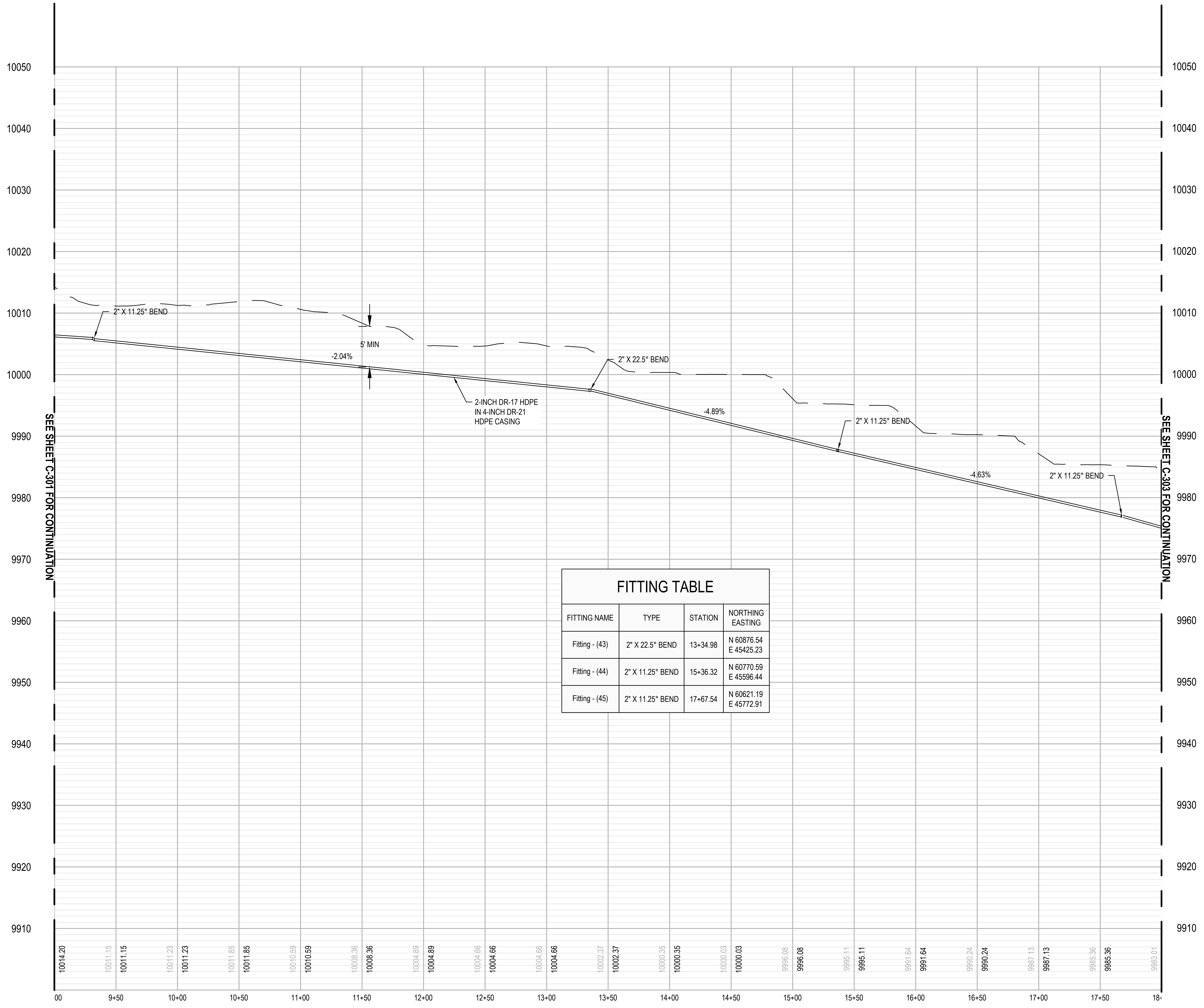
SCALE AS SHOWN

SHEET NUMBER

C301

FILE NAME 10399263-01CS1000.DWG

60% DESIGN



FITTING TABLE

FITTING NAME	TYPE	STATION	NORTHING EASTING
Fitting - (43)	2" X 22.5° BEND	13+34.98	N 60876.54 E 45425.23
Fitting - (44)	2" X 11.25° BEND	15+36.32	N 60770.59 E 45596.44
Fitting - (45)	2" X 11.25° BEND	17+67.54	N 60621.19 E 45772.91

SCALE:
H: 1" = 50'
V: 1" = 10'

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MITIGATION

CRIPPLE CREEK, CO

MARK	DATE	DESCRIPTION
60%	01/06/2025	ISSUED FOR REVIEW

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	J. VAIL
PROJECT DESIGNER	F. SHARIF
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

35B TO TANK-2 STA 9+00 TO 18+00

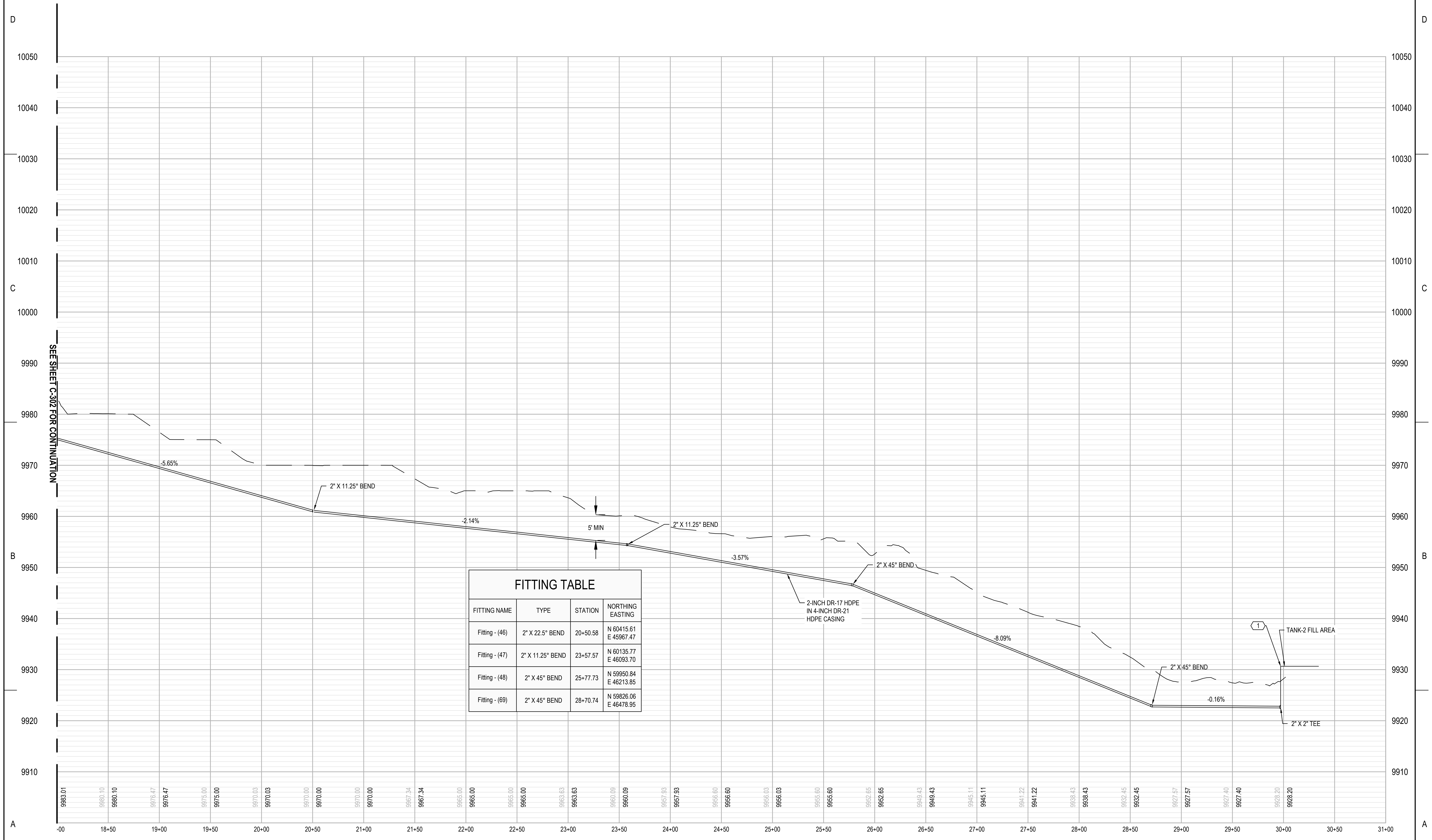
SCALE AS SHOWN

SHEET NUMBER

C302

FILE NAME 10399263-01CS1000.DWG

60% DESIGN



FITTING TABLE

FITTING NAME	TYPE	STATION	NORTHING EASTING
Fitting - (46)	2" X 22.5° BEND	20+50.58	N 60415.61 E 45967.47
Fitting - (47)	2" X 11.25° BEND	23+57.57	N 60135.77 E 46093.70
Fitting - (48)	2" X 45° BEND	25+77.73	N 59950.84 E 46213.85
Fitting - (69)	2" X 45° BEND	28+70.74	N 59826.06 E 46478.95

SCALE:
H: 1" = 50'
V: 1" = 10'

1. SEE MECHANICAL DETAIL 2 ON SHEET MY100 FOR TYPICAL TRANSITION TO PVC

PROJECT FOR

NEWMONT

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ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

35B TO TANK-2 STA 18+00 TO 27+30

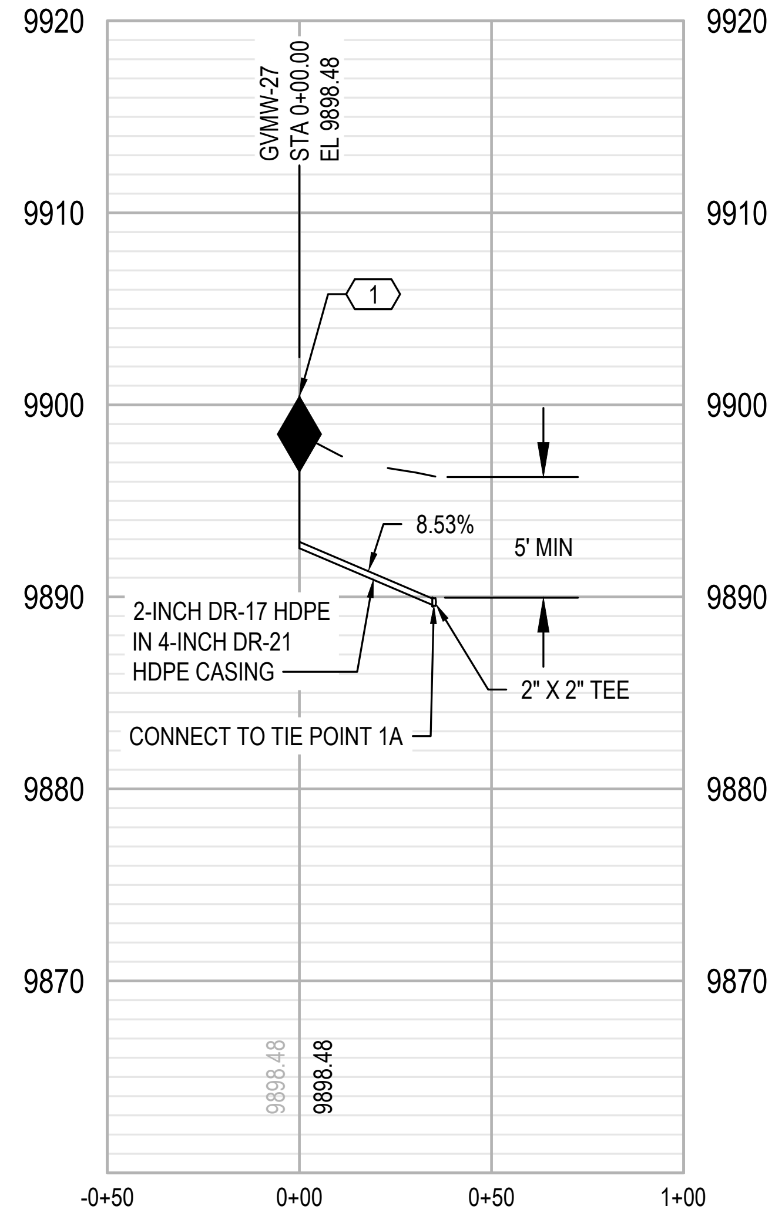
SCALE: AS SHOWN

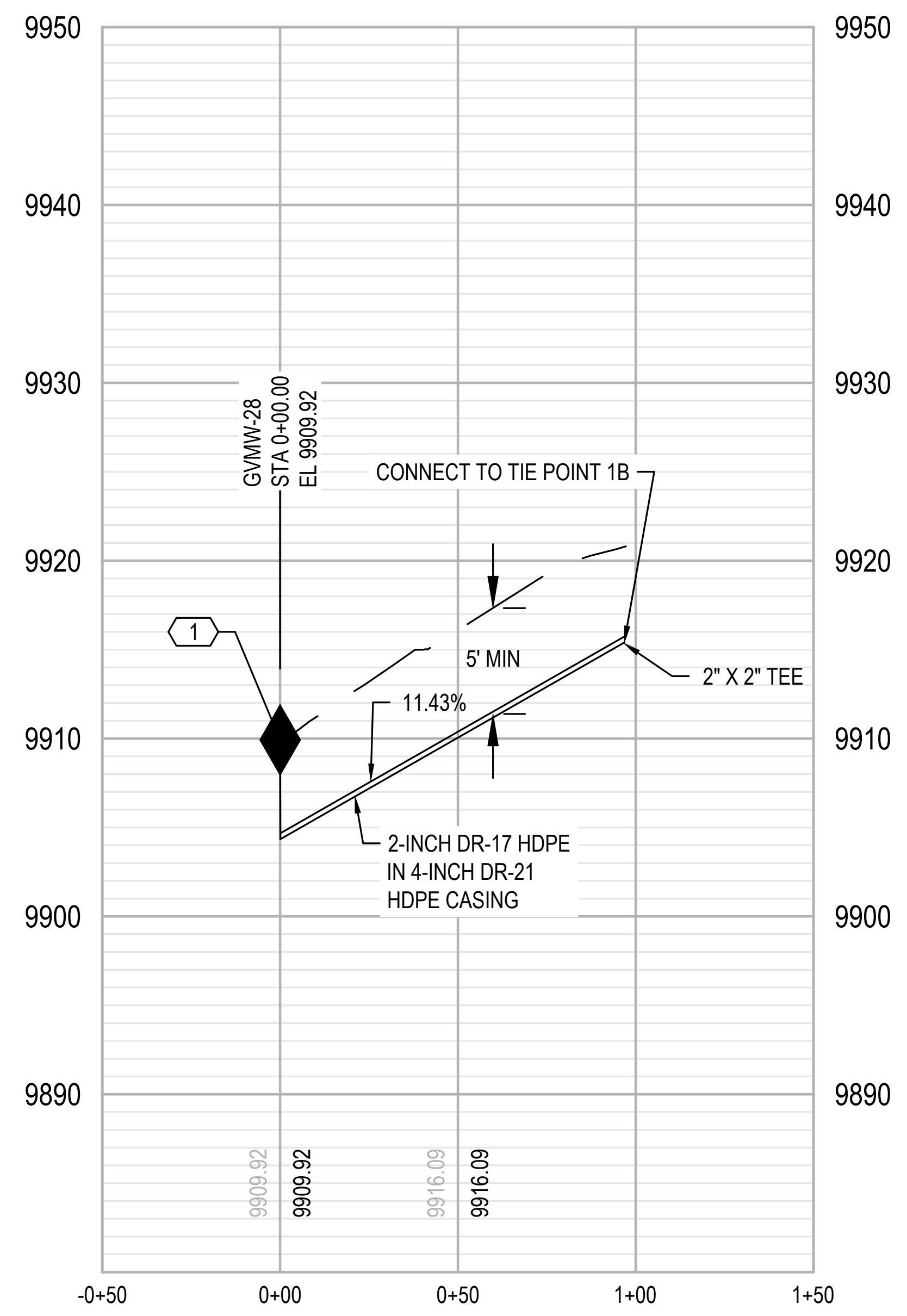
SHEET NUMBER

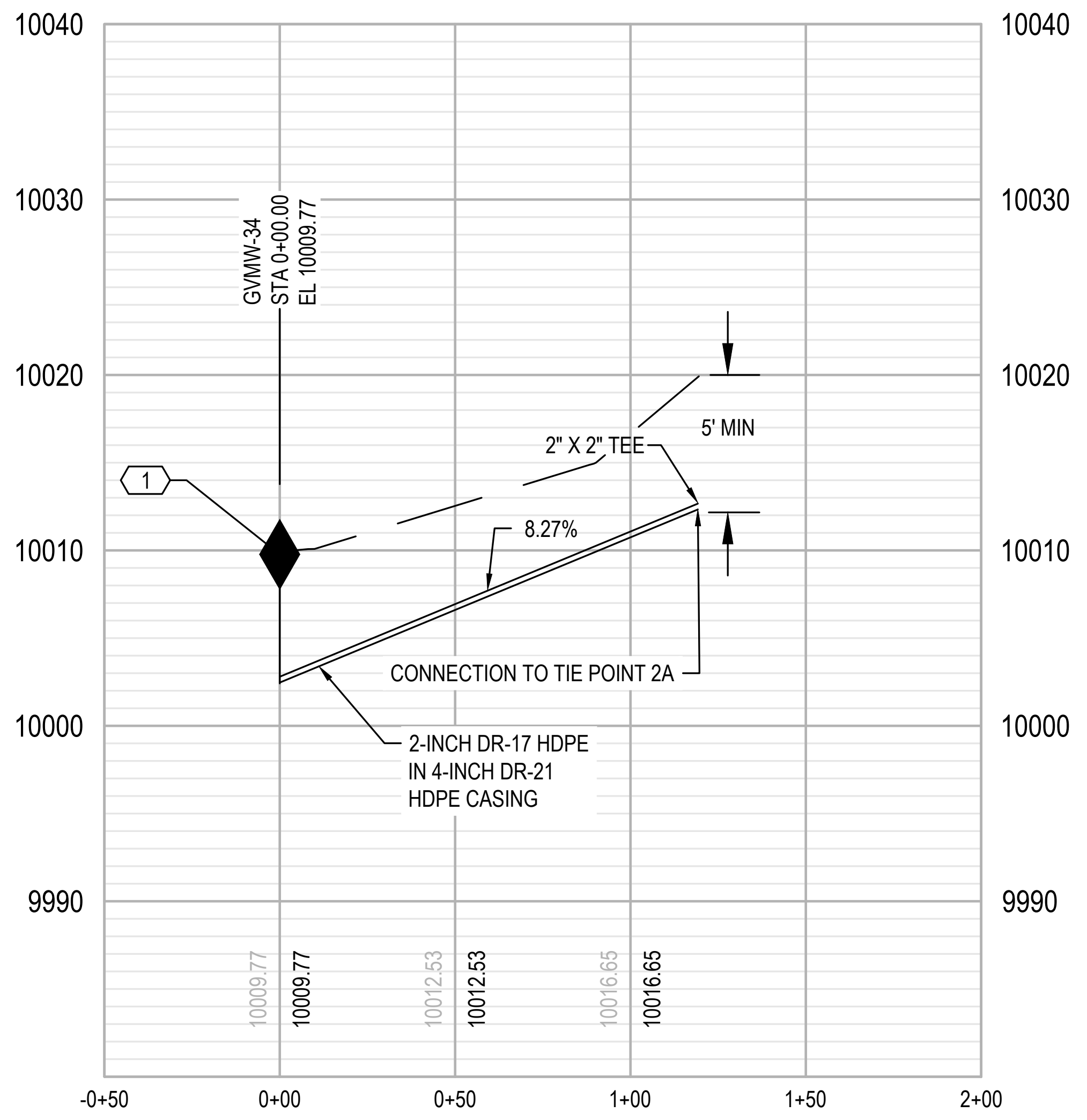
C303

FILE NAME: 10399263-01CS1000.DWG

60% DESIGN







SCALE:
H: 1" = 50'
V: 1" = 10'

1. SEE MECHANICAL DETAIL 1 ON SHEET MY100 FOR TYPICAL WELL PUMP CONSTRUCTION

HDR

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ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

WELL SITES TO MAIN ALIGNMENT TIE POINTS

SCALE AS SHOWN

SHEET NUMBER

C304

FILE NAME 10399263-01CS1000.DWG

60% DESIGN

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

STORAGE TANK SITE PLAN

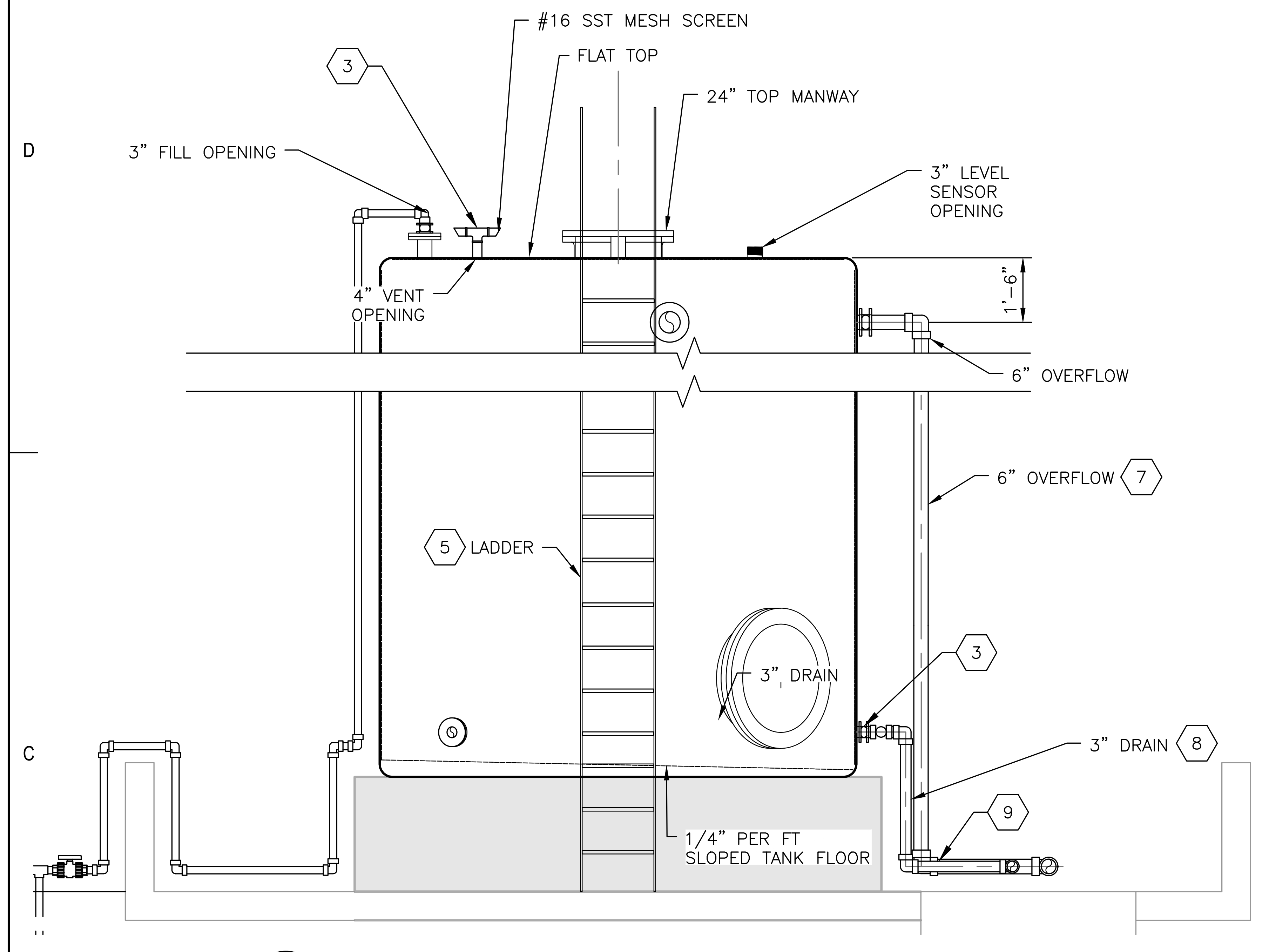
SCALE 1" = 10'

SHEET NUMBER

C401

FILE NAME 10399263-01CS1000.DWG

60% DESIGN



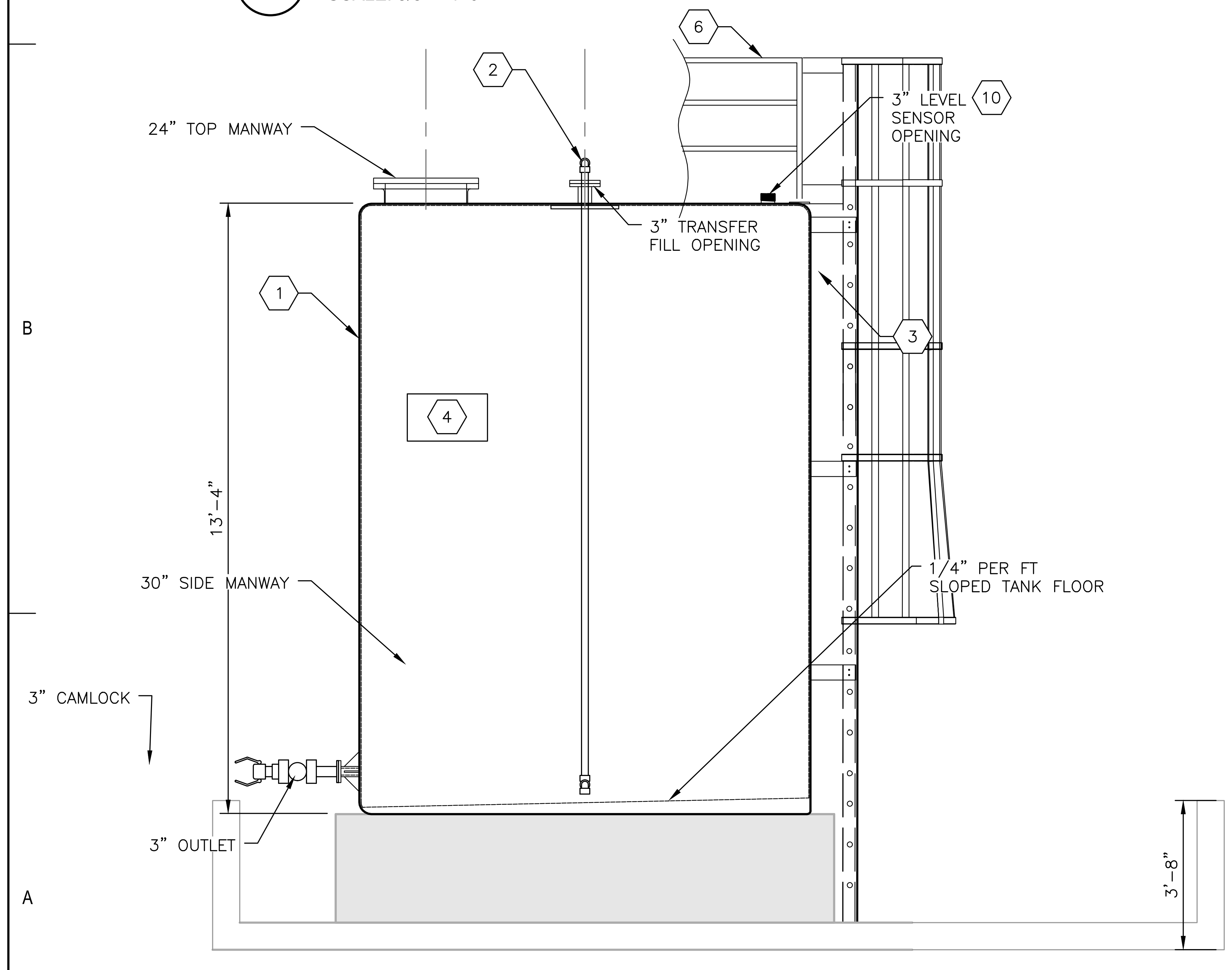
C1 STORAGE TANK SECTION
SCALE: 3/8" = 1'-0"

KEYED NOTES

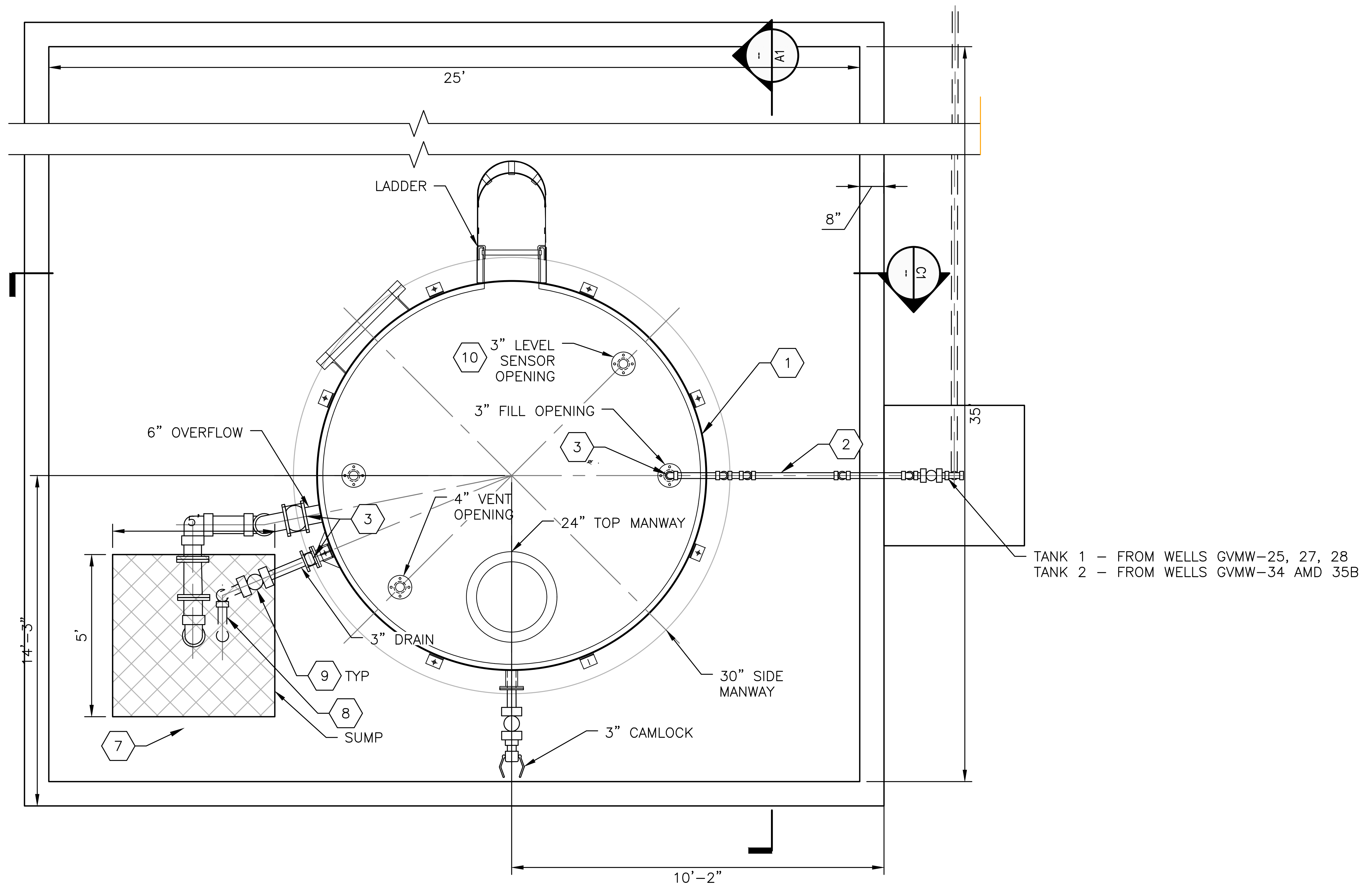
1. INSTALL 10,000 GALLON HDPE STORAGE TANK.
2. 3" TANK FILL LINE.
3. CPVC FLEX COUPLING.
4. ATTACH NAME PLATE TO EXTERIOR SURFACE OF STORAGE TANK.
5. PROVIDE SAF-T-CLIMB FALL PREVENTION SYSTEM BY NORTH CONSUMER PRODUCTS, OR EQUAL, AT LADDER.
6. FULL PERIMETER SAFETY RAILING.
7. 6" SCH 80 CPVC OVERFLOW PIPE.
8. 3" SCH 80 CPVC DRAIN PIPE.
9. 3" CPVC VENTED BALL VALVE.
10. ULTRASOUND LEVEL TRANSMITTER.

GENERAL NOTES

1. TANK ANCHORING SYSTEM SHALL BE PER MANUFACTURER.
2. PIPING, VALVES, AND INSTRUMENTATION ARRANGEMENT IS FOR GENERAL INFORMATION ONLY. CONTRACTOR TO INSTALL ALL PIPING, VALVES, AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS.
3. SEE STRUCTURAL SHEETS FOR TANK FOUNDATION AND CONCRETE CONTAINMENT DETAILS.



A1 STORAGE TANK SECTION
SCALE: 3/8" = 1'-0"



STORAGE TANK PLAN
SCALE: 3/8" = 1'-0"

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

TANK PLAN AND SECTIONS

SCALE AS SHOWN

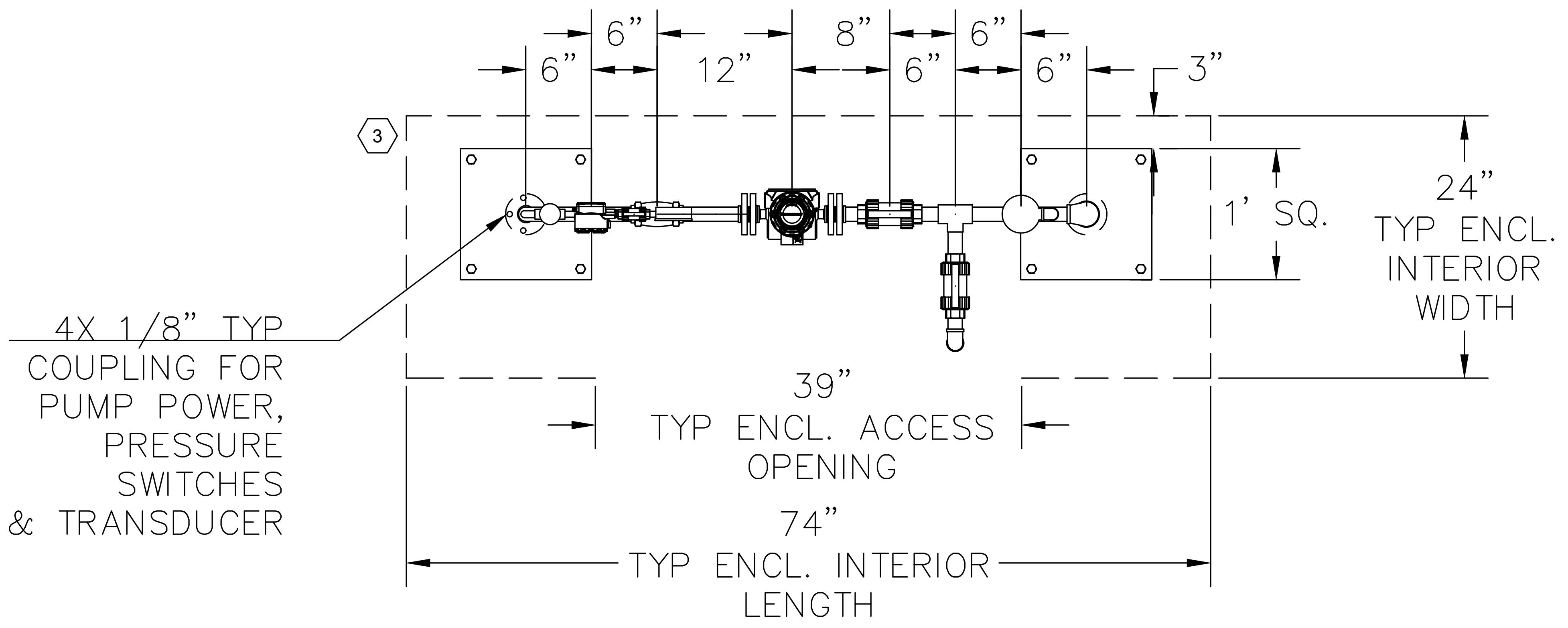
SHEET NUMBER

C500

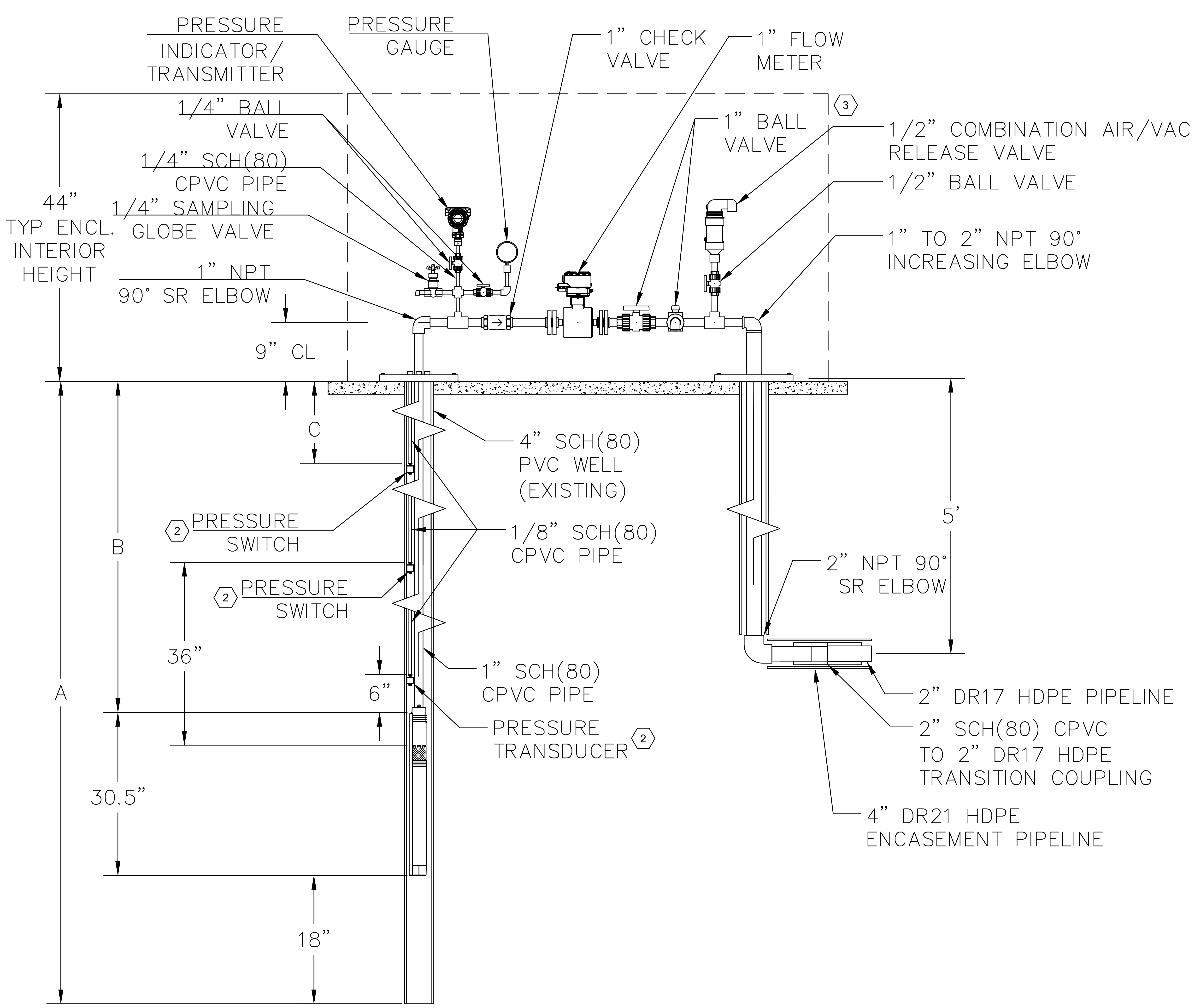
FILE NAME 10399263-01CS1000.DWG

60% DESIGN

WELL SITE PLAN

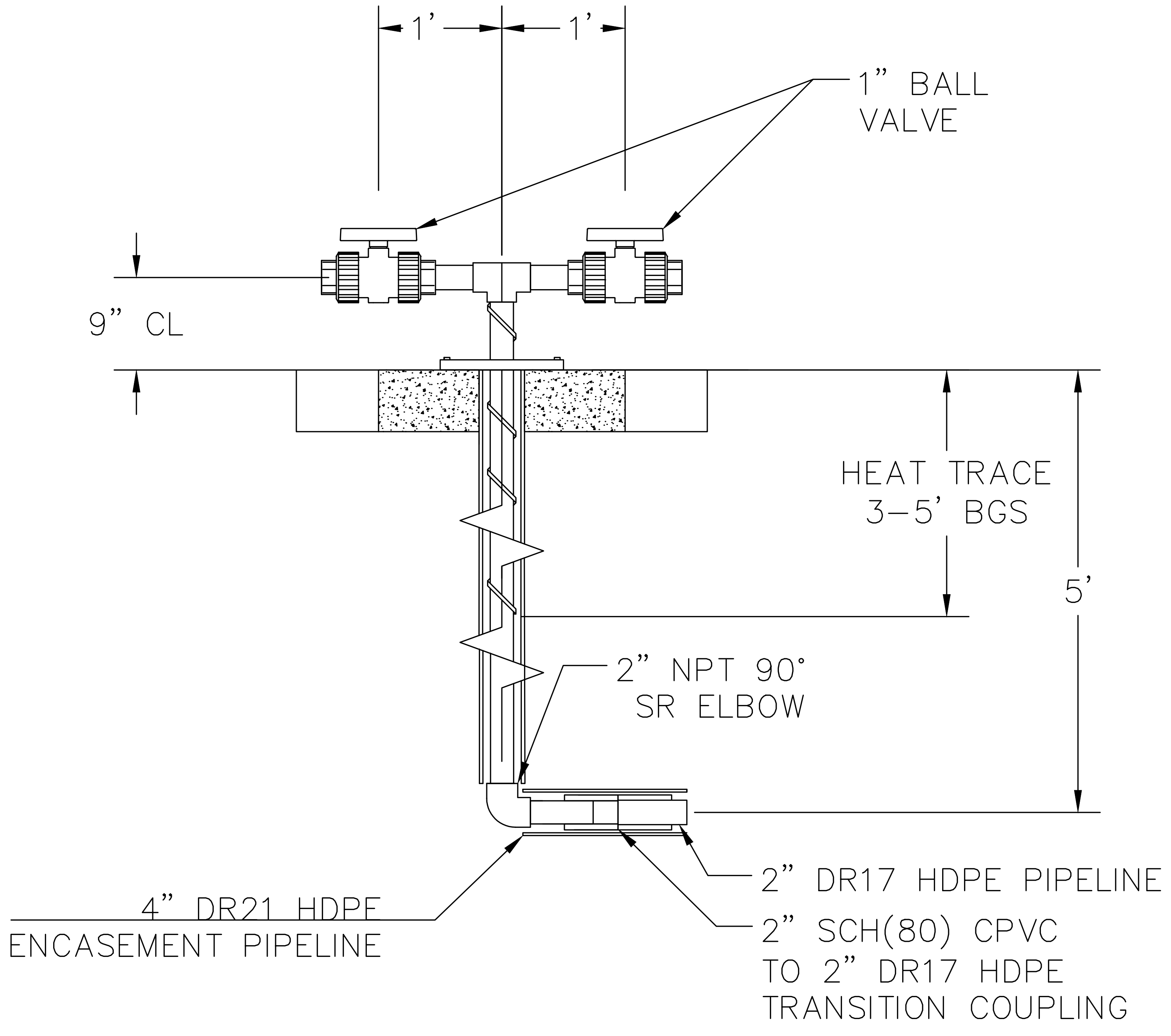


WELL SITE PROFILE



WELL & PUMP DIMENSIONS			
WELL	WELL DEPTH (ft. bgs): A	PUMP COL. LENGTH (ft.): B	STATIC DEPTH (ft. bgs): C
GVMW-25	79.0	75.0	45.5
GVMW-27	71.0	67.0	55.5
GVMW-28	71.5	67.5	36.0
GVMW-34	84.5	80.5	60.0
GVMW-35B	75.0	71.0	32.5

TANK CONNECTION DETAIL



1. ALL WETTED PIPE AND VALVE MATERIALS CONSTRUCTED WITH CPVC
2. SWITCHES AND TRANSDUCERS SHOWN IN 180 DEG POSITION FOR VISIBILITY.
3. FURNISH AND INSTALL COATED GALVANIZED STEEL EQUIPMENT ENCLOSURE WITH SPACE HEATER. 6' X 2' X 3' MINIMUM. VERIFY EQUIPMENT SIZE AND CLEARANCE PRIOR TO ORDERING ENCLOSURE. ANCHOR PER MANUFACTURER. CONTRACTOR TO COORDINATE.

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ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

MECHANICAL DETAILS

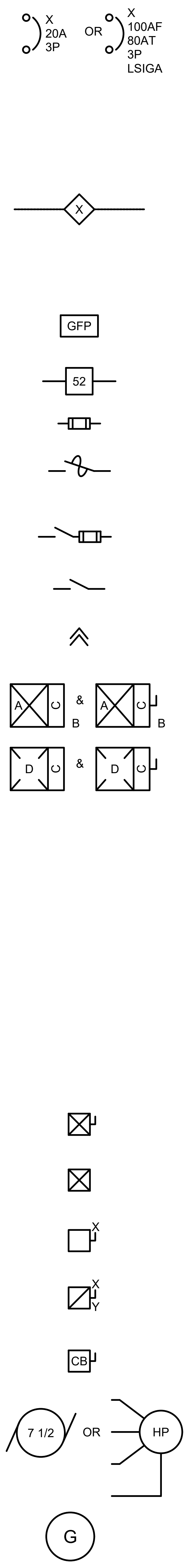
SCALE NA

SHEET NUMBER **M100**

FILE NAME 10399263-06M000.DWG

60% DESIGN

ONE LINE, POWER AND LIGHTING SYMBOLOGY



LOW VOLTAGE CIRCUIT BREAKER (CB). RATING AND NO. OF POLES AS SHOWN. WHEN SPECIFIC TYPE, OTHER THAN MCCB, IS REQUIRED, X INDICATES TYPE.

TYPES:
MCCB - MOLDED CASE
ICCB - INSULATED CASE
LVP - LOW VOLTAGE POWER
MCP - MOTOR CIRCUIT PROTECTOR (RATING PER CONNECTED LOAD)

TRIP UNIT:
L - LONG TIME PICKUP
S - SHORT TIME PICKUP
I - INSTANTANEOUS PICKUP
G - GROUND FAULT PICKUP
A - ARC FLASH MAINTENANCE

INTERLOCK; X INDICATES TYPE

TYPES:
E - ELECTRICAL
M - MECHANICAL
K - KEY

GROUND FAULT PROTECTION

MEDIUM VOLTAGE CIRCUIT BREAKER

FUSE, RATING, AND NUMBER OF FUSES AS NOTED

FUSED CUTOUT, CURRENT RATING, FUSE RATING, AND QUANTITY AS NOTED

FUSIBLE SWITCH, CURRENT RATING, FUSE RATING, AND QUANTITY AS NOTED (3 POLE UON)

NON-FUSED SWITCH, CURRENT RATING, AND NUMBER OF POLES AS NOTED (3 POLE UON)

DISCONNECT OR DRAWOUT CONNECTION

MAGNETIC MOTOR STARTER AND SEPARATELY MOUNTED COMBINATION MAGNETIC MOTOR STARTER

MOTOR/LOAD CONTROLLER AND SEPARATELY MOUNTED MOTOR/LOAD CONTROLLER WITH SHORT CIRCUIT PROTECTION AND DISCONNECT

MOTOR STARTER AND CONTROLLER SUBSCRIPTS:

A - MAGNETIC STARTER NEMA SIZE

B - STARTER TYPE
- NONE - FULL VOLTAGE NON-REVERSING (FVNR)
- FVR - FULL VOLTAGE REVERSING
- 2S - TWO SPEED
- RVAT - REDUCED VOLTAGE AUTO TRANSFORMER

C - CONTROL DIAGRAM OR CONTROLS SCHEDULE NUMBER (IF REQUIRED)

D - CONTROLLER TYPE
- VFD - VARIABLE FREQUENCY DRIVE
- SS - SOLID STATE
- CONT - CONTACTOR

SEPARATELY MOUNTED COMBINATION MOTOR STARTER OR CONTROLLER; SEE ELECTRICAL ONE - LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION

SEPERATELY MOUNTED MOTOR STARTER OR CONTROLLER; SEE ELECTRICAL ONE-LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION.

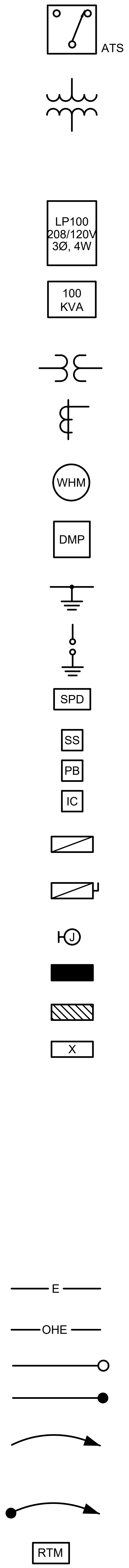
NON-FUSED SAFETY SWITCH, 30A, 3P, X INDICATES AMP RATING GREATER THAN 30A

SAFETY SWITCH, 3P, X INDICATES AMP RATING GREATER THAN 30A, Y INDICATES FUSE SIZE

SEPARATELY MOUNTED CIRCUIT BREAKER; SEE ELECTRICAL ONE - LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION

MOTOR WITH DESIGN HORSEPOWER (WHEN INDICATED)

GENERATOR



TRANSFER SWITCH, CURRENT RATING, AND NUMBER OF POLES AS NOTED

ATS - AUTOMATIC
MTS - MANUAL

TRANSFORMER

△ 3-PHASE, 3-WIRE DELTA CONNECTION
3-PHASE, 4-WIRE GROUNDED WYE CONNECTION

SWITCHBOARD OR PANELBOARD; NAME, VOLTAGE, PHASE, NUMBER OF WIRES WHEN INDICATED

NON-MOTOR LOAD WITH DESIGN KVA, KW, OR AMP

VOLTAGE TRANSFORMER (VT, PT, OR CPT)

CURRENT TRANSFORMER (CT)

UTILITY WATT-HOUR METER PER UTILITY REQUIREMENTS

DIGITAL METERING PACKAGE

GROUND

LIGHTNING ARRESTER

LOW VOLTAGE SURGE PROTECTIVE DEVICE

SELECTOR SWITCH

PUSHBUTTON

INSTRUMENTATION/CONTROL DEVICE

CONTROL PANEL INTEGRAL OR PROVIDED WITH ASSOCIATED EQUIPMENT

CONTROL PANEL WITH DISCONNECT SWITCH INTEGRAL OR PROVIDED WITH ASSOCIATED EQUIPMENT

JUNCTION OR PULL BOX

PANELBOARD (250V TO 600V)

PANELBOARD (LESS THAN 250V)

ELECTRICAL EQUIPMENT ENCLOSURE: SWITCHBOARD, MOTOR CONTROL CENTER, CONTROL PANEL, TRANSFORMER OR OTHER EQUIPMENT AS INDICATED. ESTIMATED SIZE AS INDICATED. WHEN USED X INDICATES EQUIPMENT TYPE.

EQUIPMENT TYPES:
- ATS - AUTOMATIC TRANSFER SWITCH
- CP - CONTROL PANEL
- MTS - MANUAL TRANSFER SWITCH
- MCC - MOTOR CONTROL CENTER
- UPS - UNINTERUPTABLE POWER SUPPLY
- VFD - VARIABLE FREQUENCY DRIVE
- SB - SWITCHBOARD
- SG - SWITCHGEAR
- T - TRANSFORMER

UNDERGROUND (UNO) ELECTRICAL AND COMMUNICATION SYSTEMS PATHWAY

OVERHEAD ELECTRICAL AND COMMUNICATION SYSTEMS PATHWAY

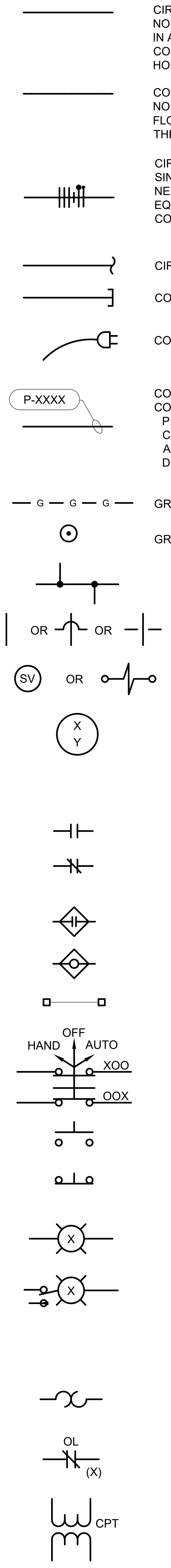
CONDUIT TURNING UP

CONDUIT TURNING DOWN

HOMERUN TO PANEL
SINGLE PHASE: 2#12, 1#12G IN 3/4"C
THREE PHASE: 3#12, 1#12G IN 3/4"C
UNLESS OTHERWISE NOTED, CONDUCTOR SIZE IS FOR ENTIRE CIRCUIT

CONDUIT CONNECTION TO EQUIPMENT

RUN TIME METER



CIRCUIT RUN BETWEEN DEVICES EXPOSED IN NON-ARCHITECTURALLY FINISHED AREAS; CONCEALED IN ARCHITECTURALLY FINISHED AREAS. CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE CIRCUIT.

CONDUIT RUN BETWEEN DEVICES CONCEALED IN NON-ARCHITECTURALLY FINISHED AREAS OR UNDER FLOOR SLAB. CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE CIRCUIT.

CIRCUIT HASH MARKS (WHEN INDICATED); LONG, SHORT, SINGLE DOT, AND DOUBLE DOT REPRESENT PHASE, NEUTRAL, EQUIPMENT GROUND, AND ISOLATED EQUIPMENT GROUND, RESPECTIVELY. #12 IN 3/4" CONDUIT UNLESS OTHERWISE INDICATED.

CIRCUIT CONTINUATION

CONDUIT STUBBED OUT AND CAPPED

CORD AND PLUG CONNECTION

CONDUIT TAG OR CIRCUIT NUMBER - WIRE AND CONDUIT SIZE AS SPECIFIED IN CONDUIT SCHEDULE
P: POWER
C: CONTROL
A: ANALOG
D: DATA

GROUND CABLE

GROUND ROD

ELECTRICAL CONNECTION

NO ELECTRICAL CONNECTION

SOLENOID VALVE

CONTROL/RELAY COIL:
X-INDICATES TYPE
Y-INDICATES LOOP NUMBER ,WHEN USED

TYPES:

CR-CONTROL RELAY	TC-TIME CLOCK
PC-PHOTOCELL	LC-LIGHTING CONTACTOR
DP-DEFINITE PURPOSE	TR-TIMING RELAY
M-MOTOR STARTER	

NORMALLY OPEN CONTACT (N.O.)

NORMALLY CLOSED CONTACT (N.C.)

MICROPROCESSOR (PLC ,RTU ,ETC .)OUTPUT

MICROPROCESSOR (PLC ,RTU ,ETC .)INPUT

FIELD WIRING EXTERNAL TO CONTROL PANEL

3POSITION SELECTOR SWITCH ,MAINTAINED CONTACTS ;UNLESS OTHERWISE NOTED-2 ,POSITION SIMILAR

NORMALLY OPEN PUSHBUTTON ,MOMENTARY CONTACT UNLESS OTHERWISE NOTED

NORMALLY CLOSED PUSHBUTTON ,MOMENTARY CONTACT UNLESS OTHERWISE NOTED

INDICATING LIGHT :X INDICATES LENS COLOR

PUSH TO TEST INDICATING LIGHT :X INDICATES LENS COLOR

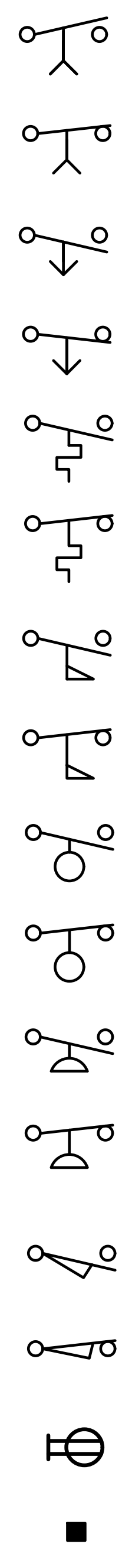
LENS COLORS:

R -RED	Y -YELLOW
G -GREEN	W -WHITE
B -BLUE	A -AMBER

THERMAL OVERLOAD ELEMENT

THERMAL OVERLOAD RELAY CONTACT . WHEN SHOWN X INDICATES QUANTITY.

CONTROL POWER TRANSFORMER (CPT)



NORMALLY OPEN TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS ENERGIZED

NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON OPENING AFTER COIL IS ENERGIZED

NORMALLY OPEN TIME DELAY RELAY CONTACT WITH TIME DELAY ON OPENING AFTER COIL IS DE-ENERGIZED

NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS DE-ENERGIZED

NORMALLY OPEN TEMPERATURE SWITCH ; CLOSE ON RISING TEMPERATURE

NORMALLY CLOSED TEMPERATURE SWITCH ; OPEN ON RISING TEMPERATURE

NORMALLY OPEN FLOW SWITCH ; CLOSE ON INCREASING FLOW

NORMALLY CLOSED FLOW SWITCH ; OPEN ON INCREASING FLOW

NORMALLY OPEN LEVEL SWITCH , CLOSE ON RISING LEVEL

NORMALLY CLOSED LEVEL SWITCH , OPEN ON RISING LEVEL

NORMALLY OPEN PRESSURE SWITCH , CLOSE ON INCREASING PRESSURE

NORMALLY CLOSED PRESSURE SWITCH , OPEN ON INCREASING PRESSURE

NORMALLY OPEN LIMIT SWITCH , CLOSE ON REACHING LIMIT

NORMALLY CLOSED LIMIT SWITCH , OPEN ON REACHING LIMIT

DUPLEX RECEPTACLE ,NEMA 5-20R OR AS NOTED

GROUND CONNECTION , BOLTED

GENERAL NOTES:

1. THIS IS A STANDARD ELECTRICAL SYMBOLOGY SHEET. NOT ALL SYMBOLS MAY BE USED ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.
3. SEE P&ID LEGEND SHEET FOR PROJECT-SPECIFIC EQUIPMENT SYMBOLS, EQUIPMENT ABBREVIATIONS, AND PIPING SYSTEM ABBREVIATIONS.

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

ELECTRICAL SYMBOLS AND ABBREVIATIONS

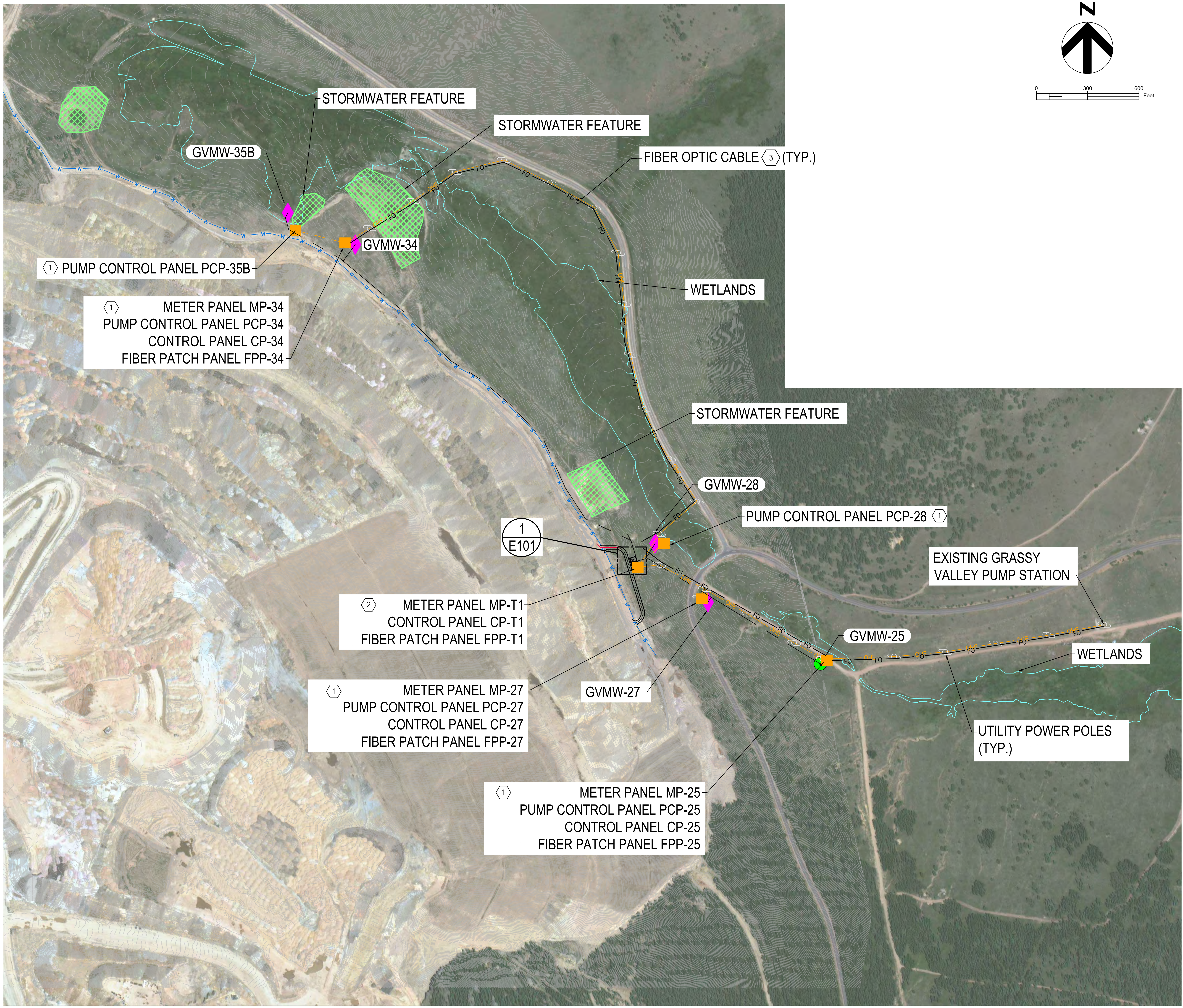
SCALE NO SCALE

SHEET NUMBER

E001

FILE NAME 10399263-01E001.DWG

60% DESIGN



GENERAL NOTES

1. COORDINATE NEW SERVICE WITH BLACK HILLS ENERGY FOR SERVICE DROP LOCATIONS, CONDUITS ROUTING AND ALL REQUIREMENTS PRIOR TO START OF ANY WORK.

   TROY BEDFORD
   UTILITY CONSTRUCTION PROJECT PLANNER
   BLACK HILLS ENERGY
   719–289–8253
   TROY.BEDFORD@BLACKHILLSCORP.COM

2. UTILITY POWER POLES LOCATION AND OVERHEAD LINES SHOWN IS DIAGRAMMATIC ONLY. FIELD CONFIRM, COORDINATE AND ADJUST EQUIPMENT LOCATION TO AVOID INTERFERENCES.

KEYNOTES

1. REFER TO SHEET E602 FOR WELL SITE AND TANK SITE ELECTRICAL EQUIPMENT LAYOUT AND DETAIL.
2. THE METER PANEL MP–T1 IS POWERING WELL SITE GVMW–28, TANK T1 AND TANK T2. REFER TO SHEET E601 FOR MORE DETAILS.
3. FIBER OPTIC CABLE SHALL BE INSTALLED ON THE UTILITY POWER POLE AND ALONG THE UTILITY POWER LINES. COORDINATE WITH BLACK HILL ENERGY FOR INSTALLATION REQUIREMENT PRIOR TO ANY WORK.

LEGEND

- ● EXISTING WELL
- ◆ PROPOSED WELL
- –OHE– OVERHEAD POWER LINE
- OVERHEAD POWER POLE
- –W– GRASSY VALLEY WATER LINE
- PROPOSED PIPING CENTERLINE
- ▨ STORMWATER STRUCTURE
- ■ ELECTRICAL EQUIPMENT
- WETLAND BOUNDARY
- –FO– FIBER OPTIC CABLE

HDR

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

ELECTRICAL OVERALL SITE PLAN

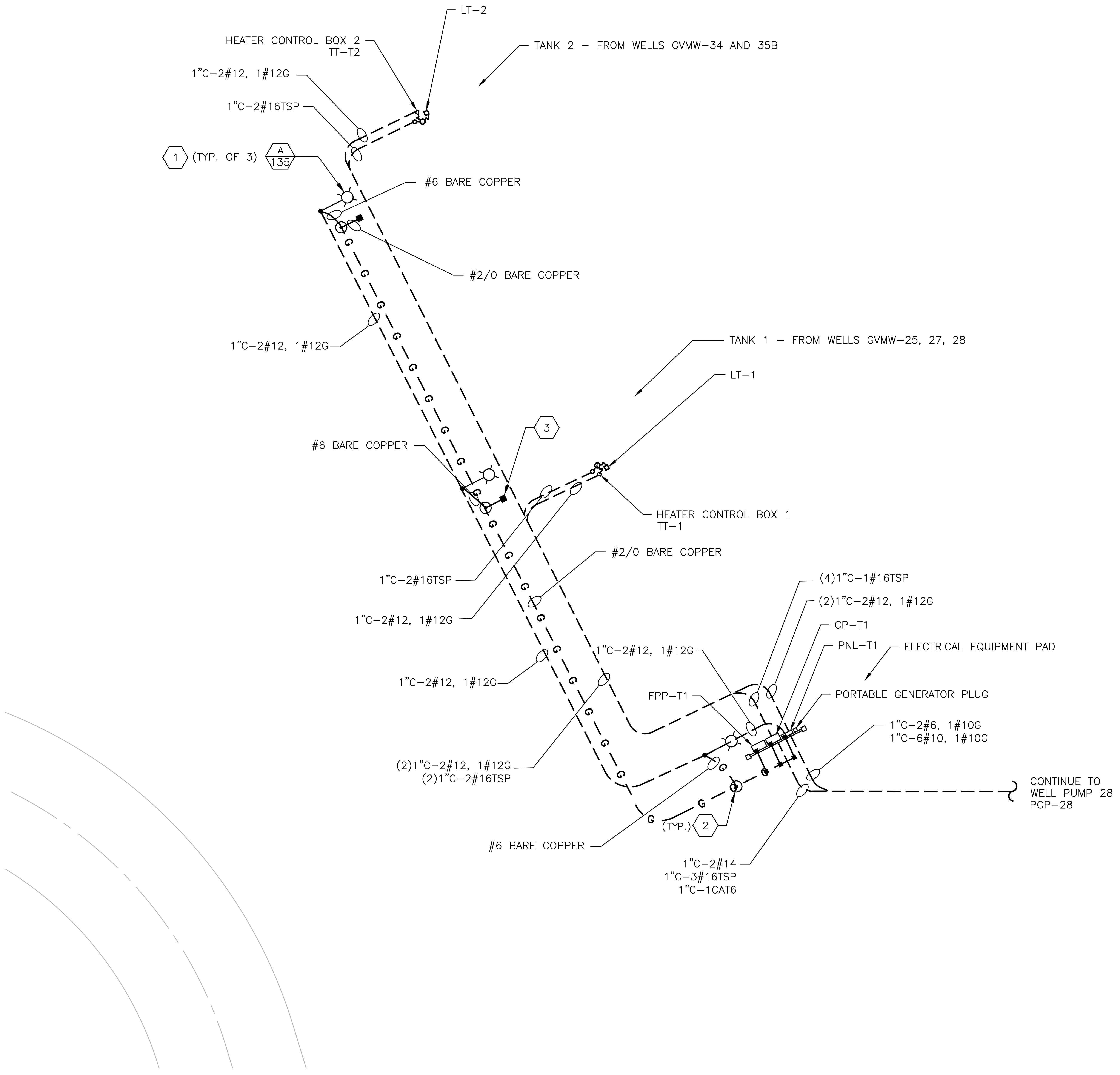
SCALE	1" = 300'

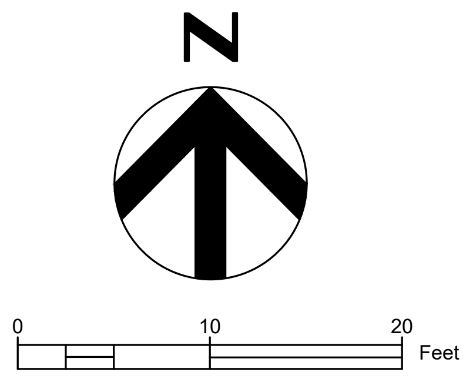
SHEET NUMBER

E100

FILE NAME	10399263-01E100.DWG

60% DESIGN





GENERAL NOTES

1. REFER TO CIVIL DRAWINGS FOR PROCESS PIPING AND CONCRETE PAD DETAIL.
2. REFER TO SHEET E501 FOR ELECTRICAL DETAILS.
3. CONDUIT ROUTING IS DIAGRAMMATIC ONLY. FIELD CONFIRM, COORDINATE AND ADJUST ROUTING AND GRADING TO AVOID INTERFERENCES.
4. CONDUITS SHALL BE DIRECTLY BURIED. SEE DETAIL SHEET FOR MORE INFORMATION.
5. MAINTAIN A MINIMUM OF 12 INCH SEPARATION BETWEEN ELECTRICAL CONDUITS AND NEW WATER PIPELINE.

KEYNOTES

1. REFER TO SHEET E501 DETAIL 1 FOR LIGHT POLE DETAIL.
2. REFER TO SHEET E501 DETAIL 2 FOR GROUND ROD DETAIL.
3. ROUTE #2/0 BARE COPPER AND BOND TO CONCRETE PAD STRUCTURAL REBAR.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEP MANAGMENT

CRIPPLE CREEK, CO

REV A	05/24/2024	ISSUED FOR REVIEW
MARK	DATE	DESCRIPTION

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	E. GRIMM
PROJECT DESIGNER	
PROJECT ARCHITECT	
LANDSCAPE ARCHITECT	
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	
INTERIOR DESIGNER	
EQUIPMENT PLANNER	
WAYFINDING	
DRAWN BY	I. MILLER

SHEET NAME

ELECTRICAL TANK SITE PLAN

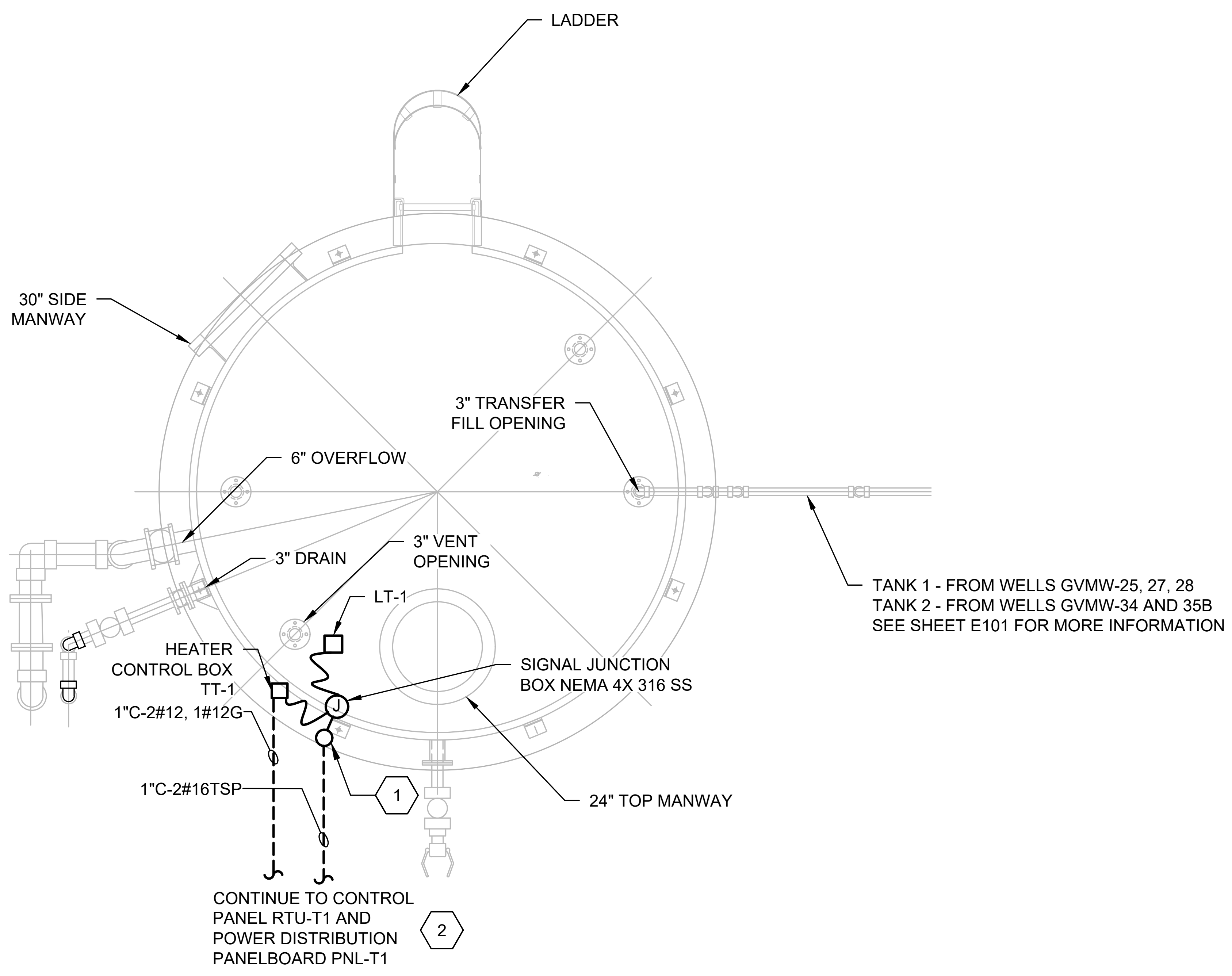
SCALE	1"=10'

SHEET NUMBER

E101

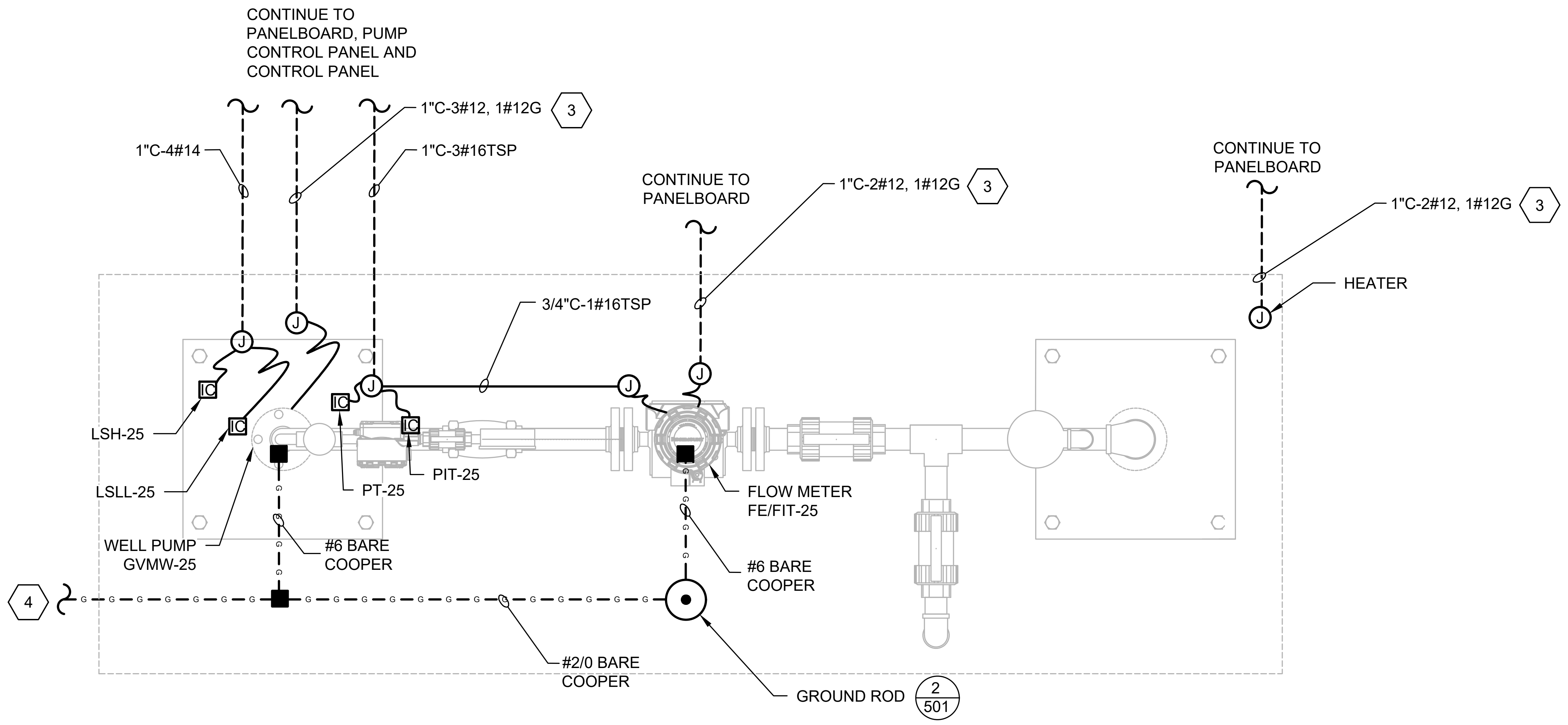
FILE NAME	10399263-01E101.DWG

FOR REVIEW



TYPICAL STORAGE TANK ELECTRICAL PLAN

SCALE: 3/8"=1'=0"
TYPICAL FOR TANK T2



TYPICAL WELL ELECTRICAL PLAN

NOT TO SCALE
TYPICAL FOR WELL GVMW-27, GVMW-28, GVMW-34, GVMW-35B

GENERAL NOTES

1. REFER TO CIVIL DRAWINGS FOR PROCESS PIPING AND CONCRETE PAD DETAIL.
2. REFER TO SHEET E501 FOR ELECTRICAL DETAILS.
3. CONDUIT ROUTING IS DIAGRAMMATIC ONLY. FIELD CONFIRM, COORDINATE AND ADJUST ROUTING AND GRADING TO AVOID INTERFERENCES.
4. CONDUITS SHALL BE DIRECTLY BURIED. SEE DETAIL SHEET FOR MORE INFORMATION.
5. MAINTAIN A MINIMUM OF 12 INCH SEPARATION BETWEEN ELECTRICAL CONDUITS AND NEW WATER PIPELINE.

KEYNOTES

1. CONDUIT SHALL STUB UP FROM UNDERGROUND AND RUN EXPOSED VERTICALLY ALONG THE TANK TO JUNCTION BOX.
2. INSTRUMENT FOR TANK T1 AND T2 TO BE CONNECTED TO RTU-T1, AND THE POWER DISTRIBUTION PANEL PNL-T1 TO FEED BOTH TANKS.
3. CONDUIT SIZE AND CONDUCTOR SIZE VARIES BY LOCATION, REFER TO SINGLE LINE DIAGRAM FOR DETAIL.
4. CONTINUE TO THE GROUNDING SYSTEM WITH #2/0 BARE COPPER.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MITIGATION

CRIPPLE CREEK, CO

MARK	DATE	DESCRIPTION
60%	01/06/2025	ISSUED FOR REVIEW

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	J. VAIL
PROJECT DESIGNER	F. SHARIF
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

TYPICAL WELL AND TANK ELECTRICAL PLAN

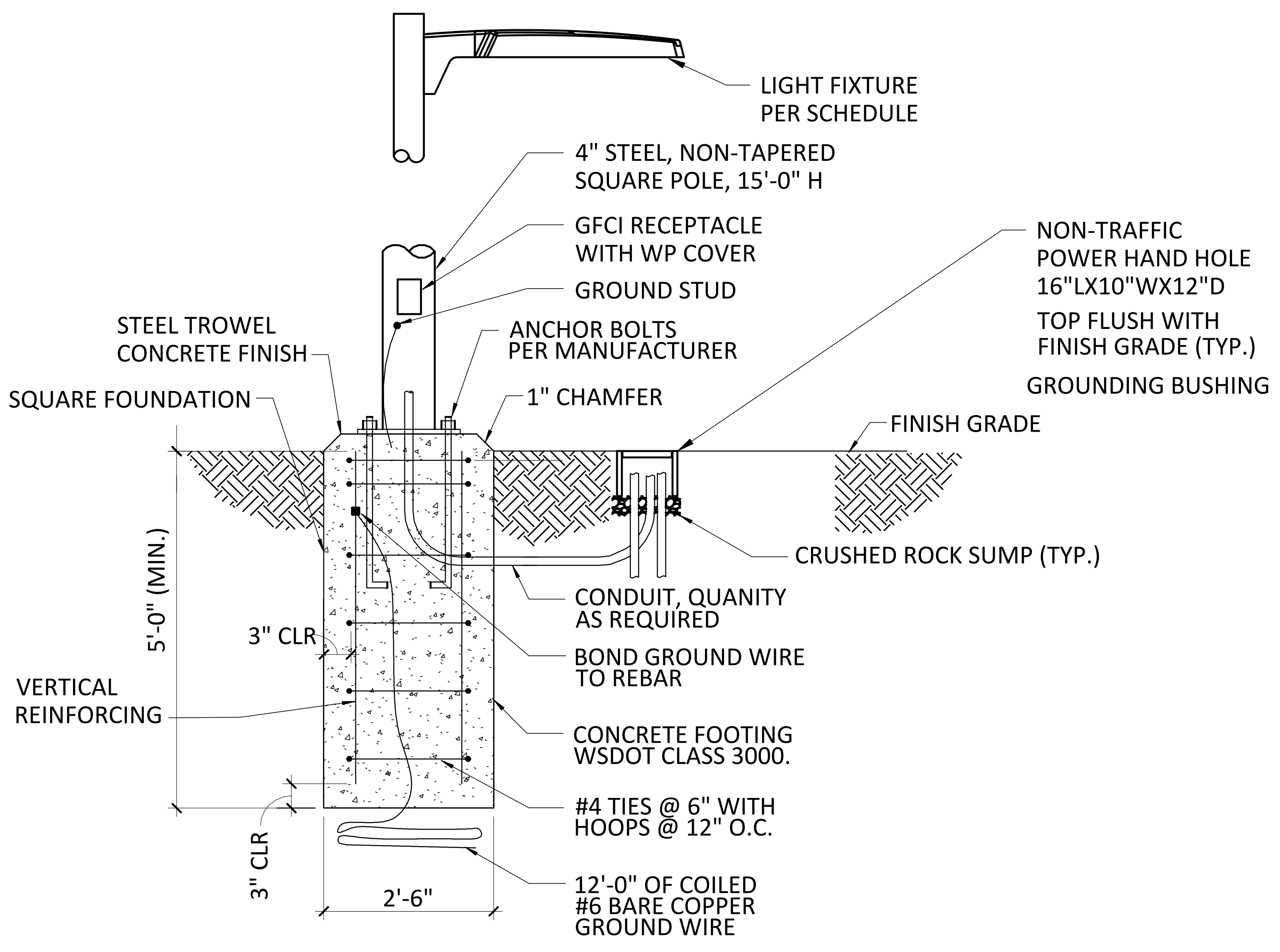
SCALE	NOT TO SCALE

SHEET NUMBER

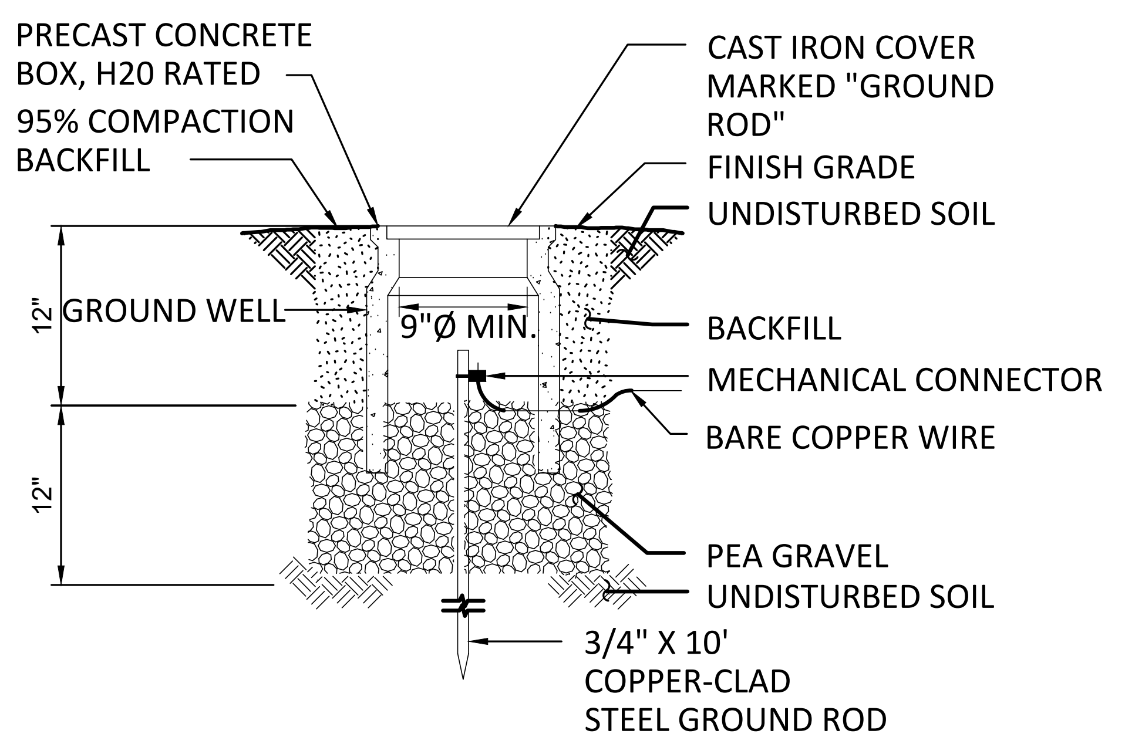
E102

FILE NAME	10399263-01E102.DWG

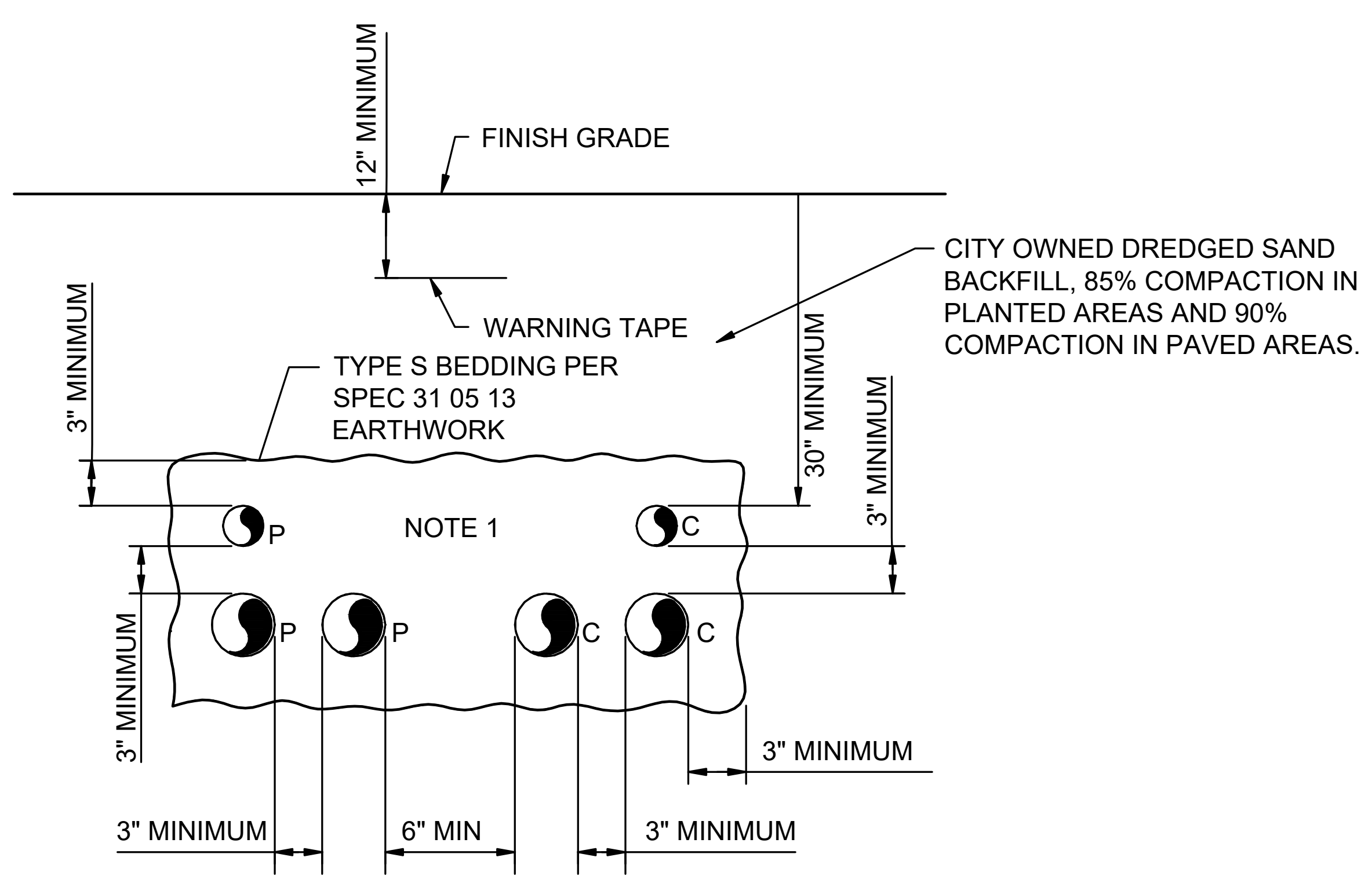
60% DESIGN



1 - LIGHT POLE FOUNDATION DETAIL
NTS



2 - GROUND ROD
NTS



NOTES:

1. NUMBER OF CONDUITS AS REQUIRED FOR THE APPLICATION.
2. P SUBSCRIPT ELECTRICAL POWER CONDUIT.
3. C SUBSCRIPT COMMUNICATION (CONTROL, DATA, INSTRUMENTATION) CONDUIT.

3 - DIRECT BURIED CONDUIT(S) SECTION
NTS

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MITIGATION

CRIPPLE CREEK, CO

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	I. MILLER

SHEET NAME

ELECTRICAL DETAILS

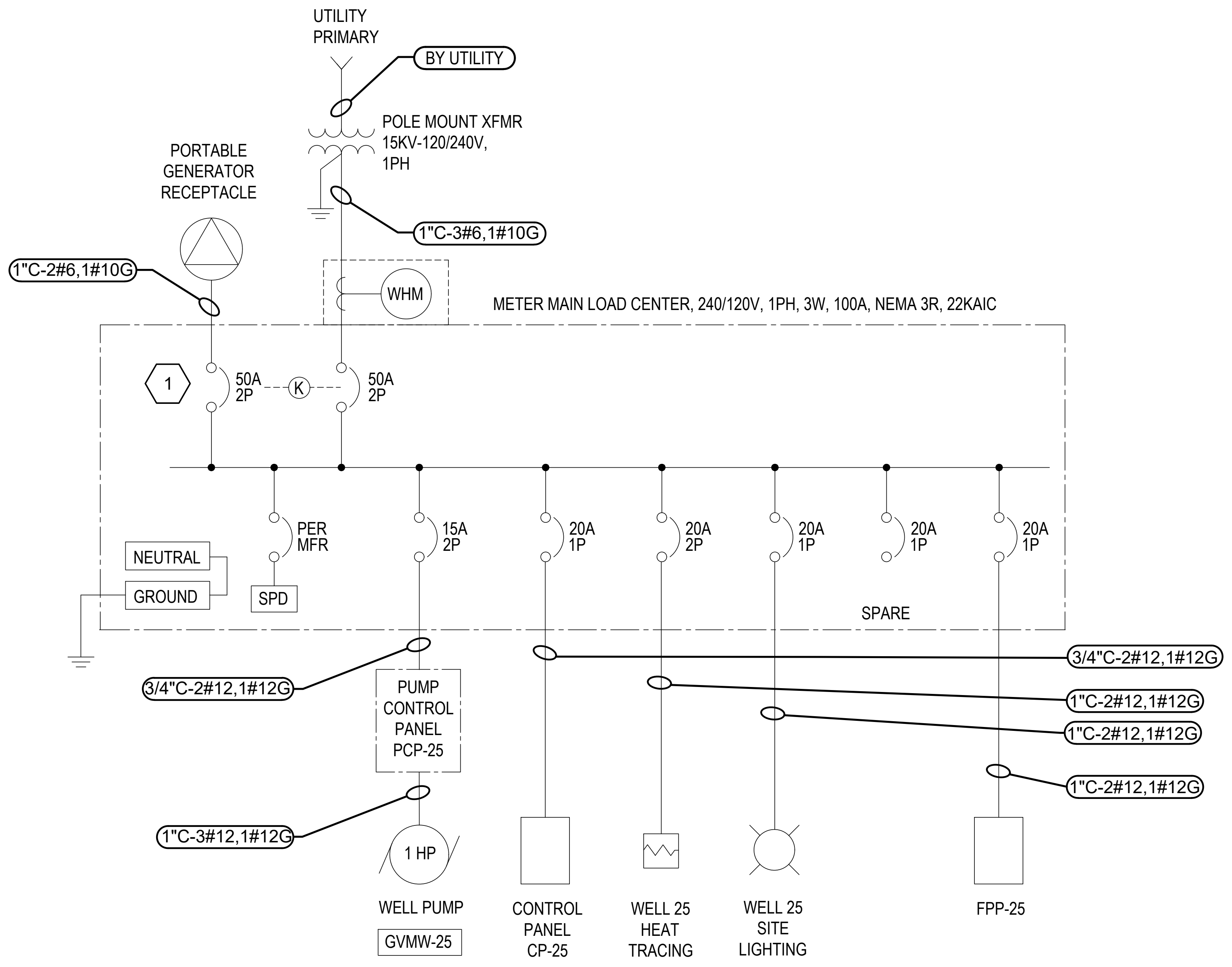
SCALE NOT TO SCALE

SHEET NUMBER

E501

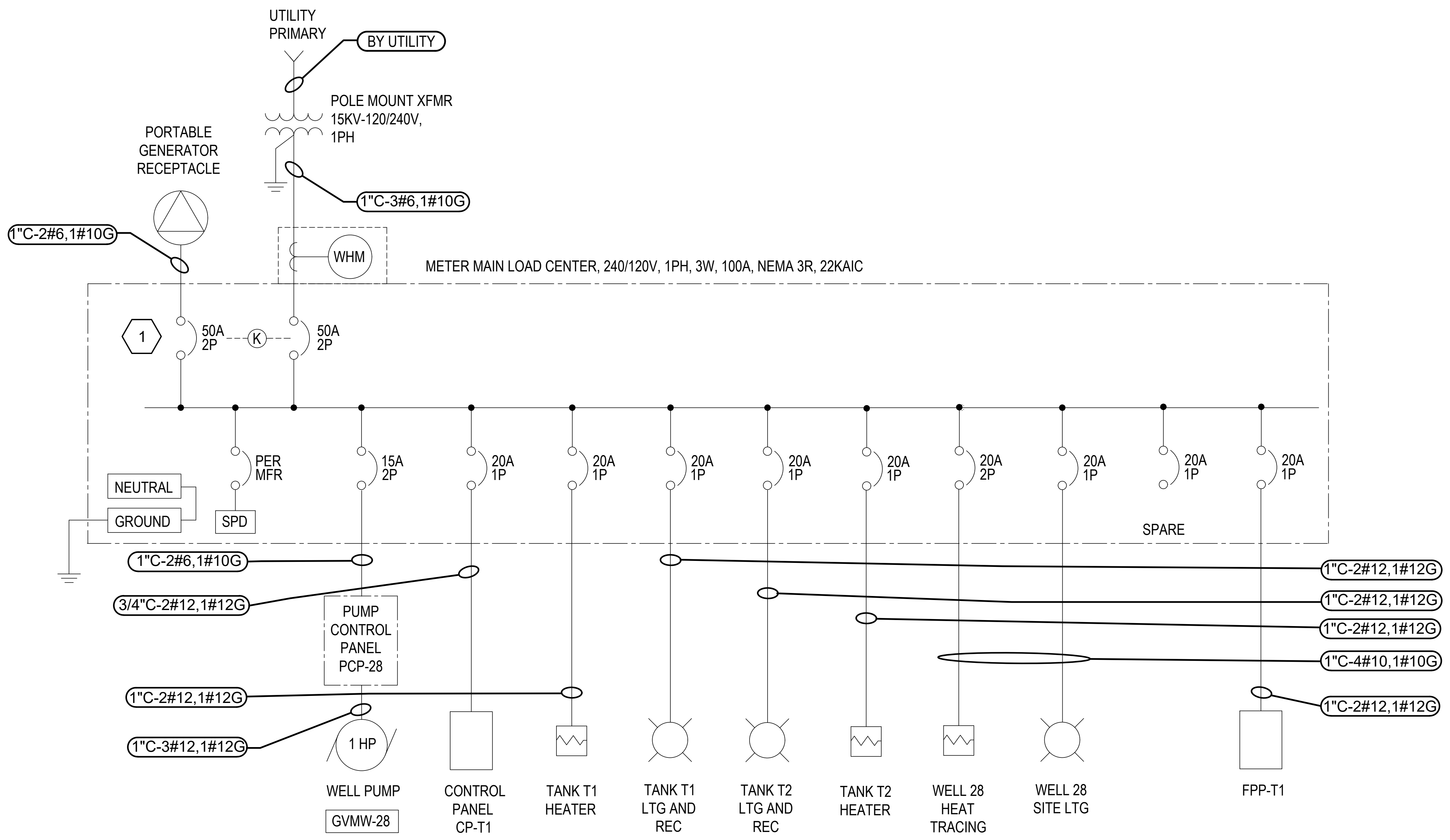
FILE NAME 10399263-01E501.DWG

60% DESIGN



ONE LINE DIAGRAM - TYPICAL FOR SINGLE WELL

NOT TO SCALE
TYPICAL FOR GVMW-27

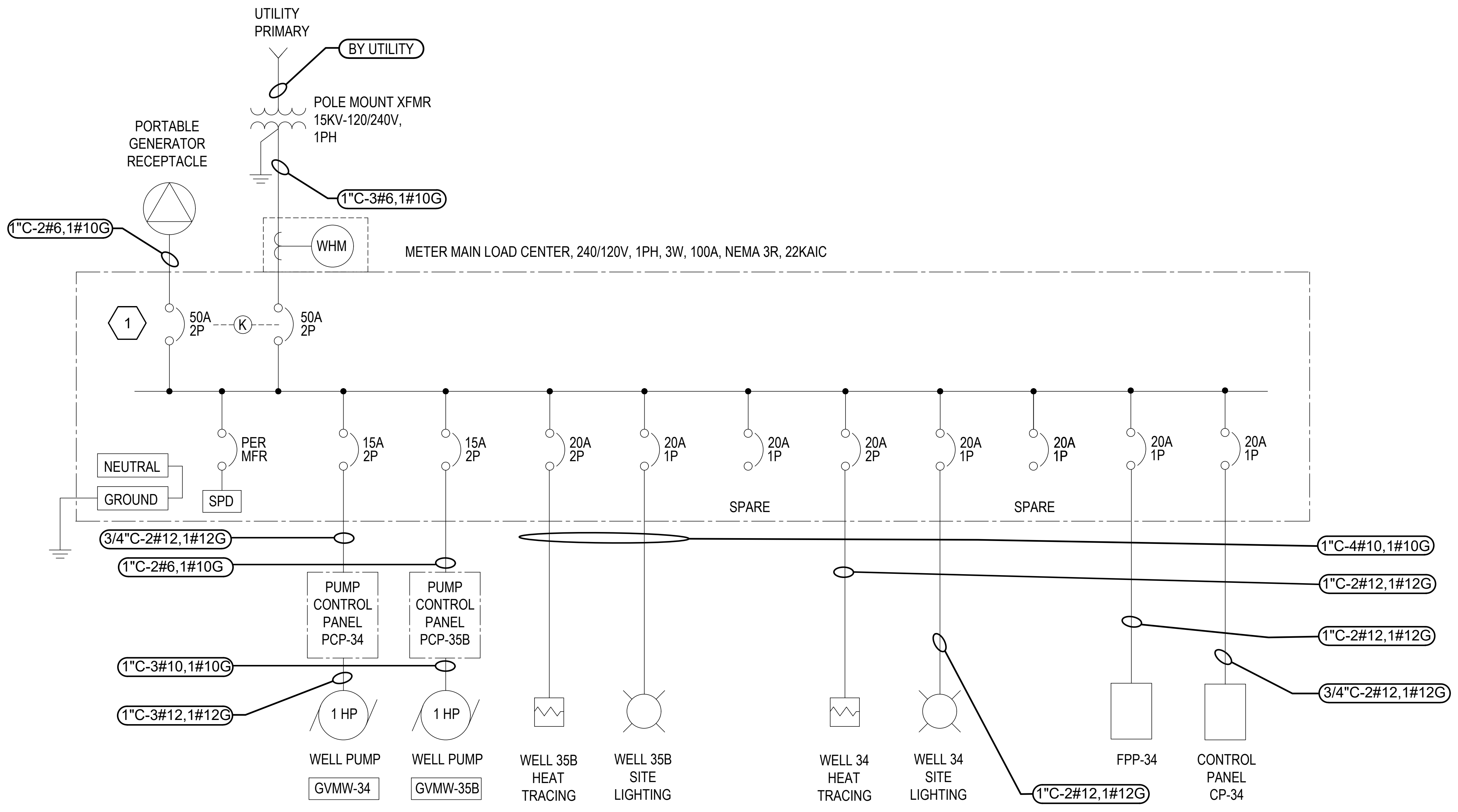


ONE LINE DIAGRAM - TANK SITE

NOT TO SCALE

KEYNOTES

1. MAIN CIRCUIT BREAKER AND PORTABLE GENERATOR CIRCUIT BREAKER SHALL BE INTERLOCKED AND ONLY ONE CIRCUIT BREAKER CAN BE TURNED ON AT A TIME.



ONE LINE DIAGRAM - GVMW-34 AND GVMW35B

NOT TO SCALE

PUMP SCHEDULE		
WELL	HP	FLA
GVMW-25	1	8
GVMW-27	1	8
GVMW-28	1	8
GVMW-34	1	8
GVMW-35B	1	8

PROJECT FOR

NEWMONT

ECOSA SEEP MANAGMENT

CRIPPLE CREEK, CO

MARK	DATE	DESCRIPTION
REV A	05/24/2024	ISSUED FOR REVIEW

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ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	E. GRIMM
PROJECT DESIGNER	
PROJECT ARCHITECT	
LANDSCAPE ARCHITECT	
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	
INTERIOR DESIGNER	
EQUIPMENT PLANNER	
WAYFINDING	
DRAWN BY	I. MILLER

SHEET NAME

SINGLE LINE DIAGRAM

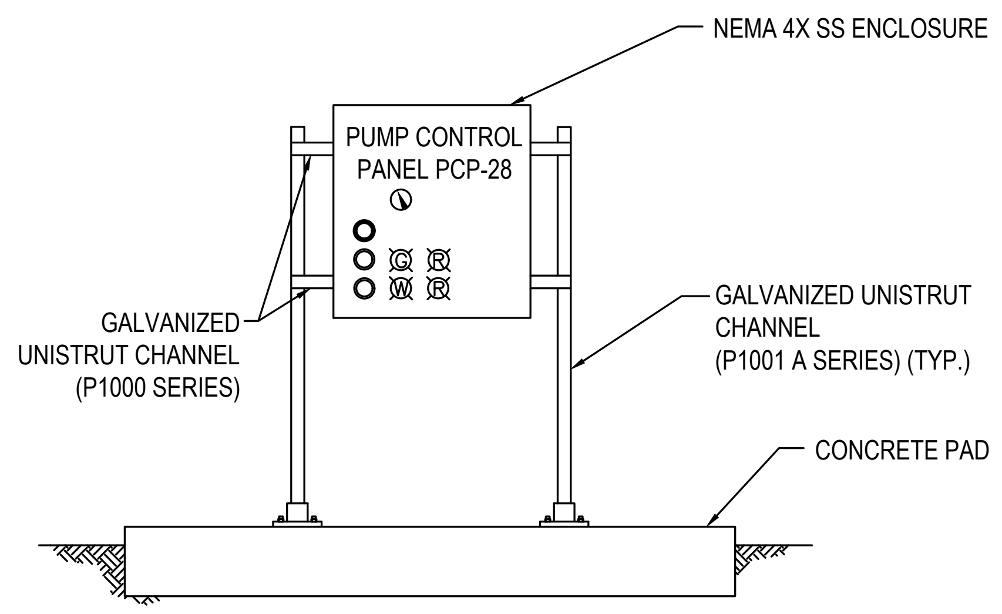
SCALE NOT TO SCALE

SHEET NUMBER

E601

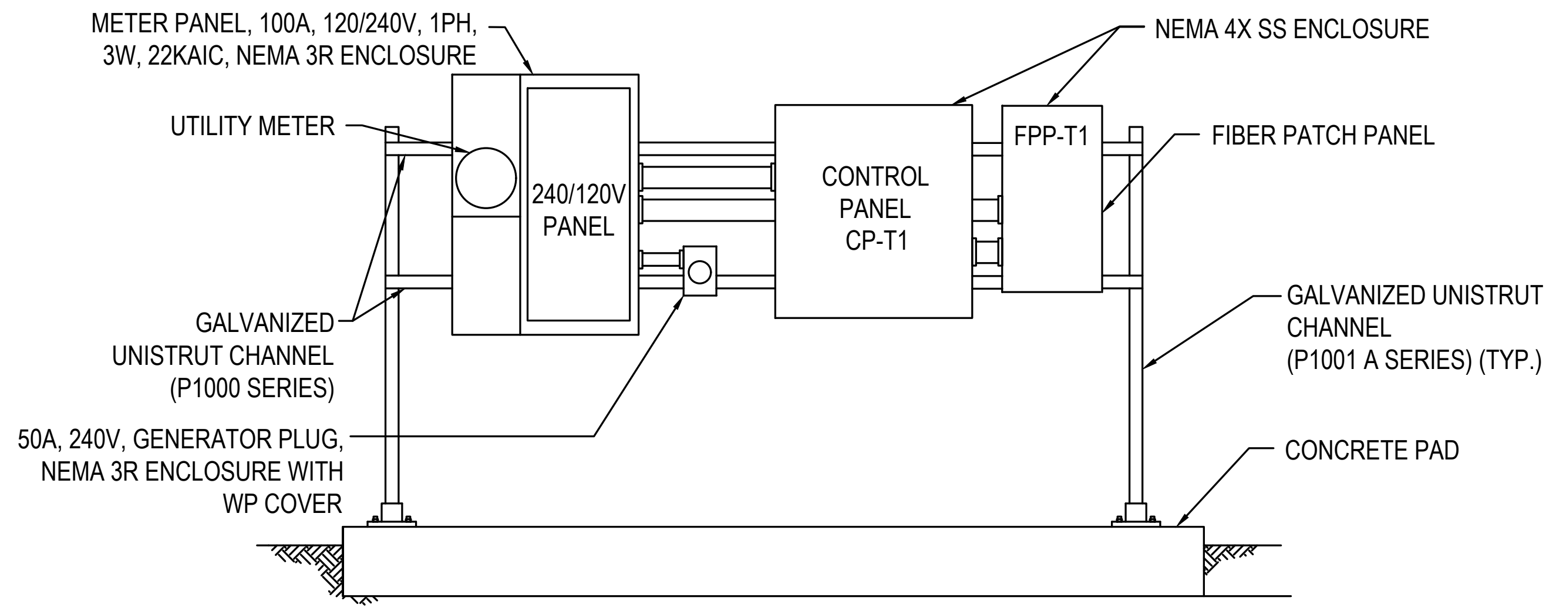
FILE NAME 10399263-01E601.DWG

FOR REVIEW



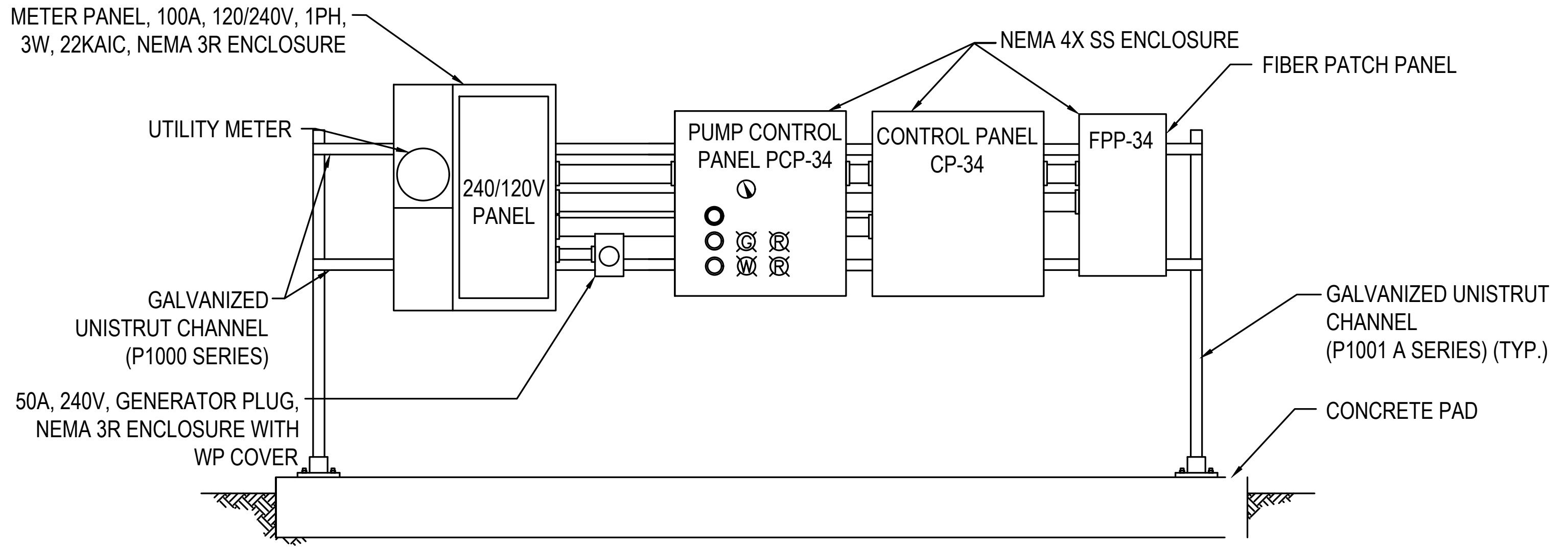
EQUIPMENT ELEVATION - WELL SITE 28 AND 35B

NOT TO SCALE
(LAYOUT SHOWN DIAGRAMMATIC AND FOR REFERENCE ONLY. ACTUAL LAYOUT MAY VARY)



EQUIPMENT ELEVATION - STORAGE TANK SITE

NOT TO SCALE
(LAYOUT SHOWN DIAGRAMMATIC AND FOR REFERENCE ONLY. ACTUAL LAYOUT MAY VARY)



TYPICAL EQUIPMENT ELEVATION - WELL SITE 25, 27 AND 34

NOT TO SCALE
(LAYOUT SHOWN DIAGRAMMATIC AND FOR REFERENCE ONLY. ACTUAL LAYOUT MAY VARY)

PANELBOARD NO:	**PNL-T1**				
VOLTAGE:	240/120	**BUS RATING (A):**	100A	**ENCLOSURE:**	NEMA 3R
PHASE:	1	**MAIN OC DEVICE:**	50A, 2P	**MOUNTING:**	UNISTRUT
WIRE:	3+GND	**INTERRUPTING RATING (KA):**	22KAIC	**LOCATION:**	TANK T1 SITE
200% NEUTRAL:	NO	**SERVICE ENTRANCE LABEL:**	YES		

	CKT		CONNECTED LOAD (VA)				OCP			OCP		CONNECTED LOAD (VA)					CKT
	NO.	DESCRIPTION	LTS	REC	MECH	MISC	AMPS	P		AMPS	P	LTS	REC	MECH	MISC	DESCRIPTION	NO.
1	1	MAIN CIRCUIT BREAKER					50	2	A	20	1				500	CONTROL PANEL RTU-T1	2
	3								B	20	1	200	360			TANK T1 LTG AND REC	4
1	5	PORTABLE GENERATOR CIRCUIT BREAKER					50	2	A	20	1	100	180			TANK T2 LTG AND REC	6
	7								B	20	1	100	180			WELL 28 SITE LIGHTING	8
	9	PUMP CONTROL PANEL PCP-28				960	15	2	A	20	1					SPARE	10
	11					960			B	15	2				72	WELL 28 HEATER	12
	13	TANK T1 HEATER				550	20	1	A						72		14
	15	TANK T2 HEATER				550	20	1	B	20	1				500	FPP-T1	16
	17	TANK T1 PIPE HEATER				100	20	1	A	20	1					SPARE	18
	19	TANK T2 PIPE HEATER				100	20	1	B	20	1					SPARE	20
	21	SPARE					20	1	A	20	1					SPARE	22
	23	SPARE					20	1	B	20	1					SPARE	24

LOAD SUMMARY										
	LTS	REC	MECH	MISC	SPARE	TOTAL			PHASE BALANCE	
CONNECTED LOAD (KVA)	0.4	0.7	0.0	4.4	---	5.5	240	LINE-TO-LINE VOLTS	PHASE A (KVA)	2.4
DEMAND FACTOR	1.25	NEC	1.00	1.00	20%	---	23	CONNECTED AMPS	PHASE B (KVA)	2.4
DESIGN LOAD (KVA)	0.5	0.7	0.0	4.4	1.1	6.7	28	DESIGN AMPS		

PANELBOARD NO:	**PNL-25**				
VOLTAGE:	240/120	**BUS RATING (A):**	100A	**ENCLOSURE:**	NEMA 3R
PHASE:	1	**MAIN OC DEVICE:**	50A, 2P	**MOUNTING:**	UNISTRUT
WIRE:	3+GND	**INTERRUPTING RATING (KA):**	22KAIC	**LOCATION:**	WELL SITE 25
200% NEUTRAL:	NO	**SERVICE ENTRANCE LABEL:**	YES		

	CKT		CONNECTED LOAD (VA)				OCP			OCP		CONNECTED LOAD (VA)					CKT
	NO.	DESCRIPTION	LTS	REC	MECH	MISC	AMPS	P		AMPS	P	LTS	REC	MECH	MISC	DESCRIPTION	NO.
1	1	MAIN CIRCUIT BREAKER					50	2	A	20	1				500	CP-25	2
	3								B	20	1	100	180			WELL 25 SITE LIGHTING	4
1	5	PORTABLE GENERATOR CIRCUIT BREAKER					50	2	A	20	1					SPARE	6
	7								B	20	1					SPARE	8
	9	PUMP CONTROL PANEL PCP-25				960	15	2	A	20	1					SPARE	10
	11					960			B	20	1					SPARE	12
	13	WELL 25 HEATER				72	15	2	A	20	1					SPARE	14
	15					72			B	20	1				500	FPP-25	16
	17	SPARE					20	1	A	20	1					SPARE	18
	19	SPARE					20	1	B	20	1					SPARE	20
	21	SPARE					20	1	A	20	1					SPARE	22
	23	SPARE					20	1	B	20	1					SPARE	24

LOAD SUMMARY										
	LTS	REC	MECH	MISC	SPARE	TOTAL			PHASE BALANCE	
CONNECTED LOAD (KVA)	0.1	0.2	0.0	3.1	---	3.3	240	LINE-TO-LINE VOLTS	PHASE A (KVA)	1.5
DEMAND FACTOR	1.25	NEC	1.00	1.00	20%	---	14	CONNECTED AMPS	PHASE B (KVA)	1.2
DESIGN LOAD (KVA)	0.1	0.2	0.0	3.1	0.7	4.0	17	DESIGN AMPS		

PANELBOARD NO:	**PNL-27**				
VOLTAGE:	240/120	**BUS RATING (A):**	100A	**ENCLOSURE:**	NEMA 3R
PHASE:	1	**MAIN OC DEVICE:**	50A, 2P	**MOUNTING:**	UNISTRUT
WIRE:	3+GND	**INTERRUPTING RATING (KA):**	22KAIC	**LOCATION:**	WELL SITE 27
200% NEUTRAL:	NO	**SERVICE ENTRANCE LABEL:**	YES		

	CKT		CONNECTED LOAD (VA)				OCP			OCP		CONNECTED LOAD (VA)					CKT
	NO.	DESCRIPTION	LTS	REC	MECH	MISC	AMPS	P		AMPS	P	LTS	REC	MECH	MISC	DESCRIPTION	NO.
1	1	MAIN CIRCUIT BREAKER					50	2	A	20	1				500	CP-27	2
	3								B	20	1	100	180			WELL 27 SITE LIGHTING	4
1	5	PORTABLE GENERATOR CIRCUIT BREAKER					50	2	A	20	1					SPARE	6
	7								B	20	1					SPARE	8
	9	PUMP CONTROL PANEL PCP-27				960	15	2	A	20	1					SPARE	10
	11					960			B	20	1					SPARE	12
	13	WELL 27 HEATER				72	15	2	A	20	1					SPARE	14
	15					72			B	20	1				500	FPP-27	16
	17	SPARE					20	1	A	20	1					SPARE	18
	19	SPARE					20	1	B	20	1					SPARE	20
	21	SPARE					20	1	A	20	1					SPARE	22
	23	SPARE					20	1	B	20	1					SPARE	24

LOAD SUMMARY										
	LTS	REC	MECH	MISC	SPARE	TOTAL			PHASE BALANCE	
CONNECTED LOAD (KVA)	0.1	0.2	0.0	3.1	---	3.3	240	LINE-TO-LINE VOLTS	PHASE A (KVA)	1.5
DEMAND FACTOR	1.25	NEC	1.00	1.00	20%	---	14	CONNECTED AMPS	PHASE B (KVA)	1.2
DESIGN LOAD (KVA)	0.1	0.2	0.0	3.1	0.7	4.0	17	DESIGN AMPS		

PANELBOARD NO:	**PNL-34**				
VOLTAGE:	240/120	**BUS RATING (A):**	100A	**ENCLOSURE:**	NEMA 3R
PHASE:	1	**MAIN OC DEVICE:**	50A, 2P	**MOUNTING:**	UNISTRUT
WIRE:	3+GND	**INTERRUPTING RATING (KA):**	22KAIC	**LOCATION:**	WELL SITE 34
200% NEUTRAL:	NO	**SERVICE ENTRANCE LABEL:**	YES		

	CKT		CONNECTED LOAD (VA)				OCP			OCP		CONNECTED LOAD (VA)					CKT
	NO.	DESCRIPTION	LTS	REC	MECH	MISC	AMPS	P		AMPS	P	LTS	REC	MECH	MISC	DESCRIPTION	NO.
1	1	MAIN CIRCUIT BREAKER					50	2	A	20	1				500	CP-34	2
	3								B	20	1	100	180			WELL 34 SITE LIGHTING	4
1	5	PORTABLE GENERATOR CIRCUIT BREAKER					50	2	A	15	2				960	PUMP CONTROL PANEL PCP-35B	6
	7								B						960		8
	9	PUMP CONTROL PANEL PCP-34				960	15	2	A	15	2				72	WELL 35B HEATER	10
	11					960			B						72		12
	13	WELL 34 HEATER				72	15	2	A	20	1	100	180			WELL 35B SITE LIGHTING	14
	15					72			B	20	1				500	FPP-34	16
	17	SPARE					20	1	A	20	1					SPARE	18
	19	SPARE					20	1	B	20	1					SPARE	20
	21	SPARE					20	1	A	20	1					SPARE	22
	23	SPARE					20	1	B	20	1					SPARE	24

LOAD SUMMARY										
	LTS	REC	MECH	MISC	SPARE	TOTAL			PHASE BALANCE	
CONNECTED LOAD (KVA)	0.2	0.4	0.0	5.1	---	5.7	240	LINE-TO-LINE VOLTS	PHASE A (KVA)	2.8
DEMAND FACTOR	1.25	NEC	1.00	1.00	20%	---	24	CONNECTED AMPS	PHASE B (KVA)	2.3
DESIGN LOAD (KVA)	0.3	0.4	0.0	5.1	1.1	6.9	29	DESIGN AMPS		

LUMINAIRE SCHEDULE										
LUMINAIRE ID	DESCRIPTION	WATTS (MAX)	VOLTAGE	COLOR TEMP (K)	CRI (MIN)	LUMENS	MOUNTING		MANUFACTURER AND SERIES	NOTES
							TYPE	HEIGHT		
A	POLE MOUNTED, LOW EPA AREA LIGHT IN DIE-CAST ALUMINUM HOUSING WITH INTEGRAL HEAT SINKS, DARK BRONZE IN COLOR. TYPE 4 MEDIUM FORWARD OPTICS WITH HOUSE-SIDE SHIELD AND BI-LEVEL MOTION/AMBIENT SENSOR (15-30 FT MTG HT) 19,700 LUMENS (NOMINAL)	135	240V	5000	80	20,155	POLE	15'-0" AFF	LITHONIA DSX2 SERIES WITH "PIRH" SENSOR DSX2 LED-P1-50K-80CRI-T4M-MVOLT-SPA-PIRHN-DDBXD	

KEYNOTES

1. MAIN CIRCUIT BREAKER AND PORTABLE GENERATOR CIRCUIT BREAKER SHALL BE INTERLOCKED AND ONLY ONE CIRCUIT BREAKER CAN BE TURNED ON AT A TIME.
2. WELL SITES GVMW-34 AND GVMW-35B WILL BE USING THE SAME LOAD CENTER FOR POWER DISTRIBUTION, WILL BE USING THE SAME CONTROL PANEL FOR COMMUNICATION.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEP MANAGMENT

CRIPPLE CREEK, CO

REV A	05/24/2024	ISSUED FOR REVIEW
MARK	DATE	DESCRIPTION

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	E. GRIMM
PROJECT DESIGNER	
PROJECT ARCHITECT	
LANDSCAPE ARCHITECT	
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	
INTERIOR DESIGNER	
EQUIPMENT PLANNER	
WAYFINDING	
DRAWN BY	I. MILLER

SHEET NAME

ELEVATION, PANEL SCHEDULE AND LIGHT FIXTURE SCHEDULE

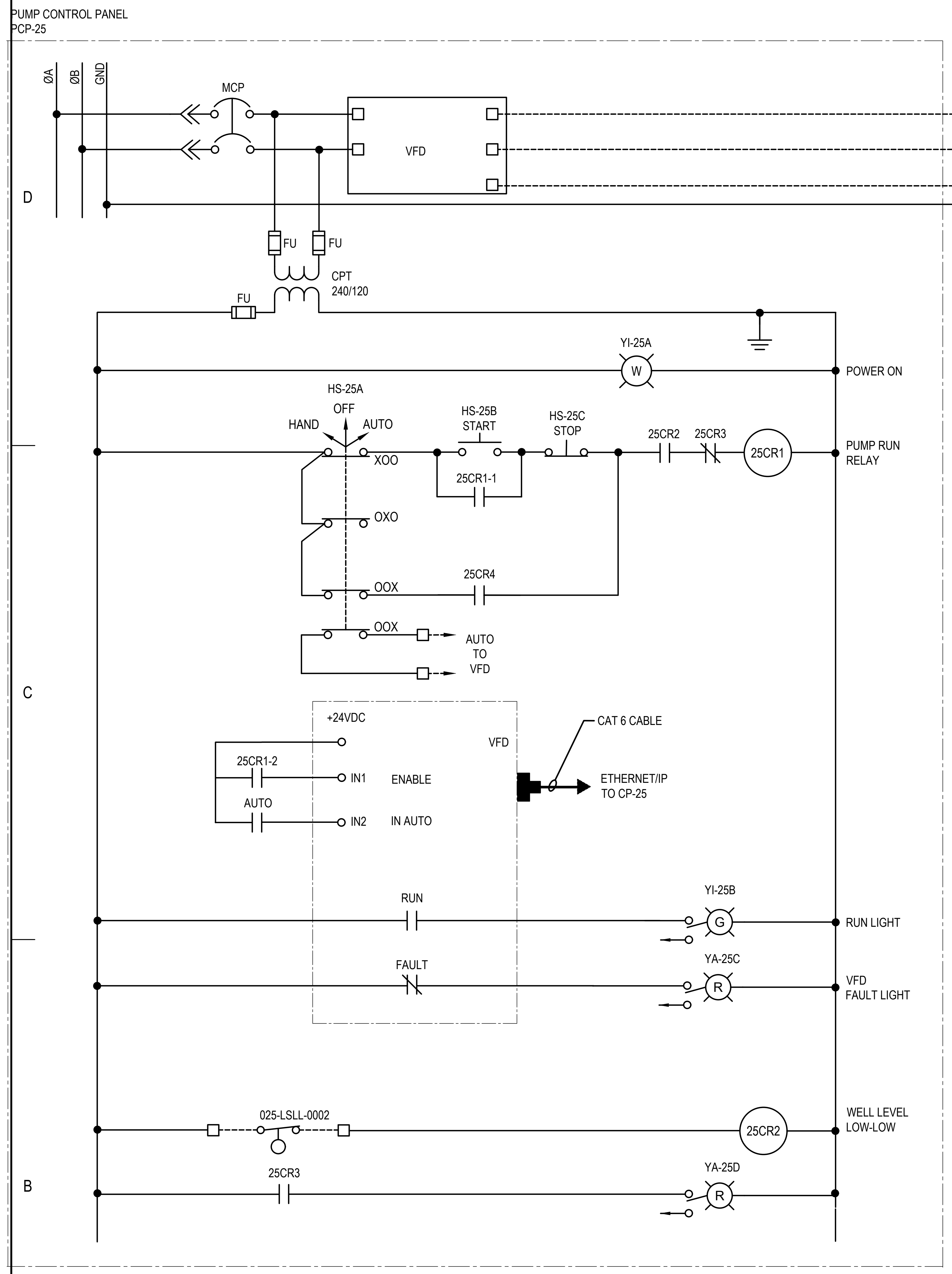
SCALE: NOT TO SCALE

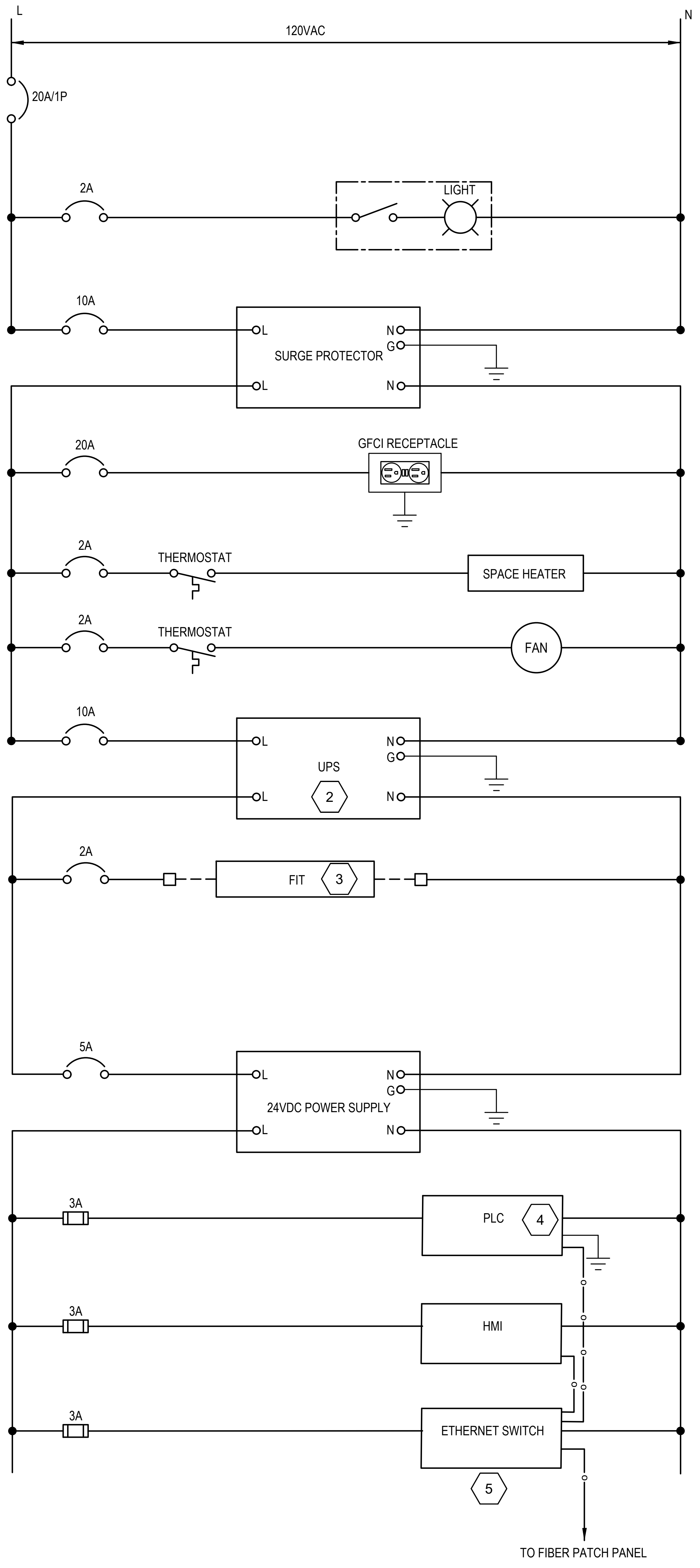
SHEET NUMBER

E602

FILE NAME: 10399263-01E602.DWG

FOR REVIEW





KEYNOTES:

1. GENERAL FAULT ALARM SIGNAL FROM PLC, SIGNAL REPRESENTING A COMBINED FAULT ALARM INCLUDING PIPELINE HIGH PRESSURE, WELL HAS NO OUTPUT FLOW, STORAGE TANK LEVEL HIGH.
2. UPS HOLD UP TIME SHALL BE 20 MINUTES. SUBMIT CALCULATION TO SUPPORT UPS SIZE.
3. POWER 025-FIT-0031 FROM CP-25, POWER 027-FIT-0031 FROM CP-27, POWER FIT-28 FROM CP-T1, POWER 034-FIT-0031 AND 035-FIT-0031 FROM CP-34.
4. MANUFACTURER AND MODEL SHALL COMPLY WITH DIVISION 40 SPECIFICATIONS.

LEGEND

▲ REMOTE MOUNTED EQUIPMENT

WELL PUMP CONTROL DIAGRAM

NOT TO SCALE
ALL CONNECTIONS IN PUMP CONTROL PANEL
TYPICAL FOR WELL PUMP GVMW-27, GVMW-28, GVMW-34, GVMW-35B

WELL PUMP CONTROL PANEL NAMING SCHEDULE

WELL SITE	CONTROL PANEL	PUMP	HS	CR	YI/YA	LSLL
WP-25	PCP-25	WP-25	HS-25A	25CR1	YI-25A	LSLL-25
			HS-25B	25CR2	YI-25B	
			HS-25C	25CR3	YA-25C	
				25CR4	YA-25D	
WP-27	PCP-27	WP-27	HS-27A	27CR1	YI-27A	LSLL-27
			HS-27B	27CR2	YI-27B	
			HS-27C	27CR3	YA-27C	
				27CR4	YA-27D	
WP-28	PCP-28	WP-28	HS-28A	28CR1	YI-28A	LSLL-28
			HS-28B	28CR2	YI-28B	
			HS-28C	28CR3	YA-28C	
				28CR4	YA-28D	
WP-34	PCP-34	WP-34	HS-34A	34CR1	YI-34A	LSLL-34
			HS-34B	34CR2	YI-34B	
			HS-34C	34CR3	YA-34C	
				34CR4	YA-34D	
WP-35B	PCP-35B	WP-35B	HS-35A	35CR1	YI-35A	LSLL-35
			HS-35B	35CR2	YI-35B	
			HS-35C	35CR3	YA-35C	
				35CR4	YA-35D	

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ECOSA SEEP MANAGMENT

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CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	
ELECTRICAL ENGINEER	
INTERIOR DESIGNER	
EQUIPMENT PLANNER	
WAYFINDING	
DRAWN BY	I. MILLER

SHEET NAME

PUMP CONTROL PANEL WIRING PLAN

SCALE NOT TO SCALE

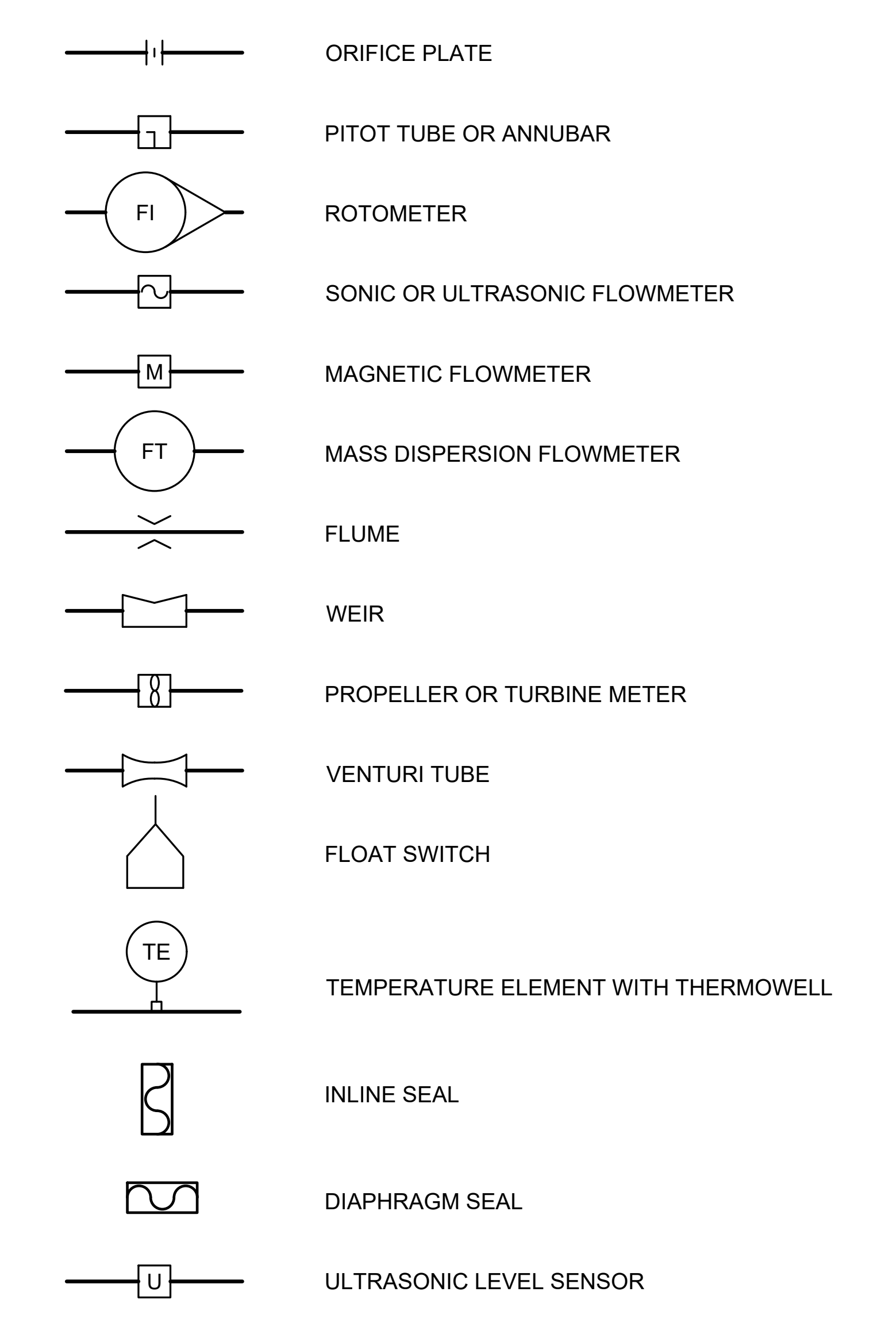
SHEET NUMBER

E603

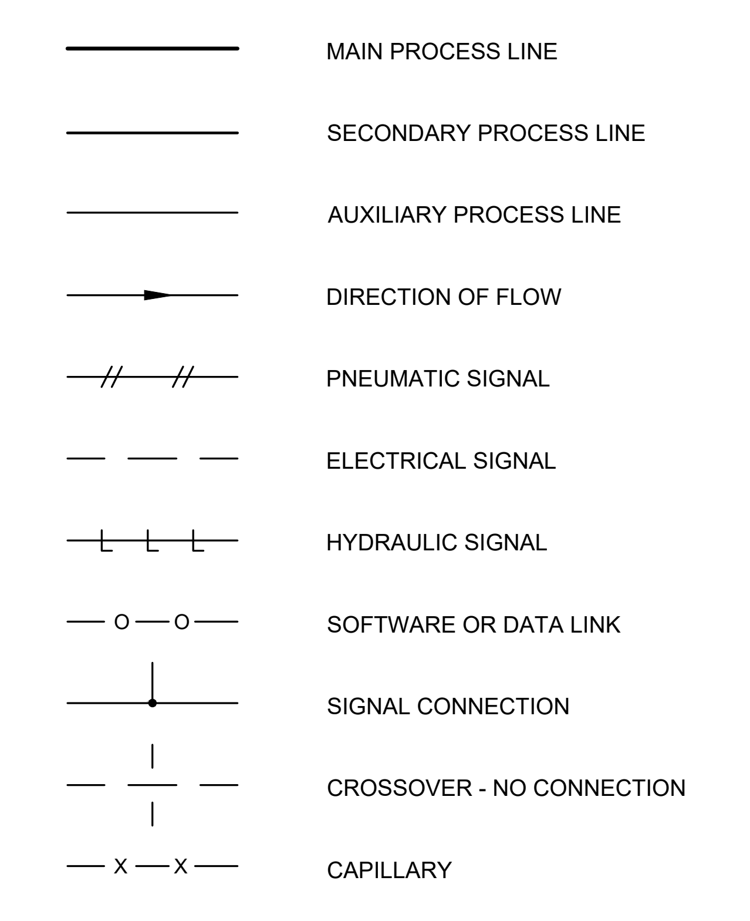
FILE NAME 10399263-01E603.DWG

FOR REVIEW

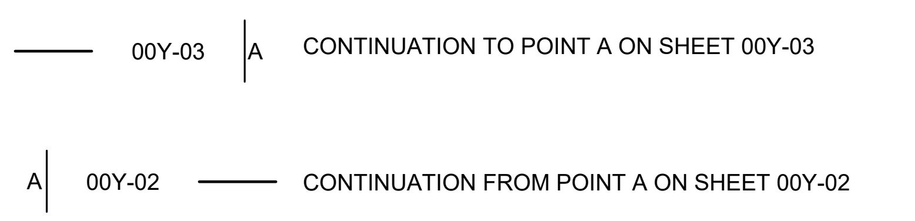
PRIMARY ELEMENT SYMBOLOGY



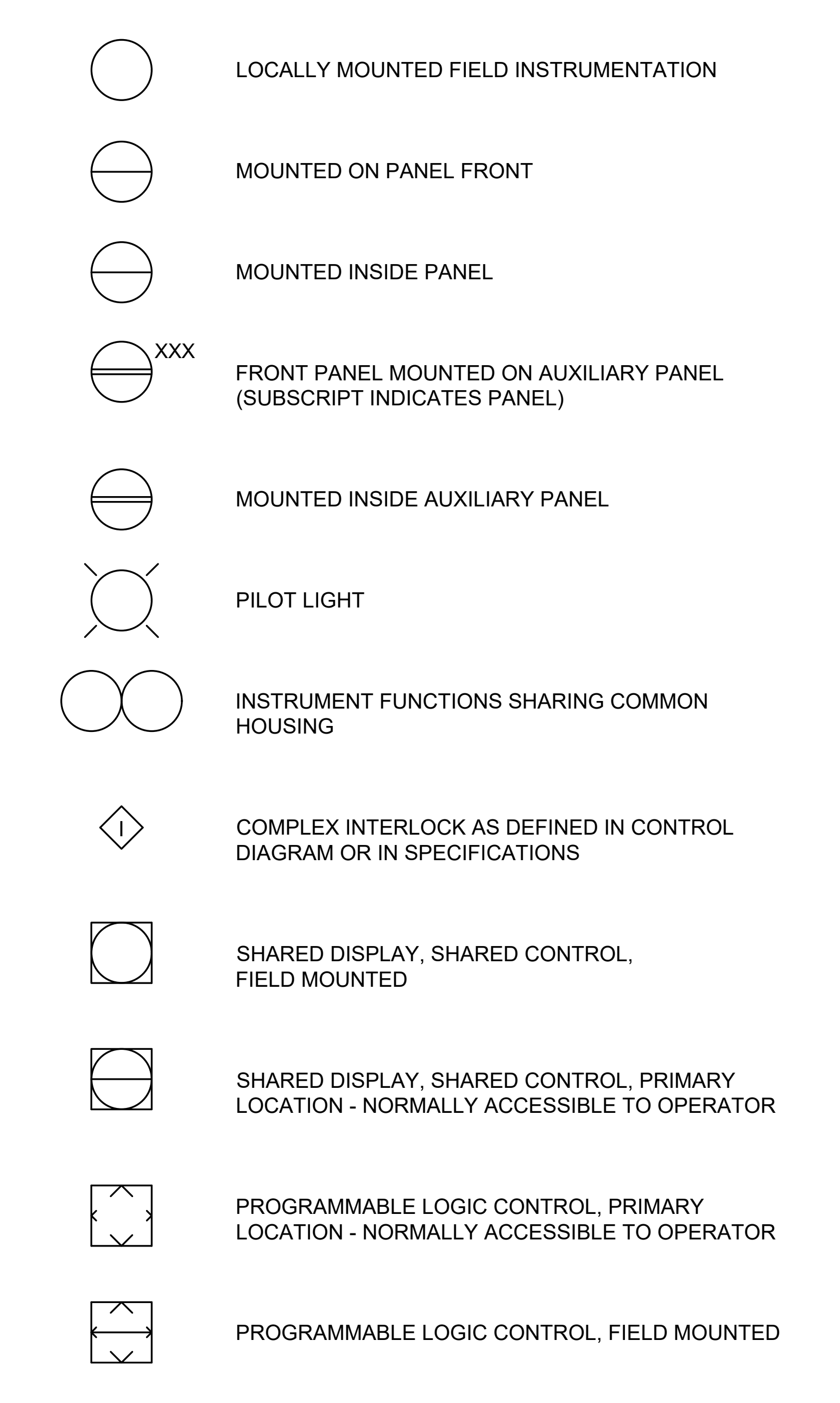
LINE TYPES



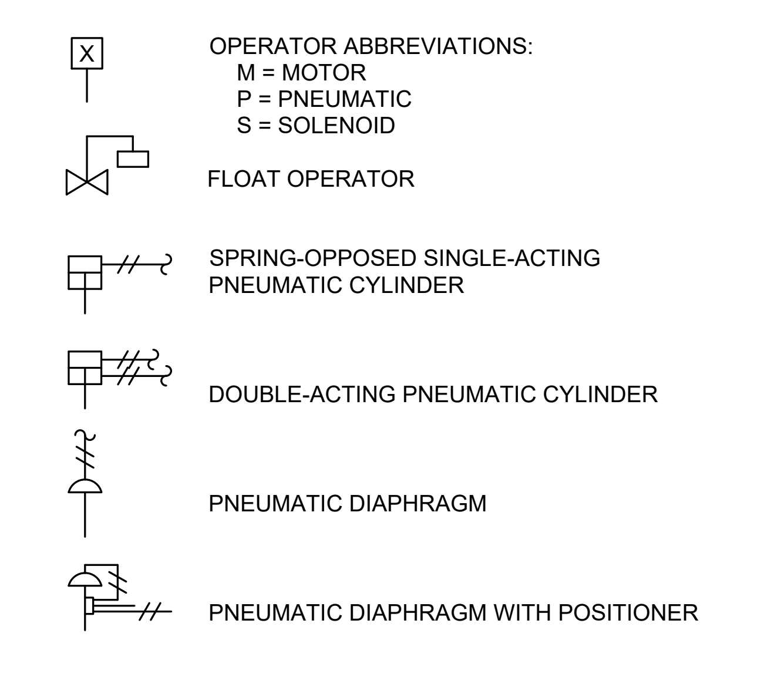
CROSS REFERENCE SYMBOLOGY



INSTRUMENT SYMBOLOGY



ACTUATOR SYMBOLOGY



TYPES OF POWER SUPPLY

A	PLANT COMPRESSED AIR
IA	INSTRUMENTATION AIR
ES	ELECTRIC SUPPLY
NG	NATURAL GAS
HYD	HYDRAULIC
120VAC	120VAC POWER
480VAC	480VAC POWER

INSTRUMENT IDENTIFICATION LETTERS

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USERS CHOICE			CONTROL	CLOSED
D	USERS CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME; RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	TORQUE		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECH. ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

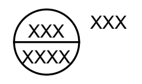
MISCELLANEOUS INSTRUMENTATION ABBREVIATIONS

AB	AERATION BASIN
AD	AERATION DIGESTER
AI	ANALOG INPUT
ALK	ALKALINITY (ANALYZER MODIFIER)
AN	ANOXIC BASIN
AO	ANALOG OUTPUT
BFPF	BELT FILTER PRESS FILTRATE
BWW	BACKWASH WATER
CCT	CHLORINE CONTACT TANK
CE	CLARIFIED EFFLUENT
CL2	CHLORINE (ANALYZER MODIFIER)
CO	CARBON MONOXIDE (ANALYZER MODIFIER)
CO2	CARBON DIOXIDE (ANALYZER MODIFIER)
COMB	COMBUSTIBLES (ANALYZER MODIFIER)
COND	CONDUCTIVITY (ANALYZER MODIFIER)
DEN	DENSITY (ANALYZER MODIFIER)
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DO	DISSOLVED OXYGEN (ANALYZER MODIFIER)
DS	DIGESTED SLUDGE
EFF	EFFLUENT
E/P	VOLTAGE TO PNEUMATIC
E/P	VOLTAGE TO PNEUMATIC
E/P	VOLTAGE TO PNEUMATIC
FC	FINAL CLARIFIER
FE	FILTERED EFFLUENT
I/O	INPUT/OUTPUT
I/P	CURRENT TO PNEUMATIC
INF	PLANT INFLUENT
IRC	INTERNAL RECYCLE
ML	MIXED LIQUOR
NH3	AMMONIA (ANALYZER MODIFIER)
NO3	NITRATE (ANALYZER MODIFIER)

NOX	NITROGEN OXIDE (ANALYZER MODIFIER)
OIT	OPERATOR INTERFACE TERMINAL
OVR	OVERFLOW
RAS	RETURN ACTIVATED SLUDGE
O2	OXYGEN (ANALYZER MODIFIER)
P&ID	PROCESS AND INSTRUMENTATION DIAGRAM
PHOS	PHOSPHORUS (ANALYZER MODIFIER)
SS	SUSPENDED SOLIDS (ANALYZER MODIFIER)
TURB	TURBIDITY (ANALYZER MODIFIER)
WAN	WIDE AREA NETWORK
VFD	VARIABLE FREQUENCY DRIVE
LCP	LOCAL CONTROL PANEL
LCS	LOCAL CONTROL STATION
MCC	MOTOR CONTROL CENTER
INF	PLANT INFLUENT
FIL	FILTRATE
D	DRAIN
PE	PLANT EFFLUENT
PS	PRIMARY SLUDGE
WAS	WASTE ACTIVATED SLUDGE
TPS	THICKENED PRIMARY SLUDGE
TWAS	THICKENED WASTE ACTIVATED SLUDGE
CLGV	CHLORINE GAS VACUUM
CLS	CHLORINE SOLUTION
POL	POLYMER SOLUTION
SDGV	SULPHUR DIOXIDE GAS VACUUM
FA	FOUL AIR
NPW	NON POTABLE WATER
DG	DIGESTER GAS
SDGP	SULPHUR DIOXIDE GAS PRESSURE
CLGP	CHLORINE GAS PRESSURE

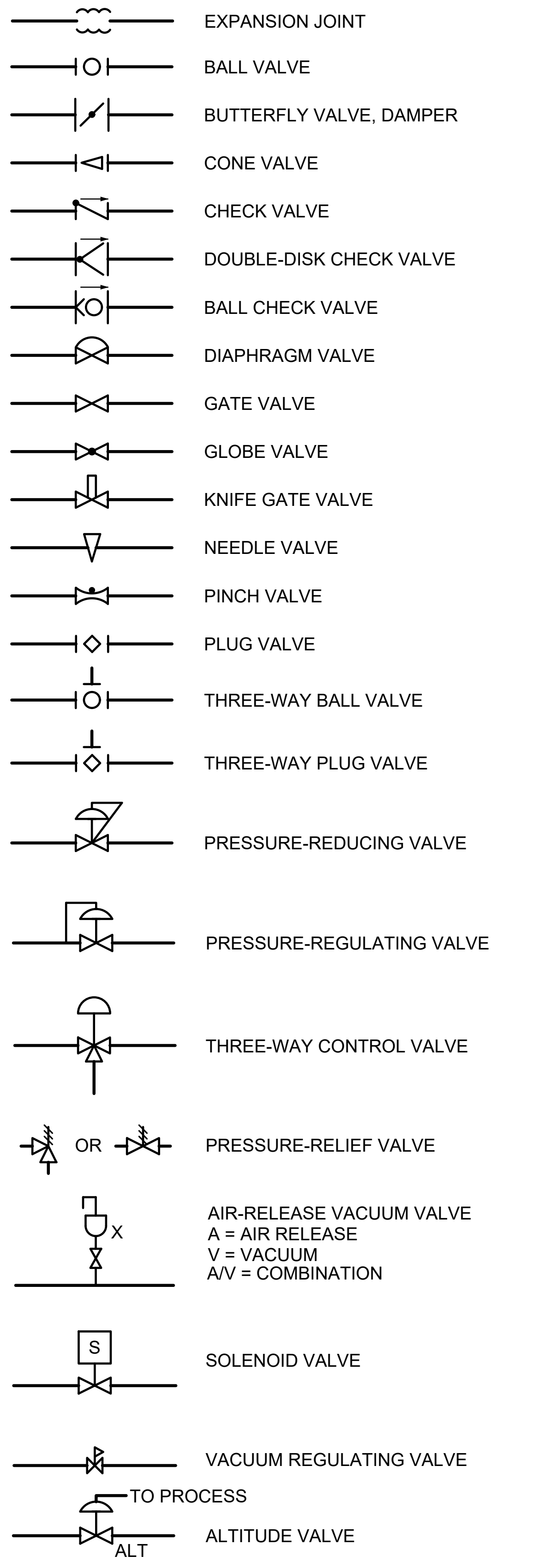
△	DISCRETE INPUT (DI)
▽	DISCRETE OUTPUT (DO)
▲	ANALOG INPUT (AI)
▼	ANALOG OUTPUT (AO)

CONTROL SWITCH NOTATION ABBREVIATIONS

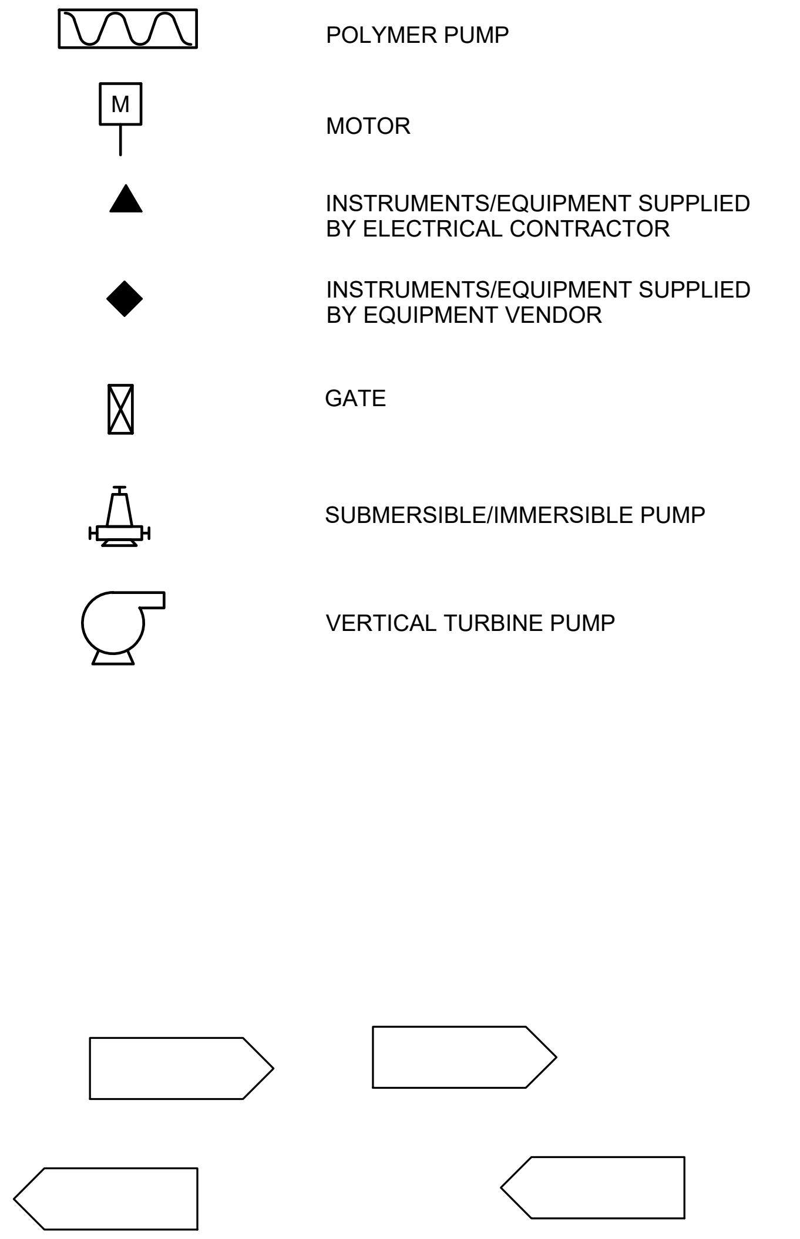


ACK	ACKNOWLEDGE
CLS	CLOSE
ESTOP	EMERGENCY STOP
FAIL	FAILURE
FOR	FORWARD-OFF-REVERSE
FR	FORWARD-REVERSE
FS	FAST-SLOW
FWD	FORWARD
HA	HAND-AUTO
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
LL	LEAD-LAG
LLS	LEAD-LAG-STANDBY
LOA	LOCAL-OFF-AUTO
LSR	LOCAL-STOP-REMOTE
LR	LOCAL-REMOTE
LS	LEAD-STANDBY
MA	MANUAL-AUTO
OAC	OPEN-AUTO-CLOSE
OC	OPEN-CLOSE
OO	ON-OFF
OPN	OPEN
OSC	OPEN-STOP-CLOSE
REV	REVERSE
RJ	RUN-JOG
RJR	RUN-JOG-REVERSE
SIL	SILENCE
SS	START-STOP

VALVES



MISCELLANEOUS SYMBOLOGY



PROCESS ABBREVIATIONS

GENERAL NOTES:

1. SEE GENERAL DRAWINGS FOR PROCESS ABBREVIATIONS.

EQUIPMENT TAGGING

XXX	-	XXX	-	XX
AREA LOCATION CODE (SEE INDEX)		EQUIPMENT ABBR.		TAG NO.

GENERAL NOTES:

1. THIS IS A STANDARD INSTRUMENTATION SYMBOLOGY AND ABBREVIATIONS SHEET. LISTING OF SYMBOLS AND ABBREVIATIONS DOES NOT IMPLY ALL SYMBOLS AND ABBREVIATIONS HAVE BEEN USED ON THIS PROJECT.

2. SEE PROCESS, MECHANICAL AND PLUMBING LEGEND SHEET FOR MISCELLANEOUS PIPING SYMBOLS.

3. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.

4. VALVE SYMBOLS SHOWN HERE ARE APPLICABLE ONLY TO INSTRUMENTATION DIAGRAMS. SEE PROCESS, MECHANICAL AND PLUMBING LEGEND SHEET FOR VALVE SYMBOLS USED ELSEWHERE ON THE SHEETS.

PROJECT FOR

NEWMONT

ECOSA SEEPAGE
MANAGEMENT

CRIPPLE CREEK, CO

MARK	DATE	DESCRIPTION
60%	01/06/2025	ISSUED FOR REVIEW

PROJECT NUMBER	10399263
ORIGINAL ISSUE	05/01/2024

PROJECT MANAGER	J. VAIL
PROJECT DESIGNER	F. SHARIF
CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	J. BOESCH

SHEET NAME

GENERAL LEGEND

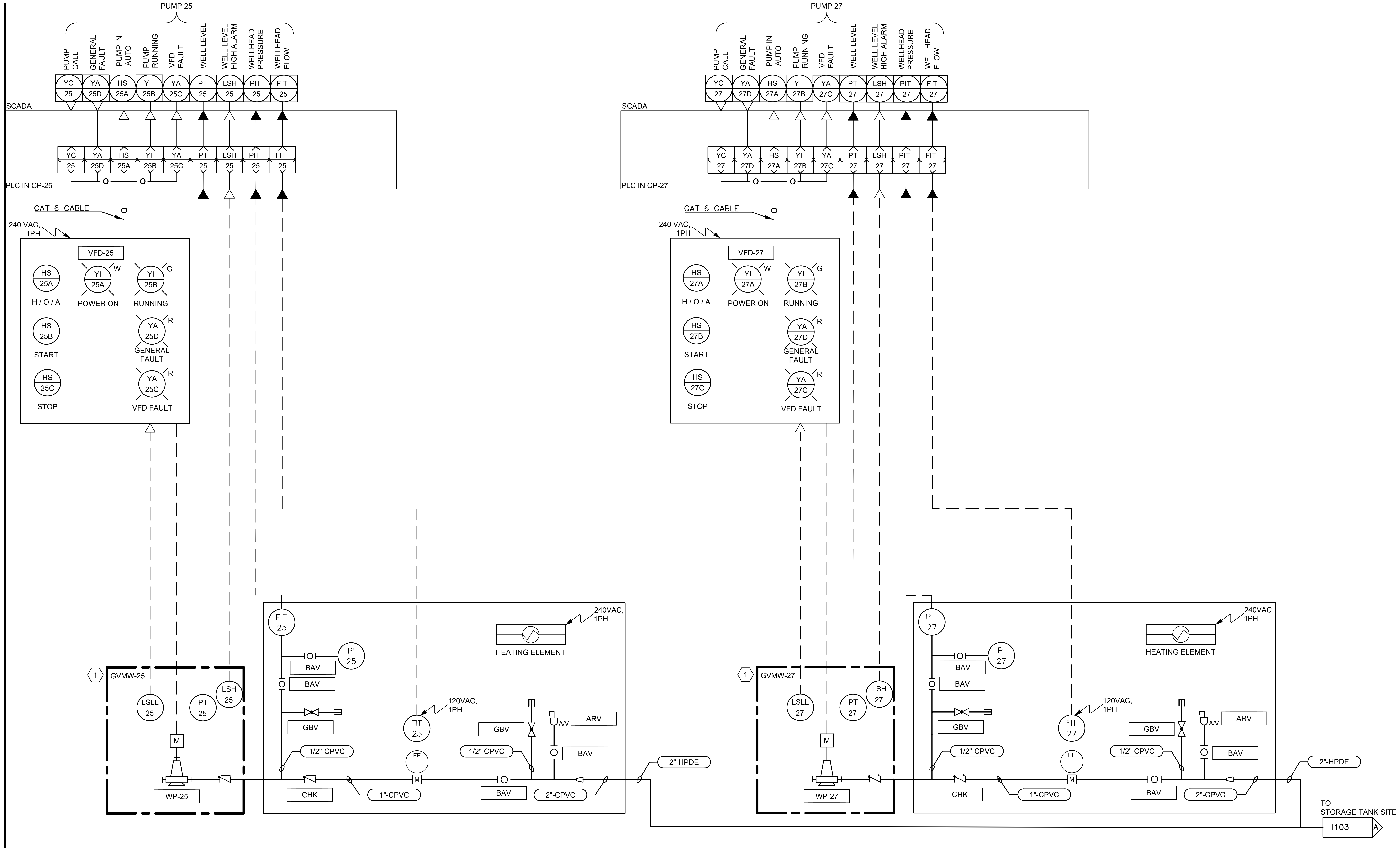
SCALE NA

SHEET NUMBER

I001

FILE NAME 10399263-08I001.DWG

60% DESIGN



KEY NOTES:

① PACKAGE INCLUDING PUMP, CONDUIT, AND PRESSURE INSTRUMENTATION BY OTHERS.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MANAGEMENT

CRIPPLE CREEK, CO

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	J. BOESCH

SHEET NAME

P&ID GVMW-25 AND -27

SCALE NA

SHEET NUMBER

I101

FILE NAME 10399263-08I101.DWG

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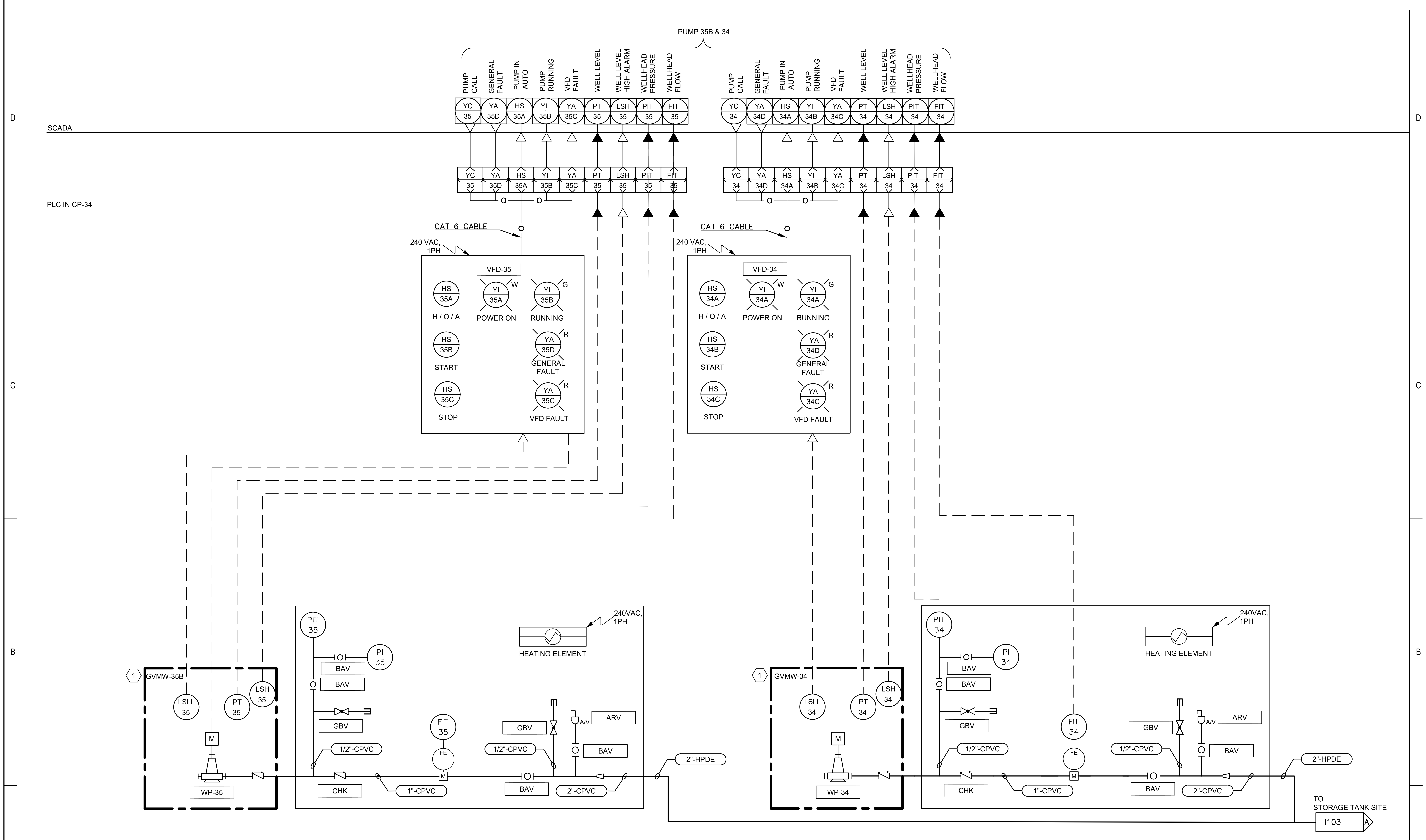

KEY NOTES:

① PACKAGE INCLUDING PUMP, CONDUIT, AND PRESSURE INSTRUMENTATION BY OTHERS.

HDR

PROJECT FOR

NEWMONT

ECOSA SEEPAGE MANAGEMENT

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CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	J. BOESCH

SHEET NAME

P&ID GVMW-35B AND -34

SCALE NA

SHEET NUMBER

I102

FILE NAME 10399263-08I102.DWG

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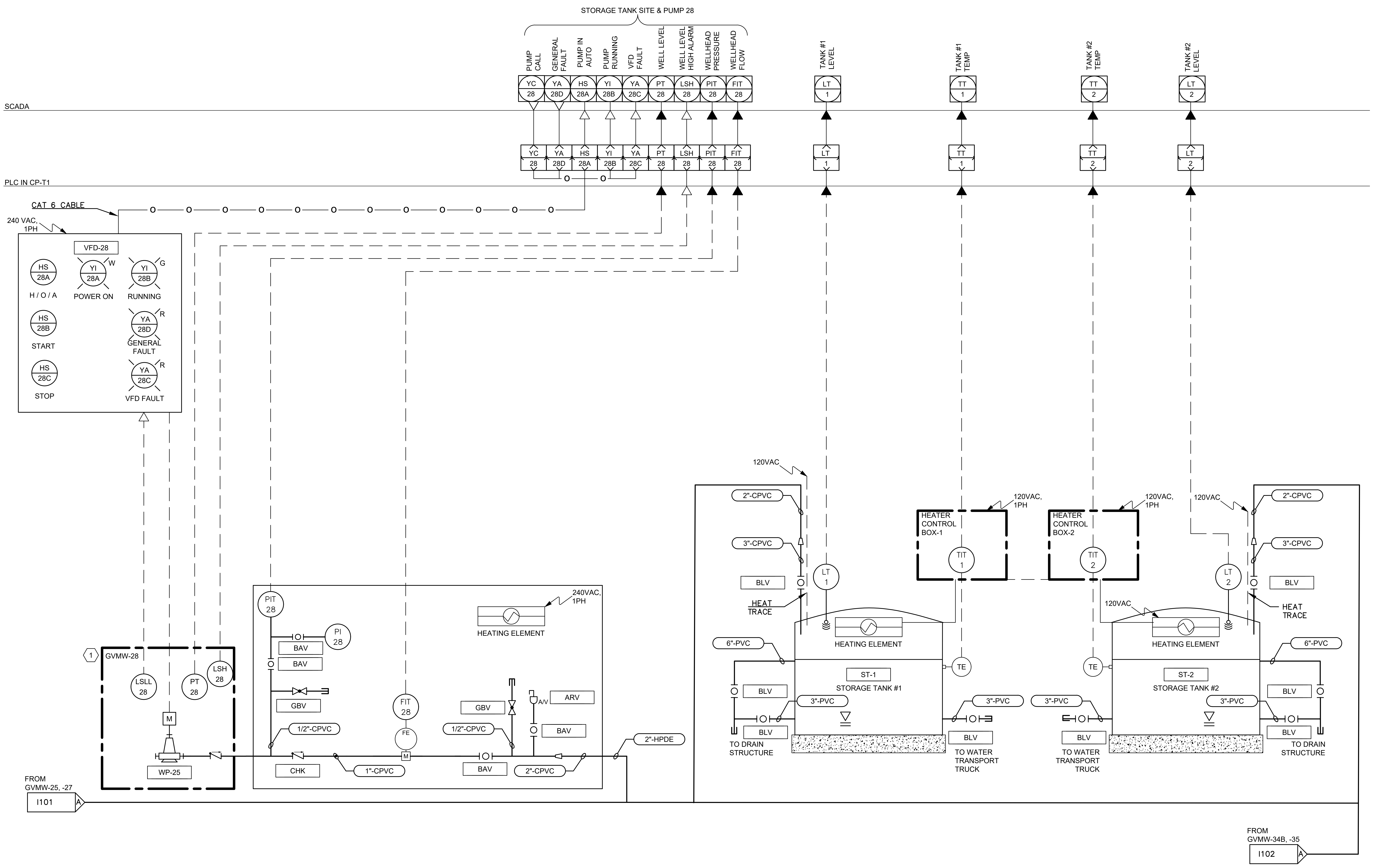

KEY NOTES:

1. PACKAGE INCLUDING PUMP, CONDUIT, AND PRESSURE INSTRUMENTATION BY OTHERS.

PROJECT FOR

NEWMONT

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CIVIL ENGINEER	
STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	J. BOESCH

SHEET NAME

P&ID GVMW-28 & STORAGE TANK SITE

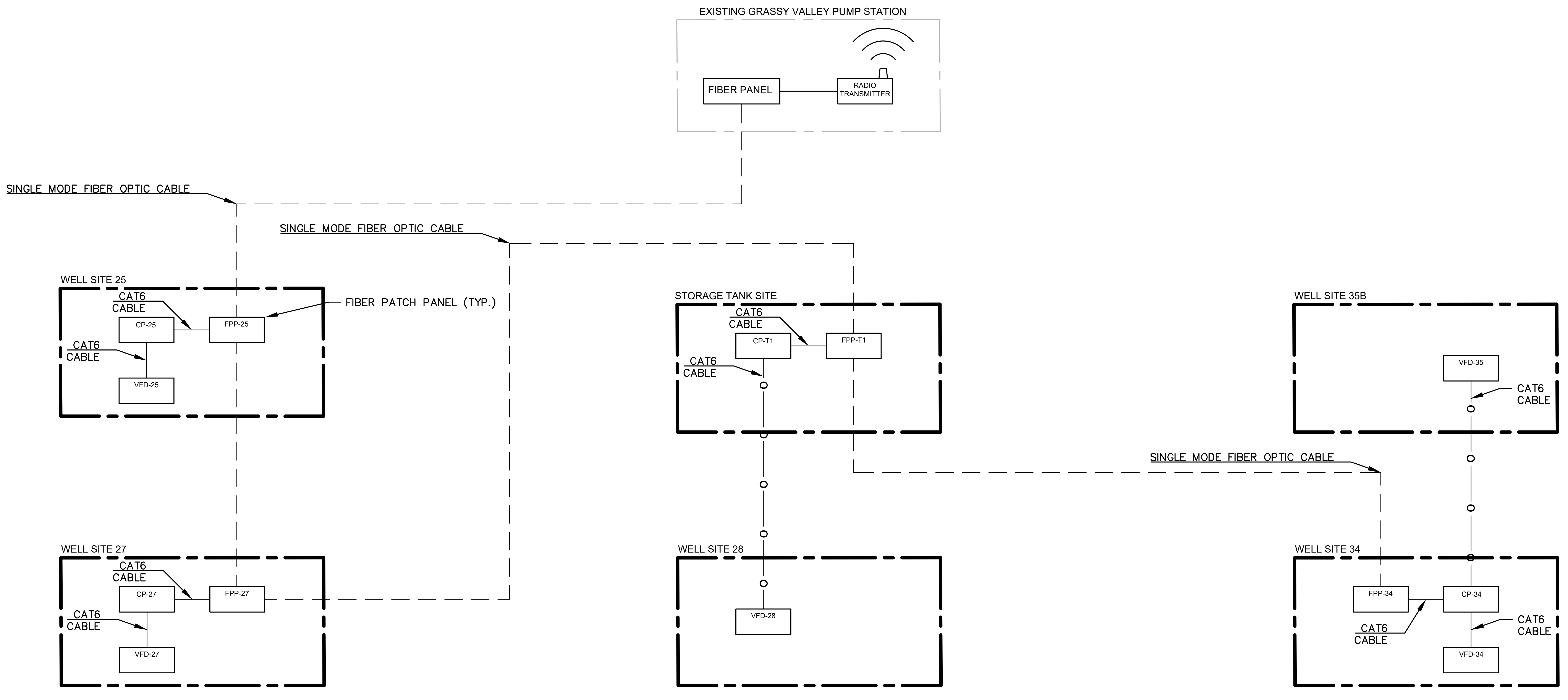
SCALE NA

SHEET NUMBER

I103

FILE NAME 10399263-08I103.DWG

60% DESIGN



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PROJECT FOR

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STRUCTURAL ENGINEER	
MECHANICAL ENGINEER	J. BOESCH
ELECTRICAL ENGINEER	Y. SEE
DRAWN BY	J. BOESCH

SHEET NAME

NETWORK TOPOLOGY DIAGRAM

SCALE NA

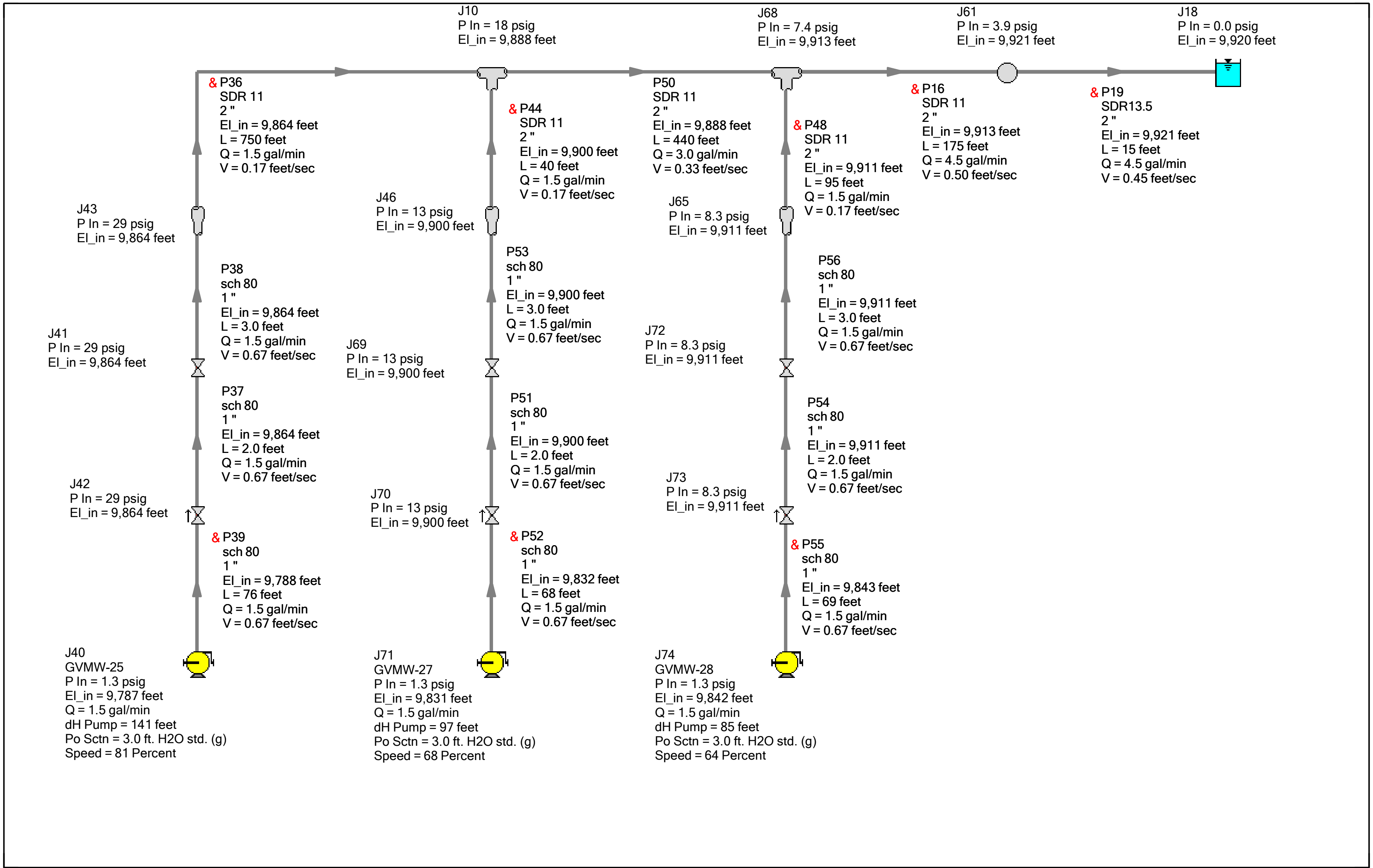
SHEET NUMBER

I104

FILE NAME 10399263-08I104.DWG

60% DESIGN

Appendix B. Hydraulic Analysis



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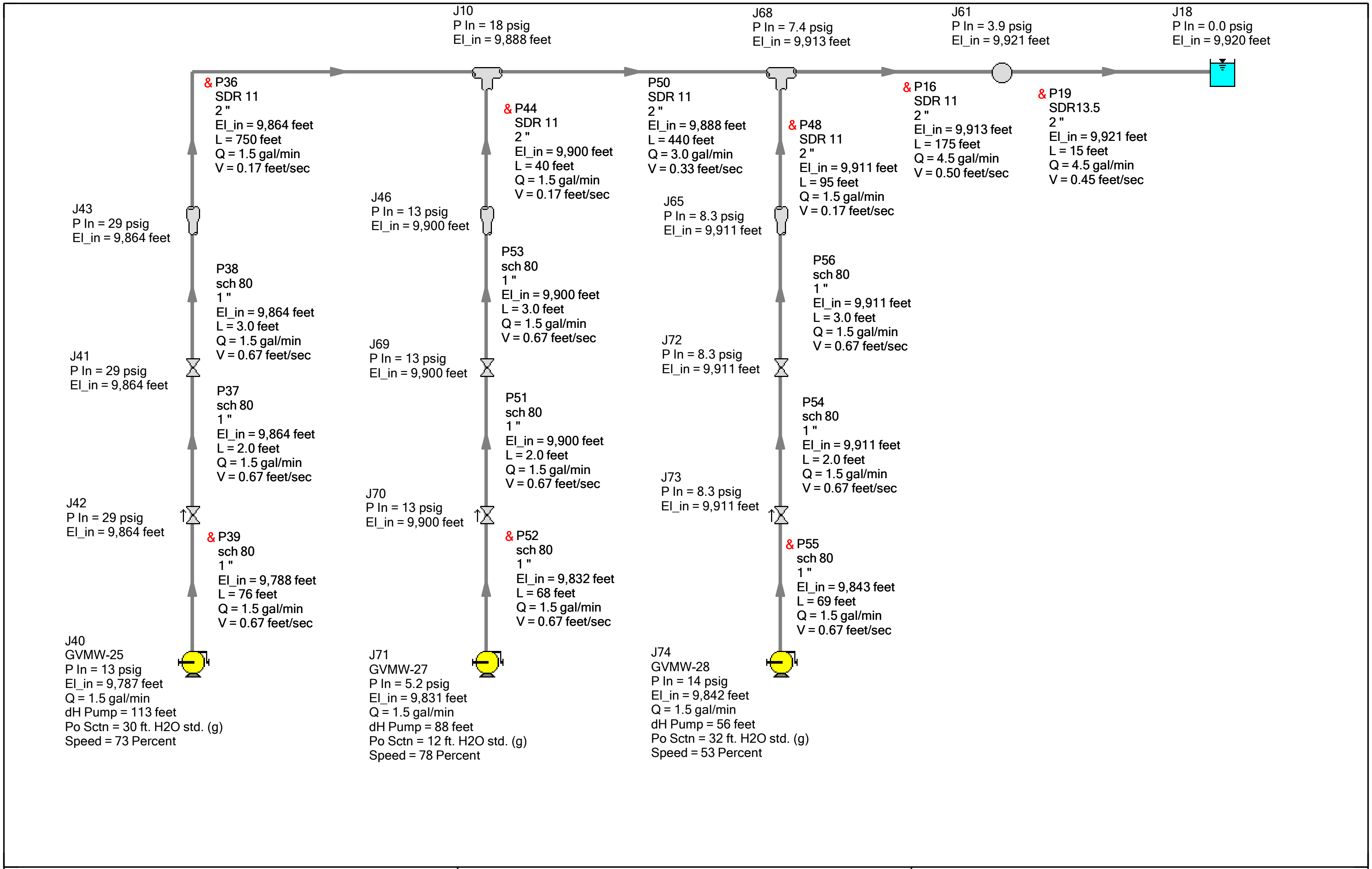

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2/4/2025
Page 1 of 1

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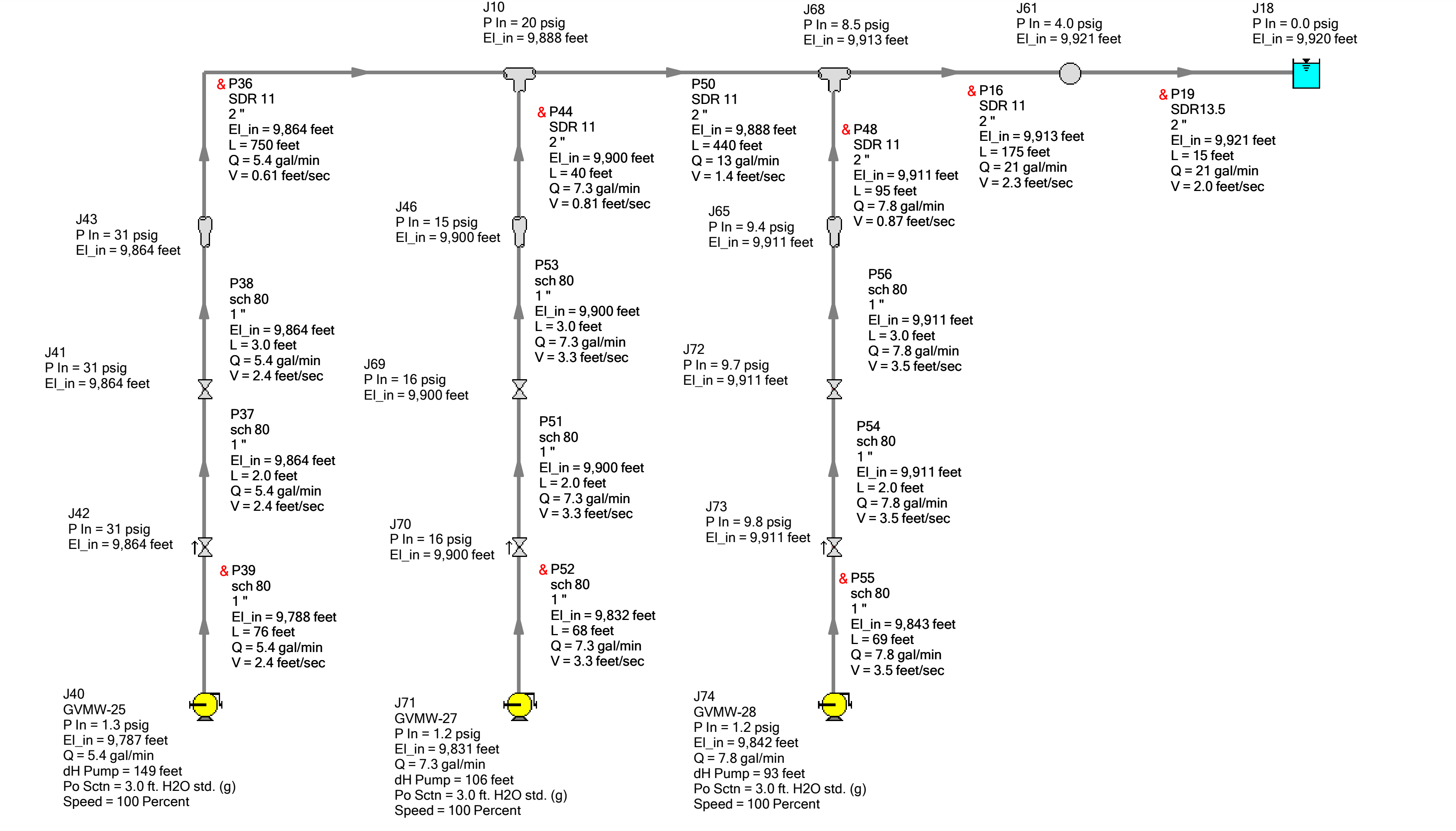

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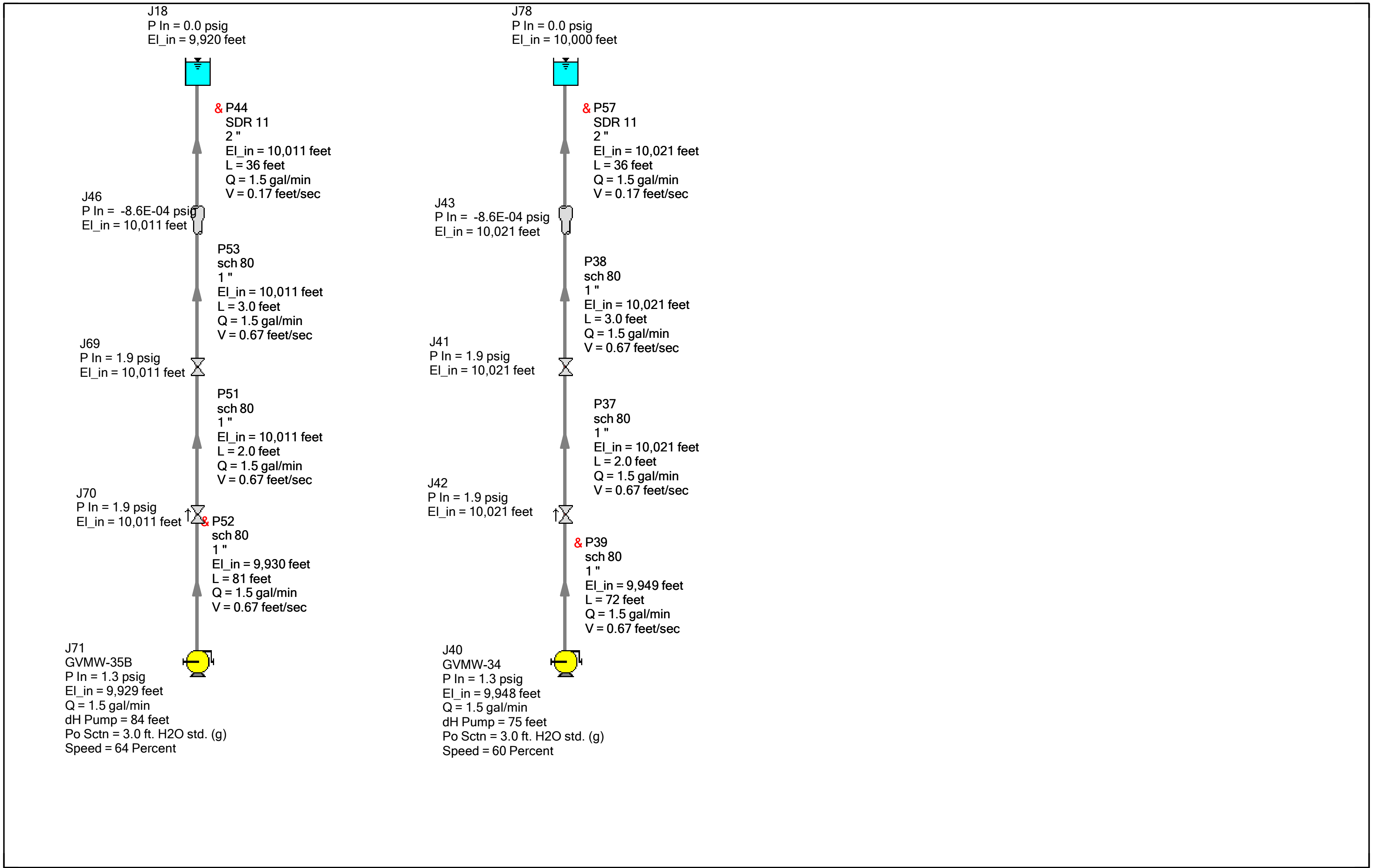

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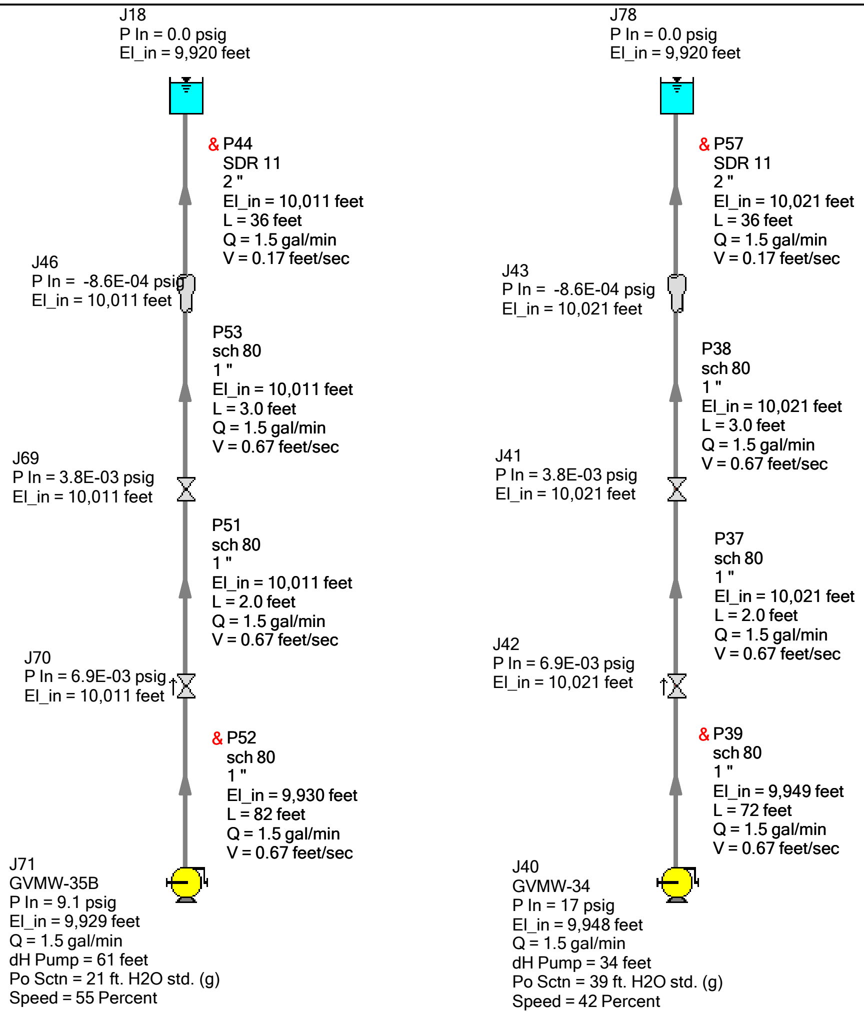

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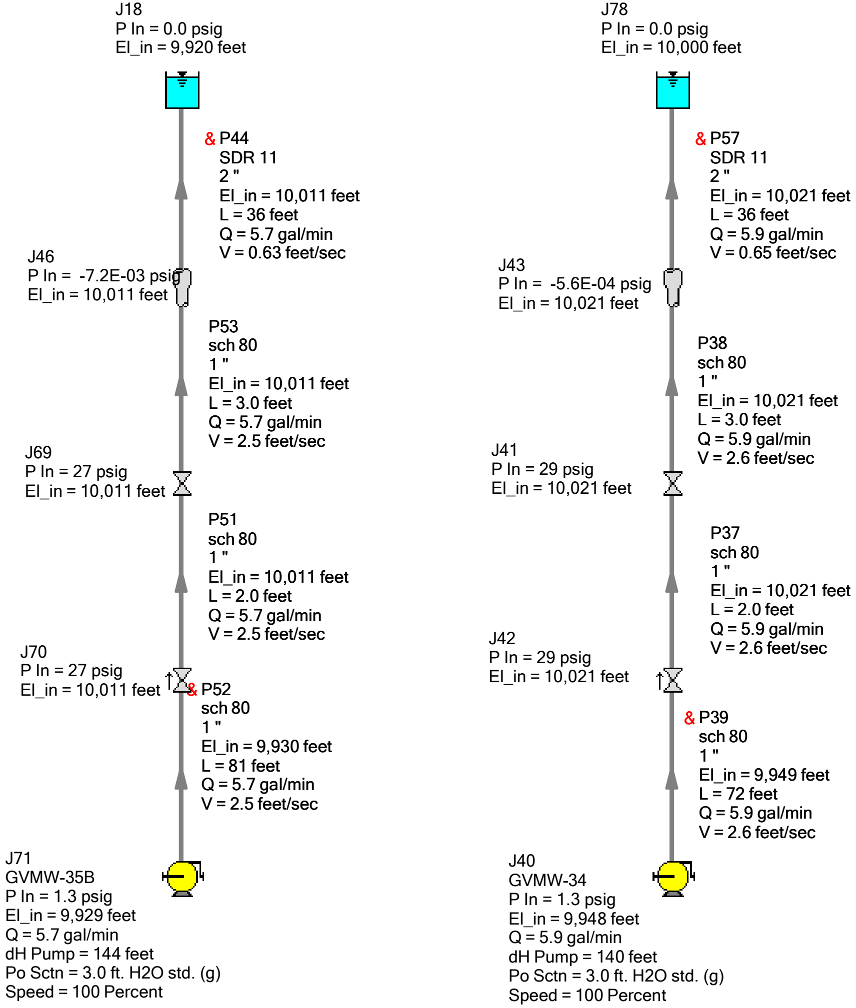

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2/4/2025
Page 1 of 1

Alignment 2: Max Head (Full Speed)

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