STORMWATER MANAGEMENT PLAN
For
WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PCD Project Number: PPR-21-014

April 2021

QUALIFIED STORMWATER MANAGER:
Name: _____
Company: _____
Address: _____

CONTRACTOR
Name: _____
Company: _____
Address: _____

Prepared By:

JDS-HYDRO CONSULTANTS, INC.

5540 TECH CENTER DRIVE • COLORADO SPRINGS, CO • 80919 • (719) 227-0072 • FAX (719) 471-3401

STORMWATER MANAGEMENT PLAN

Widefield Water and Sanitation District
Rolling Hills Tank Inlet Pipeline

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1 PROJECT CONTACTS

Applicant/Owner Information

Name:	Widefield Water and Sanitation District
Address:	8495 Fontaine Blvd., Colorado Springs, CO 80925
Contact:	Brandon Bernard, Water Department Manager
Telephone:	719-464-2051
Fax:	719-392-4328

Prepared by

Name:	JDS-Hydro Consultants, Inc.
Address:	5540 Tech Center Dr., Ste. 100, Colorado Springs, CO 80919
Contact:	Gwen Dall, P.E.
Telephone:	719-227-0072 ext. 109
Email:	gdall@jdshydro.com

Designated Operator

Name:	Widefield Water and Sanitation District
Address:	8495 Fontaine Blvd., Colorado Springs, CO 80925
Contact:	Brandon Bernard, Water Department Manager
Telephone:	719-464-2051

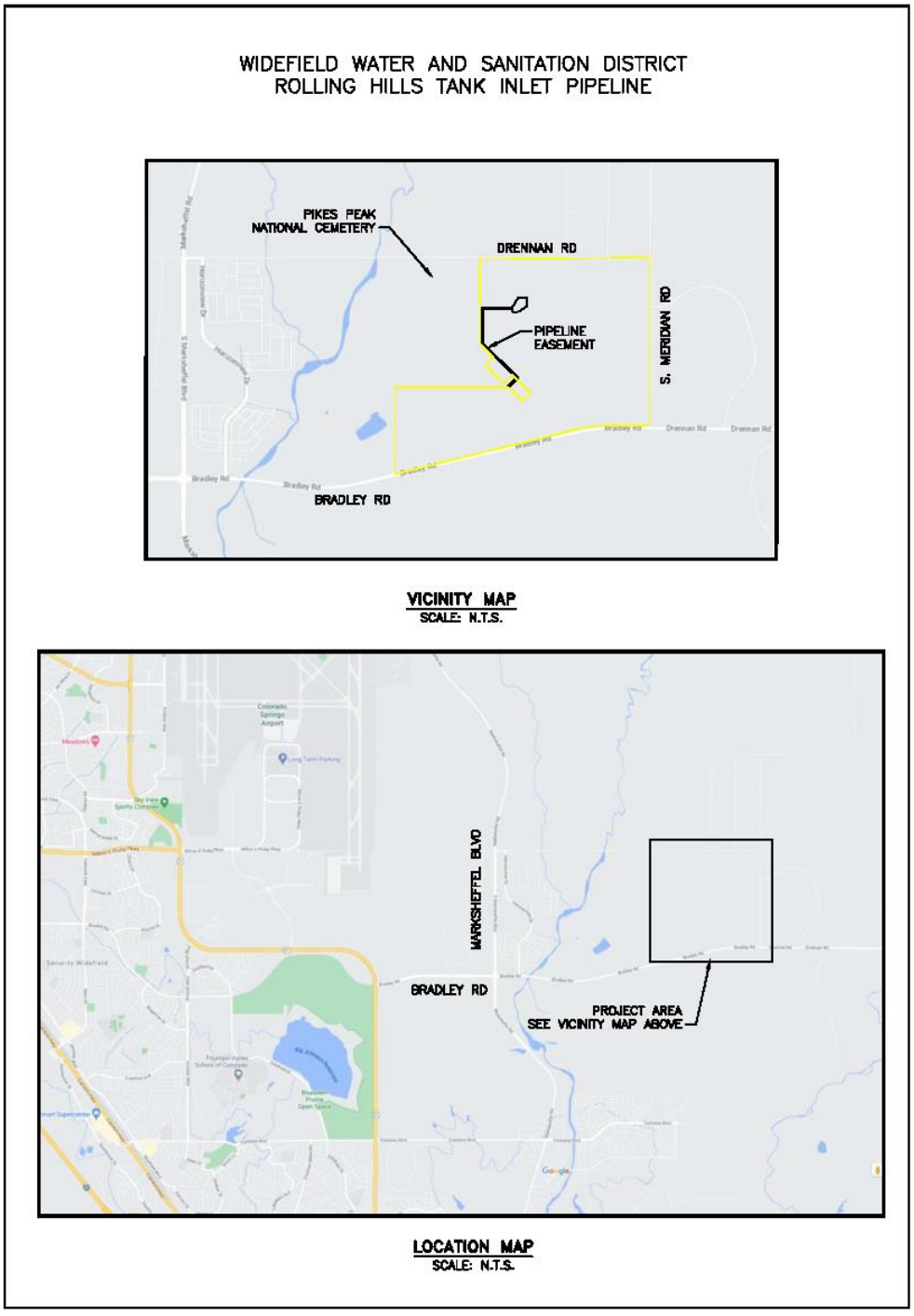
Contractor

Name:	TBD
Address:	TBD
Contact:	TBD
Telephone:	TBD

2 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The proposed water line begins approximately 2000 feet north of Bradley Road, east of the SDS water line and utility corridor. The water line will be constructed on a 3.275 acre easement within the property described in El Paso County Schedule 5500000385 in the Northwest ¼ of Section 2, Township 15 South, Range 65 West of the 6th Principle Meridian. The vicinity map below shows the proposed water line location:



2.2 Description of Construction

The project generally includes the construction of 4,879 feet of PVC water line, varying diameter from 12 inches to 24 inches on private property. Disturbed areas are generally grazing lands and all disturbed areas will be re-vegetated. Pipeline installation will consist of excavation necessary to properly bed and bury the water line to maintain 5 feet of cover over the pipeline. Trench cuts are expected to be no deeper than 15 feet and generally 5 to 7 feet. Above ground structures include air/vac relief piping and hydrants. The pipeline will connect to the Rolling Hills tank which will be constructed as a separate project.

2.3 Sequence of Construction Activities

The sequence of construction activities will be based upon site contractor timing and scheduling. Upon site contractor selection, contractor to include a sequence of activities schedule in the section provided in Appendix C of this report. A typical sequence of events is included below.

Description	Time Frame
Construction Staking	March 2021 - April 2021
Erosion Control BMPs	April 2021 - October 2021
Excavation and Installation of Pipeline	April 2021 - June 2021
Disinfection and Commissioning	April 2021 - June 2021
Cleanup and Demobilization	July 2021 – September 2021
Revegetation	November 2021 – December 2021

The anticipated time period for pipeline installation is to start April 2021 with final site stabilization by fall 2021. This time schedule could vary depending on construction schedules. This project does not require phasing.

2.4 Estimates of Excavation

The total acreage of land within the temporary and permanent easements for the pipeline is approximately 7.11 acres. All disturbance and excavation will take place within temporary and permanent easement boundaries. Actual disturbed area is anticipated to be only 3.5 acres of the total 7.11 acres within the temporary and permanent easements but any disturbed land will be revegetated. No changes to the existing grade will be made as a result of the pipeline project.

2.5 Drainage Characteristics

No springs, streams, wetlands or other surface water are within the project boundaries. There are no existing drainage facilities (storm pipes, inlets, culverts, etc.) on the site and the site is entirely outside the 100-year floodplain. A portion of the pipeline easement drains to the west and enters Franceville Tributary either by entering the roadside ditch along Drennan Road and flowing west or by overland flow and a portion of the site drains to the south and enters the Jimmy Camp East Tributary either directly by overland flow or via the roadside ditch along Bradley Road.

2.6 Soils Description

Soils for this project are delineated as Tassel fine sandy loam, 3 to 18 percent slopes (89) and are characterized as Hydrologic Soil Group D (high runoff potential when thoroughly wet). Soils were mapped using the NRCS Web Soil Survey. According to a geotechnical evaluation report by Vivid Engineering Group, dated 1/7/2021, site soils were comprised predominately of Piney Creek Alluvium deposits of mostly clayey and silty sand underlain by interbedded sandstone, claystone, and shale bedrock of the Pierre Shale Formation. A total of three (3) exploratory borings were drilled to a depth of approximately 15 feet below the existing ground surface. An additional eight (8) bores with depths ranging from approximately 29 to 45 feet were drilled in the vicinity. The ground surface consists of gently rolling topography and was covered predominantly with grasses and yucca plants.

2.7 Existing Vegetation and Percent Ground Cover

A field survey was conducted on June 2, 2020 by a qualified biologist and vegetation found within the project area includes grass and herbaceous species typical of vegetative assemblages in pastures routinely grazed by livestock. These species include buffalo grass (Bouteloua dactyloides), grama grass (Bouteloua sp.), Texas croton (Croton texensis), prairie sage (Artemisia ludoviciana) and yellow sweetclover (Melilotus officinale). Prickly pear (Opuntia sp.), cholla (Cylindropuntia sp.), and yucca (Yucca glauca) were also observed. No trees were found in the project area. Percent groundcover varies on the site between 50% and 70%.

2.8 Potential Pollution Sources

Pollutant sources which shall be evaluated for potential to contribute pollutants to stormwater discharge from the subject site may include the following:

- Disturbed and stored soils
- Vehicle tracking of sediments
- Management of contaminated soils
- Loading and unloading operations
- Non-industrial waste sources such as worker trash and portable toilets
- Other areas or procedures where potential spills can occur

2.9 Allowable Non-Stormwater Discharge

Construction dewatering is not anticipated within the limits of construction since no groundwater was encountered during soils testing for the geotechnical report. Should it be required, BMPs shall be implemented immediately and the contractor shall obtain a Construction Dewatering Permit from the CDPHE and comply with all conditions of the permit.

2.10 Receiving Water and Stream Crossings

A portion of the pipeline easement drains to the west and enters Franceville Tributary either by entering the roadside ditch along Drennan Road and flowing west or by overland flow and a portion of the site drains to the south and enters the Jimmy Camp East Tributary either directly by overland flow or via the roadside ditch along Bradley Road. No springs, streams, wetlands, or other surface water are within the project boundaries.

3 BEST MANAGEMENT PRACTICES

3.1 Erosion and Sediment Controls

All erosion and sediment control measures will be implemented in a manner that will protect properties and public facilities from the adverse effects of erosion and sedimentation as a result of construction activities. Control measures include any best management practice or other method used to prevent or reduce the discharge of pollutants to state waters. Control measures include, but are not limited to, best management practices. Control measures can include other methods such as the installation, operation, and maintenance of structural controls and treatment devices. To prevent an increase in sediment load downstream of the pipeline easement, control measures will be implemented during the construction life of this project. Erosion control socks and earthen berms will be placed at areas shown on the erosion control plan. All disturbed areas will be reseeded with a native seed mix and watered until a mature stand is established.

3.2 SWMP Map

An Erosion Control Plan was prepared and submitted for the proposed pipeline construction and should be used in conjunction with the design drawings located in Appendix A. The location of erosion control facilities are shown on the plans. The Erosion Control Plan will serve as the SWMP site map. The Erosion Control Plan will be amended as needed to implement additional control measures over and above those included. All construction control measures/BMP details are included as details in the construction drawings found in Appendix A. Further information can be found in the El Paso County DCM, Volume 2 and ECM.

3.3 Final Stabilization and Long-Term Storm Water Management

Soil erosion control measures for any disturbed land area shall be completed within twenty-one (21) calendar days after final earth disturbance has been completed. An area that is going to remain in an interim state for more than 60 days shall also be seeded. All temporary soil erosion control measures and BMPs shall be maintained until permanent soil erosion control measures are implemented. Vegetative cover density shall be a minimum of 70% of pre-disturbed levels to be considered stabilized.

3.4 Material Handling and Spill Prevention

During construction, the largest possible source of non-storm water pollution would be leakage of oils and other fluids from construction equipment and vehicles. If mobile fuel trucks are used to service equipment, absorbent materials and containers for the storage of used absorbent material will be nearby. Place debris, overburden, soil stockpiles and waste materials away from areas of runoff. The Spill Prevention Plan will be provided by the contractor and included in Appendix G.

3.5 Pollutant Prevention Control Measures

There are several Best Management Practices than can be employed to prevent or mitigate the source of pollutants and contamination of storm water runoff. Some of these are:

- Wind erosion shall be controlled by spraying site roadways and/or temporary stabilization of material stockpiles. Each dump truck hauling material to or from the site will be required to be covered with a tarpaulin.
- If needed, snow removal and/or stockpiling will be considered prior to placement at the site. Snow stockpiles must be kept away from any stormwater conveyance system (i.e. inlets, ponds, outfall locations, road surfaces, etc.)
- All refuse dumpsters and receptacles shall be equipped with functional lids to prevent rain and snow from entering. Lids must be closed when dumpsters and receptacles are not actively in use. Construction trash and debris removal from the site will be regularly scheduled.
- Storage containers, drums, and bags shall be stored away from direct traffic routes to prevent accidental spills. Ensure packages and containers are intact.
- Bulk storage of petroleum products or other liquid chemicals that is 55 gallons or greater must have secondary containment or equivalent protection to contain spills and prevent spilled material from entering state waters.
- Empty drums shall be covered to prevent collection of precipitation.
- Containers shall be stored on pallets to prevent corrosion of containers, which can result when containers come in contact with moisture on the ground.
- Tracking control must be implemented by the contractor to prevent unnecessary soil from entering paved surfaces. The measures to be used will be preventing equipment in the construction area from moving off-site. If the contractor cannot do this, then a vehicle tracking pad will be required according to El Paso County specifications. Brooms and shovels may be required for tracking control.
- Portable restroom facilities will be used by the construction crew during the construction phase. Portable restroom facilities will be located a minimum of 10 feet from stormwater inlets and 50 feet from state waters. They will be secured at all four corners to prevent overturning and cleaned on a weekly basis. They will be inspected daily for spills.

The contractor is certainly not limited to these measures which may require adjusting the BMP's as the project progresses and implement further controls as prudence and good judgment deem necessary.

3.6 Qualified Stormwater Manager

The Qualified Stormwater Manager is an individual knowledgeable in the principles and practices of erosion and sediment control and pollution prevention and has the skills to assess conditions at construction sites that could impact stormwater quality and the effectiveness of stormwater controls implemented to meet the requirements of the stormwater discharges associated with construction activity permit. A copy of the signed SWMP permit application is included in Appendix B.

3.7 Inspection and Maintenance

A thorough inspection of the storm water management system shall be performed every 14 days as well as within 24 hours of any rain or snowmelt event that causes surface erosion. If any system deficiencies are noted, correction actions must begin immediately. Documentation of inspection must be made available if requested. Areas to be inspected for evidence or, or the potential for, pollutants leaving the construction site boundaries and discharging to state waters include:

- Construction site perimeter
- All disturbed areas
- Designated haul routes
- Material and waste storage areas exposed to precipitation
- Locations where stormwater has the potential to discharge offsite
- Locations where vehicles exit the site

In addition, implemented control measures shall be inspected to confirm they are in operational condition and are adequate to minimize pollutant discharges. Repairs and maintenance may include, but are not limited to, the following:

- Erosion of side slopes or loose erosion control socks shall be repaired.
- Any accumulated trash or debris shall be removed from protected areas.

An Operation and Maintenance Inspection Record form is included in Appendix D. The following items must be documented by contractor as part of the site inspections and kept within this report. Completed inspected records shall be kept in Appendix E of this SWMP and kept onsite.

- Inspection date
- Name(s), title(s), and signature(s) of personnel making inspection
- Weather conditions at the time of inspection
- Phase of construction at the time of inspection
- Estimated acreage of disturbance at the time of inspection
- Location(s) of discharges of sediment or other pollutants from site
- Location(s) of control measures that need to be maintained
- Location(s) of control measures that fail to operate as designed or proved inadequate
- Location(s) where additional control measures are needed that were not in place at time of inspection
- Description of the minimum inspection frequency utilized when conducting each inspection
- Deviations from the minimum inspection schedule
- Signed statement of compliance added to the report after corrective action has been implemented

30-day inspections must take place on this site where construction activity is complete, but vegetative cover is still being established.

3.8 SWMP Availability and Revisions

A hardcopy of this SWMP is to be retained onsite or be onsite when construction activities are occurring at the site unless another location is approved by the Division. Records of the SWMP changes made that includes the date and identification of the changes must be kept at the site within this report. The SWMP should be viewed as a "living document" throughout the lifetime of the project. This SWMP shall be revised by informing Engineer of deviations to original plan. Engineer will then update this report and all applicable drawings, forms, tables, etc. as deemed necessary. Revisions to the SWMP are required when the following occurs:

- A change in design, construction, operation, or maintenance of the site requiring implementation of new or revised control measures
- The SWMP proves ineffective in controlling pollutants in stormwater runoff in compliance with the permit conditions
- Control measures identified in the SWMP are no longer necessary and are removed

- Corrective actions are taken onsite that result in a change to the SWMP

The provisions of the SWMP as written and updated must be implemented from commencement of construction activity until final stabilization is complete.

3.9 Non-Stormwater Discharges

Note that a SWMP permit covers stormwater discharges from construction activity and does not include the following: uncontaminated springs, concrete washout water, or landscape irrigation return flow. Discharges resulting from emergency firefighting activities are authorized by a SWMP permit.

APPENDIX A – Construction Drawings

WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

2019.829.2030

EL PASO COUNTY, COLORADO

SURVEY DATA

TOPOGRAPHY SURVEY CONDUCTED BY CLARK LAND SURVEYING (DATED 01/24/20). SEE SURVEY FOR ESTABLISHED CONTROL. THE FOLLOWING COORDINATE SYSTEM AND DATUM RECORD IS AS FOLLOWS:

HORIZONTAL DATUM: MODIFIED COLO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. SCALE FACTOR 1.000321070

VERTICAL DATUM: BASED ON OPUS SOLUTION RAN ON CONTROL POINT #100 (3-1/2" BRASS CAP IN CONCRETE, "EL PASO CALIBRATION BASELINE" "2003"). ELEVATION=5815.45' (NAVD1988)

UTILITIES SHOWN WITHIN THE SURVEY HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, EXISTING DRAWINGS AND/OR UTILITY LOCATE MARKINGS. THE SURVEYOR NOR ENGINEER MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR AND ENGINEER FURTHER DO NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE.

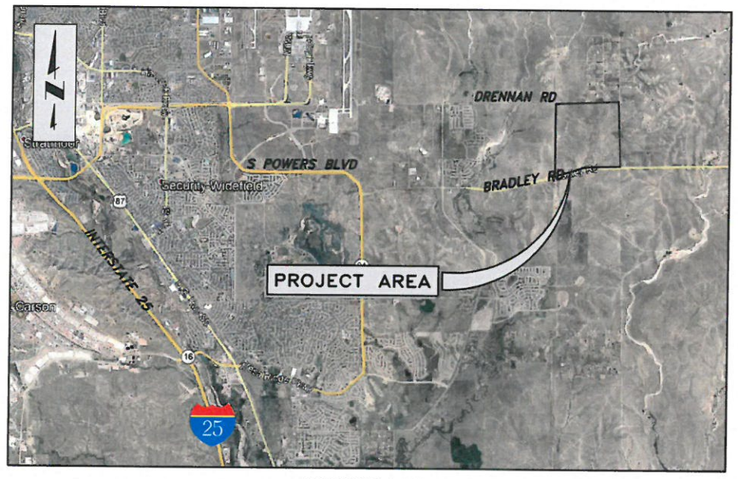
LEGEND

- EX PROPERTY LINE
- EX RIGHT-OF-WAY
- EX FENCE
- EX WATER LINE
- EX SANITARY SEWER LINE
- EX O.H. ELECTRIC
- EX U.G. GAS LINE
- EX CONTOURS-MAJOR
- EX CONTOURS-MINOR
- EX EASEMENT
- EX WATER MANHOLE
- EX GAS METER
- EX UTILITY POLE
- BORE HOLE
- OVERLAND FLOW ARROW
- PP SANITARY SEWER LINE ALIGNMENT
- PP WATER LINE ALIGNMENT
- PP CONTOURS-MAJOR (5540)
- PP CONTOURS-MINOR
- PP FENCE
- PP U.G. ELECTRIC LINE (UGE)
- PP EASEMENT
- PP TEMP. CONSTRUCTION EASEMENT
- PP EROSION CONTROL SILT FENCE (SF)
- PP EROSION CONTROL EARTHEN BERM (BERM)
- PP EROSION CONTROL BALES
- PP EROSION CONTROL LOG
- PP WATER LINE FITTING
- PP WATER VALVE
- PP HYDRANT ASSEMBLY (ISOLATION VALVE INCLUDED)

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

Widefield Water and Sanitation District

FOR CONSTRUCTION



VICINITY MAP
N.T.S.

PRE-EXCAVATION CHECKLIST

- Gas and Other Utility Lines Shown on Construction Plans
- Utility Notification Center of Colorado (UNCC)-Call at Least Two (2) Business Days Ahead-1-800-922-1987
- Utilities Located & Marked on the Ground
- Employees Briefed on Marking and Color Codes*
- Employees Trained on Excavation and Safety Procedures for Natural Gas Lines
- When Excavation Approaches Gas Lines, Employees must Expose Lines by Careful Probing and Hand-Digging

COLOR CODE FOR MARKING UNDERGROUND UTILITY LINES

WHITE	PROPOSED EXCAVATION
MAGENTA	TEMPORARY SURVEY MARKINGS
RED	ELECTRIC
YELLOW	GAS, OIL, STEAM
ORANGE	COMMUNICATIONS, CATV
BLUE	POTABLE WATER
PURPLE	IRRIGATION, RECLAIMED WATER, SLIPPIN LINES
GREEN	SEWER

UNCC UTILITY NOTIFICATION CENTER OF COLORADO
3 Days Before You Dig:
Call: 1-800-922-1987
Click: www.UNCC.org

PPR-21-014

PARTICIPANTS

OWNER
WIDEFIELD WATER AND SANITATION DISTRICT
8495 FONTAINE BLVD
COLORADO SPRINGS, CO 80925
CONTACT: ROBERT BANNISTER, PE
PHONE: (719) 955-6118

CONSULTING/DESIGN ENGINEER
JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR, STE 100
COLORADO SPRINGS, CO 80903
CONTACT: GWEN DALL, PE
PHONE: (719) 227-0072

SIGNATURE BLOCKS

EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL, AS AMENDED.
IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

JENNIFER E. IRVINE, P.E., DATE
COUNTY ENGINEER / ECM ADMINISTRATOR

DISTRICT APPROVALS
THE WIDEFIELD WATER AND SANITATION DISTRICT RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE WIDEFIELD WATER AND SANITATION DISTRICT HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

WIDEFIELD WATER AND SANITATION DISTRICT DESIGN APPROVAL

BY: DATE:

2019-829-2030
CIP NO.

IN CASE OF ERRORS OR OMISSIONS WITH THE WATER DESIGN AS SHOWN ON THIS DOCUMENT, THE STANDARDS AS DEFINED IN THE "RULES AND REGULATIONS FOR INSTALLATION OF WATER MAINS AND SERVICES" SHALL RULE. APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

ENGINEER'S STATEMENT:

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID DETAILS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE APPLICABLE GOVERNING AGENCIES.

Gwen Dall
GWEN DALL, P.E. #51810
JDS-HYDRO CONSULTANTS, INC.

COLORADO LICENSED GWENDOLYN JOYCE 4/5/21 0051810 PROFESSIONAL ENGINEER

4/5/21
DATE

102.121
PROJECT NO.

GENERAL NOTES

1. ALL UTILITY CONSTRUCTION TO BE CONDUCTED IN CONFORMANCE WITH THE CURRENT WIDEFIELD WATER AND SANITATION DISTRICT SPECIFICATIONS. COMPACTION REQUIREMENTS SHALL BE 95% STANDARD PROCTOR AS DETERMINED BY ASTM D698, UNLESS OTHERWISE APPROVED BY THE WIDEFIELD WATER AND SANITATION DISTRICT OR A HIGHER STANDARD IS IMPOSED BY ANOTHER AGENCY HAVING RIGHT-OF-WAY JURISDICTION. CONTRACTOR IS ALSO REQUIRED TO COMPLY WITH THE REQUIREMENTS OF THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.

2. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE WIDEFIELD WATER AND SANITATION DISTRICT. THE WIDEFIELD WATER AND SANITATION DISTRICT RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS. WIDEFIELD WATER AND SANITATION DISTRICT CONSTRUCTION SPECIFICATIONS MAY BE OBTAINED FROM THEIR WEBSITE: www.wwsdonline.com

3. ALL CARBON STEEL AND DUCTILE IRON PIPE, TO INCLUDE FITTINGS, VALVES AND FIRE HYDRANTS WILL BE WRAPPED WITH POLYETHEYLENE TUBING, BONDED AT EACH JOINT AND ELECTRICALLY ISOLATED.

4. ALL CARBON STEEL AND DUCTILE IRON PIPE AND FITTINGS SHALL HAVE CATHODIC PROTECTION USING NO. 6 WIRE WITH 17 LB. MAGNESIUM ANODES EVERY 400 FEET AND 1 LB. MAGNESIUM ANODES AT EVERY FITTING.

5. PVC MAIN LINES SHALL BE INSTALLED WITH COATED NO. 12 TRACER WIRE.

6. THE CONTRACTOR IS REQUIRED TO NOTIFY THE WIDEFIELD WATER AND SANITATION DISTRICT A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO NOTIFY WWSD A WEEK IN ADVANCE OF ANY REQUIRED BASIN OR UTILITY SHUTDOWNS.

7. THE LOCATION OF ALL UTILITIES AS SHOWN ON THESE DRAWINGS ARE APPROXIMATE ONLY. THE LOCATION OF ALL UTILITIES SHALL BE VERIFIED PRIOR TO CONSTRUCTION BY THE CONTRACTOR.

8. THE CONTRACTOR SHALL FIELD EXCAVATE AND VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL TIE-INS. CONTRACTOR SHALL NOTIFY THE WIDEFIELD WATER AND SANITATION DISTRICT AND THE ENGINEER OF THE FIELD VERIFIED INFORMATION PRIOR TO CONSTRUCTION.

9. ALL BENDS SHALL BE FIELD STAKED PRIOR TO CONSTRUCTION.

10. ANY WATER UTILITY MATERIAL REMOVED AND NOT REUSED SHALL BE RETURNED TO THE WIDEFIELD WATER AND SANITATION DISTRICT IF THE DISTRICT SO REQUESTS.

11. THE CONTRACTOR SHALL AT HIS EXPENSE SUPPORT AND PROTECT ALL UTILITY MAINS SO THAT THEY WILL FUNCTION CONTINUOUSLY DURING CONSTRUCTION. SHOULD A UTILITY MAIN FAIL AS A RESULT OF THE CONTRACTOR'S OPERATION, IT WILL BE REPLACED IMMEDIATELY BY EITHER THE CONTRACTOR OR THE WIDEFIELD WATER AND SANITATION DISTRICT AT FULL COST OF LABOR AND MATERIALS TO THE CONTRACTOR.

12. CONTRACTOR IS RESPONSIBLE FOR ALL DEWATERING EFFORTS. ANY PUMPING OR BYPASS OPERATIONS MUST BE REVIEWED AND APPROVED PRIOR TO EXECUTION BY BOTH THE WIDEFIELD WATER AND SANITATION DISTRICT AND THE ENGINEER.

13. CONTRACTOR MUST REPLACE OR REPAIR ANY DAMAGE TO ALL SURFACE IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO FENCES, CURB AND GUTTER AND/OR ASPHALT THAT MAY BE CAUSED DURING CONSTRUCTION.

14. ALL SITE UTILITIES AND IMPROVEMENTS SHALL HAVE AS "AS-BUILT" PLANS PREPARED AND APPROVED PRIOR TO FINAL ACCEPTANCE BY THE WIDEFIELD WATER AND SANITATION DISTRICT.

15. PRIOR TO CONSTRUCTION, A PRE-CONSTRUCTION CONFERENCE IS REQUIRED A MINIMUM OF 72 HOURS IN ADVANCE OF COMMENCEMENT OF WORK.

16. EL PASO COUNTY STORMWATER AND/OR EROSION CONTROL PERMITS, CDPHE STORMWATER CONSTRUCTION ACTIVITY AND DEWATERING PERMITS, AND CITY OF COLORADO SPRINGS WORK IN THE R.O.W. PERMIT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN PRIOR TO CONSTRUCTION.

17. ALL MAIN LINES (PVC AND DUCTILE IRON) SHALL BE INSTALLED WITH COATED NO. 12 TRACER WIRE WITH TEST STATIONS EVERY 500 FT. CARSONITES TO BE INSTALLED TO INDICATE TRACER STATION LOCATIONS.

18. AERIAL BASEMAP IMAGERY, IF DEPICTED HEREIN, IS NOT TO SCALE AND IS SHOWN FOR CONCEPTUAL REFERENCE ONLY.

19. SEE WIDEFIELD WATER AND WASTEWATER SYSTEM STANDARD SPECIFICATIONS FOR ALL GENERAL AND DESIGN STANDARDS/CIVIL DRAWINGS DETAILS.

20. WATER MAIN INSTALLATION:
THE UNIT PRICE SHALL INCLUDE ALL PIPE, PIPE INSTALLATION, TRENCHING, STABILIZATION, AND BEDDING AS SHOWN ON THE TYPICAL DETAIL, DEWATERING, BACKFILL, TRACER WIRE, COMPACTION, CLEAN-UP, REVEGETATION, FLUSHING, TESTING, GRADING AND ALL WORK INCIDENTAL THERTO TO COMPLETE THE WORK AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.

21. CONTRACTOR IS TO COORDINATE WITH THE RANCHER WHO RUNS CATTLE ON THE PROPERTY TO ENSURE NO CATTLE ARE HARMED DURING CONSTRUCTION.

22. NO WATER FACILITY SHALL BE PLACED IN SERVICE UNTIL AFTER COMPLETION OF ALL PRESSURE TESTING, DISINFECTION, AND COMPACTION TESTING.

23. SUBSURFACE UTILITY ENGINEERING
23.1. UTILITIES ARE DEPICTED ON THESE PLANS IN ACCORDANCE WITH THEIR ACHIEVED "QUALITY LEVELS" AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEER'S DOCUMENT ASCE 38, "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."
23.2. RELIANCE UPON THESE DATA FOR RISK MANAGEMENT PURPOSES DURING BIDDING DOES NOT RELIEVE THE EXCAVATOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION STATUTES, POLICIES, AND/OR PROCEDURES DURING EXCAVATION. IT IS IMPORTANT THAT THE CONTRACTOR INVESTIGATES AND UNDERSTANDS THE SCOPE OF WORK BETWEEN THE PROJECT OWNER AND THEIR ENGINEER REGARDING THE SCOPE AND LIMITS OF THE UTILITY INVESTIGATIONS LEADING TO THESE UTILITY DEPICTIONS.

24. DISINFECTION OF FACILITIES
24.1. THE CONTRACTOR SHALL DISINFECT ALL DOMESTIC WATER LINES ACCORDING TO AWWA C651-14 AND TANK ACCORDING TO AWWA C652-11.
24.2. THE CONTRACTOR SHALL COLLECT SAMPLES FROM THE PIPELINE AND TANK AFTER FINAL FLUSHING AND PRIOR TO PLACING FACILITIES IN SERVICE AND TEST FOR COLIFORM ORGANISMS. THE NUMBER AND FREQUENCY OF SAMPLES SHALL CONFORM WITH THE REQUIREMENTS OF THE PUBLIC HEALTH AGENCY HAVING JURISDICTION.
24.3. REPEAT DISINFECTION UNTIL SATISFACTORY SAMPLES HAVE BEEN OBTAINED IF INITIAL OR SUBSEQUENT DISINFECTION FAILS TO PRODUCE SATISFACTORY SAMPLES

SHEET INDEX

SHEET NUMBER	DESCRIPTION
	COVER SHEET
GENERAL	
G1	GENERAL NOTES
CIVIL	
C1	OVERALL SITE PLAN
C2	PIPELINE PLAN & PROFILE STA 0+00 TO 6+50
C3	PIPELINE PLAN & PROFILE STA 6+50 TO 12+50
C4	PIPELINE PLAN & PROFILE STA 12+50 TO 18+50
C5	PIPELINE PLAN & PROFILE STA 18+50 TO 23+50
C6	PIPELINE PLAN & PROFILE STA 23+50 TO 29+50
C7	PIPELINE PLAN & PROFILE STA 29+50 TO 35+50
C8	PIPELINE PLAN & PROFILE STA 35+50 TO 41+50
C9	PIPELINE PLAN & PROFILE STA 41+50 TO 46+50
C10	PIPELINE PLAN & PROFILE STA 46+50 TO 48+79.29
C11	PIPELINE CIVIL DETAILS
C12	PIPELINE CIVIL DETAILS
C13	PIPELINE EROSION CONTROL PLAN
C14	PIPELINE EROSION CONTROL PLAN
C15	EROSION CONTROL DETAILS

ABBREVIATIONS

WWSD	WIDEFIELD WATER AND SANITATION DISTRICT
VA PPNC	VETERANS AFFAIRS PIKES PEAK NATIONAL CEMETERY
RHBPS	ROLLING HILLS BOOSTER PUMP STATION
SDS	SOUTHERN DELIVERY SYSTEM
PP	PROPOSED
EX	EXISTING
SCH	SCHEDULE
STA	STATION
FNPT	FEMALE NATIONAL PIPE THREAD
MNPT	MALE NATIONAL PIPE THREAD
FL	FLANGE
FH	FIRE HYDRANT
TB	THRUST BLOCK
MJ	MECHANICAL JOINT
BV	BUTTERFLY VALVE
GV	GATE VALVE
SOV	SIDE OPERATED VALVE
RED	REDUCER

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

GENERAL NOTES

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

G1

SHEET 1 OF 16

2021/04/05 10:08 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Cover_Pipeline.dwg

0 200' 400'
SCALE 11x17: 1" = 400'
SCALE 24x36: 1" = 200'

NOTE:
AERIAL IMAGERY IS NOT ACCURATELY SCALED AND SHOULD BE UTILIZED FOR REFERENCE ONLY

ACCESS ROAD AND DRAINAGE STRUCTURE TO BE INSTALLED BY OTHERS

TANK TO BE INSTALLED BY OTHERS

1175'

902'

DRENNAN RD

BRADLEY RD

EXISTING FENCE

SCHEDULE #: 5500000385
OWNER: MURRAY FOUNTAIN LLC
LOCATION: 01-15-65

NUSTAR GAS LINE

XCEL ENGERY POWER LINES

25' RADIUS CLEARANCE TO BE MAINTAINED AROUND EXISTING POWER POLE NUMBERED 72 AS LABELED ON TRISTATE DRAWINGS

25' RADIUS CLEARANCE TO BE MAINTAINED AROUND EXISTING POWER POLE NUMBERED 73 AS LABELED ON TRISTATE DRAWINGS

TRISTATE GENERATION POWER LINES

35' PROPOSED TEMPORARY CONSTRUCTION EASEMENT

30' PROPOSED PERMANENT EASEMENT

PROPOSED 16" WATER LINE

PROPOSED 24" WATER LINE

PROPOSED 12" WATER LINE

EXISTING FENCE

90' SDS TEMPORARY EASEMENT (ABANDONED)

60' SDS EASEMENT

EXISTING WATER LINE CONNECTION

30' EXISTING WWSD EASEMENT

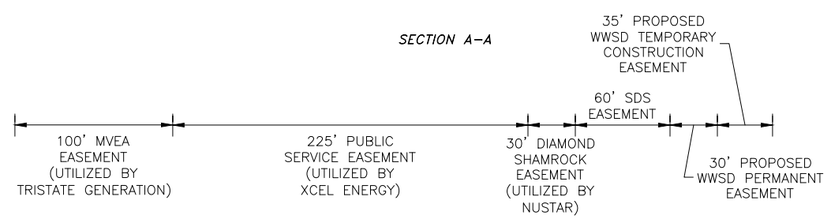
POWER LINE OWNED BY MVEA

SEC 1, T15S, R65W
SEC 12, T15S, R65W
SEC 12, T15S, R65W
SEC 11, T15S, R65W
SEC 2, T15S, R65W
SEC 11, T15S, R65W

SCHEDULE #: 5500000384
OWNER: UNITED STATES OF AMERICA
LOCATION: 10545 DRENNAN RD

NOTES:
1. WATER LINE CROSSES UNDERNEATH POWER LINES AT A 89° ANGLE.
2. VERTICAL AND HORIZONTAL DATUM IS IN MODIFIED STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983.

SECTION A-A



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5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

OVERALL SITE PLAN

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
DATE
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

C1
SHEET 2 OF 16

J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg
2021/04/05 10:00 AM By: Shelby West

0 25' 50'
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'

EXISTING ANCHOR LINES FOR POWER POLES

EXISTING FENCE

EXISTING SDS PERMANENT EASEMENT

EXISTING 66" SDS RAW WATER TRANSMISSION LINE

EXISTING 12" PARALLEL WATER LINE (NOT IN USE, CAPPED)

TH-1
STA. 0+00.00
N=1342331.41
E=3248920.57
CONNECT TO EXISTING 12" GATE VALVE W/ FOSTER ADAPTOR
SEE PIPELINE CONNECTION DETAIL BELOW

ALL UTILITIES DEPICTED AT QL B UNLESS NOTED OTHERWISE

QLB DATA SUMMARY:
TH1: 12" WATER LINE
DEPTH TO TOP OF PIPE FROM GROUND LEVEL: 53"
N = 1342331.41
E = 3248920.57

SCHEDULE: 5500000384
OWNER: UNITED STATES OF AMERICA
LOCATION: 10545 DRENNAN RD

MATCHLINE STA 6+50

PROPERTY LINE

PROPOSED 12" C900 PVC DR 18 WATER LINE

0+00 2+00 4+00 6+00

14' 16' 13' 17' 11' 19'

30' PERMANENT PIPELINE EASEMENT

35' TEMPORARY CONSTRUCTION EASEMENT

EXISTING 12" WATER LINE

REPAIR FENCE TO ORIGINAL CONDITION FOLLOWING WATER LINE INSTALLATION

EXISTING WWSD PERMANENT EASEMENT

STA. 0+06.80
N=1342331.29
E=3248927.37
INSTALL AIR/VAC VAULT
SEE DETAIL B/C11

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

5915 5910 5905 5900 5895 5890 5885 5880

EXISTING 10" WATER LINE

EXISTING 12" PARALLEL WATER LINE (NOT IN USE, CAPPED)

EXISTING 12" X 10" REDUCER

EXISTING 12" WATER LINE

CONNECT TO EXISTING 12" GATE VALVE

PIPELINE CONNECTION
SCALE: N.T.S.

PROFILE SCALE
HORIZ.-1"=50'
VERT.-1"=10'

5910 5900 5890 5880 5870

EXISTING GRADE

STA=0+00.00
BOP ELEV=5908.12
CONNECT TO EXISTING 12" WATER LINE W/ FOSTER ADAPTOR

STA=0+06.80
BOP ELEV=5907.64
INSTALL AIR/VAC VAULT
SEE DETAIL B/C11

307.44' OF 12" DR 18 C900 PVC @ -7.07%

149 L.F. OF VERT. DEFLECTION
MAX.1°/PIPE DEFLECTION

5' MIN BURY DEPTH

STA. 3+06.68
B.O.P. EL=5886.45

STA. 4+55.34
B.O.P. EL=5878.12

343.61' OF 12" DR 18 C900 PVC @ -4.14%

MATCHLINE STA 6+50

0+00 1+00 2+00 3+00 4+00 5+00 6+00

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 0+00 TO 6+50

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE DALY
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C2

SHEET 3 OF 16

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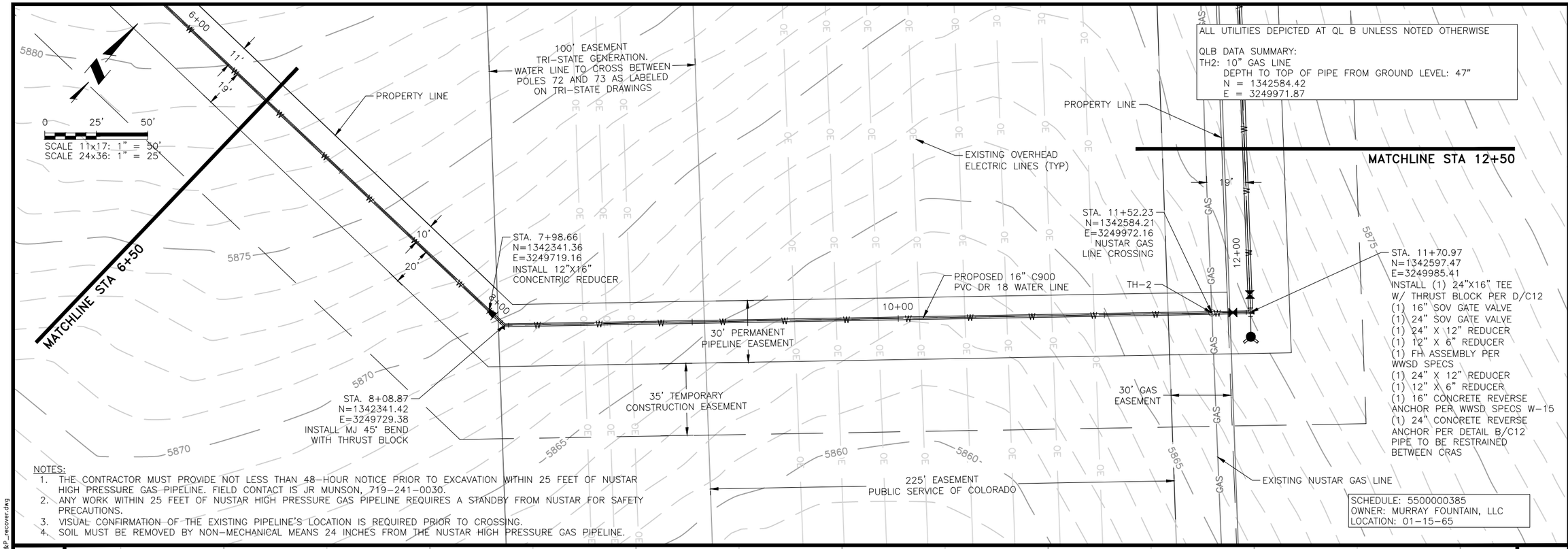

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COLORADO SPRINGS, COLORADO 80919
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 6+50 TO 12+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
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FOR CONSTRUCTION

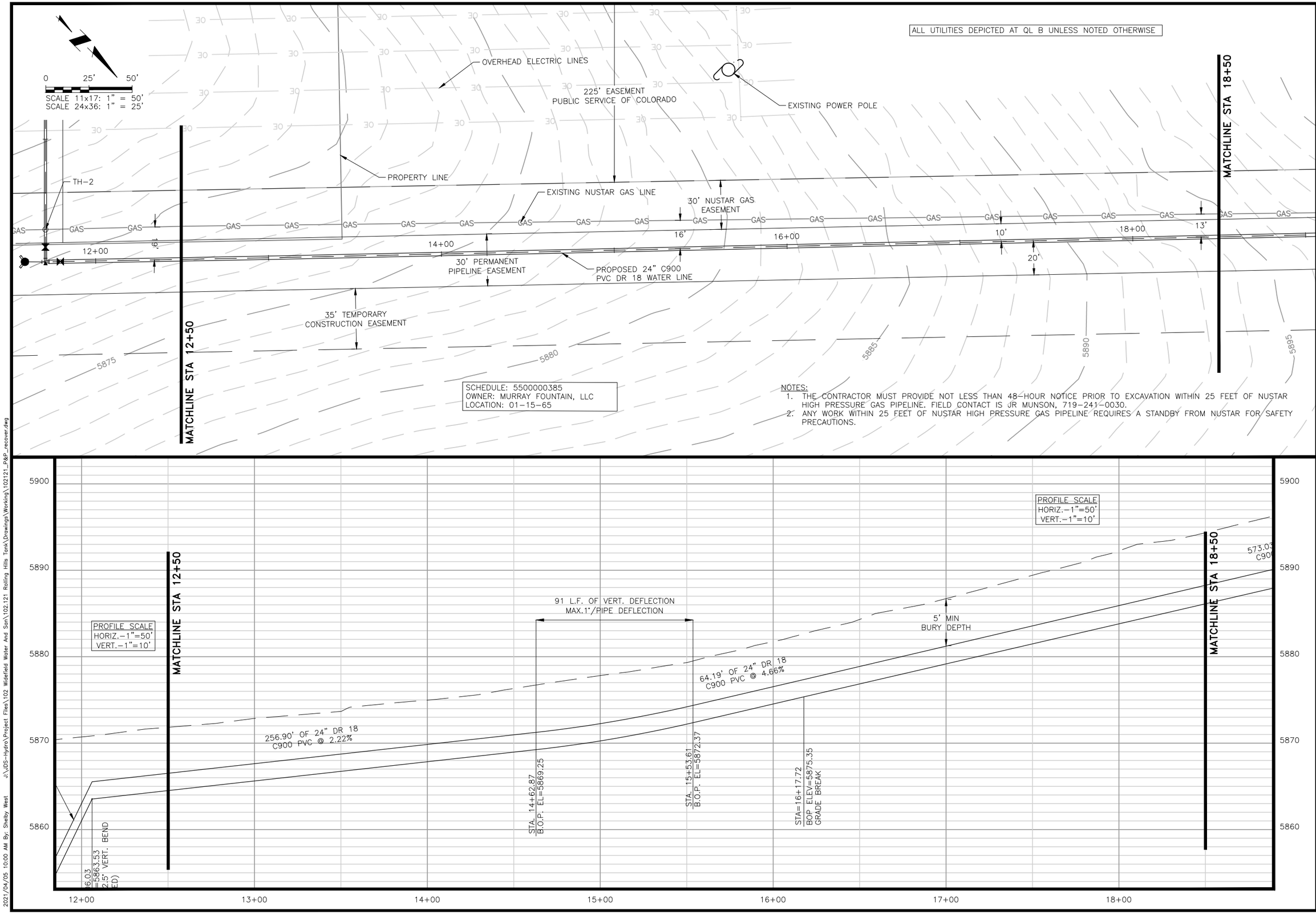
COLORADO LICENSED
GWENDOLYN JOY DAY
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C3

SHEET 4 OF 16

2021/04/05 10:00 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg



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5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 12+50 TO 18+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
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FOR CONSTRUCTION

Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

C4

SHEET 5 OF 16

2021/04/05 10:00 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg

ALL UTILITIES DEPICTED AT QL B UNLESS NOTED OTHERWISE

0 25' 50'
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'

225' EASEMENT
PUBLIC SERVICE OF COLORADO

PROPERTY LINE

EXISTING POWER POLE

EXISTING NUSTAR GAS LINE

PROPOSED 24" C900 PVC DR 18 WATER LINE

GAS

18+00

20+00

22+00

24+00

13'

10'

20'

30' PERMANENT PIPELINE EASEMENT

35' TEMPORARY CONSTRUCTION EASEMENT

MATCHLINE STA 18+50

MATCHLINE STA 23+50

5890 5895 5900 5905 5910 5915 5920

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

NOTES:
1. THE CONTRACTOR MUST PROVIDE NOT LESS THAN 48-HOUR NOTICE PRIOR TO EXCAVATION WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE. FIELD CONTACT IS JR MUNSON, 719-241-0030.
2. ANY WORK WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE REQUIRES A STANDBY FROM NUSTAR FOR SAFETY PRECAUTIONS.

PROFILE SCALE
HORIZ.-1"=50'
VERT.-1"=10'

5920 5910 5900 5890 5880

MATCHLINE STA 18+50

EXISTING GRADE

5' MIN BURY DEPTH

573.03' OF 24" DR 18 C900 PVC @ 4.70%

174.27' OF 24" DR 18 C900 PVC @ 5.36%

STA=21+90.23
BOP ELEV=5901.89
GRADE BREAK

STA. 23+64.14
B.O.P. EL=5911.41

MATCHLINE STA 23+50

18+00 19+00 20+00 21+00 22+00 23+00 24+00

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 18+50 TO 23+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
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FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
DATE
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

C5

SHEET 6 OF 16

J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg
2021/04/05 10:01 AM By: Shelby West

0 25' 50'
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'

STA. 26+19.65
N=1,343,600.34
E=3,248,939.98
INSTALL (2) 24" SOV GATE VALVES
(1) 24" X 6" SWIVEL TEE
(1) FH ASSEMBLY PER
WWSD SPECS

SDS EASEMENT

ALL UTILITIES DEPICTED AT QL B UNLESS NOTED OTHERWISE

10'

20'

28+00

30+00

30' PERMANENT
PIPELINE EASEMENT

PROPOSED 24" C900
PVC DR 18 WATER LINE

35' TEMPORARY
CONSTRUCTION EASEMENT

PROPERTY LINE

30" GAS
EASEMENT

26+00

225' EASEMENT
PUBLIC SERVICE OF COLORADO

STA. 26+38.94
N=1343613.71
E=3248926.07
MJ 45° BEND
WITH THRUST BLOCK PER D/C12
RESTRAIN USING RESTRAINED
LENGTH PER WWSD SPECS
DRAWING W-25

EXISTING FENCE

REPAIR FENCE TO ORIGINAL
CONDITION FOLLOWING
WATER LINE INSTALLATION

GAS

14'

20'

10'

24+00

STA. 25+47.07
N=1343550.06
E=3248992.33
INSTALL AIR/VAC VAULT
SEE DETAIL B/C11

5920

5915

MATCHLINE STA 29+50

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

MATCHLINE STA 23+50

NOTES:
1. THE CONTRACTOR MUST PROVIDE NOT LESS THAN 48-HOUR NOTICE PRIOR TO EXCAVATION WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE. FIELD CONTACT IS JR MUNSON, 719-241-0030.
2. ANY WORK WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE REQUIRES A STANDBY FROM NUSTAR FOR SAFETY PRECAUTIONS.

294 L.F. OF VERT. DEFLECTION
MAX.1°/PIPE DEFLECTION

B.O.P.=5915.97'
@ HIGH PT.

PROFILE SCALE
HORIZ.-1"=50'
VERT.-1"=10'

5' MIN
BURY DEPTH

153.72' OF 24" DR 18
C900 PVC @ -4.18%

333.89' OF 24" DR 18
C900 PVC @ -2.38%

STA. 23+64.14
B.O.P. EL=5911.41

STA=25+47.07
BOP ELEV=5915.92
RIM ELEV= 5923.00'
INSTALL AIR/VAC VAULT
SEE DETAIL B/C11

STA=26+19.65
BOP ELEV=5914.67
INSTALL (2) SOV GATE VALVES
(1) 24" X 6" SWIVEL TEE
(1) FH ASSEMBLY PER
WWSD SPECS

STA=26+38.94
BOP ELEV=5914.04
INSTALL 45° BEND
WITH THRUST BLOCK PER D/C12
RESTRAIN USING RESTRAINING
LENGTH PER WWSD SPECS
DRAWING W-25

STA. 26+58.16
B.O.P. EL=5913.30

STA=28+11.75
BOP ELEV=5906.87
GRADE BREAK

5930
5920
5910
5900

24+00 25+00 26+00 27+00 28+00 29+00 30+00

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR. SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 23+50 TO 29+50

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

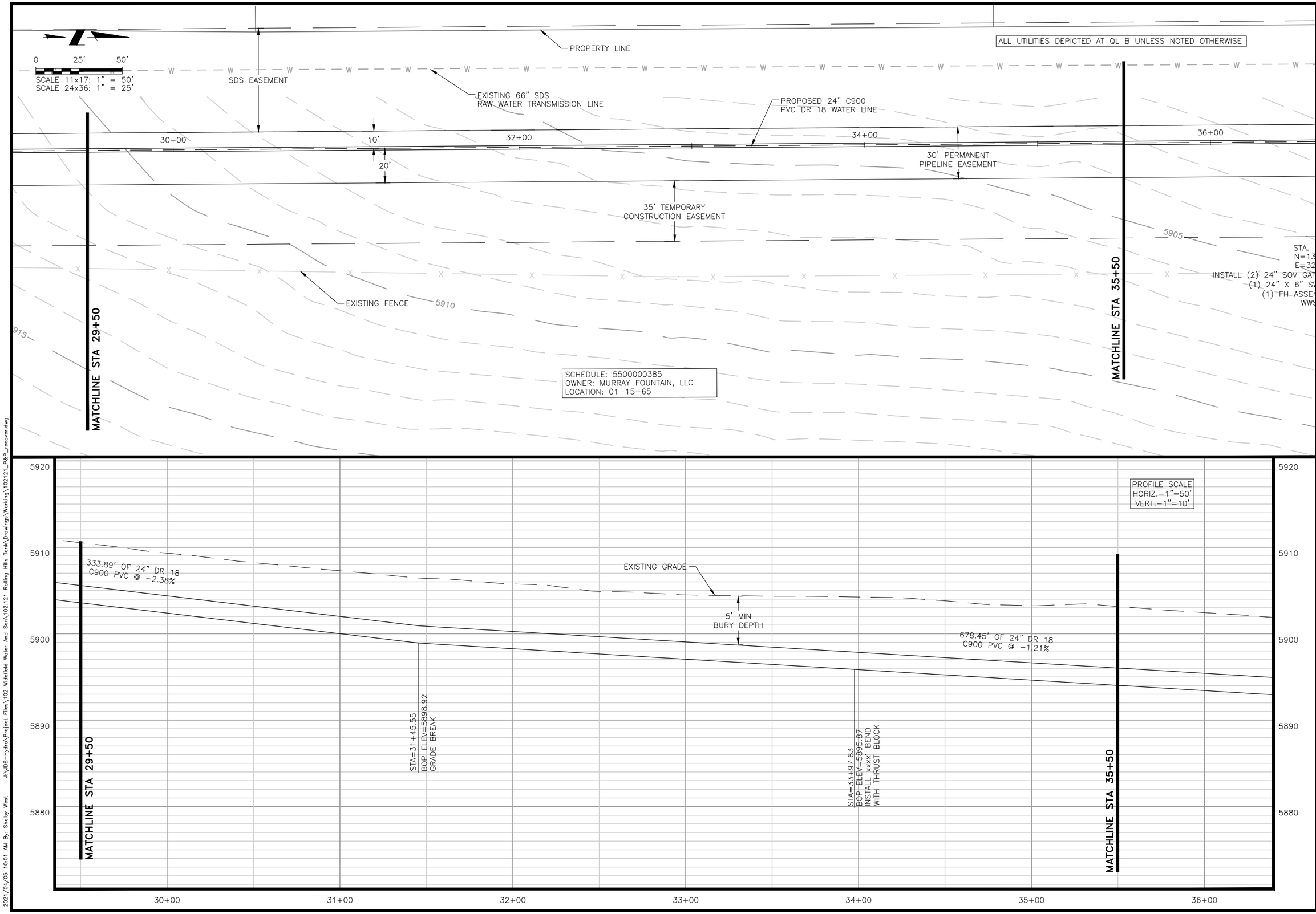
COLORADO LICENSED
GWENDOLYN JOYCE DAY
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

C6

SHEET 7 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg



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5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 29+50 TO 35+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE DALTON
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C7

SHEET 8 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg

ALL UTILITIES DEPICTED AT QL B UNLESS NOTED OTHERWISE

0 25' 50'
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'

20'
10'
30' PERMANENT PIPELINE EASEMENT
35' TEMPORARY CONSTRUCTION EASEMENT

40+00 42+00 44+00
38+00 36+00

5900 5905 5910 5915 5920 5925 5930 5935 5940

SDS EASEMENT

EXISTING 66" SDS RAW WATER TRANSMISSION LINE

STA. 38+33.22
N=1344805.25
E=3248924.14
INSTALL MJ 45° BEND
RESTRAIN USING RESTRAINED LENGTH PER WWSD SPECS DRAWING W-25
INSTALL THRUST BLOCK PER D/C12

REPAIR FENCE TO ORIGINAL CONDITION FOLLOWING WATER LINE INSTALLATION

STA. 38+23.95
N=1344798.69
E=3248917.58
INSTALL MJ 45° BEND
RESTRAIN USING RESTRAINED LENGTH PER WWSD SPECS DRAWINGS W-25
INSTALL THRUST BLOCK PER D/C12

STA. 38+07.65
N=1344782.38
E=3248917.70
INSTALL (2) 24" SOV GATE VALVES
(1) 24" X 6" SWIVEL TEE
(1) FH ASSEMBLY PER WWSD SPECS

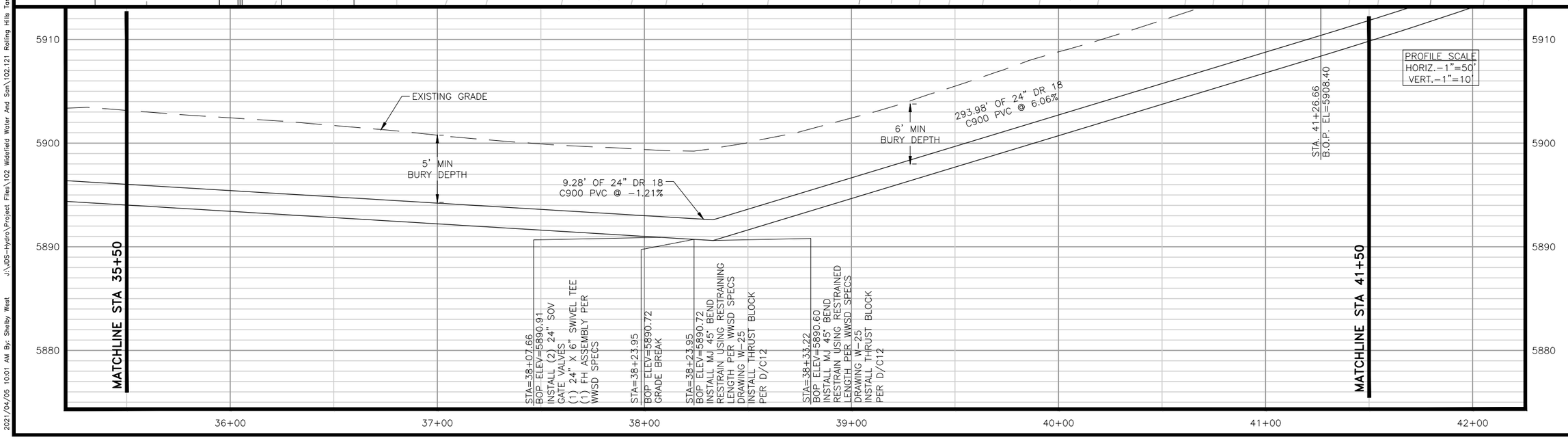
PROPOSED 24" C900 PVC DR 18 WATER LINE

EXISTING FENCE

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

MATCHLINE STA 41+50

MATCHLINE STA 35+50



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COLORADO SPRINGS, COLORADO 80919
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 35+50 TO 41+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
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FOR CONSTRUCTION

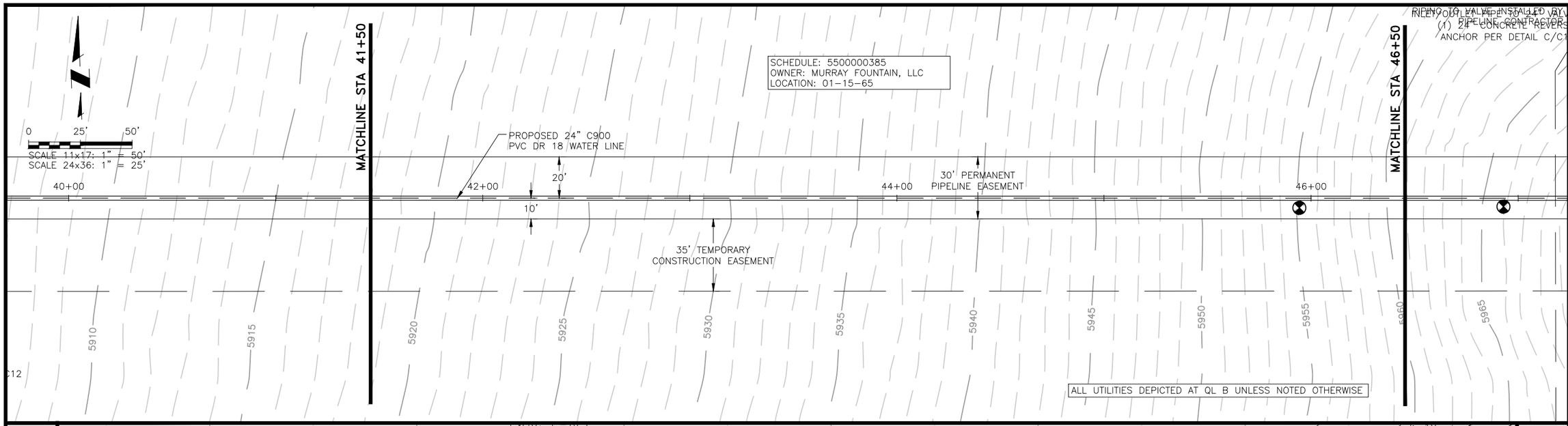
COLORADO LICENSED
GWENDOLYN JOYCE DALY
4/5/21
0051810
PROFESSIONAL ENGINEER

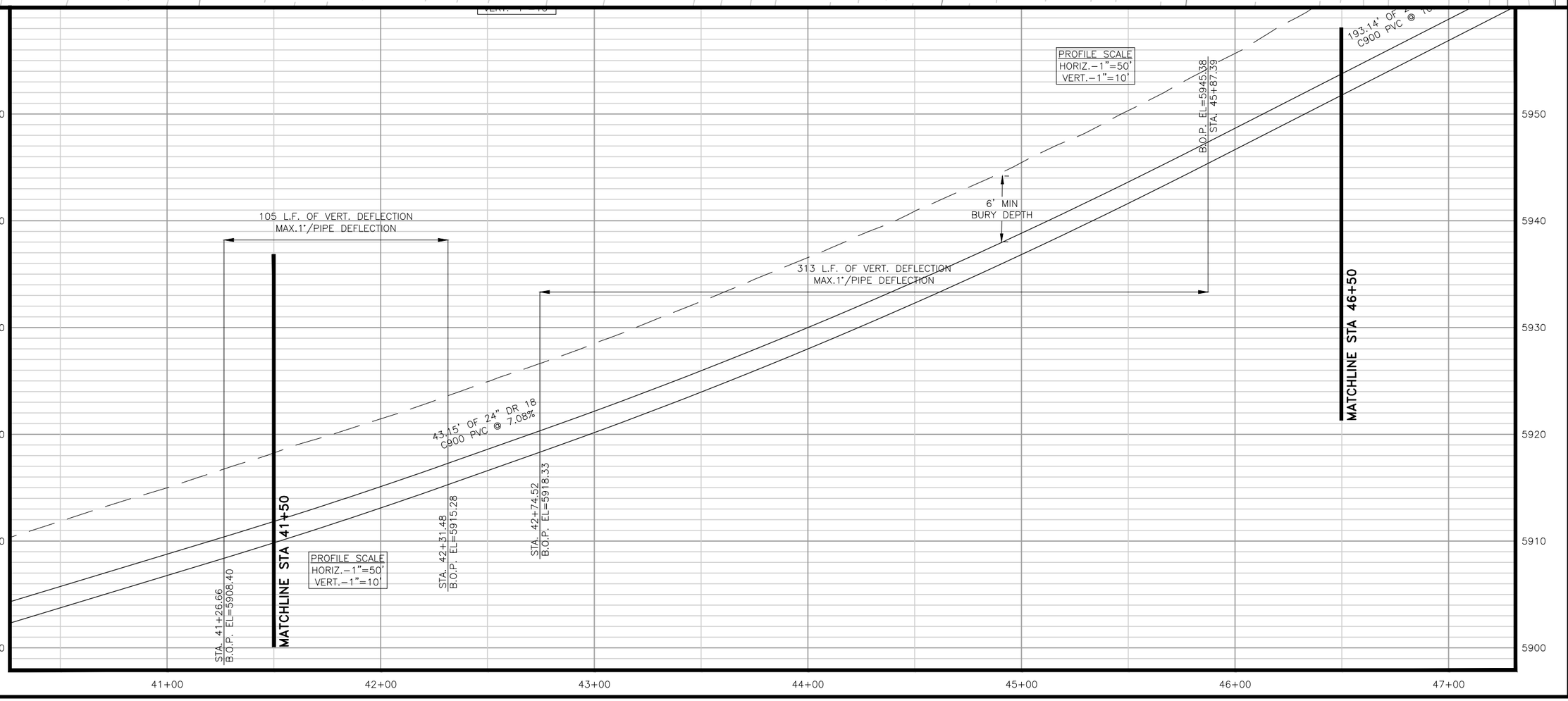
Project No.: 102.121
Date: 02/11/21
Design: GJD
Drawn: SNW
Check: JPM

C8

SHEET 9 OF 16

2021/04/06 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg





JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR. SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

DISCLAIMER: THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO JDS-HYDRO CONSULTANTS, INC. JDS-HYDRO ASSUMES NO LIABILITY FOR UNAUTHORIZED CHANGES AND/OR REVISIONS MADE TO PLANS.

WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT STA 41+50 TO 46+50

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C9

SHEET 10 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg

NOTES:
1. SEE SHEET C2 FOR TANK SITE DETAILS.
2. ALL UTILITIES DEPICTED AT QL B UNLESS NOTED OTHERWISE

0 25' 50'
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'

STA. 48+46.03 (0.00
N=1344805.19
E=3249936.95
INSTALL (1) 24" ISOLATION VALVE
TANK CONTRACTOR TO CONNECT
INLET/OUTLET PIPE TO 24" VALVE
(1) 24" CONCRETE REVERSE
ANCHOR PER DETAIL C/C12

STA. 48+75.38
N=1344805.19
E=3249966.30
2MG TANK
INLET/OUTLET

MATCHLINE STA 46+50

WWSD PIPELINE EASEMENT

PROPOSED 24" C900 DR 18 PVC WATER LINE. TO BE INSTALLED BY PIPELINE CONTRACTOR

30' PERMANENT PIPELINE EASEMENT

35' TEMPORARY CONSTRUCTION EASEMENT

20'

10'

SWALE
EL: 5974.3'

SWALE
EL: 5974.5'

SWALE
EL: 5974.1'

SWALE
EL: 5974.1'

TANK AND TANK SITE IMPROVEMENTS BY OTHERS

PROPOSED POTABLE WATER TANK
CAPACITY: 2.0MG
98.5' DIA

35' SWD
F.F.=5972', O.F.=6007'
HEIGHT (TO DOME): ±46'
COLOR: TAN

44+00 46+00 48+00 48+75 0+00 1+00 1+73

5940 5945 5950 5955 5960 5965 5970 5975 5970 5965 5975

2%

SF

PROFILE SCALE
HORIZ.-1"=50'
VERT.-1"=10'

MATCHLINE STA 46+50

PROPOSED GRADE

17.81' OF 24" DR 18
C900 PVC @ 0.00%

EXISTING GRADE

6' MIN BURY DEPTH

76.95' OF 24" DR 18
C900 PVC @ 0.76%

TANK F.F. = 5972'

193.14' OF 24" DR 18
C900 PVC @ 10.21%

STA=47+66.61
BOP ELEV=5962.09
INSTALL 22.5° VERT. BEND
(RESTRAINED)

STA=48+50.00
BOP ELEV=5965.53
INSTALL 24" ISOLATION VALVE
TANK CONTRACTOR TO CONNECT
INLET/OUTLET PIPE TO 24" VALVE
(1) 24" CONCRETE REVERSE
ANCHOR PER DETAIL C/C12

STA=48+58.74
BOP ELEV=5965.58
PVC TO STEEL TRANSITION
RESTRAINED BY OTHERS

STA=48+79.29
BOP ELEV=5965.58
TANK INLET/OUTLET
CONNECTION BY OTHERS

5990 5980 5970 5960 5950

47+00 48+00 49+00

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COLORADO SPRINGS, COLORADO 80919
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PLAN AND PROFILE

ALIGNMENT 46+50 TO 48+79.29

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
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FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
DATE
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
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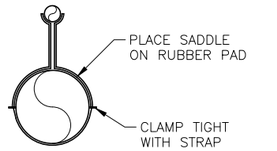
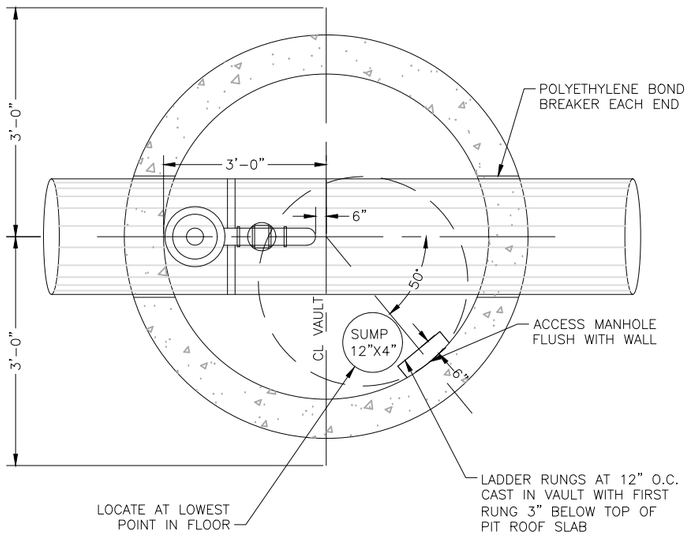
C10
SHEET 11 OF 16

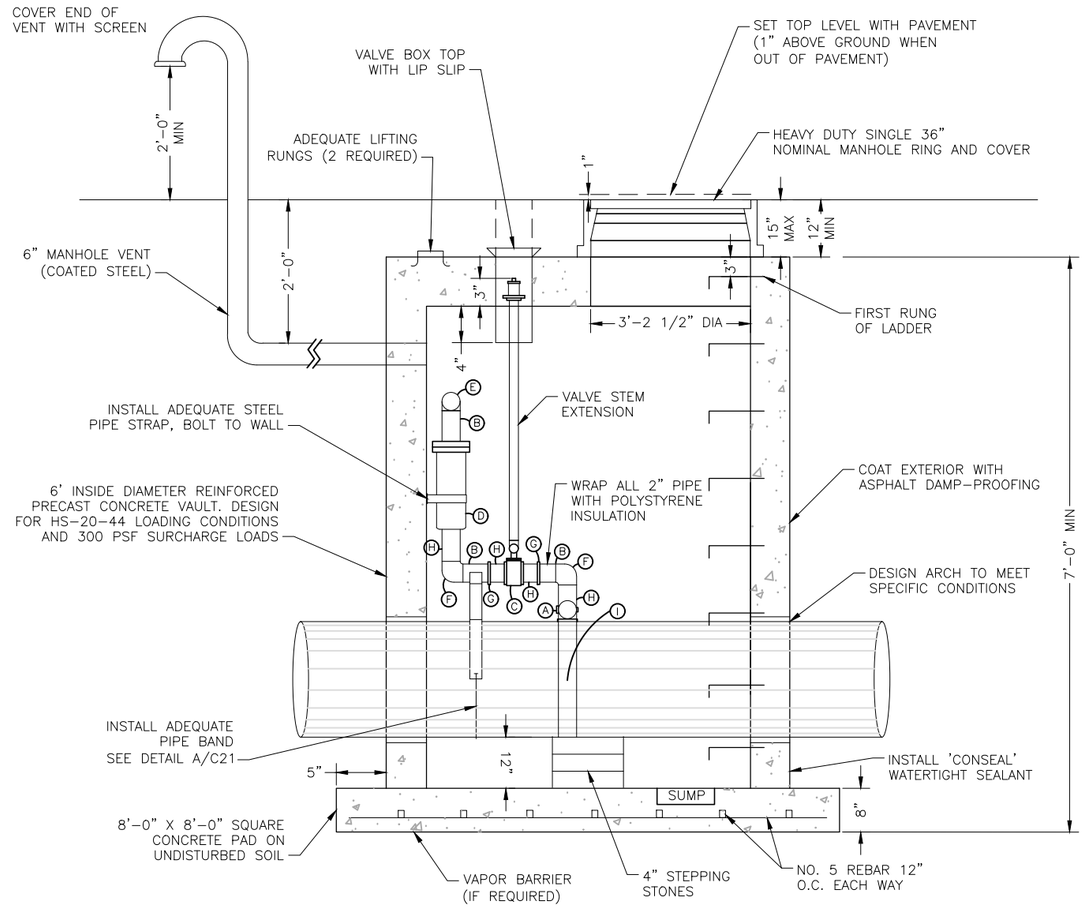
2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_P&P_recover.dwg



A / C11 PIPE STAND DETAIL
SCALE: 1/8" = 1'-0"



TOP VIEW



B / C11 2" AIR/VAC PRESSURE VALVE PIT
SCALE: 1/8" = 1'-0"

NOTES:
1. ALL CONCRETE WORK SHALL COMPLY WITH LATEST ACI-318 SPECIFICATIONS.
2. AIR VALVE ASSEMBLY LARGER THAN 2" SIZE OR FOR MAINS LARGER THAN 16" SHALL BE SPECIALLY DESIGNED AND MEET WATER DISTRICT REQUIREMENTS.
3. ALL SUPPORT MATERIALS SHALL BE GIVEN 2 COATS OF RUST INHIBITIVE PAINT.
4. ALL LADDER RUNGS MUST LINE UP BOTH HORIZONTALLY AND VERTICALLY.
5. ALL SMALL DIAMETER PIPE AND AIR RELEASE VALVE SHALL BE WRAPPED WITH INSULATION AND TAPED.

SCHEDULE	
A	2" CORPORATION TAPERED THREADS INLET WITH 2" FEMALE IRON PIPE OUTLET (MUELLER OR FORD)
B	2" CLOSE THREADED BRASS NIPPLE
C	2" THREADED GATE VALVE WITH STANDARD OPENING NUT
D	2" THREADED INLET VAL-MATIC AIR/VACUUM COMBINATION AIR VALVE, MODEL 202C
E	2" 90° PLASTIC ELBOW
F	2" 90° BRASS THREADED ELBOW
G	2" QUICK COUPLER
H	2" THREADED BRASS NIPPLE
I	2" ROMAC MODEL 202BS TAPPING SADDLE

JDS-HYDRO CONSULTANTS, INC.
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

PIPELINE CIVIL DETAILS

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
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FOR CONSTRUCTION

COLORADO LICENSED
BRANDYN JOYCE
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
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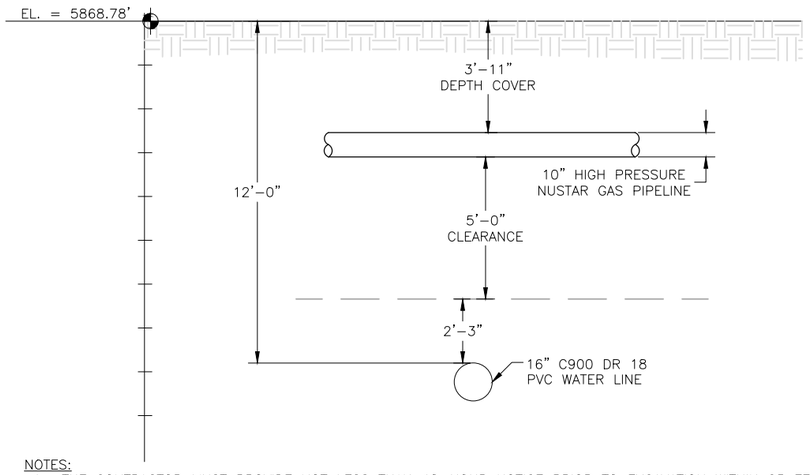
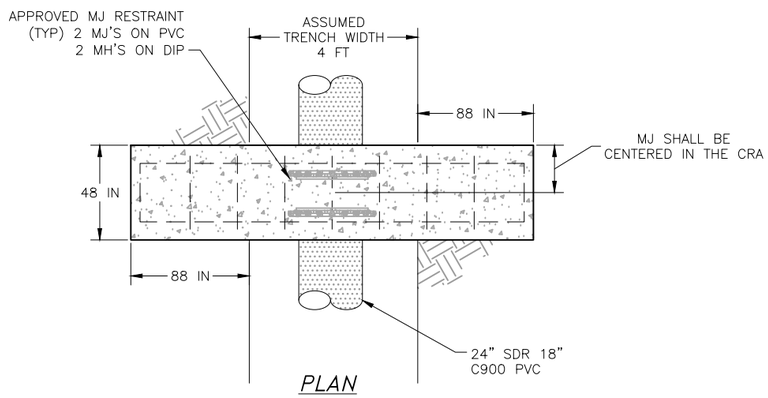
C11
SHEET 12 OF 16

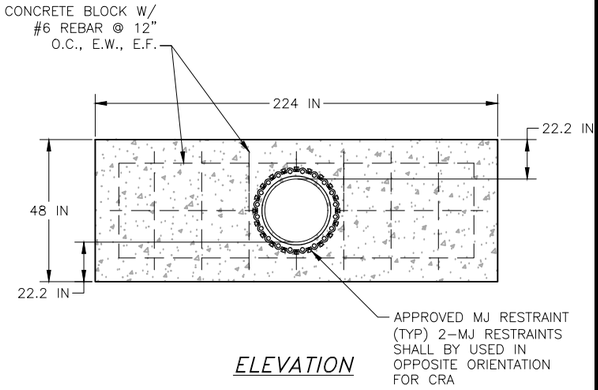
2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Civil Details.dwg



NOTES:
1. THE CONTRACTOR MUST PROVIDE NOT LESS THAN 48-HOUR NOTICE PRIOR TO EXCAVATION WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE. FIELD CONTACT IS JR MUNSON, 719-241-0030.
2. ANY WORK WITHIN 25 FEET OF NUSTAR HIGH PRESSURE GAS PIPELINE REQUIRES A STANDBY FROM NUSTAR FOR SAFETY PRECAUTIONS.
3. VISUAL CONFIRMATION OF THE EXISTING PIPELINE'S LOCATION IS REQUIRED PRIOR TO CROSSING.
4. SOIL MUST BE REMOVED BY NON-MECHANICAL MEANS 24 INCHES FROM THE NUSTAR HIGH PRESSURE GAS PIPELINE.

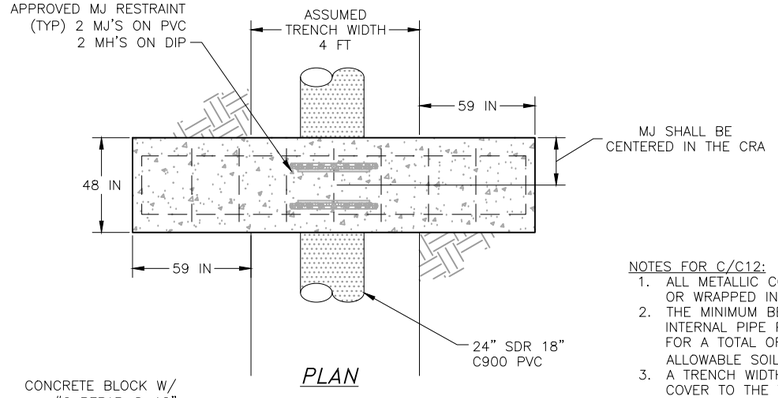
A / C12 UTILITY CROSSING DETAIL
SCALE: 1/4" = 1'-0"



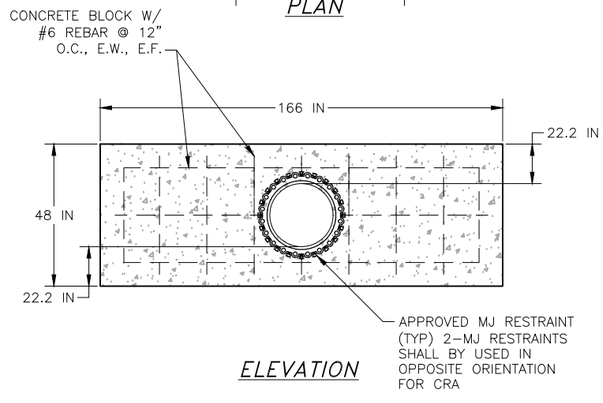


B / C12 REVERSE ANCHOR DETAIL - STA 11+70.97
SCALE: N.T.S.

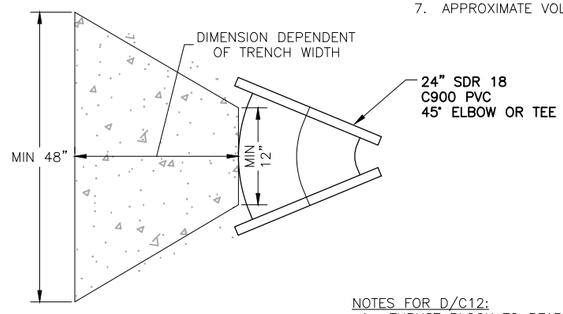
NOTES FOR B/C12:
1. ALL METALLIC COMPONENTS TO BE ENCASED IN CONCRETE OR WRAPPED IN POLYETHYLENE TUBING.
2. THE MINIMUM BEARING SURFACE AREA IS BASED ON 80 PSI INTERNAL PIPE PRESSURE PLUS 70 PSI FOR WATER HAMMER FOR A TOTAL OF 150 PSI, A SAFETY FACTOR OF 1.5 AND AN ALLOWABLE SOIL BEARING CAPACITY OF 2000 LB/FT^2.
3. A TRENCH WIDTH OF 4 FEET AND A MINIMUM DEPTH OF COVER TO THE TOP OF THE PIPE OF 5 FEET WAS ASSUMED FOR BEARING CALCULATIONS.
4. DIMENSIONS SHOWN ARE THE MINIMUM AND USED TO CALCULATE THE APPROXIMATE VOLUME OF CONCRETE.
5. REFERENCE AWWA M-23
6. MINIMUM BEARING AREA = 58.8 FT^2
7. APPROXIMATE VOLUME OF CONCRETE = 11.25 CYD



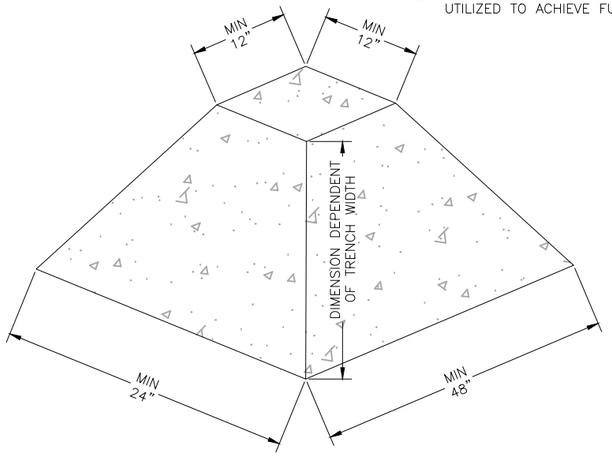
NOTES FOR C/C12:
1. ALL METALLIC COMPONENTS TO BE ENCASED IN CONCRETE OR WRAPPED IN POLYETHYLENE TUBING.
2. THE MINIMUM BEARING SURFACE AREA IS BASED ON 80 PSI INTERNAL PIPE PRESSURE PLUS 70 PSI FOR WATER HAMMER FOR A TOTAL OF 150 PSI, A SAFETY FACTOR OF 1.5 AND AN ALLOWABLE SOIL BEARING CAPACITY OF 3000 LB/FT^2.
3. A TRENCH WIDTH OF 4 FEET AND A MINIMUM DEPTH OF COVER TO THE TOP OF THE PIPE OF 5 FEET WAS ASSUMED FOR BEARING CALCULATIONS.
4. DIMENSIONS SHOWN ARE THE MINIMUM AND USED TO CALCULATE THE APPROXIMATE VOLUME OF CONCRETE.
5. REFERENCE AWWA M-23
6. MINIMUM BEARING AREA = 39.21 FT^2
7. APPROXIMATE VOLUME OF CONCRETE = 8.25 CYD



C / C12 REVERSE ANCHOR DETAIL - STA 48+49.94
SCALE: N.T.S.



NOTES FOR D/C12:
1. THRUST BLOCK TO BEAR AGAINST NATIVE SOIL
2. RESTRAINED LENGTH OR CONCRETE REVERSE ANCHOR TO BE UTILIZED TO ACHIEVE FULL THRUST SUPPORT.



D / C12 SUPPLEMENTAL THRUST BLOCK FOR 24 INCH 45 DEGREE BEND AND TEE
SCALE: N.T.S.

FOR STA 11+70.97
STA 26+38.94
STA 38+23.95
STA 38+33.22

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT
ROLLING HILLS TANK INLET PIPELINE
PIPELINE CIVIL DETAILS

REVISIONS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
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FOR CONSTRUCTION

Project No.: 102.121
Date: 02/11/21
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C12
SHEET 13 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Civil Details.dwg

0 50' 100'
SCALE 11x17: 1" = 100'
SCALE 24x36: 1" = 50'

SCHEDULE: 5500000384
OWNER: UNITED STATES OF AMERICA
LOCATION: 10545 DRENNAN RD

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

30' PERMANENT EASEMENT

35' CONSTRUCTION EASEMENT

CONSTRUCTION BOUNDARY AND LIMITS OF DISTURBANCE

PP EROSION CONTROL SOCK (TYP. 6, BEGINNING TO STA 15+00) SEE DETAIL C/C15

PP WATER LINE ALIGNMENT

100' EASEMENT TRI-STATE GENERATION

MATCHLINE STA 15+00

30' EASEMENT NUSTAR GAS

PP EARTHEN BERM (APPROX. 18 LF) SEE DETAIL B/C15

225' EASEMENT PUBLIC SERVICE OF COLORADO

PP SILT FENCE (APPRX. 137 LF) SEE DETAIL A/C15

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

SCHEDULE: 5500000385
OWNER: MURRAY FOUNTAIN, LLC
LOCATION: 01-15-65

PP EARTHEN BERM (APPROX. 19 LF) SEE DETAIL B/C15

30' PERMANENT EASEMENT

35' CONSTRUCTION EASEMENT

SDS EASEMENT

PP EROSION CONTROL SOCK (TYP. 7, STA 15+00 TO STA 30+00) SEE DETAIL C/C15

PP WATER LINE ALIGNMENT

EXISTING FENCE

CONSTRUCTION BOUNDARY AND LIMITS OF DISTURBANCE

MATCHLINE STA 15+00

MATCHLINE STA 30+00

NOTES:
1. EXISTING VEGETATION CONSISTS OF BUFFALO GRASS, GRAMA GRASS, TEXAS CROTON, PRAIRIE SAGE, YELLOW SWEETCLOVER, PRICKLY PEAR PLANTS, CHOLLA PLANTS, AND YUCCA PLANTS.
2. ALL SITE PREPARATION AND EARTHWORK OPERATIONS SHOULD BE PERFORMED IN ACCORDANCE WITH APPLICABLE CODES, SAFETY REGULATIONS AND OTHER LOCAL, STATE OR FEDERAL GUIDELINES.
3. THE GEOTECHNICAL REPORT FOR THIS PROJECT HAS BEEN PREPARED BY VIVED ENGINEERING GROUP, INC. DATED FEBRUARY 28, 2020

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

EROSION CONTROL PLAN

REVISIONS				
NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
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7				

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
REGISTERED PROFESSIONAL ENGINEER

Project No.: 102.121
Date: 02/11/21
Design: GJD
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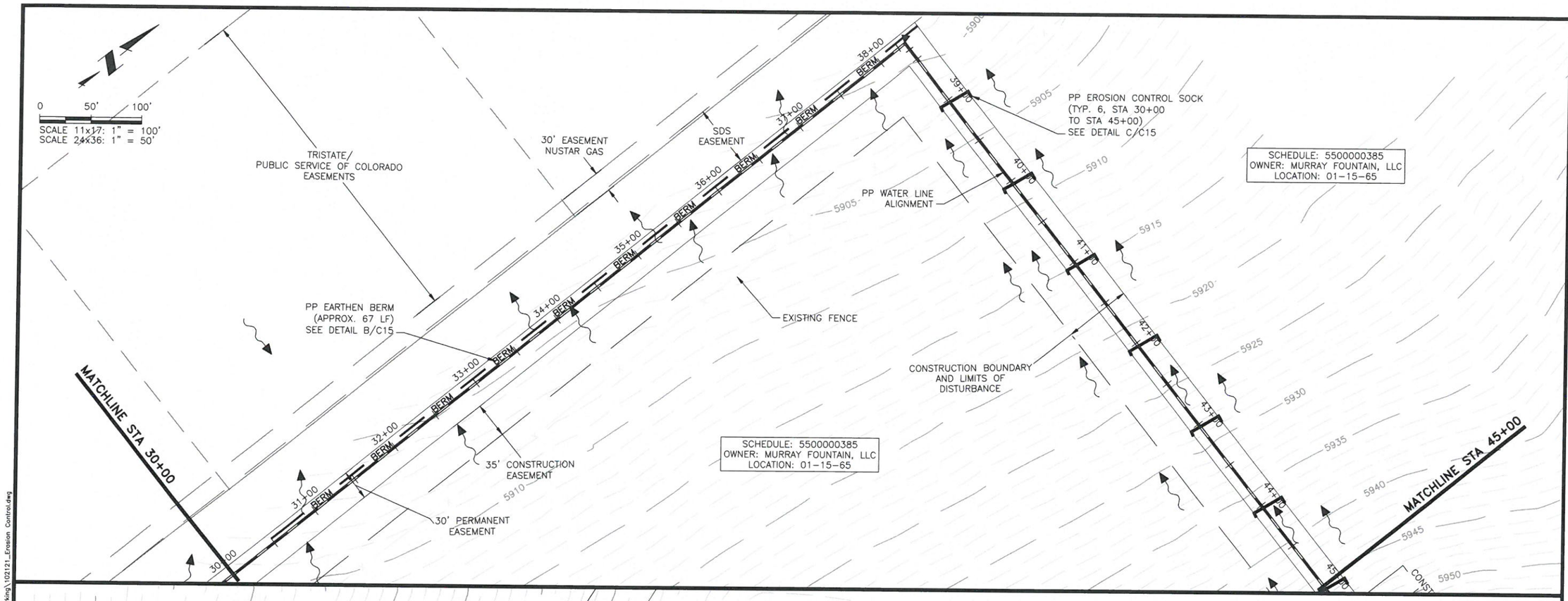
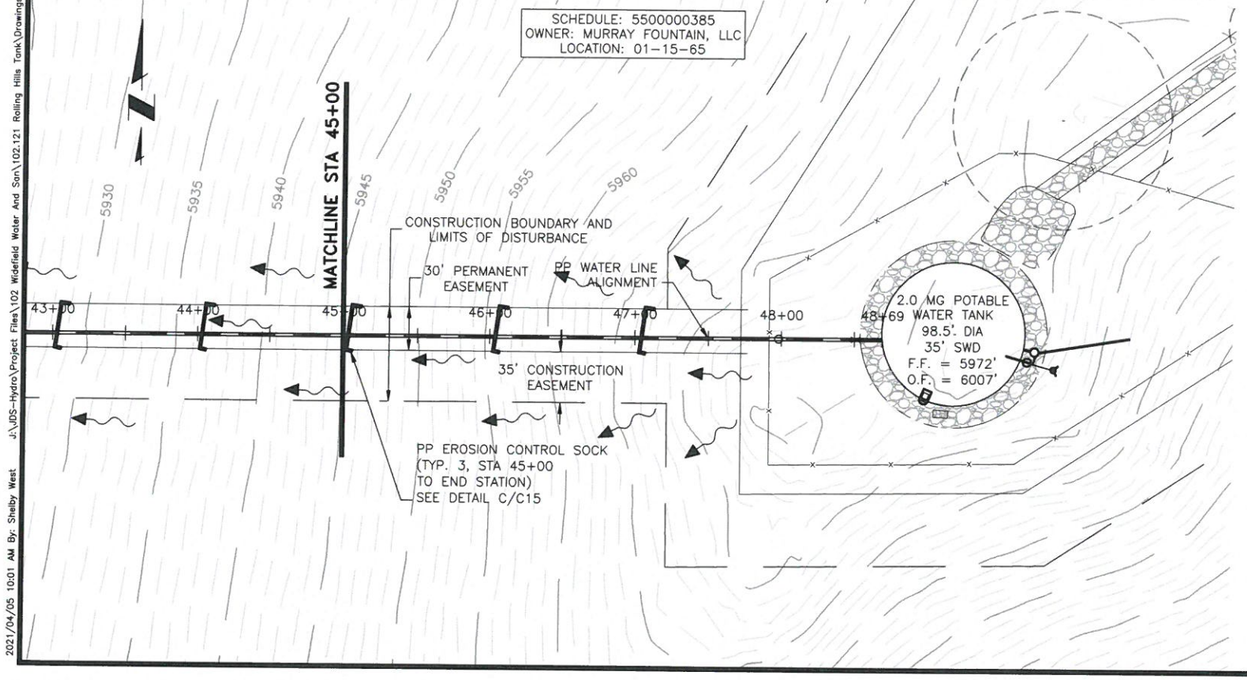
C13
SHEET 14 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Erosion Control.dwg





ENGINEER'S STATEMENT
THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

Gwen S. Dall — 4/5/2021
ENGINEER OF RECORD SIGNATURE — DATE

OWNER'S STATEMENT
I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN AND ALL OF THE REQUIREMENT SPECIFIED IN THESE DETAILED PLANS AND SPECIFICATIONS.

OWNER SIGNATURE — DATE

EL PASO COUNTY
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT. FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL, AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS
NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR'S DISCRETION.

COUNTY ENGINEER/ECM ADMINISTRATOR — DATE

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

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WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

EROSION CONTROL PLAN

REVISIONS			
NO.	DESCRIPTION	BY	APP.	DATE
1				
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FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JO DALL
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C14

SHEET 15 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Erosion Control.dwg

EROSION CONTROL NOTES

1. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.
2. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OF GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE, AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
3. A SEPARATE STORMWATER MANAGEMENT PLAN (SMWO) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
4. ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF.
5. CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
6. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATION CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURE ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
7. TEMPORARY STABLIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
8. FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
9. ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
10. EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
11. COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATION COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
12. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF SITE.
13. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
14. DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
15. EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
17. WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
18. TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
19. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
20. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
21. NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ONSITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
22. BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
23. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
24. OWNER/DEVELOPER AND THEIR AGENTS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OR OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, IN THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
25. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
26. PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
27. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
28. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY VIVID ENGINEERING GROUP AND SHALL BE CONSIDERED A PART OF THESE PLANS. (REV 2: 01/07/21)
29. AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ON (1) ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

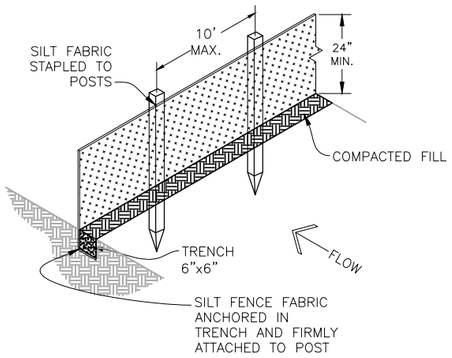
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL DIVISION
WQCD - PERMITS
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246-1530
ATTN: PERMITS UNIT

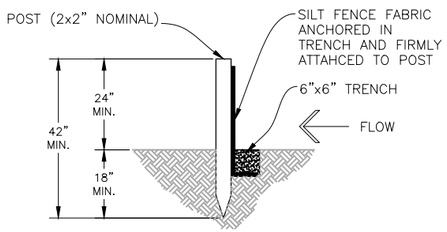
SEED MIX

AREAS DISTURBED BY THE EARTHWORK SHALL BE PERMANENTLY REVEGETATED WITH NATIVE GRASSES. NATIVE SEED MIX FOR THIS PROJECT SHALL BE AS FOLLOWS:

COMMON NAME	RECOMMENDED CULTIVAR	% OF SEED MIX	NON IRRIGATED PLS RATE PER ACRE DRILL	BROADCAST
BIG BLUESTEM, NATIVE	KAW, BISON, CHAMP	20.00%	5.5	11.0
BLUE GRAMA, NATIVE	LOVINGTON, HACHITA, ALMA	10.00%	1.5	3.0
GREEN NEEDLEGRASS, NATIVE	LODORM	10.00%	5.0	10.0
WESTERN WHEATGRASS, NATIVE	ARRIBA, BARTON	20.00%	8.0	16.0
SIDEOATS GRAMA, NATIVE	VAUGHN, BUTTE, EL RENO, NINER	10.00%	4.5	9.0
SWITHGRASS, NATIVE	BLACKWELL, GREENVILLE	10.00%	2.0	4.0
PRAIRIE SANDREED, NATIVE	GOSHEN, PRONGHORN	10.00%	3.5	7.0
YELLOW INDIANGRASS, NATIVE	CHEYENNE, HOLT, LLANO	10.00%	5.0	10.0

SEEDING APPLICATION: DRILL SEED 1/4" TO 1/2" INTO TOPSOIL. IN AREAS INACCESSIBLE TO A DRILL, HAND BROADCAST AT DOUBLE THE RATE AND RAKE 1/4" TO 1/2" INTO THE TOPSOIL. MULCHING APPLICATION: 1-1/2 TONS NATIVE HAY PER ACRE, MECHANICALLY CRIMPED INTO THE TOPSOIL.





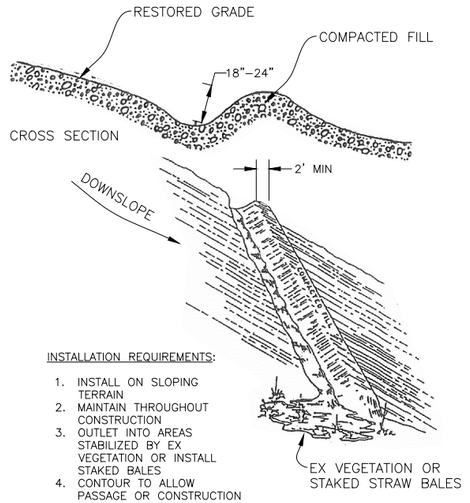
A C15 **SILT FENCE DETAIL**
SCALE: N.T.S.

INSTALLATION REQUIREMENTS:

1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
3. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL OR WOOD POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.
5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6" AND SHALL NOT EXTEND MORE THAN 3' ABOVE THE ORIGINAL GROUND SURFACE.
6. ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.
7. THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES; HIGHER FENCES MAY INPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

MAINTENANCE REQUIREMENTS:

1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
2. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
3. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED



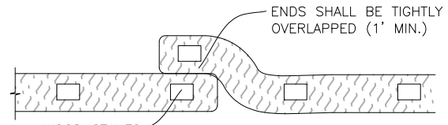
INSTALLATION REQUIREMENTS:

1. INSTALL ON SLOPING TERRAIN
2. MAINTAIN THROUGHOUT CONSTRUCTION
3. OUTLET INTO AREAS STABILIZED BY EX VEGETATION OR INSTALL STAKED BALES
4. CONTOUR TO ALLOW PASSAGE OR CONSTRUCTION EQUIPMENT
5. MAINTAIN 2% LATERAL SLOPE

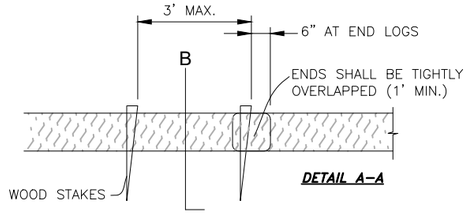
B C15 **EARTHEN BERM**
SCALE: N.T.S.

MATERIALS HANDLING SPECIFICATIONS:

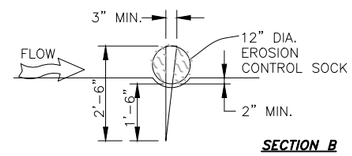
1. DEBRIS, OVERBURDEN, SOIL STOCKPILES AND WASTE MATERIALS SHALL BE PLACED AWAY FROM AREAS OF RUNOFF
2. THERE ARE SEVERAL BEST MANAGEMENT PRACTICES THAN CAN BE EMPLOYED TO PREVENT OR MITIGATE THE SOURCE OF POLLUTANTS AND CONTAMINATION OF STORM WATER RUNOFF. THE CONTRACTOR IS NOT LIMITED TO THESE MEASURES WHICH MAY REQUIRE ADJUSTING THE BMP'S AS THE PROJECT PROGRESSES AND IMPLEMENT FURTHER CONTROLS AS PRUDENCE AND GOOD JUDGMENT DEEM NECESSARY. SOME OF THESE ARE:
   A. ALL REFUSE DUMPSTERS AND RECEPTACLES SHALL BE EQUIPPED WITH FUNCTIONAL LIDS TO PREVENT RAIN AND SNOW FROM ENTERING. LIDS MUST BE CLOSED WHEN DUMPSTERS AND RECEPTACLES ARE NOT ACTIVELY IN USE
   B. STORAGE CONTAINERS, DRUMS, AND BAGS SHALL BE STORED AWAY FROM DIRECT TRAFFIC ROUTES TO PREVENT ACCIDENTAL SPILLS. ENSURE PACKAGES AND CONTAINERS ARE INTACT
   C. EMPTY DRUMS SHALL BE COVERED TO PREVENT COLLECTION OF PRECIPITATION
   D. CONTAINERS SHALL BE STORED ON PALLETS TO PREVENT CORROSION OF CONTAINERS, WHICH CAN RESULT WHEN CONTAINERS COME IN CONTACT WITH MOISTURE ON THE GROUND
   E. REGULARLY SCHEDULED REMOVAL OF CONSTRUCTION TRASH AND DEBRIS
   F. WHERE APPLICABLE, TRACKING CONTROL MUST BE IMPLEMENTED BY THE CONTRACTOR TO PREVENT UNNECESSARY SOIL FROM ENTERING PAVED SURFACES. THE MEASURES TO BE USED WILL BE PREVENTING EQUIPMENT IN THE CONSTRUCTION AREA FROM MOVING OFF-SITE. IF THE CONTRACTOR CANNOT DO THIS, THEN A VEHICLE TRACKING PAD WILL BE REQUIRED ACCORDING TO COUNTY SPECIFICATIONS. BROOMS AND SHOVELS MAY BE REQUIRED FOR TRACKING CONTROL



PLAN VIEW



DETAIL A-A



SECTION B

EROSION CONTROL SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR THE LOCATION AND LENGTH OF EROSION CONTROL SOCK.
2. EROSION CONTROL SOCKS INDICATED ON THE PLANS SHALL BE INSTALLED AFTER ANY LAND-DISTURBING ACTIVITIES OCCUR.
3. EROSION CONTROL SOCKS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
4. NOT FOR USE IN CONCENTRATED FLOW AREAS.
5. THE EROSION CONTROL SOCK SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF ⅓ OF THE DIAMETER OF THE ECS.

EROSION CONTROL SOCK MAINTENANCE NOTES

1. CONTRACTOR SHALL INSPECT EROSION CONTROL SOCKS DAILY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT UPSTREAM SEDIMENT AS NECESSARY.
2. SEDIMENT ACCUMULATED UPSTREAM OF EROSION CONTROL SOCKS SHALL BE REMOVED WHEN THE UPSTREAM SEDIMENT DEPTH IS WITHIN ½ THE HEIGHT OF THE CREST OF LOG.
3. EROSION CONTROL SOCKS SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF ANY DISTURBED AREA EXISTS AFTER REMOVAL, IT SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE OWNER.

C C15 **EROSION CONTROL SOCK**
SCALE: N.T.S.

JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

DISCLAIMER: THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. ANY ERRORS OR OMISSIONS SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY. JDS-HYDRO ASSUMES NO LIABILITY FOR UNAUTHORIZED CHANGES AND/OR REVISIONS MADE TO PLANS.

WIDEFIELD WATER AND SANITATION DISTRICT

ROLLING HILLS TANK INLET PIPELINE

EROSION CONTROL NOTES AND DETAILS

NO.	DESCRIPTION	BY	APP.	DATE
1				
2				
3				
4				
5				
6				
7				

REVISIONS

FOR CONSTRUCTION

COLORADO LICENSED
GWENDOLYN JOYCE
4/5/21
0051810
PROFESSIONAL ENGINEER

Project No.:	102.121
Date:	02/11/21
Design:	GJD
Drawn:	SNW
Check:	JPM

C15

SHEET 16 OF 16

2021/04/05 10:01 AM By: Shelby West J:\JDS-Hydro\Project Files\102 Widefield Water And San\102.121 Rolling Hills Tank\Drawings\Working\102121_Erosion Control.dwg

APPENDIX B – General Permit Application (When Complete)

APPENDIX C – Contractor Sequence of Activities (When Complete)

APPENDIX D – O&M Inspection Record Templates

CONSTRUCTION STORMWATER SITE INSPECTION REPORT

Facility Name		Permittee	
Date of Inspection		Weather Conditions	
Permit Certification #		Disturbed Acreage	
Phase of Construction		Inspector Title	
Inspector Name			

	YES	NO
Is the above inspector a qualified stormwater manager? (permittee is responsible for ensuring that the inspector is a qualified stormwater manager)	☐	☐

INSPECTION FREQUENCY	
Check the box that describes the minimum inspection frequency utilized when conducting each inspection	
At least one inspection every 7 calendar days	☐
At least one inspection every 14 calendar days, with post-storm event inspections conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosions	☐
• This is this a post-storm event inspection. Event Date: _____	☐
Reduced inspection frequency - Include site conditions that warrant reduced inspection frequency	☐
• Post-storm inspections at temporarily idle sites	☐
• Inspections at completed sites/area	☐
• Winter conditions exclusion	☐

	YES	NO
Have there been any deviations from the minimum inspection schedule? If yes, describe below.	☐	☐

INSPECTION REQUIREMENTS*
i. Visually verify all implemented control measures are in effective operational condition and are working as designed in the specifications
ii. Determine if there are new potential sources of pollutants
iii. Assess the adequacy of control measures at the site to identify areas requiring new or modified control measures to minimize pollutant discharges
iv. Identify all areas of non-compliance with the permit requirements, and if necessary, implement corrective action
*Use the attached **Control Measures Requiring Routine Maintenance** and **Inadequate Control Measures Requiring Corrective Action** forms to document results of this assessment that trigger either maintenance or corrective actions

AREAS TO BE INSPECTED			
Is there evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system or discharging to state waters at the following locations?			
	NO	YES	If "YES" describe discharge or potential for discharge below. Document related maintenance, inadequate control measures and corrective actions **Inadequate Control Measures Requiring Corrective Action** form
Construction site perimeter	☐	☐	
All disturbed areas	☐	☐	
Designated haul routes	☐	☐	
Material and waste storage areas exposed to precipitation	☐	☐	
Locations where stormwater has the potential to discharge offsite	☐	☐	
Locations where vehicles exit the site	☐	☐	
Other: _____	☐	☐	

CONTROL MEASURES REQUIRING ROUTINE MAINTENANCE

Definition: Any control measure that is still operating in accordance with its design and the requirements of the permit, but requires maintenance to prevent a breach of the control measure. These items are not subject to the corrective action requirements as specified in Part I.B.1.c of the permit.

Are there control measures requiring maintenance?	NO	YES	
	☐	☐	If "YES" document below

Date Observed	Location	Control Measure	Maintenance Required	Date Completed

INADEQUATE CONTROL MEASURES REQUIRING CORRECTIVE ACTION

Definition: Any control measure that is not designed or implemented in accordance with the requirements of the permit and/or any control measure that is not implemented to operate in accordance with its design. This includes control measures that have not been implemented for pollutant sources. If it is infeasible to install or repair the control measure immediately after discovering the deficiency the reason must be documented and a schedule included to return the control measure to effective operating condition as possible.

	NO	YES	
Are there inadequate control measures requiring corrective action?	☐	☐	If "YES" document below

	NO	YES	
Are there additional control measures needed that were not in place at the time of inspection?	☐	☐	If "YES" document below

Date Discovered	Location	Description of Inadequate Control Measure	Description of Corrective Action	Was deficiency corrected when discovered? YES/NO if "NO" provide reason and schedule to correct	Date Corrected

REPORTING REQUIREMENTS

The permittee shall report the following circumstances orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances, and shall mail to the division a written report containing the information requested within five (5) working days after becoming aware of the following circumstances. The division may waive the written report required if the oral report has been received within 24 hours.

All Noncompliance Requiring 24-Hour Notification per Part II.L.6 of the Permit

a. Endangerment to Health or the Environment

Circumstances leading to any noncompliance which may endanger health or the environment regardless of the cause of the incident (See Part II.L.6.a of the Permit)

This category would primarily result from the discharge of pollutants in violation of the permit

b. Numeric Effluent Limit Violations

- o Circumstances leading to any unanticipated bypass which exceeds any effluent limitations (See Part II.L.6.b of the Permit)
- o Circumstances leading to any upset which causes an exceedance of any effluent limitation (See Part II.L.6.c of the Permit)
- o Daily maximum violations (See Part II.L.6.d of the Permit)

Numeric effluent limits are very uncommon in certifications under the COR400000 general permit. This category of noncompliance only applies if numeric effluent limits are included in a permit certification.

Has there been an incident of noncompliance requiring 24-hour notification?	NO	YES	
	☐	☐	If "YES" document below

Date and Time of Incident	Location	Description of Noncompliance	Description of Corrective Action	Date and Time of 24 Hour Oral Notification	Date of 5 Day Written Notification *

*Attach copy of 5 day written notification to report. Indicate if written notification was waived, including the name of the division personnel who granted waiver.

After adequate corrective action(s) and maintenance have been taken, or where a report does not identify any incidents requiring corrective action or maintenance, the individual(s) designated as the Qualified Stormwater Manager, shall sign and certify the below statement:

"I verify that, to the best of my knowledge and belief, all corrective action and maintenance items identified during the inspection are complete, and the site is currently in compliance with the permit."

Name of Qualified Stormwater Manager	Title of Qualified Stormwater Manager
Signature of Qualified Stormwater Manager	Date

Notes/Comments

APPENDIX E – Completed O&M Inspection Records (When Complete)

APPENDIX F – Geotech Report

2/28/2020
Rev 1: 3/5/2020
Rev 2: 1/7/2021

Geotechnical Evaluation Report

Proposed Rolling Hills Water Tank

Vicinity of Drennan Road and Mockingbird Lane

El Paso County, Colorado

VIVID Project No.: D20-2-282

VIVID Engineering Group

Only the client or it's designated representatives may use this document
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Revised: January 7, 2021

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GEOTECHNICAL EVALUATION REPORT
Proposed Rolling Hills Water Tank
Vicinity of Drennan Road and Mockingbird Lane
El Paso County, Colorado
VIVID Project No.: D20-2-282

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed for a proposed water tank (i.e. subject tank) in a vacant field southwest of the intersection of Drennan Road and Mockingbird Lane in El Paso County, Colorado. An additional boring was also requested for each of the two proposed future water tanks, located adjacent to the subject tank site. An attached Vicinity Map (Figure 1) shows the general location of the project. Our investigation was performed for JDS-Hydro Consultants Inc. and was authorized by Ms. Gwen Dall. **This report represents revision 2 of the original report. Revision 1 reflected adjustments in anticipated tank foundation and slab elevations relative to the existing ground and bedrock surface elevations. In summary, both the foundations and slab are anticipated to bear directly on the bedrock materials, and no fill will be required below these tank structural elements.**

Revision 2 reflects the drilling and sampling of the requested four additional borings in the area of the proposed water pipeline and drainage basin in order to determine subsurface conditions anticipated during excavation. The revision includes data obtained from the drilling and sampling of the additional borings and lab testing. Additional design recommendations were not included in the scope.

This report includes our recommendations relating to the geotechnical aspects of project design and construction. The conclusions and recommendations stated in this report are based upon the subsurface conditions found at the locations of our exploratory borings at the time our exploration was performed. They also are subject to the provisions stated in the report section titled **Additional Services & Limitations**. Our findings, conclusions, and recommendations should not be extrapolated to other areas or used for other projects without our prior review. Furthermore, they should not be used if the site has been altered, or if a prolonged period has elapsed since the date of the report, without VIVID's prior review to determine if they remain valid.

1.2 PROJECT DESCRIPTION

We understand the proposed project consists of the construction of a 98.5-foot diameter, 2.0 MG above ground, post-tensioned, concrete storage tank located southwest of Drennan Road and Mockingbird Lane in El Paso County, Colorado. We understand the finished floor elevation of the tank is proposed to be at 5972 feet. Two future tanks are also proposed to be constructed northeast of the 2.0 MG tank. Geotechnical design and construction recommendations for the two future tanks are not included in this report. The proposed site layout is shown on Figure 2, attached to this report.

We understand a 24" water pipeline is to be constructed from the proposed tank and connecting to the existing WWSD water system located southwest of the proposed tanks. A drainage basin is also planned to be constructed northeast of the proposed tank. The bottom of the drainage basin is proposed to be approximately 4.5 feet below the existing ground surface.

According to approximate borehole surface elevations estimated from topographic mapping and our understanding of proposed grading plans, we believe that, in general, planned site grading to achieve

finished site grades will likely include on the order of 2 to 4 feet of cut required to bring the tank finish floor to the proposed grade. Our recommendations are based on the slab and foundation bearing on the sandstone bedrock.

No structural loads were provided at the time this report was written. We understand the tank is to be constructed with a reinforced concrete floor slab and circumferential spread footing with 6 to 12 inches of crushed stone or granular base materials below the slab. Other construction related activities are anticipated to include the connection of the inflow and outflow pipelines, site grading, and installation of utilities. If the type of construction or actual building loads vary significantly from those assumed above, VIVID should be notified in order to revise our recommendations, if required.

1.3 PURPOSE AND SCOPE

The purpose of our investigation was to explore and evaluate subsurface conditions within or near the footprint of the proposed water tank on the site and, based upon the conditions found, to develop recommendations relating to the geotechnical aspects of project design and construction. Two additional borings were requested by JDS-Hydro within or near the approximate center of the two future tanks in order to evaluate subsurface conditions only. An additional four borings were requested in the area of the proposed water pipeline and drainage basin for subsurface data only. Our conclusions and recommendations for the subject tank site in this report are based upon analysis of the data from our field exploration, laboratory tests, and our experience with similar soil and geologic conditions in the area.

VIVID's scope of services included:

- A visual reconnaissance to observe surface and geologic conditions at the project site and locating the exploratory borings;
- Notification of the Utility Notification Center of Colorado (UNCC)/Colorado 811 one-call service to identify underground utility lines at the boring locations prior to our drilling;
- The drilling of 5 exploratory borings at the perimeter and center of the subject circular water storage tank, and 2 exploratory borings within the future tank footprints, all of which were staked by JDS-Hydro based upon DN Tanks requirements, and access to the site;
- The drilling of 3 additional exploratory borings at locations selected by JDS-Hydro within the proposed water pipeline alignment and 1 additional boring within the proposed drainage basin;
- Performance of a plate load test within the subject tank footprint to determine Modulus of Subgrade Reaction, based on a 12-inch square plate;
- Laboratory testing of selected samples obtained during the field exploration to evaluate relevant physical and engineering properties of the soil;
- Evaluation and engineering analysis of the field and laboratory data collected to develop our geotechnical conclusions and recommendations; and
- Preparation of this report, which includes a description of the proposed project, a description of the surface and subsurface site conditions found during our investigation, our conclusions and recommendations as to foundation and floor slab design and construction, and other related geotechnical issues, and appendices which summarize our field and laboratory investigations.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

A field exploration performed on January 30, 2020 included drilling 7 exploratory borings at the approximate locations specified by JDS-Hydro and indicated on the Boring Location Plan (Figure 2). Borings B-1, B-2, B-4 and B-5 were drilled within/near the perimeter of the proposed subject tank and were advanced to approximate depths of 29 feet below the ground surface. Boring B-3 was drilled at the approximate center of the subject tank and was advanced to a depth of approximately 45 feet, at which depth drilling advancement was terminated due to refusal on a highly cemented layer of sandstone bedrock. Borings B-6 and B-7 were drilled near the approximate center of the two future water tanks and were advanced to depths of approximately 29 feet.

An additional field exploration performed on December 23, 2020 included drilling 4 exploratory borings at the approximate locations specified by JDS-Hydro on Figure 3 and Figure 4 of this report. Borings B-8 through B-10 were drilled within the proposed water pipeline alignment and were advanced to depths of approximately 14 to 15 feet below the existing ground surface. Boring B-11 was drilled at the approximate center of the proposed drainage basin and was advanced to a depth of approximately 15.5 feet.

The initial 7 borings were advanced using a truck-mounted CME-55 drill rig equipped with 4-inch diameter, continuous-flight, solid-stem auger. The 4 additional borings were advanced using a truck-mounted Diedrich 90 drill rig equipped with 4-inch diameter continuous-flight, solid-stem auger. Samples were taken with a standard split-spoon (SPT) sampler and California-type sampler (2.0-inch I.D./2.5-inch O.D.) and by bulk methods. Penetration tests were obtained at the various sample depths as well.

Appendix A to this report includes logs describing the subsurface conditions. The lines defining boundaries between soil and rock types on the logs are based upon drill behavior and interpolation between samples and are therefore approximate. Transition between soil and rock types may be abrupt or may be gradual.

2.2 GEOTECHNICAL LABORATORY TESTING

Laboratory tests were performed on selected soil samples to estimate their relative engineering properties. Tests were performed in general accordance with the following methods of ASTM or other recognized standards-setting bodies, and local practice:

- Description and Identification of Soils (Visual-Manual Procedure)
- Classification of Soils for Engineering Purposes
- Moisture Content and Unit Weight of Soils
- Sieve Analysis
- Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- Swell/Settlement Test

Results of the geotechnical laboratory tests are presented in the report text, where applicable, and included in Appendix B of this report. Selected test results are also shown on the boring logs in Appendix A.

2.3 ANALYTICAL LABORATORY TESTING

Analytical testing for soil corrosivity was performed on two select samples and included the following tests:

- pH
- Resistivity
- Redox Potential
- Water-soluble Chloride Content
- Sulfides
- Water-soluble Sulfate Content

Results of the analytical laboratory tests are included in Appendix C of this report. Selected test results are also shown on the boring logs in Appendix A

3.0 SITE CONDITIONS

3.1 SURFACE

At the time of our exploration, the subject site was a vacant property southwest of the intersection of Drennan Road and Mockingbird Lane in El Paso County, Colorado. The Pikes Peak National Cemetery (PPNC) is located west of the proposed project site as well as a major utility easement located between the PPNC and the project site. The ground surface consisted of gently rolling topography and was covered predominately with grasses and yucca plants. Prairie dog holes were scattered across the property. Outcroppings of sandstone bedrock were present at various locations in areas adjacent to the site. Groundwater seeps were not observed on the site.

3.2 GEOLOGY

Prior to drilling, the site geology was evaluated by reviewing available geologic information including the USGS Geologic Map of the Coral Bluffs Quadrangle, El Paso County, Colorado (Soister, P.E. 1968). Mapping indicates the surficial soils in the general area of the project site comprise predominately of Piney Creek Alluvium deposits of mostly clayey and silty sand underlain by interbedded sandstone, claystone and shale bedrock of the Pierre Shale Formation. The mapping is generally consistent with our explorations.

3.3 SEISMICITY

Based upon the geologic setting, subsurface soil conditions, and low seismic activity in this region, liquefaction is not expected to be a hazard at the site. Based on correlation of blow count data (N-values) from the borings advanced during this evaluation, the subsurface soil profiles correspond with Site Class C of the 2015 International Building Code (IBC). The intermediate design acceleration values from IBC are presented below.

Table 1
Design Acceleration for Short Periods

S_S	F_a
0.167	1.2

S_S = The mapped spectral accelerations for short periods (SEAOC/OSHPD Seismic Design Maps Tool, 2020)

F_a = Site coefficient (SEAOC/OSHPD Seismic Design Maps Tool, 2020)

Table 2
Design Acceleration for 1-Second Period

S_1	F_V
0.059	1.7

S_1 = The mapped spectral accelerations for 1 second period (SEAOC/OSHPD Seismic Design Maps Tool, 2020)

F_v = Site coefficient SEAOC/OSHPD Seismic Design Maps Tool, 2020

3.4 SUBSURFACE

VIVID explored the subsurface conditions by drilling, logging and sampling 7 exploratory borings within or near the general area to be occupied by the proposed subject tank and future tanks as shown on Figure

2. These borings were drilled to depths ranging from approximately 29 to 45 feet below the existing ground surface. In addition, 3 exploratory borings were performed at select locations within the area of the proposed water pipeline and 1 boring within the proposed drainage basin. The additional borings were drilled to depths ranging from approximately 14 to 15.5 feet below the existing ground surface. The general profile encountered in our borings consisted of:

Sand (Alluvium)

This unit comprised mainly of clayey sand with thin layers of silty sand and was encountered at the ground surface in the two borings in the locations of the future water tanks and extended to depths of approximately 3.5 to 6 feet below the existing ground surface. A thin layer, approximately 1-foot thick, of silty sand was encountered overlying the weathered bedrock in one of the water pipelines borings (Boring B-10). Silty sand extended the full depth of the boring located in the area of the drainage basin (B-11). The sand soils were generally olive and yellowish-brown in color and slightly moist. Field penetration testing (blow counts) and drill rig observations indicated the sand soils were medium dense to loose.

Bedrock

A layer of weathered sandstone bedrock was encountered at the ground surface in all 5 of the borings located within or near the footprint of the proposed 2.0 MG tank. A thin layer of weathered sandstone, approximately 1.5 feet thick, was encountered below the surficial soils in boring B-7. A weathered sandstone layer was encountered at the ground surface or below the sand in all 3 of the borings located within the proposed water pipeline alignment. The weathered sandstone was medium hard to hard based on field penetration resistance testing and drill rig observations. The weathered layer extended to depths of 2 to 5 feet below the existing ground surface, was dry to slightly moist and was generally olive, olive-brown, light brown and yellowish-brown.

Interbedded sandstone and claystone bedrock of the Pierre Shale Formation was encountered underlying the units described above and extended to depths between approximately 15 and 29 feet below the ground surface. The sandstone and claystone bedrock materials were predominantly olive, olive-brown, yellowish-brown and reddish-brown in color, slightly moist to moist, and hard to very hard as indicated by the field penetration test (blow counts). Well-cemented layers of bedrock were encountered at various depths within this unit.

The interbedded sandstone and claystone bedrock was underlain by shale bedrock of the Pierre Shale Formation and extended to the maximum depths explored of approximately 29 to 45 feet below the ground surface. The shale was generally dark gray in color, slightly moist to moist, and very hard with a highly-cemented layer encountered at a depth of approximately 45 feet in boring B-3.

The boring logs in Appendix A should be reviewed for more detailed descriptions of the subsurface conditions at each of the boring locations explored.

3.4.1 Groundwater

Groundwater was not encountered in any of the borings at the time of drilling or when checked one day after completion of drilling. Groundwater is not anticipated to be a significant factor for construction. Soil

moisture levels and groundwater levels commonly vary over time and space depending on seasonal precipitation, irrigation practices, land use, and runoff conditions. These conditions and the variations that they create often are not apparent at the time of field investigation. Accordingly, the soil moisture and groundwater data in this report pertain only to the locations and times at which exploration was performed. They can be extrapolated to other locations and times only with caution. It should also be noted that VIVID has not performed a hydrologic study to verify the seasonal high-water level.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GEOTECHNICAL FEASIBILITY OF PROPOSED CONSTRUCTION

VIVID found no subsurface conditions during this investigation that would preclude development of the site essentially as planned, provided the recommendations in this report are incorporated into the design and construction of the project. Our recommendations for earthwork, foundations, and slabs are discussed further in the following sections of the report.

Based on a finished floor elevation of 5972 feet and our understanding of the existing topography, we anticipate the slab and foundation will be bearing on sandstone bedrock. Foundation system recommendations are described in more detail in Section 4.3.1. Slab-on-grade recommendations are described in more detail in Section 4.5. This includes subgrade preparation prior to placement of the 6 to 12-inch crushed stone or granular base material below the slab, as required by DN Tanks, per Section 4.2.2.

4.2 CONSTRUCTION CONSIDERATIONS

4.2.1 General

All site preparation and earthwork operations should be performed in accordance with applicable codes, safety regulations and other local, State or Federal guidelines.

4.2.2 Site Preparation and Grading

Initial site work should consist of completely removing all organic material and other deleterious materials from all areas to be filled and areas to be cut. All material should be removed for offsite disposal in accordance with local laws and regulations or, if appropriate, stockpiled in proposed non-structural areas for future use. Areas to receive fill should be evaluated by the geotechnical engineer prior to the placement of any fill materials.

After performing the required excavations and prior to the placement of the granular base material as required by DN Tanks, processing of the subgrade should be performed. This should include scraping the bedrock clean and relatively flat (undisturbed bedrock should not be scarified). If loose material is present at the bottom of the excavation, the loose material should be compacted as specified in Section 4.2.6 of this report. All fill materials should be placed on a horizontal plane and placed in loose lifts not to exceed 8 inches in thickness, unless otherwise accepted by the geotechnical engineer.

4.2.3 Excavation Characteristics

Based on our discussion and the topographic map provided to us, we understand the desired finished floor elevation is 5972 feet. We anticipate cuts up to approximately 7 feet will be required to achieve footing elevations.

If deep excavations for utility placement are required, hard to very hard bedrock will be encountered. Excavation in the upper portions of bedrock should not present significant challenges for standard heavy-duty excavation equipment. The unweathered bedrock can be very hard and very much intact, making ripping of the bedrock extremely difficult. Excavation equipment such as heavy-duty backhoes/trackhoes suitable for rock excavation, hoe rams, dozers equipped with rock excavating teeth/rippers and similar

equipment will be required to excavate into the very hard bedrock materials. We anticipate excavation in the harder materials could be relatively slow depending on the depth of excavation, the type of bedrock encountered, the type and site of equipment used, as well as the contractor's experience with similar excavation.

All excavations must comply with applicable local, State and Federal safety regulations, and particularly with the excavation standards of the Occupational Safety and Health Administration (OSHA). Construction site safety, including excavation safety, is the sole responsibility of the Contractor as part of its overall responsibility for the means, methods and sequencing of construction operations. VIVID's recommendations for excavation support are intended for the Client's use in planning the project, and in no way relieve the Contractor of its responsibility to construct, support and maintain safe slopes. Under no circumstances should the following recommendations be interpreted to mean that VIVID is assuming responsibility for either construction site safety or the Contractor's activities.

We believe that the sand overburden soils on this site will classify as Type C materials and the sandstone and claystone bedrock will classify as Type B materials using OSHA criteria. OSHA requires that unsupported cuts be laid back to ratios no steeper than 1½:1 (horizontal to vertical) for Type C materials and no steeper than 1:1 for Type B materials. In general, we believe that these slope ratios for the soils provided above will be temporarily stable under unsaturated conditions. If groundwater seepage was to occur, flatter slopes may be appropriate. Please note that the actual determination of soil type and allowable sloping must be made in the field by an OSHA-qualified "competent person."

4.2.4 Structural Fill

If the foundation is to be backfilled on one side, structural fill must be used. If the on-site materials are used as structural fill, the bedrock must be broken down into "soil-like" material with no particles greater than 2 inches. Imported structural fill should consist of a CDOT Class 1 Structure Backfill. A sample of any imported fill material should be submitted to our office for approval and testing at least 1 week prior to stockpiling at the site.

Structural fill should be moisture-treated and compacted according to the recommendations in Section 4.2.6 of this report.

4.2.5 Utility Trench Backfill

Backfill material should be essentially free of plant matter, organic soil, debris, trash, other deleterious matter and rock particles larger than 4 inches. However, backfill material in the "pipe zone" (from the trench floor to 1 foot above the top of pipe) should not contain rock particles larger than 1 inch. Strictly observe any requirements specified by the utility agency for bedding and pipe-zone fill. In general, backfill above the pipe zone in utility trenches should be placed in lifts of 6 to 8 inches, and compacted using power equipment designed for trench work. Backfill in the pipe zone should be placed in lifts of 8 inches or less and compacted with hand-held equipment. Compact trench backfill as recommended in Section 4.2.6 of this report. If utilities are placed below tank footings or slab, the trench must be backfilled with flow fill as specified in CDOT Standard Specifications Section 206.02. This will provide support more consistent with the bedrock materials and minimize potential differential settlement.

4.2.6 Compaction Requirements

Fill materials should be placed in horizontal lifts compatible with the type of compaction equipment being used, moisture conditioned, and compacted in accordance with the following criteria:

Table 3
Compaction Specifications

FILL LOCATION [1]	MATERIAL TYPE	PERCENT COMPACTION[2] (ASTM D 1557)	MOISTURE CONTENT
Subgrade Preparation (after clearing, grubbing, excavation, and prior to placement of new fill and/or structural elements)	On-site Soils, not including undisturbed sandstone bedrock	92 minimum	± 2 % of optimum
Exterior Wall Backfill	Imported Granular Soils or On-site Soils (CDOT Class 1 Structural Backfill)	92 minimum	± 2 % of optimum
Utility Trenches (outside tank perimeter)	On-site Soils	92 minimum	± 2 % of optimum

1) Where two or more "Fill Locations" coincide, the more stringent specification should be used.
2) In non-structural or landscaped areas, the compaction specification may be reduced to 90 percent.

Structural fill should be placed in level lifts not exceeding 8-inches in loose thickness and compacted to the specified percent compaction to produce a firm and unyielding surface. If field density tests indicate the required percent compaction has not been obtained, the fill material should be reconditioned as necessary and re-compacted to the required percent compaction before placing any additional material.

4.2.7 Construction in Wet or Cold Weather

During construction, grade the site such that surface water can drain readily away from the building areas. Promptly pump out or otherwise remove any water that may accumulate in excavations or on subgrade surfaces and allow these areas to dry before resuming construction. The use of berms, ditches and similar means may be used to prevent stormwater from entering the work area and to convey any water off site efficiently.

If earthwork is performed during the winter months when freezing is a factor, no grading fill, structural fill or other fill should be placed on frosted or frozen ground, nor should frozen material be placed as fill. Frozen ground should be allowed to thaw or be completely removed prior to placement of fill. A good practice is to cover the compacted fill with a "blanket" of loose fill to help prevent the compacted fill from freezing.

If the structures are erected during cold weather, foundations, concrete slabs-on-grade, or other concrete elements should not be constructed on frozen soil. Frozen soil should be completely removed from

beneath the concrete elements, or thawed, scarified and recompacted. The amount of time passing between excavation or subgrade preparation and placing concrete should be minimized during freezing conditions to prevent the prepared soils from freezing. The use of blankets, soil cover or heating as required may be utilized to prevent the subgrade from freezing.

4.2.8 Construction Testing and Observation

Testing and construction observation should take place under the direction of VIVID to support that engineer's professional opinion as to whether the earthwork does or does not substantially conform to the recommendations in this report. Furthermore, the opinions and conclusions of a geotechnical report are based upon the interpretation of a limited amount of information obtained from the field exploration. It is therefore not uncommon to find that actual site conditions differ somewhat from those indicated in the report. The geotechnical engineer should remain involved throughout the project to evaluate such differing conditions as they appear, and to modify or add to the geotechnical recommendations as necessary.

4.2.9 Surface Drainage and Landscaping

Positive drainage away from the tank is essential to the performance of foundations and slabs and should be provided during the life of the structure. Non-paved areas within 10-feet of the structure should slope away at a minimum of 8 percent. Areas where pavements or slabs are constructed adjacent to the structure should slope away at a minimum grade of 2 percent. All downspouts from roof drains should be tight-lined to an on-site stormwater system or, at a minimum, cross all backfilled areas such that they discharge all water away from the backfill zone and the structure. Drainage should be created such that water is diverted off the site and away from backfill areas of adjacent structures.

4.2.10 Permanent Cut and Fill Slopes

If required, permanent cut and fill slopes exposing the materials encountered in our borings are anticipated to be stable at slope ratios as steep as 3:1 (horizontal to vertical) under dry conditions. We believe that slope ratios of 4:1 or flatter are more reliable if subjected to wetting, and present less of a maintenance problem. New slopes should be revegetated as soon as possible after completion to reduce erosion problems.

4.3 SHALLOW FOUNDATIONS

Provided the following recommendations are complied with, the proposed storage tank may be supported on shallow foundations. Our subsurface investigation indicates excavation for construction of shallow foundations for the proposed structure will expose sandstone bedrock materials. To provide uniform support and to limit differential settlement, all footings shall extend to bedrock.

4.3.1 Shallow Foundation

Foundation elevations were not provided to our office prior to this investigation. Based on the existing topography and our understanding of desired finished floor elevations, we anticipate the foundation will bear directly on sandstone bedrock.

- Foundations should be constructed directly on the sandstone bedrock, as discussed above.

- Foundations bearing upon sandstone bedrock should be designed for a maximum allowable soil bearing capacity of 4,000 psf. A one-third increase in bearing capacity is allowable for transient loads. Foundations should be proportioned as much as practicable to minimize differential settlement.
- If utilities are placed below tank footings or slab, the trench must be backfilled with flow fill as specified in CDOT Standard Specifications Section 206.02. This will provide support more consistent with the bedrock materials and minimize potential differential settlement.
- Foundation sizes should be determined by a structural engineer based on actual structural loading. However, as a minimum, continuous footings should have a minimum width of 18 inches. The actual footing sizes should be determined by a qualified structural engineer based on the soil bearing capacity and actual structural loads.
- Exterior foundations must be protected from frost action. We recommend footings be protected with at least 30 inches of soil cover or that which is required by local building codes. Foundation components must not be placed on frozen soils.
- A representative of VIVID should observe all foundation excavations prior to placement of concrete.

4.4 LATERAL EARTH PRESSURES

If foundations or walls are partially backfilled with soil on one side, they will therefore be subjected to lateral earth pressures. The design and construction criteria presented below should be observed for earth retention systems on this site with flat back slopes. Active and at-rest lateral earth pressures apply to the structural fill soils that are "retained" by the foundation walls. Passive lateral earth pressure applies to soils placed adjacent the inside edge of the tank footing/wall beneath the floor slab. The sliding coefficient applies to the friction between the base of the foundation and the underlying soil. The following values were estimated assuming a moist unit weight of 125 pounds per cubic foot and an internal friction angle of 32 degrees for imported granular structural fill materials. A moist unit weight of 120 pounds per cubic foot and internal friction angle of 28 degrees for on-site soils and sandstone bedrock.

Table 4
Lateral Earth Pressure Parameter Summary

Lateral Earth Pressure Parameter	Values for Imported Granular Structural Fill (ultimate values)	Values for On-site Soils (ultimate values)
At-Rest[1]	58 pcf	63 pcf
Active[2]	38 pcf	43 pcf
Passive[3]	406 pcf	332 pcf
Unfactored Coefficient of Sliding Friction[3]	0.62	0.53

Notes: 1. Retaining walls that are laterally supported (structurally restrained from rotation) can be expected to undergo only a slight amount of deflection. These walls should be designed for an "at-rest" lateral earth pressure.

2. Retaining structures which can deflect sufficiently to mobilize the full "active" earth pressure condition should be designed for an "active" lateral earth pressure.

3. Lateral loads may be resisted using these coefficients of friction for sliding and unfactored passive earth pressures. Due to the relatively large movements required to mobilize the passive pressure, we recommend a minimum factor of safety of 1.5 be utilized.

4. It should be noted that the above lateral earth pressures assume drained conditions behind the wall and a horizontal backfill surface without surcharges.

4.5 SLABS-ON-GRADE

Based on the plans provided to us and the desired slab elevation of 5972 feet, we anticipate the slab section will bear on sandstone bedrock. The slab section includes the slab and the 6 to 12 inches of granular base as required by DN Tanks. Subgrade preparation as described above for the interior slab shall be applied to exterior flatwork that is constructed adjacent the building structure as well.

The criteria presented below should be observed for design and construction of slabs on this site. The construction details should be considered when preparing the project documents.

- Considering the results obtained from a plate load test performed using a 12" square plate according to (ASTM D 1196), we recommend designing the slab utilizing a modulus of subgrade reaction of **300** pounds per cubic inch (pci) when bearing on sandstone bedrock.
- If utilities are placed below the slab, the trench must be backfilled with flow fill as specified in CDOT Standard Specifications Section 206.02. This will provide support more consistent with the bedrock materials and minimize potential differential settlement.

4.6 CORROSIVITY AND CONCRETE

4.6.1 Corrosion Potential

Laboratory testing was completed to provide data regarding corrosivity of onsite soils. Our scope of services does not include corrosion engineering and, therefore, a detailed analysis of the corrosion test results is not included. A qualified corrosion engineer should be retained to review the test results and design protective systems that may be required.

Laboratory chloride concentration, sulfate concentration, sulfide concentration, pH, oxidation reduction potential, and electrical resistivity tests were performed on a sample of onsite materials obtained during our field investigation. The results of the tests are included in Appendix C to this report and are summarized below in Table 5.

Table 5
Summary of Laboratory Soil Corrosivity Testing

Boring No.	Sample Depth (ft)	Water Soluble Chloride (%)	pH	Redox Potential (mV)	Resistivity (ohm-cm)	Water Soluble Sulfate (%)	Sulfide Content
B-4	2.0	0.0006	4.2	455.2	1,656	0.029	Negative
B-6	4.0	0.0097	7.3	369.6	490	0.271	Negative

Metal and concrete elements in contact with soil, whether part of a foundation system or part of a supported structure, are subject to degradation due to corrosion or chemical attack. Therefore, buried metal and concrete elements should be designed to resist corrosion and degradation based on accepted practices.

Based on the "10-point" method developed by the American Water Works Association (AWWA) in standard AWWA C105/A21.5, the corrosivity test results indicate that the onsite surficial clayey sand soils encountered in the area of the future tanks have corrosive potential. The test results of the soil located in the area of the subject tank indicate low corrosive potential. We recommend that a corrosion engineer be consulted to recommend appropriate protective measures, if required.

4.6.2 Chemical Sulfate Susceptibility and Concrete Type

The degradation of concrete or cement grout can be caused by chemical agents in the soil or groundwater that react with concrete to either dissolve the cement paste or precipitate larger compounds within the concrete, causing cracking and flaking. The concentration of water-soluble sulfates in the soils is a good indicator of the potential for chemical attack of concrete or cement grout. The American Concrete Institute (ACI) in their publication Guide to Durable Concrete (ACI 201.2R-08) provides guidelines for this assessment.

The concentration of water-soluble sulfates measured was variable. Based on the results we recommend assuming a Class 2 exposure of sulfate attack on concrete exposed to the soils per CDOT Standard Specifications for Road and Bridge Construction, 2019, Section 601.04. Requirements for sulfate resistance are also presented in Section 601.04 of the CDOT Standard Specifications for Road and Bridge Construction, 2019.

5.0 ADDITIONAL SERVICES & LIMITATIONS

5.1 ADDITIONAL SERVICES

Attached to this report is a document by the Geoprofessional Business Association (GBA) that summarizes limitations of geotechnical reports as well as additional services that are required to further confirm subgrade materials are consistent with that encountered at the specific boring locations presented in this report. This document should be read in its entirety before implementing design or construction activities. Examples of other services beyond completion of a geotechnical report are necessary or desirable to complete a project satisfactorily include:

- Review of design plans and specifications to verity that our recommendations were properly interpreted and implemented.
- Attendance at pre-bid and pre-construction meetings to highlight important items and clear up misunderstandings, ambiguities, or conflicts with design plans and specifications.
- Performance of construction observation and testing which allows verification that existing materials at locations beyond our borings are consistent with that presented in our report, construction is compliant with the requirements/recommendations, evaluation of changed conditions.

5.2 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of VIVID's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. VIVID makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

The work performed was based on project information provided by Client. If Client does not retain VIVID to review any plans and specifications, including any revisions or modifications to the plans and specifications, VIVID assumes no responsibility for the suitability of our recommendations. In addition, if there are any changes in the field to the plans and specifications, Client must obtain written approval from VIVID's engineer that such changes do not affect our recommendations. Failure to do so will vitiate VIVID's recommendations.

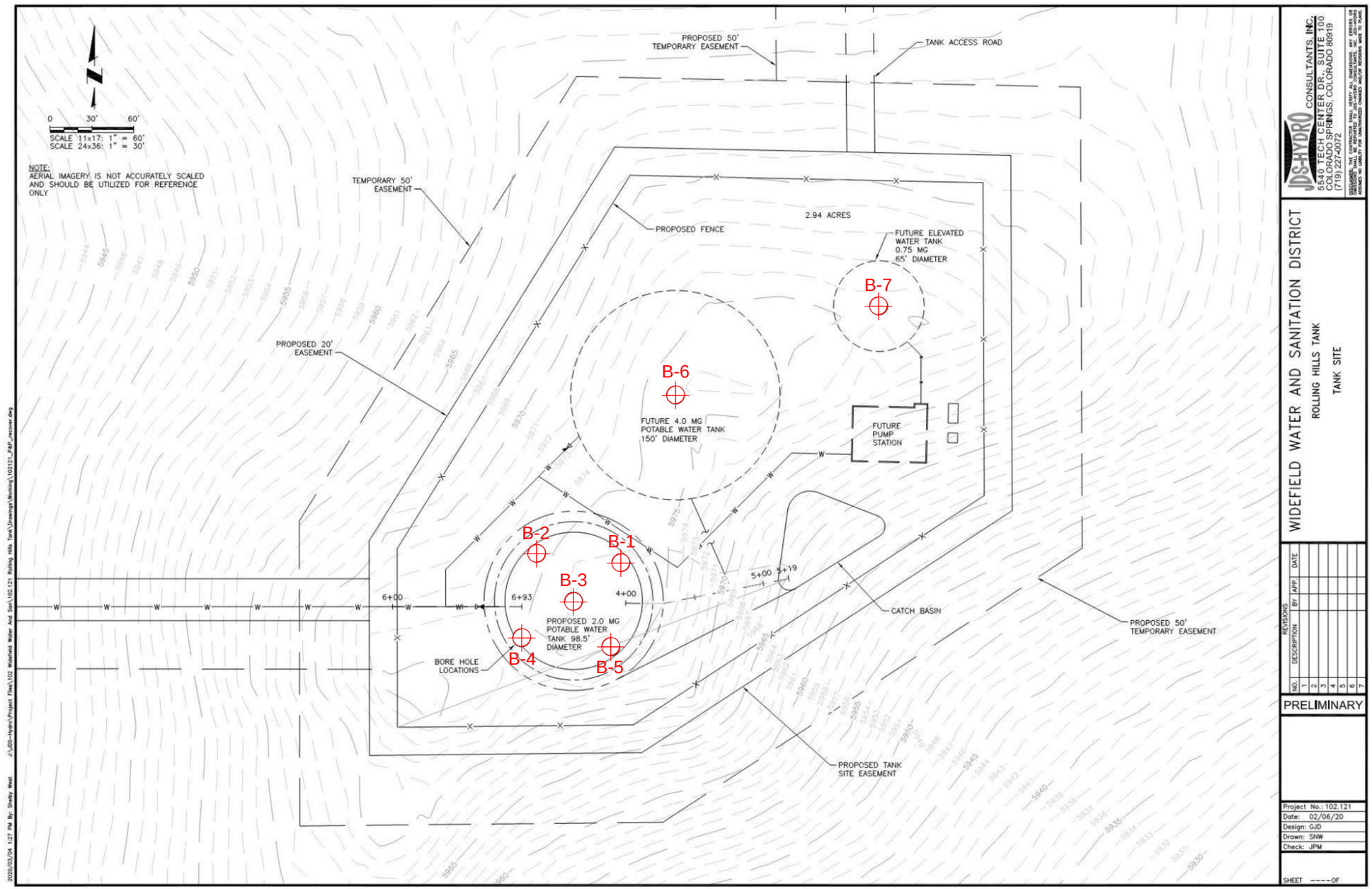
Figures

Not to Scale. Base image obtained from www.mapquest.com, 2020.

VIVID Engineering Group	Project No: D20-2-282 Date: February 12, 2020 Drawn by: MBR Reviewed by: BTM	**VICINITY MAP** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	Figure **1**

LEGEND

⊕ = APPROXIMATE LOCATION OF TANK BORING

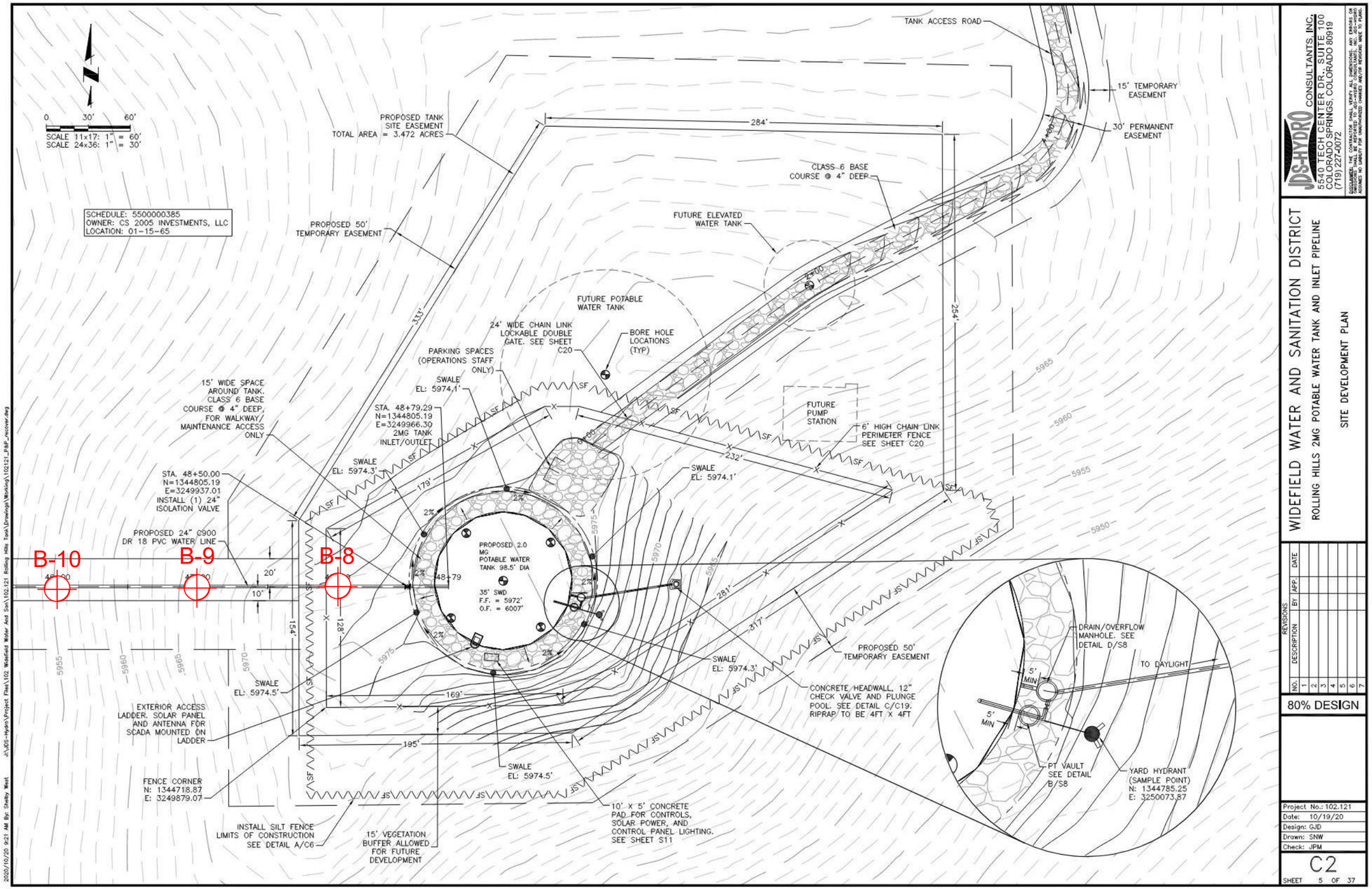


Base image dated 02/06/2020 and provided by JDS-Hydro Consultants, Inc. on 03/04/2020.

VIVID Engineering Group, Inc. 1053 Elkton Drive Colorado Springs, Colorado 80907 719.896.4356	Project No: D20-2-282 Date: March 5, 2020 Drawn by: MBR Reviewed by : BTM	**BORING LOCATION PLAN - CONCEPTUAL** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	Figure **2**

LEGEND

⊕ = APPROXIMATE LOCATION OF PIPELINE BORING



JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072

WIDEFIELD WATER AND SANITATION DISTRICT
ROLLING HILLS 2MG POTABLE WATER TANK AND INLET PIPELINE
SITE DEVELOPMENT PLAN

REVISIONS				
NO.	DESCRIPTION	BY	APP'D	DATE
1				
2				
3				
4				
5				
6				
7				

80% DESIGN

Project No.: 102.121
Date: 10/19/20
Design: GJD
Drawn: SNW
Check: JPM

C2
SHEET 5 OF 37

Base image dated 10/19/2020 and provided by JDS-Hydro Consultants, Inc.

VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
719.896.4356

Project No: D20-2-282
Date: December 28, 2020
Drawn by: MBR
Reviewed by : BTM

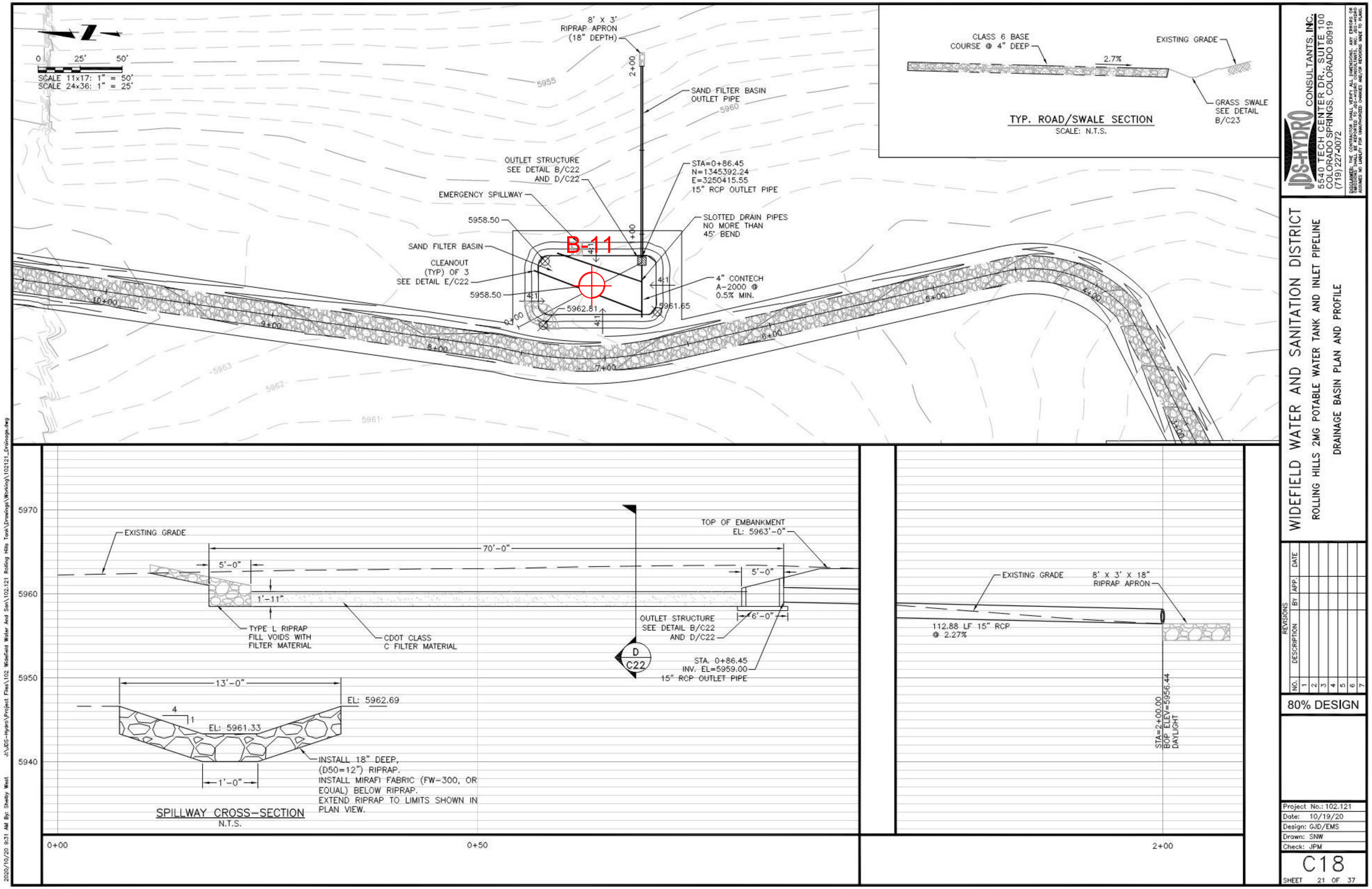
BORING LOCATION PLAN - CONCEPTUAL

Proposed Rolling Hills Water Tank
Vicinity of Drennan Road and Mockingbird Lane
El Paso County, Colorado

Figure
3

LEGEND

⊕ = APPROXIMATE LOCATION OF BORING



B-11
8' x 3' RIPRAP APRON (18" DEPTH)
SCALE 11x17: 1" = 50'
SCALE 24x36: 1" = 25'
SAND FILTER BASIN OUTLET PIPE
OUTLET STRUCTURE SEE DETAIL B/C22 AND D/C22
EMERGENCY SPILLWAY
STA=0+86.45 N=1345392.24 E=3250415.55 15" RCP OUTLET PIPE
SLOTTED DRAIN PIPES NO MORE THAN 45° BEND
SAND FILTER BASIN
CLEANOUT (TYP) OF 3 SEE DETAIL E/C22
4" CONTECH A-2000 @ 0.5% MIN.
CLASS 6 BASE COURSE @ 4" DEEP
EXISTING GRADE
GRASS SWALE SEE DETAIL B/C23
TYP. ROAD/SWALE SECTION
SCALE: N.T.S.
TOP OF EMBANKMENT EL: 5963'-0"
TYPE L RIPRAP FILL VOIDS WITH FILTER MATERIAL
CDOT CLASS C FILTER MATERIAL
OUTLET STRUCTURE SEE DETAIL B/C22 AND D/C22
STA. 0+86.45 INV. EL=5959.00 15" RCP OUTLET PIPE
8' x 3' x 18" RIPRAP APRON
112.88 LF 15" RCP @ 2.27%
STA=2+00.00 BOP ELEV=5956.44 DAYLIGHT
SPILLWAY CROSS-SECTION
N.T.S.
INSTALL 18" DEEP, (D50=12") RIPRAP. INSTALL MIRAFI FABRIC (FW-300, OR EQUAL) BELOW RIPRAP. EXTEND RIPRAP TO LIMITS SHOWN IN PLAN VIEW.
JDS-HYDRO CONSULTANTS, INC.
5540 TECH CENTER DR., SUITE 100
COLORADO SPRINGS, COLORADO 80919
(719) 227-0072
WIDEFIELD WATER AND SANITATION DISTRICT
ROLLING HILLS 2MG POTABLE WATER TANK AND INLET PIPELINE
DRAINAGE BASIN PLAN AND PROFILE
80% DESIGN
Project No.: 102.121
Date: 10/19/20
Design: GJD/EMS
Drawn: SNW
Check: JPM
C18
SHEET 21 OF 37

Base image dated 10/19/2020 and provided by JDS-Hydro Consultants, Inc.

VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
719.896.4356

Project No: D20-2-282	**BORING LOCATION PLAN - CONCEPTUAL**
Date: December 28, 2020	Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado
Drawn by: MBR	
Reviewed by : BTM	

Figure

4

Appendix A

Logs of Exploratory Borings

Vivid Engineering Group, Inc.
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Telephone: 719-896-4356
Fax: 719-896-4357

KEY TO SYMBOLS

CLIENT JDS-Hydro Consultants, Inc.

PROJECT NAME Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282

PROJECT LOCATION El Paso County, Colorado

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


SANDSTONE


SC: USCS Clayey Sand


SHALE


SM: USCS Silty Sand


WEATHERED SANDSTONE

SAMPLER SYMBOLS


Grab Sample


2" I.D. Modified California Sampler (MC)


Standard Penetration Test (SPT)

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
MC - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
FINES- PERCENT PASSING NO. 200 SIEVE
UCS - UNCONFINED COMPRESSIVE STRENGTH


Water Level at Time of Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

KEY TO SYMBOLS (GEOTECH) - GINT STD US LAB.GDT - 3/5/20 10:56 - C:\USERS\MARY BETH RAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - D

Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-1

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5976 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Weathered SANDSTONE, olive brown, slightly moist, hard
	SPT	30-30-35 (65)	MC = 6.0% LL = NP PL = NP Fines = 23.0%		
	GB			3.0	5973.0
	MC	50/6"	Swell = 0.3% when wetted under 1,000 psf load		**Pierre Shale Formation** Silty-Clayey SANDSTONE interbedded with CLAYSTONE, olive to olive brown and rust, moist, very hard
5					
10	MC	50/2"	MC = 14.8%		
15	MC	50/2"	MC = 9.6% LL = 22 PL = 17 Fines = 29.0%		
20	MC	50/1"			
25	MC	50/1"			
	MC	50/3"		29.0 29.3	5947.0 5946.7 **Pierre Shale Formation** SHALE, dark gray, moist, very hard

Bottom of borehole at 29.3 feet.

GENERAL BH / TP / WELL - MODIFIED - GINT STD US LAB.GDT - 3/5/20 10:23 - C:\USERS\MARY BETH RAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_G

Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-2

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5975 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB		MC = 13.7% LL = 25 PL = 19 Fines = 35.0%		Weathered SANDSTONE, olive, dry to slightly moist, medium hard based on drill rig observations
	MC	50/5"		2.0	5973.0
					Pierre Shale Formation Silty SANDSTONE, olive to yellowish brown, slightly moist to moist, very hard
5	SPT	32-34-27 (61)			
	MC	50/4"	MC = 13.2% DD = 104.7 pcf LL = NP PL = NP		
	MC	50/2"	MC = 10.8% LL = NP PL = NP Fines = 26.0%		
10					
	MC	50/2"	No movement when wetted under 1,000 psf load		
15					
	MC	50/1"			
20					
				24.0	5951.0
	MC	50/3"			**Pierre Shale Formation** SHALE, dark gray, slightly moist, very hard
25					
	MC	50/3"		29.2	5945.8
					Bottom of borehole at 29.2 feet.

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Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-3

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5976 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Weathered SANDSTONE, olive, slightly moist, medium hard
	SPT	12-17-24 (41)	MC = 7.3% LL = 25 PL = 20 Fines = 28.0%		
	GB				
	MC	50/4"	MC = 11.1% DD = 106.5 pcf LL = 26 PL = 21 Fines = 31.0%		
10	MC	50/4"	Swell = 0.5% when wetted under 1,000 psf load		
	MC	50/2"			
20	MC	50/3"	Swell = 0.1% when wetted under 1,000 psf load		
30	MC	50/2"			
40	MC	50/3"			

3.5 — 5972.5

Pierre Shale Formation
Silty-Clayey SANDSTONE interbedded with CLAYSTONE, olive and yellowish brown with rust, slightly moist to moist, very hard

25.0 — 5951.0

Pierre Shale Formation
SHALE, dark gray, moist, very hard, with highly cemented layers

-Highly cemented layer encountered at about 45 feet. Drill rig refusal due to melted bit occurred from multiple attempts to advance boring.

45.0 — 5931.0

Refusal at 45.0 feet.
Bottom of borehole at 45.0 feet.

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Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-4

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5975 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Weathered SANDSTONE, olive, slightly moist, medium hard based on drill rig observations
					2.0 — 5973.0
	SPT	50/6"	Chloride = 0.0006%, pH = 4.2, Redox Potential = 455.2 mv, Resistivity = 1656 ohm.cm, Sulfate = 0.029%, Sulfide = Negative		**Pierre Shale Formation** Silty SANDSTONE, olive and yellowish brown, slightly moist, very hard
5					
10	MC	50/2"	MC = 9.1% LL = NP PL = NP Fines = 28.0%		
15					
20	MC	50/2"			
					24.0 — 5951.0
25					**Pierre Shale Formation** SHALE, dark gray, moist, very hard
	MC	50/3"			29.3 — 5945.7
					Bottom of borehole at 29.3 feet.

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Vivid Engineering Group, Inc.
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Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-5

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5975 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Weathered SANDSTONE, olive, slightly moist, medium hard based on drill rig observations
2.5					5972.5
					Pierre Shale Formation
5	MC	50/9"	Swell = 1.3% when wetted under 500 psf load		Silty-Clayey SANDSTONE interbedded with CLAYSTONE, olive to yellowish brown, slightly moist to moist, hard to very hard
					-well cemented layer encountered from approximately 7 to 7.5 feet below ground surface
10					
15	MC	50/3"	MC = 16.8% DD = 98.7 pcf LL = 27 PL = 20 Fines = 41.0%		
15.0					5960.0
					Pierre Shale Formation
					SHALE, dark gray, moist, very hard, with highly cemented layers
20					
25	MC	50/3"			
29.0					5946.0

Bottom of borehole at 29.0 feet.

GENERAL BH / TP / WELL - MODIFIED - GINT STD US LAB.GDT - 3/5/20 10:23 - C:\USERS\MARY BETH RAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_G

Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-6

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5975 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Clayey SAND, olive, slightly moist, medium dense
	MC	15-15	MC = 5.7% DD = 96.9 pcf		
	SPT	10-9-9 (18)	MC = 6.7% LL = 24 PL = 16 Fines = 40.0%		
	GB				
5	MC	7-8	Compression = 2.7% when wetted under 1,000 psf load, Chloride = 0.0097 %, pH = 7.3, Redox Potential = 369.6 mv, Resistivity = 490 ohm.cm, Sulfate = 0.271%, Sulfide = Negative		6.0 5969.0 Silty SAND, light brown, slightly moist, medium dense
	SPT	5-6-8 (14)			8.0 5967.0
	MC	50/5"			**Pierre Shale Formation** SANDSTONE, yellowish brown, olive, and reddish brown, slightly moist, very hard
10			MC = 7.6% LL = 22 PL = 19 Fines = 28.0%		
	MC	50/3"			
15			MC = 5.7% DD = 102.2 pcf		
					-well cemented layer encountered from approximately 18 to 18.5 feet below ground surface
	MC	50/2"			
20					
	MC	50/3"			
25					
	MC	50/2"			29.2 5945.8 Bottom of borehole at 29.2 feet.

GENERAL BH / TP / WELL - MODIFIED - GINT STD US LAB.GDT - 3/5/20 10:23 - C:\USERS\MARY BETH RAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_G

Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-7

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 1/30/20 **COMPLETED** 1/30/20
GROUND ELEVATION 5975 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Custom Auger Drilling (CME-55)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY A. Al Eyoon **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0	GB				Clayey SAND, olive, slightly moist, medium dense
	MC	9-9			
	SPT	11-9-7 (16)	MC = 5.4% LL = 24 PL = 16 Fines = 39.0%		
	GB				
5	MC	15-25	MC = 8.9% DD = 108.6 pcf Compression = 1.6% when wetted under 1,000 psf load		3.5 — 5971.5 Weathered SANDSTONE, olive, slightly moist, medium hard 5.0 — 5970.0
	SPT	30-50			**Pierre Shale Formation** SANDSTONE interbedded with CLAYSTONE, olive brown, slightly moist, hard to very hard
10	MC	50/3"	MC = 16.6% LL = 33 PL = 19 Fines = 61.0%		
15	MC	50/6"	MC = 11.0% DD = 105.1 pcf		
20	MC	50/1"			
25	MC	50/2"			24.0 — 5951.0 **Pierre Shale Formation** SHALE, dark gray, slightly moist, very hard
	MC	50/3"			29.2 — 5945.8 Bottom of borehole at 29.2 feet.

GENERAL BH / TP / WELL - MODIFIED - GINT STD US LAB.GDT - 3/5/20 10:23 - C:\USERS\MARY BETH RAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_G

VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-8

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 12/23/20 **COMPLETED** 12/23/20
GROUND ELEVATION 5973 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR GDI Drilling, Inc. (Diedrich D-90 Truck)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY M. Ray **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					**Pierre Shale Formation** Weathered SANDSTONE, light brown, slightly moist, medium hard
	SPT	7-5-4 (9)			
					3.0 5970.0
	SPT	50/1"	MC = 11.6% LL = NP PL = NP Fines = 31.0%		**Pierre Shale Formation** SANDSTONE, moderately cemented with well-cemented layers, yellowish-brown, slightly moist, very hard
5					
	SPT	50/5"			
	SPT	50/5"			
10					
	SPT	50/2"			
					14.2 5958.8
					Bottom of borehole at 14.2 feet.

1 - GINT STD US LAB.GDT - 1/4/21 13:31 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLING HILLS WA

VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-9

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 12/23/20 **COMPLETED** 12/23/20
GROUND ELEVATION 5966 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR GDI Drilling, Inc. (Diedrich D-90 Truck)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY M. Ray **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					**Pierre Shale Formation** Weathered SANDSTONE, yellowish-brown, slightly moist, medium hard to hard based on drilling observation
	SPT	50/10"			
2.5					5963.5
					Pierre Shale Formation SANDSTONE, light brown, gray, slightly moist to moist, hard
	SPT	50/11"			
5					
	SPT	50/10"	MC = 16.4% LL = 34 PL = 24 Fines = 36.0%		
	SPT	50/8"			
10					
	SPT	50/8"			
14.7					5951.3

Bottom of borehole at 14.7 feet.

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1053 Elkton Drive
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Fax: 719-896-4357

BORING NUMBER B-10

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 12/23/20 **COMPLETED** 12/23/20
GROUND ELEVATION 5955 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR GDI Drilling, Inc. (Diedrich D-90 Truck)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY M. Ray **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, yellowish-brown, slightly moist
					1.0 5954.0
					Pierre Shale Formation
	SPT	7-14-28 (42)	MC = 9.4% LL = NP PL = NP Fines = 26.0%		Weathered SANDSTONE, yellowish-brown, grayish-brown, slightly moist, medium hard
					4.5 5950.5
5	SPT	20-25-25 (50)			**Pierre Shale Formation** SANDSTONE, light gray, yellowish-brown, hard
	SPT	50/10"			
10	SPT	50/10"			
	SPT	50/10"			14.8 5940.2

Bottom of borehole at 14.8 feet.

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VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

BORING NUMBER B-11

CLIENT JDS-Hydro Consultants, Inc.
PROJECT NAME Proposed Rolling Hills Water Tank
PROJECT NUMBER D20-2-282
PROJECT LOCATION El Paso County, Colorado
DATE STARTED 12/23/20 **COMPLETED** 12/23/20
GROUND ELEVATION 5958.5 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR GDI Drilling, Inc. (Diedrich D-90 Truck)
GROUND WATER LEVELS:
DRILLING METHOD 4" Solid Stem Auger
AT TIME OF DRILLING ---
LOGGED BY M. Ray **CHECKED BY** B. Mustain
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					Silty SAND, yellowish-brown, slightly moist, medium dense to loose
	SPT	7-5-6 (11)			
5	SPT	5-4-5 (9)	MC = 4.9% LL = NP PL = NP Fines = 19.0%		
	SPT	6-3-3 (6)			
10	SPT	5-3-5 (8)			
15	SPT	5-3-4 (7)			
15.5					5943.0 Bottom of borehole at 15.5 feet.

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Appendix B

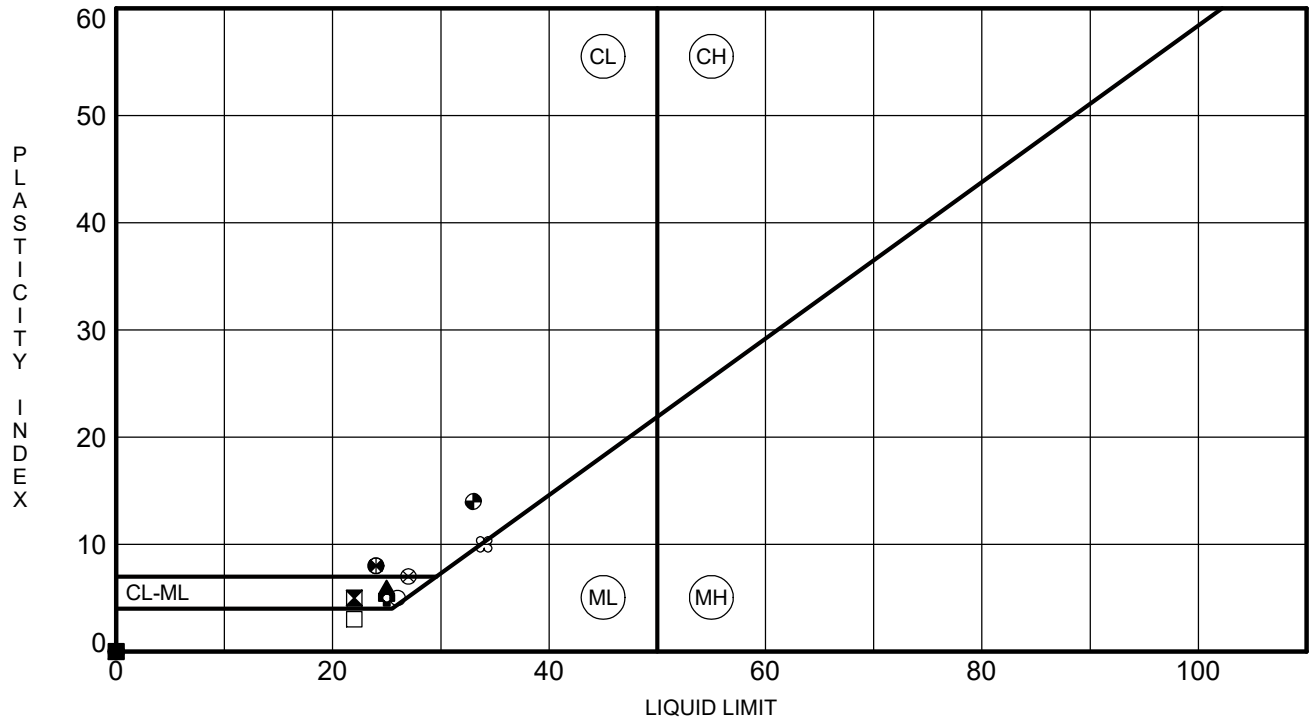
Geotechnical Laboratory Test Results

VIVID Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

ATTERBERG LIMITS' RESULTS

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	B-1	1.0	NP	NP	NP	23	SILTY SAND(SM) / WEATHERED SANDSTONE
⊠	B-1	14.0	22	17	5	29	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE
▲	B-2	0.0	25	19	6	35	SILTY, CLAYEY SAND(SC-SM) / WEATHERED SANDSTONE
★	B-2	7.0	NP	NP	NP		SANDSTONE
⊙	B-2	9.0	NP	NP	NP	26	SILTY SAND(SM) / SANDSTONE
✿	B-3	1.0	25	20	5	28	SILTY, CLAYEY SAND(SC-SM) / WEATHERED SANDSTONE
○	B-3	4.0	26	21	5	31	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE
△	B-4	9.0	NP	NP	NP	28	SILTY SAND(SM) / SANDSTONE
⊗	B-5	14.0	27	20	7	41	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE
⊕	B-6	2.0	24	16	8	40	CLAYEY SAND(SC)
□	B-6	7.0	22	19	3	28	SILTY SAND(SM)
⊛	B-7	2.0	24	16	8	39	CLAYEY SAND(SC)
◕	B-7	7.0	33	19	14	61	SANDY LEAN CLAY(CL) / CLAYSTONE
☆	B-8	4.0	NP	NP	NP	31	SILTY SAND(SM)/ SANDSTONE
⊠	B-9	7.0	34	24	10	36	SILTY SAND(SM) / SANDSTONE
■	B-10	2.0	NP	NP	NP	26	SILTY SAND(SM) / WEATHERED SANDSTONE
◆	B-11	4.0	NP	NP	NP	19	SILTY SAND(SM)

ATTERBERG LIMITS - GINT STD US LAB.GDT - 1/4/21 13:40 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\

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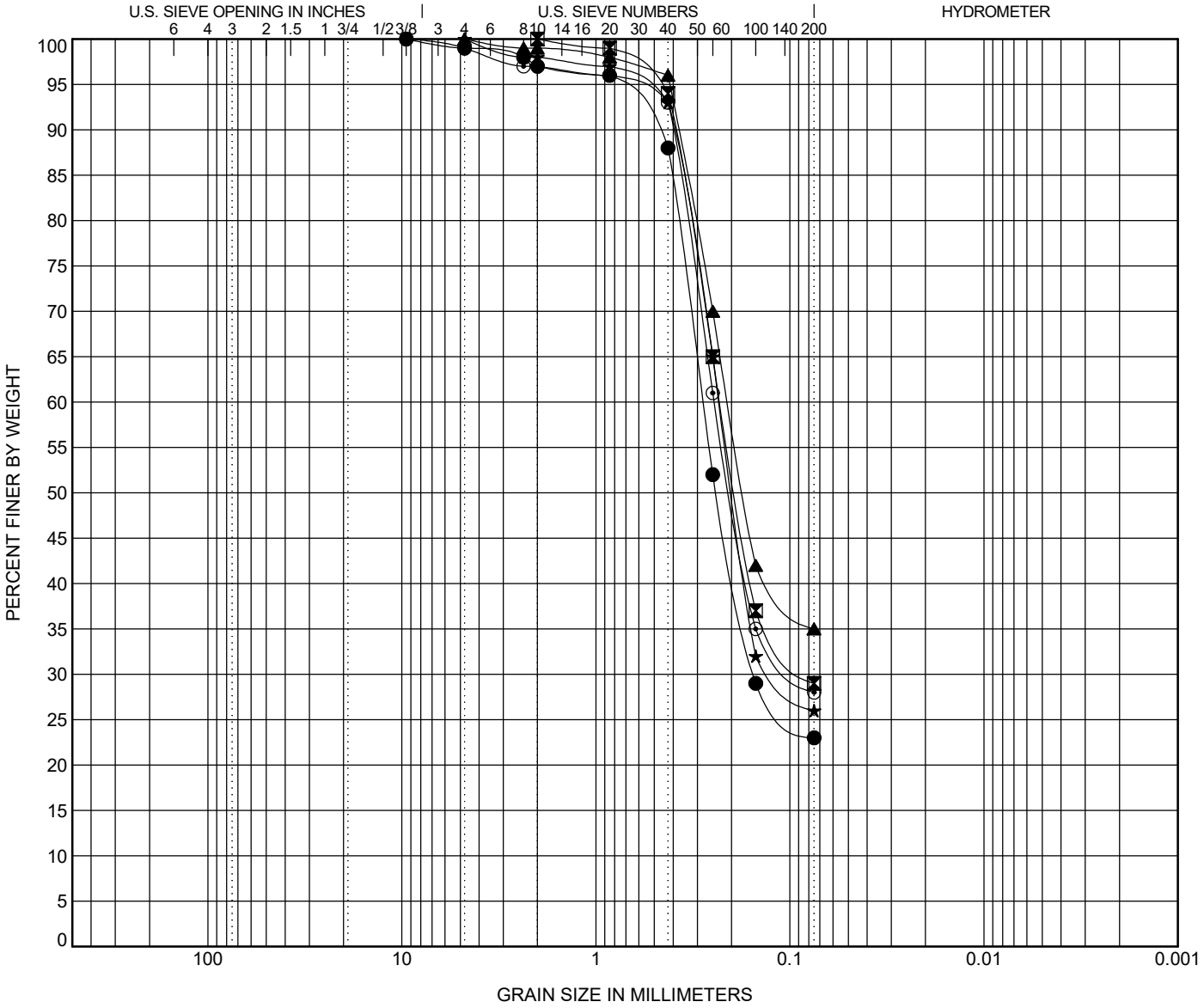
1053 Elkton Drive
Colorado Springs, Colorado 80907
Telephone: 719-896-4356
Fax: 719-896-4357

GRAIN SIZE DISTRIBUTION

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-1	1.0	SILTY SAND(SM) / WEATHERED SANDSTONE	NP	NP	NP		
⊠	B-1	14.0	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE	22	17	5		
▲	B-2	0.0	SILTY, CLAYEY SAND(SC-SM) / WEATHERED SANDSTONE	25	19	6		
★	B-2	9.0	SILTY SAND(SM) / SANDSTONE	NP	NP	NP		
⊙	B-3	1.0	SILTY, CLAYEY SAND(SC-SM) / WEATHERED SANDSTONE	25	20	5		

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	1.0	9.5	0.281	0.153		1.0	76.0	23.0	
⊠	B-1	14.0	2	0.228	0.082		0.0	71.0	29.0	
▲	B-2	0.0	4.75	0.208			0.0	65.0	35.0	
★	B-2	9.0	4.75	0.231	0.119		0.0	74.0	26.0	
⊙	B-3	1.0	9.5	0.245	0.091		1.0	71.0	28.0	

GRAIN SIZE - GINT STD US LAB.GDT - 1/4/21 13:41 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLING

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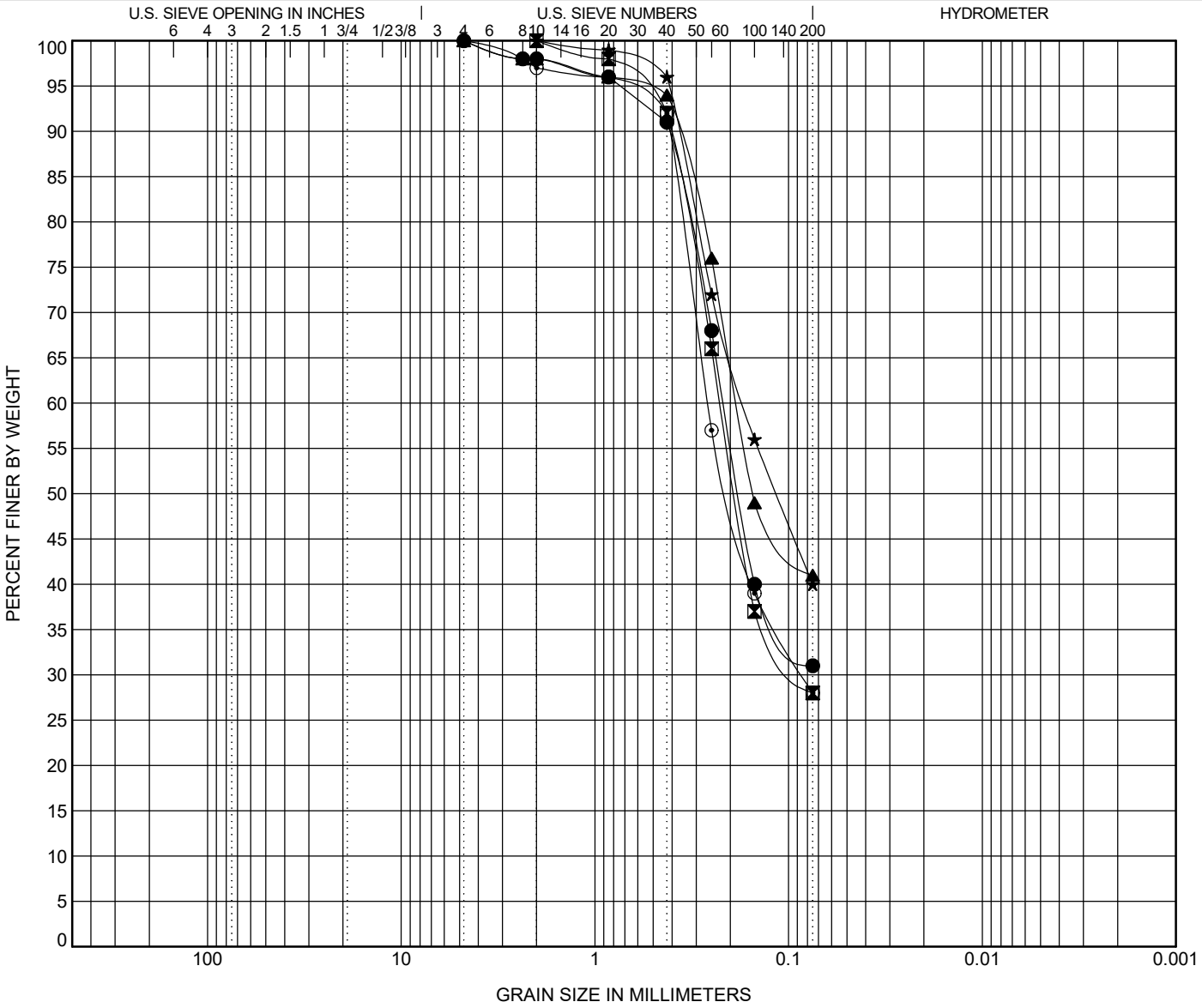
GRAIN SIZE DISTRIBUTION

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-3	4.0	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE	26	21	5		
⊠ B-4	9.0	SILTY SAND(SM) / SANDSTONE	NP	NP	NP		
▲ B-5	14.0	SILTY, CLAYEY SAND(SC-SM) / SANDSTONE	27	20	7		
★ B-6	2.0	CLAYEY SAND(SC)	24	16	8		
⊙ B-6	7.0	SILTY SAND(SM)	22	19	3		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3	4.0	4.75	0.216			0.0	69.0	31.0	
⊠ B-4	9.0	2	0.225	0.087		0.0	72.0	28.0	
▲ B-5	14.0	4.75	0.185			0.0	59.0	41.0	
★ B-6	2.0	2	0.17			0.0	60.0	40.0	
⊙ B-6	7.0	4.75	0.262	0.085		0.0	72.0	28.0	

GRAIN SIZE - GINT STD US LAB.GDT - 1/4/21 13:41 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLING

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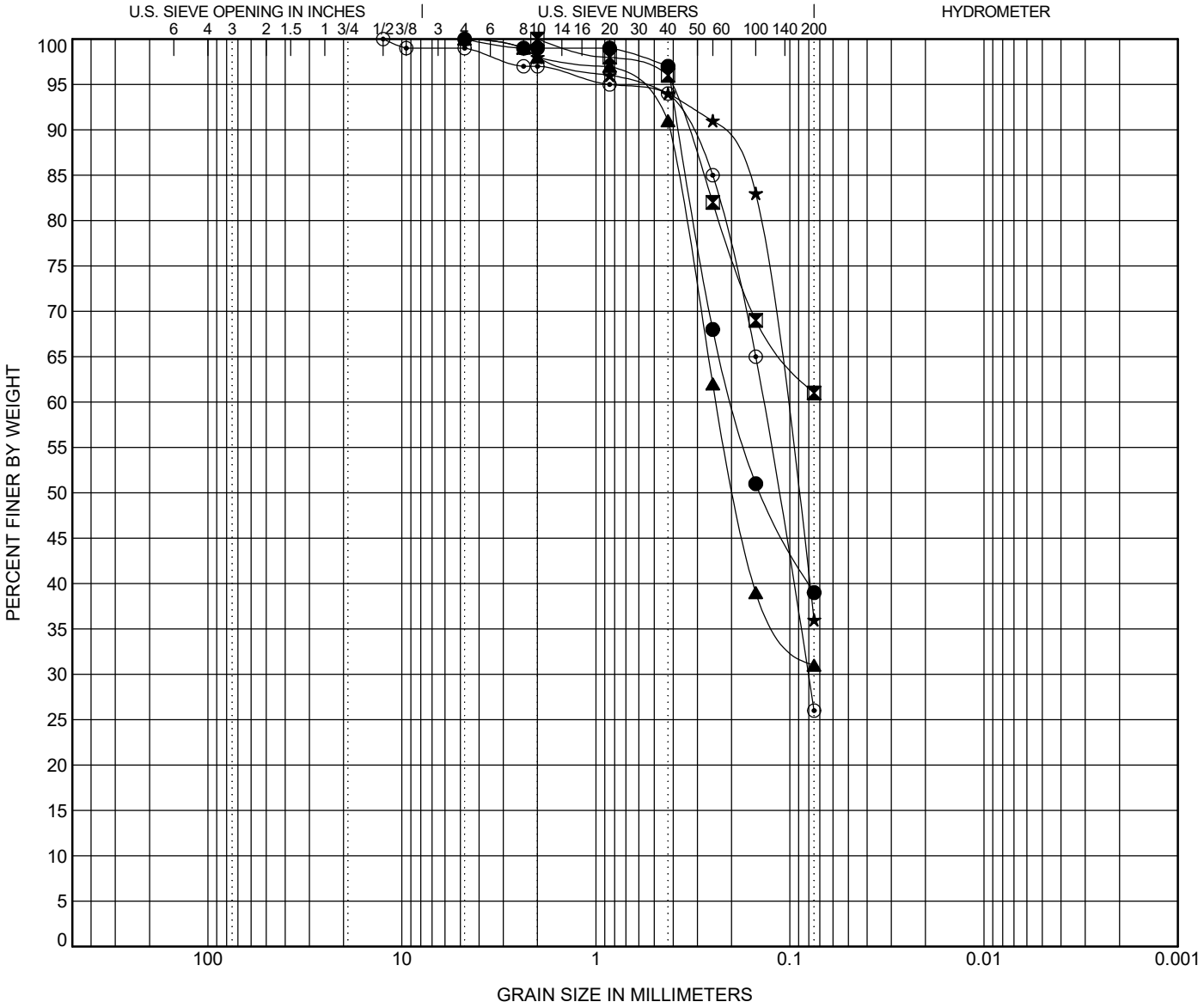
GRAIN SIZE DISTRIBUTION

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-7	2.0	CLAYEY SAND(SC)	24	16	8		
⊠ B-7	7.0	SANDY LEAN CLAY(CL) / CLAYSTONE	33	19	14		
▲ B-8	4.0	SILTY SAND(SM) / SANDSTONE	NP	NP	NP		
★ B-9	7.0	SILTY SAND(SM) / SANDSTONE	34	24	10		
⊙ B-10	2.0	SILTY SAND(SM) / WEATHERED SANDSTONE	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-7	2.0	4.75	0.197			0.0	61.0	39.0	
⊠ B-7	7.0	2				0.0	39.0	61.0	
▲ B-8	4.0	4.75	0.239			0.0	69.0	31.0	
★ B-9	7.0	4.75	0.107			0.0	64.0	36.0	
⊙ B-10	2.0	12.5	0.137	0.081		1.0	73.0	26.0	

GRAIN SIZE - GINT STD US LAB.GDT - 1/4/21 13:41 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLING

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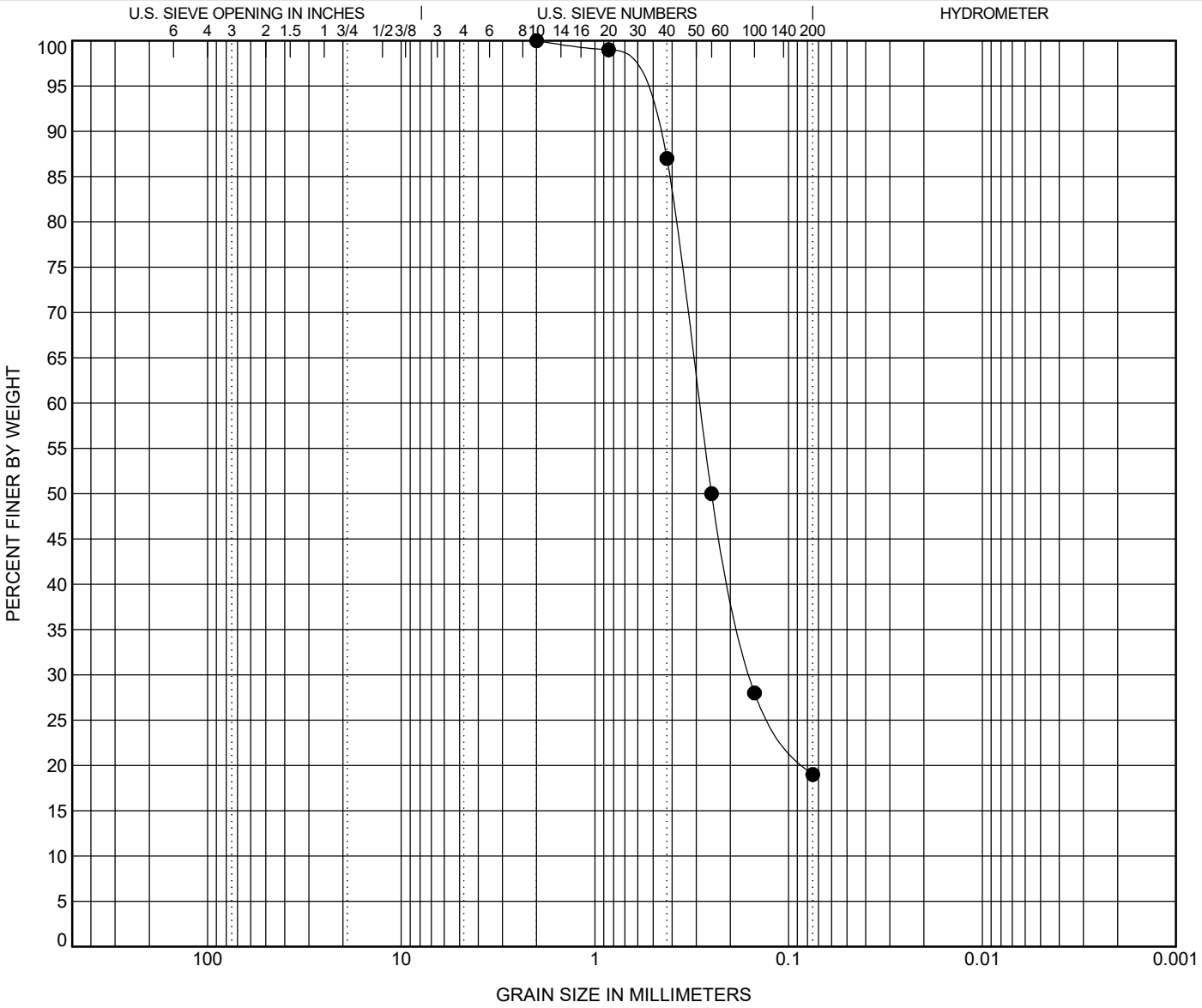
GRAIN SIZE DISTRIBUTION

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-11**	**4.0**	**SILTY SAND(SM)**	**NP**	**NP**	**NP**		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-11**	**4.0**	**2**	**0.289**	**0.157**		**0.0**	**81.0**	**19.0**	

GRAIN SIZE - GINT STD US LAB.GDT - 1/4/21 13:41 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLING

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Fax: 719-896-4357

SUMMARY OF LABORATORY RESULTS

CLIENT JDS-Hydro Consultants, Inc. **PROJECT NAME** Proposed Rolling Hills Water Tank

PROJECT NUMBER D20-2-282 **PROJECT LOCATION** El Paso County, Colorado

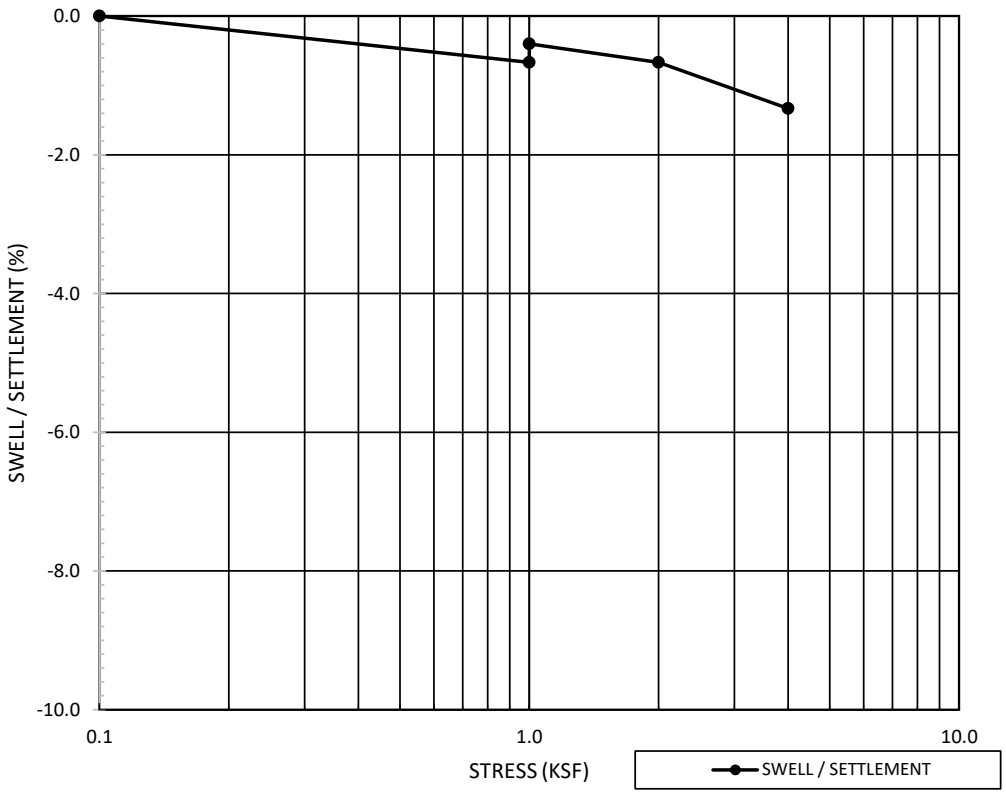
Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)		
B-1	1.0	NP	NP	NP	9.5	23	SM	6.0			
B-1	9.0							14.8			
B-1	14.0	22	17	5	2	29	SC-SM	9.6			
B-2	0.0	25	19	6	4.75	35	SC-SM	13.7			
B-2	7.0	NP	NP	NP				13.2	104.7		
B-2	9.0	NP	NP	NP	4.75	26	SM	10.8			
B-3	1.0	25	20	5	9.5	28	SC-SM	7.3			
B-3	4.0	26	21	5	4.75	31	SC-SM	11.1	106.5		
B-4	9.0	NP	NP	NP	2	28	SM	9.1			
B-5	14.0	27	20	7	4.75	41	SC-SM	16.8	98.7		
B-6	1.0							5.7	96.9		
B-6	2.0	24	16	8	2	40	SC	6.7			
B-6	7.0	22	19	3	4.75	28	SM	7.6			
B-6	9.0							5.7	102.2		
B-7	2.0	24	16	8	4.75	39	SC	5.4			
B-7	4.0							8.9	108.6		
B-7	7.0	33	19	14	2	61	CL	16.6			
B-7	14.0							11.0	105.1		
B-8	4.0	NP	NP	NP	4.75	31	SM	11.6			
B-9	7.0	34	24	10	4.75	36	SM	16.4			
B-10	2.0	NP	NP	NP	12.5	26	SM	9.4			
B-11	4.0	NP	NP	NP	2	19	SM	4.9			

LAB SUMMARY - GINT STD US LAB.GDT - 1/4/21 13:42 - C:\USERS\MARYBETHRAY\VIVID ENGINEERING GROUP\GEOTECH GROUP VIVID ENGINEERING - DOCUMENTS\PROJECTS_2020\D20-2-282_JDS-HYDRO ROLLING HILLS WATER TANK_GEO\6 - DRAFTING\ROLLI

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/3/2020
Project No.:	D20-2-282		
Boring ID.:	B-1	**Sample Depth (ft)**	4
Sample Description:	Sandstone, Clayey, Iron Oxide Stain, Calc Deposits, Light Red Gray		

	%
Swell @ Wetting Weight:	**0.3**

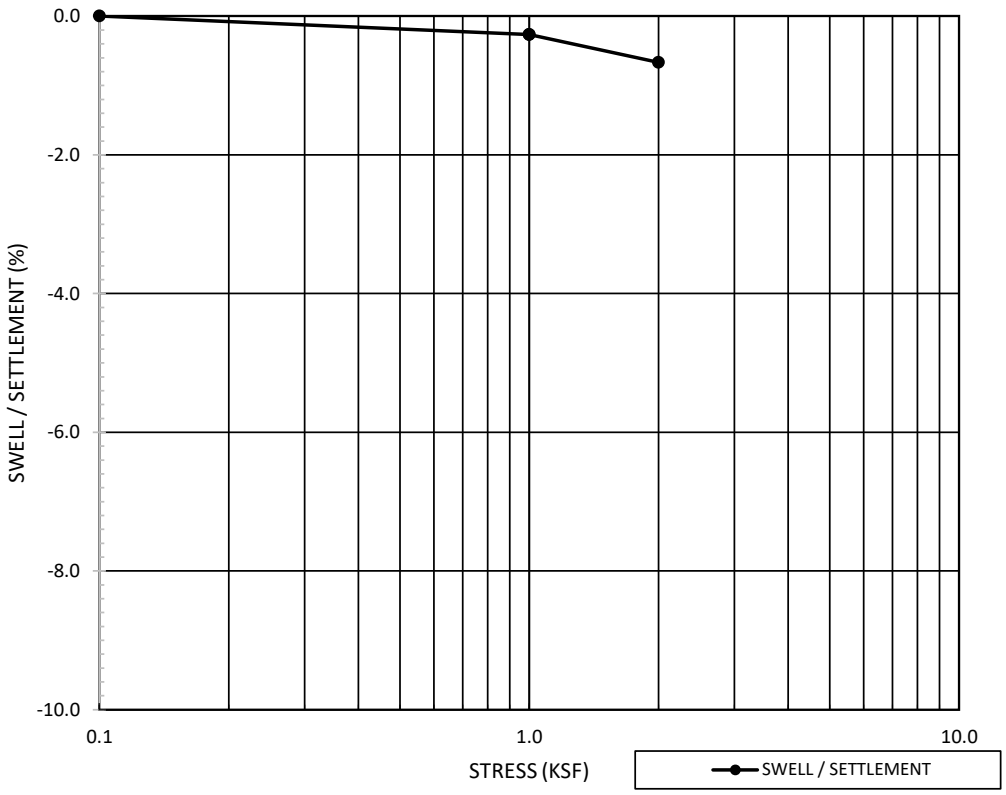


Initial Condition	
Moisture Content %	**14.1**
Dry Density (pcf)	**108.0**
Post-Swell Condition	
Moisture Content %	**19.0**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/3/2020
Project No.:	D20-2-282		
Boring ID.:	B-2	**Sample Depth (ft)**	14
Sample Description:	Sand, Clayey, Iron Oxide Stain, Sl Moist, Gray Reddish Brown		

	%
No Movement @ Wetting Weight:	**0.0**

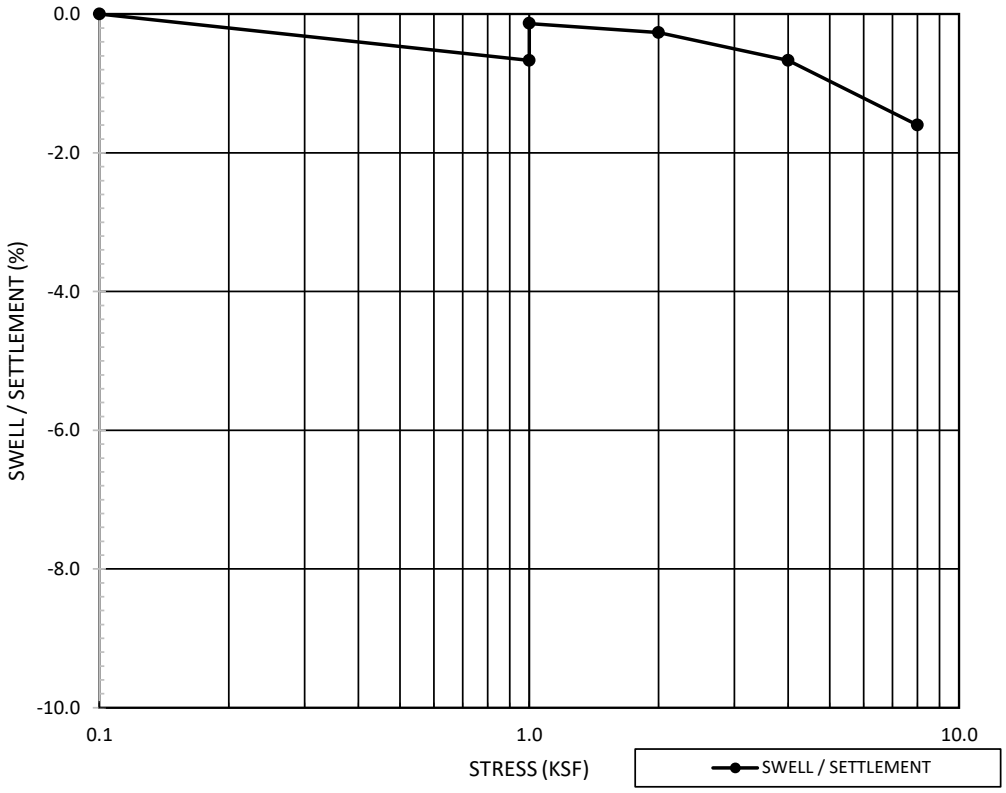


Initial Condition	
Moisture Content %	**15.5**
Dry Density (pcf)	**100.2**
Post-Swell Condition	
Moisture Content %	**23.1**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/3/2020
Project No.:	D20-2-282		
Boring ID.:	B-3	**Sample Depth (ft)**	9
Sample Description:	Clay, Sandy, Iron oxide stain, Calc deposits, Sl Moist, Gray & Red		

	%
Swell @ Wetting Weight:	**0.5**

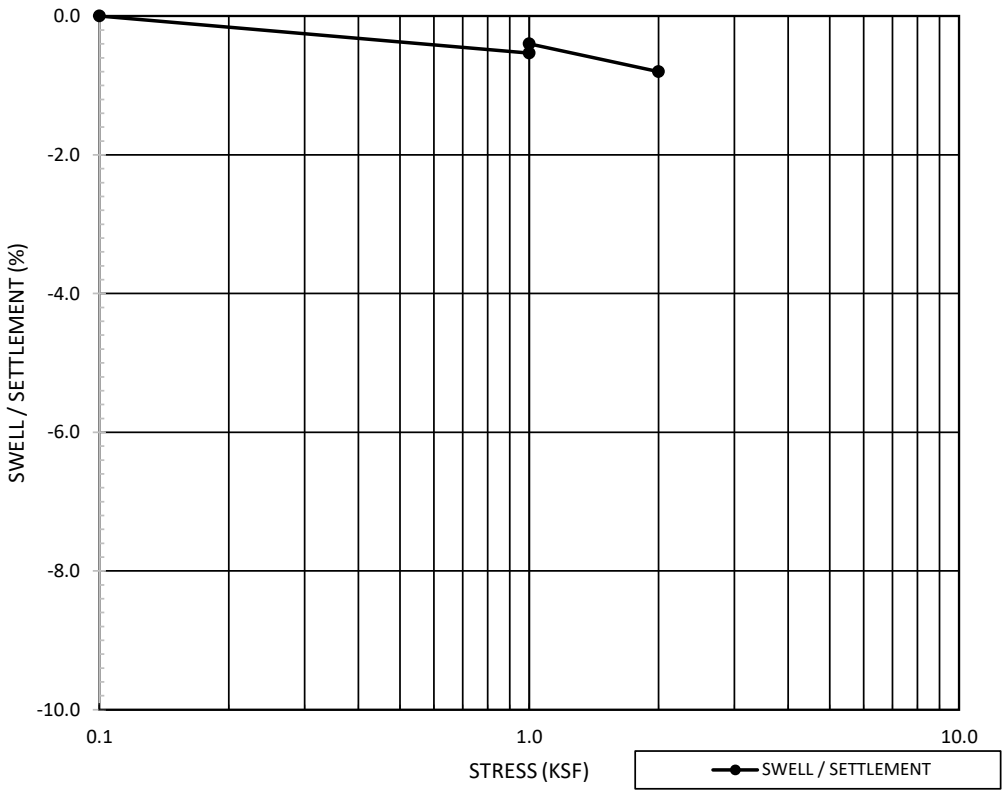


Initial Condition	
Moisture Content %	**16.8**
Dry Density (pcf)	**109.9**
Post-Swell Condition	
Moisture Content %	**21.1**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/3/2020
Project No.:	D20-2-282		
Boring ID.:	B-3	**Sample Depth (ft)**	19
Sample Description:	Clay, Sandy, Iron oxide stain, Moist, Gray Brown		

	%
Swell @ Wetting Weight:	**0.1**

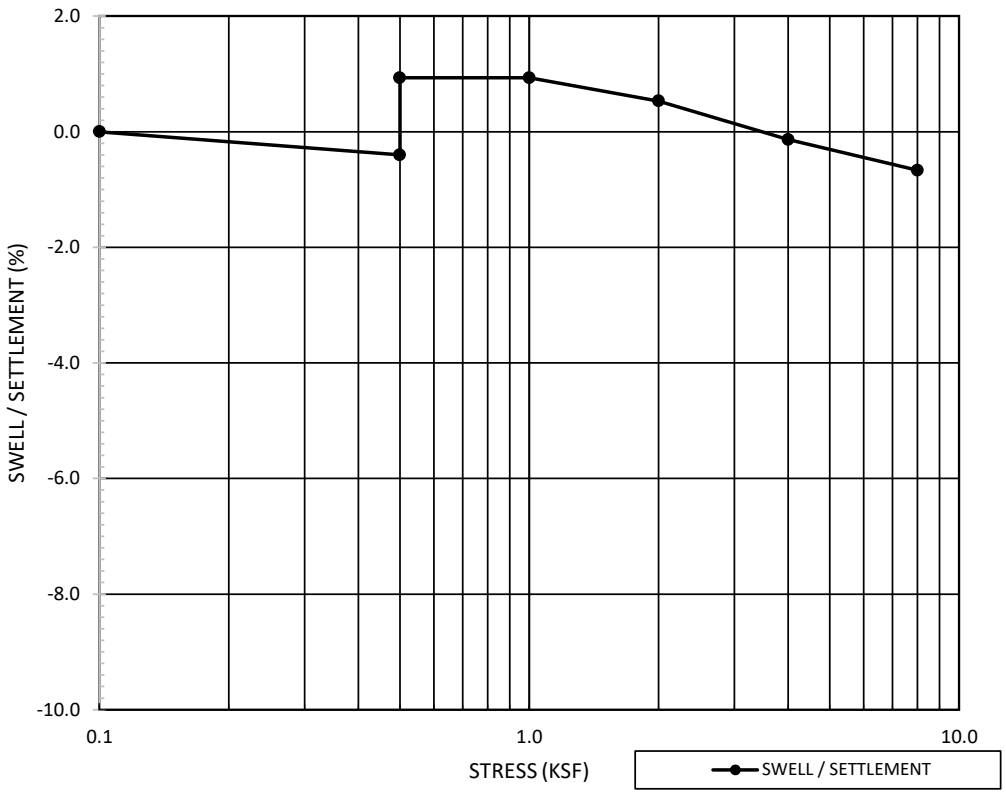


Initial Condition	
Moisture Content %	**16.3**
Dry Density (pcf)	**99.5**
Post-Swell Condition	
Moisture Content %	**25.2**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/6/2020
Project No.:	D20-2-282		
Boring ID.:	B-5	**Sample Depth (ft)**	4
Sample Description:	Gray claystone over sandstone, Iron oxide stain, calc deposits		

	%
Swell @ Wetting Weight:	**1.3**

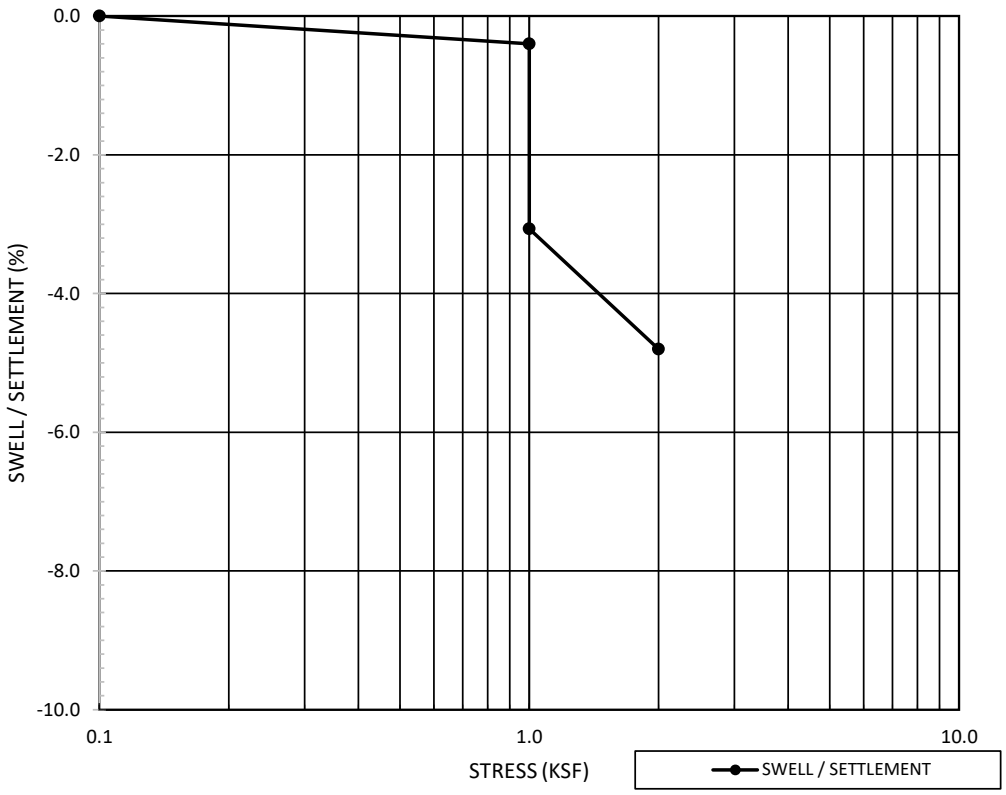


Initial Condition	
Moisture Content %	**17.4**
Dry Density (pcf)	**104.5**
Post-Swell Condition	
Moisture Content %	**22.3**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/6/2020
Project No.:	D20-2-282		
Boring ID.:	B-6	**Sample Depth (ft)**	4
Sample Description:	Sand, Slightly Clayey, Brown		

	%
Compression @ Wetting Weight:	**-2.7**

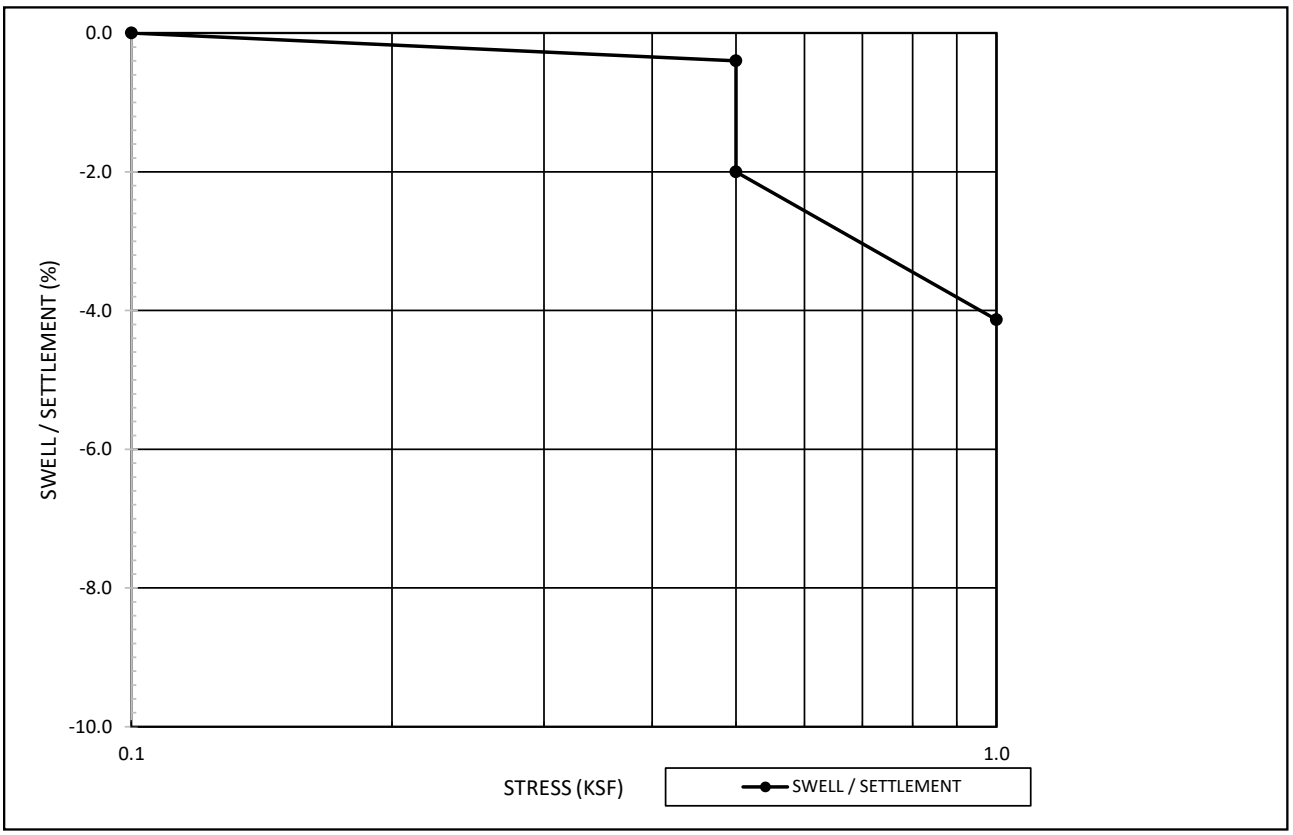


Initial Condition	
Moisture Content %	**8.1**
Dry Density (pcf)	**95.7**
Post-Swell Condition	
Moisture Content %	**22.4**

VIVID Engineering Group, Inc.

Project Name:	Rolling Hills Tank	**Date**	2/6/2020
Project No.:	D20-2-282		
Boring ID.:	B-7	**Sample Depth (ft)**	4
Sample Description:	Sand, Silty, Light Brown Dry		

	%
Compression @ Wetting Weight:	**-1.6**



Initial Condition	
Moisture Content %	**6.3**
Dry Density (pcf)	**91.2**
Post-Swell Condition	
Moisture Content %	**25.2**

Appendix C

Analytical Laboratory Test Results

Colorado Analytical LABORATORIES, INC.

Analytical Results

TASK NO: 200212060

Vivid Engineering Group, Inc.
1053 Elkton Drive
Colorado Springs CO 80907

Task No.: 200212060
Client PO:
Client Project: Rolling Hills Tank D20-2-282

Date Received: 2/12/20
Date Reported: 2/19/20
Matrix: Soil - Geotech

Customer Sample ID B-4 @ 2Ft
Lab Number: 200212060-01

Test	Result	Method
Chloride - Water Soluble	**0.0006 %**	AASHTO T291-91/ ASTM D4327
pH	**4.2 units**	AASHTO T289-91
Redox Potential	**455.2 mv**	ASTM D1498
Resistivity	**1656 ohm.cm**	AASHTO T288-91
Sulfate - Water Soluble	**0.029 %**	CDOT CP-L 2103 / ASTM D4327
Sulfide	**Negative**	AWWA C105

Customer Sample ID B-6 @ 4Ft
Lab Number: 200212060-02

Test	Result	Method
Chloride - Water Soluble	**0.0097 %**	AASHTO T291-91/ ASTM D4327
pH	**7.3 units**	AASHTO T289-91
Redox Potential	**369.6 mv**	ASTM D1498
Resistivity	**490 ohm.cm**	AASHTO T288-91
Sulfate - Water Soluble	**0.271 %**	CDOT CP-L 2103 / ASTM D4327
Sulfide	**Negative**	AWWA C105

Abbreviations/ References:

AASHTO - American Association of State Highway and Transportation Officials.
ASTM - American Society for Testing and Materials.
ASA - American Society of Agronomy.
DIPRA - Ductile Iron Pipe Research Association Handbook of Ductile Iron Pipe.

DATA APPROVED FOR RELEASE BY

Appendix D

Site Photos

DRILLING BORING B-1 - LOOKING NORTHWEST

DRILLING BORING B-2 - LOOKING NORTHEAST

VIVID Engineering Group	Project No: D20-2-282 Date: 2/6/2020 Drawn by: MBR Reviewed by: WJB	**SITE PHOTOS** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	FIGURE **D-1**

DRILLING BORING B-3 - LOOKING NORTH

DRILLING BORING B-4 - LOOKING WEST

VIVID Engineering Group	Project No: D20-2-282	**SITE PHOTOS**	FIGURE
	Date: 2/6/2020	Proposed Rolling Hills Water Tank	
	Drawn by: MBR	Vicinity of Drennan Road and Mockingbird Lane	**D-2**
	Reviewed by: WJB	El Paso County, Colorado	

DRILLING BORING B-5 - LOOKING NORTH

DRILLING BORING B-6- LOOKING NORTHWEST

VIVID Engineering Group	Project No: D20-2-282 Date: 2/6/2020 Drawn by: MBR Reviewed by: WJB	**SITE PHOTOS** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	FIGURE **D-3**

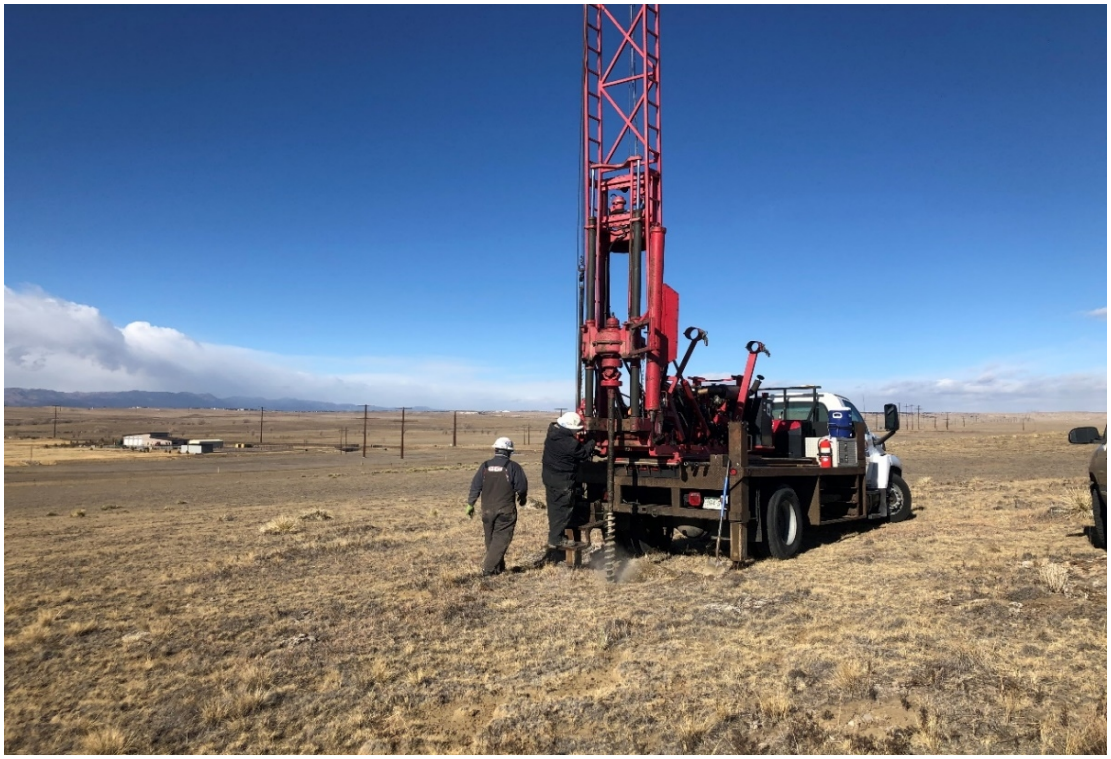
DRILLING BORING B-7 - LOOKING NORTHEAST

VIVID Engineering Group	Project No: D20-2-282 Date: 2/6/2020 Drawn by: MBR Reviewed by: WJB	**SITE PHOTOS** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	FIGURE **D-4**

DRILLING BORING B-8 - LOOKING NORTH

DRILLING BORING B-9 - LOOKING NORTHWEST

VIVID Engineering Group	Project No: D20-2-282 Date: 1/4/2021 Drawn by: MBR Reviewed by: WJB	**SITE PHOTOS** Proposed Rolling Hills Water Tank Vicinity of Drennan Road and Mockingbird Lane El Paso County, Colorado	FIGURE **D-5**



DRILLING BORING B-10 - LOOKING NORTHWEST

DRILLING BORING B-11 - LOOKING NORTH

VIVID Engineering Group	Project No: D20-2-282	**SITE PHOTOS**	FIGURE
	Date: 1/4/2021	Proposed Rolling Hills Water Tank	**D-6**
	Drawn by: MBR	Vicinity of Drennan Road and Mockingbird Lane	
	Reviewed by: WJB	El Paso County, Colorado	

Appendix E

Important Information About This Geotechnical Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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APPENDIX G – Spill Prevention Plan