Phase 5 Landfill Lateral Expansion Application

Pickles Butte Sanitary Landfill

Canyon County, Idaho

Tetra Tech Project# 114-571040-2024

Version 1: October 7, 2024
Version 2: January 23, 2025

PRESENTED TO

Canyon County Solid Waste
15500 Missouri Avenue
Nampa, Idaho 83686

PRESENTED BY

Tetra Tech
3380 Americana Terrace,
Suite 201
Boise, Idaho 83706

P +1-406-489-2826
tetratech.com

Prepared By:

Ron Phillips 10/07/24

Ron Phillips, P.G. Date:
Project Scientist

10/07/24

Richard Salas, PE. Date:
Civil/Environmental Engineer

01/23/25

Maureen McGraw, PhD, PE Date:
Sr. Hydrologist/Civil Engineer

PROFESSIONAL ENGINEER
LICENSED
16021
STATE OF IDAHO
MAUREEN A. McGRAW
1/23/2025

TABLE OF CONTENTS

TABLES

APPENDICES

ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AMSL	Above mean sea level
bgs	Below ground surface
CCSW	Canyon County Solid Waste
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipes
CN	Curve Number
DBS&A	Daniel B. Stephens & Associates
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
GCCS	Gas Collection and Control System
HELP	Hydrologic Evaluation of Landfill Performance (model)
IDWR	Idaho Department of Water Resources
ISWFA	Idaho Solid Waste Facilities Act
LFG	Landfill Gas
MPH	Miles Per Hour
MSW	Municipal Solid Waste
MSWLF	Municipal Solid Waste Landfill
NOAA	National Oceanic and Atmospheric Administration
NMOC	Non-Methane Organic Compounds
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
O&M	Operations and Maintenance
OHV	Off-highway Vehicle
PBSL	Pickles Butte Sanitary Landfill
scfm	Standard Cubic Feet per Minute
SCS	Soil Conservation Service
SWDH	Southwest District Health
USACE	United States Army Corps of Engineers
U.S. BLM	United States Bureau of Land Management
USCS	Unified Soil Classification System
USGS	United States Geological Survey

1.0 INTRODUCTION

The Pickles Butte Sanitary Landfill (PBSL) is located in rural Canyon County, Idaho, approximately 6 miles south of the City of Nampa and serves Canyon and Owyhee Counties. **Figure 1** (**Appendix A)** shows location of the Landfill in relation to Nampa and Lake Lowell. The Landfill is located within approximately 1300 acres of county-owned property covering parts of Sections 20, 21, 28, and 29 of Township 2 North, Range 3 West of the Boise Meridian. The current landfill footprint is in the east-central portion of the county-owned land. **Figure 1** also shows the extent of the county-owned land and the location of the landfill within that area. Much of the adjacent land is used for farming, dairy operations, and/or the Jubilee Park off highway vehicle (OHV) area, except for areas where the topography is unsuitable for these uses.

The Idaho Department of Environmental Quality (DEQ) approved the original design and operating plan for PBSL as a Municipal Solid Waste Landfills (MSWLF) in June 1973, and reconfirmed approval in May 1975 (Holladay, 1994). Southwest District Health (SWDH) approved the landfill in December 1979 (Holladay 1994). The landfill initially began accepting municipal solid waste (MSW) in April 1983. With the implementation of Subtitle D, the County obtained site certification for the landfill from the DEQ in August 1993. The DEQ subsequently approved a Hydrogeologic Characterization, Ground Water Monitoring Plan and Facility Design Report prepared by Holladay Engineering Company (Holladay, 1994). The approval included exemptions from the requirements for a liner/leachate collection system and groundwater monitoring. This technical decision was based on the depth to groundwater, characteristics of native soils, and the arid climate at the facility. The PBSL Operations and Maintenance (O&M) manual for the facility was recertified by Southwest District Health (SWDH) on July 19, 2024 and the plan is valid through July 2027.

Waste disposed of at the PBSL consists primarily of residential municipal solid waste, construction and demolition (C&D) materials, biosolids, and other nonhazardous waste. The landfill work to divert waste for recycling or reuse, including white goods, metal, tires, clean wood waste, and green waste.

1.1 PURPOSE

This document has been prepared to support the lateral expansion of the PBSL. Based on the aerial survey conducted on September 30, 2023, there was approximately 7.5 years of air space remaining in Phase 3 and 4 years of air space remaining in Phase 4. Phase 3 and Phase 4 are part of the approved waste footprint of 116.7 acres. However, during the five-year period between October 2018 and October 2023, the waste acceptance rate has increased an average of 4.3%, which reflects the population growth that has occurred in Canyon and Owyhee Counties, as well as the greater Treasure Valley. Therefore, to continue to provide MSW disposal services it is necessary to expand the landfill capacity. The requested lateral expansion of the landfill is designated Phase 5.

Canyon County worked with Holladay Engineering Company (Holladay) to expand the characterization of the area surrounding the landfill beginning in 1992 as part of the investigation described in their 1994 report. Seven wells were installed that were designated PB-2 through PB-8. The designation PB-1 was applied to an existing domestic well located adjacent to the shop building at the Landfill. Holladay installed monitoring wells PB-9 and PB-10 in 1995. Daniel B. Stephens & Associates (DBS&A) installed wells PB-10 through PB-15 in 2011 as part of their investigation for a future expansion. The County also commissioned significant hydrogeologic investigations between 2010 and 2014 for the future expansion of the landfill. DBS&A conducted this work. The County commissioned additional borings, a geotechnical investigation, and a seismic investigation in 2021 to address additional data gaps identified. The data from all these investigations provide the foundation for the expansion design application.

There have been several different conceptual expansion designs, which is reflected in some of the data gaps analysis reports conducted for the expansion including the geotechnical evaluation and seismic evaluation. The various conceptual expansion designs do not reflect the design as submitted in this application, nor does it alter the value of the data collected during previous investigations. This document serves as the application for a lateral expansion of the PBSL using an arid design that is in compliance with the Idaho Solid Waste Facilities Act (ISWFA) §39-7409 and §39-7410.

This application is organized into the following Sections:

- **Section 1** of this report presents an introduction and regulatory requirements for the lateral expansion application under the arid design requirements.
- **Section 2** provides background information on the site characteristics of the landfill, including the climate, geology, soils, groundwater, geotechnical stability and seismic conditions.
- **Section 3** provides the lateral expansion design, including a hydrologic and hydraulic analysis of the final conditions.
- **Section 4** summarizes the supporting documentation provided electronically with this application. The supporting documents are an essential part of the application and provide the background studies and modeling conducted as the landfill prepared for a lateral expansion. They are referenced in this application but are not included as appendices in the application.
- **Section 5** provides the references for material used in the development of this document.

Appendix A provides figures. **Appendix B** provides copies of the Site Certification Approval. **Appendix C** provides data on site soils and site-specific laboratory data. **Appendix D** provides geologic cross section to show the geology as well as the distance to the water bearing zone. **Appendix E** contains copies of well and boring logs from the site. **Appendix F** contains a geotechnical report for the site. **Appendix G** contains a copy of the seismic investigation report conducted for the site. **Appendix H** contains the lateral expansion design drawings. **Appendix I** contains a copy of the Hydrology and Hydraulic calculations.

1.2 ARID DESIGN REGULATORY COMPLIANCE

The design of a lateral expansion for a MSW landfill is regulated by 40 CFR §258.40 Design criteria for MSWLFs on the Federal level and by the ISWFA §39-7409 on the State of Idaho. **Table 1** provides information on where the required information in located in the application.

Table 1: Summary of Regulatory Requirements and Location in Application

Regulation	Title/Requirement	Location in Application and Supporting Documents
ISWFA §39-7407, §39-7408	Location Restrictions – Site Certification	The submittal and approval of the site certification was previously conducted by PBSL. *Section 1.3* discuss the Site Certification approval and copies of the approval letters are provided in Appendix B.
ISWFA §39-7409	Standards for Design	
ISWFA §39-7409(1)	Applicability	The PBSL is subject to the MSWLF design standards as an existing landfill, and under this regulation for a lateral expansion.
ISWFA §39-7409(2)	Liner designs	The regulations allow for a (a) Composite liner, (b) Alternative liner design, or (c) Arid design. This application is for use of an arid design.
ISWFA §39-7409(2)(c)	This design will apply to locations with less than twenty-five (25) inches of precipitation annually, net evaporative losses greater than thirty (30) inches annually,	*Section 2.1* discuss the local climate and presents site-specific data demonstrating these conditions have been met.

Regulation	Title/Requirement	Location in Application and Supporting Documents
	holding capacity in native soils greater than annual absorbance;	The holding capacity of soil is the equivalent to laboratory measurement known as the field capacity, which represent how much water the soil can hold against gravity. *Section 2.6* provides information from laboratory testing that demonstrates the site has sufficient holding capacity.
ISWFA §39-7409(2)(c)(i)	solid waste is deposited no less than fifty (50) feet above the seasonal high level of ground water in the uppermost aquifer	The distance between the waste and the upper most water bearing zone is greater than 300 feet. *Section 2.4* discusses the site stratigraphy and *Section 2.8* discusses the vertical distance to water bearing zone. **Appendix D** contains cross-sections that show the proposed bottom of waste, potentiometric surface and top of water bearing zone.
ISWFA §39-7409(2)(c)(ii) and (iii)	the geologic formation beneath the site and above the uppermost aquifer must have capillary capacities greater than the projected maximum volume of leachate generated during the active life of the MSWLF unit; “no potential for migration" is demonstrated when the geologic formation beneath the site and above the uppermost aquifer has sufficient hydrogeological characteristics and holding capacity adequate to contain all hazardous constituents generated during the active life, closure and post-closure care periods.	The Hydrogeologic Characterization Report prepared by Daniel B Stephens & Associates in 2014 (and included as supplemental material for this application) describes work conducted to characterize the geology in and around the PBSL to aid in evaluating the potential for landfill leachate to impact groundwater. Consistent with earlier work conducted by Holliday (1994) and additional characterization work conducted by Tetra Tech (**Appendices F and G**) a very low permeability siltstone and claystone is present beneath the entire site and serves as a confining unit. As discussed in the report, the siltstone has a low hydraulic conductivity (average of 3.99 x 10^{-8} cm/s) and overlies the first occurrence of groundwater (average of 297 feet). The report estimates that migration of leachate to first groundwater would take thousands of years. The report provides extensive discussions on the geology, hydrogeology, and infiltration modeling with HELP and HYDRUS. There are two volumes to the report. Volume 2 contains a table upfront of all of the laboratory testing conducted including hydraulic conductivity, moisture content, particle size, and Atterberg limits. The extensive laboratory testing of soil properties was used to document and support the analysis conducted in Volume 1 of the report. The geologic conditions are also discussed in *Section 2.2* to *Section 2.6*. Geotechnical and Seismic evaluations are provided in *Section 2.9 and 2.10* as well as **Appendices F** and **G**.
ISWFA §39-7409(3)	Point of compliance	The point of compliance is the site certification boundary shown in **Figure 3** (**Appendix A**). The figure also shows the additional property owned by Canyon County beyond the site certification boundary. Groundwater flows to the southwest, so monitoring wells MW-11 through MW-15 on the south side of the landfill that are downgradient of the currently approved landfill footprint, as well as the proposed lateral expansion ensure that there are no impacts to groundwater upgradient of the compliance boundary.
ISWFA §39-7409(4)	Leachate discharge	The PBSL does not have a leachate collection system, and therefore does not have any discharges that fall under the Clean Water act (40 CFR 122)
ISWFA §39-7410	Ground water monitoring design	Although the PBSL currently operates under an arid exemption, the landfill voluntarily conducts bi-annual groundwater, monitoring and submits the reports to DEQ for review. Details

Regulation	Title/Requirement	Location in Application and Supporting Documents
		on groundwater at the site, including a summary of groundwater monitoring, are provided in *Section 2.7. Section 3.4* provides details on updates to the monitoring program associated with the proposed expansion.

1.3 SITE CERTIFICATION

There have been three different Site Certifications for the PBSL. All three Site Certifications meet the requirements for the lateral expansion of the landfill under §39-7407, Idaho Code. Copies of the approval letters are provided in **Appendix B**.

1.3.1 Original

On June 24, 1993, Holiday Engineering Company filed a Site Certification for the PBSL on behalf of Canyon County to comply with the new state requirements for an MSWLF pursuant to §39-7407, Idaho Code. At the time it had been accepting waste for approximately 10 years, the Site Certification Boundary encompassed approximately 260 acres although only 116 acres was approved to accept waste. The approval was received from the DEQ on August 9, 1993.

1.3.2 DBS&A

On June 17, 2010, Daniel B Stephens and Associates filed a Site Certification Application on behalf of Canyon County for the PBSL in preparation for an expansion design (DBS&A, 2010). The Site Certification boundary was expanded to include additional land purchased by the County and expand the area that could be included in the expansion design application. The Site Certification increased the acreage from approximately 260 acres to 490 acres. The approval was received from the DEQ on August 2, 2010.

1.3.3 Current

On November 19, 2020, Tetra Tech filed a Site Certification Application on behalf of Canyon County for the PBSL in preparation for an expansion design. The Site Certification was expanded to include additional land purchased by the County and included areas that were part of a conceptual expansion design developed in 2017 to vet the overall scope and configuration of the expansion with the County, and to be able to identify potential data gaps and design constraints. The Site Certification increased the acreage from approximately 490 acres to 600 acres. The approval was received from the DEQ on February 26, 2021.

2.0 SITE CHARACTERISTICS

Information from site investigations have been used to characterize the soil and geologic conditions at the Landfill. The investigations include those conducted for the original site certification and design, work conducted to develop the groundwater monitoring program, shallow investigations for cover material (1994, 2016, 2022), a geotechnical investigation to support landfill expansion, a seismic study, and groundwater monitoring conducted since 2017.

Additional information on the geologic setting of southeastern Canyon County has been garnered from reports and maps published through the Idaho Geological Survey, Idaho Department of Water Resources (IDWR) and the United States Bureau of Land Management (U.S. BLM).

2.1 CLIMATE

The PBSL is located in Nampa, which is a high desert that is bordered to north by the Rocky Mountain front range and to the south by the Owyhee mountains. The average precipitation in the region is 11.6 inches per year (City of Nampa, 2024). The winters are typically cooler and wetter. January is generally the coolest month. The summers are hot and dry. The warmest month is generally July. **Figure 2** (**Appendix A**) shows the wind rose for Nampa, Idaho. The data indicates that the prevailing wind direction is from the northwest, but that wind also occurs from the west and the southeast.

The PBSL installed a weather station in 2017 to determine site specific conditions. **Table 2** shows the annual data from 2018 to the present. The site-specific data indicates that the location of the landfill has less precipitation than the City of Nampa. Both the City of Nampa data and the site-specific data indicate that the site meets the requirements for an arid design in §39-7409(2)(c), Idaho code that requires an arid design to be sited in a location that has less than twenty-five (25) inches of precipitation annually.

Table 2: Summary of Annual PBSL Weather Station Data

Year	Annual Precipitation (inches)	Minimum Annual Temperature (°F)	Average Annual Temperature (°F)	Maximum Annual Temperature (°F)	Average Annual Wind Speed (mph)	Maximum Annual Wind Speed (mph)
2018	7.3	9.3	54.6	107.9	7.9	39.5
2019	8.2	14.3	53.0	99.1	7.9	41.9
2020	10.6	17.2	54.5	101.5	7.7	41.5
2021	5.3	16.0	55.6	106.7	8.1	38.8
2022	5.9	4.5	53.1	106.5	7.8	41.8
2023	9.0	8.3	53.8	103.7	8.2	40.4
2024 (thru 9/9)	6.1	-1.2	58.2	106.9	8.1	35.8

Table 2 also provides the minimum, average, and maximum temperatures, as well as the average and maximum windspeeds. The site weather station does not measure pan evaporation. Therefore, to evaluate the evaporation at the site, the Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho available on the IDWR website (IDWR, 2024) was used to determine the potential evapotranspiration (ET). Selecting Nampa, ID and range grasses – long season to represent the vegetation at the site indicates that the annual potential ET was 728 ± 53 mm (28.7 ± 2.1 inches). Based on the lower precipitation at the site, maximum wind speeds, elevated summer temperatures, and the need to apply water for dust control, the actual net ET is likely on the higher range of the standard deviation which infers that the site meets the requirements for an arid design in §39-7409(2)(c), Idaho code that requires an arid design to be sited in a location that has net evaporative losses greater than thirty (30) inches annually.

2.2 GEOLOGY

The PBSL is located within a geologic structure known as the Western Snake River Plain. The Snake River Plain is a broad, arc shaped depression extending across southern Idaho. While the eastern portion of the Snake River Plain is considered to be a function of the movement of the North American Plate relative to an underlying heat source (“the Yellowstone Hotspot”), the Western Snake River Plain was formed by different geologic processes. The Western Snake River Plain is generally regarded as being a rift zone, where the earth’s crust was pulled apart by tensional forces. In this case, the forces were pulling the crust to the northeast and southwest, resulting in a thinning of the crust in the middle of the northwest/southeast trending rift zone. Fault zones developed on the borders of the rift zone, perpendicular to the direction of the tensional forces. Evidence suggests this process for the Western Snake River Plain began between approximately 12 million (U.S. BLM n.d.) and 17 million years ago (Mabey, 1982), during the Miocene epoch.

The fault zone on the northeast side of the Western Snake River Plain is called the Boise Front Fault, sometimes referred to as the Boise Foothills Fault zone. The system of faults on the southwest side of the basin is often called the Owyhee Mountains Fault zone. Both are recognized as normal faults, though strike-slip movement has also been postulated for the Owyhee Mountains Fault Zone (Mayo et. al., 1984). Normal faults are those in which the hanging wall moves downward relative to the footwall. In this way, the interior of the basin (a graben or graben-like structure) decreased in elevation compared to the Boise Front on the northeast and the Owyhee Range on the southwest. The normal faults on either side of the Western Snake River Plain have an average orientation of approximately North 50° West.

The total relative vertical movement of the graben relative to the ranges on either side is not known. The Western Snake River Plain is a current topographical basin, but erosion on the ranges and filling of the basin with sediments and upwelling basalt has obscured the total vertical movement. In addition to vertical movement along the fault lines, subsidence or downwarping in the interior of the basin has likely occurred because of the weight of the sediments and volcanic rocks that have filled the depression (Swirydczuk, et. al. 1982). Malde (1959) suggests that there may have been 5000 feet of vertical displacement along the faults and an additional 4000 feet of subsidence. This is consistent with the findings of deep wells referenced by Mabey (1982) where lacustrine sediments and basalt flows accounted for more than 6000 feet of material above granite bedrock. The lithology from a deep well (Anshutz Federal No.1) in the Western Snake River Plain showed that there was 11,150 feet of sediment and basalt above granite (Maley, 1987). The granite could be an extension of the late-Cretaceous Idaho batholith. Otherwise, there is no evidence that the pre-Cenozoic rocks on the borders of the plain have been downfaulted under the plain (Digital Atlas of Idaho, 2023)

Basalt flows in the Western Snake River Plain began approximately 11 million years ago (Shervais, et.al., 2002). The basalt eruptions appear to have been a direct result of the tectonic forces that created the basin.

Most of the Western Snake River Plain basin was eventually covered by ancient Lake Idaho, possibly because of basalt flows forming a dam at the western end. Kimmell (1982) theorizes that the basin was occupied by two large lakes in succession. The sizes of the lakes may have been controlled by tectonics and changes in climate. The Western Snake River Plain basin has been largely filled with sedimentary materials from this depositional environment. Lacustrine sedimentation appears to have occurred largely between 8.5 and 2 million years ago, during the Pliocene and upper Miocene epochs (Wood, 1994). These sediments become more lithified at depth because of the weight of overlying materials. The type and nature of the sediments are important factors in preventing migration of landfill leachate through the sediments beneath the current and future landfill cells.

Later sedimentation in the Western Snake River Plain basin included fluvial and possibly eolian deposits. These are generally coarser and less indurated than the underlying lacustrine sediments. Basalt eruptions occasionally intercalate with these sediments (Digital Atlas of Idaho, 2023).

The materials filling the Western Snake River Plain basin are part of the Idaho Group, a designation first provided by Malde and Powers (1962). They divided the Idaho Group into seven formations and provided a lithologic sequence. These are shown in **Table 3**, along with ages provided by Savage (1968). The Idaho group is underlain by volcanics (rhyolite and basalt) of the Idavada Group and covered by the Snake River Group; both contacts are unconformable (Ruez, 2009; Wood and Anderson, 1981).

Wood and Anderson (1981) add a division to the Idaho Group, designating the Chalk Hills and older formations as the Lower Idaho Group and the Glenns Ferry Formation and younger materials as the Upper Idaho Group. This latter group comprises the near surface and subsurface geologic materials that have been encountered during the investigations at PBSL.

Table 3: Idaho Group Formations

Formation (Young to Old)	Rock and/or Soil Types	Geologic Age
Black Mesa Gravel	Sand and Gravel	Middle Pleistocene
Bruneau Formation	Basalt, Sand, Gravel	Middle Pleistocene
Tuana Gravel	Sandy Gravel	Lower Pleistocene
Glenns Ferry Formation	Sand, Silt, Clay, Siltstone, Claystone, some Sandstone.	Upper Pliocene to Lower Pleistocene
Chalk Hills Formation	Silt and Sand; some Ash content	Middle Pliocene
Banbury Basalt	Basalt with Tuff Beds	Middle Pliocene
Poison Creek Formation	Ash and Tuff with some Sands and Gravel	Lower Pliocene

2.3 TOPOGRAPHY

Pickles Butte and Deadhorse Canyon are the two prominent topographic features near the landfill. Pickles Butte is at the eastern end of a 1.25 mile long ridge that trends slightly north of west. The elevation at the top of the ridge ranges from 2996 to 3083 feet above mean seal level (AMSL). Much of the north face of this ridge slopes steeply into Deadhorse Canyon at a slope of approximately 30% (18 degrees). The slope decreases toward the base of Deadhorse Canyon. The northern base of the ridge essentially forms the southern extent of the current landfill footprint and the expansion area.

Deadhorse Canyon trends toward the northwest on the north side of Pickles Butte. The canyon was historically 0.5 to 0.75 miles wide as shown on topographic maps, through road construction and the landfill have altered the natural topography in the eastern and northern parts of it. Gently rolling landscape is present east and northeast of the landfill and Deadhorse Canyon. The elevation of the eastern and northern rim of the historic Deadhorse Canyon ranged from approximately 2800 to 2900 feet AMSL. The slope along the east wall of the historic canyon was approximately 30 to 35%, then decreasing to approximately 10% in the lower part of the canyon (USGS, 1958). The steep natural slope of the east wall is visible now only in a location south of Deer Flat Road where this road descends into the canyon.

The canyon funnels into a narrow outlet, approximately 200 feet wide at an approximate elevation of 2590 feet AMSL. This is near the current western boundary of Canyon County owned property. From here, the canyon opens up into a gently sloping plain, approximately 0.5 mile wide, that is used for agriculture.

2.4 STRATIGRAPHY

Stratigraphic information specific to the PBSL has been collected during several investigations beginning in 1992. These include monitoring well installations in 1992, 1995, 2011, and 2020, site specific geologic mapping by Holladay, regional geologic mapping, geotechnical drilling programs in 1998 and 2021, and observations of surface geologic materials and outcrops.

Based on the information from the site investigations, a stratigraphic sequence of geologic materials near to and underlying the landfill has been developed. **Table 4** presents the basic information for the stratigraphic sequence of the generalized soil and rock units present within the investigated areas at the landfill.

Table 4: Site Lithologic Sequence

Formation	Rock and/or Soil Types	Thickness (feet)
Unclassified (Quaternary Deposits)	Sand, non-lithified	Up to 25
Bruneau	Basalt; Sandy Silt to Silty Sand	Up to 50
Tuana Gravel	Sandy Gravel	Up to 50
Glenns Ferry	Sand, silt, clay, siltstone, claystone	Possibly >2000 feet total, 893 penetrated by monitoring well PB-14

The Bruneau Formation, Tuana Gravel, and Glenns Ferry Formation are considered the Upper Idaho Group. The formations of the Lower Idaho Group (including the Poison Creek Formation, Banbury Basalt, and the Chalk Hills Formation) lie at depths that are beyond the depths explored at the landfill. Descriptions of the geologic materials in the study area are provided below.

Six geologic cross sections across the landfill area were developed using information from the drilling investigations. The locations of the cross-section lines, identified as A through F, are shown on **Sheet X-100** (**Appendix D**). The cross sections are included as **Sheets X-101** through **Sheet X-110** (**Appendix D**).

2.4.1 Unclassified Sediments

The youngest sediments in the study area are likely the light tan to buff-colored sands found in the northern and central parts of the investigated study area. The sand is described by the National Resource Conservation Service (NRCS) as being derived from alluvium, eolian, or lacustrine sediments (NRCS, 2023). The sand appears to be most prominent on the eastern/northeastern rim of Deadhorse Canyon, generally east and north of the original landfill cell. Holladay (1994) designated these as “minor sand dunes” that are the most recent deposit in the area. Their mapping included a low ridge in the central part of the study area, west of PB-1 and south of PB-8, in the minor sand dunes classification. This would indicate deposition after most, or all of the erosion had occurred to create Deadhorse Canyon. The sand north and east of the landfill is outside of the expansion area, and the ridge of sand in Deadhorse Canyon is above the base of the future landfill cells. These younger sands, therefore, have not been further investigated or evaluated for the current study.

2.4.2 Bruneau Formation

Sediments of the Bruneau Formation include fine-grained sandy silt to silty fine-grained sand. Much of the native material in the area east of Phase 1 of the landfill, in the locations of monitoring wells PB-6, PB-7, PB-9 and PB-10, is typical of the Bruneau Formation. The silt and sand layers at these locations varies in thickness with up to 25 feet above gravel and sand deposits of the Tuana Formation (described below). In other places, little of the Bruneau Formation sand/silt is present above the Tuana Gravel. This silt and sand are generally tan-white colored.

The sediments of the Bruneau Formation are mostly unconsolidated. Test pits excavated in April and July 2016 to evaluate soil for cover material encountered loose to slightly lithified soil, except when calcium carbonate cementation was present. The amount and strength of cementation varied laterally. The thickness of the Bruneau Formation at most of the test pit locations exceeded the depth of the test pit; however, gravel belonging to the Tuana Formation was found in the five test pits along the eastern site boundary. The depth to gravel ranged from 1.4 feet in the southernmost test pit (T31) to 12.5 feet in test pit T20, located at the northeast corner of the property.

Observations from the test pits east of the eastern rim of Deadhorse Canyon indicate the soil in the Bruneau Formation grades coarser with depth. The majority of the soil found near the surface in the 2016 test pits consisted of silt with varying levels of clay. Sandy silt to silty sand was often found at depth in the test pits.

The coarsening with depth was further viewed in test pits collected on the western slope of the eastern canyon wall, north of the existing landfill. In many cases, the near surface soil was sand or silty sand, with a coarsening seen with depth. The surface elevation of these test pits was several feet lower than those east of the rim of the canyon, and thus the soil seen in them is representative of soil lower in the geologic profile.

A relatively thin layer of basalt belonging to the Bruneau Formation is present on the top of Pickles Butte and on Canyon County property in areas south and southwest of Pickles Butte. To date, the only boring that has intercepted the basalt is PB-13 which was drilled on Pickles Butte southwest of the active landfill. The upper 20 feet of this boring was in the Bruneau Formation basalt. The surface of the basalt is generally covered by loess except on the top Pickles Butte ridge, at the edge of a linear ledge southeast of the ridge, and in a small canyon further to the southeast. The top of basalt in these latter two features ranges from approximately 2900 to 3000 feet AMSL. The lack of basalt in similar depths at monitoring well locations PB-13 and PB-14 suggest that the area to the southwest may be on the downthrown side of a normal fault on the southwest side of the ridge, trending toward the northwest. This is consistent with information from various geologic maps. The geographic extent of the basalt does not coincide with the proposed landfill expansion area, and thus further investigation of the rock including hydrogeologic characteristics has not been conducted.

2.4.3 Tuana Gravel

The Tuana Gravel underlies the Bruneau Formation, though the type of contact between them is not clear. Wood and Anderson (1981) suggest that it is an unconformable contact. This has not been confirmed by the limited observations made during investigations at the landfill. The best visual exposure of the Tuana Gravel at the site is in a borrow pit located east of the southern extent of Phase 1 of the landfill (northeast of the shop and equipment staging area). Landfill personnel use this as a source of gravel for roadbuilding or other construction needs. The Tuana Gravel is also exposed in some of the road cuts near Pickles Butte, and in a Jubilee Park parking area at the west end of Missouri Avenue. Holladay (1994) also describe a 30-foot-thick exposure along the eastern rim of Deadhorse Canyon. The filling of the canyon in this area by Phase 1 of the landfill has covered this exposure, leaving the aforementioned areas as the best exposures of Tuana Gravel on the property.

Holladay indicated that the exposure along the eastern rim of Deadhorse Canyon as being moderately well cemented by calcium carbonate. This level of cementation is not seen in the gravel pit area, nor in the road cuts and parking area near Pickles Butte. The gravel is generally subround, with some cobbles ranging in size up to approximately 6 inches, though much of the gravel is less than 3 inches in diameter. Interbedded lenses of sand and/or silt intervals may locally comprise substantial portions of the Tuana Gravel profile.

Tuana Gravel was encountered in the borings east of the landfill (PB-5, PB-6, PB-7, PB-9, and PB-10), in the three monitoring wells on the Pickles Butte ridge (PB-13, PB-14 and PB-15), and at monitoring wells PB-4 and PB-16 which are located in the south-central part of the landfill area. As noted above, the top of the Tuana Gravel was encountered in several test pits east of Phase 1 of the landfill. A comparison of the elevation of the top of the gravel at PB-13, the wells east of the landfill, and the 2016 test pits, shows that the upper surface of the gravel slopes to the northeast at 2.6 degrees. This correlates with observations made by Holladay where a slope of 3 degrees was reported.

Comparing the elevation of the bottom of the gravel shows a slightly smaller slope to the northeast of 1.7 degrees. This indicates a thinning of the layer from southwest to northeast. This agrees with the findings presented by Holladay, where they indicated the thickness of the unit ranges from less than 10 feet along parts of the northeastern rim of Deadhorse Canyon to nearly 100 feet on Pickles Butte.

More importantly, the bottom of gravel elevation, which ranges from approximately elevation 2988 to 2865 feet AMSL, is well above the base of the landfill cells in the expansion area. The Tuana Gravel therefore has no bearing on the hydrogeologic issues related to the landfill expansion.

2.4.4 Glenns Ferry Formation

Upper (younger) Glenns Ferry Formation soils are the majority of geologic materials exposed on the northern flank of Pickles Butte and in the walls of Deadhorse Canyon. This formation underlies the Tuana Gravel, where present. The Glenns Ferry Formation extends beneath the landfill beyond the total depths explored in the groundwater and geotechnical investigations conducted to date.

Malde (1972), in a study of the stratigraphy of the Western Snake River Plain, made extensive observations of the Glenns Ferry Formation. They indicate that it consists of lacustrine (lake deposited), fluvial (stream deposited) and flood plain facies that intertongue, often complexly. The lacustrine facies is the most dominant, both in terms of volume and extent. It consists mostly of massive layers of tan colored silt. The fluviatile facies is composed mainly of thick beds of pale brown-grey sand and silt. The flood plain facies is mostly thin beds of silt and clay with intermittent layers of shale and sand (Malde and Powers, 1972).

Information gathered during drilling for monitoring well installation indicates that the textural composition and physical properties of the Glenns Ferry Formation at the landfill site vary with depth. In general, the material becomes finer grained and more consolidated or indurated with increasing depth. The properties may also vary somewhat laterally, and the Holladay (1994) report mentioned that the lithification in correlating beds was seen to vary between borings.

The upper part of the Glenns Ferry Formation encountered in the borings is comprised primarily of sand and silt. DBS&A described the sand beds as ranging from poorly to well sorted, from very fine grained to coarse-grained, and having little or no consolidated structure to a well-lithified sandstone. The grain size of the upper Glenns Ferry Formation tends to decrease with depth, and in the lower depths explored the Glenns Ferry Formation consists primarily of siltstone or claystone. The change from upper portion of the Glenns Ferry Formation showing little consolidation to the more lithified sediments at depth is often abrupt, as described by DBS&A (2014a).

These lithified sediments are considered a hydraulic confining layer. This laterally extensive zone in the Glenns Ferry Formation has been found in all areas that have been explored to a sufficient depth at the landfill. The layer is usually described as a siltstone or claystone on the lithologic logs prepared by field geologists. The material is most often described as clay on lithologic logs prepared by drillers. Contained within this layer is a boundary at which the sediments below may have been deposited in an anoxic or oxygen deficient state. This condition gives them a characteristic blue green or blue grey color. This distinguishing characteristic is easily seen, so the layer is often referred to as the “blue clay,” and can be identified on boring logs and traced laterally across the entire landfill area. This anoxic layer is not limited to the areas explored at the landfill. Wood and Anderson (1981) indicate that the layer has been found as far to the west as Parma and as far to the east as Boise. The widespread presence of this layer is important for two reasons. First, its lateral continuity shows the uninterrupted nature of the middle Glenns Ferry Formation across the entire study area. This is consistent with the depositional environment proposed by Kimmel (1982) that the lower part of the Glenns Ferry Formation was formed in lacustrine setting across a large part of the Western Snake River Plain.

Secondly, the blue clay is postulated as acting as an impermeable or nearly impermeable layer limiting groundwater movement. Wood and Anderson (1981), as part of a geothermal investigation in southwestern Idaho, found significant temperature differences in wells completed above and below the blue clay indicating that it is acting as a cap above deeper warm water aquifers.

In their discussion of area groundwater conditions, Holladay (1994) compiled a table showing how the presence of blue clay can be traced throughout the general area. That table is designated as Table 1 in their report. They inspected the drillers logs for 72 wells located in the general vicinity of the landfill. The blue clay (or a lithologic feature that correlates to it) was identified on the majority of the logs. Those that did not specifically indicate blue colored clay nonetheless showed a thick sequence of clay and similar material (e.g. claystone, mudstone, siltstone) at depth in the area south of Lake Lowell. A recent search of well logs in the IDWR database found nine additional wells within approximately 1.3 miles of the landfill that have been installed since the Holladay research. Two of these (Stuart and Snell) are on property now owned by Canyon County Solid Waste. Four others (Helfrich, Lowry, Riggs, and Sevy) are downgradient of the expansion area based on the piezometric surface measured at the PBSL monitoring wells. These are summarized on **Table 5**.

Table 5: Area Domestic Wells, Post 1994

Well Owner	Address	Top of Redox Zone Elevation (AMSL)	Top of Confining Layer Elevation (AMSL)
Esther Helfrich	16666 Deer Flat	2372	2392
Chad Lowry	17626 Deer Flat	2270	2397
Lonnie Riggs	8018 Bale Lane	2402	2402
Daniel Sevy	17957 Deer Flat	2320	2355
David Snell[1]	16141 Deer Flat	2417	2587
Don Stuart[1]	16241 Deer Flat	>2264[2]	Unknown[2]

1 – Now owned by Canyon County.
2 – Only the portion of the log below 485 feet deep is available. The elevation of the top of the redox zone and confining layer cannot be determined.

Interpreting the lithology from driller's logs should be considered an approximation; in many cases there is no differentiation between silt and clay, or reliable information about the consolidation. Nonetheless, an inspection of the six1 logs for the wells shown in **Table 5** does provide useful information to show that that conditions encountered in monitoring wells at the landfill extend beneath and beyond the expansion area. The redox layer is discernible from each of the well logs. The elevation of the redox layer can be estimated by subtracting the depth to the redox layer from the approximate ground surface elevation at each well location. The elevation of the top of the claystone/siltstone can also be estimated, though there is more uncertainty because of the lack of descriptive information on the consolidation of the material.

Overall, the information shows that the fine-grained material (silt and clay) of the Glenns Ferry Formation is present at depth across the area, as is the redox boundary with a slight gradient to the northwest. The redox boundary in the western part of the landfill area ranges from an approximate elevation of 2417 feet at the Snell well to 2527 feet at monitoring well PB-13. The elevation of the redox boundary at the Daniel Sevy domestic well located approximately 1.3 miles west of the land fill is approximately 2320 feet. The redox boundary elevations at the Riggs and Helfrich wells (approximately 1 mile west-southwest and one-half mile west of the landfill) are approximately 2402 and 2372 feet respectively. Using these four points as a reference, the redox boundary slopes to the northwest with a gradient of 185 feet per mile.

As discussed above, the transition from less compacted sediments of the upper Glenns Ferry Formation to the more consolidated claystone and siltstone is not easily discernible from the driller's logs. Using a best interpretation of when the confining layer starts also shows a slope of that surface to the northwest though the gradient is slightly flatter than the redox boundary at approximately 155 feet per mile.

The northwestward slope in the top of the confining layer across the western part of the study area is consistent with the information shown on Cross Section A in **Appendix D**. This cross section is constructed roughly parallel to the apparent slope of the confining layer and shows a slope toward the northwest from the center of the landfill at PB-1 toward PB-11. In the northeastern part of the landfill, the apparent slope is toward the northeast, which is consistent the findings from the Holladay analysis.

2.5 AREA FAULTING

The USGS Quaternary Fault and Fold Database of the United States indicates that the Western Snake River Plain (WSRP) fault system is present in the general area, and a portion of an undifferentiated Quaternary-aged northeast-dipping normal fault is mapped within the project boundaries. The mapped location shows it extending northwest through the proposed expansion area. It is labeled as a normal fault with an approximate slip rate of less than 0.2 mm/year. The approximate location, as indicated by USGS, is shown on Figure 1 in a Seismic Survey Report prepared by Tetra Tech in 2022. This report is included as **Appendix G**. The WSRP fault system consists of northwest-striking, northeast- and southwest-dipping normal faults. Most of these faults are described as having subdued expressions on the floor of the Snake River Plain. The USGS information indicates that detailed studies on the age of faulted deposits have not been published, but most fault traces are confined to older Quaternary deposits. The USGS thus assigns a Quaternary age to the faults until further detailed studies are conducted.

The fault locations are from various sources, mapped at scales ranging from 1:250,000-scale to 1:62,500-scale mapping. Mapping at the latter scale was conducted by Wood and Anderson (1981). The USGS information indicates that slip rates have not been described, but the weak geomorphic expression of these faults indicates very low rates of long-term slip (Personius 2003).

Two faults mapped by the sources listed above are on the northeast and southwest sides of the Pickles Butte ridge and are outside of the expansion area. Cross Section X-108 (**Appendix D**) shows the approximate location of the fault on the northeast side of the ridge. The USGS database shows one fault that is potentially present near the expansion area. It is shown with a length of approximately 3.4 miles with a strike of approximately North 37° West. The southern terminus is shown in the northern part of the active landfill area. A seismic survey was conducted in 2022 to collect more information on this fault. This is discussed in *Section 2.10* below.

2.6 SOIL AND ROCK PROPERTIES

Samples of soil and rock have been collected during three test pit investigations and during three of the drilling efforts to characterize the hydrogeologic and geotechnical properties of the materials. In some cases, the samples were collected and analyzed to use in slope stability calculations for landfill design. Other samples were specifically collected to provide data for use in Hydrologic Evaluation of Landfill Performance (HELP) and HYDRUS models. Still other samples were analyzed for various physical properties for final cover design purposes.

2.6.1 Test Pit Investigations

Holladay collected 25 soil samples from 13 test pits in 1994 to evaluate the material for a final landfill cover. The test pits were excavated in the area east of Phase 1 of the landfill. The sample depths ranged from 2 to 10.5 feet deep. Holladay had each of the samples tested for grain size analysis. Four of the samples were tested for Atterberg Limits. Holladay estimated ranges of field capacity and wilting point but did not provide specific values for individual samples.

Tetra Tech also collected soil samples during two investigations (April and July 2016) to evaluate near-surface soils for suitability as use for final cover material. Five test pits were excavated east and northeast of Phase 1 of the landfill in April. Thirteen additional test pits were excavated in July to provide additional spatial coverage of the area extending further south and west. The second round of testing pitting focused on identifying the upper and lower bounds of the silt loam layer target for the final cover. The maximum depth of the test pits was 13.5 feet. Nine samples were submitted for grain size analysis, two samples for Atterberg Limits, and four for Proctor compaction testing (moisture-density relationship). Four samples were also analyzed for permeability, field capacity, and wilting point. This data was presented as part of an alternative cover evaluation (Tetra Tech 2016) that was approved by SWDH on December 8, 2016 and by the DEQ on December 9, 2016. This document is provided in the supplemental material provided as part of the application.

Tetra Tech conducted another test pit investigation in October 2022 to evaluate soils in the County-owned property south of Missouri Avenue as part of the expansion investigation to ensure sufficient, suitable cover material would be available for closure. Fifteen samples were collected for grain size analysis and Proctor compaction tests, three samples were tested for permeability, eight samples were analyzed for field capacity, wilting point, and porosity, and five samples were tested for Atterberg limits. The soils from the 2022 investigation have lower permeability and would be better for final closure then the soils used for the alternative cover application. Therefore, the combination of the originally identified soils for final closure evaluated in 2016, as well as the additional soils available south of Missouri Avenue would ensure sufficient final cover material is available for closure of Phase 5.

Table 6 summarizes the results of the testing of the shallow soil samples from the three test pit investigations. Laboratory analysis included measurements of field capacity (holding capacity) that represents the amount of moisture the soil can hold against drainage by gravity. As the particle surface area (e.g. finer material) and organic matter increases, the moisture retention capacity of the soil increases resulting in a higher field capacity. The test pit samples from 2016 were collected to the east and northeast of the active landfill and showed an average field capacity of 13.8%. The test pit samples from 2022 collected south of Missouri Avenue had an average field capacity of 37.9%. The difference between these two areas is a higher sand content in the area east and northeast of the active landfill but may also reflect a higher organic content in the southern soils. The difference is field capacity is also reflected in the lower hydraulic conductivity for the southern soils. Given the low precipitation in the area around the landfill and the thickness of soil above the water bearing zone, there is more than sufficient capacity in the soil to retain the annual precipitation.

Table 6: Test Pit Data Summary

Sample No.	Depth (ft)	Soil Type (USCS)	Perme-ability (cm/s)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Passing No. 200	Field Capacity (% Moisture)	Wilting Point (% Moisture)	Porosity (%)	Atterberg Limits PL/LL/PI
1A	2	ML	-	-	-	55%	-	-	-	20/22/2
2A	2	ML	-	-	-	55%	-	-	-	-
2B	10	SM	-	-	-	15%	-	-	-	-
3A	2	SM	-	-	-	49%	-	-	-	-
3B	9	SM	-	-	-	20%	-	-	-	-
4A	2	ML	-	-	-	53%	-	-	-	18/20/2
4B	10	SM	-	-	-	29%	-	-	-	-
5A	2	SM	-	-	-	47%	-	-	-	-
5B	9.5	SM	-	-	-	18%	-	-	-	-
6A	2	ML	-	-	-	53%	-	-	-	-
6B	10	SM	-	-	-	23%	-	-	-	-
7A	2	ML	-	-	-	70%	-	-	-	NP/17/NP
7B	10	SM	-	-	-	16%	-	-	-	-
8A	2	ML	-	-	-	60%	-	-	-	NP/24/NP
8B	9.5	SM	-	-	-	26%	-	-	-	-
9A	2	ML	-	-	-	68%	-	-	-	15/20/5
9B	10.5	SM	-	-	-	15%	-	-	-	-
10A	2	SM	-	-	-	33%	-	-	-	-
10B	6.5	SM	-	-	-	22%	-	-	-	-
11A	2	ML	-	-	-	60%	-	-	-	NP/25/NP
11B	9	SM	-	-	-	36%	-	-	-	-
12A	2	SM	-	-	-	27%	-	-	-	-
12B	9	SM	-	-	-	12%	-	-	-	-
13A	2	SM	-	-	-	15%	-	-	-	-
13B	5	SM	-	-	-	20%	-	-	-	-

Sample No.	Depth (ft)	Soil Type (USCS)	Permeability (cm/s)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Passing No. 200	Field Capacity (% Moisture)	Wilting Point (% Moisture)	Porosity (%)	Atterberg Limits PL/LL/PI
14A	1-3	SM	-	-	-	34.0%	-	-	-	-
14B	4-5	SM	5.63E-04	109.5	15.0%	23.0%	13.13	8.59	-	NP/NP/NP
15A	1-4	ML	4.24E-05	111.0	13.9%	65.0%	17.84	4.37	-	NP/NP/NP
16A	0.5-1.5	ML	-	-	-	64.0%	-	-	-	-
16B	4-5.5	SM	1.74E-04	113.5	11.9%	41.0%	11.53	6.09	-	NP/NP/NP
16C	8.5-9.5	SM	-	-	-	36.0%	-	-	-	-
17A	1.5-5.5	ML	-	-	-	51.0%	12.80	6.52	-	-
18A	2-3.2	ML	-	-	-	67.0%	-	-	-	-
18B	7-8	SM	1.22E-05	86.0	31.8%	15.0%	-	-	-	42/64/22
TP-1	2-3	ML	-	98.4	18.6%	71.5%	-	-	-	NP/NP/NP
TP-2	6-8	ML	-	96.3	20.5%	67.3%	-	-	-	NP/NP/NP
TP-3	2-3	SM	2.11E-07	98.9	20.5%	40.2%	35.2	8.85	48.44	-
TP-4	4-5	ML	2.54E-07	91.8	14.4%	64.8%	37.6	6.1	51.82	-
TP-5	2-3	SM	-	102.9	17.3%	49.0%	-	-	-	NP/NP/NP
TP-6	2-3	ML	-	97.6	19.3%	71.6%	-	-	-	-
TP-7	4-5	ML	1.87E-07	99.2	19.0%	76.1%	36.3	6.6	48.67	-
TP-8	2-3	SM	-	98.5	18.7%	49.6%	-	-	-	-
TP-9	4-8	ML	-	90.9	22.4%	77.2%	41.6	7.15	53.14	-
TP-10	5-6	ML	-	94.1	21.4%	66.7%	37.4	8.43	49.85	-
TP-13B	0-1	SM	-	91.7	23.8%	32.6%	-	-	-	-
TP-14	4-5	ML	-	101.6	17.4%	78.4%	36.9	10.8	50.86	NP/NP/NP
TP-15	2-3	CL-ML	-	104.3	16.1%	77.1%	-	-	-	-
TP-16	4-8	ML	-	95.7	20.7%	75.3%	40.8	8.11	53.68	NP/NP/NP
TP-17	1-3	ML	-	97.0	19.9%	72.4%	37.7	6.96	51.15	-

Notes:
Samples 1A through 13B collected by Holladay Engineering Company, ca. 1994; Samples 14A through 18B collected by Tetra Tech, April 2016; Samples TP-1 through TP-17 collected by Tetra Tech, October 2022.
ML – silt; SM - silty sand; CL - lean clay
Atterberg Limits Abbreviations: PL=Plastic Limit, LL=Liquid Limit, PI=Plasticity Index, NP=Non-Plastic.
- Indicates test not conducted.

2.6.2 Drilling Investigations

Several subsurface investigations have been conducted since the early 1990s. These generally served one of two purposes: obtaining information on the hydrogeologic properties of the subsurface materials (usually during groundwater monitoring well installation) and collecting information for geotechnical engineering studies.

Holladay conducted a geotechnical investigation that included five borings drilled in November 1996. Over 80 samples from these borings were collected for various analyses; many of them were tested only for moisture content (Holladay, 1998). The results are included in Appendices E and F of the 1998 Holladay report.

Tetra Tech collected samples from 8 borings drilled in 2021 as part of a geotechnical slope stability evaluation. 21 samples were submitted to a geotechnical soils laboratory for Atterberg limits, 19 samples were submitted for grain size analysis, 9 samples were tested for Proctor compaction testing, 11 samples were tested for friction angle and cohesion, and 5 for unconfined compressive strength. 46 samples were also tested for natural moisture content.

The complete report for the slope stability evaluation is included **Appendix F**. The results of the testing are included in Appendix C of the Tetra Tech report.

Holladay collected 11 core samples from three of the monitoring well borings drilled in 1992. DBS&A collected 56 samples from the five monitoring well borings they drilled in 2011. Sample analysis from both of these investigations concentrated on physical properties of the soil and rock relative to hydrogeologic characteristics of the material.

The samples collected by Holladay ranged from 206 to 479 feet deep. These represent elevations ranging from approximately 2621 to 2320 feet AMSL. The lithologic descriptions of the materials included clayey silt, silty clay, and claystone. Table 5 of the 1994 Holladay report summarizes the pertinent tests and results from their testing. Saturated hydraulic conductivities in these samples ranged from $1.8x10^{-9}$ to $1.0x10^{-4}$ centimeters per second (cm/sec).

The 56 samples from the DBS&A drilling program in 2011 ranged from 39 to 750 feet deep. The elevations represented by the samples ranged from approximately 2793 to 2294 feet AMSL. The samples were analyzed for moisture content, dry bulk density, saturated hydraulic conductivity, moisture characteristics, grain size distribution, specific gravity, porosity (calculated), and Atterberg limits (DBS&A 2014a). The range of saturated hydraulic conductivity across all of the samples ranged from $4.29x10^{-9}$ to $7.24x10^{-4}$ cm/sec. These closely match the range from the 1992 Holladay investigation.

Table 7 presents a summary of the drilling investigations described above. These reports can be reviewed for additional details including the locations of the geotechnical borings.

Table 7: Summary of Drilling Investigations

Reference Report	Borings Drilled	Purpose	Number of Samples Collected	Tests Conducted
Holladay 1994	PB-2 through PB-8(A)	Monitoring Well Installation and Hydrogeologic Characterization	11	Moisture, bulk density, wilting point, specific retention, porosity, absolute and saturated hydraulic conductivity
Holladay 1998	GT-1 through GT-5(B)	Geotechnical Evaluation	87	Grain size distribution, Atterberg limits, bulk density, moisture, triaxial compression
DBS&A 2014a and 2014b	PB-11 through PB-15	Monitoring Well Installation and Hydrogeologic Characterization	56	Moisture, dry bulk density, saturated hydraulic conductivity, moisture characteristics, grain size distribution, specific gravity, porosity (calculated), Atterberg limits
Tetra Tech 2022	B2021-1 through B2021-8	Geotechnical Evaluation	68	Moisture, grain size distribution, Atterberg limits, friction angle/cohesion, Proctor compaction testing, consolidation, unconfined compressive strength

(A) Lab samples collected only from PB-2, PB-3, and PB-4
(B) Core samples saved from PB-2 were also submitted for analysis

2.7 GROUNDWATER

Groundwater beneath the Landfill has been comprehensively studied beginning with the Holladay investigations described above and listed in **Table 7**. The Holladay work was followed by investigations conducted by DBS&A, and then by Tetra Tech. **Figure 3** (**Appendix A**) shows the location of the site wells and other wells in the area. Fifteen monitoring wells and one former water supply well have provided information on the site’s hydrogeology.

Canyon County has been granted a waiver for conducting groundwater monitoring at the Landfill, but has voluntarily conducted quarterly or semi-annual monitoring. This groundwater monitoring program has been used to study the groundwater flow characteristics and groundwater composition beneath and adjacent to the Landfill. Groundwater at the Landfill has a unique chemistry and is greater than 400 feet deep. The potential for impacts to groundwater from the Landfill are negligible because of the depth to groundwater and the geologic stratigraphy described above.

2.7.1 Groundwater Conditions

Holladay identified three water bearing zones during a literature review and their investigation and referred to them as the Upper Aquifer (UA), Middle Aquifer (MA), and Bottom Aquifer (BA). It should be noted that while these names may correspond to subsurface intervals that produce water, they are not necessarily considered aquifers because of low production rates or quality concerns. DBS&A acknowledged the naming convention used by Holladay and used similar reference names in their 2014 report (uppermost-unconfined aquifer or unconfined aquifer, middle confined aquifer, or confined aquifer, and bottom aquifer).

Monitoring wells have been constructed to characterize the first groundwater encountered at each location. Monitoring wells on the eastern part of the project area are completed in the Upper Aquifer in unconfined conditions. The remainder of the project wells are completed in the Middle Aquifer in confined conditions. The uppermost (unconfined) aquifer has been characterized at monitoring wells PB-5, PB-6, PB-7, PB-9, and PB-10. This water bearing zone is not present beneath the entire Landfill area; it is limited to the area at the northeast corner of the active Landfill and certification area; it is not present above the expansion area. The Middle Aquifer has been characterized by the former shop domestic well (PB-1), former monitoring wells PB-2, PB-3 and PB-4, and current monitoring wells PB-8 and PB-11 through PB-16. **Table 8** is a summary of monitoring well construction information.

Table 8: Summary of Monitoring Well Construction Information

Well Number	Groundwater Source	Screened Interval(s)	Depth to Top of Confining Layer	Total Depth Drilled	Approx. Depth First Water Encountered	Depth to Potentiometric Surface* (March 2023)
PB-1	Glenns Ferry Fm - Confining Layer	577-367	251	658	595	NA - Well Closed prior to 1997
PB-2	Glenns Ferry Fm - Confining Layer	407-420, 515-530	280	557	490	NA- Well Closed prior to 1997
PB-3	Glenns Ferry Fm - Confining Layer	340-350, 410-420, 520-530	263	860	410	NA - Well Closed June 2017
PB-4	Glenns Ferry Fm - Confining Layer	560 - 575, 605 - 620	422	640	565 - 630	NA- Well Closed September 2020
PB-5	Glenns Ferry Fm – unconfined	512.5 - 522.5	630	660	517	NA - Well Closed August 2021
PB-6	Glenns Ferry Fm – unconfined	487.5 - 497.5	620	700	490	NA - Well Closed August 2021
PB-7	Glenns Ferry Fm – unconfined	535 - 555	540	610	535	550.81
PB-8	Glenns Ferry Fm - Confining Layer	377 - 407	240	420	380	286.19
PB-9	Glenns Ferry Fm – unconfined	508 - 543	510**	544	Unknown	529.87
PB-10	Glenns Ferry Fm – unconfined	504 - 534	515**	560	Unknown	525.83

PB-11	Glenns Ferry Fm - Confining Layer	340 - 400	200	420	350 - 400	292.35
PB-12	Glenns Ferry Fm - Confining Layer	480 - 540	140	555	500 - 560	304.27
PB-13	Glenns Ferry Fm - Confining Layer	840 - 900	545	923	850 - 900	728.78
PB-14	Glenns Ferry Fm - Confining Layer	845 - 905	522	923	800 - 840	712.91
PB-15	Glenns Ferry Fm - Confining Layer	790 - 850	565	870	800 - 860	652.76
PB-16	Glenns Ferry Fm - Confining Layer	572-592	262	600	580 - 590	550.83
Measurements are in feet and referenced to ground surface except as noted						
*Referenced to top of casing, typically about 2 feet higher than ground surface						
**Based on interpretation from driller's log						

2.7.2 Upper Aquifer

The wells set in this zone encountered water between approximately 490 to 535 feet deep, or between elevations of about 2330 and 2400 feet AMSL. The saturated thickness of the Tuana Gravel at these locations is on the order of tens of feet, with groundwater present at depths ranging from about 500 to 550 feet deep. These depths have steadily increased over the duration of groundwater monitoring (groundwater elevations have decreased). The elevation at MW-7 was 2401.18 in September 1992; the elevation in September 2024 was 2388.02. This steady decrease of 0.4 foot per year has been echoed by the other four unconfined monitoring wells. This resulted in MW-5 and MW-6 becoming dry in 2003 and 2021 respectively. The wells were closed in August 2021. Groundwater in the unconfined aquifer flows to the northeast with a hydraulic gradient of approximately 0.05 to 0.06 feet per foot. As shown on **Cross Section A** in **Appendix D**, the confining layer on the eastern side of the landfill also has a downward slope toward to the east. DBS&A's analysis was that the slope of the upper surface of the groundwater in the unconfined aquifer is similar to the slope of the top of the confining layer (DBS&A 2014a).

2.7.3 Middle Confined Aquifer

The middle confined aquifer is located within the blue clay unit and appears to underlie the entire expansion area. Observations during the previous investigations indicated that water within the confining layer is present in deeper fractures within that unit. DBS&A's interpretation was that the material is harder and more brittle with depth and can support open fractures, while the shallower parts of it are more plastic and not able to support open fractures (DBS&A, 2014a).

The middle aquifer is currently characterized by current monitoring wells PB-8 and PB-11 through PB-16. The depth to the top of the piezometric surface ranges from less than 300 feet for wells installed in the lower parts of Wildhorse Canyon, to over 700 feet for wells on the Pickles Butte Ridge. Groundwater in the middle confined aquifer moves to the southwest with a gradient of approximately 0.03 to 0.04 feet per foot.

The depth to the water bearing zone in the middle confined aquifer wells ranges from over 300 feet to almost 900 feet BGS, which corresponds to elevations ranging from 2125 to 2340 feet AMSL. The potentiometric surface in these wells in March 2023 ranged from 2345 to 2423 feet AMSL, indicating the presence of a positive pressure head. This positive head is present at each of these wells, ranging from approximately 35 feet at PB-16 to approximately 225 feet at PB-12. This positive head exerts an upward pressure on the confining layer and would this inhibit the downward migration of fluids from above the confining layer and into the water bearing zone.

Monitoring wells PB-4 and PB-8 were installed in 1992 and provide the longest duration of piezometric levels in the middle confined aquifer. The elevations of the piezometric surface over the duration of the monitoring program at these two locations have had different trends. The piezometric surface elevation at PB-4 decreased by 0.5 foot per year through April 2007. After that time, the level stabilized. PB-16, installed as a replacement of PB-4, has also shown stable levels since it was installed in 2020. Contrasting this is the piezometric surface at PB-8 which has shown a steady increase in elevation over time, with an average increase of 0.4 foot per year. PB-11, located approximately 1200 feet west of PB-8 and also on the north side of Wildhorse Canyon, has shown a similar increase. Monitoring wells PB-12 through PB-15 are middle confined aquifer wells located on the south side of Wildhorse Canyon. These have shown a greater increase in the elevation of the piezometric surface over time, averaging over 0.7 foot per year.

Canyon County Solid Waste (CCSW) has acquired two properties on the south side of Deer Flat Road that were formerly used as homesteads or residences. Each of these has a domestic well that provides information on the middle confined aquifer north of the existing monitoring well network. Property formerly owned by Don and Shelly Stuart includes a well that is approximately 1800 feet north of monitoring well PB-8. The driller’s log indicates that the top of the piezometric surface was 330 feet BGS. This equates to a piezometric surface elevation of approximately 2419 feet AMSL. Property formerly owned by David Snell includes a well that is approximately 1400 feet north of monitoring well PB-11. The driller’s log indicates that the top of the piezometric surface was 370 feet BGS. This equates to a piezometric surface elevation of approximately 2367 feet AMSL. Both of these values agree with the groundwater depth and migration direction of water in the middle confined aquifer. The driller’s logs for each of the wells show hundreds of feet of unsaturated clay or sandstone above the middle confined aquifer, which is also in agreement with observations from the previous investigations at the Landfill.

2.7.4 Lower Confined Aquifer

Holladay defined the lower confined aquifer as the next water bearing zone beneath the blue clay. Their interpretation appears to have been mainly based on inspection of area domestic and irrigation well logs showing deeper water-producing zones of sand or rock beneath the material described as blue clay on the drillers’ logs. Holladay’s review of the logs for wells that penetrate the lower confined aquifer showed that there is usually clay units that do not produce water between the middle confined aquifer and the lower confined aquifer (Holladay, 1994).

2.7.5 Aquifer Recharge

Recharge to the upper aquifer is postulated to be from surface sources, including Lake Lowell, surface irrigation, and possibly irrigation canals. Precipitation is not likely a significant contribution to recharge because of the low annual precipitation for the area. The middle confined water bearing zone is believed to be recharged by underflow from geothermal water that lies beneath the blue clay. Anderson and Wood (1981) theorized that recharge to the thermal system may be taking place slowly over a long period of time with little present day recharge. A depletion of heavy isotopes in the geothermal waters may indicate that recharge to this aquifer occurred more than 10,000 years ago.

2.7.6 Groundwater Quality

Groundwater monitoring has been conducted using the monitoring wells installed at the site since April 1995. Through 2016, groundwater samples were collected using stainless steel bailers. Beginning in December 2017, groundwater samples have been collected using dedicated pneumatic submersible pumps under a site specific groundwater monitoring plan that was last updated in November 2023 (Tetra Tech). Groundwater monitoring was conducted on a quarterly basis with the submersible pumps through September 2019. Since that time, groundwater monitoring has been conducted semi-annually, with monitoring events typically occurring in March and late August/early September. A monitoring report has been prepared summarizing the results of each sampling event. These reports have been submitted to the DEQ and should be referenced for the sampling results and statistical analysis.

2.7.7 Groundwater Quantity

The yield from the groundwater monitoring wells at the site is low to very low. Regionally, the production from wells in the upper unconfined aquifer vary spatially. Observations made at site monitoring wells completed in this unit (PB-5, PB-6, PB-7, PB-9 and PB-10) indicates that recharge takes place in a matter of hours to days. This is contrasted with monitoring wells completed in the middle-confined unit, where the time to recharge after bailing or pumping in monitoring wells PB-1, PB-2, and PB-3 was noted to take months (Holladay, 1994). The middle-confined unit is the first water bearing zone underlying the expansion area.

2.8 VERTICAL DISTANCE – WASTE TO WATER

The geologic cross sections in **Appendix D** includes information on the bottom of waste, the hydraulic head in the water bearing unit (referred to as the potentiometric surface), and the top of the confined aquifer (water bearing zone). This provides a visual of the distance between the bottom of waste and water bearing zone for compliance with §39-7409 (c)(i), Idaho Code - Standards for Design that requires solid waste should not be deposited within fifty (50) feet of the seasonal high ground water elevation in the uppermost aquifer. For example, on **Sheet X-104**, monitoring well PB-8 will be within the excavation and will be abandoned as discussed in *Section 3.4*. Based on data from September 2024, which is representative of historical data at the site, the potentiometric surface is 251 feet below the bottom of the waste and the water bearing confined aquifer is 357 feet below the bottom of waste. Similarly, on **Sheet X-108** that is near boring B2021-7, data from September 2024, the potentiometric surface is estimated to be 270 feet below the bottom of the waste and the water bearing confined aquifer is estimated to be near 375 feet below the bottom of waste. This demonstrates that the proposed expansion exceeds the requirements in §39-7409 (c)(i), Idaho Code for the distance between waste and the upper most water bearing zone.

2.9 GEOTECHNICAL EVALUATION

Tetra Tech conducted a geotechnical study in 2021 and 2022 to support the lateral expansion of the landfill. The investigation evaluated the proposed permanent excavation slopes that are planned to be on the order of 3H:1V to 4H:1V, with maximum cut depths on the order of 150 to 165 feet. The full report is available in **Appendix F**.

Tetra Tech previously completed a slope stability evaluation that included static and seismic stability evaluations for Phases 2 through 4 of the Canyon County Landfill (October 7, 2015). Tetra Tech also reviewed the previous evaluations conducted by Holladay in 1998 and conducted a seismic survey in December 2021. The survey was designed to image and delineate a suspected fault in support of the proposed expansion program at the PBSL. The seismic survey is discussed in *Section 2.10* and the report is available in **Appendix G**.

For the stability evaluation, Tetra Tech incorporated the following information: 1) the soils strength data available from previous analyses, 2) materials strength properties assigned based on the laboratory testing of the geotechnical samples collected in 2021 and also correlated from the Standard Penetration Testing (SPT) N-value (blow count) data collected during the geotechnical drilling and previous well installation reports.

Based on findings from this and former site investigations, the subsurface conditions beneath the areas of proposed landfill expansion are assumed to generally consist of silty and clayey sand, clay, and gravel overlying the Glenns Ferry Formation (300 to 950 feet thick), which includes younger lacustrine and fluvial sediments. The surrounding local geology includes an igneous basalt group of the Hat Butte-McElroy Butte type[1] that was not encountered in area of the proposed expansion.

Slope stability and pseudo-static analyses were performed using the computer program Slide2 (2020), developed by Rocscience, Inc., to determine the factors of safety (FS) of critical slip surfaces using both circular (rotational) and block failure analyses and vertical slice limit equilibrium methods. Circular failures can be viewed as a soil ‘slump’ with a remnant head ‘scarp’ or drop in elevation where the slide started, and a resultant ‘hump’ or bulge at

---

[1] Mancos - Macrostrat.org

the slide terminus. A block failure represents a large mass or ‘chunk’ of soil failing outwardly as a larger intact mass. Where the pseudo-static analysis indicated a factor of safety of equal to or less than 1.3 (industry standard for pseudo-static factor of safety for landfills), the internal slope of the landfill cell prior to waste emplacement was evaluated using the Newmark displacement analysis method to determine a range of potential seismic-induced deformations of the refuse mass.

Results of the slope stability evaluations indicate that the preliminary design for the expansion phases will meet the requirements of the Idaho Administrative Rules IDAPA 58.01.06 for the Idaho DEQ’s administration of MSWLF. The analyses indicate static FS values on the order of 1.38 to 2.43, and 1.83 to 3.11 for circular and block failure respectively, while the pseudo-static FS values were on the order of 0.99 to 1.88, and 1.45 to 2.16 for circular and block failure, respectively. Subsequent seismic deformation analyses indicate maximum probable displacements on the order of 0.25 to 3.19 inches (0.5 to 8 cm) for the anticipated peak ground acceleration of 0.12g generated during the design seismic event at the project site. In general, the seismic displacement analyses indicate permanent seismic-induced displacements within the tolerances 6 to 12 inches (15 to 30 cm) that are typically considered acceptable for design of landfill systems with no liner.

Multiple slope angles were considered for Tetra Tech’s slope analyses, ranging from 2.5:1 to 4:1 depending on the soil and bedrock types at each location. Based on Tetra Tech’s analysis and the required FS’s, the following two slope angles are recommended for the preliminary landfill site grading plans:

3H:1V: for the majority of the site slopes

4H:1V: where silt is encountered (Section F discussed below)

The 4:1 slope was analyzed and recommended for Section F because silt was interbedded between poorly-graded sand and fine sand and created a weakened soil profile. In areas where a high concentration of silt is predominant during construction, a slope of 4H:1V is recommended for cut areas. The soil profile within Section F was identified as having a high concentration of silt in the upper 135 feet of the proposed slope cut, thus decreasing the factor of safety. There are other areas where the silt was present; however, based on the analysis the proposed cut slope of 3H:1V was allowable for the silts as they were interbedded into stronger soil deposits. As the stratification is exposed during excavation of future cells, it is recommended that the soil conditions be reviewed to verify they match the design criteria.

The slope with compacted refuse were modeled to confirm the slope angles that were allowable during the backfilling process. Slopes of 3H:1V are recommended as a maximum angle for the backfill process. A steeper slope of 2.75H:1V was modeled as an iteration to confirm the recommendations, and in this situation the pseudo static conditions produced a factor of safety below 1.3 and is not recommended.

Portions of the soil profile were defined as claystone and have unconfined compression strengths higher than the site soils; however, the claystone had interbedded layers of softer soils, and for this reason Tetra tech has treated these areas as a soil rather than a rock and also recommends a slope cut of 3H:1V for the claystone zones.

2.10 SEISMIC STUDY

Tetra Tech conducted an active-source 3D seismic survey at the site in December 2021. The seismic survey was designed to image and delineate a suspected fault in support of the proposed landfill expansion. Seismic imaging over the suspected fault area was attained by using 3D seismic velocity tomography and reflection processing. The complete report is available in **Appendix G**.

The results from the 3D survey revise the location and structure of the USGS mapped NW-striking NE-dipping WSRP normal fault across the project site. The new 3D imaging of fault structure demonstrates that faulting along the USGS NW-striking NE-dipping WSRP normal fault is tapering to zero west of geotechnical boring B2021-5 and that residual fault deformation is distributed amongst a network of tip splay faults across the project site. Thus, primary normal fault slip is unlikely east of the west edges of the tip splay faults. Instead, any fault slip associated with earthquakes along the USGS mapped NW-striking NE-dipping WSRP normal fault will likely partition into attenuated fault slip among the splay faults within the project site. There may be additional limited extent (strike lengths < 200 feet) fault splays and relay fault within or outside of the 3D seismic volume extent. Distributed small stepover and relay faults commonly occur between large fault stepovers.

Typically, in highly weathered rock or in poorly consolidated sediments, fault slip transitions to distributed deformation or bedding flexure prior to reaching the ground surface. Tip splay faulting may decrease with decreasing depth above the water table and transition to flexure or distributed deformation. This is the most likely scenario for the PBSL project site. The projected intersection of the SW-dipping tip splay fault at a depth of 81 feet in geotechnical boring B2021-5 near the base of a zone of distributed broken clay deformation, suggests the fault has produced distributed deformation in the 66-86-foot depth interval of borehole B5. Since the age of this depth interval in geotechnical boring B2021-5 is probably much greater than the ~100 ka overlying unfaulted geologic strata used by Personius (2003) to constrain the most recent age of active faulting along the WSRP normal faults, this possible fault deformation observed in borehole B5 in the 66-86-foot depth interval is likely older than 100 ka.

The USGS NW-striking NE-dipping WSRP normal fault that is mapped as extending into the project site from the northwest does not appear to displace ~100ka age sedimentary units (Personius, 2003). From a probabilistic perspective there seems to be little possibility of significant shallow (< 200 feet) faulting within the project site southeast of the west edges of the mapped tip splay faults (negligible nonzero fault slip for annual exceedance probabilities greater than 0.01%). To best characterize the potential movement and absolute location of faulting would require geologic mapping during excavation of a future landfill cell. The current expansion application does not include the area identified for additional investigation and would need to be considered if future lateral expansions of the landfill are considered in the area of interest. This could be done when the area is excavated as a borrow source for cover material. At that time, geologic mapping of the fault could be conducted, with particular attention to identifying narrow fault zones with evidence of recent activity and areas of potential distributed deformation. Careful sampling can yield materials suitable to date the most recent age of fault activity to determine if any detected fault activity is recent (unlikely) or > 100 ka in age (most likely).

3.0 LATERAL EXPANSION DESIGN

The requested expansion design expands the current footprint of the landfill from 116.7 acres to 200.5 acres, which covers an additional 83.8 acres. The design primarily expands the landfill to the west of the current footprint, and then covers Phase 3 and incorporates the majority of Phase 4.

The excavation and final surface design was based on existing conditions and limitations, which included:

- Maintain the Phase 5 expansion within the existing landfill gas (LFG) header pipeline to the maximum extent possible;
- Maintain the current location of the condensate tank;
- Utilize the borrow source excavation area that provides daily cover for Phase 3;
- Maintain a 2.5% minimum floor slope along the bottom of the waste;
- Adhere to the geotechnical design criteria of 4H:1V for the outside slopes;
- Incorporate as much of the existing approved Phase 4 design;
- Maintain the peak height of the landfill at or below the level of Phase 4 to minimize visibility;
- Maintain access along Perch Road, which extends from the scale house to the lower areas for waste placement during both the excavation and waste placement portions of Phase 5 for as long as possible;
- Allow for wider operating floors for waste placement to improve operational efficiency and allow separation of commercial haulers and the public;
- Incorporate a stormwater pond inside the LFG header to minimize run-off;
- Incorporate a new road along the northside of the expansion for access as the lower portion if filled with waste; and
- Relocate the storage of white goods, concrete, clean wood, and green waste from the landfill face to reduce maintenance of the intermediate cover.

These criteria were used to determine the depth of excavation to the south, west, and northwest and determine the potential air space available from the expansion. **Appendix H** contains the design drawings. The excavation plan is shown on **Sheet C-101**, and the lowest elevation of waste is 2640 feet amsl. The excavation would include 1,806,895 cubic yards of soil. Although some of the soil would be utilized for daily the cover, the site is soil heavy and a significant portion of the soil would need to be relocated. The County owns the land south of Deer Flat Road and east of the portion of Perch Road that extends off Deer Flat Road. This area is a low spot and is currently used by OHV for recreation. The area was evaluated and has the capacity required for relocation of the clean soil.

Sheet C-102 (**Appendix H**) shows the Phase 5 top of waste plan with a maximum elevation of 3000 feet amsl. Intermediate and final cover would be placed on the surface shown. This results in an additional 24,360,554 cubic yards of air space. If approved, the landfill would modify operations to start filling Phase 5 on the western side of the landfill and build successive lifts going up to the east, which would delay the completion of Phase 3 and Phase 4. This would improve operational efficiency by allowing wider lifts, facilitate separation of commercial haulers and the public, and reduce modification to traffic flow. The northern and southern sections would be tied into the design based on elevation of the lifts. Based on past acceptance rate, if it is assumed that 370,000 tons of waste is accepted per year this will add approximately 36 years of operational life above the remaining capacity available in Phase 3 and Phase 4, assuming no growth. However, if it is assumed that the tonnage rate increases by 1% per year, Phase 5 would only provide approximately 29 additional years.

Sheets C-103 to **Sheet C-107** (**Appendix H**) shows various cross sections through the proposed expansion and differentiates between Phase 3 and Phase 4 that are already approved and Phase 5. **Sheet C-106** shows that with lateral expansion, the tie-in point for the top of the landfill would be further west then under the approved Phase 4 design and a small portion (114,264 cubic yards) of the Phase 4 design would not be utilized.

3.1 LANDFILL GAS SYSTEM

3.1.1 Regulatory Framework

State and Federal regulations require that landfill gas (LFG) generated by the facility be controlled to prevent migration beyond the property boundary, and to mitigate surface emissions beyond certain limits (500 parts per million by volume). PBSL operates under Air Quality Permit T1-2017.0049, dated March 1, 2018. PBSL is currently operating under a continuance of the permit. An application for renewal of the permit was submitted on August 30, 2022. A draft of the new permit (T1-2022.0038) was received from DEQ on September 24, 2024, and is currently being reviewed. The waste capacity of the PBSL is over 2.5 million megagrams (Mg), making it a major source of hazardous air pollutants (HAPS).

On June 21, 2021, the Federal Plan Requirements for Municipal Solid Waste Landfills that commenced construction on or before July 17, 2014, and have not been modified or reconstructed since July 17, 2014 (Federal Register, Volume 86, No. 97, page 27756, May 21, 2021) under authority of the Clean Air Act became effective. These rules reduced the allowable NMOC emissions rate for landfills before a landfill gas collection system must be installed from 50 Mg/year to 34 Mg/year.

In May 2019, the site specific NMOC concentration was 422 parts per million (ppm) based on the Tier 2 Testing for Non-Methane Organic Compounds (NMOC), which resulted in an annual NMOC emission rate of 37.3 Mg/year. Therefore, as a result of the change in regulations in 2021, PBSL was required to install a Gas Collection and Control System (GCCS).

3.1.2 Gas Collection and Control System

In response to the change in regulations, PBSL commissioned the design and installation of a GCCS that covers landfill operations through the completion of Phase 3. A permit to construct (PTC) was submitted to DEQ on December 23, 2022, for a candle stick flare associated with the GCCS design. The PTC for the GCCS system was approved on July 28, 2023. The GCCS consists of 14 vertical wells, 17 horizontal collectors (10 installed and 7 future), associated pipelines, control valves, and pneumatic condensate pumps that are tied in to a 10-inch header pipe that extends around the landfill perimeter. **Sheets C-101** and **C-102** (**Appendix H**) show the existing header pipe that is tied into a gas handling system consisting of 2 variable drive blowers, condensate knock-out vessel, and control panel. The vacuum blowers draw the LFG from the collection points to the control system. All LFG extracted by the GCCS is combusted by a 1,360 standard cubic feet per minute (scfm) flare. The system became operational on March 19, 2024.

3.1.3 Expansion of the Landfill Gas System

One objective of the expansion design was to stay within the existing landfill gas header pipeline and still be able to tie-in future horizontal LFG collectors. This would also minimize modification to the location of currently in-place manifolds, sumps, or highpoint valves. This was possible for the majority of the expansion, except in the southern area where it was necessary to tie into the hillside to promote positive drainage, minimize stormwater run-on from the radio antenna area, and improve capture of run-off water. In addition, it also provided additional waste capacity. **Sheet C-108** (**Appendix H**) shows how the landfill gas header line will need to be extended as part of the expansion design. The drawing shows the location of existing blind flanges where the extension would tie into to the existing header line. **Sheet C-108** also shows the location of an existing manifold for horizontal collectors from Phase 3 that will need to be relocated.

New vertical and horizontal collectors were not designed as part of the expansion design at this time. This is because the system just became operation in 2024, the current design extends through the life of Phase 3, and that the current flare only has an estimated lifespan of 10 years (Tetra Tech 2022). The current flare is capable of processing up to 1,360 scfm. In September 2024, the flare was operating at a flow rate of 950 scfm. The modeled peak flow rate of 1,148 scfm was calculated during the design phase and was estimated to occur in the year 2034 but is dependent on the tonnage and type of waste landfilled (i.e. organic versus C&D). As a result, as operational data is obtained, it will be necessary for the landfill to modify the Gas Collection and Control System (GCCS) system from a candlestick flare to a larger flare or develop a waste to energy program for the LFG (e.g. engines or liquified natural gas). Therefore, design of additional vertical and horizontal LFG collectors will be required as part of the system upgrade and will be designed based on operational data in the future. Any modifications to the GCCS system will be submitted to DEQ and any required air permits (e.g. Permit to Construct) will be submitted prior to any modifications to the existing system.

3.2 HYDROLOGIC ANALYSIS

PBSL reviews, and if required updates the stormwater plan approximately every five years based on the location of the active face and how well existing controls are working. The last update was completed on August 5, 2020, for Phase 3 (Tetra Tech 2020). The Phase 3 design was used as the starting point for the final Phase 5 design because the location of ponds and mechanism for drainage along bench roads are effective for the management of stormwater and minimizing erosion at the PBSL.

For the final Phase 5 design, Tetra Tech performed a detailed rainfall-run-off hydrologic analysis to estimate peak run-off rates and volumetric inflows for the 25-year, 24-hour design storm utilizing the National Resource Conservation Service (NRCS) Curve Number (CN) Method and the United States Army Corps of Engineers' (USACE) HEC-HMS software. The analysis presented in this section is the end point of the stormwater controls for Phase 5. Interim reviews and potential updates will be required between when the expansion design is approved, landfill operations are modified to more efficiently fill the landfill, and the design presented in this section is constructed. The parameters used for the hydrologic analysis and results used for the final hydraulic/stormwater management structures for the final Phase 5 design are provided in the following sections.

3.2.1 Rainfall Data

Site-specific rainfall data for the 25-year, 24-hour storm were obtained from the National Oceanic and Atmospheric Administration's (NOAA) Precipitation-Frequency Atlas. NOAA Atlas 14 Volume 12 Version 2 was released in September 2024 (https://hdsc.nws.noaa.gov/pfds/) and indicates that the precipitation at the landfill for the 24-hour, 25-year storm event would be between 1.47 to 1.83 inches with a 90% confidence value of 1.64 inches. Stormwater controls for the landfill since 2016, have been calculated based on the NOAA Precipitation-Frequency Atlas of the Western United States, Atlas 2, Volume V-Idaho which estimates the precipitation for the 25-year, 24-hour storm event as 1.8 inches (NOAA, 1973). Since the historic precipitation value used at the landfill is conservative (i.e. assumes a higher precipitation rate) and within the estimated range of the NOAA Atlas 14 of 1.47 to 1.83 inches, a precipitation value of 1.8 inches for the 24-hour, 25-year storm event was used for the model.

3.2.2 Drainage Area Delineation

The drainage area for PBSL was delineated using client-provided survey data and aerial imagery from September 2023 and the final Phase 5 design utilizing AutoCAD Civil 3D software. The landfill conducts an aerial survey annually on September 30th of each year to reflect changes and modifications based on operations and to evaluate landfill performance. The entire drainage area reporting to existing or proposed stormwater structures encompasses approximately 247.9 acres. The drainage areas were delineated to account for the areas that report to the various existing or proposed stormwater management structures such as channels, culverts, and retention ponds.

Drainage area soils and land cover types were characterized by assigning Curve Numbers to each respective drainage area. Landfill cover material has been assigned a Curve Number of 70 and is assumed to be vegetated. The entrance to the landfill consists of paved/gravel roads, buildings, and other impermeable surfaces. As such, this area can be expected to have a higher run-off potential. For the site entrance area, a Curve Number of 85 has been assigned. Run-on areas upgradient of the landfill have been characterized as “Sagebrush with grass understory” and has been assigned a Curve Number of 51. A full list of assigned drainage areas, Curve Numbers, and landcover characteristics are provided in **Tables 1, 2, 3 and 4** of **Appendix I**. The drainage area delineations are shown on **Sheet C-109** and **C-110** (**Appendix H**).

3.2.3 Time of Concentration

The NRCS Watershed Lag Method was used to calculate concentration times for each individual subbasin. This method was developed for use in nonurban watersheds and accounts for a lag time for each subbasin that distributes the respective run-off hydrograph peaks as they occur naturally without reaching the design point simultaneously (NRCS 2010). The NRCS Watershed Lag Method calculates time of concentration using the following equation referenced from Part 630, Chapter 15, of the National Engineering Handbook (NRCS 2010):

$$T_c = \frac{L^{0.8}\,(S+1)^{0.7}}{1140Y^{0.5}}$$

T_c = Time of Concentration, hr

L = Flow Length, ft

S = Maximum Potential Retention, in

Y = Average Watershed Land Slope, %

Referring to the NEH Part 630, the relation between lag and time of concentration can be expressed as L (lag time) = $0.6T_c$, where the lag time is a factor of the time of concentration multiplied by 0.6. The lag time is defined as the delay between the time run-off begins until it reaches its peak.

3.2.4 Hydrologic Model (HEC-HMS)

Tetra Tech utilized the USACE’s HEC-HMS software to simulate the 25-year, 24-hour storm event using the NRCS CN Method. The hydraulic evaluation of the proposed stormwater management structures used an estimated Soil Conservation Service (SCS) Type II rainfall distribution, peak run-off rates and inflow volumes for the study area. The following parameters and assumptions were used to quantify the estimated peak flows and inflow volumes:

- Precipitation: Based on the site’s location, an SCS Type II Storm was selected as the synthetic rainfall distribution
- Run-off Volume: The SCS CN Method was used to model the estimated run-off

- Direct Run-off: The model used the SCS Unit Hydrograph transform method with a Standard (PRF 484) graph type

Results from the HEC-HMS hydrologic model is provided in **Appendix I**.

3.3 HYDRAULIC ANALYSIS

Based on the calculated peak flows and volumes that report to the proposed stormwater management structures, the capacities of each proposed structure were evaluated to confirm they can safely capture, convey, and store the estimated run-off from the 25-year, 24-hour design storm event.

3.3.1 Regulations

Stormwater discharges are regulated by the Environmental Protection Agency (EPA) under Code of Federal Regulations (CFR) Title 40 sections 122, 123, and 124 (National Pollutant Discharge Elimination System (NPDES) Permit Application Regulations for Storm Water Discharges). These rules have been in effect since December 17, 1990, and apply to landfills that are subject to regulation under subtitle D of Resource Conservation and Recovery Act (RCRA). The rules cover the discharge of stormwater that flows from a waste containing area of the facility to any offsite collection system. If the stormwater runoff from a waste containing areas is collected and treated on-site these regulations do not apply. The design collects stormwater runoff from the waste containing area of the Site and routes them to onsite retention basins through a series of benches, ditches, and culverts.

Per the e-CFR website, amended September 24, 2024, the following surface water requirements shall apply under Title 40, Chapter 1, Subchapter I, Part 258, Subpart C, §258.26:

> **Title 40: Protection of Environment**
>
> PART 258 – CRITERIA FOR MUNICIPAL SOLID WASTE LANDFILLS
>
> Subpart C – Operating Criteria
>
> **§258.26: Run-on/run-off control systems**.
>
> (a) Owners or operators of all MSWLF units must design, construct, and maintain:
>
> (1) A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 25-year storm;
>
> (2) A run-off control system from the active portion of the landfill to collect and control at least the water volume resulting from a 24-hour, 25-year storm.
>
> (b) Run-off from the active portion of the landfill unit must be handled in accordance with §258.27(a) of this part.

3.3.2 Stormwater Channels and Run-On Control

The lateral expansion of the PBSL will require additional stormwater controls to effectively manage stormwater run-off. Stormwater controls for the landfill expansion have been designed to capture most of the run-off except for a small area on the eastern slopes. Run-off from this eastern area will flow into the existing gravel pit that is within the controlled access for the site.

Four stormwater channels are proposed around the perimeter of the landfill expansion to capture and convey run-off. The location of the proposed channels are shown on **Sheet C-109** (**Appendix H**) and the channel dimensions are shown on **Sheet C-113** (**Appendix H**). The four channels are as follows:

- North Channel: Triangular shaped (V-ditch) stormwater channel that will capture stormwater run-off from the northern benches of the landfill and convey the captured run-off to the proposed Northwest Pond. This channel will parallel the outer edge of the existing landfill gas header road. A 1-ft tall earthen berm should be constructed along the outer edge of North Channel to prevent run-on from upgradient areas.

- East Channel: A trapezoidal shaped stormwater channel that captures stormwater from of portion of the landfill eastern slopes and conveys run-off to the proposed Eastern Pond. This channel will be constructed along the outside edge of the existing road.

- West Channel 1: A trapezoidal shaped stormwater that captures stormwater from the southern benches of the landfill in addition to some run-on from an upgradient area. This channel will convey captured run-off to an existing drainage west of the landfill within the controlled access area.
- West Channel 2: A triangular shaped (V-ditch) channel that runs parallel to the inside edge of the existing landfill gas header road. This conveyance channel with direct captured run-off from a small portion of the landfill southern benches and tie into a bench drainage channel network.

Additional internal stormwater channels that will be required include are shown on **Sheet C-109** (**Appendix H**) and include:

- Half Corrugated Metal Pipes (CMP): CMPs will be installed along the fill slopes of the landfill to drain water off the face of the landfill. The half CMPs should include a region at the bottom of each lift (i.e. distance between stormwater benches or approximately 40 ft) for transition to connect to the next adjoining earthen channels and/or half CMP down slope drainage channel. Energy dissipation devices (e.g. rock gabions or concrete splash walls) should be installed on the side opposite their respective adjoining earthen channels as required based on the length of the channel and if required to prevent erosion after a significant storm event. These features will serve to reduce channel velocity prior to their respective junctions.
- Bench Drainage Channel: Triangular shaped (V-ditch) conveyance channels along the benches of the landfill (**Sheet C-113**, **Appendix H**). These drainage channels convey captured run-off from the landfill slopes to the half-CMPs or the North and West Channels.

An existing series of culverts and drainage channels exist adjacent to the landfill entrance and scale house area. Run-off from the southeastern slopes of the landfill will be captured and conveyed via this existing stormwater conveyance system to the existing Southeast Pond that will be modified as part of the design. Except for West Channel 1, all stormwater is directed to on-site retention ponds.

Run-on to the landfill is expected to occur from an upgradient area west of the landfill and will be captured by West Channel 1 then diverted away from the landfill. Minor run-on along the northern perimeter of the landfill is expected. As such, a 1-ft tall run-on berm on the outside edge of the North Channel is proposed. Along the northwestern perimeter, downstream of West Channel 1, minor run-on may occur. A 1-ft tall run-on berm should be installed on the inside edge of the existing road, terminating at the proposed North Pond. Refer to **Sheet C-110** in **Appendix H** for the location of the run-on berms.

A hydraulic analysis using Bentley FlowMaster hydraulic calculator software and Manning’s Equation for open-channel flow were used to determine minimum geometric and hydraulic properties for proposed channels. Hydraulic results for the channels are presented in **Table 9** below.

Table 9: Stormwater Channels Design Properties

Stormwater ID	Peak Discharge (cfs)	Length (ft)	Geometric Shape	Side Slopes (XH:1V)	Bottom Width (ft)	Minimum Design Depth (ft)
North Channel	0.2	3,125	Triangular	2	N/A	1
East Channel	1.2	680	Trapezoidal	2	1	1
West Channel 1	1.6	2,370	Trapezoidal	2	1	1
West Channel 2	0.2	710	Triangular	2	N/A	1
Bench Drainage Channel	0.8	Varies	Triangular	2	N/A	1

3.3.3 Stormwater Retention

Three retention ponds are proposed and designed to store captured runoff from the 25-year, 24-hour storm event. They are designated the Northwest Pond, East Pond, and Southeast Pond, and were designed to minimize discharge from the project site.

The Northwest Pond currently exists and was designed for the Revised Phase 3 design in 2020. The current pond will be expanded as Phase 3 is built and will be completed when the fill for Phase 3 starts to tie into the Phase 2 slopes. Stormwater is conveyed to the pond through a series of channels and CMPs. The northwest pond will be retained as part of the expansion design to collect runoff from a large portion of the north and northwest landfill slopes. Based on the final grading of the expansion design, less stormwater will be conveyed to the pond at the completion of the expansion than during the end of Phase3 construction. Rather than modify the pond, it will be oversized for the expansion design and will have more than ample capacity to store the estimated inflow volume.

The East Pond has been designed to store captured run-off from the eastern slopes of the landfill. Planned construction, existing roadways, and spatial constraints limit the East Channel from capturing all runoff from the eastern landfill slopes. Run-off from the eastern landfill slopes that would otherwise be directed to the East Pond will likely flow into the existing gravel pit.

The Southeast Pond is a modification of the existing pond near the site entrance. Specifically, the Southeast Pond will be deepened by excavating a foot from the existing pond bottom, the existing dam will require minor regrading and the addition of a foot of fill to raise the dam crest elevation. Although these modifications provide sufficient capacity for the 25-yr 24-hr storm event, an overflow pond was added downstream of the Southeast Pond to address concerns of neighboring landowners should the site experience sequential low-probably storms. The Southeast Pond and the overflow will be connected via a 3-ft wide x 2-ft deep trapezoidal overflow weir. Between the two ponds, there is more than ample capacity to store captured runoff from multiple 25-yr 24-hr storm events.

Stage-storage data for the four ponds are provided in **Tables 10, 11, 12** and **13** below. **Sheet C-111** and **Sheet-112** (**Appendix H**) show the pond cross sections.

Table 10: Northwest Pond Stage-Storage

Stage (ft)	Area (ac)	Incremental Volume (ac-ft)	Cumulative Volume (ac-ft)
2616	0.99	0.00	0.00
2617	1.05	1.02	1.02
2618	1.11	1.08	2.10
2619	1.17	1.14	3.24
2620	1.23	1.20	4.44
2621	1.29	1.26	5.70
2622	1.36	1.33	7.03
2623	1.43	1.39	8.42
2624	1.49	1.46	9.88
2625	1.56	1.53	11.41
2626	1.64	1.60	13.01

*Required capacity = 1.1 ac-ft

Table 11: East Pond Stage-Storage

Stage (ft)	Area (ac)	Incremental Volume (ac-ft)	Cumulative Volume (ac-ft)
2909	0.00	0.00	0.00
2910	0.12	0.06	0.06
2911	0.14	0.13	0.19
2912	0.15	0.14	0.34
2913	0.17	0.16	0.49
2914	0.18	0.17	0.67

*Required capacity = 0.3 ac-ft

Table 12: Southeast Pond Stage-Storage

Stage (ft)	Area (ac)	Incremental Volume (ac-ft)	Cumulative Volume (ac-ft)
2895	0.00	0.00	0.00
2896	0.01	0.00	0.00
2897	0.06	0.03	0.04
2898	0.09	0.07	0.11
2899	0.12	0.10	0.21
2900	0.14	0.13	0.34
2901	0.17	0.16	0.50
2902	0.20	0.18	0.68
2903[1]	0.23	0.21	0.89
2904	0.26	0.25	1.14
2905	0.31	0.29	1.43

*Required capacity = 1.1 ac-ft

1Overflow weir invert elevation

Table 13: Southeast Overflow Pond Stage Storage

Stage (ft)	Area (ac)	Incremental Volume (ac-ft)	Cumulative Volume (ac-ft)
2892	0.00	0.00	0.00
2893	0.01	0.00	0.00
2894	0.02	0.01	0.02
2895	0.04	0.03	0.05
2896	0.06	0.05	0.10
2897	0.09	0.07	0.17
2898	0.11	0.10	0.27
2899	0.14	0.13	0.40

Stage (ft)	Area (ac)	Incremental Volume (ac-ft)	Cumulative Volume (ac-ft)
2900	0.17	0.15	0.55
2901	0.19	0.18	0.74
2902	0.22	0.21	0.94
2903	0.25	0.24	1.18
2904	0.28	0.27	1.45
2905	0.33	0.31	1.76

3.3.4 Stormwater Culverts

The proposed North and East Channel alignments include road crossings and as a result a culvert for each of the channels is required to convey flow through these roads.

A hydraulic analysis using the U.S. Federal Highway Administration's HY-8 Culvert Hydraulic Analysis Program was completed to adequately size culverts which are to be used to convey captured runoff under existing and proposed roads.

The proposed culverts were analyzed as corrugated metal pipes with projecting inlet and outlet configurations. Culvert properties are presented in **Table 14** below. HY-8 culvert analysis results are provided in **Appendix I**.

Table 14: Stormwater Culvert Properties

Culvert ID	Material	Shape	Diameter (ft)	Length (ft)	Inlet Invert (ft)	Outlet Invert (ft)
North Culvert	Corrugated Metal Pipe	Circular	0.5	32	2,723.81	2,723.20
East Culvert	Corrugated Metal Pipe	Circular	1	22	2,926.82	2,926.38
*Culvert inverts are approximate and should be field verified upon installation						

3.4 GROUNDWATER MONITORING UPDATE

Monitoring well PB-8 is located within the footprint of the expansion area. This well will be properly abandoned before Phase 5 is excavated and filled in this area. Since this well in an upgradient background well, two new monitoring wells will be installed outside of the expansion area to provide groundwater quality data upgradient of the new cell. The proposed replacement wells are shown on **Sheet C-101** and **C-102** (**Appendix H**) and would be installed and monitored for 8 quarters before well PB-8 is abandoned. Existing monitoring wells PB-11 through PB-15 will provide downgradient coverage.

3.4.1 PB-8 Abandonment

PB-8 was installed in 1993 to a depth of 417 feet BGS using 4-inch diameter steel casing. It will be abandonment in accordance with IDWR regulations to prevent it from being a conduit of fluid or vapors to the subsurface. This well was installed with 8-inch diameter outer steel casing to a depth of 190 feet BGS. Outer casing was not placed between the 4-inch monitoring well casing and the walls of the boring below 190 feet where the consolidated formation allowed the boring to remain open. The annular space between the well casing and the walls of the boring was filled with bentonite chips. Over time, the bentonite can become desiccated enough to allow vapors to pass through it.

The submersible sampling pump, tubing, and cable will be removed from the well before the abandonment process. To help prevent the boring from being a conduit for vapors, the well casing will be perforated, and a pressure grouting technique will be used during the abandonment. The 4-inch diameter well casing will be perforated from 175 feet below ground surface to the bottom of the well (417 feet BGS). The perforations may be made with an air knife, mills knife or other appropriate method that creates an opening large enough to allow grout to be pushed into the space outside the well casing. At least four equally spaced perforations around the circumference of the casing spaced no greater than one foot apart vertically will be created to comply with IDWR rules.

The well will be pressure grouted with a cement/bentonite-based grout after the perforation is complete. A suitable packer or other seal will be placed near the surface to allow the grout to be injected into the casing under a minimum pressure of 20 psi at ground surface to force the grout out through the perforations into the filter pack, dried bentonite seal, or voids. The grout will be placed through a tremie pipe, from the bottom of the well up, for the full length of the well to approximately 6 feet below the future cut elevation. Additional neat cement grout will be added to match this elevation as needed following overnight settlement. The remainder of the well casing will be filled with hydrated bentonite chips and a temporary but secure cap will be placed on the well. Having bentonite chips instead of cement in the upper portion of the casing will allow CCSW personnel to periodically cut the top part of the casing as the excavation for Phase 5 progresses. Each time the casing is cut, water will be added as needed to maintain the hydration of the bentonite chips and the cap will be replaced.

After the final cut elevation is achieved in this area, an additional six feet of soil will be removed from around the well casing. The casing will be cut off at that level, and a steel cap will be welded on top of it as a permanent cap. The excavation around the casing will then be backfilled up to the bottom elevation of the Phase 5 cut so that the casing will be protected from damage.

3.4.2 New Upgradient Well Installation

The proposed locations of the two new upgradient monitoring wells are shown on **Sheets C-101** and **C-102** in **Appendix H**. These wells will be installed and monitored for at least 8 quarters prior to the abandonment of well PB-8. They will be incorporated into the sampling program upon completion, using the schedule described below. At least two sampling events will be conducted that includes PB-8 and the new wells prior to the abandonment of PB-8 to verify correlation of groundwater conditions.

One of the wells will be installed approximately 250 north-northwest of PB-8 and 1130 feet east of PB-11. The ground surface at this location is similar to that at PB-8 (approximately 2707 feet AMSL). The direction of groundwater flow at PB-8 is slightly south of west, so the piezometric surface at this location is also expected to be similar to that at PB-8. The piezometric surface elevation at PB-8 was 2426.37 feet AMSL when measured in early September 2024.

The second new monitoring well will be installed approximately 1000 feet east-northeast of PB-8 and 1000 feet west of former monitoring well PB-6. The first groundwater at this location should be beneath the confining layer, though it is possible that the unconfined conditions found at PB-6 extend this far to the west. At the location of PB-6, the current elevation of the unconfined groundwater is approximately 2370 feet AMSL, with groundwater moving to the east. The selected location is almost due north of former monitoring well PB-1, where the unconfined aquifer was not encountered. Groundwater at PB-1 was produced from sandy shale at an elevation beginning at approximately 2100 feet AMSL, beneath the confining layer. The piezometric surface after drilling was noted to be approximately 250 feet higher, or approximately 2350 feet AMSL. Holladay (1994) noted that the true piezometric may have been much higher had the well been allowed to recover longer. Extrapolating the groundwater levels from the recent monitoring events, the level of unconfined groundwater (if present) at the proposed location may be near 2440 feet AMSL, while the piezometric surface of the confined layer is expected to be near 2460 feet AMSL. The well will be installed such that it is screened within the confined aquifer and that the seal above the top of the screen is sufficient to prevent mixing with the unconfined aquifer, if present. If the unconfined aquifer is encountered during well installation, it will be noted in the well log.

Each of the two new wells will be installed with rotary drilling techniques. 8 or 10-inch diameter steel casing will be installed in the unconsolidated materials in the upper portion of the borings to prevent the walls of the borings from collapsing. The actual depths of the bottom of the casing will be determined during drilling. This casing will be permanently sealed to the walls of the boring with cement grout so that a conduit for subsurface vapor is not present.

The monitoring wells will be set once the final depth of the boring is established; this depth will be determined based on field observations and measurements of groundwater egress into the boring. The wells will be constructed with 4-inch diameter steel casing. The casing sections will be threaded together to provide smooth internal walls. The bottom of the casing will include an end cap connected to a five-foot section of blank (non-screened) casing to provide a sump at the bottom of the wells. Wire-wrapped screening casing will be placed above the sump spanning the zone(s) of water production. Blank casing will be placed above the screened section; the blank casing will then extend approximately two feet above the ground surface.

Each of the wells will be developed by surging and pumping or bailing. Once the installation and development for both wells is complete, dedicated, pneumatically powered submersible pumps will be installed into them. The pumps will be the same model or current equivalent to the pumps that are in the other PBSL monitoring wells (QED Environmental ST100PM). The new wells will be sampled within one week after pump installation. The wells will then be sampled on a quarterly basis until 8 sampling events have been conducted. Four of these events will coincide with the semi-annual monitoring program (March and late August or early September). The other four events will be conducted in June and December. After the 8 quarterly sampling events have been conducted, the wells will be sampled semi-annually. The sampling will be conducted in accordance with the Sampling and Analysis Plan that is current at the time of the sampling. The most current Plan is dated December 1, 2023 (Tetra Tech, 2023).

4.0 SUPPLEMENTAL REPORTS

In addition to the Geotechnical Investigation and Seismic Survey reports included in **Appendices F** and **G**, several other reports prepared for PBSL between 1998 and 2016 contain information to support this expansion application. These are being submitted electronically with this application in a separate folder. The following is a list of the reports including the year published, title, author, and relevant information.

- 1994 - Hydrogeologic Characterization, Ground Water Monitoring Plan, and Facility Design (Holladay). This report includes a description of the geologic and hydrogeologic conditions at the landfill, a summary of the installation and testing of monitoring wells PB-2 through PB-8, core sample collection and testing, HELP modeling to estimate travel times and support the non-lined arid design, cell design, surface water management, and cover design.
- 1998 – 1997 Landfill Status Report (Holladay). This report included a summary of the previous designs, an evaluation of project capacity, presented the groundwater monitoring plan, and discussed Title V compliance.
- 1998 – Geotechnical Evaluation (Holladay). The results of a geotechnical investigation were presented in this report. Samples were collected from borings GT-1 and GT-5 that were analyzed for various physical properties. Core samples previously collected from the boring for monitoring well PB-2 were also tested. Analysis of loading was conducted, and the potential for liquefaction and settlement was addressed.
- 2014 – Monitor Well Installation (DBSA). The installation of monitoring wells PB-11 through PB-15 is described in this report. The wells were completed between June and October 2011. The analysis of

laboratory samples for soil and rock is not discussed in this report. The laboratory results for the initial groundwater sampling event from these wells (collected April 2012) is included as an appendix.

- 2014 – Hydrogeologic Characterization Report, Volume 1 (DBSA). This report included the results of laboratory testing of core samples collected during the 2011 drilling program (Table 3 of the report). The results were used for infiltration modeling using Darcian flux calculations, the HYDRUS model, and the HELP model. The modeling results were summarized in Tables 5 through 10 and Table 14 of that report. The calculated travel times from the top of the confining layer to the groundwater beneath it ranged from 3,158 to over 52,000 years.
- 2014 – Hydrogeologic Characterization Report, Volume 2 (DBSA). This second volume of the report contained the laboratory results of the core samples collected during the 2011 drilling program. These results support the modeling that is described in Volume 1.
- 2015 – Landfill Status Report Update (Tetra Tech). The update of the PBSL status report included summaries of previous investigations, statistical analyses of the results of groundwater sampling, modeling for LFG emissions, a slope stability evaluation, stormwater controls, and cost estimates for closure and post-closure maintenance.
- 2016 – Alternative Final Cover System Equivalency Demonstration (Tetra Tech). This document proposed a cover system consisting of mulch for erosion control over an infiltration control layer, which would in turn be placed over an intermediate cover layer. This was proposed as an alternative to the EPA Subtitle D prescriptive final cover system. The report included a description of the borrow source investigation, laboratory testing of soil samples, infiltration modeling, and a grading plan. The DEQ approved the alternative cover design in a letter dated December 9, 2016.
- 2023 - Groundwater Sampling & Analysis Plan (Tetra Tech). This document outlines the procedures used to collect groundwater samples, the frequency, and the quality assurance requirements.

5.0 REFERENCES

40 CFR 258, 2024. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-258/subpart-C/section-258.27#p-258.27(a), September 24, 2024.

Bentley Flow Master Hydraulic Modeling Software V81 (SELECT series 1) 2009, Bentley Systems Incorporated.

City of Nampa, 2024. Climate. https://www.cityofnampa.us/909/Climate accessed September 2024.

DBS&A (Daniel B. Stephens & Associates), 2010. Site Certification, Pickles Butte Sanitary Landfill. Report to Canyon County, June 17.

DBS&A. 2014a. Hydrogeologic Characterization Report, Pickles Butte Sanitary Landfill, Volumes 1 and 2. Report to Pickles Butte Sanitary Landfill, April 25.

DBS&A. 2014b. Monitor Well Installation, Pickles Butte Sanitary Landfill. Report to Pickles Butte Sanitary Landfill, April 25.

Digital Atlas of Idaho, 2023. Snake River Plan. Available on-line at https://digitalatlas.cose.isu.edu/geo/snkrvpln/snkrvpln.htm. Accessed December 2023.

Holladay (Holladay Engineering Company), 1994. Hydrogeologic Characterization, Groundwater Monitoring Plan, & Facility Design, Pickles Butte Sanitary Landfill, Canyon County Idaho, July 1994.

Holladay, 1998. Geotechnical Evaluation Pickles Butte Sanitary Landfill, Canyon County, Idaho. February 1998.

Hydrologic Modeling Software (HEC-HMS) 4.4 2020, US Army Corps of Engineers, Davis, CA.

Idaho Department of Water Resources (IDWR) 2024. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho, Nampa, Idaho https://et-idwr.idaho.gov/stninfo.py?station=2168 Accessed October 2024.

Kimmel, P.G., 1982, Stratigraphy, age, and tectonic setting of the Miocene-Pliocene lacustrine sediments of the western Snake River Plain, Oregon and Idaho, in Bill Bonnichsen and R.M. Breckenridge, eds., Cenozoic Geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26, p. 559-558.

Mabey, D.R. 1982. Geophysics and Tectonics of the Snake River Plain, Idaho. Cenozoic Geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26. Bill Bonnichsen and R.M. Breckenridge, editors. P. 139-153.

Malde, H.E., 1959, Fault zone along northern boundary of western Snake River Plain, Idaho: Science, v. 130, p. 272.

Malde, H.E., 1972. Stratigraphy of the Glenns Ferry Formation from Hammett to Hagerman, Idaho. United States Geological Survey Bulletin 1331-D.

Malde, H.E., and H.A. Powers, 1962, Upper Cenozoic stratigraphy of western Snake River Plain, Idaho: Geological Society of America Bulletin 73, p. 1197-1220.

Malde, H.E., and H.A. Powers, 1972, Geologic map of the Glenns Ferry-Hagerman area, west-central Snake River Plain, Idaho: U.S. Geological Survey Miscellaneous Investigations Map I-696, scale 1:48,000, 2 sheets.

Maley, Terry, 1987. Exploring Idaho Geology, Mineral Land Publications, Boise, ID.

Mayo, Alan L., Muller, Anthony B., and Mitchell, John C., 1984. Geochemical and Isotopic Investigations of Thermal Water Occurrences of the Boise Front area, Ada County, Idaho. In Idaho Department of Water Resources Bulleting No. 30, Geothermal Investigations In Idaho. December.

National Oceanic and Atmospheric Administration (NOAA) Precipitation-Frequency Atlas of the United States Atlas 14 Volume 12 Version 2.0: Interior Northwest, Idaho, Montana, Wyoming 2024. US Department of Commerce. September.

National Oceanic and Atmospheric Administration (NOAA) Precipitation-Frequency Atlas of the Western United States Atlas 2 Volume V - Idaho 1973. US Department of Commerce.

National Resources Conservation Service, United States Department of Agriculture (NRCS), 2010. National Engineering Handbook Part 630 Hydrology, Chapter 15, Time of Concentration. Washington D.C.

National Resources Conservation Service, United States Department of Agriculture (NRCS), 2023. Web Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. Accessed December 2023.

Personius, S.F., compiler, 2003, Fault number 635, Western Snake River Plain fault system, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed December 2023.

Ruez, Dennis R., 2009. Framework for stratigraphic analysis of Pliocene fossiliferous deposits at Hagerman Fossil Beds National Monument, Idaho. Rocky Mountain Geology, v. 44, no. 1, p. 33–70, 10 figs., 2 appendices, May.

Savage, Carl N., 1968. Lexicon of Idaho Geologic Names, Idaho Bureau of Mines and Geology Information Circular #20. December.

Shervais, J.W., Gaurav Shroff, S.K. Vetter, Scott Matthews, B.B. Hanan, and J.J. McGee, 2002, Origin and evolution of the western Snake River Plain: Implications from stratigraphy, faulting, and the geochemistry of basalts near Mountain Home, Idaho, in Bill Bonnichsen, C.M. White, and Michael McCurry, eds., Tectonic and Magmatic Evolution of the Snake River Plain Volcanic Province: Idaho Geological Survey Bulletin 30, p. 343-361.

Swirydczuk, K., Larson G.P., and Smith, G.R., 1982. Volcanic Ash Beds as Stratigraphic Markers in the Glenns Ferry and Chalk Hills Formations from Adrian, Oregon to Bruneau, Idaho. Cenozoic Geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26. Bill Bonnichsen and R.M. Breckenridge, editors. P. 543-558.

Tetra Tech 2023. Groundwater Sampling & Analysis Plan, Pickles Butte Sanitary Landfill, December 1, 2023.

Tetra Tech, 2022. Pickles Butte Sanitary Landfill, Basis of Design Report, Nampa, Idaho. April 28, 2022.

Tetra Tech, 2020. Pickles Butte Sanitary Landfill, Phase 3 Stormwater Controls, Nampa, Idaho. August 4, 2020.

Tetra Tech, 2016. Alternative Final Cover System Equivalency Demonstration, Pickles Butte Sanitary Landfill. November 28, 2016.

U.S. BLM, undated. Geology of Southwest Idaho. Informational pamphlet prepared for Hulls Gulch National Recreation Trail in Idaho.

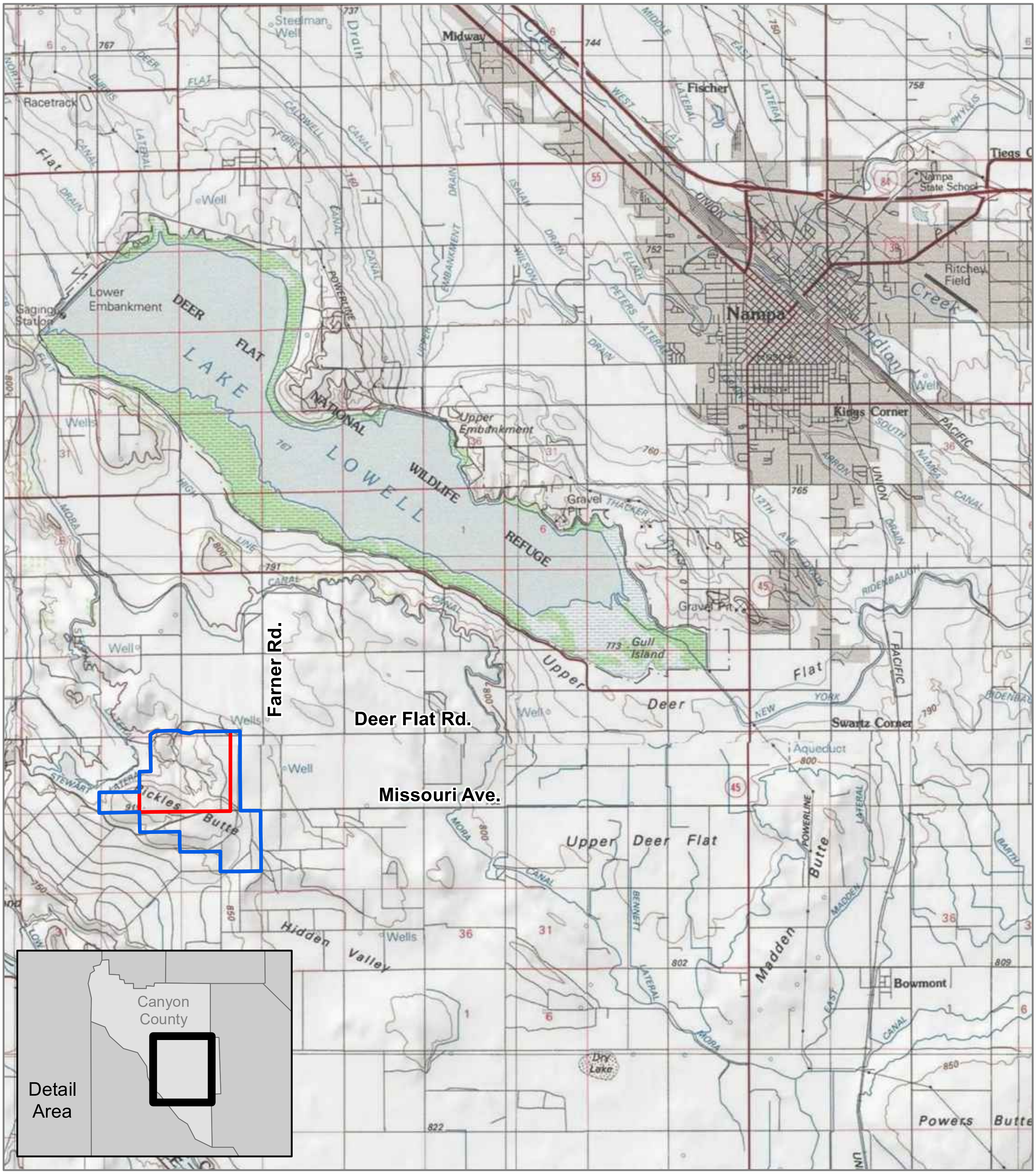
USGS, 1968. 7.5 Minute Series Topographic Map, Givens Hot Springs Quadrangle, Idaho – Canyon County.

USGS, 1968. 7.5 Minute Series Topographic Map, Lake Lowell Quadrangle, Idaho – Canyon County.

Wood, S.H., and J.E. Anderson, 1981, Chapter 2, Geology, in J.C. Mitchell, ed., Geothermal Investigations in Idaho, Part 11: Geological, Hydrological, Geochemical, and Geophysical Investigations of the Nampa-Caldwell and Adjacent Areas, Southwestern Idaho: Idaho Department of Water Resources, Water Information Bulletin 30, p. 9-31.

Wood, Spencer H., 1994. Seismic Expression and Geological Significance of a Lacustrine Delta in Neogene Deposits of the Western Snake River Plain, Idaho. APG Bulletin, Volume 78, No. 1, P. 102-121. January.

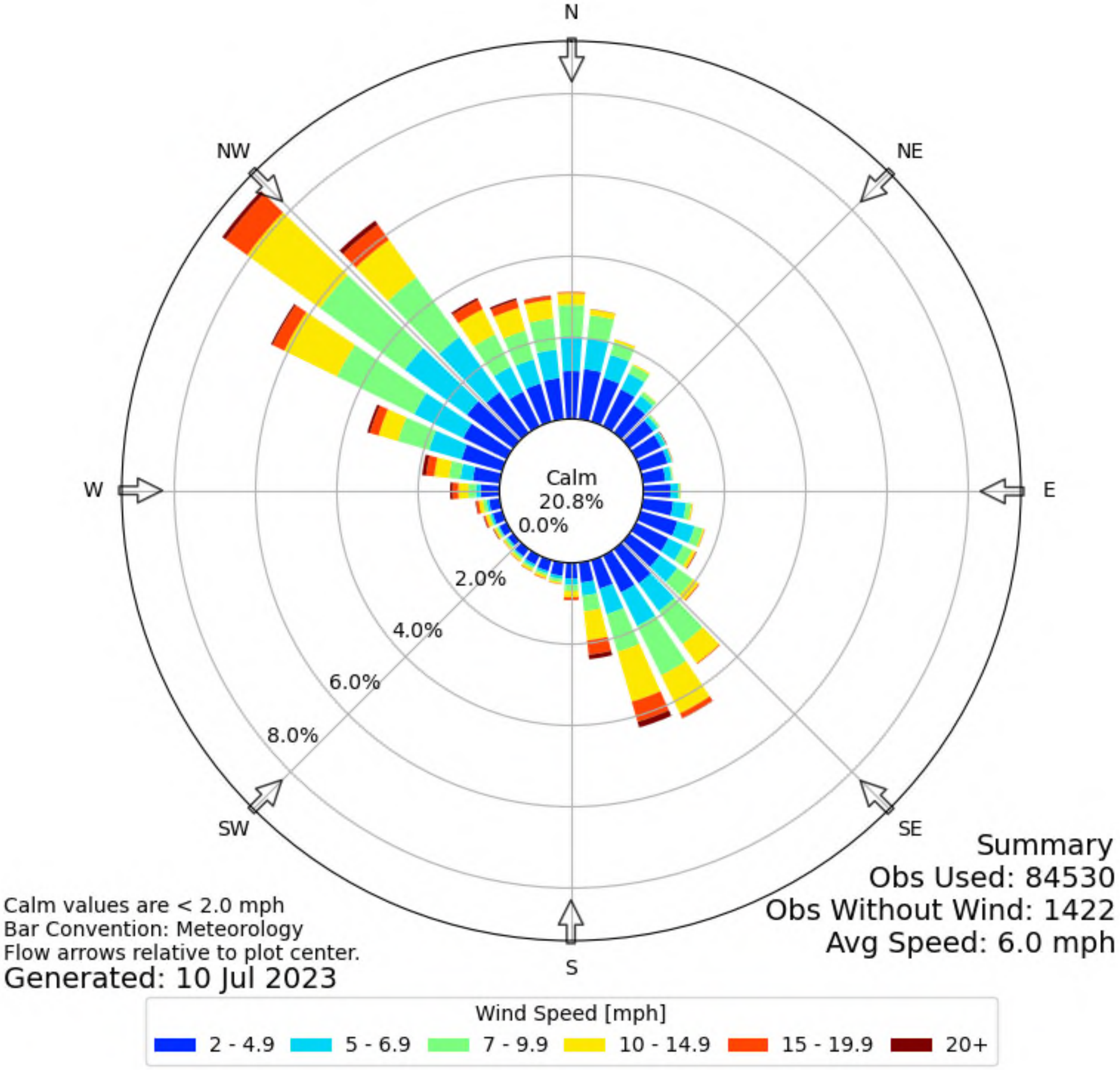
APPENDIX A : FIGURES



TETRA TECH

Figure 1
Overview
Pickles Butte Sanitary Landfill
Canyon County, ID

\\cess706gisfs1\CES\Projects\BOI\GeoServ\Pickles_Butte



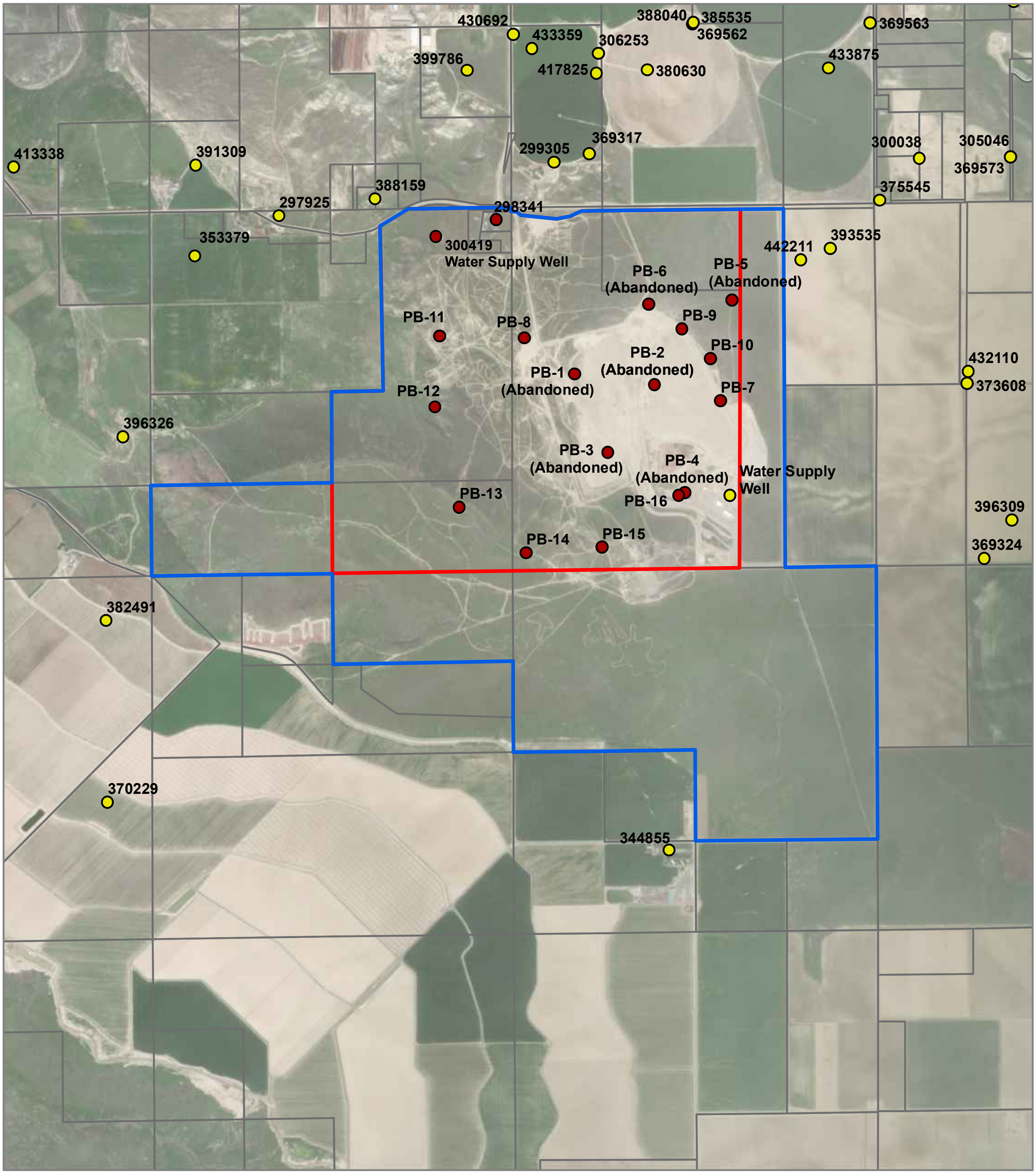
Summary
Obs Used: 84530
Obs Without Wind: 1422
Avg Speed: 6.0 mph

Calm values are < 2.0 mph
Bar Convention: Meteorology
Flow arrows relative to plot center.
Generated: 10 Jul 2023

TETRA TECH

Source: https://mesonet.agron.iastate.edu/sites/locate.php

Wind Rose
Nampa, ID
Figure 2



N

0 2,000
Feet

TETRA TECH

🟥 Site Certification Boundary
🟦 Canyon County Landfill Property
☐ Parcel Adjacent Property
● Groundwater Well
● Onsite Groundwater Well

*Accessed IDWR well logs 10/22/2020.

Figure 3
Onsite and Adjacent Property
Groundwater Wells
Pickles Butte Sanitary Landfill
Canyon County, ID

APPENDIX B: SITE CERTIFICATION

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1445 North Orchard • Boise, Idaho 83706 • (208) 373-0550

C.L. "Butch" Otter, Governor
Toni Hardesty, Director

August 2, 2010

The Honorable David J. Ferdinand
Chair, Canyon County Commission
15500 Missouri Avenue
Nampa, ID 83686

Re: Pickles Butte Sanitary Landfill Lateral Expansion
Site Certification Application and Supplemental Information

Dear Chairman Ferdinand:

The Department of Environmental Quality (DEQ) has reviewed the above referenced Site Certification Application and Supplemental Information for the Pickles Butte Sanitary Landfill Lateral Expansion for conformance with the provisions of Chapter 74, Title 39, Idaho Code, "Idaho Solid Waste Facilities Act." DEQ based its decision upon this review and information obtained during a site visit to the proposed new lateral expansion to the municipal solid waste landfill (MSWLF) on June 17, 2010, and has concluded the following.

Site Certification Application

Idaho Code § 39-7408 set forth the procedure for each application to obtain site certification. The application for the site certification process must meet the location restrictions as specified in Idaho Code § 39-7407. Canyon County Solid Waste Department (applicant), seeking to expand the municipal solid waste landfill unit for Pickles Butte, submitted to DEQ the Site Certification Report – Proposed Pickles Butte MSWLF Lateral Expansion dated June 17, 2010. The information necessary to review compliance with the location restrictions was considered complete on July 23, 2010.

As required by Idaho Code § 39-7408, on June 17, 2010, the applicant published notice that the site certification application had been submitted and provided an opportunity for public comment. One comment letter was received by DEQ before the deadline of July 16, 2010. The applicant's consultant provided a response to the public comment.

Upon review of the site certification application, supporting documentation, DEQ site visit to the proposed new lateral expansion and comment received, DEQ has concluded that the Pickles Butte MSWLF lateral expansion application has demonstrated that the site complies with the location restrictions in Idaho Code § 39-7407. The application addressed each of the criteria set forth in Idaho Code § 39-7407, explaining the technical

c:
Jack Biddle, Director, Canyon County Solid Waste Department
John Ayarbe, P.G, Daniel B. Stephens & Associates, Inc.
David Loper/ Brian Crawford, Southwest District Health Department
Pete Wagner, Regional Administrator, Boise Regional Office
Todd Crutcher, P.E., DEQ-Boise Regional Office
Susan Hamlin, AG
Dean Ehlert, DEQ-State Office
Source File #11.1 Pickles Butte MSWLF Lateral Expansion /Reading File

PUBLIC NOTICE OF RECEIPT OF SITE CERTIFICATION THE BOARD

PUBLIC NOTICE OF RECEIPT OF SITE CERTIFICATION The Board of Commissioners of Canyon County, Idaho, submitted an application for Site Certification to the Department of Environmental Quality for the Pickles Butte Sanitary Landfill, a municipal solid waste landfill facility, on June 17, 2010. Written public comments concerning the application were accepted until July 16, 2010. All submitted comments were reviewed and addressed by the County. On August 4, 2010, the County received notification, dated August 2, 2010, from the Idaho Department of Environmental Quality that the proposed Pickles Butte MSWLF Lateral Expansion was certified compliant with Idaho Code § 39-7407. The County hereby informs the public that certification of the proposed Pickles Butte Municipal Solid Waste Landfill Facility lateral expansion has been approved. Board of Canyon County Commissioners Canyon County Courthouse 1115 Albany Street Caldwell, ID 83605 CANYON COUNTY COMMISSIONERS Commissioner Steven J. Rule Commissioner Kathryn Alder ATTEST: WILLIAM H. HURST, CLERK Date: 8-12-10 Claudia Amaral, Deputy Clerk August 16, 2010 277370

Appeared in: ***Idaho Press Tribune*** on Monday, 08/16/2010

IDAHO DEPARTMENT
OF HEALTH AND WELFARE
DIVISION OF
ENVIRONMENTAL QUALITY

1420 North Hilton, Boise, ID 83706-1260, (208) 334-0550

Cecil D. Andrus, Governor

RECEIVED
AUG 11 1993
CANYON COUNTY
COMMISSIONERS OFFICE

Copy - Brewer
Landfill

August 9, 1993

Commissioner George Vance
Chairman of the Board
Canyon County Commissioners
1115 Albany
Caldwell, ID 83605

RE: Pickles Butte Municipal Solid Waste Landfill Site Certification

Dear Mr. Vance:

This purpose of this letter is to issue a site certification pursuant to Idaho Code § 39-7408 for the referenced municipal solid waste landfill unit. Upon review of the site certification application and supporting documentation, the Pickles Butte Municipal Solid Waste Landfill has demonstrated that the site complies with the locational restrictions in Idaho Code § 39-7407.

The Department of Health and Welfare, Division of Environmental Quality (DEQ) bases this certification on information submitted on June 28, 1993.

On July 1, 1993, the applicant published notice that the site certification application had been submitted and provided an opportunity for public comment. No comments were received by either DEQ or Canyon County.

In a letter dated July 26, 1993, DEQ requested additional information including a site visit request to support the site certification application. Holladay Engineers provided that information on July 30, 1993.

Idaho does not currently have approval from the U.S. Environmental Protection Agency (EPA) to operate a municipal solid waste program in lieu of the Federal Subtitle D requirements (40 CFR Parts 258). The authority for DEQ to certify compliance with locational restrictions is not in place until EPA approves the state program. In the interim, DEQ provides this approval recognizing that if state approval is not received, the applicant must comply with all the provisions for municipal solid waste landfills under the federal regulations. Should state approval occur, the documentation including the application, DEQ review, and site certification for the Pickles Butte Municipal Solid Waste Landfill will be in place and the site will remain certified provided conditions have remained the same and the facility does not violate any of the criteria set forth in Idaho Code § 39-7407.

The information necessary to review compliance with locational restrictions was considered complete on July 30, 1993. The Pickles Butte Municipal Solid Waste Landfill is hereby certified in compliance with section 39-7407, Idaho Code dated this 9th day of August, 1993.

We appreciate the Commissioner's commitment to this project and process, and look forward to the next phase of the project. As a reminder, Idaho Code § 39-7408(g) stipulates that:

> "within ten (10) working days of receipt of certification ... the applicant shall publish notice in the newspaper... informing the public that certification of the site has been approved."

We encourage you to keep the public informed and meet this requirement.

Sincerely,

Larry L Koenig

Larry L. Koenig
Regional Administrator
Southwest Idaho Regional Office

cc: Katie Sewell, DEQ - CO
Jack Gantz, DEQ - SWIRO
Mike Smith, DEQ - SWIRO
Southwest District Health Department
Holladay Engineering Company

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1445 North Orchard Street, Boise, ID, 83706
(208) 373-0550

Brad Little, Governor
Jess Byrne, Director

February 26, 2021

By email: lvanbeek@canyonco.org

The Honorable Leslie Van Beek
Board of Canyon County Commissioners
15500 Missouri Avenue
Nampa, Idaho 83686

Subject: Pickles Butte Sanitary Landfill Lateral Expansion
Site Certification Application Approval

Dear Commissioner Van Beek:

The Idaho Department of Environmental Quality (DEQ) has reviewed the Pickles Butte Sanitary Landfill Lateral Expansion Site Certification Application (DEQ document reference 2021BAB74) and subsequently submitted Supplemental Information (DEQ document reference 2021BAB85) for the Pickles Butte Sanitary Landfill Lateral Expansion for conformance with the provisions of Chapter 74, Title 39, Idaho, “Idaho Solid Waste Facilities Act.” DEQ has concluded the following:

Site Certification Application

Idaho Code §39-7408 sets forth the procedure for each application to obtain site certification. The site certification application must meet the location restrictions as specified in Idaho Code §39-7407. Canyon County Solid Waste Department (applicant), seeking to expand the municipal solid waste landfill (MSWLF) unit for Pickles Butte, submitted to DEQ the site certification report, *Proposed Pickles Butte MSWLF Lateral Expansion*, dated November 19, 2020. Supplemental information necessary to review compliance with the location restrictions was received on February 16, 2021.

As required by Idaho Code §39-7408, on December 5, 2020, the applicant published notice that the site certification application had been submitted and provided an opportunity for public comment. No comments were received by DEQ.

Upon review of the above mentioned site certification application and supporting documentation, DEQ has concluded that the Pickles Butte Sanitary Landfill Lateral Expansion Site complies with the location restrictions in Idaho Code §39-7407. The application addressed each of the criteria set forth in Idaho Code §39-7407, explaining the technical findings regarding each criterion, and a qualified professional has certified compliance with the requisite criteria.

The proposed Pickles Butte MSWLF Lateral Expansion is hereby certified to be in compliance with Idaho Code §39-7407, Idaho Code dated this 26th day of February, 2021.

As a reminder, Idaho Code §39-7408(2)(g) requires that:

> "within ten (10) working days of receipt of certification … the applicant shall publish notice in the newspaper … informing the public that certification of the site has been approved."

Please provide DEQ with a copy of the published notice for our records.

General Requirements

Before receipt of any waste in the lateral expansion area, Canyon County must demonstrate to DEQ the proposed lateral expansion facility will also be in compliance with the following requirements of the "Idaho Solid Waste Facilities Act":

§39-7409 STANDARDS FOR DESIGN

§39-7410 GROUND WATER MONITORING DESIGN

§39-7412 STANDARDS FOR OPERATION
(Southwest District Health Department)

DEQ appreciates Canyon County's commitment to this project and process, and looks forward to working with Canyon County on the next phases of the project. Should you have any questions or require additional information, please do not hesitate to contact me at (208) 373-0184, or via e-mail at taylor.enos@deq.idaho.gov.

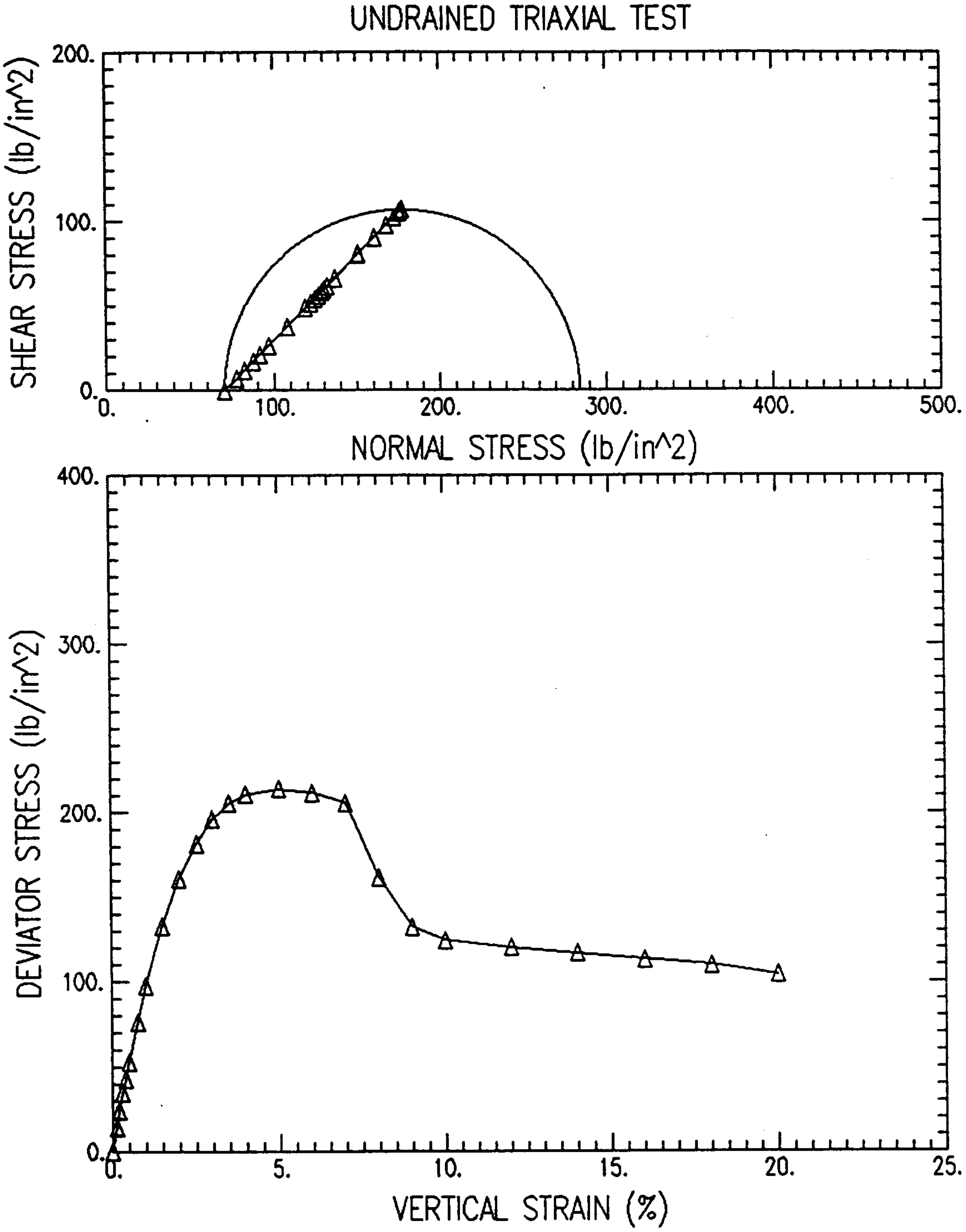
Sincerely,

Taylor Enos
Water Quality/Solid Waste Engineer

TE:tg
2021BAB102

c: Maureen McGraw, PE, Tetra Tech
David Loper, Canyon County Solid Waste Department
Bradford Goodsell, Canyon County Solid Waste Department
Daniel Pecunia, Canyon County Solid Waste Department
Mitch Kiester, Southwest District Health
Matthew Beeter, DEQ Solid Waste Manager
Valerie Greear, PE, DEQ Engineering Manager

APPENDIX C: SOILS DATA



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-4	@70 PSI	70-71 FEET	GT4-70	GT4-70.UU

Wed Mar 19 17:14:58 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-70
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : @70 PSI
Depth : 70-71 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 70 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	70.00	70.00
2)	0.004	0.11	1.61	0.00	22.98	22.98	14.28	84.28	84.28
3)	0.007	0.20	1.61	0.00	38.49	38.49	23.89	93.89	93.89
4)	0.011	0.31	1.61	0.00	56.30	56.30	34.88	104.88	104.88
5)	0.014	0.39	1.62	0.00	68.94	68.94	42.65	112.65	112.65
6)	0.018	0.50	1.62	0.00	86.18	86.18	53.21	123.21	123.21
7)	0.027	0.75	1.63	0.00	124.09	124.09	76.30	146.30	146.30
8)	0.036	1.00	1.63	0.00	159.71	159.71	97.78	167.78	167.78
9)	0.054	1.51	1.65	0.00	219.46	219.46	133.22	203.22	203.22
10)	0.072	2.01	1.66	0.00	267.72	267.72	161.12	231.12	231.12
11)	0.090	2.51	1.68	0.00	304.49	304.49	181.66	251.66	251.66
12)	0.107	2.99	1.69	0.00	331.49	331.49	196.13	266.13	266.13
13)	0.125	3.49	1.71	0.00	350.45	350.45	205.52	275.52	275.52
14)	0.143	3.99	1.72	0.00	362.51	362.51	210.71	280.71	280.71
15)	0.179	5.00	1.75	0.00	375.15	375.15	214.14	284.14	284.14
16)	0.215	6.00	1.78	0.00	378.02	378.02	211.84	281.84	281.84
17)	0.251	7.01	1.82	0.00	374.00	374.00	205.69	275.69	275.69
18)	0.287	8.01	1.85	0.00	299.89	299.89	161.80	231.80	231.80
19)	0.322	8.99	1.89	0.00	250.48	250.48	132.61	202.61	202.61
20)	0.358	9.99	1.93	0.00	239.57	239.57	124.33	194.33	194.33
21)	0.430	12.00	2.01	0.00	241.29	241.29	120.19	190.19	190.19
22)	0.502	14.01	2.10	0.00	244.74	244.74	116.80	186.80	186.80
23)	0.573	15.99	2.19	0.00	247.61	247.61	113.08	183.08	183.08
24)	0.645	18.00	2.29	0.00	251.63	251.63	109.67	179.67	179.67
25)	0.717	20.01	2.41	0.00	250.48	250.48	103.95	173.95	173.95

Wed Mar 19 17:31:24 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-70
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : @70 PSI
Depth : 70-71 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 70 PSI

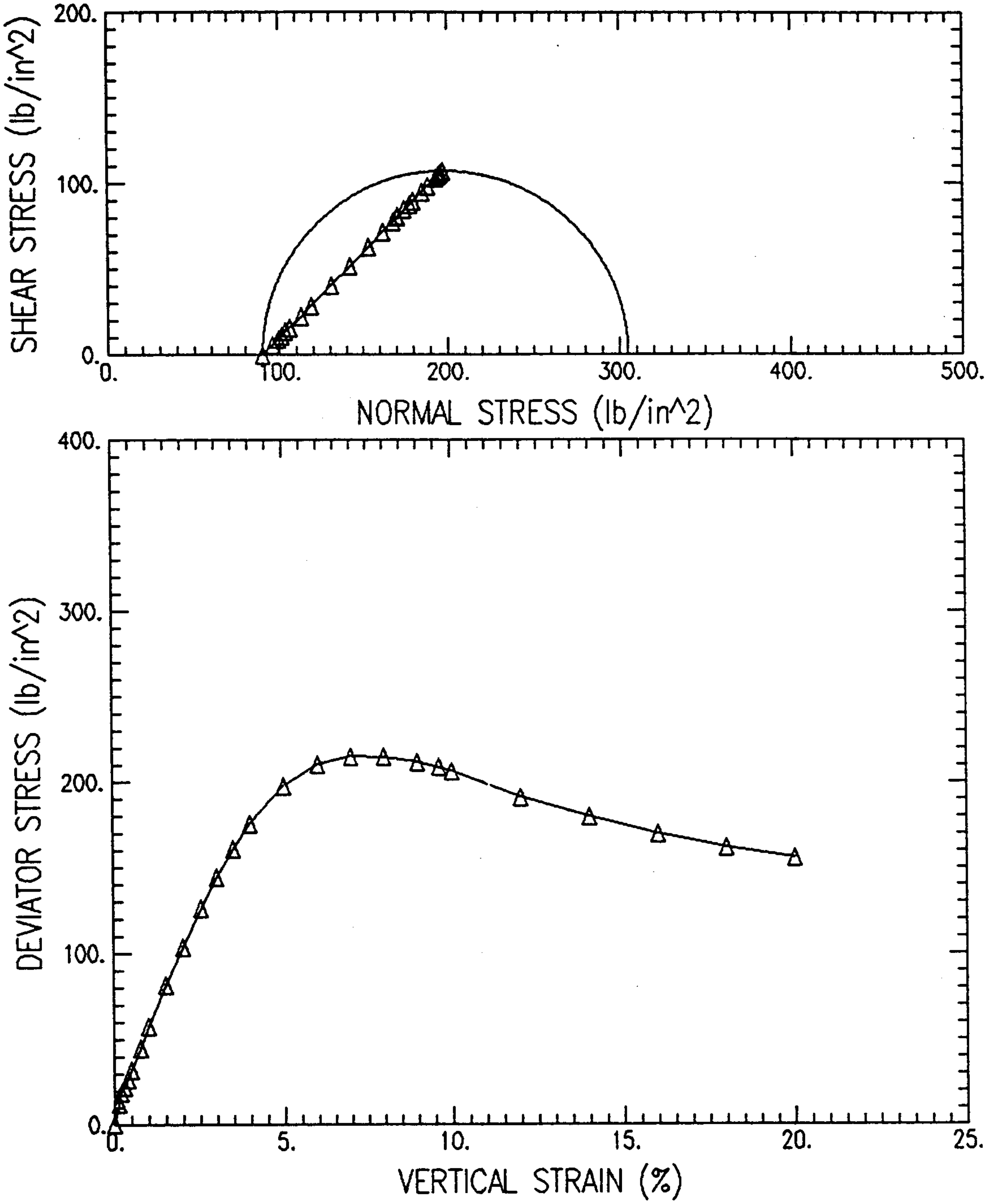
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	135.70	135.70	0.00
WT CONTAINER + DRY SOIL (gm)	128.20	128.20	0.00
WT WATER (gm)	7.50	7.50	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	128.20	128.20	0.00
WATER CONTENT (%)	5.85	5.85	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	5.85	5.85
VOID RATIO	0.82	0.82
WET DENSITY (lb/ft^3)	98.78	98.78
DRY DENSITY (lb/ft^3)	93.32	93.32
DEGREE OF SATURATION (%)	19.43	19.43

Maximum Shear Stress = 107.07 (lb/in^2) at a Vertical Strain of 5.00 %

UNDRAINED TRIAXIAL TEST



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-4	@90 PSI	90-91 FEET	GT4-90	GT4-90.UU

Wed Mar 19 17:17:01 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-90
Boring No. : GT-4
Test Date : 03/12/97
Tested by : C. WASON
Sample No. : @90 PSI
Depth : 90-91 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. GRAYISH BROWN FINE SANDY SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 90 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	90.00	90.00
2)	0.004	0.11	1.61	0.00	19.64	19.64	12.20	102.20	102.20
3)	0.007	0.20	1.61	0.00	30.61	30.61	19.00	109.00	109.00
4)	0.011	0.31	1.61	0.00	36.38	36.38	22.54	112.54	112.54
5)	0.014	0.39	1.62	0.00	43.89	43.89	27.15	117.15	117.15
6)	0.018	0.50	1.62	0.00	51.98	51.98	32.09	122.09	122.09
7)	0.027	0.75	1.63	0.00	72.77	72.77	44.74	134.74	134.74
8)	0.036	1.00	1.63	0.00	93.56	93.56	57.28	147.28	147.28
9)	0.054	1.51	1.65	0.00	133.98	133.98	81.33	171.33	171.33
10)	0.072	2.01	1.66	0.00	172.10	172.10	103.57	193.57	193.57
11)	0.090	2.51	1.68	0.00	211.37	211.37	126.10	216.10	216.10
12)	0.107	2.99	1.69	0.00	243.71	243.71	144.19	234.19	234.19
13)	0.125	3.49	1.71	0.00	274.31	274.31	160.87	250.87	250.87
14)	0.143	3.99	1.72	0.00	302.61	302.61	175.89	265.89	265.89
15)	0.179	5.00	1.75	0.00	346.50	346.50	197.79	287.79	287.79
16)	0.215	6.00	1.78	0.00	375.38	375.38	210.36	300.36	300.36
17)	0.251	7.01	1.82	0.00	390.97	390.97	215.02	305.02	305.02
18)	0.287	8.01	1.85	0.00	398.48	398.48	214.99	304.99	304.99
19)	0.322	8.99	1.89	0.00	400.21	400.21	211.87	301.87	301.87
20)	0.345	9.63	1.91	0.00	399.63	399.63	208.90	298.90	298.90
21)	0.358	9.99	1.93	0.00	397.90	397.90	206.50	296.50	296.50
22)	0.430	12.00	2.01	0.00	383.46	383.46	191.01	281.01	281.01
23)	0.502	14.01	2.10	0.00	376.53	376.53	179.71	269.71	269.71
24)	0.573	15.99	2.19	0.00	371.91	371.91	169.85	259.85	259.85
25)	0.645	18.00	2.29	0.00	371.33	371.33	161.84	251.84	251.84
26)	0.717	20.01	2.41	0.00	375.38	375.38	155.78	245.78	245.78

Wed Mar 19 17:17:01 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689	Location : PICKLES BUTTE L/F- IDAHO	
Project No. : 941138NA	Test No. : GT4-90	
Boring No. : GT-4	Test Date : 03/12/97	Tested by : C. WASON
Sample No. : @90 PSI	Depth : 90-91 FEET	Checked by : C. CAPPS
Sample Type : TUBE	Elevation : NA	

Soil Description : LT. GRAYISH BROWN FINE SANDY SILTY CLAY

Remarks : TXUU TEST WITH CONFINING PRESSURE OF 90 PSI

Liquid Limit : 0

Plastic Limit : 0

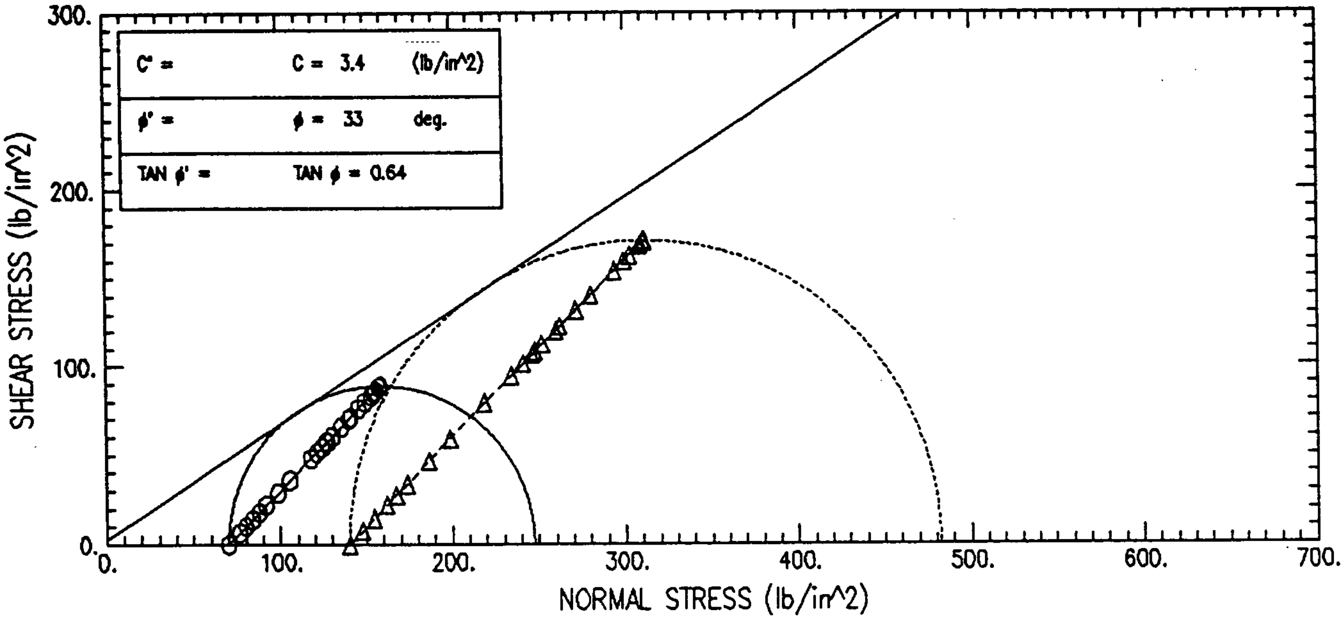
Specific Gravity : 2.72

	WATER CONTENT BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	166.00	166.00	0.00
WT CONTAINER + DRY SOIL (gm)	138.43	138.43	0.00
WT WATER (gm)	27.57	27.57	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	138.43	138.43	0.00
WATER CONTENT (%)	19.92	19.92	0.00

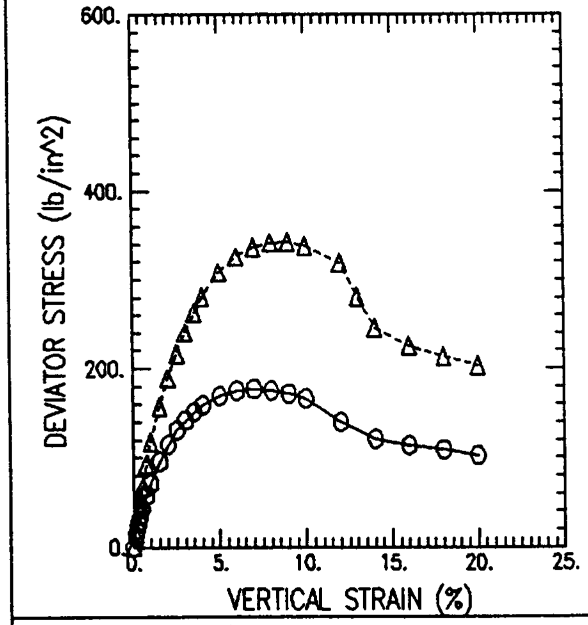
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	19.92	19.92
VOID RATIO	0.85	0.85
WET DENSITY (lb/ft^3)	109.90	109.90
DRY DENSITY (lb/ft^3)	91.65	91.65
DEGREE OF SATURATION (%)	63.58	63.58

Maximum Shear Stress = 107.51 (lb/in^2) at a Vertical Strain of 7.01 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



	SYMBOL	○	Δ		
	TEST NO.	GT5-70A	GT5-70B		
INITIAL	WATER CONTENT (%)	4.87	5.48		
	DRY DENSITY (lb/ft^3)	97.07	97.29		
	SATURATION (%)	17.69	20.03		
	VOID RATIO	0.748	0.744		
BEFORE SHEAR	WATER CONTENT (%)	4.87	5.48		
	DRY DENSITY (lb/ft^3)	97.07	97.29		
	SATURATION (%)	17.69	20.03		
	VOID RATIO	0.748	0.744		
	BACK PRESS. (lb/in^2)	0.00	0.00		
	MINOR PRIN. STRESS (lb/in^2)	70.00	140.00		
	MAX. DEV. STRESS (lb/in^2)	177.22	342.11		
	TIME TO FAILURE (min)				
	RATE OF STRAIN INCR (%/min)	0.00	0.00		
	INITIAL DIAMETER (in)	1.43	1.43		
	INITIAL HEIGHT (in)	3.74	3.50		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) BROWN SILTY SAND WITH CLAYSTONE & SANDSTONE FRAGS 2) BROWN SILTY SAND

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:

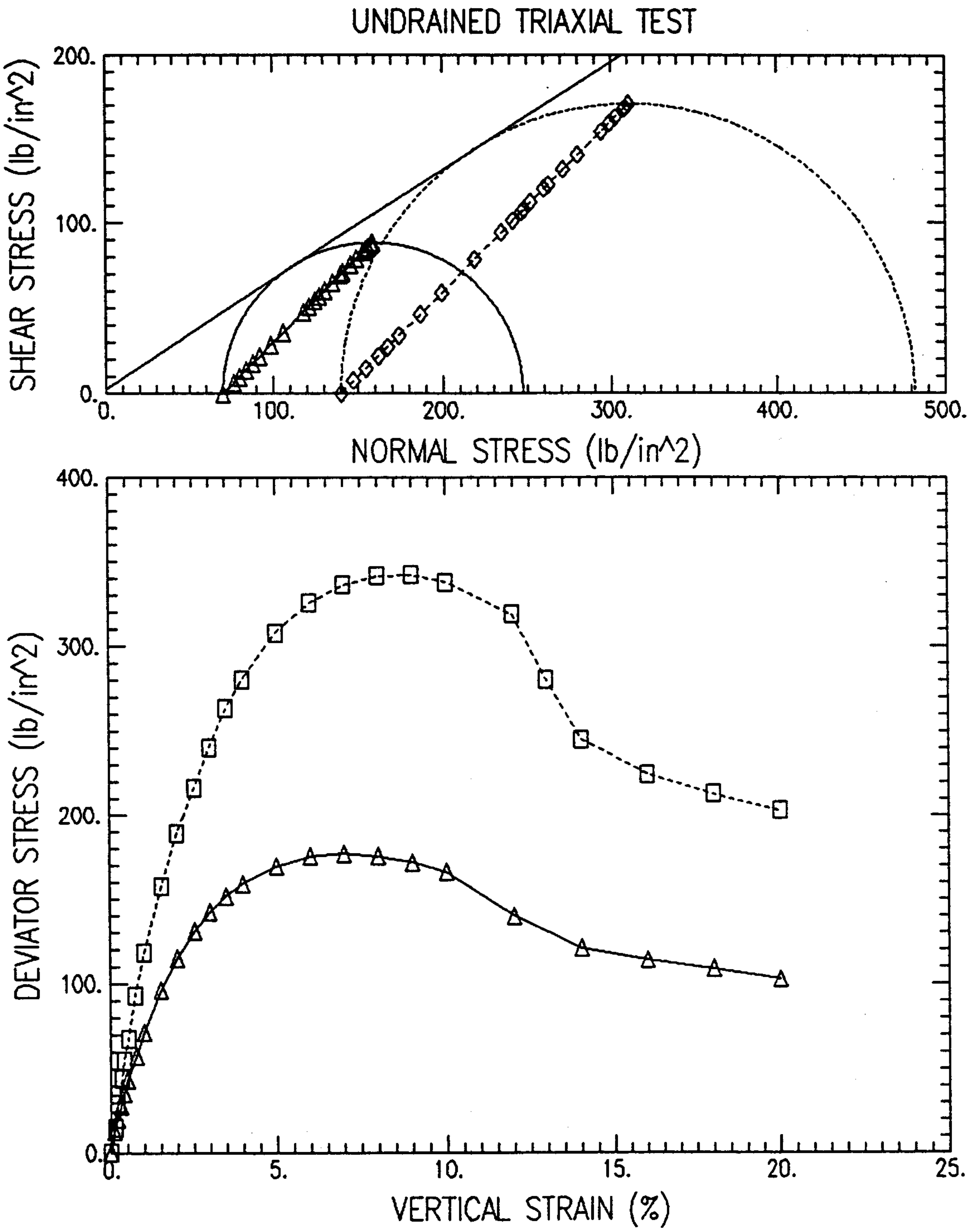
1) TXUU TEST WITH CONFINING PRESSURE OF 70 PSI

2) TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-5	SAMPLE NO.	A @70 PSI	B @140 PSI		
TECH. C. WASON	DEPTH/ELEV	70-71 FEET	70-71 FEET		
LABORATORY	DATE	03/12/97	03/12/97		

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-5	A @70 PSI	70-71 FEET	GT5-70A	GT5A-70.UU
GT-5	B @140 PSI	70-71 FEET	GT5-70B	GT5B-70.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 17:23:07 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT5-70A
Boring No. : GT-5
Test Date : 03/12/97
Tested by : C. WASON
Sample No. : A @70 PSI
Depth : 70-71 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : BROWN SILTY SAND WITH CLAYSTONE & SANDSTONE FRAGS
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 70 PSI

Height : 3.740 (in)
Area : 1.61 (in^2)
Volume : 6.01 (in^3)
Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)
Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : None

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	70.00	70.00
2)	0.004	0.11	1.61	0.00	20.79	20.79	12.95	82.95	82.95
3)	0.007	0.19	1.61	0.00	32.34	32.34	20.14	90.14	90.14
4)	0.011	0.29	1.61	0.00	45.05	45.05	28.05	98.05	98.05
5)	0.015	0.40	1.61	0.00	57.75	57.75	35.96	105.96	105.96
6)	0.019	0.51	1.61	0.00	70.46	70.46	43.87	113.87	113.87
7)	0.028	0.75	1.61	0.00	93.56	93.56	58.25	128.25	128.25
8)	0.037	0.99	1.61	0.00	116.66	116.66	72.64	142.64	142.64
9)	0.056	1.50	1.61	0.00	158.24	158.24	98.53	168.53	168.53
10)	0.075	2.01	1.61	0.00	190.58	190.58	118.66	188.66	188.66
11)	0.094	2.51	1.61	0.00	219.45	219.45	136.64	206.64	206.64
12)	0.112	2.99	1.61	0.00	240.24	240.24	149.59	219.59	219.59
13)	0.131	3.50	1.61	0.00	258.72	258.72	161.10	231.10	231.10
14)	0.150	4.01	1.61	0.00	273.74	273.74	170.45	240.45	240.45
15)	0.187	5.00	1.61	0.00	296.84	296.84	184.83	254.83	254.83
16)	0.224	5.99	1.61	0.00	313.01	313.01	194.90	264.90	264.90
17)	0.262	7.01	1.61	0.00	322.25	322.25	200.65	270.65	270.65
18)	0.299	7.99	1.61	0.00	325.13	325.13	202.45	272.45	272.45
19)	0.337	9.01	1.61	0.00	324.56	324.56	202.09	272.09	272.09
20)	0.374	10.00	1.61	0.00	320.51	320.51	199.57	269.57	269.57
21)	0.449	12.01	1.61	0.00	280.67	280.67	174.76	244.76	244.76
22)	0.524	14.01	1.61	0.00	252.95	252.95	157.50	227.50	227.50
23)	0.598	15.99	1.61	0.00	249.48	249.48	155.34	225.34	225.34
24)	0.673	17.99	1.61	0.00	249.48	249.48	155.34	225.34	225.34
25)	0.748	20.00	1.61	0.00	247.17	247.17	153.90	223.90	223.90

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT5-70A
Boring No. : GT-5
Test Date : 03/12/97
Tested by : C. WASON
Sample No. : A @70 PSI
Depth : 70-71 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : BROWN SILTY SAND WITH CLAYSTONE & SANDSTONE FRAGS
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 70 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	160.50	159.40	0.00
WT CONTAINER + DRY SOIL (gm)	153.05	152.00	0.00
WT WATER (gm)	7.45	7.40	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	153.05	152.00	0.00
WATER CONTENT (%)	4.87	4.87	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	4.87	4.87
VOID RATIO	0.75	0.75
WET DENSITY (lb/ft^3)	101.80	101.80
DRY DENSITY (lb/ft^3)	97.07	97.07
DEGREE OF SATURATION (%)	17.69	17.69

Maximum Shear Stress = 101.22 (lb/in^2) at a Vertical Strain of 7.99 %

Wed Mar 19 16:30:16 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-5
Sample No. : B @140 PSI
Sample Type : TUBE
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

Location : PICKLES BUTTE L/F- IDAHO
Test No. : GT5-70B
Test Date : 03/12/97
Depth : 70-71 FEET
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Height : 3.505 (in)
Area : 1.61 (in^2)
Volume : 5.63 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	140.00	140.00
2)	0.004	0.11	1.61	0.00	24.26	24.26	15.07	155.07	155.07
3)	0.007	0.20	1.61	0.00	47.36	47.36	29.39	169.39	169.39
4)	0.011	0.31	1.61	0.00	71.61	71.61	44.36	184.36	184.36
5)	0.014	0.40	1.62	0.00	88.94	88.94	55.01	195.01	195.01
6)	0.018	0.51	1.62	0.00	109.73	109.73	67.74	207.74	207.74
7)	0.026	0.74	1.63	0.00	151.31	151.31	93.05	233.05	233.05
8)	0.035	1.00	1.63	0.00	192.89	192.89	118.10	258.10	258.10
9)	0.053	1.51	1.65	0.00	259.88	259.88	157.74	297.74	297.74
10)	0.070	2.00	1.66	0.00	314.16	314.16	189.11	329.11	329.11
11)	0.088	2.51	1.68	0.00	362.67	362.67	216.37	356.37	356.37
12)	0.105	3.00	1.69	0.00	406.56	406.56	240.51	380.51	380.51
13)	0.123	3.51	1.71	0.00	449.30	449.30	263.40	403.40	403.40
14)	0.140	3.99	1.72	0.00	482.79	482.79	280.60	420.60	420.60
15)	0.175	4.99	1.75	0.00	539.39	539.39	307.91	447.91	447.91
16)	0.210	5.99	1.78	0.00	580.97	580.97	325.62	465.62	465.62
17)	0.245	6.99	1.82	0.00	611.00	611.00	336.12	476.12	476.12
18)	0.280	7.99	1.85	0.00	632.94	632.94	341.64	481.64	481.64
19)	0.315	8.99	1.89	0.00	646.22	646.22	342.11	482.11	482.11
20)	0.350	9.99	1.93	0.00	650.84	650.84	337.81	477.81	477.81
21)	0.420	11.98	2.01	0.00	639.87	639.87	318.85	458.85	458.85
22)	0.455	12.98	2.05	0.00	575.19	575.19	280.66	420.66	420.66
23)	0.491	14.01	2.10	0.00	513.98	513.98	245.31	385.31	385.31
24)	0.561	16.01	2.19	0.00	492.03	492.03	224.64	364.64	364.64
25)	0.631	18.00	2.29	0.00	488.57	488.57	212.93	352.93	352.93
26)	0.701	20.00	2.41	0.00	488.57	488.57	202.81	342.81	342.81

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-5
Sample No. : B @140 PSI
Sample Type : TUBE
Location : PICKLES BUTTE L/F- IDAHO
Test No. : GT5-70B
Test Date : 03/12/97
Depth : 70-71 FEET
Elevation : NA
Tested by : C. WASON
Checked by : C. CAPPS
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

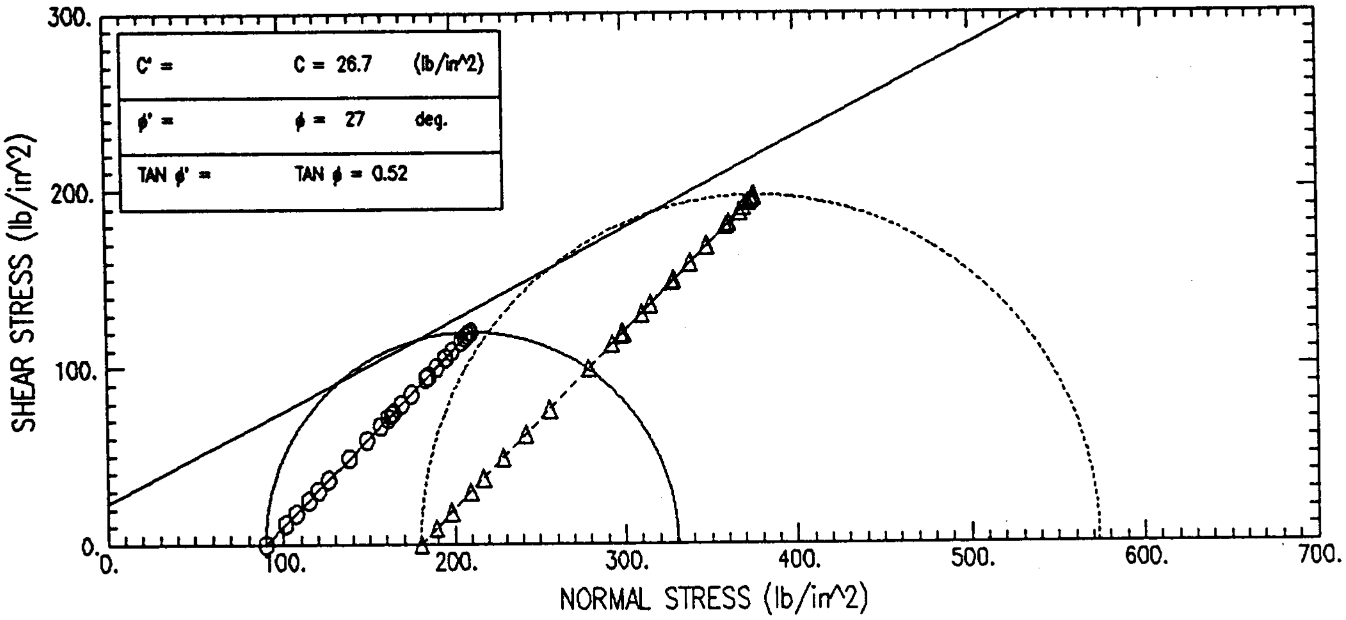
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	151.60	151.10	0.00
WT CONTAINER + DRY SOIL (gm)	143.72	143.25	0.00
WT WATER (gm)	7.88	7.85	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	143.72	143.25	0.00
WATER CONTENT (%)	5.48	5.48	0.00

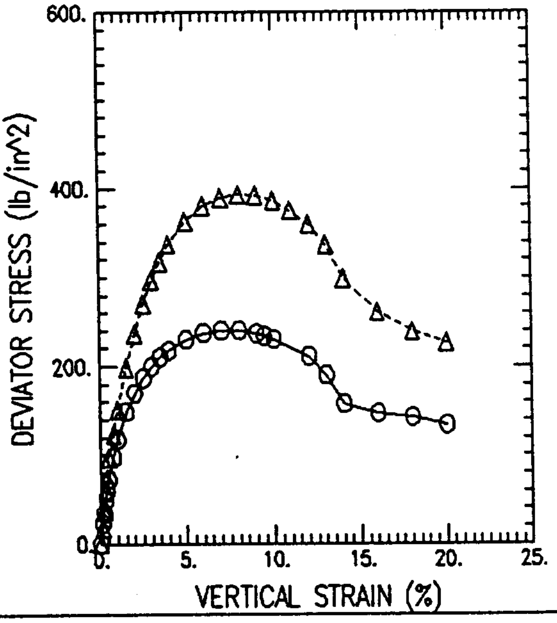
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	5.48	5.48
VOID RATIO	0.74	0.74
WET DENSITY (lb/ft^3)	102.63	102.63
DRY DENSITY (lb/ft^3)	97.29	97.29
DEGREE OF SATURATION (%)	20.03	20.03

Maximum Shear Stress = 171.05 (lb/in^2) at a Vertical Strain of 8.99 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



	SYMBOL	○	Δ		
	TEST NO.	GT5-90A	GT5-90B		
INITIAL	WATER CONTENT (%)	4.91	4.73		
	DRY DENSITY (lb/ft^3)	91.22	91.53		
	SATURATION (%)	15.66	15.19		
	VOID RATIO	0.847	0.841		
BEFORE SHEAR	WATER CONTENT (%)	4.91	4.73		
	DRY DENSITY (lb/ft^3)	91.22	91.53		
	SATURATION (%)	15.66	15.19		
	VOID RATIO	0.847	0.841		
	BACK PRESS. (lb/in^2)	0.00	0.00		
	MINOR PRIN. STRESS (lb/in^2)	90.00	180.00		
	MAX. DEV. STRESS (lb/in^2)	240.43	393.22		
	TIME TO FAILURE (min)				
	RATE OF STRAIN INCR (%/min)	0.00	0.00		
	INITIAL DIAMETER (in)	1.43	1.43		
	INITIAL HEIGHT (in)	3.58	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) BROWN SILTY SAND 2) BROWN SILTY SAND

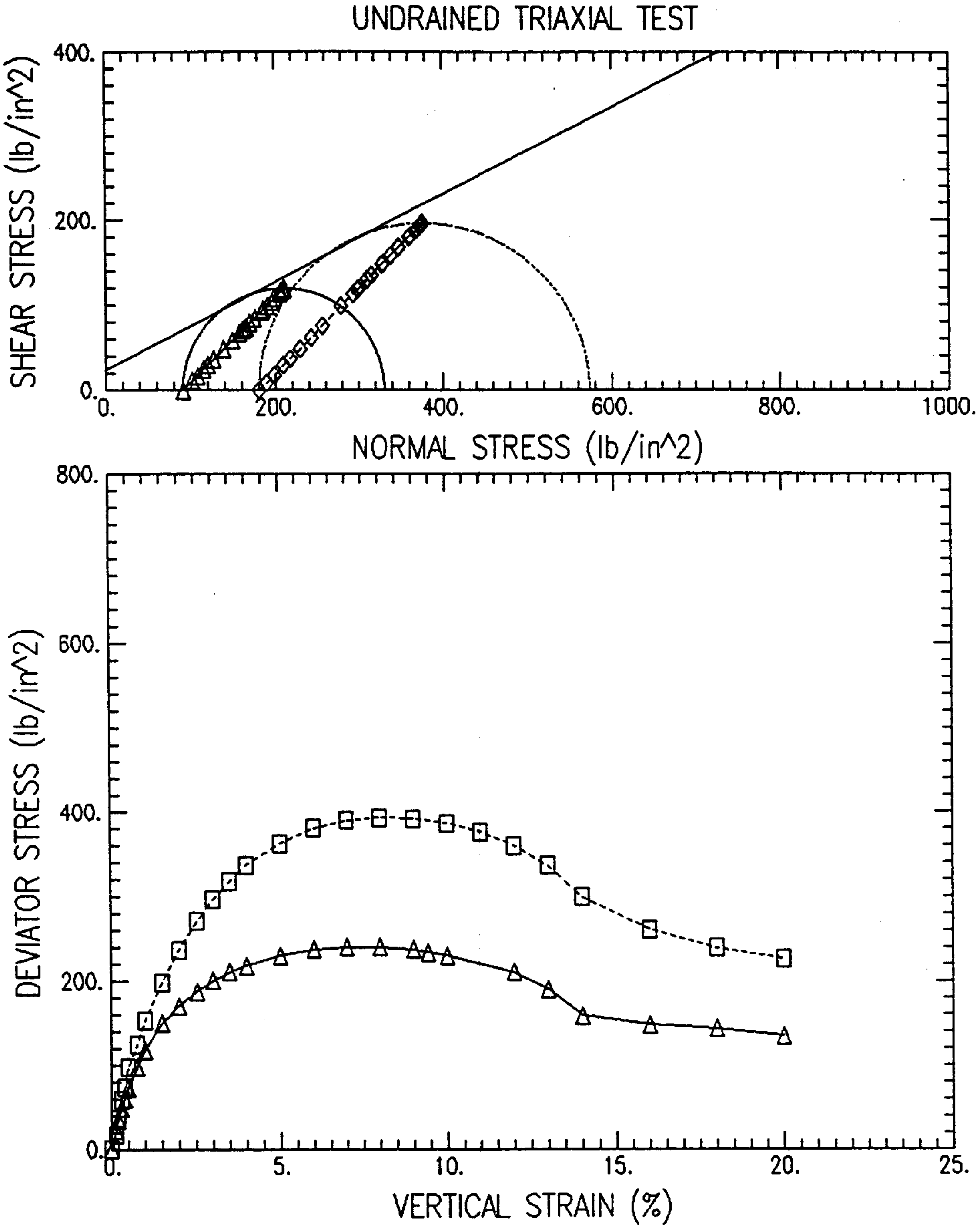
LL	PL	PI	GS 2.70	TYPE OF SPECIMEN TUBE		TYPE OF TEST UNDRAINED	

REMARKS:
1) TXUU TEST WITH CONFINING PRESSURE OF 90 PSI
2) TXUU TEST WITH CONFINING PRESSURE OF 180 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-5	SAMPLE NO.	A @90 PSI	B @180 PSI	
TECH. C. WASON	DEPTH/ELEV	90-91 FEET	90-91 FEET	
LABORATORY	DATE	03/13/97	03/13/97	

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-5	A @90 PSI	90-91 FEET	GT5-90A	GT5A-90.UU
GT-5	B @180 PSI	90-91 FEET	GT5-90B	GT5B-90.UU

Failure Criteria: Peak Deviator Stress

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-5
Sample No. : A @90 PSI
Sample Type : TUBE
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 90 PSI

Location : PICKLES BUTTE L/F- IDAHO
Test No. : GT5-90A
Test Date : 03/13/97
Depth : 90-91 FEET
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Height : 3.583 (in)
Area : 1.61 (in^2)
Volume : 5.75 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	90.00	90.00
2)	0.004	0.11	1.61	0.00	36.96	36.96	22.97	112.97	112.97
3)	0.007	0.20	1.61	0.00	56.60	56.60	35.12	125.12	125.12
4)	0.011	0.31	1.61	0.00	80.85	80.85	50.08	140.08	140.08
5)	0.014	0.39	1.62	0.00	98.18	98.18	60.73	150.73	150.73
6)	0.018	0.50	1.62	0.00	117.81	117.81	72.74	162.74	162.74
7)	0.027	0.75	1.63	0.00	158.24	158.24	97.29	187.29	187.29
8)	0.036	1.00	1.63	0.00	192.89	192.89	118.09	208.09	208.09
9)	0.054	1.51	1.65	0.00	246.02	246.02	149.34	239.34	239.34
10)	0.072	2.01	1.66	0.00	282.98	282.98	170.30	260.30	260.30
11)	0.090	2.51	1.68	0.00	314.16	314.16	187.43	277.43	277.43
12)	0.107	2.99	1.69	0.00	338.42	338.42	200.23	290.23	290.23
13)	0.125	3.49	1.71	0.00	359.21	359.21	210.66	300.66	300.66
14)	0.143	3.99	1.72	0.00	375.38	375.38	218.19	308.19	308.19
15)	0.179	5.00	1.75	0.00	403.10	403.10	230.09	320.09	320.09
16)	0.215	6.00	1.78	0.00	423.89	423.89	237.54	327.54	327.54
17)	0.251	7.01	1.82	0.00	437.17	437.17	240.43	330.43	330.43
18)	0.287	8.01	1.85	0.00	445.25	445.25	240.23	330.23	330.23
19)	0.322	8.99	1.89	0.00	448.14	448.14	237.25	327.25	327.25
20)	0.338	9.43	1.91	0.00	446.41	446.41	234.26	324.26	324.26
21)	0.358	9.99	1.93	0.00	443.52	443.52	230.18	320.18	320.18
22)	0.430	12.00	2.01	0.00	423.89	423.89	211.15	301.15	301.15
23)	0.466	13.01	2.05	0.00	390.39	390.39	190.39	280.39	280.39
24)	0.502	14.01	2.10	0.00	331.49	331.49	158.21	248.21	248.21
25)	0.573	15.99	2.19	0.00	322.25	322.25	147.17	237.17	237.17
26)	0.645	18.00	2.29	0.00	328.02	328.02	142.97	232.97	232.97
27)	0.717	20.01	2.41	0.00	323.40	323.40	134.21	224.21	224.21

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689 Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA Test No. : GT5-90A
Boring No. : GT-5 Test Date : 03/13/97 Tested by : C. WASON
Sample No. : A @90 PSI Depth : 90-91 FEET Checked by : C. CAPPS
Sample Type : TUBE Elevation : NA
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 90 PSI

Liquid Limit : 0 Plastic Limit : 0 Specific Gravity : 2.7

	WATER CONTENT BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	144.55	144.10	0.00
WT CONTAINER + DRY SOIL (gm)	137.78	137.35	0.00
WT WATER (gm)	6.77	6.75	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	137.78	137.35	0.00
WATER CONTENT (%)	4.91	4.91	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	4.91	4.91
VOID RATIO	0.85	0.85
WET DENSITY (lb/ft^3)	95.70	95.70
DRY DENSITY (lb/ft^3)	91.22	91.22
DEGREE OF SATURATION (%)	15.66	15.66

Maximum Shear Stress = 120.21 (lb/in^2) at a Vertical Strain of 7.01 %

Wed Mar 19 16:31:29 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT5-908
Boring No. : GT-5
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : B @180 PSI
Depth : 90-91 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 180 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	180.00	180.00
2)	0.004	0.11	1.61	0.00	28.88	28.88	17.95	197.95	197.95
3)	0.007	0.20	1.61	0.00	58.91	58.91	36.56	216.56	216.56
4)	0.011	0.31	1.61	0.00	95.87	95.87	59.39	239.39	239.39
5)	0.014	0.39	1.62	0.00	120.12	120.12	74.31	254.31	254.31
6)	0.018	0.50	1.62	0.00	158.24	158.24	97.70	277.70	277.70
7)	0.027	0.75	1.63	0.00	202.13	202.13	124.28	304.28	304.28
8)	0.036	1.00	1.63	0.00	248.33	248.33	152.03	332.03	332.03
9)	0.054	1.51	1.65	0.00	326.87	326.87	198.42	378.42	378.42
10)	0.072	2.01	1.66	0.00	393.86	393.86	237.03	417.03	417.03
11)	0.090	2.51	1.68	0.00	453.92	453.92	270.80	450.80	450.80
12)	0.107	2.99	1.69	0.00	501.27	501.27	296.59	476.59	476.59
13)	0.125	3.49	1.71	0.00	541.70	541.70	317.68	497.68	497.68
14)	0.143	3.99	1.72	0.00	579.81	579.81	337.01	517.01	517.01
15)	0.179	5.00	1.75	0.00	635.25	635.25	362.61	542.61	542.61
16)	0.215	6.00	1.78	0.00	679.14	679.14	380.59	560.59	560.59
17)	0.251	7.01	1.82	0.00	708.59	708.59	389.70	569.70	569.70
18)	0.287	8.01	1.85	0.00	728.81	728.81	393.22	573.22	573.22
19)	0.322	8.99	1.89	0.00	740.36	740.36	391.94	571.94	571.94
20)	0.358	9.99	1.93	0.00	743.82	743.82	386.02	566.02	566.02
21)	0.394	11.00	1.97	0.00	738.05	738.05	375.33	555.33	555.33
22)	0.430	12.00	2.01	0.00	721.88	721.88	359.58	539.58	539.58
23)	0.466	13.01	2.05	0.00	689.54	689.54	336.28	516.28	516.28
24)	0.502	14.01	2.10	0.00	626.01	626.01	298.77	478.77	478.77
25)	0.573	15.99	2.19	0.00	571.73	571.73	261.11	441.11	441.11
26)	0.645	18.00	2.29	0.00	548.63	548.63	239.12	419.12	419.12
27)	0.717	20.01	2.41	0.00	545.16	545.16	226.24	406.24	406.24

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT5-90B
Boring No. : GT-5
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : B @180 PSI
Depth : 90-91 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : BROWN SILTY SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 180 PSI

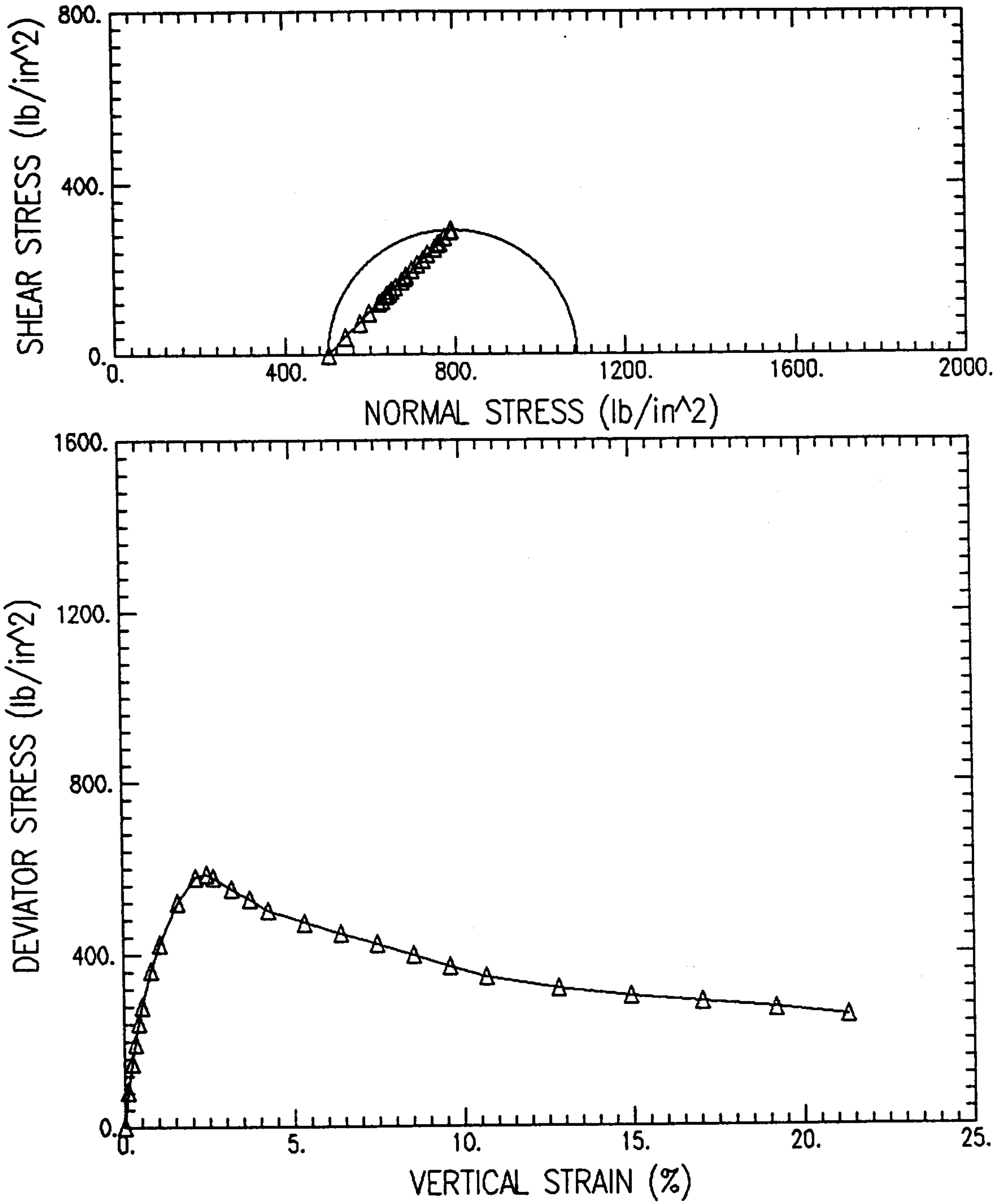
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.7

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	144.80	144.32	0.00
WT CONTAINER + DRY SOIL (gm)	138.26	137.80	0.00
WT WATER (gm)	6.54	6.52	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	138.26	137.80	0.00
WATER CONTENT (%)	4.73	4.73	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	4.73	4.73
VOID RATIO	0.84	0.84
WET DENSITY (lb/ft^3)	95.86	95.86
DRY DENSITY (lb/ft^3)	91.53	91.53
DEGREE OF SATURATION (%)	15.19	15.19

Maximum Shear Stress = 196.61 (lb/in^2) at a Vertical Strain of 8.01 %

UNDRAINED TRIAXIAL TEST



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
PB-2	1 @500 PSI	522-524 FT	PB2-522	PB2-522.UU

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : PB2-522
Boring No. : PB-2
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : 1 @500 PSI
Depth : 522-524 FT
Checked by : C. CAPPS
Sample Type : PLASTIC TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAYSTONE -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 500 PSI

Height : 5.079 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.89 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 19.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.89	0.00	0.00	0.00	0.00	500.00	500.00
2)	0.005	0.10	3.89	0.00	328.02	328.02	84.23	584.23	584.23
3)	0.011	0.22	3.90	0.00	581.49	581.49	149.02	649.02	649.02
4)	0.016	0.32	3.91	0.00	767.87	767.87	196.46	696.46	696.46
5)	0.022	0.43	3.92	0.00	954.24	954.24	243.66	743.66	743.66
6)	0.027	0.53	3.92	0.00	1103.34	1103.34	281.27	781.27	781.27
7)	0.040	0.79	3.94	0.00	1431.36	1431.36	363.32	863.32	863.32
8)	0.054	1.06	3.96	0.00	1684.83	1684.83	425.66	925.66	925.66
9)	0.081	1.59	3.99	0.00	2079.95	2079.95	520.75	1020.75	1020.75
10)	0.108	2.13	4.03	0.00	2340.87	2340.87	580.74	1080.74	1080.74
11)	0.125	2.46	4.05	0.00	2378.15	2378.15	586.57	1086.57	1086.57
12)	0.135	2.66	4.07	0.00	2355.78	2355.78	579.07	1079.07	1079.07
13)	0.162	3.19	4.11	0.00	2266.32	2266.32	551.91	1051.91	1051.91
14)	0.189	3.72	4.15	0.00	2191.77	2191.77	528.76	1028.76	1028.76
15)	0.217	4.27	4.19	0.00	2102.31	2102.31	502.21	1002.21	1002.21
16)	0.271	5.34	4.27	0.00	2020.31	2020.31	473.42	973.42	973.42
17)	0.325	6.40	4.35	0.00	1953.21	1953.21	448.79	948.79	948.79
18)	0.379	7.46	4.44	0.00	1886.12	1886.12	424.78	924.78	924.78
19)	0.433	8.53	4.53	0.00	1804.11	1804.11	398.09	898.09	898.09
20)	0.487	9.59	4.63	0.00	1714.65	1714.65	370.53	870.53	870.53
21)	0.541	10.65	4.73	0.00	1640.10	1640.10	346.95	846.95	846.95
22)	0.650	12.80	4.94	0.00	1580.46	1580.46	319.79	819.79	819.79
23)	0.758	14.92	5.18	0.00	1558.10	1558.10	301.06	801.06	801.06
24)	0.866	17.05	5.43	0.00	1565.55	1565.55	288.23	788.23	788.23
25)	0.974	19.18	5.71	0.00	1565.55	1565.55	273.96	773.96	773.96
26)	1.083	21.32	6.03	0.00	1543.19	1543.19	255.85	755.85	755.85

Wed Mar 19 16:32:14 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : PB2-522
Boring No. : PB-2
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : 1 @500 PSI
Depth : 522-524 FT
Checked by : C. CAPPS
Sample Type : PLASTIC TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAYSTONE -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 500 PSI

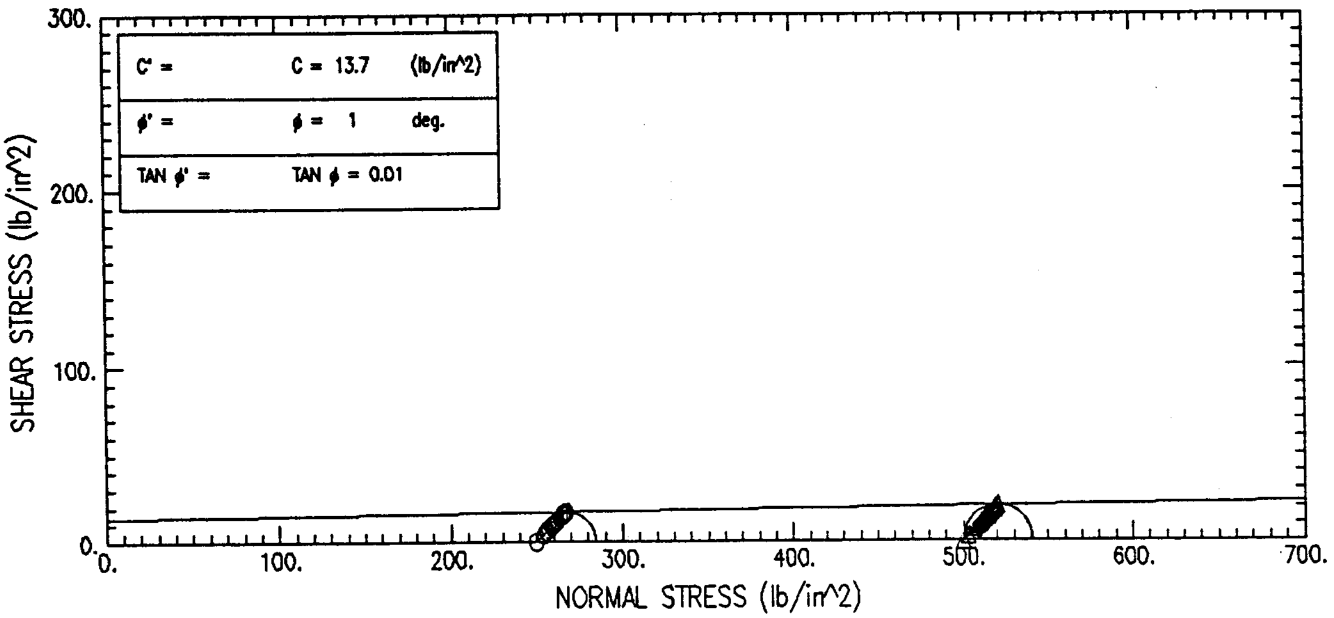
Liquid Limit : 58.63
Plastic Limit : 23.68
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	544.40	544.40	0.00
WT CONTAINER + DRY SOIL (gm)	508.52	508.52	0.00
WT WATER (gm)	35.88	35.88	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	508.52	508.52	0.00
WATER CONTENT (%)	7.06	7.06	0.00

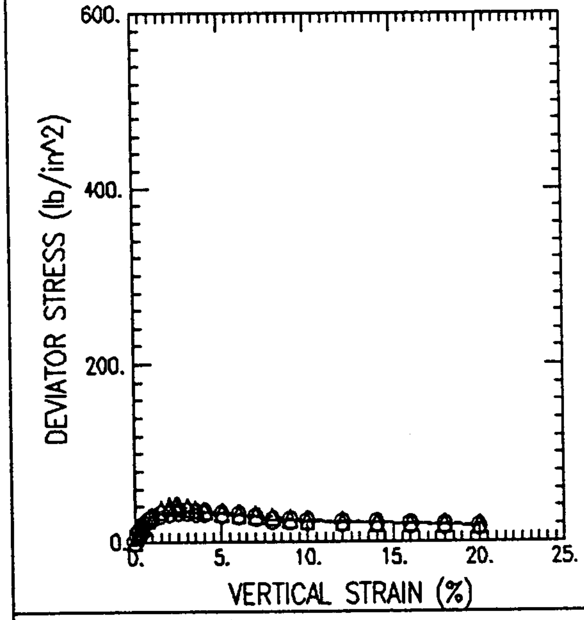
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	7.06	7.06
VOID RATIO	0.73	0.73
WET DENSITY (lb/ft^3)	105.03	105.03
DRY DENSITY (lb/ft^3)	98.10	98.10
DEGREE OF SATURATION (%)	26.29	26.29

Maximum Shear Stress = 293.29 (lb/in^2) at a Vertical Strain of 2.46 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress

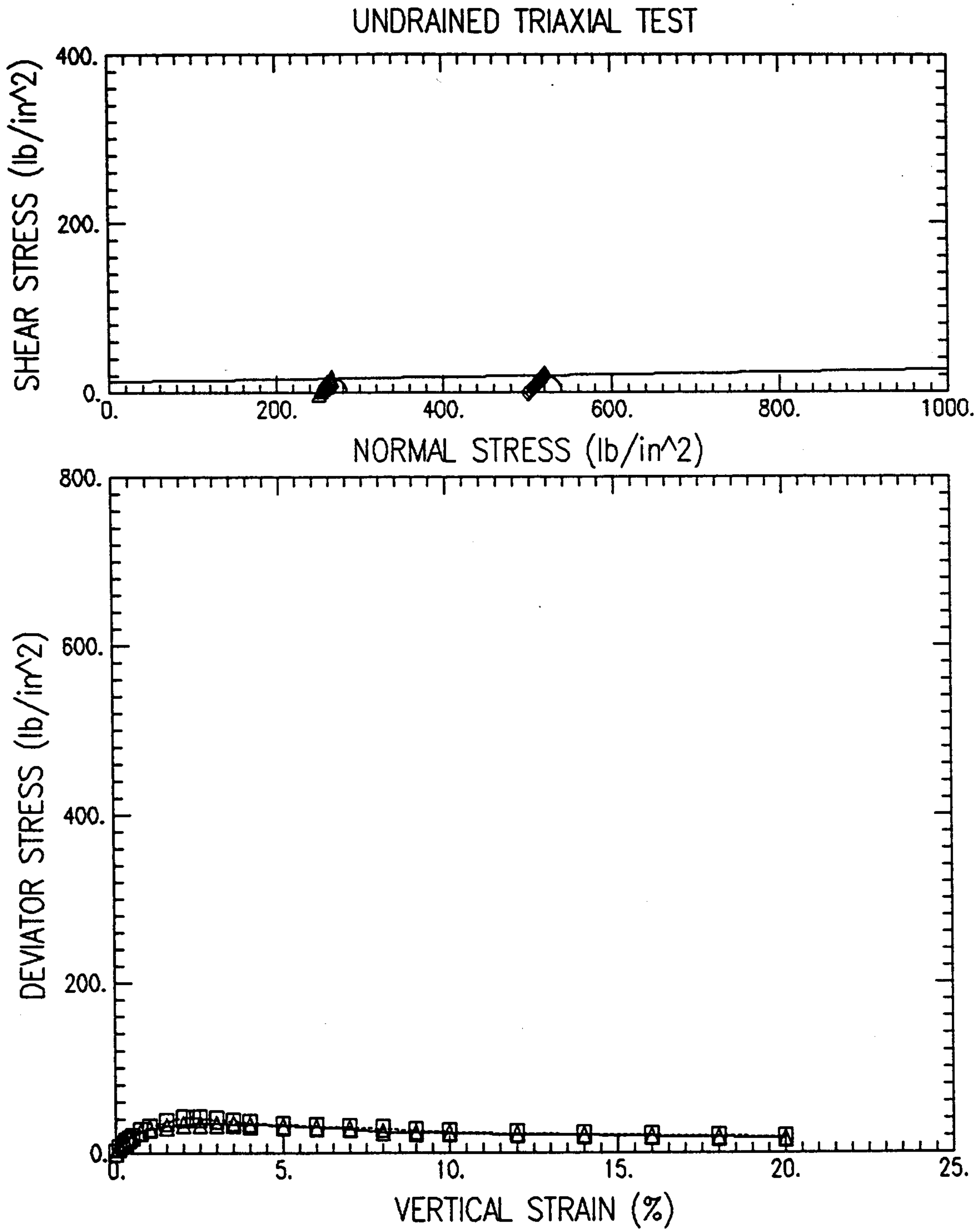


	SYMBOL	○	Δ		
	TEST NO.	PB2-536A	PB2-536B		
INITIAL	WATER CONTENT (%)	31.29	31.87		
	DRY DENSITY (lb/ft^3)	85.34	84.61		
	SATURATION (%)	86.07	86.18		
	VOID RATIO	0.989	1.006		
BEFORE SHEAR	WATER CONTENT (%)	31.29	31.87		
	DRY DENSITY (lb/ft^3)	85.34	84.61		
	SATURATION (%)	86.07	86.18		
	VOID RATIO	0.989	1.006		
	BACK PRESS. (lb/in^2)	0.00	0.00		
	MINOR PRIN. STRESS (lb/in^2)	250.00	500.00		
	MAX. DEV. STRESS (lb/in^2)	34.33	40.84		
	TIME TO FAILURE (min)				
	RATE OF STRAIN INCR (%/min)	0.00	0.00		
	INITIAL DIAMETER (in)	2.35	2.35		
	INITIAL HEIGHT (in)	5.39	5.41		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. GRAYISH BROWN SILTY CLAY -CH- 2) LT. GRAYISH BROWN SILTY CLAY -CH-

LL 58.06	PL 25.27	PI 32.79	GS 2.72	TYPE OF SPECIMEN PLASTIC TUBE		TYPE OF TEST UNDRAINED	
REMARKS:				PROJECT C. E. L. P.O. #3689			
1) TXUU TEST WITH CONFINING PRESSURE OF 250 PSI							
2) TXUU TEST WITH CONFINING PRESSURE OF 500 PSI				BORING NO. PB-2	SAMPLE NO.	A @250 PSI	B @500 PSI
				TECH. C. WASON	DEPTH/ELEV	536-538 FT	536-538 FT
				LABORATORY	DATE	03/17/97	03/17/97
				TRIAXIAL COMPRESSION TEST REPORT			



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
PB-2	A @250 PSI	536-538 FT	PB2-536A	PB2A-536.UU
PB-2	B @500 PSI	536-538 FT	PB2-536B	PB2B-536.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:34:02 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : PB2-536A
Boring No. : PB-2
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : A @250 PSI
Depth : 536-538 FT
Checked by : C. CAPPS
Sample Type : PLASTIC TUBE
Elevation : NA
Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 250 PSI

Height : 5.394 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 4.33 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 23.36 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	4.33	0.00	0.00	0.00	0.00	250.00	250.00
2)	0.005	0.09	4.34	0.00	33.50	33.50	7.72	257.72	257.72
3)	0.011	0.20	4.34	0.00	50.82	50.82	11.70	261.70	261.70
4)	0.016	0.30	4.35	0.00	62.37	62.37	14.33	264.33	264.33
5)	0.022	0.41	4.36	0.00	76.23	76.23	17.49	267.49	267.49
6)	0.027	0.50	4.37	0.00	85.47	85.47	19.57	269.57	269.57
7)	0.040	0.74	4.38	0.00	106.26	106.26	24.24	274.24	274.24
8)	0.054	1.00	4.40	0.00	123.01	123.01	27.93	277.93	277.93
9)	0.081	1.50	4.44	0.00	138.60	138.60	31.21	281.21	281.21
10)	0.108	2.00	4.48	0.00	148.42	148.42	33.13	283.13	283.13
11)	0.135	2.50	4.52	0.00	154.19	154.19	34.12	284.12	284.12
12)	0.162	3.00	4.56	0.00	156.50	156.50	34.33	284.33	284.33
13)	0.189	3.50	4.60	0.00	153.62	153.62	33.41	283.41	283.41
14)	0.216	4.00	4.64	0.00	153.04	153.04	32.98	282.98	282.98
15)	0.270	5.01	4.72	0.00	149.57	149.57	31.66	281.66	281.66
16)	0.324	6.01	4.81	0.00	144.95	144.95	30.12	280.12	280.12
17)	0.378	7.01	4.90	0.00	136.87	136.87	27.92	277.92	277.92
18)	0.431	7.99	5.00	0.00	121.85	121.85	24.39	274.39	274.39
19)	0.485	8.99	5.09	0.00	120.70	120.70	23.70	273.70	273.70
20)	0.539	9.99	5.20	0.00	118.39	118.39	22.79	272.79	272.79
21)	0.647	11.99	5.41	0.00	115.50	115.50	21.34	271.34	271.34
22)	0.755	14.00	5.65	0.00	116.66	116.66	20.66	270.66	270.66
23)	0.863	16.00	5.90	0.00	113.77	113.77	19.27	269.27	269.27
24)	0.971	18.00	6.19	0.00	111.46	111.46	18.02	268.02	268.02
25)	1.079	20.00	6.50	0.00	109.73	109.73	16.89	266.89	266.89

Wed Mar 19 16:34:02 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : PB2-536A
Boring No. : PB-2
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : A @250 PSI
Depth : 536-538 FT
Checked by : C. CAPPS
Sample Type : PLASTIC TUBE
Elevation : NA
Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 250 PSI

Liquid Limit : 58.06
Plastic Limit : 25.27
Specific Gravity : 2.72

	WATER CONTENT BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	686.90	524.96	0.00
WT CONTAINER + DRY SOIL (gm)	523.19	399.86	0.00
WT WATER (gm)	163.71	125.10	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	523.19	399.86	0.00
WATER CONTENT (%)	31.29	31.29	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	31.29	31.29
VOID RATIO	0.99	0.99
WET DENSITY (lb/ft^3)	112.04	112.04
DRY DENSITY (lb/ft^3)	85.34	85.34
DEGREE OF SATURATION (%)	86.07	86.07

Maximum Shear Stress = 17.17 (lb/in^2) at a Vertical Strain of 3.00 %

Wed Mar 19 16:34:33 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : PB-2
Sample No. : B @500 PSI
Sample Type : PLASTIC TUBE
Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 500 PSI

Location : PICKLES BUTTE L/F- IDAHO
Test No. : PB2-536B
Test Date : 03/17/97
Depth : 536-538 FT
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Height : 5.413 (in)
Area : 4.34 (in^2)
Volume : 23.48 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	4.34	0.00	0.00	0.00	0.00	500.00	500.00
2)	0.005	0.09	4.34	0.00	25.41	25.41	5.85	505.85	505.85
3)	0.011	0.20	4.35	0.00	45.05	45.05	10.35	510.35	510.35
4)	0.016	0.30	4.36	0.00	59.48	59.48	13.65	513.65	513.65
5)	0.022	0.41	4.37	0.00	73.92	73.92	16.93	516.93	516.93
6)	0.027	0.50	4.37	0.00	85.47	85.47	19.54	519.54	519.54
7)	0.040	0.74	4.39	0.00	110.88	110.88	25.25	525.25	525.25
8)	0.054	1.00	4.41	0.00	130.52	130.52	29.59	529.59	529.59
9)	0.081	1.50	4.45	0.00	161.12	161.12	36.22	536.22	536.22
10)	0.108	2.00	4.49	0.00	181.34	181.34	40.42	540.42	540.42
11)	0.125	2.31	4.51	0.00	184.22	184.22	40.84	540.84	540.84
12)	0.135	2.49	4.53	0.00	182.49	182.49	40.33	540.33	540.33
13)	0.162	2.99	4.56	0.00	175.56	175.56	38.46	538.46	538.46
14)	0.189	3.49	4.60	0.00	169.79	169.79	36.87	536.87	536.87
15)	0.217	4.01	4.65	0.00	162.86	162.86	35.04	535.04	535.04
16)	0.271	5.01	4.73	0.00	156.50	156.50	33.07	533.07	533.07
17)	0.325	6.00	4.82	0.00	151.31	151.31	31.40	531.40	531.40
18)	0.379	7.00	4.91	0.00	146.11	146.11	29.76	529.76	529.76
19)	0.433	8.00	5.00	0.00	139.76	139.76	27.93	527.93	527.93
20)	0.487	9.00	5.10	0.00	132.83	132.83	26.03	526.03	526.03
21)	0.541	9.99	5.20	0.00	127.05	127.05	24.41	524.41	524.41
22)	0.650	12.01	5.42	0.00	122.43	122.43	22.58	522.58	522.58
23)	0.758	14.00	5.66	0.00	120.70	120.70	21.33	521.33	521.33
24)	0.866	16.00	5.91	0.00	121.28	121.28	20.51	520.51	520.51
25)	0.974	17.99	6.19	0.00	121.28	121.28	19.58	519.58	519.58
26)	1.083	20.01	6.51	0.00	119.54	119.54	18.37	518.37	518.37

Wed Mar 19 16:34:33 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689	Location : PICKLES BUTTE L/F- IDAHO	
Project No. : 941138NA	Test No. : PB2-536B	
Boring No. : PB-2	Test Date : 03/17/97	Tested by : C. WASON
Sample No. : B @500 PSI	Depth : 536-538 FT	Checked by : C. CAPPS
Sample Type : PLASTIC TUBE	Elevation : NA	

Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 500 PSI

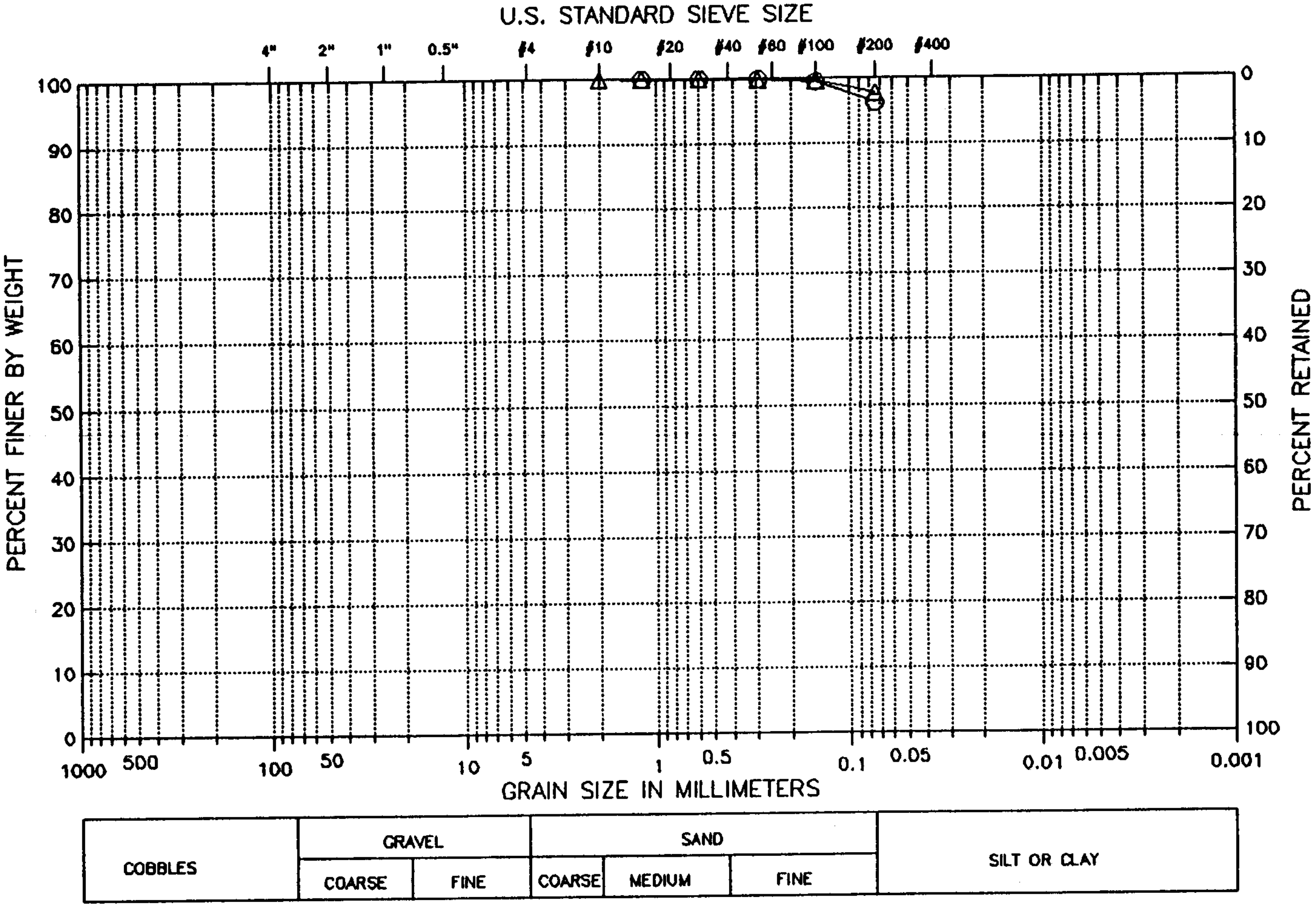
Liquid Limit : 58.06 Plastic Limit : 25.27 Specific Gravity : 2.72

		WATER CONTENT	
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	687.60	510.80	0.00
WT CONTAINER + DRY SOIL (gm)	521.42	387.34	0.00
WT WATER (gm)	166.18	123.46	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	521.42	387.34	0.00
WATER CONTENT (%)	31.87	31.87	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	31.87	31.87
VOID RATIO	1.01	1.01
WET DENSITY (lb/ft^3)	111.58	111.58
DRY DENSITY (lb/ft^3)	84.61	84.61
DEGREE OF SATURATION (%)	86.18	86.18

Maximum Shear Stress = 20.42 (lb/in^2) at a Vertical Strain of 2.31 %

Project : CONSOLIDATED ENGINEERING LABORATORY
Project No.: 941138NA
Location: PICKLES BUTTE LANDFILL, IDAHO
Date : Wed Mar 19 1997

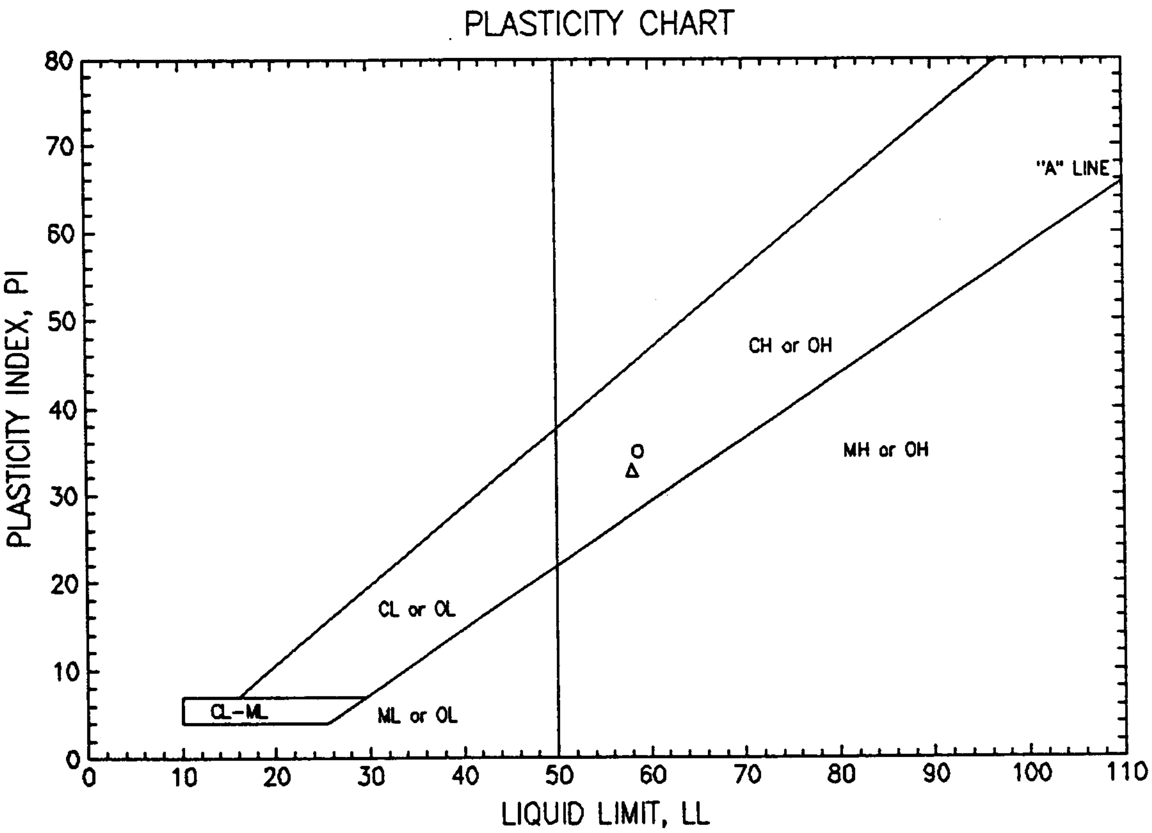


Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description	
-○-	PB-2	522-524	522-524 FEET	PB2-522	CH	fat clay
-△-	PB-2	536-538	536-538 FEET	PB2-536	CH	fat clay

Figure 1

Woodward-Clyde

Project : CONSOLIDATED ENGINEERING LABORATORY
Project No. : 941138NA
Location : PICKLES BUTTE LANDFILL, IDAHO
Date : Wed Mar 19 1997

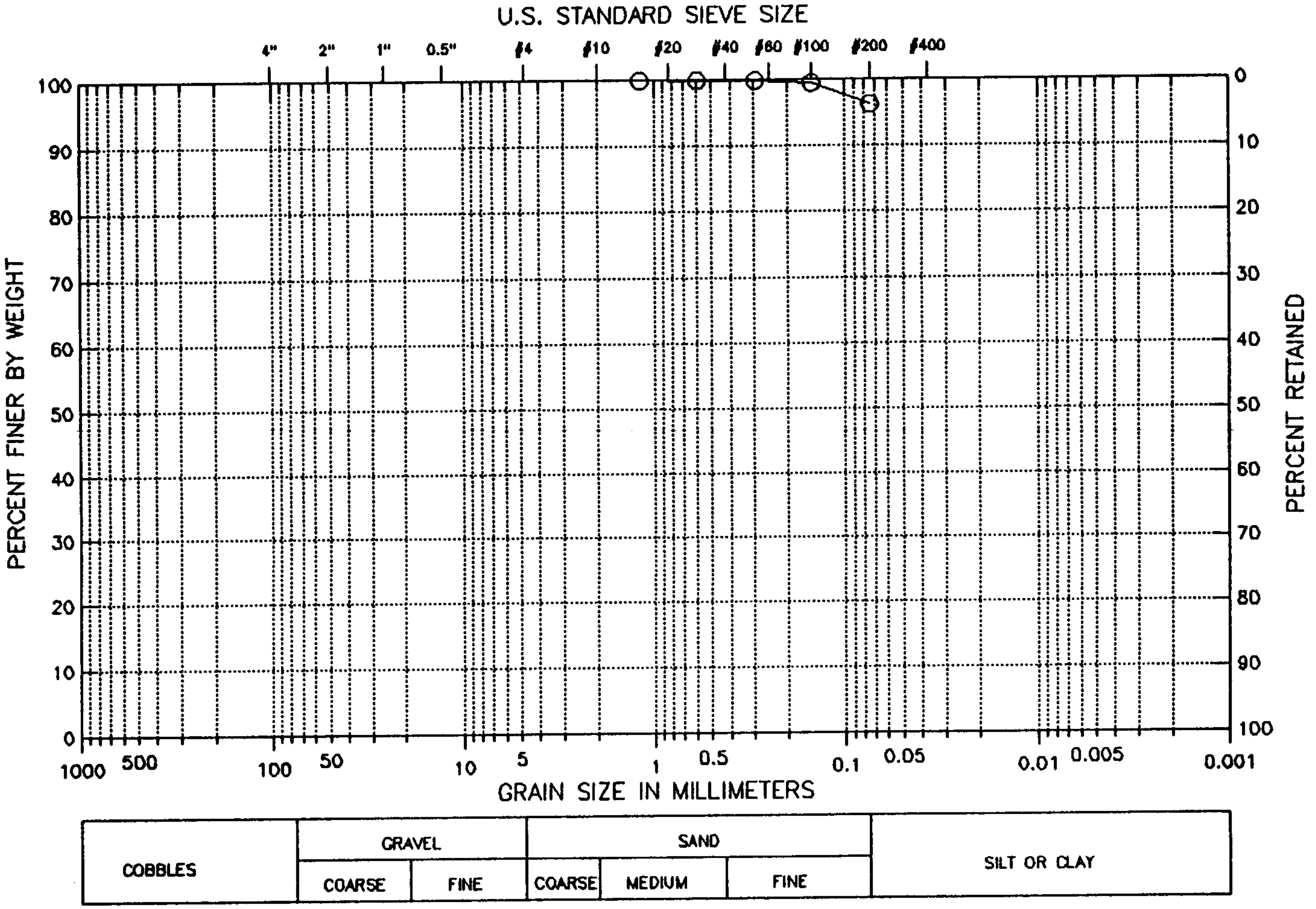


Symbol	Boring No.	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
○	PB-2	522-524	58.63	23.68	34.95
Δ	PB-2	536-538	58.06	25.27	32.79

Figure 1

Boring No. : PB-2
Sample No.: 522-524
Tested by : C. WASON
Filename : PB2-522

Project : CONSOLIDATED ENGINEERING LABORATORY
Project No.: 941138NA
Location: PICKLES BUTTE LANDFILL, IDAHO
Date : Wed Mar 19 1997



Classification :
(CH) fat clay
Visual Description :
LT. BROWN SILTY CLAY -CH-

Remarks :
P.O. # 3689

Figure 1

```
Wed Mar 19 14:47:45 1997                                                    Page :  1

                              GEOTECHNICAL LABORATORY TEST DATA

Project : CONSOLIDATED ENGINEERING LABORATORY                        Filename : PB2-522
Project No. : 941138NA            Depth : 522-524 FEET               Elevation : NA
Boring No. : PB-2                 Test Date : 03/18/97               Tested by : C. WASON
Sample No. : 522-524              Test Method : ASTM D422/4318       Checked by : C. CAPPS
Location : PICKLES BUTTE LANDFILL, IDAHO
Soil Description : LT. BROWN SILTY CLAY -CH-
Remarks : P.O. # 3689

                              COARSE SIEVE SET
Sieve         Sieve Openings         Weight        Cumulative          Percent
Mesh          Inches  Millimeters    Retained      Weight Retained     Finer
                                     (gm)          (gm)                (%)
----------    ------  -----------    ---------     ---------------     -------
#16            0.047      1.19          0.00                 0.00         100
#30            0.023      0.60          0.11                 0.11         100
#50            0.012      0.30          0.35                 0.46         100
#100           0.006      0.15          1.82                 2.28         100
#200           0.003      0.07         16.51                18.79          96
     Total Dry Weight of Sample = 508.52

 D85 : N/A
 D60 : N/A
 D50 : N/A
 D30 : N/A
 D15 : N/A
 D10 : N/A

 Soil Classification
        ASTM Group Symbol   : CH
        ASTM Group Name     : fat clay
        AASHTO Group Symbol : A-7-6(42)
        AASHTO Group Name   : Clayey Soils
```

ATTERBERG LIMITS

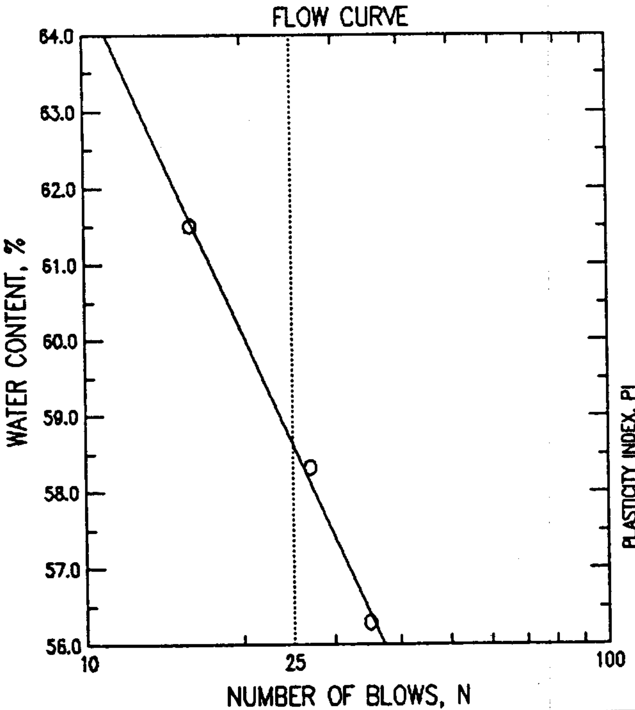
PROJECT CONSOLIDATED ENGINEERING LABORATORY	PROJECT NUMBER 941138NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL, IDAHO		CHECKED BY C. CAPPS	SAMPLE NUMBER 522-524
SAMPLE DESCRIPTION LT. BROWN SILTY CLAY -CH-		DATE Wed Mar 19 1997	FILENAME PB2-522

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	44	88	91		
WT. WET SOIL + TARE	26.73	27.73	27.09		
WT. DRY SOIL + TARE	21	21.63	21		
WT. WATER	5.73	6.1	6.09		
TARE WT.	10.82	11.17	11.1		
WT. DRY SOIL	10.18	10.46	9.9		
WATER CONTENT, W_N (%)	56.29	58.32	61.52		
NUMBER OF BLOWS, N	35	27	16		
ONE-POINT LIQUID LIMIT, LL	58.63	58.86	58.28		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	26				
WT. WET SOIL + TARE	26.69				
WT. DRY SOIL + TARE	24.53				
WT. WATER	2.16				
TARE WT.	15.41				
WT. DRY SOIL	9.12				
WATER CONTENT (%)	23.68				



SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	7.1
LIQUID LIMIT, LL	58.6
PLASTIC LIMIT, PL	23.7
PLASTICITY INDEX, PI	35.0
LIQUIDITY INDEX, LI*	-0.48

*LI = (W - PL)/PI

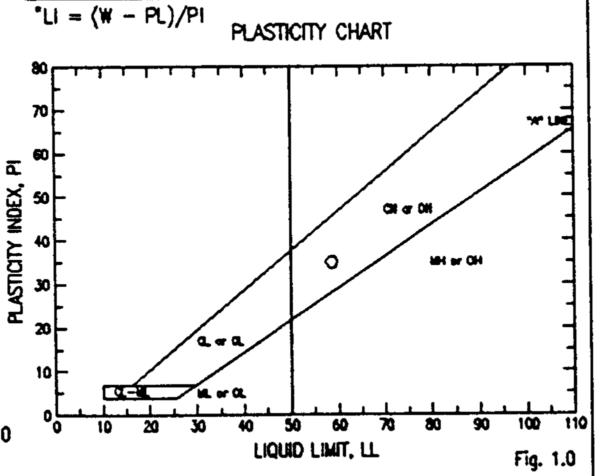


Fig. 1.0

Wed Mar 19 14:47:45 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : CONSOLIDATED ENGINEERING LABORATORY		Filename : PB2-522
Project No. : 941138NA	Depth : 522-524 FEET	Elevation : NA
Boring No. : PB-2	Test Date : 03/18/97	Tested by : C. WASON
Sample No. : 522-524	Test Method : ASTM D422/4318	Checked by : C. CAPPS

Location : PICKLES BUTTE LANDFILL, IDAHO
Soil Description : LT. BROWN SILTY CLAY -CH-
Remarks : P.O. # 3689

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) PB2-522	218.68	763.08	727.20	7.06

Average Moisture Content = 7.06

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 26	15.41	26.69	24.53	23.68

Plastic Limit = 23.68

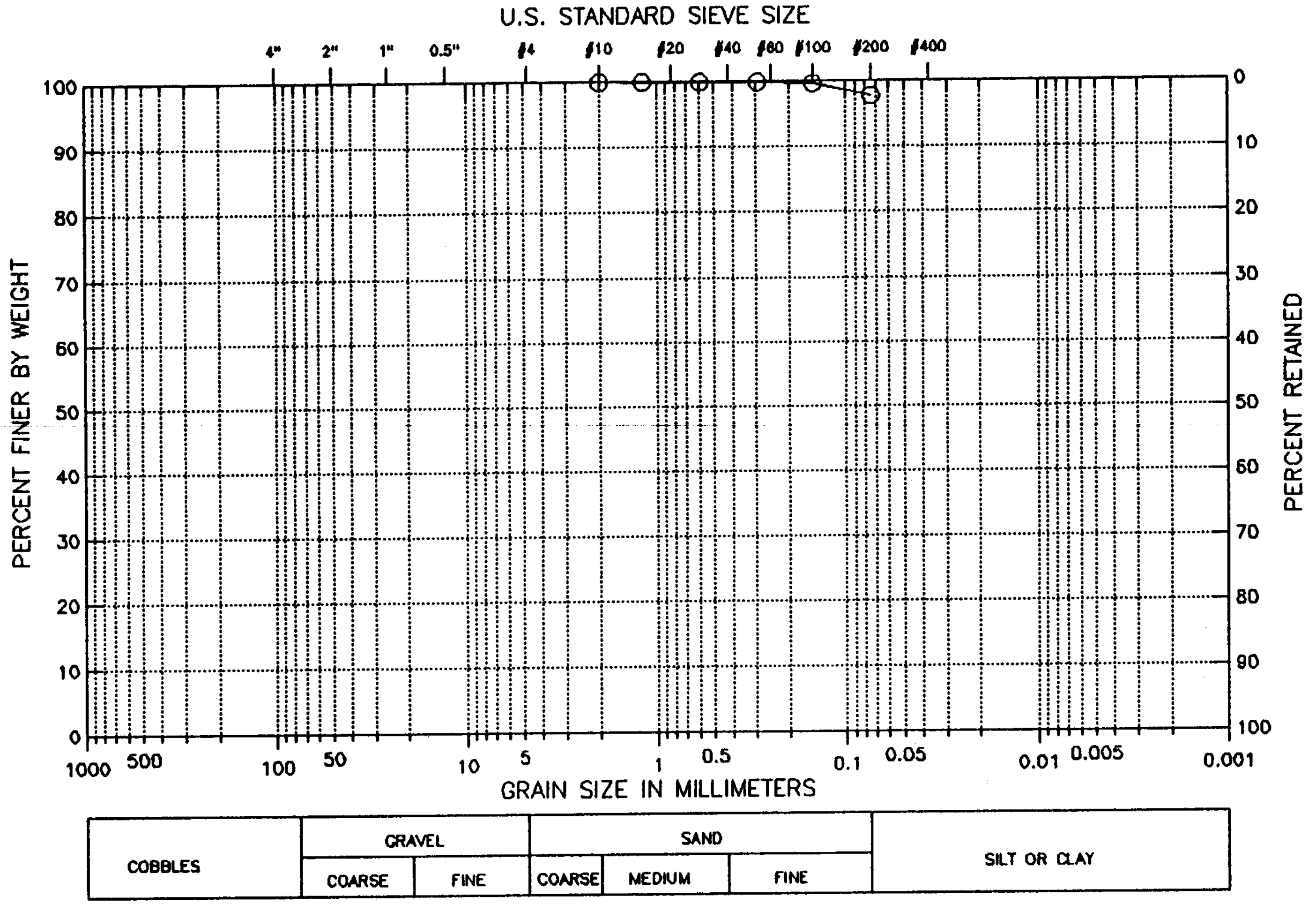
Liquid Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) 44	10.82	26.73	21.00	35	56.29
2) 88	11.17	27.73	21.63	27	58.32
3) 91	11.10	27.09	21.00	16	61.52

Liquid Limit = 58.63
Plastic Index = 34.95

Boring No. : PB-2
Sample No.: 536-538
Tested by : C. WASON
Filename : PB2-536

Project : CONSOLIDATED ENGINEERING LABORATORY
Project No.: 941138NA
Location: PICKLES BUTTE LANDFILL, IDAHO
Date : Wed Mar 19 1997



Classification :
(CH) fat clay
Visual Description :
LT. GRAYISH BROWN SILTY CLAY -CH-

Remarks :
P.O. # 3689

Figure 2

Wed Mar 19 14:47:51 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : CONSOLIDATED ENGINEERING LABORATORY
Filename : PB2-536
Project No. : 941138NA
Depth : 536-538 FEET
Elevation : NA
Boring No. : PB-2
Test Date : 03/18/97
Tested by : C. WASON
Sample No. : 536-538
Test Method : ASTM D422/4318
Checked by : C. CAPPS
Location : PICKLES BUTTE LANDFILL, IDAHO
Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : P.O. # 3689

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#10	0.079	2.00	0.00	0.00	100
#16	0.047	1.19	0.09	0.09	100
#30	0.023	0.60	0.07	0.16	100
#50	0.012	0.30	0.20	0.36	100
#100	0.006	0.15	1.03	1.39	100
#200	0.003	0.07	7.44	8.83	98

Total Dry Weight of Sample = 399.86

D85 : N/A
D60 : N/A
D50 : N/A
D30 : N/A
D15 : N/A
D10 : N/A

Soil Classification

ASTM Group Symbol : CH
ASTM Group Name : fat clay
AASHTO Group Symbol : A-7-6(41)
AASHTO Group Name : Clayey Soils

GEOTECHNICAL LABORATORY TEST DATA

Project : CONSOLIDATED ENGINEERING LABORATORY
Project No. : 941138NA
Boring No. : PB-2
Sample No. : 536-538
Location : PICKLES BUTTE LANDFILL, IDAHO
Soil Description : LT. GRAYISH BROWN SILTY CLAY -CH-
Remarks : P.O. # 3689

Depth : 536-538 FEET
Test Date : 03/18/97
Test Method : ASTM D422/4318

Filename : PB2-536
Elevation : NA
Tested by : C. WASON
Checked by : C. CAPPS

Natural Moisture Content

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) PB2-536	225.24	750.20	625.10	31.29

Average Moisture Content = 31.29

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 48	16.01	27.46	25.15	25.27

Plastic Limit = 25.27

Liquid Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) 18	10.70	26.54	20.80	31	56.83
2) 14	10.83	25.96	20.41	25	57.93
3) 8	11.12	26.94	21.00	18	60.12

Liquid Limit = 58.06
Plastic Index = 32.79

ATTERBERG LIMITS

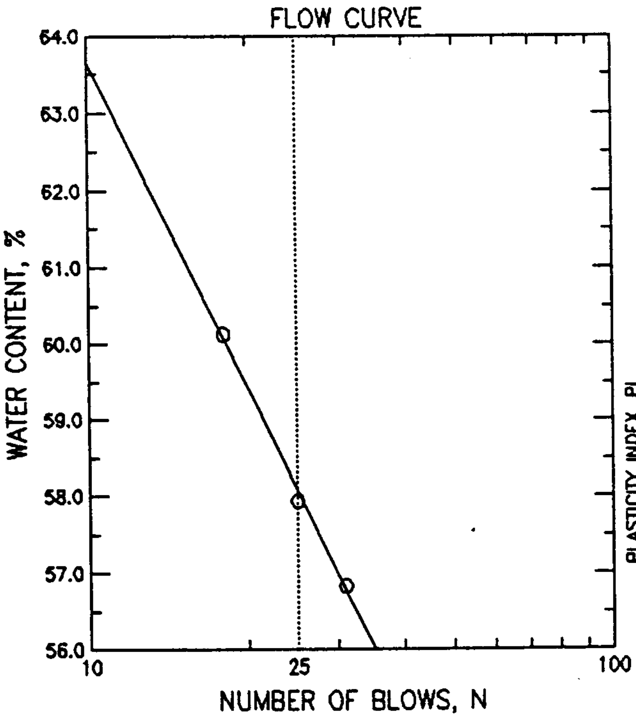
PROJECT CONSOLIDATED ENGINEERING LABORATORY	PROJECT NUMBER 941138NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL, IDAHO		CHECKED BY C. CAPPS	SAMPLE NUMBER 536-538
SAMPLE DESCRIPTION LT. GRAYISH BROWN SILTY CLAY -CH-		DATE Wed Mar 19 1997	FILENAME PB2-536

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	18	14	8		
WT. WET SOIL + TARE	26.54	25.96	26.94		
WT. DRY SOIL + TARE	20.8	20.41	21		
WT. WATER	5.74	5.55	5.94		
TARE WT.	10.7	10.83	11.12		
WT. DRY SOIL	10.1	9.58	9.88		
WATER CONTENT, W_N (%)	56.83	57.93	60.12		
NUMBER OF BLOWS, N	31	25	18		
ONE-POINT LIQUID LIMIT, LL	58.33	57.93	57.78		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	48				
WT. WET SOIL + TARE	27.46				
WT. DRY SOIL + TARE	25.15				
WT. WATER	2.31				
TARE WT.	16.01				
WT. DRY SOIL	9.14				
WATER CONTENT (%)	25.27				



SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	31.3
LIQUID LIMIT, LL	58.1
PLASTIC LIMIT, PL	25.3
PLASTICITY INDEX, PI	32.8
LIQUIDITY INDEX, LI*	0.18

*LI = (W - PL)/PI

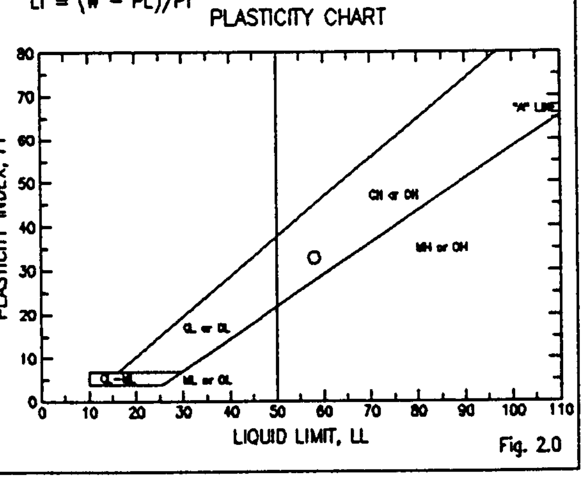


Fig. 2.0

ASTM D2937

WATER CONTENT(%), WET AND DRY UNIT WEIGHT(PCF)

Project Name C.E.L P.O. 3689 Project Number 941138NA Date 03/06/97

Tested By C. WASON Reduced By C. WASON Checked By S. CAPPS

Location PICKLES BUTTE LANDFILL Page 1 of 1

Specimen Number	Diam. Inch	Height CM.	Wet Wt. Grams	Dry Wt. Grams	Visual Description	Water Content	Wet Unit Weight	Dry Unit Weight
GT-4 15-17 mid	2.86	15.2	927.7	877.2	lt. brown clayey fine sandy silt/ clayey silty sand	5.76	91.9	86.9
GT-4 15-17 bottom	2.86	15.2	845.9	783.7	lt. brown clayey fine sandy silt/ clayey silty sand	7.94	83.8	77.6
GT-4 70-71 B	1.43	9.0	140.7	133.81	lt. orange brown fine sandy silt/ silty sand	5.15	94.1	89.5
GT-4 90-91 B	1.43	9.0	168.7	145.81	lt. grayish brown clayey silty sand to sandy silt	15.70	112.9	97.6
GT-5 65-67	1.43	14.45	222.92	212.0	lt. grayish brown silty sand	5.15	92.9	88.4
GT-5 80-81	1.43	13.0	204.32	191.52	grayish brown silty sand	6.68	94.7	88.7
GT-5 100-101	1.43	13.55	190.32	172.79	lt. grayish brown silty sand	10.15	84.6	76.8

Woodward-Clyde

Project: Pickles Butte Landfill Slope Stability Study
Owner: Canyon County
Project #: 030496
RE: Soils Lab test data summary

Boring #:	Depth	c	ϕ	Water Content		Dry Unit Weight		Wet Unit Weight		Avg Wet Unit Weight Calculated	Visual Description
				Top	Bottom	Top	Bottom	Top	Bottom		
GT-1	10-12 ft	706	20	11.7	9.95	100.69	103.33	112.47	113.61	113.04	Brown silty sand to sandy silt with traces of clay & mica
	100-101 ft	9936	2	25.81	27.16	98.51	92.98	123.94	118.23	121.08	Lt. brown silty clay to clayey silt
	140-141 ft	6566	3	27.96	26.96	94.66	95.91	121.13	121.77	121.45	Grayish brown clayey silt to silty clay
	160-161 ft	3370	8	27.22	26.58	96.39	96.51	122.63	122.16	122.39	Grayish brown clayey silt to silty clay
	180-181 ft	7114	10	26.5	24.43	90.24	88.17	114.15	109.71	111.93	Lt. yellowish brown silty clay to clayey silt
	200-201 ft	7762	1	27.12	27.09	95.73	94.66	121.69	120.30	121.00	Lt. brown clayey silty to silty clay
GT-4	15-17 ft	One test		5.76	7.94	86.9	77.6	91.91	83.76	87.83	Lt. brown clayey fine sandy silt/clayey silty sand
	30-31 ft	1339	37	6.23	5.85	82.52	84.57	87.66	89.52	88.59	Lt. orange brown fine sandy silt/silty fine sand
	40-41 ft	One test									
	70-71 ft	One test		5.15		89.5		94.11		94.11	Lt. orange brown fine sandy silt/silty sand
	90-91 ft	One test		15.7		97.6		112.92		112.92	Lt. grayish brown clayey silty sand to sandy silt
GT-5	65-67 ft			5.15		88.4		92.95		92.95	Lt. grayish brown silty sand
	70-71 ft	490	33	4.87	5.48	97.07	97.29	101.80	102.62	102.21	Brown silty sand
	80-81 ft			6.68		88.7		94.63		94.63	Grayish brown silty sand
	90-91 ft	3845	27	4.91	4.73	91.22	91.53	95.70	95.86	95.78	Brown silty sand
	100-101 ft	No test		10.15		76.8		84.60		84.60	Lt. grayish brown silty sand
PB-2	429-430 ft	17928	9	22.98	23.31	93.27	93.1	114.70	114.80	114.75	Grayish brown silty clay/clayey silt
	456-457 ft	29765	2	21.88	22.92	93.08	92.53	113.45	113.74	113.59	Lt. grayish brown silty clay/clayey silt
	458-460 ft	29491	1	22.5	22.66	93.27	89.19	114.26	109.40	111.83	Lt. grayish brown silty clay/clayey silt
	474-475 ft	16128	7	24.79	25.22	91.46	90.11	114.13	112.84	113.48	Grayish brown sitly clay/clayey silt
	522-524 ft	One test									
	530-531 ft	24336	4	21.24	20.21	93.63	95.26	113.52	114.51	114.01	Brown silty clay/clayey silt
	536-538 ft	1973	1	31.29	31.87	85.34	84.61	112.04	111.58	111.81	Lt. grayish brown silty clay

CONSOLIDATED ENGINEERING
LABORATORIES

June 30, 1997

Holladay Engineering Co.
P.O. Box 235
Payette, ID 83661
Bill Stroud

RE: Pickles Butte Landfill
15500 Missouri
Caldwell, ID
CEL #11364
LAB #27735

SOIL ANALYSIS REPORT

On 01/24/97, a Holladay Engineering representative in Payette, ID prepared various soil samples for analysis from the above project.

The samples were transported to Consolidated Engineering Laboratories in Pleasanton for testing as requested. Please refer to the attached data sheets for results.

REVIEWED BY: LORENZO K. LAWSON, LABORATORY MANAGER

REVIEWING ENGINEER: JAMES M. POWERS, R.C.E.

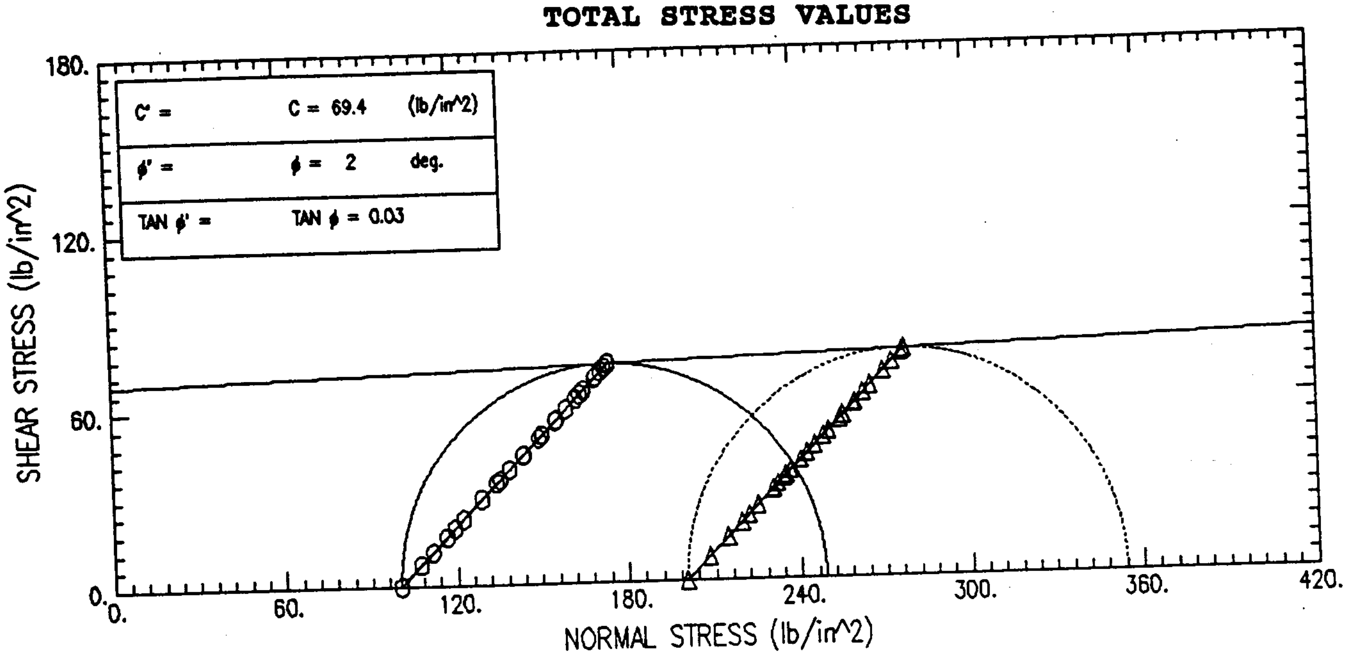
cc: Holladay Engineering Co.

Enclosures

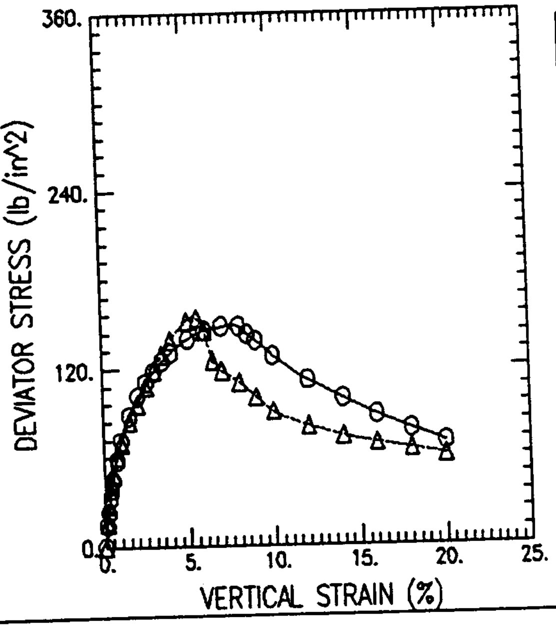
JAMES M. POWERS
No. C41046
Exp. 5-31-99

RECEIVED
JUL 14 1997
HOLLADAY ENGIN[illegible] CO.
PAYETTE, ID

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



	SYMBOL	○	△		
	TEST NO.	GT1-100A	GT1-100B		
INITIAL	WATER CONTENT (%)	25.81	27.16		
	DRY DENSITY (lb/ft^3)	98.51	92.98		
	SATURATION (%)	97.10	89.52		
	VOID RATIO	0.723	0.825		
BEFORE SHEAR	WATER CONTENT (%)	25.81	27.16		
	DRY DENSITY (lb/ft^3)	98.51	92.98		
	SATURATION (%)	97.10	89.52		
	VOID RATIO	0.723	0.825		
	BACK PRESS. (lb/in^2)	0.00	0.00		
	MINOR PRIN. STRESS (lb/in^2)	100.00	200.00		
	MAX. DEV. STRESS (lb/in^2)	148.31	153.94		
	TIME TO FAILURE (min)				
	RATE OF STRAIN INCR (%/min)	0.00	0.00		
	INITIAL DIAMETER (in)	1.43	1.43		
	INITIAL HEIGHT (in)	3.58	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. BROWN SILTY CLAY TO CLAYEY SILT 2) LT. BROWN SILTY CLAY TO CLAYEY SILT

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:

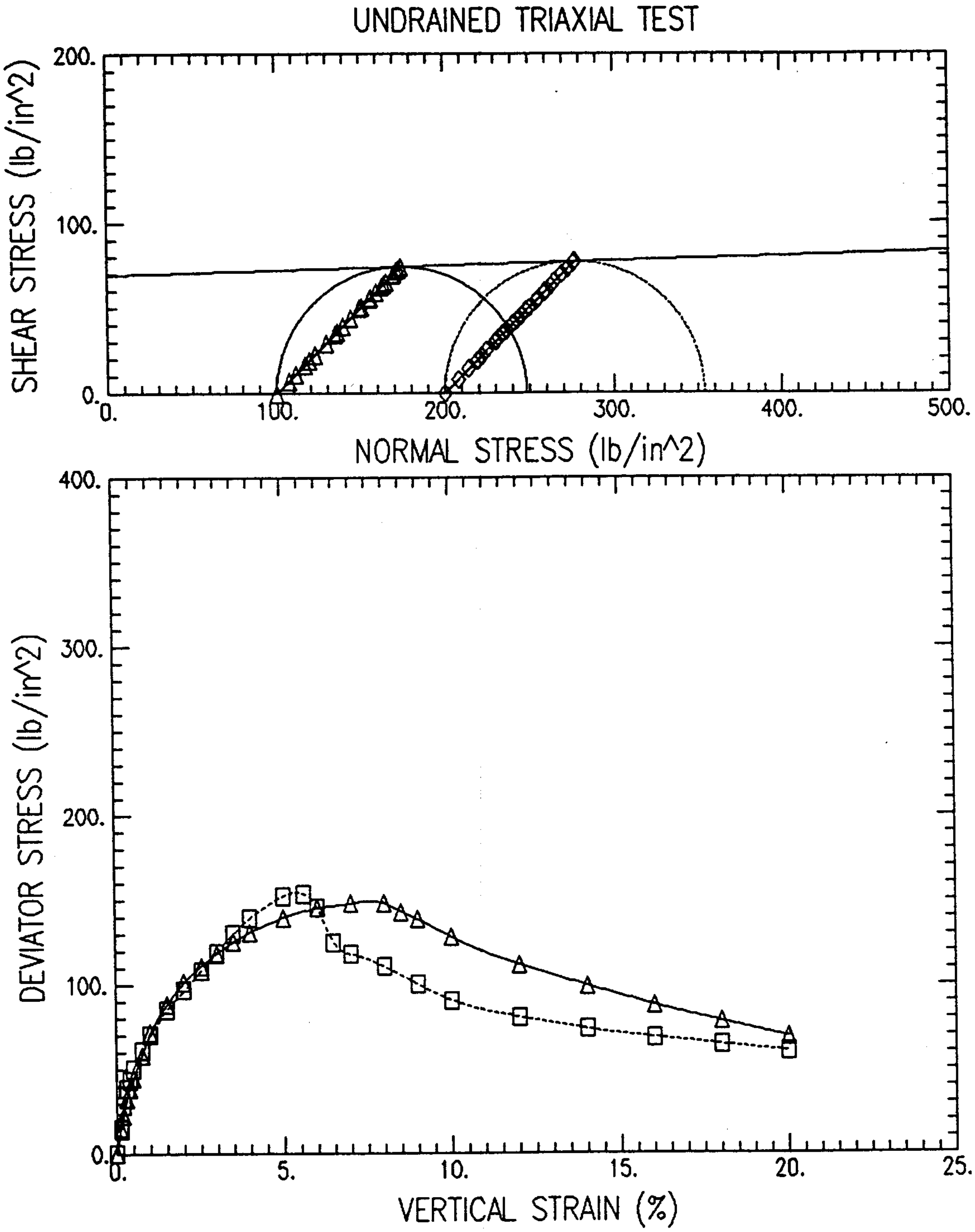
1) TXUU TEST WITH CONFINING PRESSURE OF 100 PSI

2) TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-1	SAMPLE NO.	A @100 PSI	B @200 PSI		
TECH. C. WASON	DEPTH/ELEV	100-101 FT	100-101 FT		
LABORATORY	DATE	03/13/97	03/13/97		

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	A @100 PSI	100-101 FT	GT1-100A	GT1A-100.UU
GT-1	B @200 PSI	100-101 FT	GT1-100B	GT1B-100.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 15:58:56 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-100A
Boring No. : GT-1
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : A @100 PSI
Depth : 100-101 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 100 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	100.00	100.00
2)	0.004	0.11	1.61	0.00	23.10	23.10	14.36	114.36	114.36
3)	0.007	0.20	1.61	0.00	36.96	36.96	22.94	122.94	122.94
4)	0.011	0.31	1.61	0.00	53.13	53.13	32.91	132.91	132.91
5)	0.014	0.39	1.62	0.00	62.37	62.37	38.58	138.58	138.58
6)	0.018	0.50	1.62	0.00	72.77	72.77	44.93	144.93	144.93
7)	0.027	0.75	1.63	0.00	94.71	94.71	58.23	158.23	158.23
8)	0.036	1.00	1.63	0.00	116.66	116.66	71.42	171.42	171.42
9)	0.054	1.51	1.65	0.00	145.53	145.53	88.34	188.34	188.34
10)	0.072	2.01	1.66	0.00	168.63	168.63	101.48	201.48	201.48
11)	0.090	2.51	1.68	0.00	185.96	185.96	110.94	210.94	210.94
12)	0.107	2.99	1.69	0.00	200.39	200.39	118.57	218.57	218.57
13)	0.125	3.49	1.71	0.00	213.68	213.68	125.31	225.31	225.31
14)	0.143	3.99	1.72	0.00	225.23	225.23	130.91	230.91	230.91
15)	0.179	5.00	1.75	0.00	244.86	244.86	139.77	239.77	239.77
16)	0.215	6.00	1.78	0.00	259.88	259.88	145.63	245.63	245.63
17)	0.251	7.01	1.82	0.00	269.12	269.12	148.00	248.00	248.00
18)	0.287	8.01	1.85	0.00	274.89	274.89	148.31	248.31	248.31
19)	0.305	8.51	1.87	0.00	267.96	267.96	143.18	243.18	243.18
20)	0.322	8.99	1.89	0.00	262.19	262.19	138.80	238.80	238.80
21)	0.358	9.99	1.93	0.00	247.17	247.17	128.27	228.27	228.27
22)	0.430	12.00	2.01	0.00	224.07	224.07	111.61	211.61	211.61
23)	0.502	14.01	2.10	0.00	207.90	207.90	99.22	199.22	199.22
24)	0.573	15.99	2.19	0.00	192.31	192.31	87.83	187.83	187.83
25)	0.645	18.00	2.29	0.00	179.03	179.03	78.03	178.03	178.03
26)	0.717	20.01	2.41	0.00	166.32	166.32	69.02	169.02	169.02

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-100A
Boring No. : GT-1
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : A @100 PSI
Depth : 100-101 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 100 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	187.20	186.47	0.00
WT CONTAINER + DRY SOIL (gm)	148.80	148.21	0.00
WT WATER (gm)	38.40	38.26	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	148.80	148.21	0.00
WATER CONTENT (%)	25.81	25.81	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	25.81	25.81
VOID RATIO	0.72	0.72
WET DENSITY (lb/ft^3)	123.93	123.93
DRY DENSITY (lb/ft^3)	98.51	98.51
DEGREE OF SATURATION (%)	97.10	97.10

Maximum Shear Stress = 74.16 (lb/in^2) at a Vertical Strain of 8.01 %

Wed Mar 19 16:00:58 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-100B
Boring No. : GT-1
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : B @200 PSI
Depth : 100-101 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	200.00	200.00
2)	0.004	0.11	1.61	0.00	25.41	25.41	15.79	215.79	215.79
3)	0.007	0.20	1.61	0.00	46.20	46.20	28.67	228.67	228.67
4)	0.011	0.31	1.61	0.00	62.37	62.37	38.64	238.64	238.64
5)	0.014	0.39	1.62	0.00	70.46	70.46	43.58	243.58	243.58
6)	0.018	0.50	1.62	0.00	80.85	80.85	49.92	249.92	249.92
7)	0.027	0.75	1.63	0.00	99.33	99.33	61.07	261.07	261.07
8)	0.036	1.00	1.63	0.00	114.35	114.35	70.01	270.01	270.01
9)	0.054	1.51	1.65	0.00	140.33	140.33	85.19	285.19	285.19
10)	0.072	2.01	1.66	0.00	160.55	160.55	96.62	296.62	296.62
11)	0.090	2.51	1.68	0.00	181.34	181.34	108.18	308.18	308.18
12)	0.107	2.99	1.69	0.00	201.55	201.55	119.25	319.25	319.25
13)	0.125	3.49	1.71	0.00	221.76	221.76	130.05	330.05	330.05
14)	0.143	3.99	1.72	0.00	239.66	239.66	139.30	339.30	339.30
15)	0.179	5.00	1.75	0.00	266.81	266.81	152.30	352.30	352.30
16)	0.200	5.58	1.77	0.00	272.58	272.58	153.94	353.94	353.94
17)	0.215	6.00	1.78	0.00	259.88	259.88	145.63	345.63	345.63
18)	0.232	6.48	1.80	0.00	225.23	225.23	125.11	325.11	325.11
19)	0.251	7.01	1.82	0.00	214.83	214.83	118.15	318.15	318.15
20)	0.287	8.01	1.85	0.00	205.01	205.01	110.61	310.61	310.61
21)	0.322	8.99	1.89	0.00	189.42	189.42	100.28	300.28	300.28
22)	0.358	9.99	1.93	0.00	174.41	174.41	90.51	290.51	290.51
23)	0.430	12.00	2.01	0.00	161.70	161.70	80.55	280.55	280.55
24)	0.502	14.01	2.10	0.00	153.62	153.62	73.32	273.32	273.32
25)	0.573	15.99	2.19	0.00	150.15	150.15	68.57	268.57	268.57
26)	0.645	18.00	2.29	0.00	147.84	147.84	64.44	264.44	264.44
27)	0.717	20.01	2.41	0.00	145.53	145.53	60.39	260.39	260.39

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-100B
Boring No. : GT-1
Test Date : 03/13/97
Tested by : C. WASON
Sample No. : B @200 PSI
Depth : 100-101 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN SILTY CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

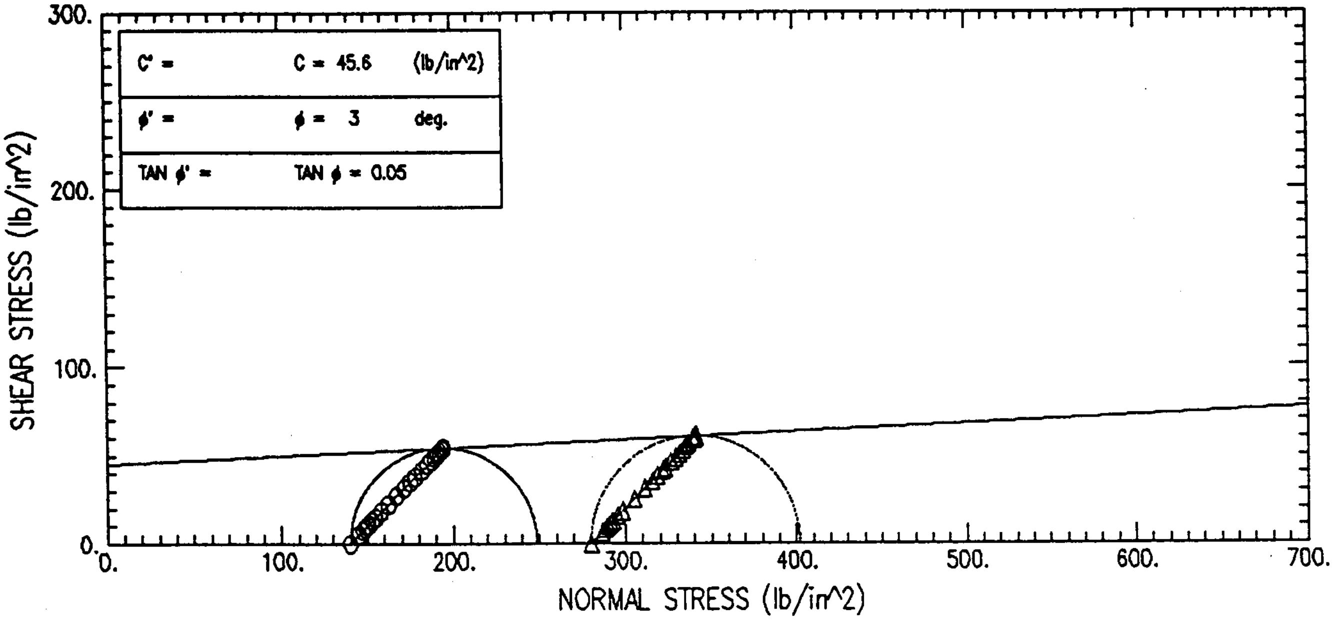
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	178.60	178.32	0.00
WT CONTAINER + DRY SOIL (gm)	140.45	140.23	0.00
WT WATER (gm)	38.15	38.09	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	140.45	140.23	0.00
WATER CONTENT (%)	27.16	27.16	0.00

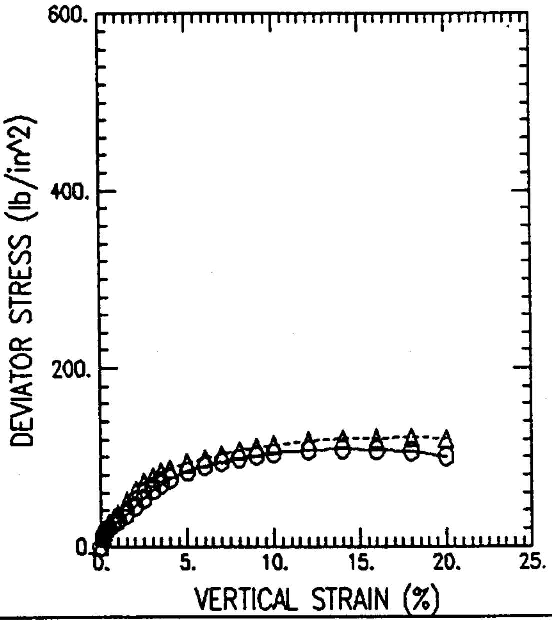
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	27.16	27.16
VOID RATIO	0.83	0.83
WET DENSITY (lb/ft^3)	118.24	118.24
DRY DENSITY (lb/ft^3)	92.98	92.98
DEGREE OF SATURATION (%)	89.52	89.52

Maximum Shear Stress = 76.97 (lb/in^2) at a Vertical Strain of 5.58 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		○	△		
TEST NO.		GT1-140A	GT1-140B		
INITIAL	WATER CONTENT (%)	27.96	26.96		
	DRY DENSITY (lb/ft^3)	94.66	95.91		
	SATURATION (%)	95.91	95.26		
	VOID RATIO	0.793	0.770		
BEFORE SHEAR	WATER CONTENT (%)	27.96	26.96		
	DRY DENSITY (lb/ft^3)	94.66	95.91		
	SATURATION (%)	95.91	95.26		
	VOID RATIO	0.793	0.770		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		140.00	280.00		
MAX. DEV. STRESS (lb/in^2)		108.61	121.82		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		1.43	1.43		
INITIAL HEIGHT (in)		3.56	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) GRAYISH BROWN CLAYEY SILT TO SILTY CLAY 2) GRAYISH BROWN CLAYEY SILT TO SILTY CLAY

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:

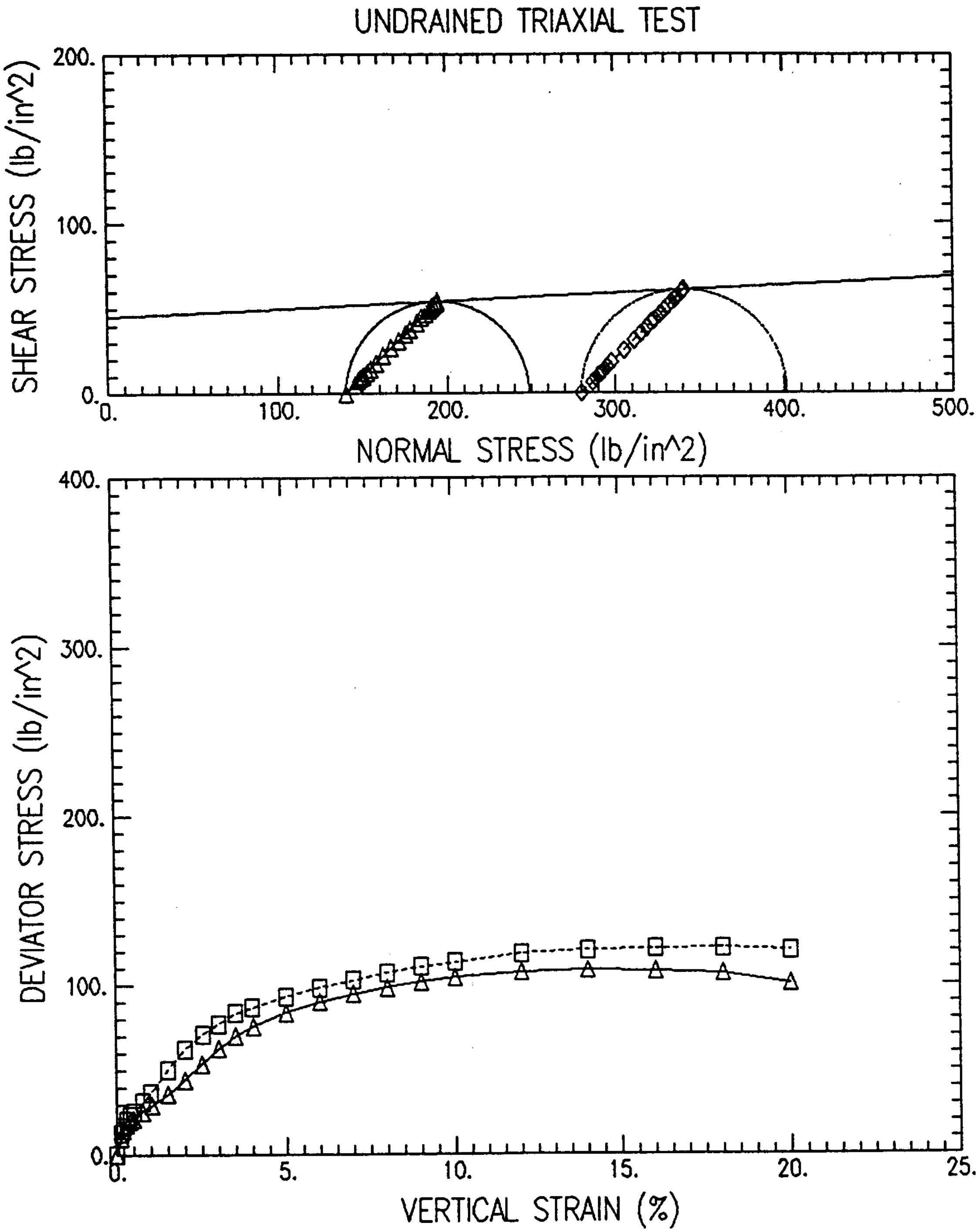
1) TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

2) TXUU TEST WITH CONFINING PRESSURE OF 280 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-1	SAMPLE NO.	A @140 PSI	B @280 PSI		
TECH. C. WASON	DEPTH/ELEV	140-141 FT	140-141 FT		
LABORATORY	DATE	03/14/97	03/14/97		

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	A @140 PSI	140-141 FT	GT1-140A	GT1A-140.UU
GT-1	B @280 PSI	140-141 FT	GT1-140B	GT1B-140.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:01:30 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-1
Sample No. : A @140 PSI
Sample Type : TUBE
Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

Location : PIKCLES BUTTE L/F- IDAHO
Test No. : GT1-140A
Test Date : 03/14/97
Depth : 140-141 FT
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Height : 3.563 (in)
Area : 1.61 (in^2)
Volume : 5.72 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	140.00	140.00
2)	0.004	0.11	1.61	0.00	16.17	16.17	10.05	150.05	150.05
3)	0.007	0.20	1.61	0.00	24.26	24.26	15.05	155.05	155.05
4)	0.011	0.31	1.61	0.00	28.88	28.88	17.89	157.89	157.89
5)	0.014	0.39	1.62	0.00	32.34	32.34	20.01	160.01	160.01
6)	0.018	0.51	1.62	0.00	34.65	34.65	21.39	161.39	161.39
7)	0.027	0.76	1.63	0.00	41.58	41.58	25.56	165.56	165.56
8)	0.036	1.01	1.63	0.00	47.93	47.93	29.34	169.34	169.34
9)	0.053	1.49	1.65	0.00	59.48	59.48	36.12	176.12	176.12
10)	0.071	1.99	1.66	0.00	73.92	73.92	44.50	184.50	184.50
11)	0.089	2.50	1.68	0.00	90.09	90.09	53.76	193.76	193.76
12)	0.107	3.00	1.69	0.00	106.26	106.26	62.85	202.85	202.85
13)	0.125	3.51	1.71	0.00	119.54	119.54	70.08	210.08	210.08
14)	0.143	4.01	1.72	0.00	130.52	130.52	75.83	215.83	215.83
15)	0.178	5.00	1.75	0.00	146.69	146.69	83.73	223.73	223.73
16)	0.214	6.01	1.78	0.00	160.55	160.55	89.96	229.96	229.96
17)	0.249	6.99	1.82	0.00	172.10	172.10	94.68	234.68	234.68
18)	0.285	8.00	1.85	0.00	182.49	182.49	98.48	238.48	238.48
19)	0.321	9.01	1.89	0.00	192.31	192.31	101.76	241.76	241.76
20)	0.356	9.99	1.93	0.00	200.97	200.97	104.30	244.30	244.30
21)	0.428	12.01	2.01	0.00	215.99	215.99	107.56	247.56	247.56
22)	0.499	14.01	2.10	0.00	227.54	227.54	108.61	248.61	248.61
23)	0.570	16.00	2.19	0.00	236.78	236.78	108.12	248.12	248.12
24)	0.641	17.99	2.29	0.00	244.86	244.86	106.75	246.75	246.75
25)	0.713	20.01	2.41	0.00	243.13	243.13	100.90	240.90	240.90

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689	Location : PIKCLES BUTTE L/F- IDAHO	
Project No. : 941138NA	Test No. : GT1-140A	
Boring No. : GT-1	Test Date : 03/14/97	Tested by : C. WASON
Sample No. : A @140 PSI	Depth : 140-141 FT	Checked by : C. CAPPS
Sample Type : TUBE	Elevation : NA	

Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 140 PSI

Liquid Limit : 0 Plastic Limit : 0 Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	181.94	181.94	0.00
WT CONTAINER + DRY SOIL (gm)	142.18	142.18	0.00
WT WATER (gm)	39.76	39.76	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	142.18	142.18	0.00
WATER CONTENT (%)	27.96	27.96	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	27.96	27.96
VOID RATIO	0.79	0.79
WET DENSITY (lb/ft^3)	121.13	121.13
DRY DENSITY (lb/ft^3)	94.66	94.66
DEGREE OF SATURATION (%)	95.91	95.91

Maximum Shear Stress = 54.30 (lb/in^2) at a Vertical Strain of 14.01 %

Wed Mar 19 16:03:51 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-140B
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : B @280 PSI
Depth : 140-141 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 280 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	280.00	280.00
2)	0.004	0.11	1.61	0.00	20.79	20.79	12.92	292.92	292.92
3)	0.007	0.20	1.61	0.00	27.72	27.72	17.20	297.20	297.20
4)	0.011	0.31	1.61	0.00	33.50	33.50	20.75	300.75	300.75
5)	0.014	0.39	1.62	0.00	38.12	38.12	23.58	303.58	303.58
6)	0.018	0.50	1.62	0.00	41.58	41.58	25.67	305.67	305.67
7)	0.027	0.75	1.63	0.00	50.82	50.82	31.25	311.25	311.25
8)	0.036	1.00	1.63	0.00	60.06	60.06	36.77	316.77	316.77
9)	0.054	1.51	1.65	0.00	83.16	83.16	50.48	330.48	330.48
10)	0.072	2.01	1.66	0.00	103.95	103.95	62.56	342.56	342.56
11)	0.090	2.51	1.68	0.00	118.97	118.97	70.97	350.97	350.97
12)	0.107	2.99	1.69	0.00	130.52	130.52	77.22	357.22	357.22
13)	0.125	3.49	1.71	0.00	142.07	142.07	83.32	363.32	363.32
14)	0.143	3.99	1.72	0.00	149.00	149.00	86.60	366.60	366.60
15)	0.179	5.00	1.75	0.00	162.86	162.86	92.96	372.96	372.96
16)	0.215	6.00	1.78	0.00	175.56	175.56	98.38	378.38	378.38
17)	0.251	7.01	1.82	0.00	187.11	187.11	102.90	382.90	382.90
18)	0.287	8.01	1.85	0.00	198.66	198.66	107.18	387.18	387.18
19)	0.322	8.99	1.89	0.00	209.06	209.06	110.67	390.67	390.67
20)	0.358	9.99	1.93	0.00	218.30	218.30	113.29	393.29	393.29
21)	0.430	12.00	2.01	0.00	237.93	237.93	118.52	398.52	398.52
22)	0.502	14.01	2.10	0.00	252.37	252.37	120.45	400.45	400.45
23)	0.573	15.99	2.19	0.00	265.65	265.65	121.32	401.32	401.32
24)	0.645	18.00	2.29	0.00	279.51	279.51	121.82	401.82	401.82
25)	0.717	20.01	2.41	0.00	289.91	289.91	120.31	400.31	400.31

Wed Mar 19 16:03:51 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-140B
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : B @280 PSI
Depth : 140-141 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 280 PSI

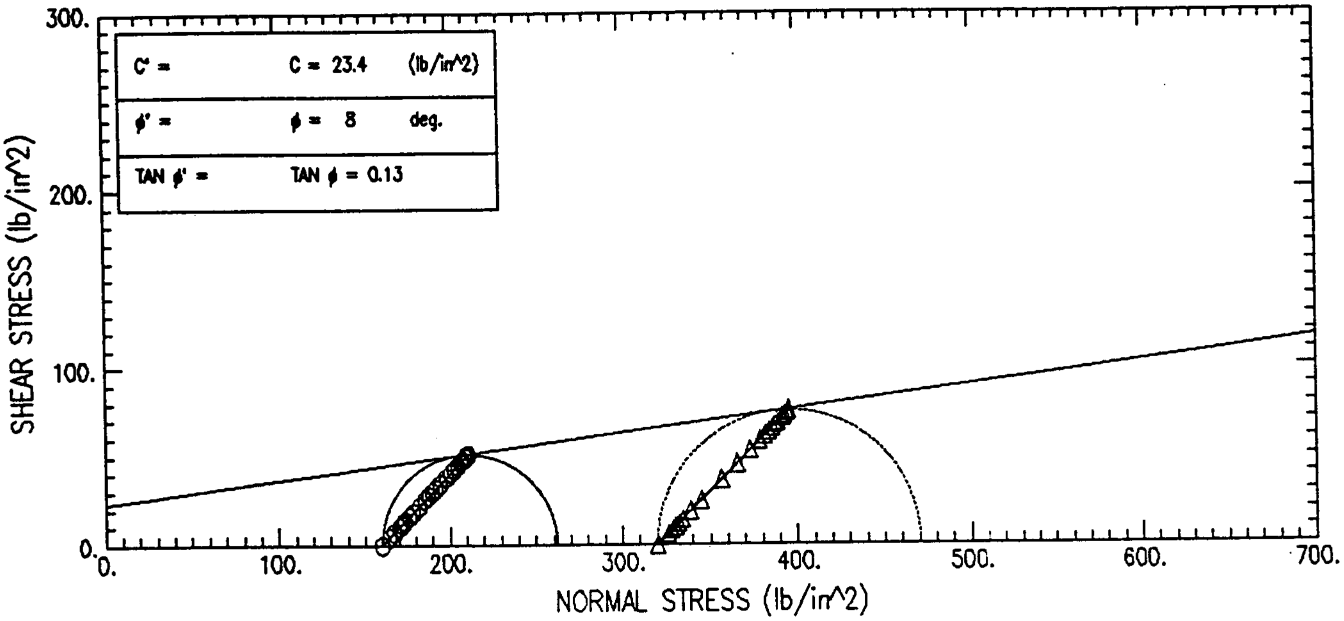
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	183.92	183.92	0.00
WT CONTAINER + DRY SOIL (gm)	144.87	144.87	0.00
WT WATER (gm)	39.05	39.05	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	144.87	144.87	0.00
WATER CONTENT (%)	26.96	26.96	0.00

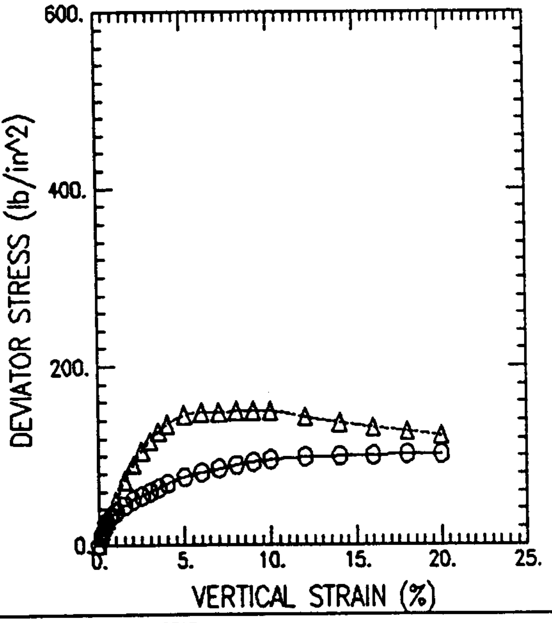
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	26.96	26.96
VOID RATIO	0.77	0.77
WET DENSITY (lb/ft^3)	121.76	121.76
DRY DENSITY (lb/ft^3)	95.91	95.91
DEGREE OF SATURATION (%)	95.26	95.26

Maximum Shear Stress = 60.91 (lb/in^2) at a Vertical Strain of 18.00 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		○	△		
TEST NO.		GT1-160A	GT1-160B		
INITIAL	WATER CONTENT (%)	27.22	26.58		
	DRY DENSITY (lb/ft^3)	96.39	96.51		
	SATURATION (%)	97.30	95.30		
	VOID RATIO	0.761	0.759		
BEFORE SHEAR	WATER CONTENT (%)	27.22	26.58		
	DRY DENSITY (lb/ft^3)	96.39	96.51		
	SATURATION (%)	97.30	95.30		
	VOID RATIO	0.761	0.759		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		160.00	320.00		
MAX. DEV. STRESS (lb/in^2)		101.94	150.42		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		1.43	1.43		
INITIAL HEIGHT (in)		3.58	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) GRAYISH BROWN CLAYEY SILT TO SILTY CLAY 2) GRAYISH BROWN CLAYEY SILT TO SILTY CLAY

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:

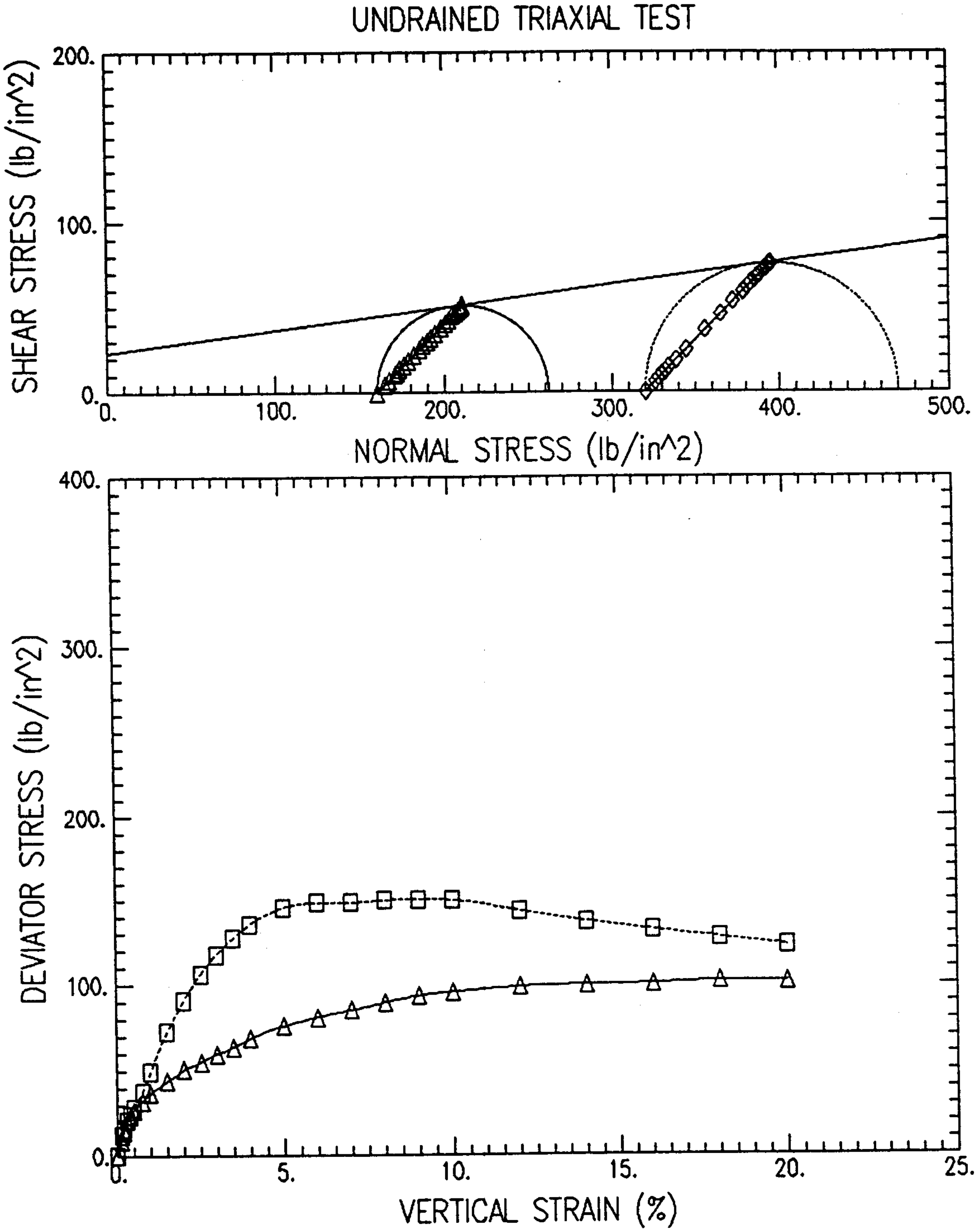
1) TXUU TEST WITH CONFINING PRESSURE OF 160 PSI

2) TXUU TEST WITH CONFINING PRESSURE OF 320 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-1	SAMPLE NO.	A @160 PSI	B @320 PSI	
TECH. C. WASON	DEPTH/ELEV	160-161 FT	160-161 FT	
LABORATORY	DATE	03/14/97	03/14/97	

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	A @160 PSI	160-161 FT	GT1-160A	GT1A-160.UU
GT-1	B @320 PSI	160-161 FT	GT1-160B	GT1B-160.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:05:04 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-160A
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : A @160 PSI
Depth : 160-161 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 160 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	160.00	160.00
2)	0.004	0.11	1.61	0.00	13.86	13.86	8.61	168.61	168.61
3)	0.007	0.20	1.61	0.00	23.10	23.10	14.34	174.34	174.34
4)	0.011	0.31	1.61	0.00	33.50	33.50	20.75	180.75	180.75
5)	0.014	0.39	1.62	0.00	38.12	38.12	23.58	183.58	183.58
6)	0.018	0.50	1.62	0.00	43.89	43.89	27.10	187.10	187.10
7)	0.027	0.75	1.63	0.00	52.55	52.55	32.31	192.31	192.31
8)	0.036	1.00	1.63	0.00	60.06	60.06	36.77	196.77	196.77
9)	0.054	1.51	1.65	0.00	72.77	72.77	44.17	204.17	204.17
10)	0.072	2.01	1.66	0.00	84.32	84.32	50.74	210.74	210.74
11)	0.090	2.51	1.68	0.00	92.40	92.40	55.13	215.13	215.13
12)	0.107	2.99	1.69	0.00	101.06	101.06	59.80	219.80	219.80
13)	0.125	3.49	1.71	0.00	108.57	108.57	63.67	223.67	223.67
14)	0.143	3.99	1.72	0.00	118.39	118.39	68.81	228.81	228.81
15)	0.179	5.00	1.75	0.00	133.40	133.40	76.15	236.15	236.15
16)	0.215	6.00	1.78	0.00	144.95	144.95	81.23	241.23	241.23
17)	0.251	7.01	1.82	0.00	155.35	155.35	85.44	245.44	245.44
18)	0.287	8.01	1.85	0.00	166.32	166.32	89.74	249.74	249.74
19)	0.322	8.99	1.89	0.00	176.72	176.72	93.55	253.55	253.55
20)	0.358	9.99	1.93	0.00	184.22	184.22	95.61	255.61	255.61
21)	0.430	12.00	2.01	0.00	198.08	198.08	98.67	258.67	258.67
22)	0.502	14.01	2.10	0.00	209.06	209.06	99.77	259.77	259.77
23)	0.573	15.99	2.19	0.00	220.03	220.03	100.49	260.49	260.49
24)	0.645	18.00	2.29	0.00	233.89	233.89	101.94	261.94	261.94
25)	0.717	20.01	2.41	0.00	244.86	244.86	101.62	261.62	261.62

Wed Mar 19 16:05:04 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689	Location : PICKLES BUTTE L/F- IDAHO	
Project No. : 941138NA	Test No. : GT1-160A	
Boring No. : GT-1	Test Date : 03/14/97	Tested by : C. WASON
Sample No. : A @160 PSI	Depth : 160-161 FT	Checked by : C. CAPPS
Sample Type : TUBE	Elevation : NA	

Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 160 PSI

Liquid Limit : 0 Plastic Limit : 0 Specific Gravity : 2.72

		WATER CONTENT	
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	185.22	185.22	0.00
WT CONTAINER + DRY SOIL (gm)	145.59	145.59	0.00
WT WATER (gm)	39.63	39.63	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	145.59	145.59	0.00
WATER CONTENT (%)	27.22	27.22	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	27.22	27.22
VOID RATIO	0.76	0.76
WET DENSITY (lb/ft^3)	122.62	122.62
DRY DENSITY (lb/ft^3)	96.39	96.39
DEGREE OF SATURATION (%)	97.30	97.30

Maximum Shear Stress = 50.97 (lb/in^2) at a Vertical Strain of 18.00 %

Wed Mar 19 16:07:39 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-160B
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : B @320 PSI
Depth : 160-161 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 320 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	320.00	320.00
2)	0.004	0.11	1.61	0.00	19.64	19.64	12.20	332.20	332.20
3)	0.007	0.20	1.61	0.00	26.57	26.57	16.49	336.49	336.49
4)	0.011	0.31	1.61	0.00	33.50	33.50	20.75	340.75	340.75
5)	0.014	0.39	1.62	0.00	39.27	39.27	24.29	344.29	344.29
6)	0.018	0.50	1.62	0.00	46.20	46.20	28.53	348.53	348.53
7)	0.027	0.75	1.63	0.00	61.22	61.22	37.64	357.64	357.64
8)	0.036	1.00	1.63	0.00	80.85	80.85	49.50	369.50	369.50
9)	0.054	1.51	1.65	0.00	120.12	120.12	72.92	392.92	392.92
10)	0.072	2.01	1.66	0.00	151.31	151.31	91.06	411.06	411.06
11)	0.090	2.51	1.68	0.00	177.87	177.87	106.12	426.12	426.12
12)	0.107	2.99	1.69	0.00	198.66	198.66	117.54	437.54	437.54
13)	0.125	3.49	1.71	0.00	217.14	217.14	127.34	447.34	447.34
14)	0.143	3.99	1.72	0.00	233.31	233.31	135.61	455.61	455.61
15)	0.179	5.00	1.75	0.00	255.26	255.26	145.70	465.70	465.70
16)	0.215	6.00	1.78	0.00	265.65	265.65	148.87	468.87	468.87
17)	0.251	7.01	1.82	0.00	270.27	270.27	148.64	468.64	468.64
18)	0.287	8.01	1.85	0.00	278.36	278.36	150.18	470.18	470.18
19)	0.322	8.99	1.89	0.00	284.13	284.13	150.42	470.42	470.42
20)	0.358	9.99	1.93	0.00	289.33	289.33	150.15	470.15	470.15
21)	0.430	12.00	2.01	0.00	288.17	288.17	143.54	463.54	463.54
22)	0.502	14.01	2.10	0.00	287.60	287.60	137.26	457.26	457.26
23)	0.573	15.99	2.19	0.00	289.33	289.33	132.14	452.14	452.14
24)	0.645	18.00	2.29	0.00	292.79	292.79	127.61	447.61	447.61
25)	0.717	20.01	2.41	0.00	296.26	296.26	122.95	442.95	442.95

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689	Location : PICKLES BUTTE L/F- IDAHO	
Project No. : 941138NA	Test No. : GT1-160B	
Boring No. : GT-1	Test Date : 03/14/97	Tested by : C. WASON
Sample No. : B @320 PSI	Depth : 160-161 FT	Checked by : C. CAPPS
Sample Type : TUBE	Elevation : NA	

Soil Description : GRAYISH BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 320 PSI

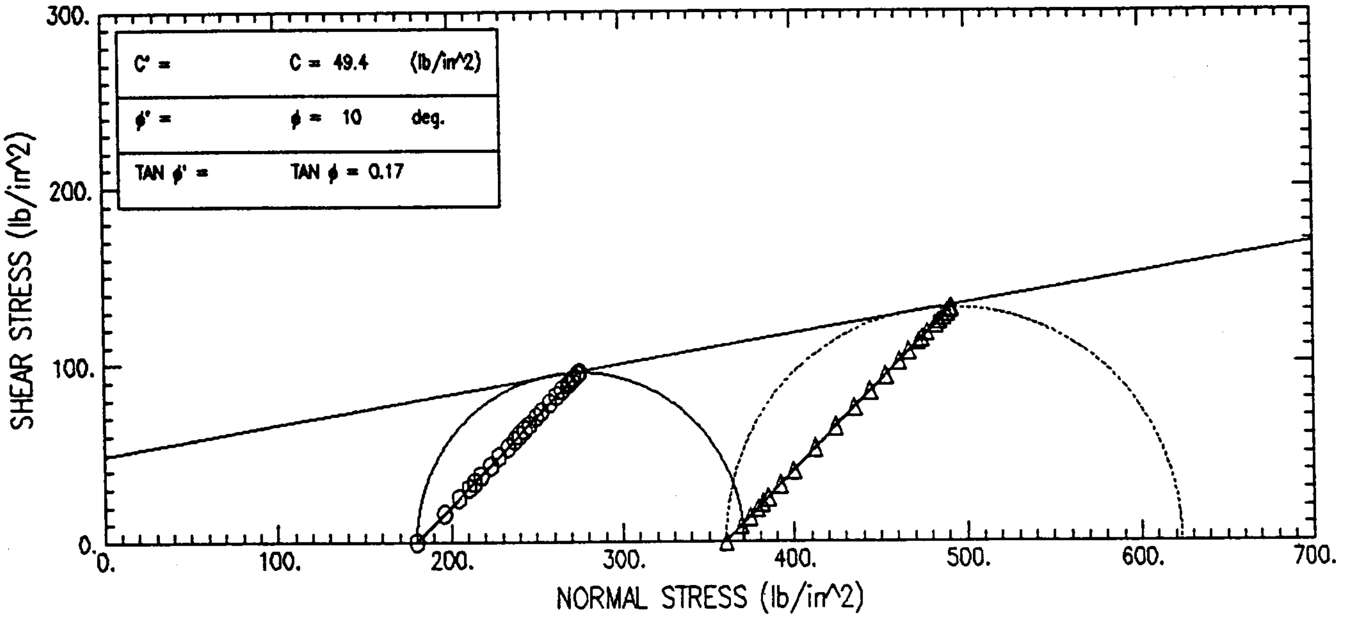
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

		WATER CONTENT	
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	184.52	184.52	0.00
WT CONTAINER + DRY SOIL (gm)	145.77	145.77	0.00
WT WATER (gm)	38.75	38.75	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	145.77	145.77	0.00
WATER CONTENT (%)	26.58	26.58	0.00

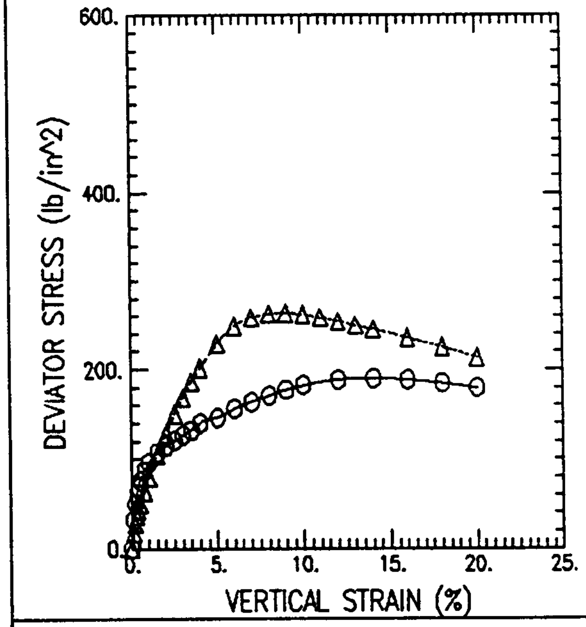
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	26.58	26.58
VOID RATIO	0.76	0.76
WET DENSITY (lb/ft^3)	122.16	122.16
DRY DENSITY (lb/ft^3)	96.51	96.51
DEGREE OF SATURATION (%)	95.30	95.30

Maximum Shear Stress = 75.21 (lb/in^2) at a Vertical Strain of 8.99 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress

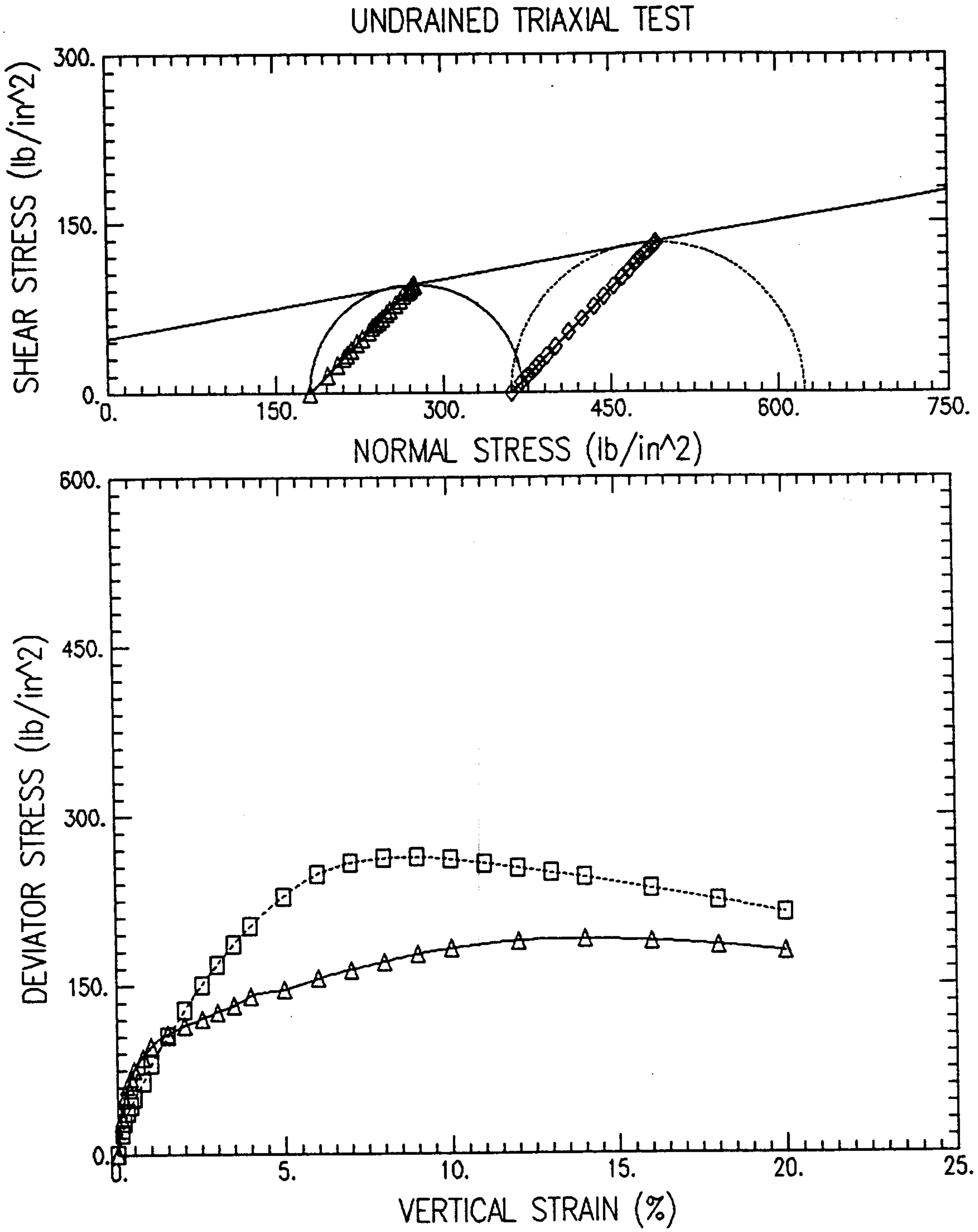


SYMBOL		○	△		
TEST NO.		GT1-180A	GT1-180B		
INITIAL	WATER CONTENT (%)	26.50	24.43		
	DRY DENSITY (lb/ft^3)	90.24	88.17		
	SATURATION (%)	81.82	71.85		
	VOID RATIO	0.881	0.925		
BEFORE SHEAR	WATER CONTENT (%)	26.50	24.43		
	DRY DENSITY (lb/ft^3)	90.24	88.17		
	SATURATION (%)	81.82	71.85		
	VOID RATIO	0.881	0.925		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		180.00	360.00		
MAX. DEV. STRESS (lb/in^2)		190.18	263.23		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		1.43	1.43		
INITIAL HEIGHT (in)		3.58	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT 2) LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE		TYPE OF TEST UNDRAINED	
REMARKS:				PROJECT C. E. L. P.O. #3689			
1) TXUU TEST WITH CONFINING PRESSURE OF 180 PSI							
2) TXUU TEST WITH CONFINING PRESSURE OF 360 PSI				BORING NO. GT-1	SAMPLE NO.	A @180 PSI	B @360 PSI
				TECH. C. WASON	DEPTH/ELEV	180-181 FT	180-181 FT
				LABORATORY	DATE	03/14/97	03/14/97
				TRIAXIAL COMPRESSION TEST REPORT			



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	A @180 PSI	180-181 FT	GT1-180A	GT1A-180.UU
GT-1	B @360 PSI	180-181 FT	GT1-180B	GT1B-180.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:08:26 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689 Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA Test No. : GT1-180A
Boring No. : GT-1 Test Date : 03/14/97 Tested by : C. WASON
Sample No. : A @180 PSI Depth : 180-181 FT Checked by : C. CAPPS
Sample Type : TUBE Elevation : NA
Soil Description : LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 180 PSI

Height : 3.583 (in) Piston Diameter : 0.000 (in) Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2) Piston Friction : 0.00 (lb) Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3) Piston Weight : 0.00 (gm) Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	180.00	180.00
2)	0.004	0.11	1.61	0.00	51.98	51.98	32.30	212.30	212.30
3)	0.007	0.20	1.61	0.00	79.70	79.70	49.46	229.46	229.46
4)	0.011	0.31	1.61	0.00	99.33	99.33	61.53	241.53	241.53
5)	0.014	0.39	1.62	0.00	109.73	109.73	67.88	247.88	247.88
6)	0.018	0.50	1.62	0.00	122.43	122.43	75.59	255.59	255.59
7)	0.027	0.75	1.63	0.00	140.91	140.91	86.64	266.64	266.64
8)	0.036	1.00	1.63	0.00	157.08	157.08	96.17	276.17	276.17
9)	0.054	1.51	1.65	0.00	176.72	176.72	107.27	287.27	287.27
10)	0.072	2.01	1.66	0.00	190.58	190.58	114.69	294.69	294.69
11)	0.090	2.51	1.68	0.00	202.13	202.13	120.59	300.59	300.59
12)	0.107	2.99	1.69	0.00	213.68	213.68	126.43	306.43	306.43
13)	0.125	3.49	1.71	0.00	225.23	225.23	132.09	312.09	312.09
14)	0.143	3.99	1.72	0.00	241.40	241.40	140.31	320.31	320.31
15)	0.179	5.00	1.75	0.00	256.41	256.41	146.36	326.36	326.36
16)	0.215	6.00	1.78	0.00	278.36	278.36	155.99	335.99	335.99
17)	0.251	7.01	1.82	0.00	297.99	297.99	163.88	343.88	343.88
18)	0.287	8.01	1.85	0.00	316.47	316.47	170.75	350.75	350.75
19)	0.322	8.99	1.89	0.00	334.95	334.95	177.32	357.32	357.32
20)	0.358	9.99	1.93	0.00	351.12	351.12	182.22	362.22	362.22
21)	0.430	12.00	2.01	0.00	378.84	378.84	188.71	368.71	368.71
22)	0.502	14.01	2.10	0.00	398.48	398.48	190.18	370.18	370.18
23)	0.573	15.99	2.19	0.00	412.34	412.34	188.31	368.31	368.31
24)	0.645	18.00	2.29	0.00	423.89	423.89	184.75	364.75	364.75
25)	0.717	20.01	2.41	0.00	431.97	431.97	179.27	359.27	359.27

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-180A
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : A @180 PSI
Depth : 180-181 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 180 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT BEFORE TEST	WATER CONTENT AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	172.42	172.42	0.00
WT CONTAINER + DRY SOIL (gm)	136.30	136.30	0.00
WT WATER (gm)	36.12	36.12	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	136.30	136.30	0.00
WATER CONTENT (%)	26.50	26.50	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	26.50	26.50
VOID RATIO	0.88	0.88
WET DENSITY (lb/ft^3)	114.15	114.15
DRY DENSITY (lb/ft^3)	90.24	90.24
DEGREE OF SATURATION (%)	81.82	81.82

Maximum Shear Stress = 95.09 (lb/in^2) at a Vertical Strain of 14.01 %

Wed Mar 19 16:09:01 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-180B
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : 8 @360 PSI
Depth : 180-181 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 360 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	360.00	360.00
2)	0.004	0.11	1.61	0.00	28.88	28.88	17.95	377.95	377.95
3)	0.007	0.20	1.61	0.00	45.05	45.05	27.96	387.96	387.96
4)	0.011	0.31	1.61	0.00	60.06	60.06	37.21	397.21	397.21
5)	0.014	0.39	1.62	0.00	70.46	70.46	43.58	403.58	403.58
6)	0.018	0.50	1.62	0.00	80.85	80.85	49.92	409.92	409.92
7)	0.027	0.75	1.63	0.00	103.95	103.95	63.91	423.91	423.91
8)	0.036	1.00	1.63	0.00	130.52	130.52	79.91	439.91	439.91
9)	0.054	1.51	1.65	0.00	173.25	173.25	105.17	465.17	465.17
10)	0.072	2.01	1.66	0.00	213.68	213.68	128.59	488.59	488.59
11)	0.090	2.51	1.68	0.00	251.79	251.79	150.22	510.22	510.22
12)	0.107	2.99	1.69	0.00	284.71	284.71	168.45	528.45	528.45
13)	0.125	3.49	1.71	0.00	317.63	317.63	186.27	546.27	546.27
14)	0.143	3.99	1.72	0.00	347.66	347.66	202.07	562.07	562.07
15)	0.179	5.00	1.75	0.00	400.79	400.79	228.78	588.78	588.78
16)	0.215	6.00	1.78	0.00	443.52	443.52	248.55	608.55	608.55
17)	0.251	7.01	1.82	0.00	469.51	469.51	258.21	618.21	618.21
18)	0.287	8.01	1.85	0.00	486.26	486.26	262.35	622.35	622.35
19)	0.322	8.99	1.89	0.00	497.23	497.23	263.23	623.23	623.23
20)	0.358	9.99	1.93	0.00	503.58	503.58	261.35	621.35	621.35
21)	0.394	11.00	1.97	0.00	507.05	507.05	257.86	617.86	617.86
22)	0.430	12.00	2.01	0.00	509.36	509.36	253.72	613.72	613.72
23)	0.466	13.01	2.05	0.00	511.09	511.09	249.25	609.25	609.25
24)	0.502	14.01	2.10	0.00	513.40	513.40	245.03	605.03	605.03
25)	0.573	15.99	2.19	0.00	515.13	515.13	235.26	595.26	595.26
26)	0.645	18.00	2.29	0.00	515.71	515.71	224.77	584.77	584.77
27)	0.717	20.01	2.41	0.00	514.55	514.55	213.54	573.54	573.54

Wed Mar 19 16:09:01 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-180B
Boring No. : GT-1
Test Date : 03/14/97
Tested by : C. WASON
Sample No. : B @360 PSI
Depth : 180-181 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. YELLOWISH BROWN SI-CLAY TO CLAYEY SILT
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 360 PSI

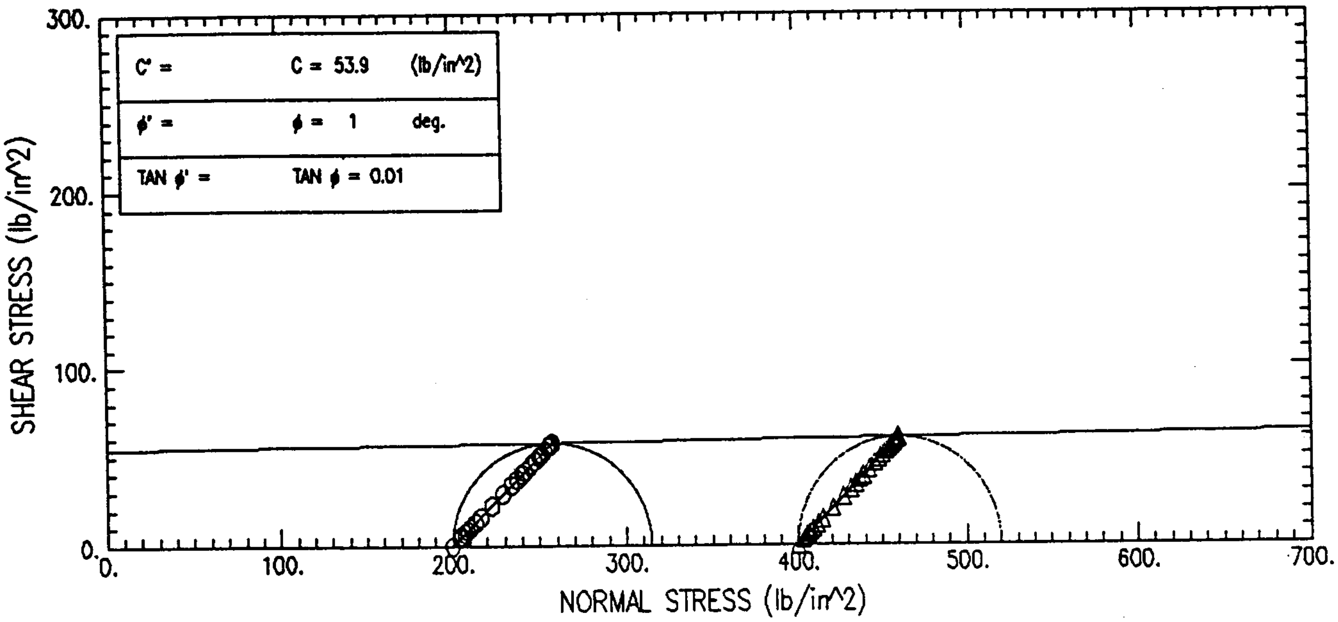
Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	165.72	164.68	0.00
WT CONTAINER + DRY SOIL (gm)	133.18	132.35	0.00
WT WATER (gm)	32.54	32.33	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	133.18	132.35	0.00
WATER CONTENT (%)	24.43	24.43	0.00

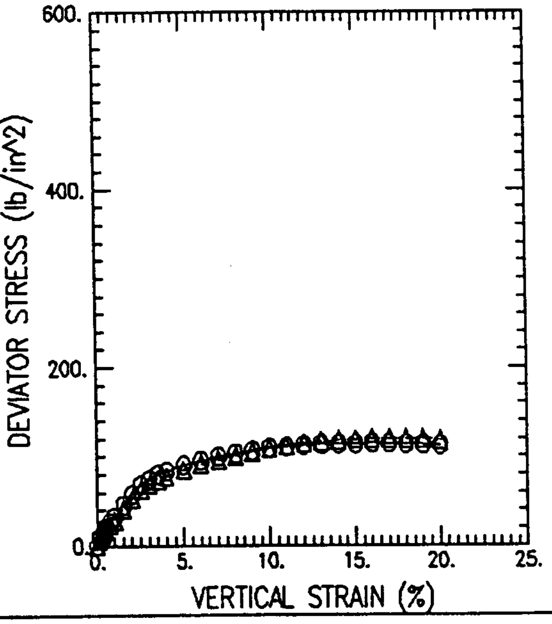
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	24.43	24.43
VOID RATIO	0.92	0.92
WET DENSITY (lb/ft^3)	109.71	109.71
DRY DENSITY (lb/ft^3)	88.17	88.17
DEGREE OF SATURATION (%)	71.85	71.85

Maximum Shear Stress = 131.62 (lb/in^2) at a Vertical Strain of 8.99 %

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		○	△		
TEST NO.		GT1-200A	GT1-200B		
INITIAL	WATER CONTENT (%)	27.12	27.09		
	DRY DENSITY (lb/ft^3)	95.73	94.66		
	SATURATION (%)	95.44	92.93		
	VOID RATIO	0.773	0.793		
BEFORE SHEAR	WATER CONTENT (%)	27.12	27.09		
	DRY DENSITY (lb/ft^3)	95.73	94.66		
	SATURATION (%)	95.44	92.93		
	VOID RATIO	0.773	0.793		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		200.00	400.00		
MAX. DEV. STRESS (lb/in^2)		114.47	119.74		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		1.43	1.43		
INITIAL HEIGHT (in)		3.58	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. BROWN CLAYEY SILT TO SILTY CLAY 2) LT. BROWN CLAYEY SILT TO SILTY CLAY

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:

1) TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

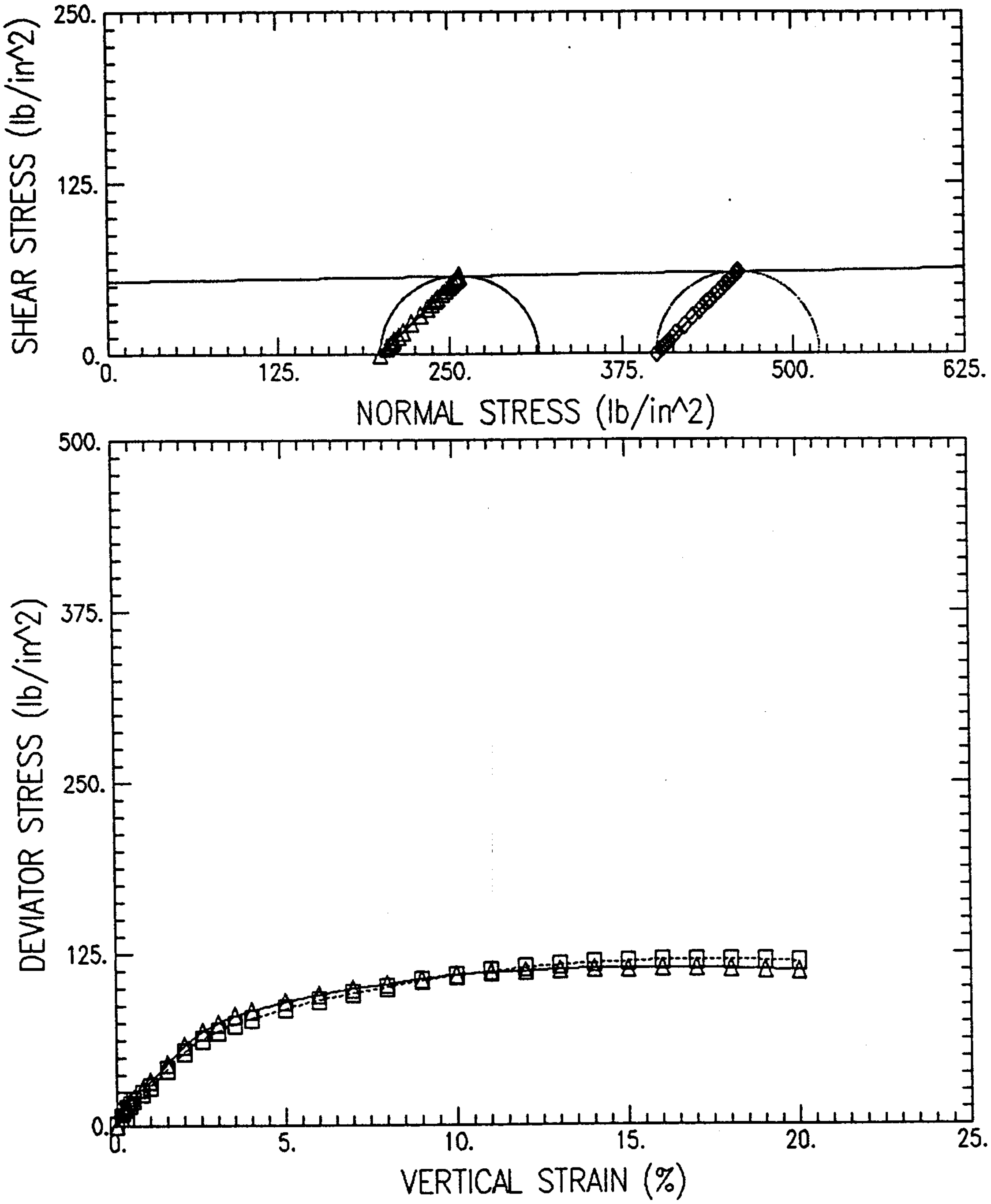
2) TXUU TEST WITH CONFINING PRESSURE OF 400 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-1	SAMPLE NO.	A @200 PSI	B @400 PSI	
TECH. C. WASON	DEPTH/ELEV	200-201 FT	200-201 FT	
LABORATORY	DATE	03/17/97	03/17/97	

TRIAXIAL COMPRESSION TEST REPORT

UNDRAINED TRIAXIAL TEST



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	A @200 PSI	200-201 FT	GT1-200A	GT1A-200.UU
GT-1	B @400 PSI	200-201 FT	GT1-200B	GT1B-200.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:09:30 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-200A
Boring No. : GT-1
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : A @200 PSI
Depth : 200-201 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	200.00	200.00
2)	0.004	0.11	1.61	0.00	15.02	15.02	9.33	209.33	209.33
3)	0.007	0.20	1.61	0.00	17.33	17.33	10.75	210.75	210.75
4)	0.011	0.31	1.61	0.00	23.10	23.10	14.31	214.31	214.31
5)	0.014	0.39	1.62	0.00	28.30	28.30	17.51	217.51	217.51
6)	0.018	0.50	1.62	0.00	33.50	33.50	20.68	220.68	220.68
7)	0.027	0.75	1.63	0.00	43.31	43.31	26.63	226.63	226.63
8)	0.036	1.00	1.63	0.00	53.13	53.13	32.53	232.53	232.53
9)	0.054	1.51	1.65	0.00	75.08	75.08	45.57	245.57	245.57
10)	0.072	2.01	1.66	0.00	97.02	97.02	58.39	258.39	258.39
11)	0.090	2.51	1.68	0.00	114.35	114.35	68.22	268.22	268.22
12)	0.107	2.99	1.69	0.00	125.90	125.90	74.49	274.49	274.49
13)	0.125	3.49	1.71	0.00	136.29	136.29	79.93	279.93	279.93
14)	0.143	3.99	1.72	0.00	143.80	143.80	83.58	283.58	283.58
15)	0.179	5.00	1.75	0.00	157.66	157.66	89.99	289.99	289.99
16)	0.215	6.00	1.78	0.00	169.79	169.79	95.15	295.15	295.15
17)	0.251	7.01	1.82	0.00	181.34	181.34	99.73	299.73	299.73
18)	0.287	8.01	1.85	0.00	190.58	190.58	102.82	302.82	302.82
19)	0.322	8.99	1.89	0.00	200.97	200.97	106.39	306.39	306.39
20)	0.358	9.99	1.93	0.00	210.79	210.79	109.39	309.39	309.39
21)	0.394	11.00	1.97	0.00	218.30	218.30	111.01	311.01	311.01
22)	0.430	12.00	2.01	0.00	224.65	224.65	111.90	311.90	311.90
23)	0.466	13.01	2.05	0.00	232.16	232.16	113.22	313.22	313.22
24)	0.502	14.01	2.10	0.00	238.51	238.51	113.83	313.83	313.83
25)	0.538	15.02	2.14	0.00	244.28	244.28	114.04	314.04	314.04
26)	0.573	15.99	2.19	0.00	250.64	250.64	114.47	314.47	314.47
27)	0.609	17.00	2.24	0.00	255.83	255.83	114.17	314.17	314.17
28)	0.645	18.00	2.29	0.00	261.03	261.03	113.77	313.77	313.77
29)	0.681	19.01	2.35	0.00	265.65	265.65	113.01	313.01	313.01
30)	0.717	20.01	2.41	0.00	270.27	270.27	112.16	312.16	312.16

Wed Mar 19 16:09:30 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-200A
Boring No. : GT-1
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : A @200 PSI
Depth : 200-201 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 200 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	183.82	183.82	0.00
WT CONTAINER + DRY SOIL (gm)	144.60	144.60	0.00
WT WATER (gm)	39.22	39.22	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	144.60	144.60	0.00
WATER CONTENT (%)	27.12	27.12	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	27.12	27.12
VOID RATIO	0.77	0.77
WET DENSITY (lb/ft^3)	121.70	121.70
DRY DENSITY (lb/ft^3)	95.73	95.73
DEGREE OF SATURATION (%)	95.44	95.44

Maximum Shear Stress = 57.23 (lb/in^2) at a Vertical Strain of 15.99 %

Wed Mar 19 16:10:09 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

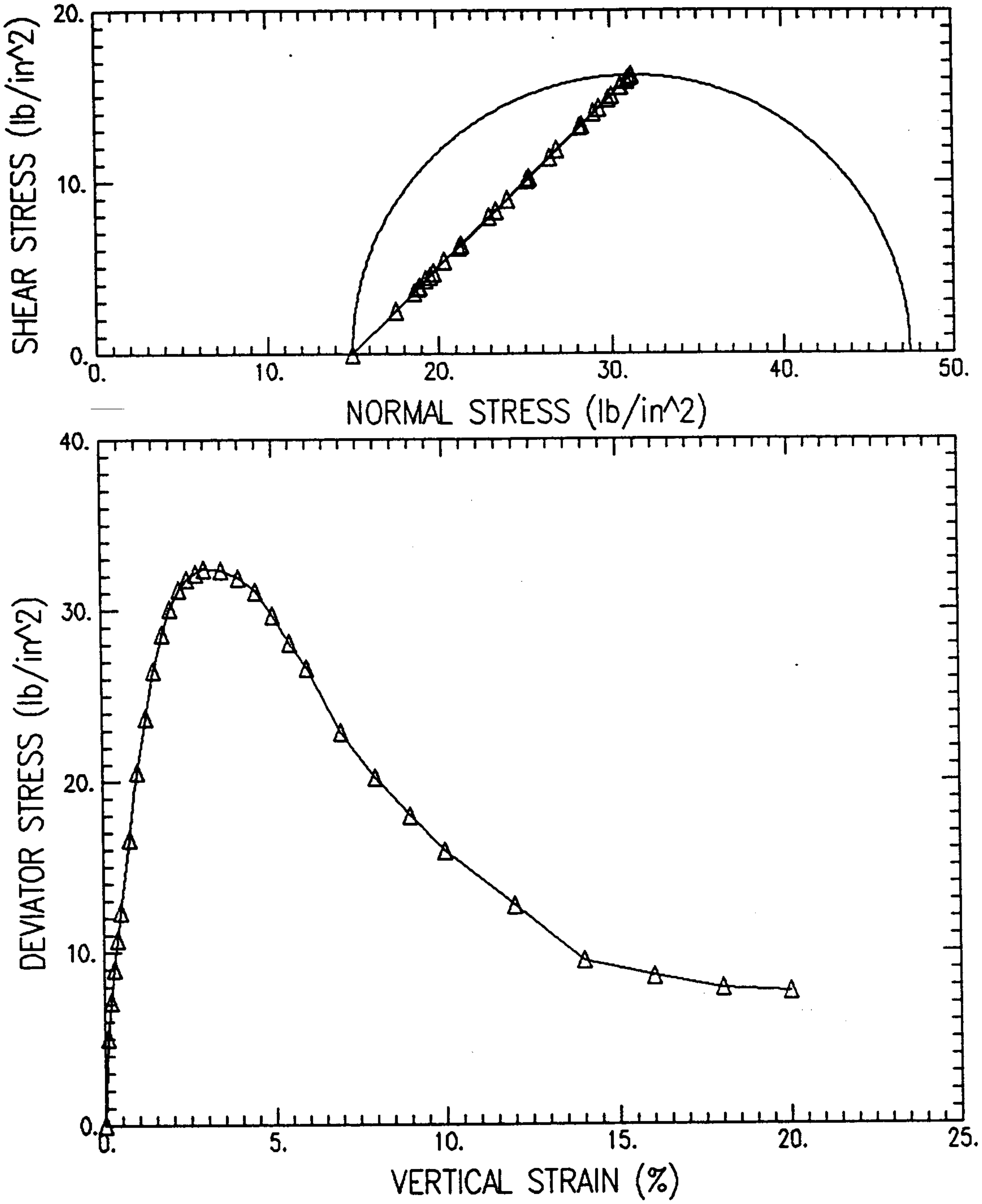
Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-200B
Boring No. : GT-1
Test Date : 03/17/97
Tested by : C. WASON
Sample No. : B @400 PSI
Depth : 200-201 FT
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 400 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	400.00	400.00
2)	0.004	0.11	1.61	0.00	10.40	10.40	6.46	406.46	406.46
3)	0.007	0.20	1.61	0.00	16.17	16.17	10.04	410.04	410.04
4)	0.011	0.31	1.61	0.00	20.79	20.79	12.88	412.88	412.88
5)	0.014	0.39	1.62	0.00	24.83	24.83	15.36	415.36	415.36
6)	0.018	0.50	1.62	0.00	29.45	29.45	18.19	418.19	418.19
7)	0.027	0.75	1.63	0.00	38.12	38.12	23.43	423.43	423.43
8)	0.036	1.00	1.63	0.00	47.36	47.36	28.99	428.99	428.99
9)	0.054	1.51	1.65	0.00	68.15	68.15	41.37	441.37	441.37
10)	0.072	2.01	1.66	0.00	89.51	89.51	53.87	453.87	453.87
11)	0.090	2.51	1.68	0.00	105.68	105.68	63.05	463.05	463.05
12)	0.107	2.99	1.69	0.00	116.66	116.66	69.02	469.02	469.02
13)	0.125	3.49	1.71	0.00	125.90	125.90	73.83	473.83	473.83
14)	0.143	3.99	1.72	0.00	133.98	133.98	77.88	477.88	477.88
15)	0.179	5.00	1.75	0.00	149.00	149.00	85.05	485.05	485.05
16)	0.215	6.00	1.78	0.00	162.86	162.86	91.26	491.26	491.26
17)	0.251	7.01	1.82	0.00	174.98	174.98	96.23	496.23	496.23
18)	0.287	8.01	1.85	0.00	186.53	186.53	100.64	500.64	500.64
19)	0.322	8.99	1.89	0.00	198.66	198.66	105.17	505.17	505.17
20)	0.358	9.99	1.93	0.00	209.63	209.63	108.79	508.79	508.79
21)	0.394	11.00	1.97	0.00	219.45	219.45	111.60	511.60	511.60
22)	0.430	12.00	2.01	0.00	229.85	229.85	114.49	514.49	514.49
23)	0.466	13.01	2.05	0.00	238.51	238.51	116.32	516.32	516.32
24)	0.502	14.01	2.10	0.00	246.59	246.59	117.69	517.69	517.69
25)	0.538	15.02	2.14	0.00	254.10	254.10	118.62	518.62	518.62
26)	0.573	15.99	2.19	0.00	262.19	262.19	119.74	519.74	519.74
27)	0.609	17.00	2.24	0.00	267.96	267.96	119.58	519.58	519.58
28)	0.645	18.00	2.29	0.00	274.31	274.31	119.56	519.56	519.56
29)	0.681	19.01	2.35	0.00	280.67	280.67	119.40	519.40	519.40
30)	0.717	20.01	2.41	0.00	285.29	285.29	118.39	518.39	518.39

```
                              UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L.  P.O. #3689     Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA             Test No. : GT1-2008
Boring No. : GT-1                  Test Date : 03/17/97              Tested by : C. WASON
Sample No. : B @400 PSI            Depth : 200-201 FT                Checked by : C. CAPPS
Sample Type : TUBE                 Elevation : NA
Soil Description : LT. BROWN CLAYEY SILT TO SILTY CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 400 PSI

Liquid Limit : 0                  Plastic Limit : 0                 Specific Gravity : 2.72

                                                     WATER CONTENT
                                         BEFORE TEST      AFTER TEST        TRIMMINGS
CONTAINER NO.
WT CONTAINER + WET SOIL (gm)               181.72           181.72            0.00
WT CONTAINER + DRY SOIL (gm)               142.98           142.98            0.00
WT WATER (gm)                               38.74            38.74            0.00
WT CONTAINER (gm)                            0.00             0.00            0.00
WT DRY SOIL (gm)                           142.98           142.98            0.00
WATER CONTENT (%)                           27.09            27.09            0.00



                                               INITIAL             AT CONSOLIDATION
WATER CONTENT (%)                               27.09                   27.09
VOID RATIO                                       0.79                    0.79
WET DENSITY (lb/ft^3)                          120.31                  120.31
DRY DENSITY (lb/ft^3)                           94.66                   94.66
DEGREE OF SATURATION (%)                        92.93                   92.93

Maximum Shear Stress = 59.87 (lb/in^2) at a Vertical Strain of 15.99 %
```

UNDRAINED TRIAXIAL TEST



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-4	BOTTOM	15-17 FEET	GT4-BOTTOM	GT4-15.UU

Wed Mar 19 16:54:36 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-BOTTOM
Boring No. : GT-4
Test Date : 03/06/97
Tested by : C. WASON
Sample No. : BOTTOM
Depth : 15-17 FEET
Checked by : C. CAPPS
Sample Type : SHELBY
Elevation : NA
Soil Description : LT. BRN CLAYEY FINE SA-SILT / CLAYEY SI-FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 15 PSI

Height : 5.984 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 6.42 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 38.44 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : None

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	6.42	0.00	0.00	0.00	0.00	15.00	15.00
2)	0.006	0.10	6.42	0.00	32.17	32.17	5.01	20.01	20.01
3)	0.012	0.20	6.42	0.00	45.96	45.96	7.15	22.15	22.15
4)	0.018	0.30	6.42	0.00	58.02	58.02	9.03	24.03	24.03
5)	0.024	0.40	6.42	0.00	68.94	68.94	10.73	25.73	25.73
6)	0.030	0.50	6.42	0.00	79.28	79.28	12.34	27.34	27.34
7)	0.045	0.75	6.42	0.00	106.86	106.86	16.63	31.63	31.63
8)	0.060	1.00	6.42	0.00	132.14	132.14	20.57	35.57	35.57
9)	0.075	1.25	6.42	0.00	152.82	152.82	23.79	38.79	38.79
10)	0.090	1.50	6.42	0.00	170.05	170.05	26.47	41.47	41.47
11)	0.105	1.75	6.42	0.00	183.84	183.84	28.62	43.62	43.62
12)	0.120	2.01	6.42	0.00	193.61	193.61	30.14	45.14	45.14
13)	0.135	2.26	6.42	0.00	200.50	200.50	31.21	46.21	46.21
14)	0.150	2.51	6.42	0.00	204.52	204.52	31.84	46.84	46.84
15)	0.165	2.76	6.42	0.00	206.82	206.82	32.19	47.19	47.19
16)	0.180	3.01	6.42	0.00	208.54	208.54	32.46	47.46	47.46
17)	0.209	3.49	6.42	0.00	207.97	207.97	32.37	47.37	47.37
18)	0.239	3.99	6.42	0.00	205.10	205.10	31.93	46.93	46.93
19)	0.269	4.50	6.42	0.00	199.93	199.93	31.12	46.12	46.12
20)	0.299	5.00	6.42	0.00	190.73	190.73	29.69	44.69	44.69
21)	0.329	5.50	6.42	0.00	180.39	180.39	28.08	43.08	43.08
22)	0.359	6.00	6.42	0.00	171.20	171.20	26.65	41.65	41.65
23)	0.419	7.00	6.42	0.00	147.07	147.07	22.89	37.89	37.89
24)	0.479	8.00	6.42	0.00	129.84	129.84	20.21	35.21	35.21
25)	0.539	9.01	6.42	0.00	115.47	115.47	17.98	32.98	32.98
26)	0.598	9.99	6.42	0.00	102.26	102.26	15.92	30.92	30.92
27)	0.718	12.00	6.42	0.00	81.58	81.58	12.70	27.70	27.70
28)	0.838	14.00	6.42	0.00	60.90	60.90	9.48	24.48	24.48
29)	0.957	15.99	6.42	0.00	55.15	55.15	8.59	23.59	23.59
30)	1.077	18.00	6.42	0.00	50.56	50.56	7.87	22.87	22.87
31)	1.197	20.00	6.42	0.00	49.41	49.41	7.69	22.69	22.69

UNDRAINED TRIAXIAL COMPRESSION TEST

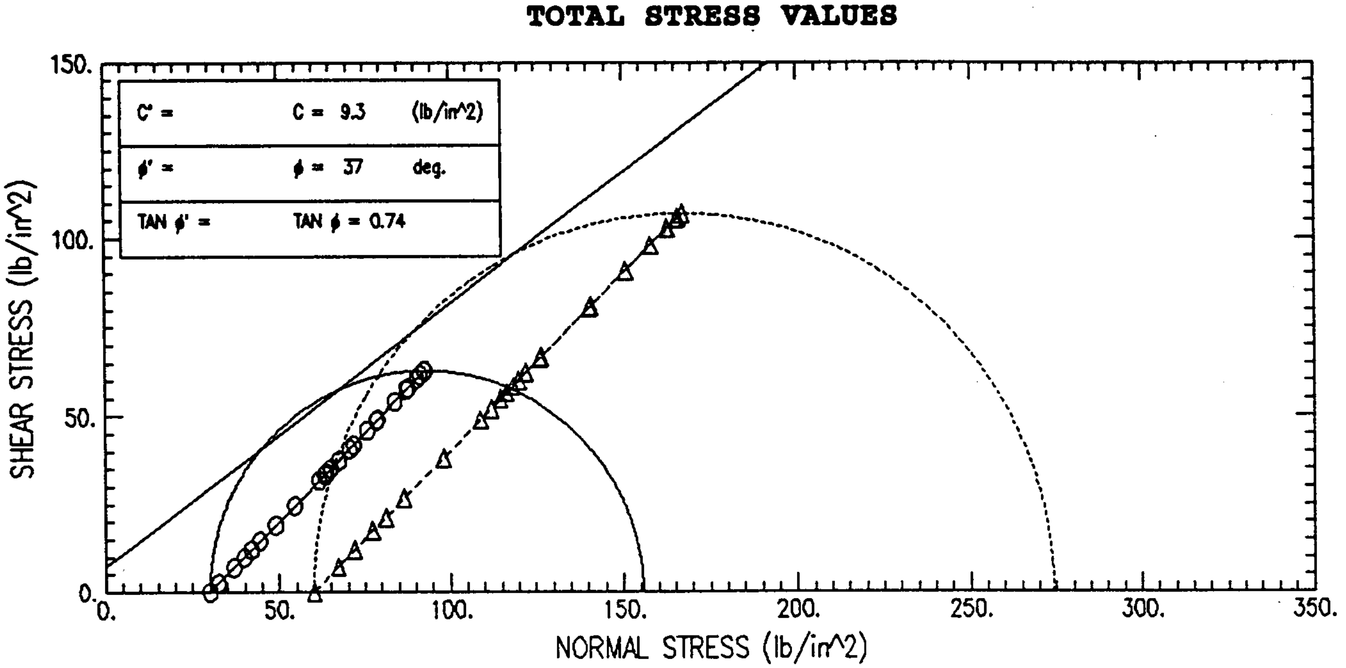
Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-4
Sample No. : BOTTOM
Sample Type : SHELBY
Location : PICKLES BUTTE L/F- IDAHO
Test No. : GT4-BOTTOM
Test Date : 03/06/97
Depth : 15-17 FEET
Elevation : NA
Tested by : C. WASON
Checked by : C. CAPPS
Soil Description : LT. BRN CLAYEY FINE SA-SILT / CLAYEY SI-FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 15 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

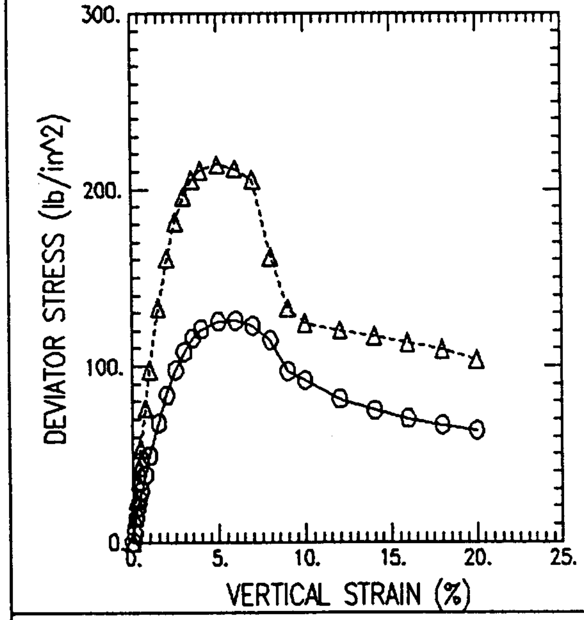
	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	1005.60	1005.40	0.00
WT CONTAINER + DRY SOIL (gm)	951.30	951.10	0.00
WT WATER (gm)	54.30	54.30	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	951.30	951.10	0.00
WATER CONTENT (%)	5.71	5.71	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	5.71	5.71
VOID RATIO	0.80	0.80
WET DENSITY (lb/ft^3)	99.66	99.66
DRY DENSITY (lb/ft^3)	94.28	94.28
DEGREE OF SATURATION (%)	19.40	19.40

Maximum Shear Stress = 16.23 (lb/in^2) at a Vertical Strain of 3.01 %



Failure Criteria: Peak Deviator Stress



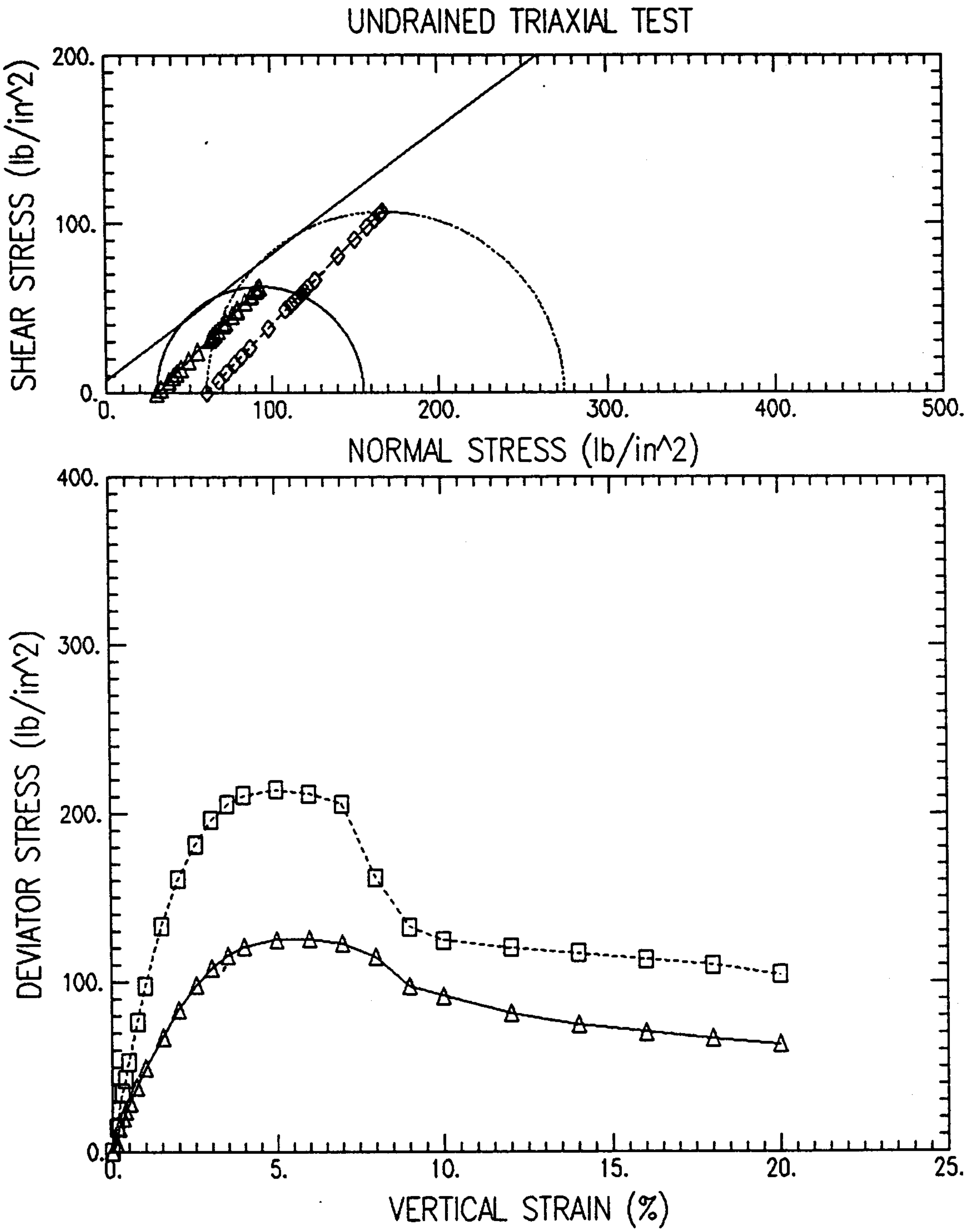
	SYMBOL	○	△		
	TEST NO.	GT4-30A	GT4-30B		
INITIAL	WATER CONTENT (%)	6.23	5.85		
	DRY DENSITY (lb/ft^3)	82.52	84.87		
	SATURATION (%)	16.05	15.92		
	VOID RATIO	1.057	1.000		
BEFORE SHEAR	WATER CONTENT (%)	6.23	5.85		
	DRY DENSITY (lb/ft^3)	82.52	84.87		
	SATURATION (%)	16.05	15.92		
	VOID RATIO	1.057	1.000		
	BACK PRESS. (lb/in^2)	0.00	0.00		
	MINOR PRIN. STRESS (lb/in^2)	30.00	60.00		
	MAX. DEV. STRESS (lb/in^2)	125.58	214.14		
	TIME TO FAILURE (min)				
	RATE OF STRAIN INCR (%/min)	0.00	0.00		
	INITIAL DIAMETER (in)	1.43	1.43		
	INITIAL HEIGHT (in)	3.50	3.58		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND 2) LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN TUBE	TYPE OF TEST UNDRAINED

REMARKS:	PROJECT C. E. L. P.O. #3689				
1) TXUU TEST WITH CONFINING PRESSURE OF 30 PSI					
2) TXUU TEST WITH CONFINING PRESSURE OF 60 PSI	BORING NO. GT-4	SAMPLE NO.	A @30 PSI	B @60 PSI	
	TECH. C. WASON	DEPTH/ELEV	30-31 FEET	30-31 FEET	
	LABORATORY	DATE	03/11/97	03/11/97	
	TRIAXIAL COMPRESSION TEST REPORT				



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-4	A @30 PSI	30-31 FEET	GT4-30A	GT4A-30.UU
GT-4	B @60 PSI	30-31 FEET	GT4-30B	GT4B-30.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:13:31 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-30A
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : A @30 PSI
Depth : 30-31 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 30 PSI

Height : 3.504 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.63 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	30.00	30.00
2)	0.004	0.11	1.61	0.00	8.04	8.04	5.00	35.00	35.00
3)	0.007	0.20	1.61	0.00	22.41	22.41	13.90	43.90	43.90
4)	0.011	0.31	1.61	0.00	32.17	32.17	19.93	49.93	49.93
5)	0.014	0.40	1.62	0.00	39.07	39.07	24.16	54.16	54.16
6)	0.018	0.51	1.62	0.00	47.11	47.11	29.08	59.08	59.08
7)	0.026	0.74	1.63	0.00	62.05	62.05	38.16	68.16	68.16
8)	0.035	1.00	1.63	0.00	80.43	80.43	49.25	79.25	79.25
9)	0.053	1.51	1.65	0.00	111.45	111.45	67.65	97.65	97.65
10)	0.070	2.00	1.66	0.00	139.03	139.03	83.69	113.69	113.69
11)	0.088	2.51	1.68	0.00	164.31	164.31	98.03	128.03	128.03
12)	0.105	3.00	1.69	0.00	182.69	182.69	108.07	138.07	138.07
13)	0.123	3.51	1.71	0.00	197.63	197.63	115.86	145.86	145.86
14)	0.140	4.00	1.72	0.00	207.97	207.97	120.87	150.87	150.87
15)	0.175	4.99	1.75	0.00	219.46	219.46	125.27	155.27	155.27
16)	0.210	5.99	1.78	0.00	224.06	224.06	125.58	155.58	155.58
17)	0.245	6.99	1.82	0.00	223.48	223.48	122.94	152.94	152.94
18)	0.280	7.99	1.85	0.00	212.57	212.57	114.73	144.73	144.73
19)	0.315	8.99	1.89	0.00	183.84	183.84	97.32	127.32	127.32
20)	0.350	9.99	1.93	0.00	176.95	176.95	91.84	121.84	121.84
21)	0.420	11.99	2.01	0.00	163.16	163.16	81.30	111.30	111.30
22)	0.491	14.01	2.10	0.00	156.84	156.84	74.85	104.85	104.85
23)	0.561	16.01	2.19	0.00	153.97	153.97	70.29	100.29	100.29
24)	0.631	18.01	2.29	0.00	152.82	152.82	66.59	96.59	96.59
25)	0.701	20.01	2.41	0.00	152.82	152.82	63.43	93.43	93.43

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-30A
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : A @30 PSI
Depth : 30-31 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 30 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	129.50	129.50	0.00
WT CONTAINER + DRY SOIL (gm)	121.90	121.90	0.00
WT WATER (gm)	7.60	7.60	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	121.90	121.90	0.00
WATER CONTENT (%)	6.23	6.23	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	6.23	6.23
VOID RATIO	1.06	1.06
WET DENSITY (lb/ft^3)	87.67	87.67
DRY DENSITY (lb/ft^3)	82.52	82.52
DEGREE OF SATURATION (%)	16.05	16.05

Maximum Shear Stress = 62.79 (lb/in^2) at a Vertical Strain of 5.99 %

Wed Mar 19 16:15:25 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-30B
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : 8 @60 PSI
Depth : 30-31 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 60 PSI

Height : 3.583 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 1.61 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 5.75 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	1.61	0.00	0.00	0.00	0.00	60.00	60.00
2)	0.004	0.11	1.61	0.00	22.98	22.98	14.28	74.28	74.28
3)	0.007	0.20	1.61	0.00	38.49	38.49	23.89	83.89	83.89
4)	0.011	0.31	1.61	0.00	56.30	56.30	34.88	94.88	94.88
5)	0.014	0.39	1.62	0.00	68.94	68.94	42.65	102.65	102.65
6)	0.018	0.50	1.62	0.00	86.18	86.18	53.21	113.21	113.21
7)	0.027	0.75	1.63	0.00	124.09	124.09	76.30	136.30	136.30
8)	0.036	1.00	1.63	0.00	159.71	159.71	97.78	157.78	157.78
9)	0.054	1.51	1.65	0.00	219.46	219.46	133.22	193.22	193.22
10)	0.072	2.01	1.66	0.00	267.72	267.72	161.12	221.12	221.12
11)	0.090	2.51	1.68	0.00	304.49	304.49	181.66	241.66	241.66
12)	0.107	2.99	1.69	0.00	331.49	331.49	196.13	256.13	256.13
13)	0.125	3.49	1.71	0.00	350.45	350.45	205.52	265.52	265.52
14)	0.143	3.99	1.72	0.00	362.51	362.51	210.71	270.71	270.71
15)	0.179	5.00	1.75	0.00	375.15	375.15	214.14	274.14	274.14
16)	0.215	6.00	1.78	0.00	378.02	378.02	211.84	271.84	271.84
17)	0.251	7.01	1.82	0.00	374.00	374.00	205.69	265.69	265.69
18)	0.287	8.01	1.85	0.00	299.89	299.89	161.80	221.80	221.80
19)	0.322	8.99	1.89	0.00	250.48	250.48	132.61	192.61	192.61
20)	0.358	9.99	1.93	0.00	239.57	239.57	124.33	184.33	184.33
21)	0.430	12.00	2.01	0.00	241.29	241.29	120.19	180.19	180.19
22)	0.502	14.01	2.10	0.00	244.74	244.74	116.80	176.80	176.80
23)	0.573	15.99	2.19	0.00	247.61	247.61	113.08	173.08	173.08
24)	0.645	18.00	2.29	0.00	251.63	251.63	109.67	169.67	169.67
25)	0.717	20.01	2.41	0.00	250.48	250.48	103.95	163.95	163.95

Wed Mar 19 16:15:25 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

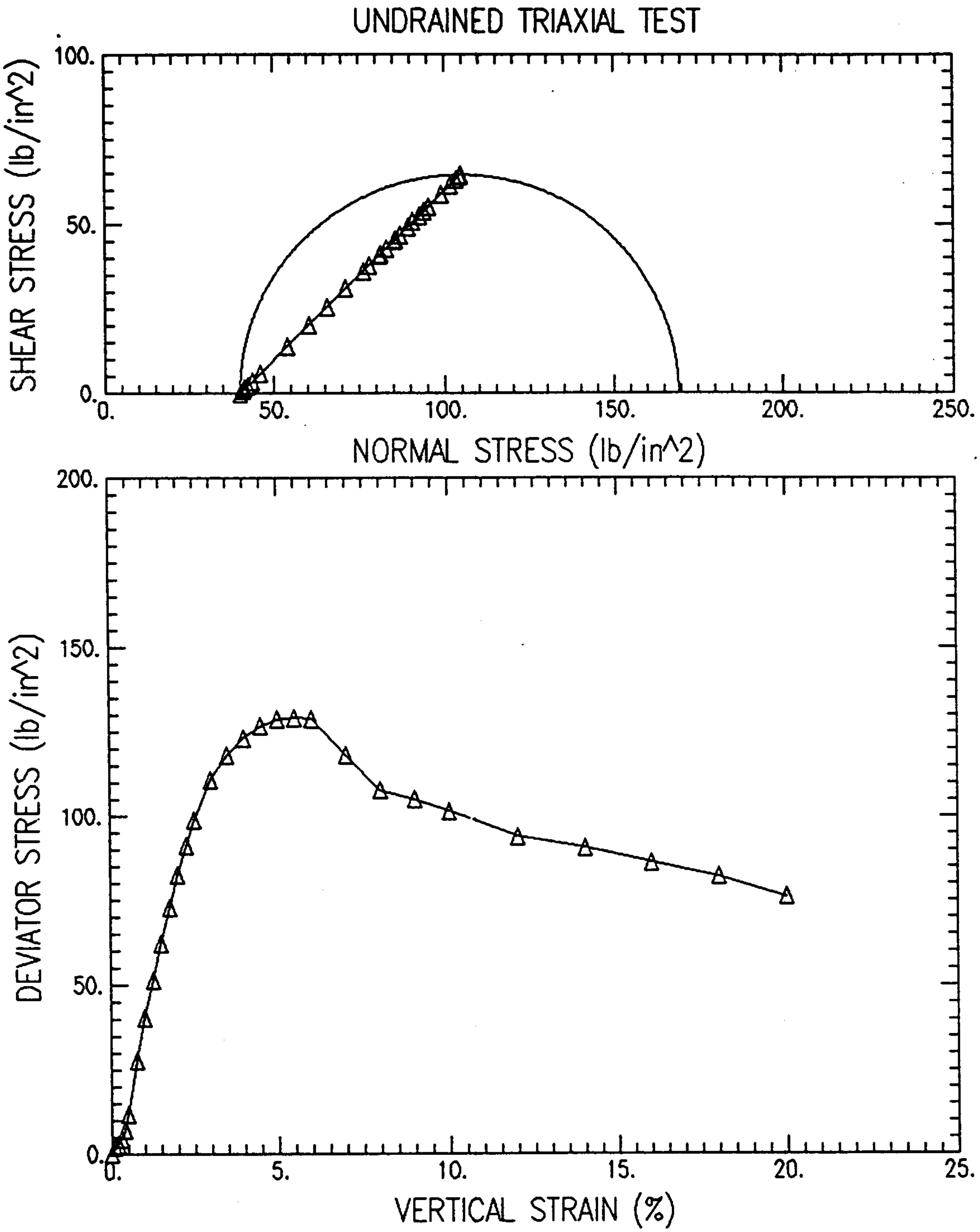
Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-30B
Boring No. : GT-4
Test Date : 03/11/97
Tested by : C. WASON
Sample No. : B @60 PSI
Depth : 30-31 FEET
Checked by : C. CAPPS
Sample Type : TUBE
Elevation : NA
Soil Description : LT. ORANGE BROWN FINE SA-SILT / SILTY FINE SAND
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 60 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	135.70	135.70	0.00
WT CONTAINER + DRY SOIL (gm)	128.20	128.20	0.00
WT WATER (gm)	7.50	7.50	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	128.20	128.20	0.00
WATER CONTENT (%)	5.85	5.85	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	5.85	5.85
VOID RATIO	1.00	1.00
WET DENSITY (lb/ft^3)	89.84	89.84
DRY DENSITY (lb/ft^3)	84.87	84.87
DEGREE OF SATURATION (%)	15.92	15.92

Maximum Shear Stress = 107.07 (lb/in^2) at a Vertical Strain of 5.00 %



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-4	@40 PSI	40-41 FEET	GT4-40	GT4-40.UU

Wed Mar 19 17:12:53 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-40
Boring No. : GT-4
Test Date : 03/06/97
Tested by : C. WASON
Sample No. : @40 PSI
Depth : 40-41 FEET
Checked by : C. CAPPS
Sample Type : SHELBY
Elevation : NA
Soil Description : BROWN SA-SILT / SI-SAND W/ IRON OXIDE STAIN & CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 40 PSI

Height : 5.984 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 6.42 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 38.44 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : None

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	6.42	0.00	0.00	0.00	0.00	40.00	40.00
2)	0.006	0.10	6.42	0.00	12.64	12.64	1.97	41.97	41.97
3)	0.012	0.20	6.42	0.00	18.38	18.38	2.86	42.86	42.86
4)	0.018	0.30	6.42	0.00	29.30	29.30	4.56	44.56	44.56
5)	0.024	0.40	6.42	0.00	44.81	44.81	6.98	46.98	46.98
6)	0.030	0.50	6.42	0.00	75.83	75.83	11.80	51.80	51.80
7)	0.045	0.75	6.42	0.00	179.24	179.24	27.90	67.90	67.90
8)	0.060	1.00	6.42	0.00	260.82	260.82	40.60	80.60	80.60
9)	0.075	1.25	6.42	0.00	330.91	330.91	51.51	91.51	91.51
10)	0.090	1.50	6.42	0.00	399.85	399.85	62.24	102.24	102.24
11)	0.105	1.75	6.42	0.00	467.64	467.64	72.80	112.80	112.80
12)	0.120	2.01	6.42	0.00	530.84	530.84	82.63	122.63	122.63
13)	0.135	2.26	6.42	0.00	584.84	584.84	91.04	131.04	131.04
14)	0.150	2.51	6.42	0.00	634.25	634.25	98.73	138.73	138.73
15)	0.180	3.01	6.42	0.00	712.38	712.38	110.89	150.89	150.89
16)	0.209	3.49	6.42	0.00	758.34	758.34	118.05	158.05	158.05
17)	0.239	3.99	6.42	0.00	791.66	791.66	123.23	163.23	163.23
18)	0.269	4.50	6.42	0.00	814.07	814.07	126.72	166.72	166.72
19)	0.299	5.00	6.42	0.00	826.71	826.71	128.69	168.69	168.69
20)	0.329	5.50	6.42	0.00	830.73	830.73	129.32	169.32	169.32
21)	0.359	6.00	6.42	0.00	827.85	827.85	128.87	168.87	168.87
22)	0.419	7.00	6.42	0.00	758.34	758.34	118.05	158.05	158.05
23)	0.479	8.00	6.42	0.00	692.27	692.27	107.76	147.76	147.76
24)	0.538	8.99	6.42	0.00	675.04	675.04	105.08	145.08	145.08
25)	0.598	9.99	6.42	0.00	652.63	652.63	101.59	141.59	141.59
26)	0.718	12.00	6.42	0.00	603.23	603.23	93.90	133.90	133.90
27)	0.838	14.00	6.42	0.00	581.97	581.97	90.59	130.59	130.59
28)	0.957	15.99	6.42	0.00	553.82	553.82	86.21	126.21	126.21
29)	1.077	18.00	6.42	0.00	527.39	527.39	82.10	122.10	122.10
30)	1.197	20.00	6.42	0.00	488.33	488.33	76.02	116.02	116.02

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT4-40
Boring No. : GT-4
Test Date : 03/06/97
Tested by : C. WASON
Sample No. : @40 PSI
Depth : 40-41 FEET
Checked by : C. CAPPS
Sample Type : SHELBY
Elevation : NA
Soil Description : BROWN SA-SILT / SI-SAND W/ IRON OXIDE STAIN & CLAY
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 40 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	906.90	904.40	0.00
WT CONTAINER + DRY SOIL (gm)	851.50	849.20	0.00
WT WATER (gm)	55.40	55.20	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	851.50	849.20	0.00
WATER CONTENT (%)	6.51	6.50	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	6.51	6.51
VOID RATIO	1.01	1.01
WET DENSITY (lb/ft^3)	89.88	89.88
DRY DENSITY (lb/ft^3)	84.39	84.39
DEGREE OF SATURATION (%)	17.50	17.50

Maximum Shear Stress = 64.66 (lb/in^2) at a Vertical Strain of 5.50 %

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 429-430 FT
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN SILTY CLAY
Remarks : 429-430 FEET

Depth : 429-430 FEET
Test Date : 07/02/97
Test Method : ASTM D4318/422

Filename : PB2-430
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 10	16.22	27.09	24.95	24.51

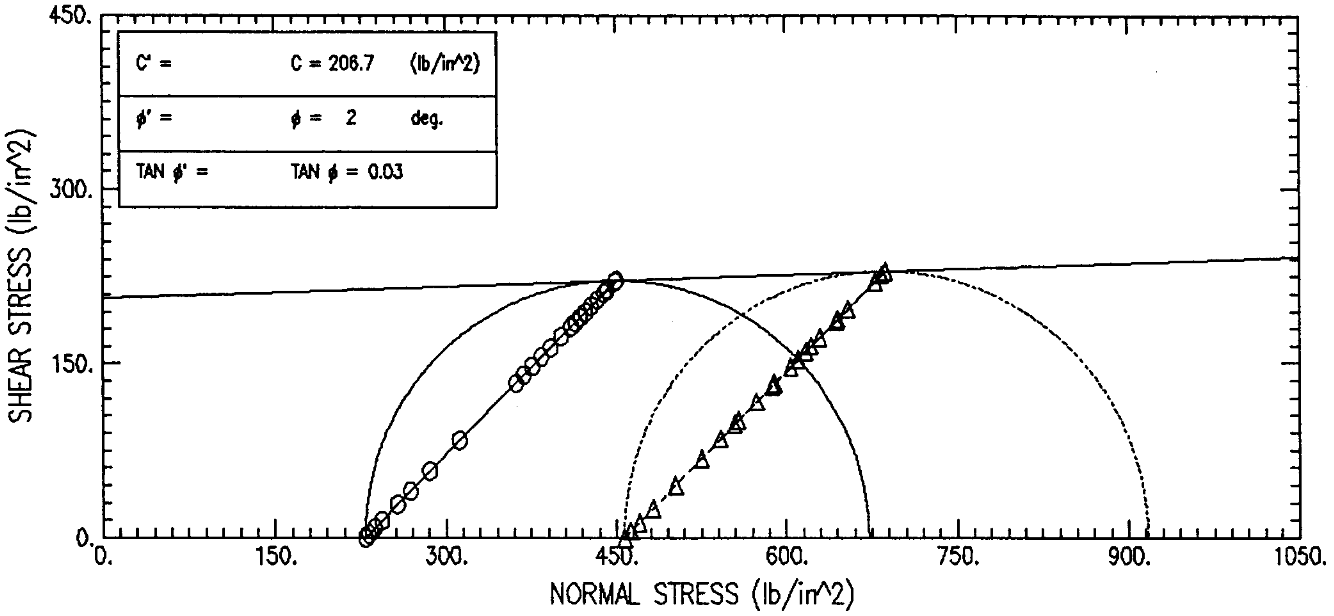
Plastic Limit = 24.51

Liquid Limit

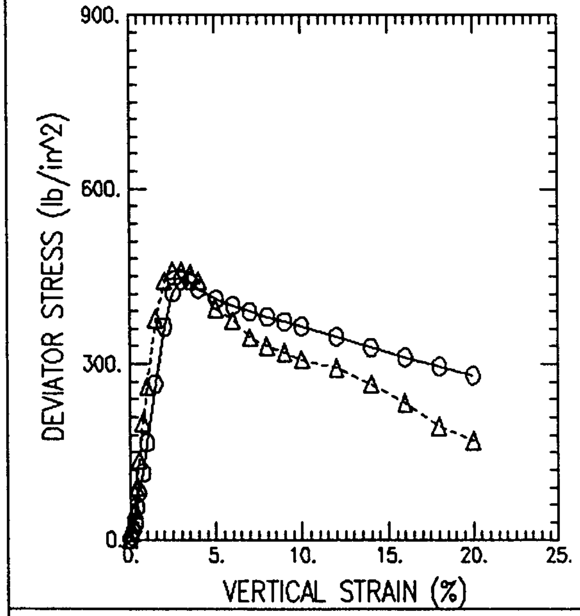
Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) 8	11.11	27.18	22.01	30	47.43
2) F	10.81	28.50	22.69	24	48.91
3) 90	11.13	28.49	22.64	17	50.83

Liquid Limit = 48.57
Plastic Index = 24.06

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		○	Δ		
TEST NO.		PB2-228	PB2-457		
INITIAL	WATER CONTENT (%)	21.88	22.92		
	DRY DENSITY (lb/ft^3)	93.08	92.53		
	SATURATION (%)	71.94	74.39		
	VOID RATIO	0.830	0.841		
BEFORE SHEAR	WATER CONTENT (%)	21.88	22.92		
	DRY DENSITY (lb/ft^3)	93.08	92.53		
	SATURATION (%)	71.94	74.39		
	VOID RATIO	0.830	0.841		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		228.50	457.00		
MAX. DEV. STRESS (lb/in^2)		443.71	459.76		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		2.14	2.15		
INITIAL HEIGHT (in)		3.03	3.74		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT 2) LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT

LL 50.19	PL 25.08	PI 25.11	GS 2.73	TYPE OF SPECIMEN CORE	TYPE OF TEST UNDRAINED

REMARKS:

1)

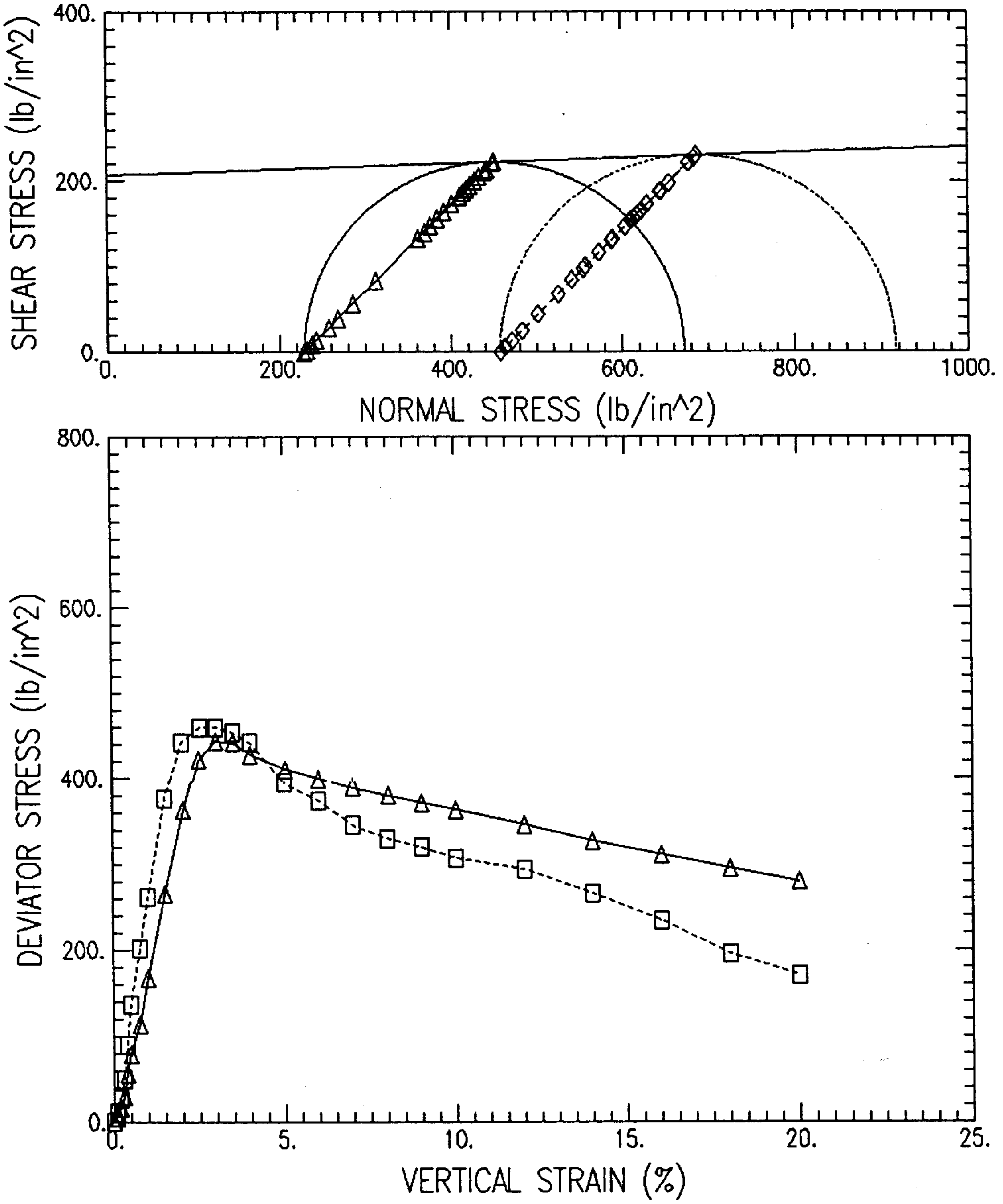
2)

PROJECT HOLLADAY ENGINEERING CO.

BORING NO. PB-2	SAMPLE NO.	228.5 PSI	457 PSI		
TECH. S. CAPPS	DEPTH/ELEV	456-457 FT	456-457 FT		
LABORATORY	DATE	06/25/97	06/25/97		

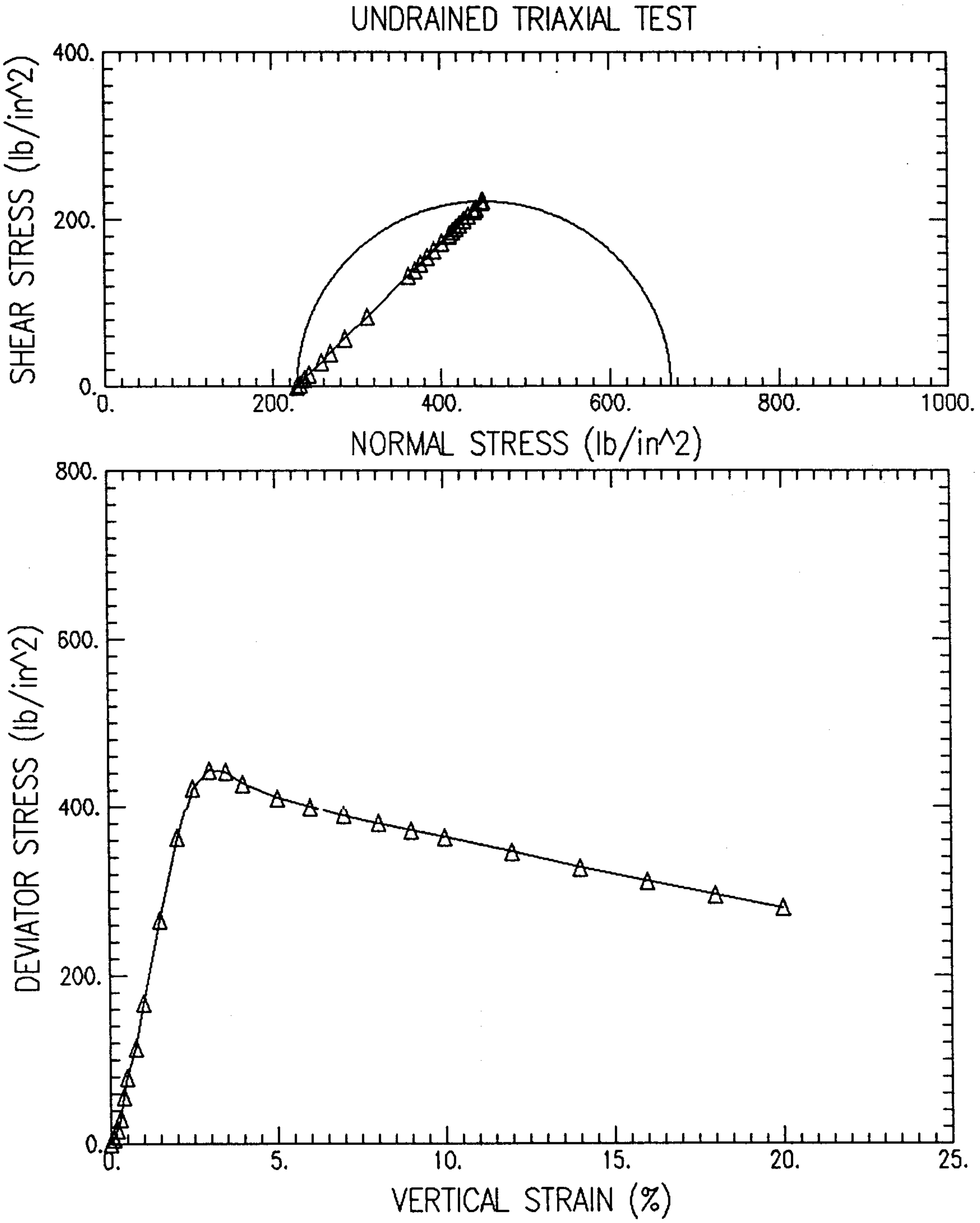
TRIAXIAL COMPRESSION TEST REPORT

UNDRAINED TRIAXIAL TEST



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	228.5 PSI	456-457 FT	PB2-228	PB2-228.UU
PB-2	457 PSI	456-457 FT	PB2-457	PB2-457.UU



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	228.5 PSI	456-457 FT	PB2-228	PB2-228.UU

Fri Jun 27 07:41:02 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-228
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 228.5 PSI
Depth : 456-457 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.73

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	324.30	324.30	0.00
WT CONTAINER + DRY SOIL (gm)	266.09	266.09	0.00
WT WATER (gm)	58.21	58.21	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	266.09	266.09	0.00
WATER CONTENT (%)	21.88	21.88	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	21.88	21.88
VOID RATIO	0.83	0.83
WET DENSITY (lb/ft^3)	113.44	113.44
DRY DENSITY (lb/ft^3)	93.08	93.08
DEGREE OF SATURATION (%)	71.94	71.94

Maximum Shear Stress = 221.85 (lb/in^2) at a Vertical Strain of 3.00 %

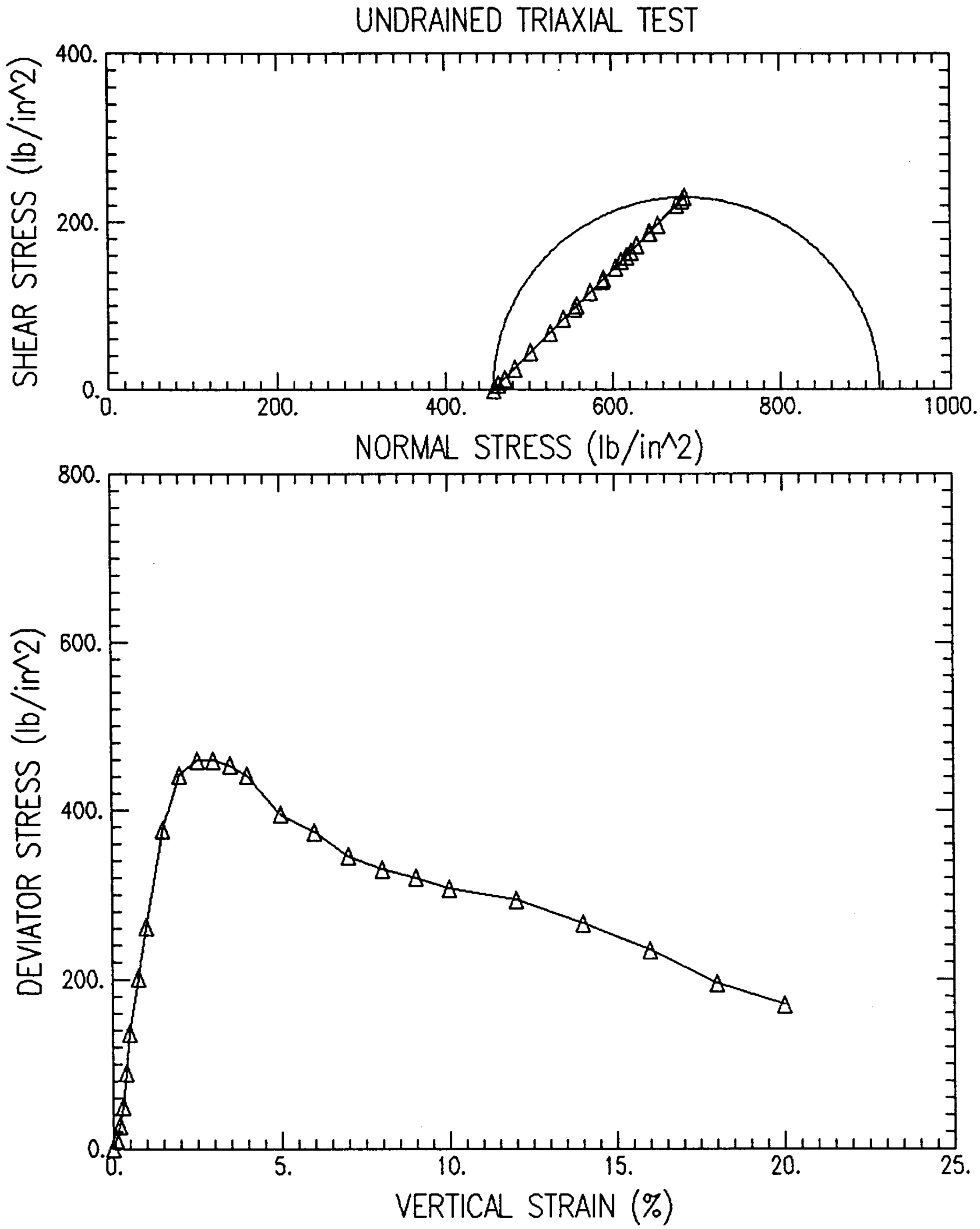
Fri Jun 27 07:41:02 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-228
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 228.5 PSI
Depth : 456-457 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.031 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.59 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 10.89 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.59	0.00	0.00	0.00	0.00	228.50	228.50
2)	0.003	0.10	3.60	0.00	20.79	20.79	5.78	234.28	234.28
3)	0.006	0.20	3.60	0.00	61.22	61.22	16.98	245.48	245.48
4)	0.009	0.30	3.61	0.00	105.11	105.11	29.11	257.61	257.61
5)	0.012	0.40	3.62	0.00	205.59	205.59	56.84	285.34	285.34
6)	0.015	0.49	3.62	0.00	288.75	288.75	79.70	308.20	308.20
7)	0.023	0.76	3.64	0.00	415.80	415.80	114.26	342.76	342.76
8)	0.030	0.99	3.65	0.00	609.84	609.84	166.93	395.43	395.43
9)	0.045	1.48	3.68	0.00	981.75	981.75	266.48	494.98	494.98
10)	0.061	2.01	3.72	0.00	1350.20	1350.20	363.18	591.68	591.68
11)	0.076	2.51	3.75	0.00	1582.35	1582.35	421.99	650.49	650.49
12)	0.091	3.00	3.78	0.00	1678.22	1678.22	443.71	672.21	672.21
13)	0.106	3.50	3.82	0.00	1686.30	1686.30	441.97	670.47	670.47
14)	0.121	3.99	3.85	0.00	1645.88	1645.88	427.60	656.10	656.10
15)	0.152	5.01	3.92	0.00	1610.07	1610.07	410.66	639.16	639.16
16)	0.182	6.00	3.99	0.00	1595.06	1595.06	399.51	628.01	628.01
17)	0.212	6.99	4.07	0.00	1583.51	1583.51	389.34	617.84	617.84
18)	0.243	8.02	4.15	0.00	1576.58	1576.58	380.16	608.66	608.66
19)	0.273	9.01	4.23	0.00	1571.96	1571.96	371.83	600.33	600.33
20)	0.303	10.00	4.31	0.00	1568.49	1568.49	363.81	592.31	592.31
21)	0.364	12.01	4.49	0.00	1556.94	1556.94	346.59	575.09	575.09
22)	0.424	13.99	4.69	0.00	1536.15	1536.15	327.86	556.36	556.36
23)	0.485	16.00	4.90	0.00	1525.76	1525.76	311.40	539.90	539.90
24)	0.546	18.01	5.13	0.00	1516.52	1516.52	295.35	523.85	523.85
25)	0.606	19.99	5.39	0.00	1510.74	1510.74	280.36	508.86	508.86



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	457 PSI	456-457 FT	PB2-457	PB2-457.UU

Fri Jun 27 07:42:26 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-457
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 457 PSI
Depth : 456-457 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.740 (in)
Area : 3.65 (in^2)
Volume : 13.64 (in^3)
Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)
Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.65	0.00	0.00	0.00	0.00	457.00	457.00
2)	0.004	0.11	3.65	0.00	42.74	42.74	11.70	468.70	468.70
3)	0.007	0.19	3.66	0.00	98.18	98.18	26.84	483.84	483.84
4)	0.011	0.29	3.66	0.00	184.80	184.80	50.42	507.42	507.42
5)	0.015	0.40	3.67	0.00	330.33	330.33	89.97	546.97	546.97
6)	0.019	0.51	3.68	0.00	502.43	502.43	136.60	593.60	593.60
7)	0.028	0.75	3.69	0.00	744.98	744.98	201.72	658.72	658.72
8)	0.037	0.99	3.71	0.00	970.20	970.20	261.64	718.64	718.64
9)	0.056	1.50	3.74	0.00	1409.10	1409.10	376.73	833.73	833.73
10)	0.075	2.01	3.77	0.00	1668.98	1668.98	442.33	899.33	899.33
11)	0.094	2.51	3.81	0.00	1749.83	1749.83	459.70	916.70	916.70
12)	0.112	2.99	3.84	0.00	1764.84	1764.84	459.76	916.76	916.76
13)	0.131	3.50	3.87	0.00	1757.91	1757.91	453.88	910.88	910.88
14)	0.150	4.01	3.91	0.00	1726.73	1726.73	441.82	898.82	898.82
15)	0.187	5.00	3.98	0.00	1570.80	1570.80	394.82	851.82	851.82
16)	0.224	5.99	4.05	0.00	1516.52	1516.52	374.32	831.32	831.32
17)	0.262	7.01	4.13	0.00	1426.43	1426.43	345.46	802.46	802.46
18)	0.299	7.99	4.21	0.00	1390.62	1390.62	330.50	787.50	787.50
19)	0.337	9.01	4.29	0.00	1374.45	1374.45	320.27	777.27	777.27
20)	0.374	10.00	4.38	0.00	1346.73	1346.73	307.73	764.73	764.73
21)	0.449	12.01	4.56	0.00	1340.96	1340.96	294.12	751.12	751.12
22)	0.524	14.01	4.76	0.00	1265.88	1265.88	266.05	723.05	723.05
23)	0.598	15.99	4.97	0.00	1163.09	1163.09	233.93	690.93	690.93
24)	0.673	17.99	5.21	0.00	1017.56	1017.56	195.33	652.33	652.33
25)	0.748	20.00	5.47	0.00	929.78	929.78	169.96	626.96	626.96

Fri Jun 27 07:42:26 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-457
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 457 PSI
Depth : 456-457 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0

Plastic Limit : 0

Specific Gravity : 2.73

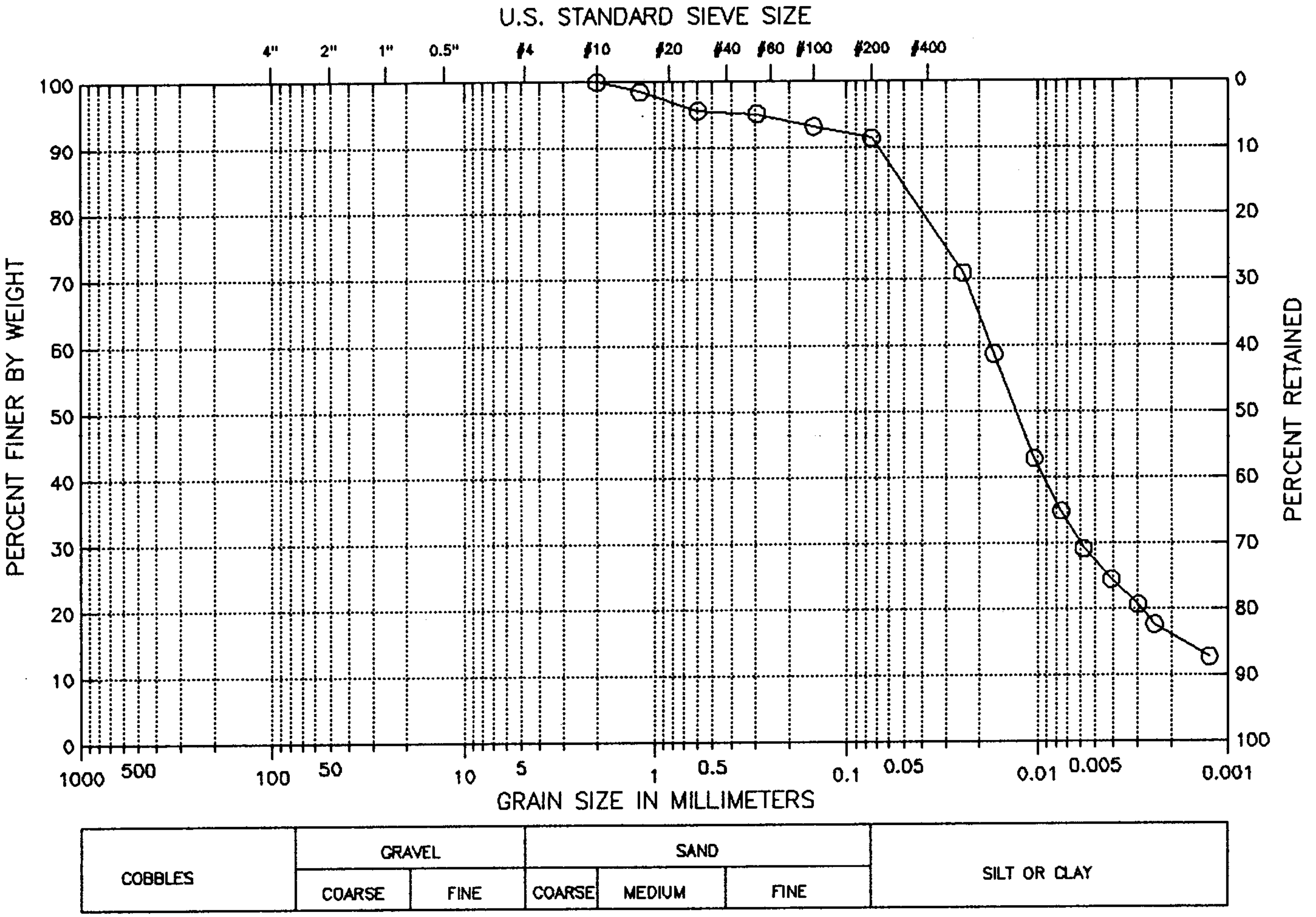
	WATER CONTENT BEFORE TEST	WATER CONTENT AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	407.22	407.22	0.00
WT CONTAINER + DRY SOIL (gm)	331.30	331.30	0.00
WT WATER (gm)	75.92	75.92	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	331.30	331.30	0.00
WATER CONTENT (%)	22.92	22.92	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	22.92	22.92
VOID RATIO	0.84	0.84
WET DENSITY (lb/ft^3)	113.74	113.74
DRY DENSITY (lb/ft^3)	92.53	92.53
DEGREE OF SATURATION (%)	74.39	74.39

Maximum Shear Stress = 229.88 (lb/in^2) at a Vertical Strain of 2.99 %

Boring No. : PB-2
Sample No.: 456-457
Tested by : C. WASON
Filename : PB2-456

Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Tue Jul 01 1997



Classification :
(CH) fat clay
Visual Description :
GRAY BROWN SILTY CLAY WITH FINE SAND

Remarks :
456-457 FEET

Figure 1

Woodward-Clyde

Tue Jul 01 12:59:04 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 456-457
Depth : 456-457 FEET
Test Date : 06/30/97
Test Method : ASTM D4318/422
Filename : PB2-456
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAY BROWN SILTY CLAY WITH FINE SAND
Remarks : 456-457 FEET

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 70 gm
Specific Gravity = 2.73

Hydroscopic Moisture Content :
Weight of Wet Soil = 70 gm
Weight of Dry Soil = 66.37 gm
Moisture Content = 0.0546934

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	56.00	22.40	47.80	0.024	71	0.024
5.00	47.80	22.40	39.60	0.017	59	0.017
16.00	37.20	22.20	28.91	0.010	43	0.010
33.00	32.00	21.80	23.53	0.008	35	0.008
60.00	28.20	21.70	19.68	0.006	29	0.006
122.00	24.80	22.10	16.47	0.004	24	0.004
240.00	22.20	22.20	13.91	0.003	21	0.003
360.00	20.00	22.60	11.90	0.002	18	0.002
1440.00	17.00	21.90	8.57	0.001	13	0.001

FINE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#10	0.079	2.00	0.00	0.00	100
#16	0.047	1.19	0.98	0.98	99
#30	0.023	0.60	1.91	2.89	96
#50	0.012	0.30	0.32	3.21	95
#100	0.006	0.15	1.31	4.52	93
#200	0.003	0.07	1.14	5.66	91
Pan			60.71	66.37	0

Total Wet Weight of Sample = 66.37
Total Dry Weight of Sample = 66.37
Moisture Content = 0.0546934

D85 : 0.0522 mm
D60 : 0.0175 mm
D50 : 0.0129 mm
D30 : 0.0060 mm
D15 : 0.0017 mm
D10 : 0.0009 mm

Soil Classification
ASTM Group Symbol : CH
ASTM Group Name : fat clay
AASHTO Group Symbol : A-7-6(28)
AASHTO Group Name : Clayey Soils

ATTERBERG LIMITS

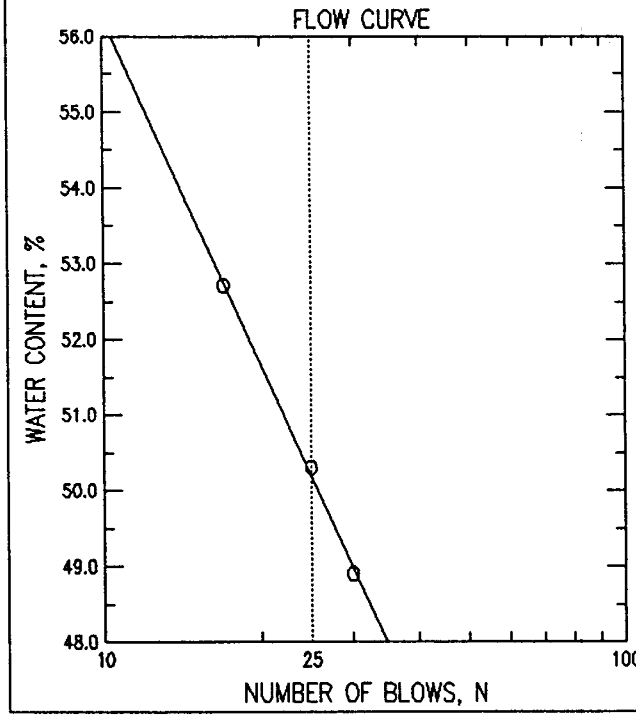
PROJECT HOLLADAY ENGINEERING CO. 030496	PROJECT NUMBER 971144NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL		CHECKED BY S. CAPPS	SAMPLE NUMBER 456-457
SAMPLE DESCRIPTION GRAY BROWN SILTY CLAY WITH FINE SAND		DATE Tue Jul 01 1997	FILENAME PB2-456

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	0	17	55		
WT. WET SOIL + TARE	27.25	28.3	26.88		
WT. DRY SOIL + TARE	21.89	22.44	21.44		
WT. WATER	5.36	5.86	5.44		
TARE WT.	10.93	10.79	11.12		
WT. DRY SOIL	10.96	11.65	10.32		
WATER CONTENT, W_N (%)	48.91	50.30	52.71		
NUMBER OF BLOWS, N	30	25	17		
ONE-POINT LIQUID LIMIT, LL	50.00	50.30	50.31		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	6				
WT. WET SOIL + TARE	26.9				
WT. DRY SOIL + TARE	24.67				
WT. WATER	2.23				
TARE WT.	15.78				
WT. DRY SOIL	8.89				
WATER CONTENT (%)	25.08				



SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	
LIQUID LIMIT, LL	50.2
PLASTIC LIMIT, PL	25.1
PLASTICITY INDEX, PI	25.1
LIQUIDITY INDEX, LI*	

*LI = (W − PL)/PI

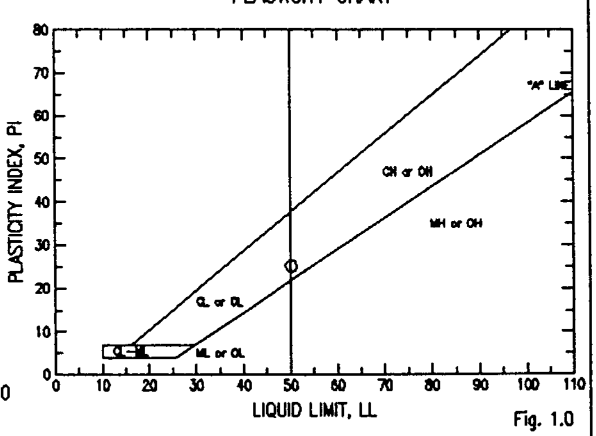


Fig. 1.0

Tue Jul 01 12:59:04 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 456-457
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAY BROWN SILTY CLAY WITH FINE SAND
Remarks : 456-457 FEET

Depth : 456-457 FEET
Test Date : 06/30/97
Test Method : ASTM D4318/422

Filename : PB2-456
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 6	15.78	26.90	24.67	25.08

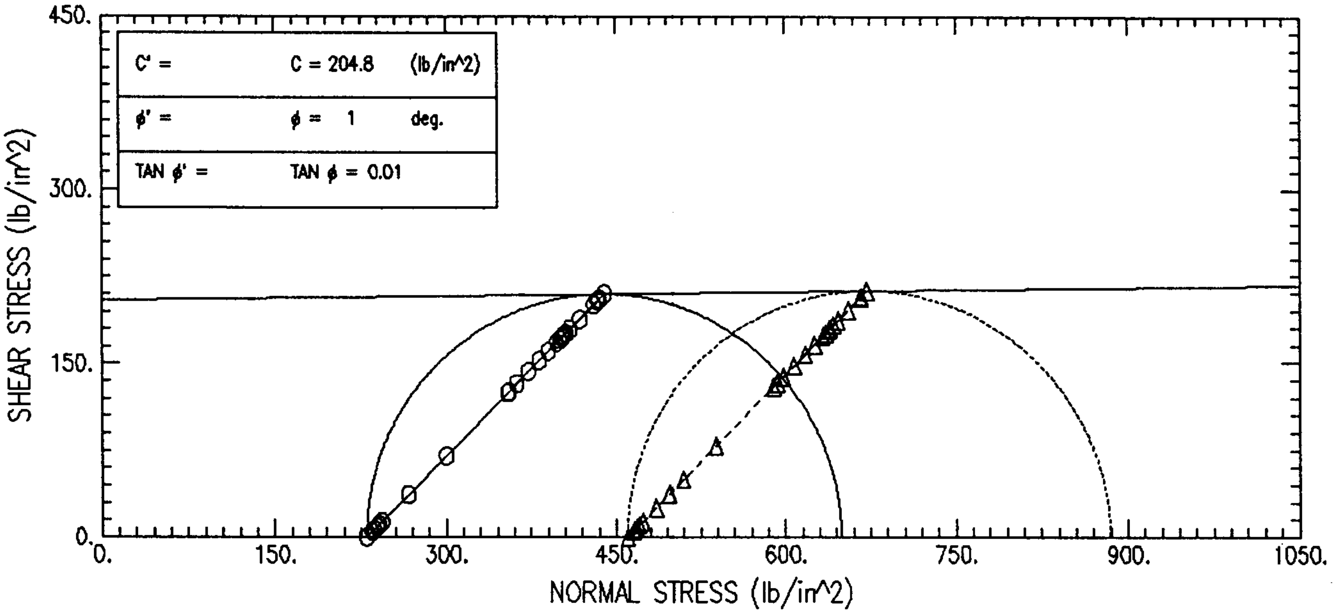
Plastic Limit = 25.08

Liquid Limit

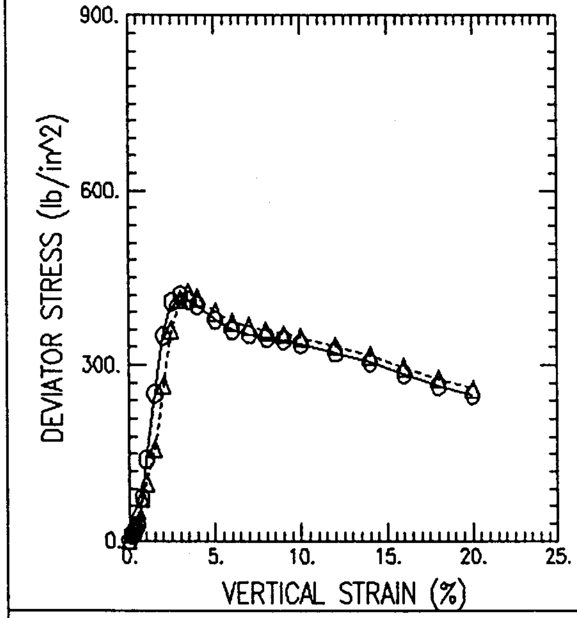
Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) 0	10.93	27.25	21.89	30	48.91
2) 17	10.79	28.30	22.44	25	50.30
3) 55	11.12	26.88	21.44	17	52.71

Liquid Limit = 50.19
Plastic Index = 25.11

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		O	Δ		
TEST NO.		PB2-230	PB2-460		
INITIAL	WATER CONTENT (%)	22.50	22.66		
	DRY DENSITY (lb/ft^3)	93.27	89.19		
	SATURATION (%)	74.32	67.97		
	VOID RATIO	0.827	0.910		
BEFORE SHEAR	WATER CONTENT (%)	22.50	22.66		
	DRY DENSITY (lb/ft^3)	93.27	89.19		
	SATURATION (%)	74.32	67.97		
	VOID RATIO	0.827	0.910		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		230.00	460.00		
MAX. DEV. STRESS (lb/in^2)		419.14	424.22		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		2.14	2.18		
INITIAL HEIGHT (in)		3.96	3.98		

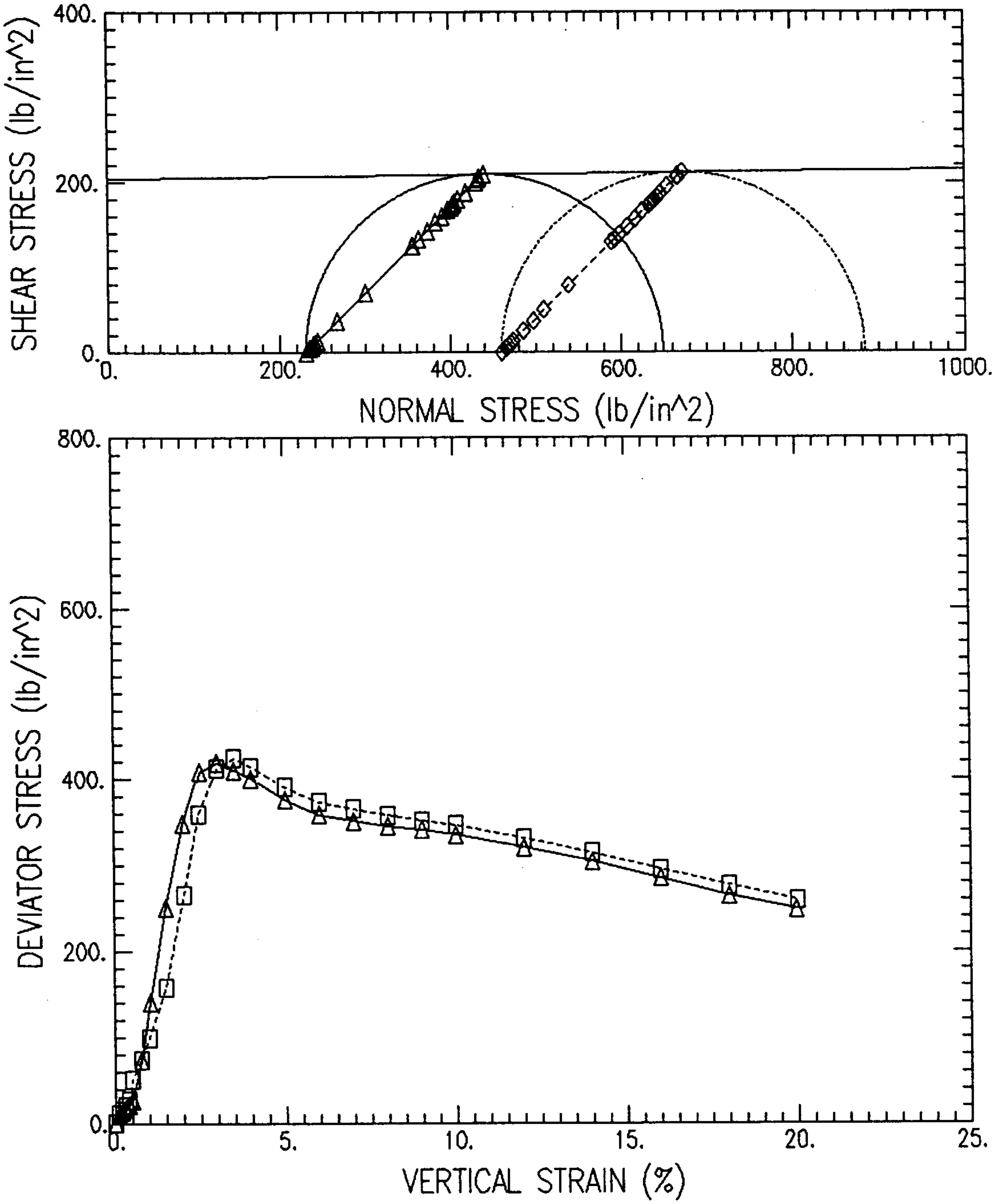
CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT 2) LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT

LL 49.21	PL 25.51	PI 23.70	GS 2.73	TYPE OF SPECIMEN CORE		TYPE OF TEST UNDRAINED	
REMARKS:				PROJECT HOLLADAY ENGINEERING CO.			
1)							
2)				BORING NO. PB-2	SAMPLE NO.	230 PSI	460 PSI
				TECH. S. CAPPS	DEPTH/ELEV	458-460 FT	458-460 FT
				LABORATORY	DATE	06/25/97	06/26/97

TRIAXIAL COMPRESSION TEST REPORT

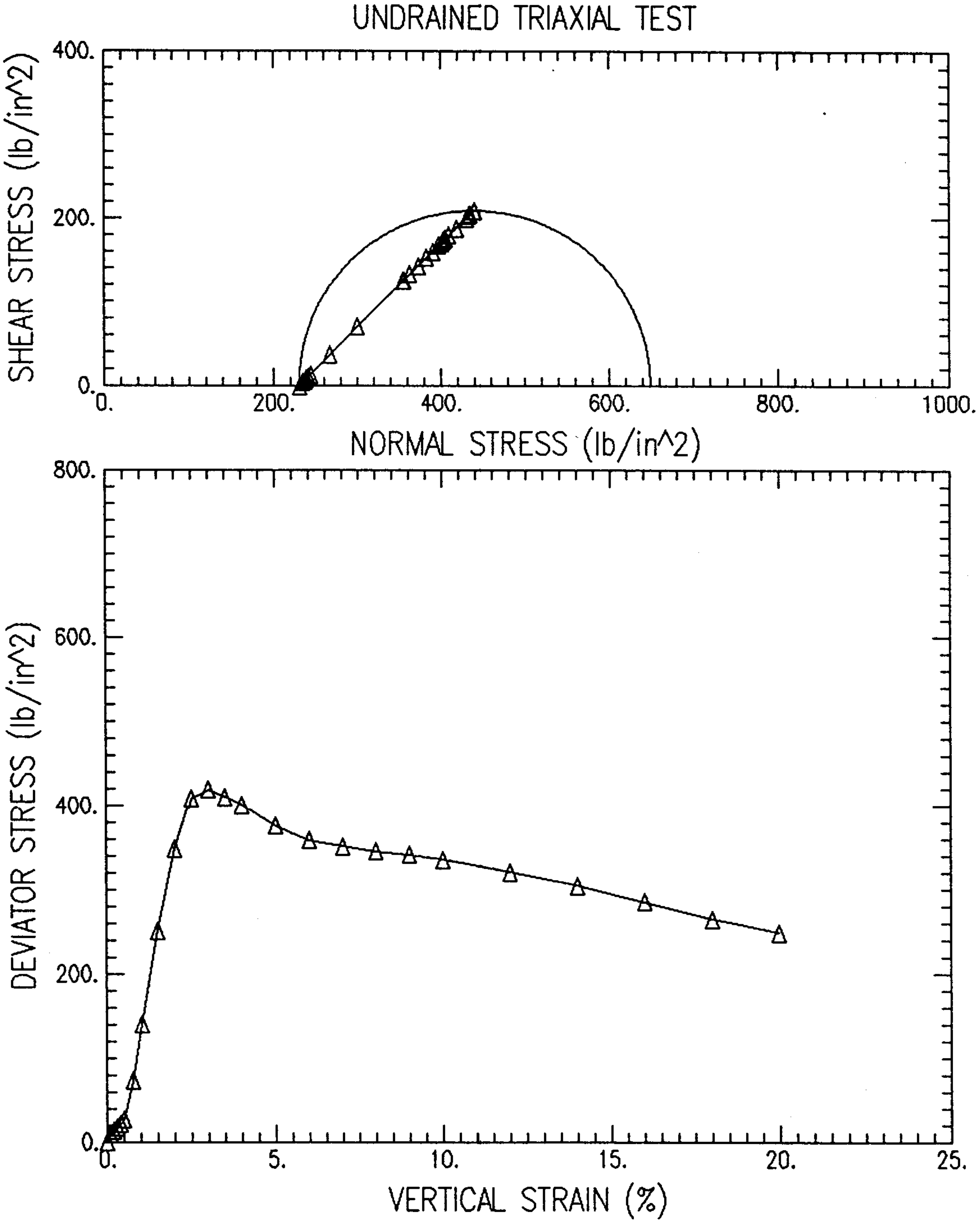
UNDRAINED TRIAXIAL TEST



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	230 PSI	458-460 FT	PB2-230	PB2-230.UU
PB-2	460 PSI	458-460 FT	PB2-460	PB2-460.UU

Woodward-Clyde



Project Name : HOLLADAY ENGINEERING CO.				
Boring No:	Sample No	Depth	Test No	Filename
PB-2	230 PSI	458-460 FT	PB2-230	PB2-230.UU

Fri Jun 27 07:43:17 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-230
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 230 PSI
Depth : 458-460 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.957 (in)
Area : 3.59 (in^2)
Volume : 14.19 (in^3)
Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)
Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.59	0.00	0.00	0.00	0.00	230.00	230.00
2)	0.004	0.10	3.59	0.00	33.50	33.50	9.32	239.32	239.32
3)	0.008	0.20	3.60	0.00	48.51	48.51	13.48	243.48	243.48
4)	0.012	0.30	3.60	0.00	65.84	65.84	18.27	248.27	248.27
5)	0.016	0.40	3.61	0.00	76.23	76.23	21.11	251.11	251.11
6)	0.020	0.51	3.62	0.00	97.02	97.02	26.83	256.83	256.83
7)	0.030	0.76	3.63	0.00	265.65	265.65	73.14	303.14	303.14
8)	0.040	1.01	3.65	0.00	512.82	512.82	140.60	370.60	370.60
9)	0.059	1.49	3.68	0.00	924.00	924.00	251.27	481.27	481.27
10)	0.079	2.00	3.71	0.00	1293.60	1293.60	348.73	578.73	578.73
11)	0.099	2.50	3.74	0.00	1526.91	1526.91	408.04	638.04	638.04
12)	0.119	3.01	3.78	0.00	1582.35	1582.35	419.14	649.14	649.14
13)	0.138	3.49	3.81	0.00	1562.72	1562.72	410.45	640.45	640.45
14)	0.158	3.99	3.84	0.00	1539.62	1539.62	400.77	630.77	630.77
15)	0.198	5.00	3.91	0.00	1472.63	1472.63	376.41	606.41	606.41
16)	0.237	5.99	3.98	0.00	1429.89	1429.89	358.94	588.94	588.94
17)	0.277	7.00	4.06	0.00	1428.74	1428.74	351.94	581.94	581.94
18)	0.317	8.01	4.14	0.00	1431.05	1431.05	345.78	575.78	575.78
19)	0.356	9.00	4.22	0.00	1440.29	1440.29	341.42	571.42	571.42
20)	0.396	10.01	4.30	0.00	1444.91	1444.91	335.72	565.72	565.72
21)	0.475	12.00	4.48	0.00	1437.98	1437.98	320.77	550.77	550.77
22)	0.554	14.00	4.68	0.00	1426.43	1426.43	304.96	534.96	534.96
23)	0.633	16.00	4.89	0.00	1395.24	1395.24	285.34	515.34	515.34
24)	0.712	17.99	5.12	0.00	1357.13	1357.13	264.96	494.96	494.96
25)	0.791	19.99	5.38	0.00	1339.80	1339.80	249.14	479.14	479.14

UNDRAINED TRIAXIAL COMPRESSION TEST

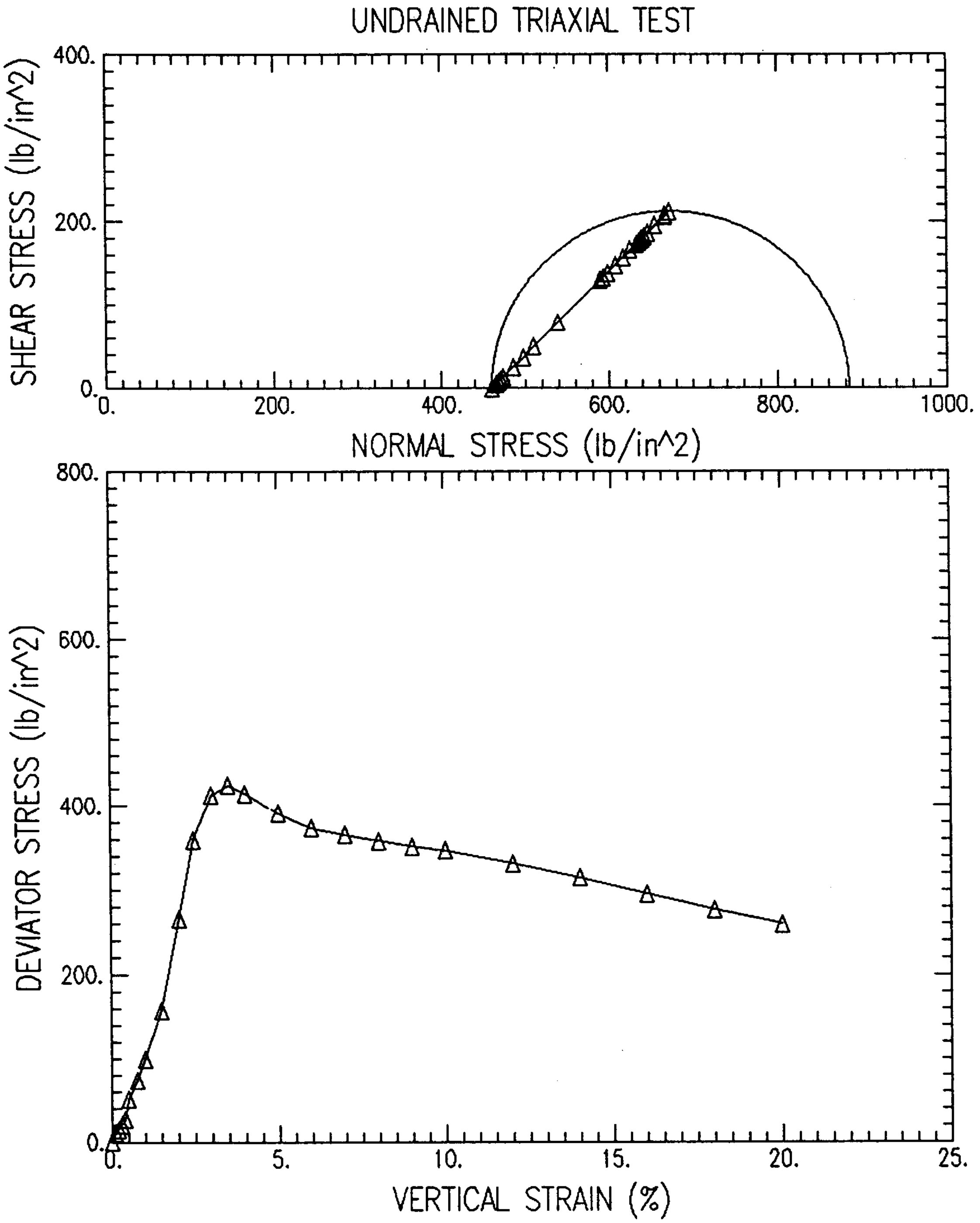
Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-230
Boring No. : PB-2
Test Date : 06/25/97
Tested by : S. CAPPS
Sample No. : 230 PSI
Depth : 458-460 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.73

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	425.20	425.20	0.00
WT CONTAINER + DRY SOIL (gm)	347.10	347.10	0.00
WT WATER (gm)	78.10	78.10	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	347.10	347.10	0.00
WATER CONTENT (%)	22.50	22.50	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	22.50	22.50
VOID RATIO	0.83	0.83
WET DENSITY (lb/ft^3)	114.25	114.25
DRY DENSITY (lb/ft^3)	93.27	93.27
DEGREE OF SATURATION (%)	74.32	74.32

Maximum Shear Stress = 209.57 (lb/in^2) at a Vertical Strain of 3.01 %



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	460 PSI	458-460 FT	PB2-460	PB2-460.UU

Fri Jun 27 07:48:05 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-460
Boring No. : PB-2
Test Date : 06/26/97
Tested by : S. CAPPS
Sample No. : 460 PSI
Depth : 458-460 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.976 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.75 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 14.89 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.75	0.00	0.00	0.00	0.00	460.00	460.00
2)	0.004	0.10	3.75	0.00	41.58	41.58	11.08	471.08	471.08
3)	0.008	0.20	3.76	0.00	58.91	58.91	15.67	475.67	475.67
4)	0.012	0.30	3.76	0.00	78.54	78.54	20.86	480.86	480.86
5)	0.016	0.40	3.77	0.00	100.49	100.49	26.64	486.64	486.64
6)	0.020	0.50	3.78	0.00	190.58	190.58	50.45	510.45	510.45
7)	0.030	0.75	3.79	0.00	280.67	280.67	73.98	533.98	533.98
8)	0.040	1.01	3.81	0.00	378.84	378.84	99.44	559.44	559.44
9)	0.060	1.51	3.84	0.00	607.53	607.53	158.10	618.10	618.10
10)	0.080	2.01	3.88	0.00	1032.57	1032.57	266.40	726.40	726.40
11)	0.098	2.46	3.91	0.00	1404.48	1404.48	359.53	819.53	819.53
12)	0.119	2.99	3.94	0.00	1626.24	1626.24	412.47	872.47	872.47
13)	0.139	3.50	3.98	0.00	1687.46	1687.46	424.22	884.22	884.22
14)	0.159	4.00	4.01	0.00	1663.20	1663.20	414.40	874.40	874.40
15)	0.199	5.01	4.09	0.00	1597.37	1597.37	390.85	850.85	850.85
16)	0.239	6.01	4.16	0.00	1554.63	1554.63	373.43	833.43	833.43
17)	0.278	6.99	4.24	0.00	1550,01	1550.01	365.56	825.56	825.56
18)	0.318	8.00	4.32	0.00	1547.70	1547.70	358.09	818.09	818.09
19)	0.358	9.00	4.41	0.00	1551.17	1551.17	351.95	811.95	811.95
20)	0.398	10.01	4.50	0.00	1560.41	1560.41	347.06	807.06	807.06
21)	0.477	12.00	4.68	0.00	1553.48	1553.48	331.78	791.78	791.78
22)	0.557	14.01	4.89	0.00	1540.77	1540.77	315.28	775.28	775.28
23)	0.636	16.00	5.11	0.00	1509.59	1509.59	295.55	755.55	755.55
24)	0.716	18.01	5.35	0.00	1481.87	1481.87	276.86	736.86	736.86
25)	0.795	19.99	5.62	0.00	1459.92	1459.92	259.85	719.85	719.85

Fri Jun 27 07:48:05 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.   Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA   Test No. : PB2-460
Boring No. : PB-2   Test Date : 06/26/97   Tested by : S. CAPPS
Sample No. : 460 PSI   Depth : 458-460 FT   Checked by : C. WASON
Sample Type : CORE   Elevation :
Soil Description : LT. GRAYISH BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0   Plastic Limit : 0   Specific Gravity : 2.73

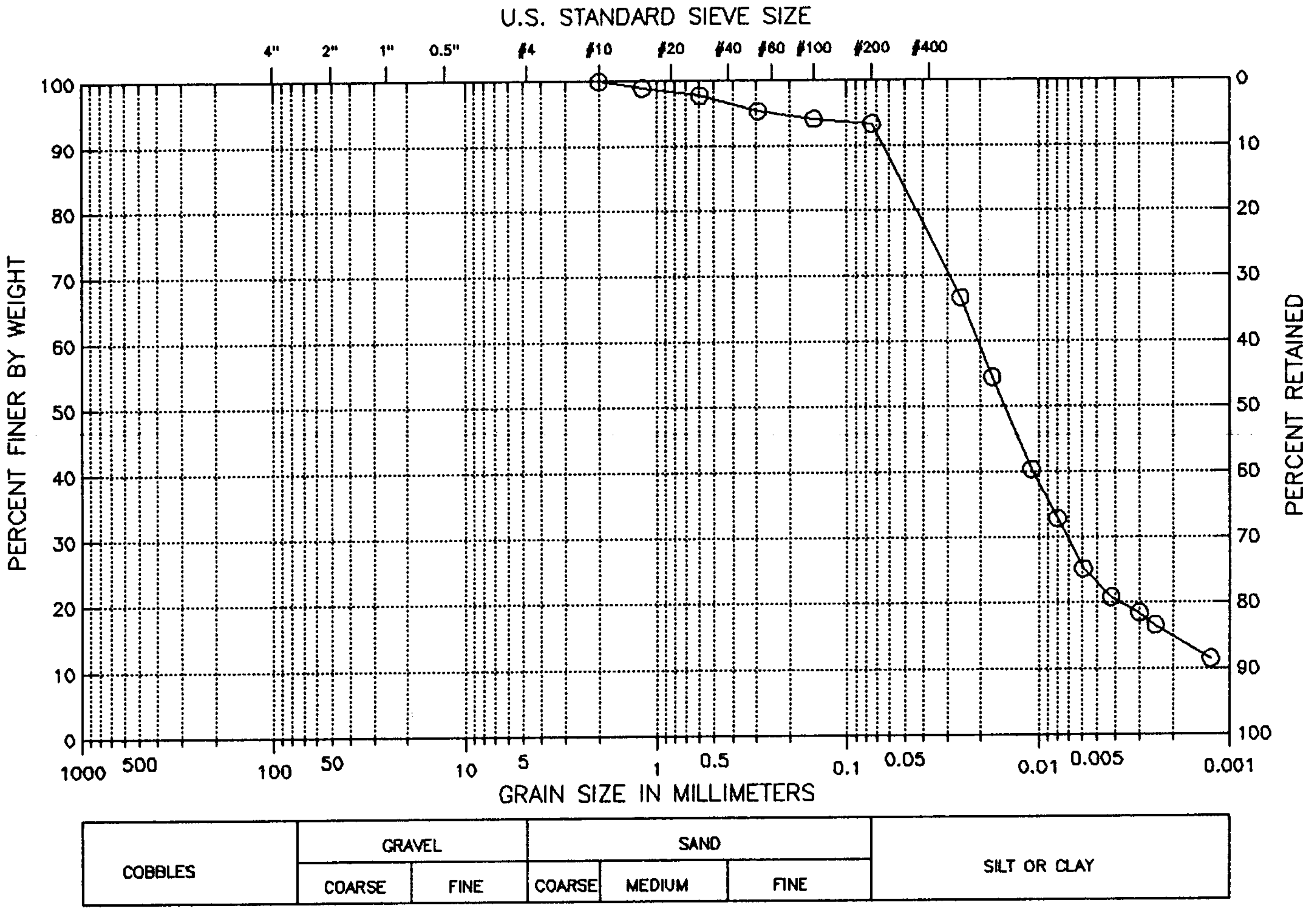
		WATER CONTENT	
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	427.70	427.70	0.00
WT CONTAINER + DRY SOIL (gm)	348.70	348.70	0.00
WT WATER (gm)	79.00	79.00	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	348.70	348.70	0.00
WATER CONTENT (%)	22.66	22.66	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	22.66	22.66
VOID RATIO	0.91	0.91
WET DENSITY (lb/ft^3)	109.40	109.40
DRY DENSITY (lb/ft^3)	89.19	89.19
DEGREE OF SATURATION (%)	67.97	67.97

Maximum Shear Stress = 212.11 (lb/in^2) at a Vertical Strain of 3.50 %

Boring No. : PB-2
Sample No.: 458-460
Tested by : C. WASON
Filename : PB2-460

Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Tue Jul 01 1997



Classification :
(CL) lean clay
Visual Description :
GRAYISH BROWN FINE SANDY SILTY LEAN CLAY

Remarks :
458–460 FEET

Figure 2

```
Tue Jul 01 12:59:29 1997                                                                    Page :  1

                                     GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO.  030496                         Filename : PB2-460
Project No. : 971144NA              Depth : 458-460 FEET           Elevation : NA
Boring No. : PB-2                   Test Date : 06/30/97           Tested by : C. WASON
Sample No. : 458-460                Test Method : ASTM D4318/422   Checked by : S. CAPPS
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN FINE SANDY SILTY LEAN CLAY
Remarks : 458-460 FEET

                                         HYDROMETER
Hydrometer ID : 1734
Weight of air-dried soil = 70 gm
Specific Gravity         = 2.73

Hydroscopic Moisture Content :
   Weight of Wet Soil = 70 gm
   Weight of Dry Soil = 64.7 gm
   Moisture Content   = 0.0819165

Elapsed        Reading        Temperature     Corrected      Particle       Percent        Adjusted
Time (min)                    (deg. C)        Reading        Size (mm)      Finer (%)      Particle Size
----------     ----------     ------------    ----------     ----------     ---------      -------------
      2.00          52.00            22.40         43.80          0.026            67            0.026
      5.00          44.00            22.40         35.80          0.017            54            0.017
     15.00          34.80            22.20         26.51          0.011            40            0.011
     30.00          30.00            22.00         21.62          0.008            33            0.008
     60.00          25.00            21.80         16.53          0.006            25            0.006
    120.00          22.00            22.10         13.67          0.004            21            0.004
    240.00          20.40            22.20         12.11          0.003            18            0.003
    360.00          19.00            22.60         10.90          0.002            17            0.002
   1440.00          16.00            21.80          7.53          0.001            11            0.001


                                    FINE SIEVE SET
Sieve          Sieve Openings             Weight        Cumulative            Percent
Mesh           Inches   Millimeters       Retained      Weight Retained       Finer
                                          (gm)          (gm)                  (%)
----------     ------   -----------       --------      ---------------       -------
#10             0.079          2.00           0.00                 0.00           100
#16             0.047          1.19           0.66                 0.66            99
#30             0.023          0.60           0.77                 1.43            98
#50             0.012          0.30           1.55                 2.98            95
#100            0.006          0.15           0.77                 3.75            94
#200            0.003          0.07           0.52                 4.27            93
Pan                                          60.43                64.70             0
     Total Wet Weight of Sample = 64.7
     Total Dry Weight of Sample = 64.7
     Moisture Content           = 0.0819165

  D85 : 0.0530 mm
  D60 : 0.0208 mm
  D50 : 0.0150 mm
  D30 : 0.0071 mm
  D15 : 0.0020 mm
  D10 : 0.0011 mm

  Soil Classification
         ASTM Group Symbol   : CL
         ASTM Group Name     : lean clay
         AASHTO Group Symbol : A-7-6(27)
         AASHTO Group Name   : Clayey Soils
```

ATTERBERG LIMITS

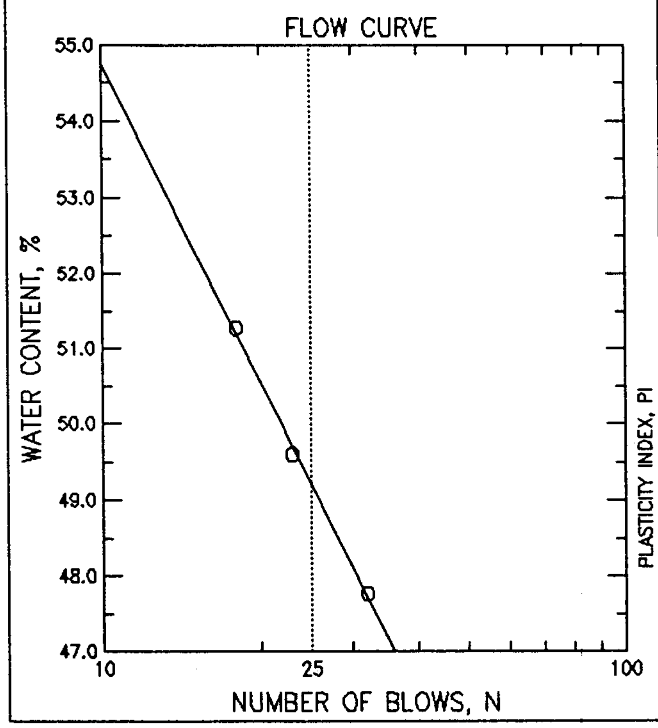
PROJECT HOLLADAY ENGINEERING CO. 030496	PROJECT NUMBER 971144NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL		CHECKED BY S. CAPPS	SAMPLE NUMBER 458-460
SAMPLE DESCRIPTION GRAYISH BROWN FINE SANDY SILTY LEAN CLAY		DATE Tue Jul 01 1997	FILENAME PB2-460

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	11	12	45		
WT. WET SOIL + TARE	27.25	27.63	27.93		
WT. DRY SOIL + TARE	21.91	22.1	22.07		
WT. WATER	5.34	5.53	5.86		
TARE WT.	10.73	10.95	10.64		
WT. DRY SOIL	11.18	11.15	11.43		
WATER CONTENT, W_N (%)	47.76	49.60	51.27		
NUMBER OF BLOWS, N	32	23	18		
ONE-POINT LIQUID LIMIT, LL	49.21	49.10	49.27		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	47				
WT. WET SOIL + TARE	27.35				
WT. DRY SOIL + TARE	24.97				
WT. WATER	2.38				
TARE WT.	15.64				
WT. DRY SOIL	9.33				
WATER CONTENT (%)	25.51				



SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	
LIQUID LIMIT, LL	49.2
PLASTIC LIMIT, PL	25.5
PLASTICITY INDEX, PI	23.7
LIQUIDITY INDEX, LI*	

*LI = (W − PL)/PI

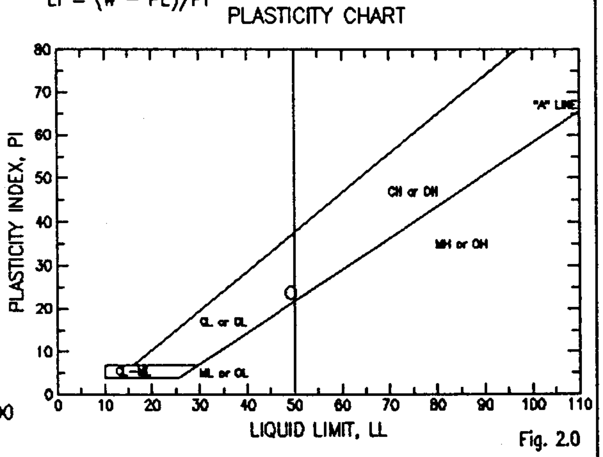


Fig. 2.0

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 458-460
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN FINE SANDY SILTY LEAN CLAY
Remarks : 458-460 FEET

Depth : 458-460 FEET
Test Date : 06/30/97
Test Method : ASTM D4318/422

Filename : PB2-460
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Plastic Limit

	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1)	47	15.64	27.35	24.97	25.51

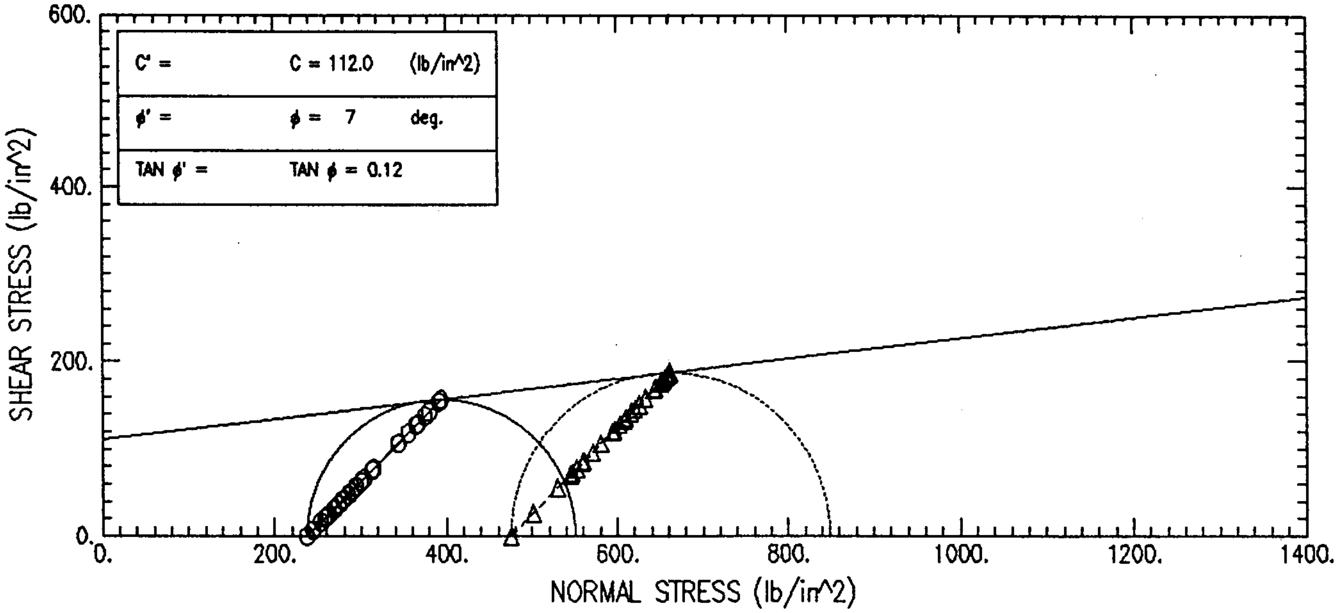
Plastic Limit = 25.51

Liquid Limit

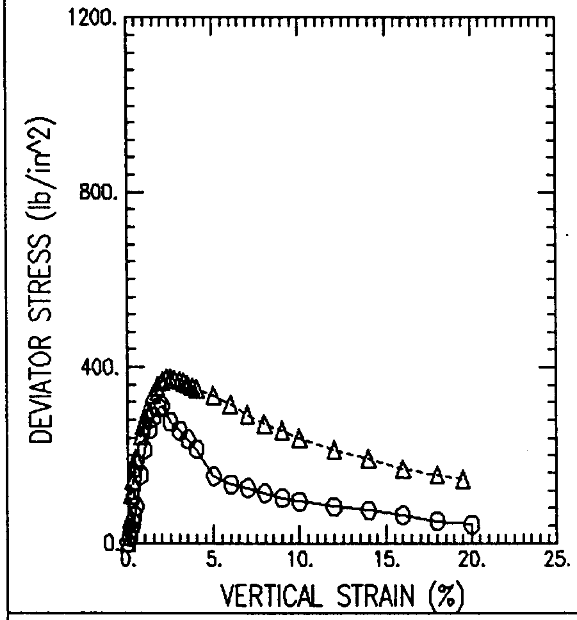
	Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1)	11	10.73	27.25	21.91	32	47.76
2)	12	10.95	27.63	22.10	23	49.60
3)	45	10.64	27.93	22.07	18	51.27

Liquid Limit = 49.21
Plastic Index = 23.70

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress

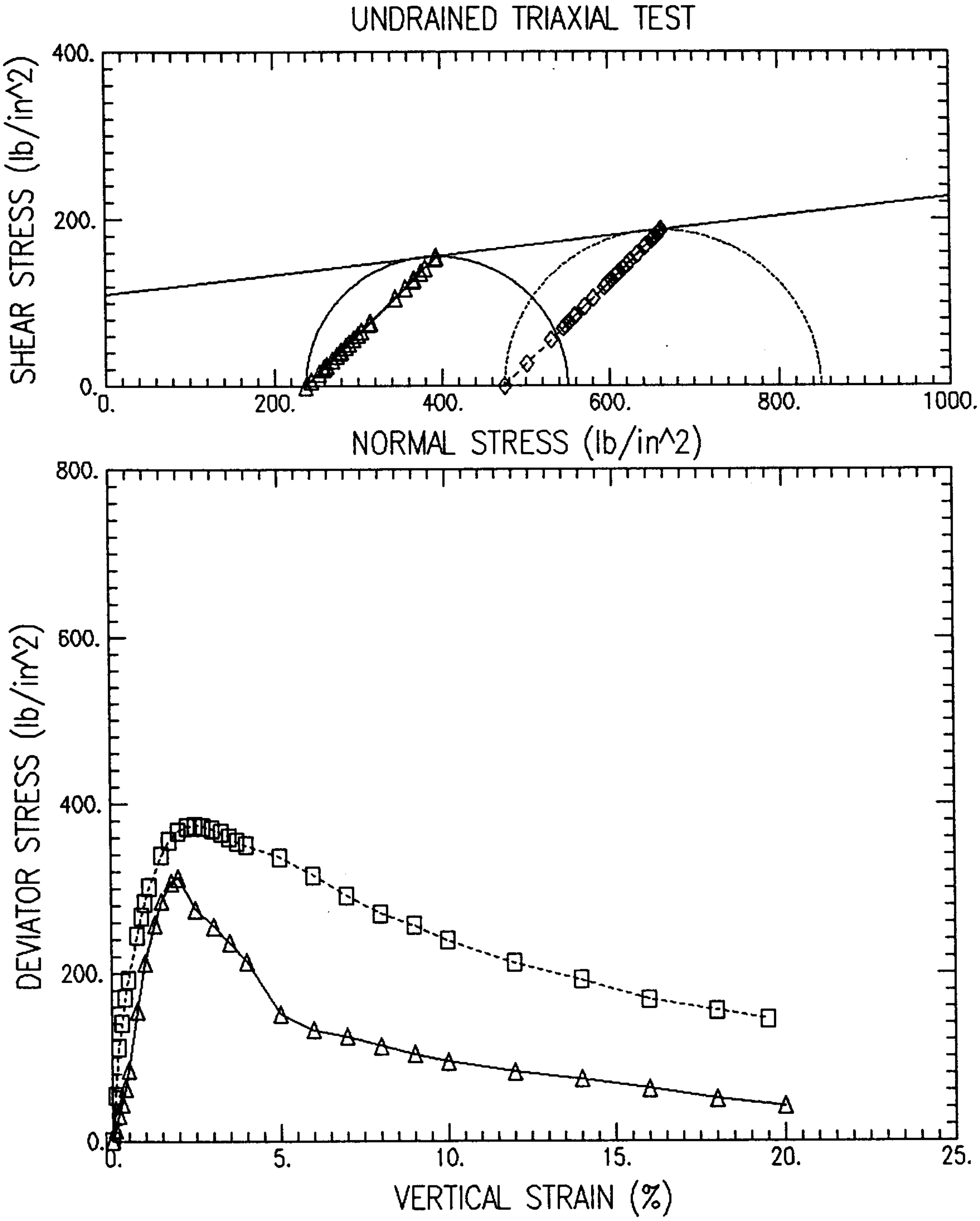


SYMBOL		○	△		
TEST NO.		PB2-237	PB2-475		
INITIAL	WATER CONTENT (%)	24.79	25.22		
	DRY DENSITY (lb/ft^3)	91.46	90.11		
	SATURATION (%)	78.47	77.33		
	VOID RATIO	0.863	0.890		
BEFORE SHEAR	WATER CONTENT (%)	24.79	25.22		
	DRY DENSITY (lb/ft^3)	91.46	90.11		
	SATURATION (%)	78.47	77.33		
	VOID RATIO	0.863	0.890		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		237.50	475.00		
MAX. DEV. STRESS (lb/in^2)		312.84	374.27		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		2.36	2.19		
INITIAL HEIGHT (in)		5.73	4.49		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) GRAYISH BROWN SI CLAY / CLAYEY SILT 2) GRAYISH BROWN SI CLAY / CLAYEY SILT

LL 54.76	PL 25.96	PI 28.80	GS 2.73	TYPE OF SPECIMEN CORE		TYPE OF TEST UNDRAINED		
REMARKS:				PROJECT HOLLADAY ENGINEERING CO.				
1)								
2)				BORING NO. PB-2	SAMPLE NO.	237.5 PSI	475 PSI	
				TECH. C. WASON	DEPTH/ELEV	474-475 FT	474-475 FT	
				LABORATORY	DATE	07/01/97	07/01/97	
				TRIAXIAL COMPRESSION TEST REPORT				



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	237.5 PSI	474-475 FT	PB2-237	PB2-237.UU
PB-2	475 PSI	474-475 FT	PB2-475	PB2-475.UU

Failure Criteria: Peak Deviator Stress

Thu Jul 03 15:45:46 1997 Page : 1

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-237
Boring No. : PB-2
Test Date : 07/01/97
Tested by : C. WASON
Sample No. : 237.5 PSI
Depth : 474-475 FT
Checked by : C. CAPPS
Sample Type : CORE
Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Height : 5.728 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 4.38 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 25.10 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	4.38	0.00	0.00	0.00	0.00	237.50	237.50
2)	0.006	0.10	4.39	0.00	57.75	57.75	13.16	250.66	250.66
3)	0.011	0.19	4.40	0.00	138.60	138.60	31.53	269.03	269.03
4)	0.017	0.30	4.40	0.00	196.35	196.35	44.59	282.09	282.09
5)	0.023	0.40	4.41	0.00	277.20	277.20	62.84	300.34	300.34
6)	0.029	0.51	4.42	0.00	371.91	371.91	84.16	321.66	321.66
7)	0.043	0.75	4.44	0.00	686.07	686.07	154.61	392.11	392.11
8)	0.057	1.00	4.46	0.00	947.10	947.10	212.55	450.05	450.05
9)	0.074	1.29	4.48	0.00	1157.31	1157.31	258.42	495.92	495.92
10)	0.086	1.50	4.49	0.00	1282.05	1282.05	285.25	522.75	522.75
11)	0.103	1.80	4.52	0.00	1390.62	1390.62	307.84	545.34	545.34
12)	0.115	2.01	4.53	0.00	1418.34	1418.34	312.84	550.34	550.34
13)	0.143	2.50	4.57	0.00	1258.95	1258.95	275.35	512.85	512.85
14)	0.173	3.02	4.61	0.00	1178.10	1178.10	255.32	492.82	492.82
15)	0.200	3.49	4.65	0.00	1099.56	1099.56	236.32	473.82	473.82
16)	0.229	4.00	4.69	0.00	1004.85	1004.85	214.03	451.53	451.53
17)	0.286	4.99	4.78	0.00	723.03	723.03	151.27	388.77	388.77
18)	0.344	6.01	4.87	0.00	644.49	644.49	132.36	369.86	369.86
19)	0.401	7.00	4.96	0.00	616.77	616.77	124.33	361.83	361.83
20)	0.458	8.00	5.06	0.00	571.73	571.73	113.08	350.58	350.58
21)	0.516	9.01	5.16	0.00	528.99	528.99	102.59	340.09	340.09
22)	0.573	10.00	5.26	0.00	496.65	496.65	94.44	331.94	331.94
23)	0.687	11.99	5.48	0.00	450.45	450.45	82.25	319.75	319.75
24)	0.802	14.00	5.72	0.00	421.58	421.58	73.76	311.26	311.26
25)	0.916	15.99	5.97	0.00	371.91	371.91	62.25	299.75	299.75
26)	1.031	18.00	6.26	0.00	311.85	311.85	49.82	287.32	287.32
27)	1.146	20.01	6.57	0.00	271.43	271.43	41.29	278.79	278.79

```
Thu Jul 03 15:45:46 1997

                              UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.  Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA              Test No. : PB2-237
Boring No. : PB-2                   Test Date : 07/01/97                Tested by : C. WASON
Sample No. : 237.5 PSI              Depth : 474-475 FT                  Checked by : C. CAPPS
Sample Type : CORE                  Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Liquid Limit : 54.76               Plastic Limit : 25.96              Specific Gravity : 2.73

                                                           WATER CONTENT
                                           BEFORE TEST      AFTER TEST         TRIMMINGS
CONTAINER NO.
WT CONTAINER + WET SOIL (gm)                 752.00           752.00              0.00
WT CONTAINER + DRY SOIL (gm)                 602.60           602.60              0.00
WT WATER (gm)                                149.40           149.40              0.00
WT CONTAINER (gm)                              0.00             0.00              0.00
WT DRY SOIL (gm)                             602.60           602.60              0.00
WATER CONTENT (%)                             24.79            24.79              0.00



                                                 INITIAL               AT CONSOLIDATION
WATER CONTENT (%)                                 24.79                      24.79
VOID RATIO                                         0.86                       0.86
WET DENSITY (lb/ft^3)                            114.14                     114.14
DRY DENSITY (lb/ft^3)                             91.46                      91.46
DEGREE OF SATURATION (%)                          78.47                      78.47

Maximum Shear Stress = 156.42 (lb/in^2) at a Vertical Strain of 2.01 %
```

Thu Jul 03 14:45:31 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 475 PSI
Sample Type : CORE
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Location : PICKLES BUTTE LANDFILL
Test No. : PB2-475
Test Date : 07/01/97
Depth : 474-475 FT
Elevation :

Tested by : C. WASON
Checked by : C. CAPPS

Height : 4.488 (in)
Area : 3.77 (in^2)
Volume : 16.91 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

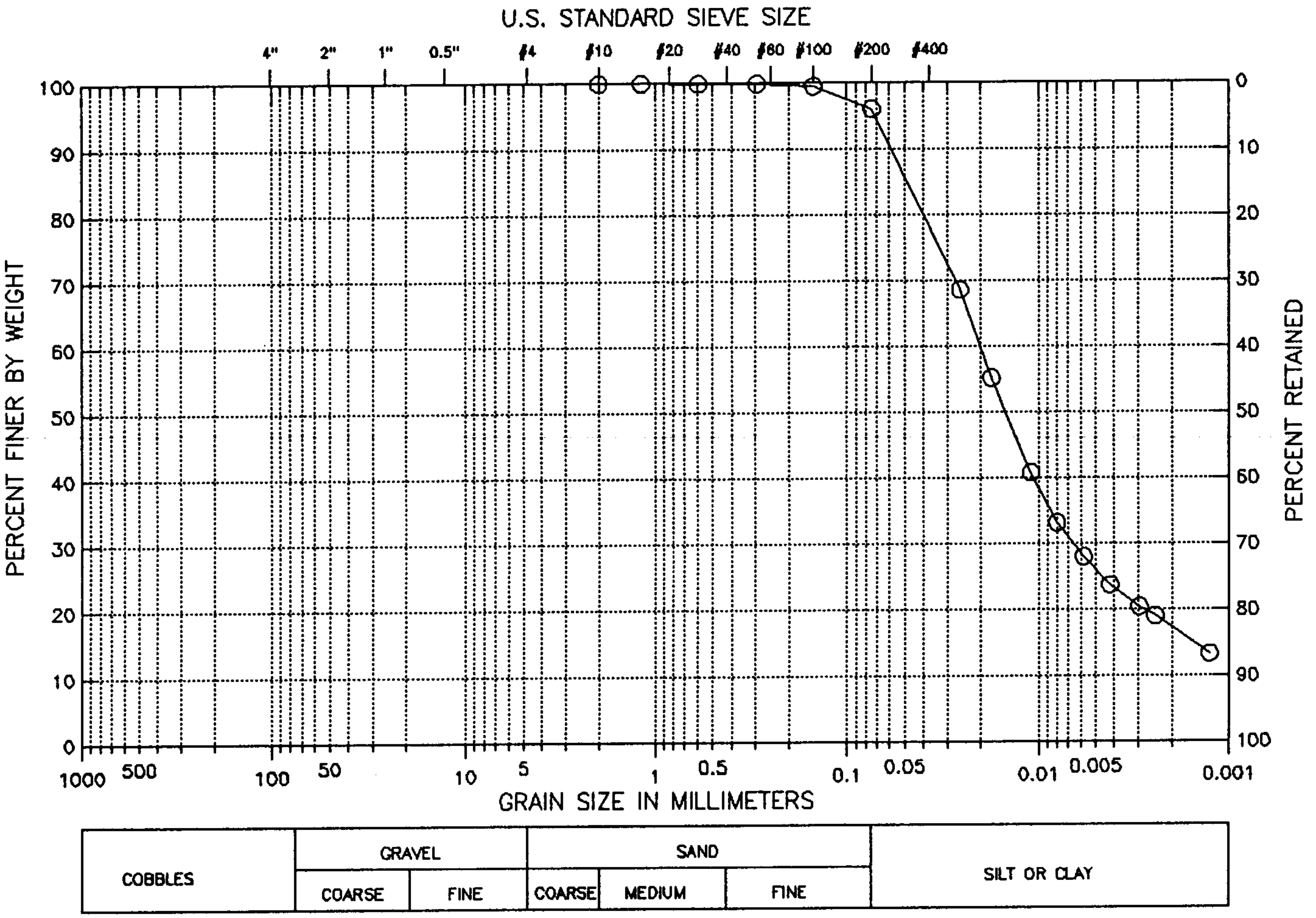
Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.77	0.00	0.00	0.00	0.00	475.00	475.00
2)	0.004	0.09	3.77	0.00	200.97	200.97	53.26	528.26	528.26
3)	0.009	0.20	3.78	0.00	418.11	418.11	110.59	585.59	585.59
4)	0.013	0.29	3.79	0.00	531.30	531.30	140.32	615.32	615.32
5)	0.018	0.40	3.79	0.00	647.96	647.96	170.81	645.81	645.81
6)	0.022	0.49	3.80	0.00	729.96	729.96	192.14	667.14	667.14
7)	0.034	0.76	3.82	0.00	930.93	930.93	243.94	718.94	718.94
8)	0.040	0.89	3.82	0.00	1022.18	1022.18	267.25	742.25	742.25
9)	0.045	1.00	3.83	0.00	1085.70	1085.70	283.32	758.32	758.32
10)	0.051	1.14	3.84	0.00	1158.47	1158.47	301.63	776.63	776.63
11)	0.067	1.49	3.86	0.00	1310.93	1310.93	339.25	814.25	814.25
12)	0.078	1.74	3.88	0.00	1382.54	1382.54	356.29	831.29	831.29
13)	0.090	2.01	3.90	0.00	1432.20	1432.20	367.39	842.39	842.39
14)	0.101	2.25	3.91	0.00	1461.08	1461.08	373.21	848.21	848.21
15)	0.112	2.50	3.93	0.00	1471.47	1471.47	374.27	849.27	849.27
16)	0.123	2.74	3.95	0.00	1472.63	1472.63	372.97	847.97	847.97
17)	0.135	3.01	3.97	0.00	1468.01	1468.01	370.07	845.07	845.07
18)	0.146	3.25	3.98	0.00	1457.61	1457.61	365.87	840.87	840.87
19)	0.157	3.50	4.00	0.00	1443.75	1443.75	360.82	835.82	835.82
20)	0.168	3.74	4.02	0.00	1426.43	1426.43	354.94	829.94	829.94
21)	0.180	4.01	4.04	0.00	1416.03	1416.03	350.68	825.68	825.68
22)	0.224	4.99	4.11	0.00	1383.69	1383.69	336.67	811.67	811.67
23)	0.269	5.99	4.19	0.00	1322.48	1322.48	315.91	790.91	790.91
24)	0.314	7.00	4.27	0.00	1245.09	1245.09	291.91	766.91	766.91
25)	0.359	8.00	4.35	0.00	1175.79	1175.79	270.44	745.44	745.44
26)	0.404	9.00	4.43	0.00	1136.52	1136.52	256.37	731.37	731.37
27)	0.449	10.00	4.52	0.00	1079.93	1079.93	238.82	713.82	713.82
28)	0.539	12.01	4.71	0.00	1000.23	1000.23	212.32	687.32	687.32
29)	0.628	13.99	4.91	0.00	944.79	944.79	192.26	667.26	667.26
30)	0.718	16.00	5.14	0.00	867.41	867.41	168.82	643.82	643.82
31)	0.808	18.00	5.38	0.00	836.22	836.22	155.34	630.34	630.34
32)	0.875	19.50	5.58	0.00	809.66	809.66	145.05	620.05	620.05

```
Thu Jul 03 14:45:31 1997

                              UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.  Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA              Test No. : PB2-475
Boring No. : PB-2                   Test Date : 07/01/97           Tested by : C. WASON
Sample No. : 475 PSI                Depth : 474-475 FT             Checked by : C. CAPPS
Sample Type : CORE                  Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Liquid Limit : 54.76               Plastic Limit : 25.96              Specific Gravity : 2.73

                                                         WATER CONTENT
                                          BEFORE TEST     AFTER TEST       TRIMMINGS
CONTAINER NO.
WT CONTAINER + WET SOIL (gm)                500.90          500.90            0.00
WT CONTAINER + DRY SOIL (gm)                400.00          400.00            0.00
WT WATER (gm)                               100.90          100.90            0.00
WT CONTAINER (gm)                             0.00            0.00            0.00
WT DRY SOIL (gm)                            400.00          400.00            0.00
WATER CONTENT (%)                            25.22           25.22            0.00


                                                 INITIAL              AT CONSOLIDATION
WATER CONTENT (%)                                 25.22                    25.22
VOID RATIO                                         0.89                     0.89
WET DENSITY (lb/ft^3)                            112.84                   112.84
DRY DENSITY (lb/ft^3)                             90.11                    90.11
DEGREE OF SATURATION (%)                          77.33                    77.33

Maximum Shear Stress = 187.14 (lb/in^2) at a Vertical Strain of 2.50 %
```

Boring No. : PB-2
Sample No.: 474-475 FT
Tested by : C. WASON
Filename : PB2-475

Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Thu Jul 03 1997



Classification :
(CH) fat clay
Visual Description :
GRAYISH BROWN SILTY CLAY

Remarks :
474-475 FFET

Figure 1

Thu Jul 03 14:29:09 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 474-475 FT
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN SILTY CLAY
Remarks : 474-475 FFET

Depth : 474-475 FEET
Test Date : 07/02/97
Test Method : ASTM D4318/422

Filename : PB2-475
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 70 gm
Specific Gravity = 2.73

Hydroscopic Moisture Content :
Weight of Wet Soil = 70 gm
Weight of Dry Soil = 62.09 gm
Moisture Content = 0.127396

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	51.50	22.40	43.30	0.026	69	0.026
5.00	43.00	22.40	34.80	0.018	55	0.018
15.00	34.00	22.30	25.76	0.011	41	0.011
30.00	29.20	22.20	20.91	0.008	33	0.008
60.00	26.00	22.10	17.67	0.006	28	0.006
120.00	23.30	22.00	14.92	0.004	24	0.004
244.00	21.00	22.50	12.85	0.003	20	0.003
360.00	20.00	22.80	11.99	0.002	19	0.002
1440.00	16.80	21.90	8.37	0.001	13	0.001

FINE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Sieve Openings Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#10	0.079	2.00	0.00	0.00	100
#16	0.047	1.19	0.00	0.00	100
#30	0.023	0.60	0.03	0.03	100
#50	0.012	0.30	0.03	0.06	100
#100	0.006	0.15	0.23	0.29	100
#200	0.003	0.07	2.14	2.43	96
Pan			59.66	62.09	0

Total Wet Weight of Sample = 70
Total Dry Weight of Sample = 62.09
Moisture Content = 0.127396

D85 : 0.0482 mm
D60 : 0.0202 mm
D50 : 0.0148 mm
D30 : 0.0066 mm
D15 : 0.0015 mm
D10 : 0.0009 mm

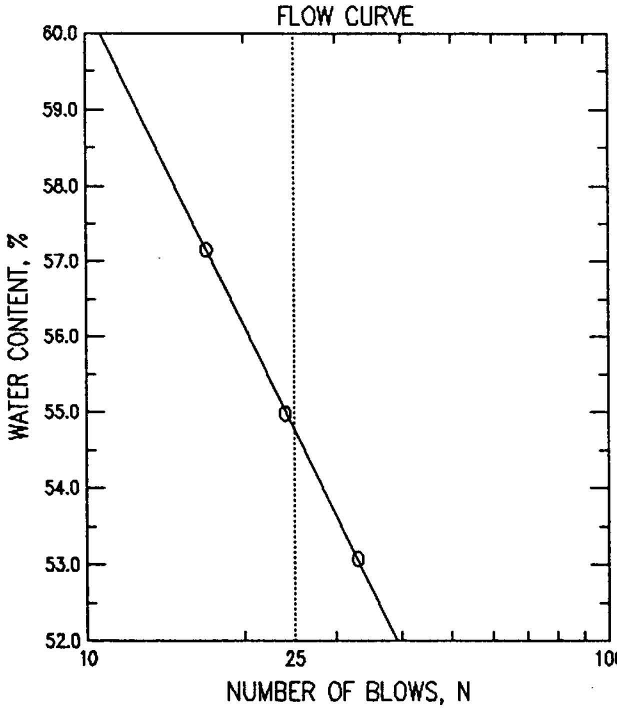
Soil Classification
ASTM Group Symbol : CH
ASTM Group Name : fat clay
AASHTO Group Symbol : A-7-6(35)
AASHTO Group Name : Clayey Soils

ATTERBERG LIMITS

PROJECT HOLLADAY ENGINEERING CO. 030496	PROJECT NUMBER 971144NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL		CHECKED BY S. CAPPS	SAMPLE NUMBER 474-475 FT
SAMPLE DESCRIPTION GRAYISH BROWN SILTY CLAY		DATE Thu Jul 03 1997	FILENAME PB2-475

LIQUID LIMIT DETERMINATIONS					
CONTAINER NUMBER	13	14	18		
WT. WET SOIL + TARE	27.48	27.62	27.51		
WT. DRY SOIL + TARE	21.78	21.66	21.4		
WT. WATER	5.7	5.96	6.11		
TARE WT.	11.04	10.82	10.71		
WT. DRY SOIL	10.74	10.84	10.69		
WATER CONTENT, W_N (%)	53.07	54.98	57.16		
NUMBER OF BLOWS, N	33	24	17		
ONE-POINT LIQUID LIMIT, LL	54.89	54.71	54.55		

PLASTIC LIMIT DETERMINATIONS					
CONTAINER NUMBER	2				
WT. WET SOIL + TARE	27.29				
WT. DRY SOIL + TARE	24.93				
WT. WATER	2.36				
TARE WT.	15.84				
WT. DRY SOIL	9.09				
WATER CONTENT (%)	25.96				



SUMMARY OF RESULTS	
NATURAL WATER CONTENT, W (%)	
LIQUID LIMIT, LL	54.8
PLASTIC LIMIT, PL	26.0
PLASTICITY INDEX, PI	28.8
LIQUIDITY INDEX, LI*	

*LI = (W − PL)/PI

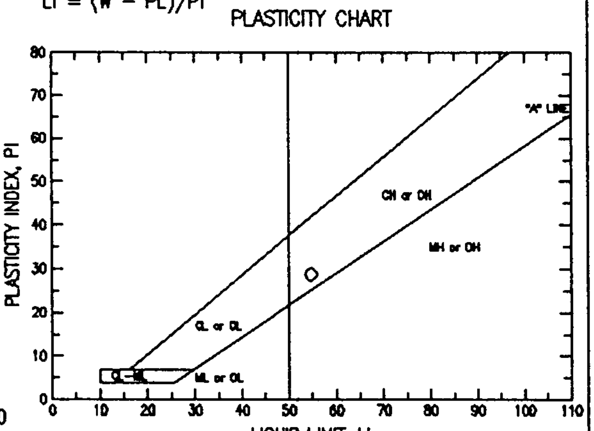


Fig. 1.0

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 474-475 FT
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN SILTY CLAY
Remarks : 474-475 FFET

Depth : 474-475 FEET
Test Date : 07/02/97
Test Method : ASTM D4318/422

Filename : PB2-475
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 2	15.84	27.29	24.93	25.96

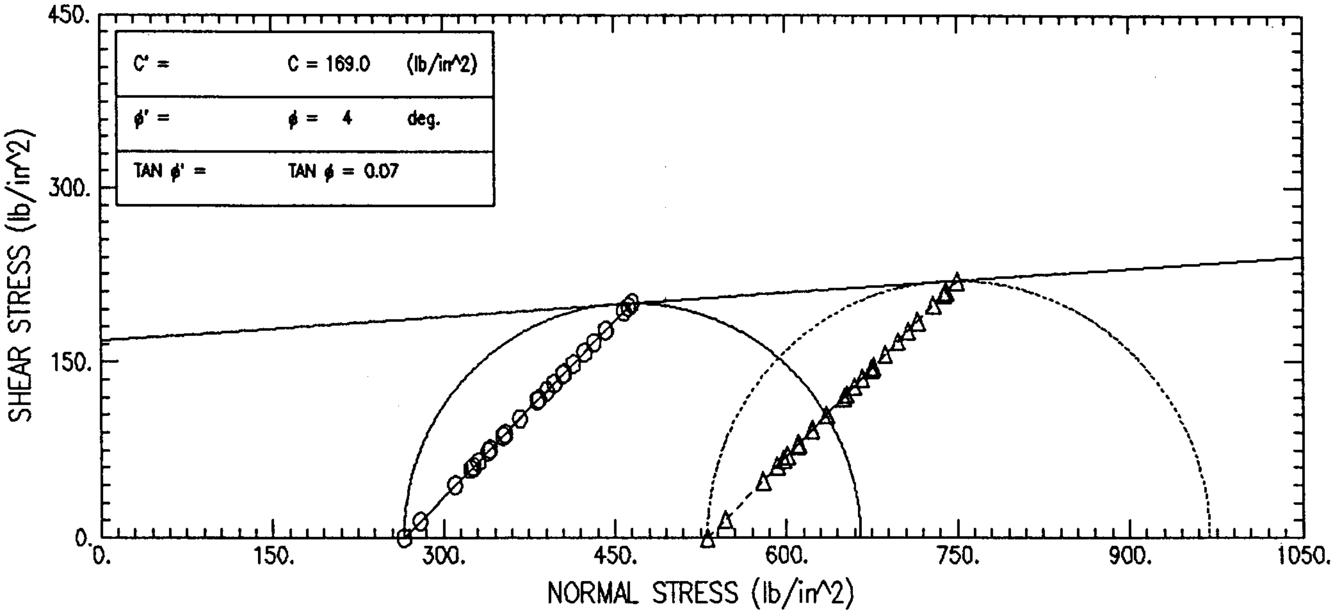
Plastic Limit = 25.96

Liquid Limit

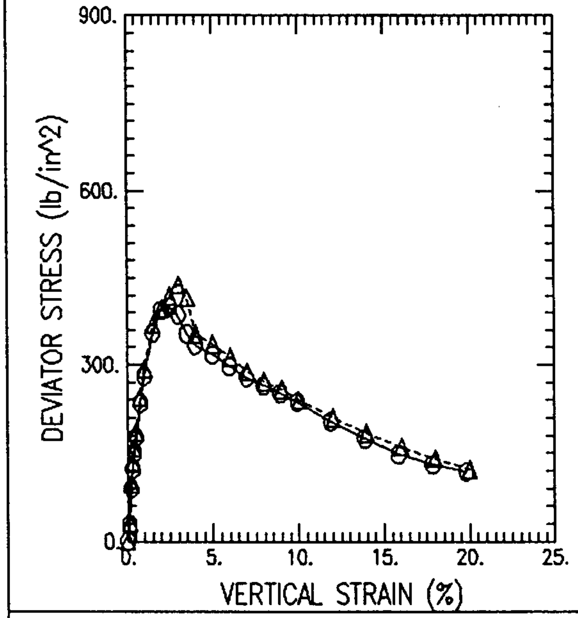
Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) 13	11.04	27.48	21.78	33	53.07
2) 14	10.82	27.62	21.66	24	54.98
3) 18	10.71	27.51	21.40	17	57.16

Liquid Limit = 54.76
Plastic Index = 28.80

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



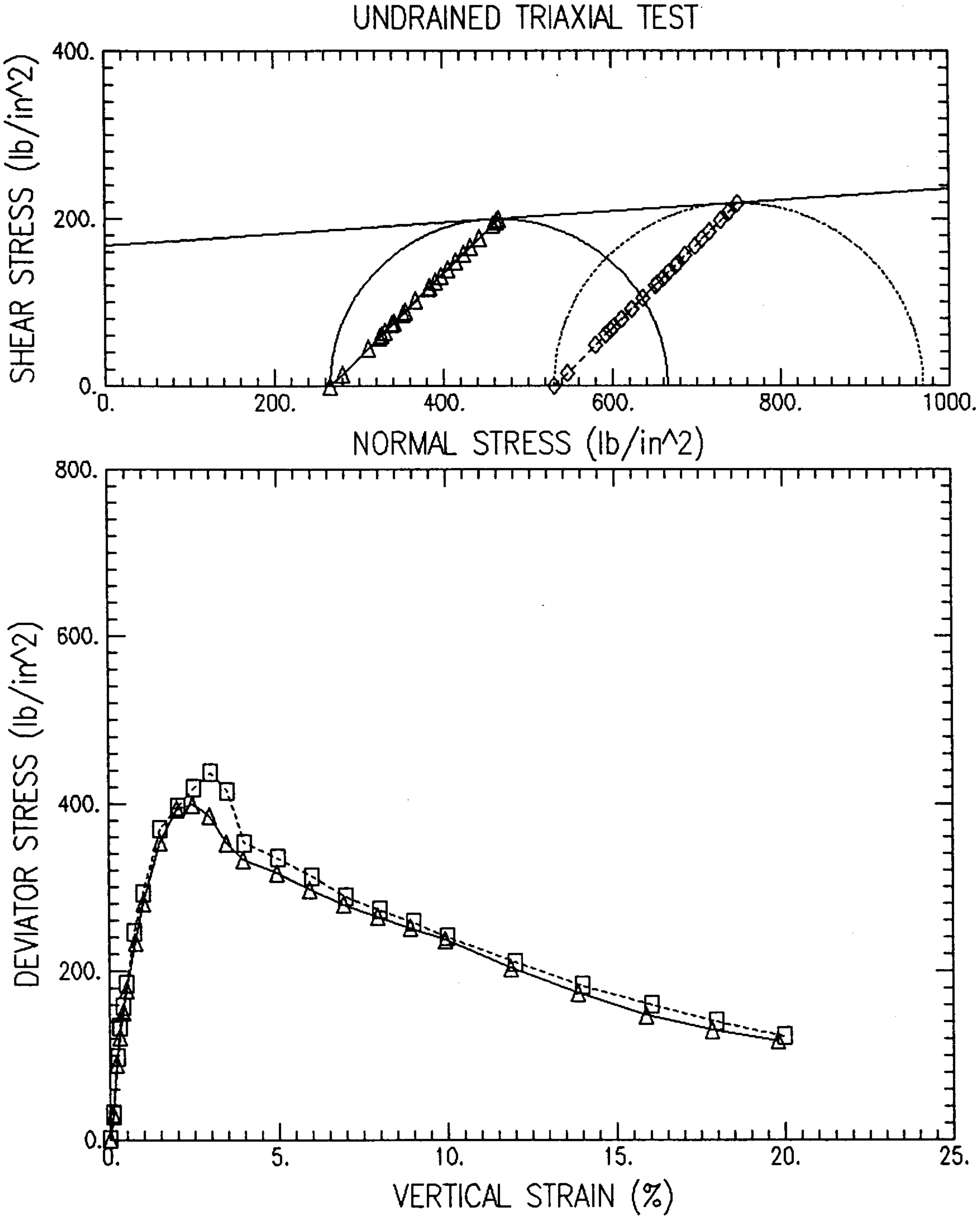
SYMBOL		O	Δ		
TEST NO.		PB2-265	PB2-531		
INITIAL	WATER CONTENT (%)	21.24	20.21		
	DRY DENSITY (lb/ft^3)	93.63	95.26		
	SATURATION (%)	70.76	69.99		
	VOID RATIO	0.819	0.788		
BEFORE SHEAR	WATER CONTENT (%)	21.24	20.21		
	DRY DENSITY (lb/ft^3)	93.63	95.26		
	SATURATION (%)	70.76	69.99		
	VOID RATIO	0.819	0.788		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		265.50	531.00		
MAX. DEV. STRESS (lb/in^2)		399.73	437.99		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		1.99	1.98		
INITIAL HEIGHT (in)		3.97	3.78		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) BROWN SILTY CLAY/CLAYEY SILT 2) BROWN SILTY CLAY/CLAYEY SILT

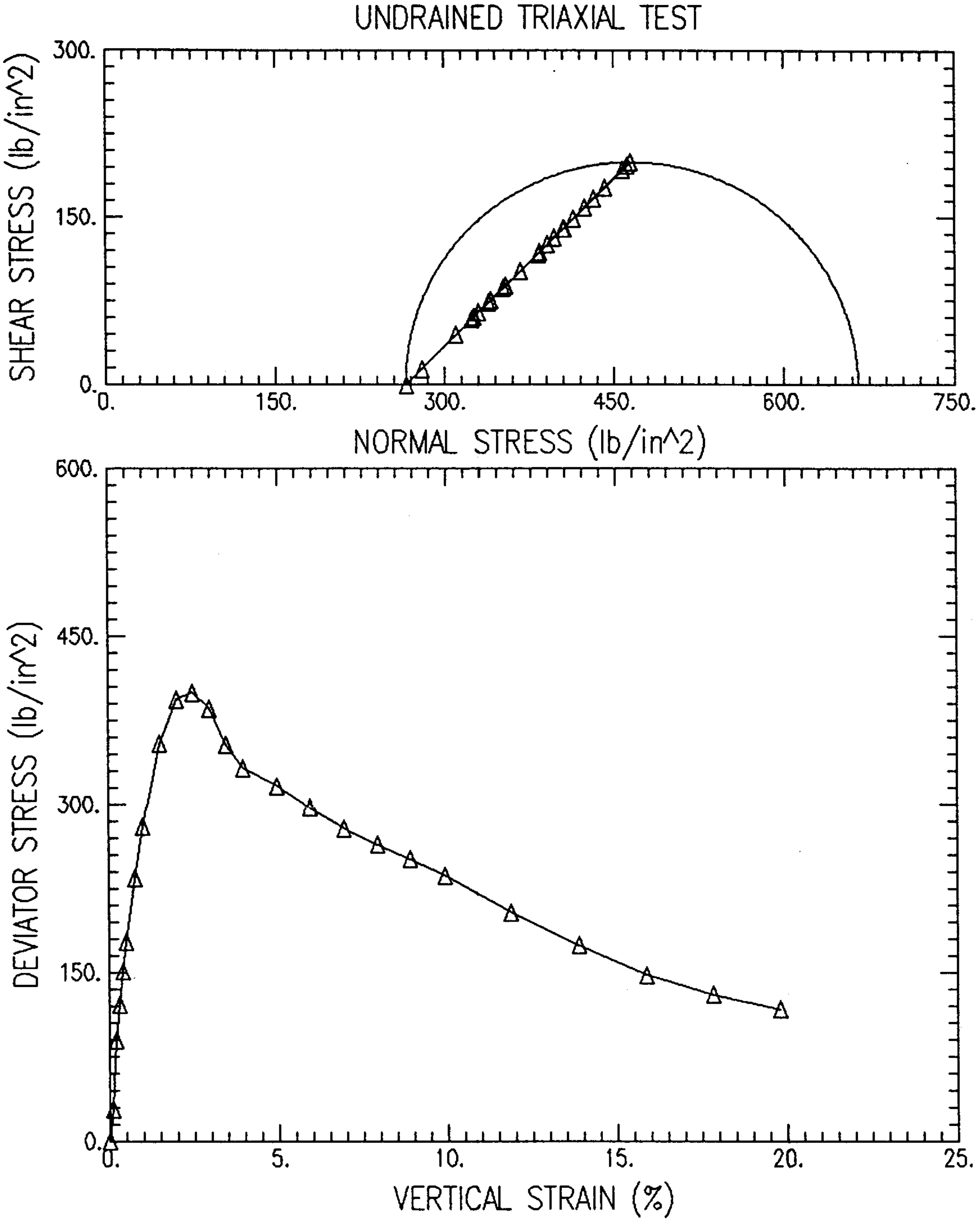
LL 55.01	PL 24.30	PI 30.71	GS 2.73	TYPE OF SPECIMEN CORE	TYPE OF TEST UNDRAINED

REMARKS:	PROJECT HOLLADAY ENGINEERING CO.				
1)					
2)	BORING NO. PB-2	SAMPLE NO.	265.5 PSI	531 PSI	
	TECH. S. CAPPS	DEPTH/ELEV	530-531 FT	530-531 FT	
	LABORATORY	DATE	06/27/97	06/27/97	
	TRIAXIAL COMPRESSION TEST REPORT				



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	265.5 PSI	530-531 FT	PB2-265	PB2-265.UU
PB-2	531 PSI	530-531 FT	PB2-531	PB2-531.UU



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	265.5 PSI	530-531 FT	PB2-265	PB2-265.UU

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-265
Boring No. : PB-2
Test Date : 06/27/97
Tested by : S. CAPPS
Sample No. : 265.5 PSI
Depth : 530-531 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.973 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.12 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 12.38 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.12	0.00	0.00	0.00	0.00	265.50	265.50
2)	0.004	0.10	3.12	0.00	88.94	88.94	28.48	293.98	293.98
3)	0.008	0.20	3.13	0.00	279.51	279.51	89.37	354.87	354.87
4)	0.012	0.30	3.13	0.00	381.15	381.15	121.67	387.17	387.17
5)	0.016	0.40	3.14	0.00	473.55	473.55	150.91	416.41	416.41
6)	0.020	0.50	3.14	0.00	557.87	557.87	177.47	442.97	442.97
7)	0.030	0.76	3.16	0.00	739.20	739.20	234.17	499.67	499.67
8)	0.039	0.98	3.17	0.00	889.35	889.35	280.65	546.15	546.15
9)	0.059	1.49	3.20	0.00	1131.90	1131.90	354.15	619.65	619.65
10)	0.079	1.99	3.22	0.00	1269.35	1269.35	393.74	659.24	659.24
11)	0.098	2.47	3.25	0.00	1299.38	1299.38	399.73	665.23	665.23
12)	0.118	2.97	3.28	0.00	1264.73	1264.73	385.67	651.17	651.17
13)	0.138	3.47	3.31	0.00	1168.86	1168.86	353.29	618.79	618.79
14)	0.157	3.95	3.34	0.00	1111.11	1111.11	332.99	598.49	598.49
15)	0.197	4.96	3.40	0.00	1076.46	1076.46	316.81	582.31	582.31
16)	0.236	5.94	3.46	0.00	1027.95	1027.95	297.14	562.64	562.64
17)	0.276	6.95	3.53	0.00	982.91	982.91	278.83	544.33	544.33
18)	0.315	7.93	3.59	0.00	948.26	948.26	264.02	529.52	529.52
19)	0.354	8.91	3.66	0.00	919.38	919.38	251.15	516.65	516.65
20)	0.394	9.92	3.73	0.00	884.73	884.73	236.93	502.43	502.43
21)	0.472	11.88	3.89	0.00	791.18	791.18	203.57	469.07	469.07
22)	0.551	13.87	4.05	0.00	705.71	705.71	174.07	439.57	439.57
23)	0.630	15.86	4.24	0.00	624.86	624.86	147.49	412.99	412.99
24)	0.709	17.85	4.44	0.00	576.35	576.35	129.91	395.41	395.41
25)	0.787	19.81	4.65	0.00	545.16	545.16	117.16	382.66	382.66

Mon Jun 30 08:12:41 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

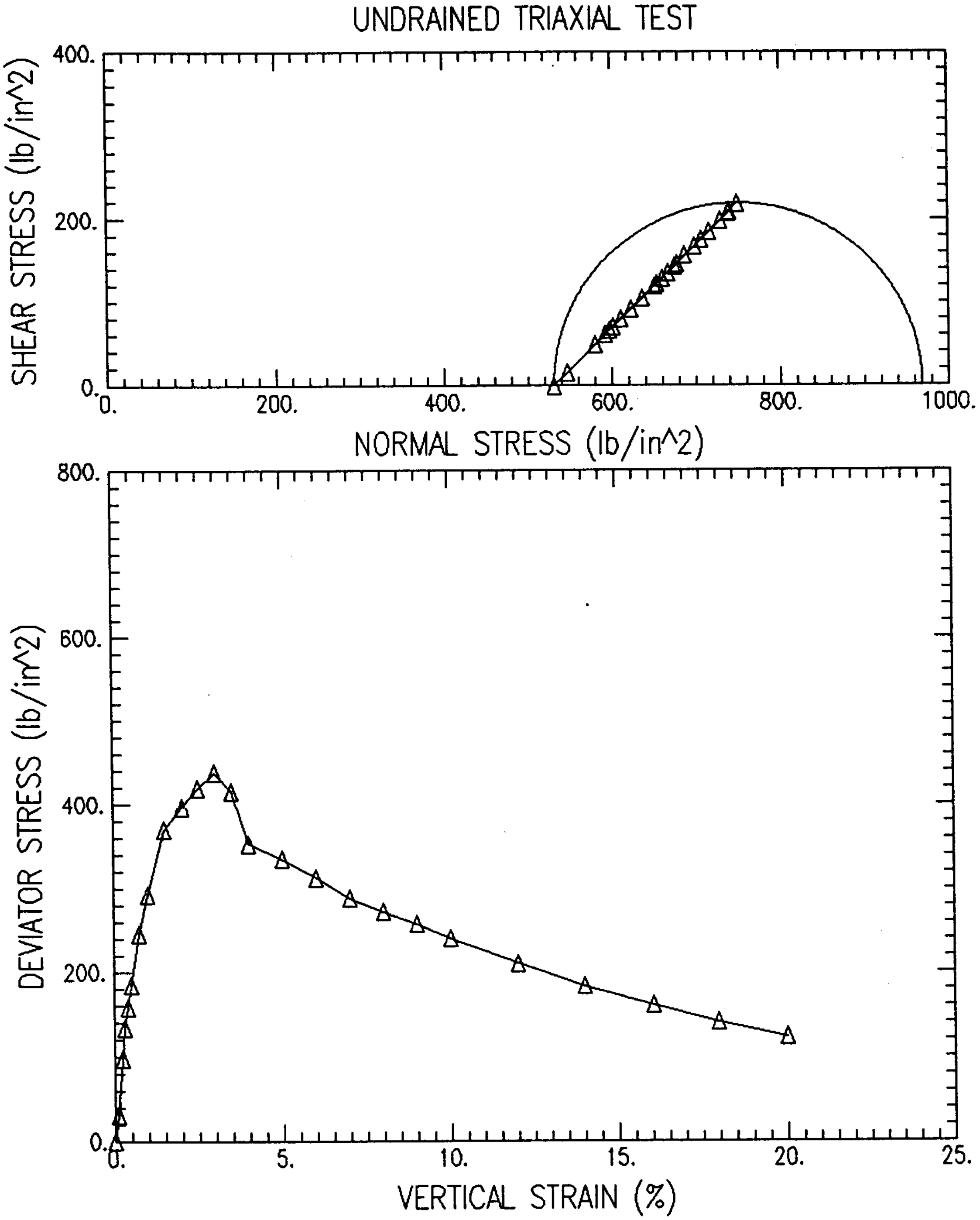
Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-265
Boring No. : PB-2
Test Date : 06/27/97
Tested by : S. CAPPS
Sample No. : 265.5 PSI
Depth : 530-531 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.73

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	369.00	369.00	0.00
WT CONTAINER + DRY SOIL (gm)	304.36	304.36	0.00
WT WATER (gm)	64.64	64.64	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	304.36	304.36	0.00
WATER CONTENT (%)	21.24	21.24	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	21.24	21.24
VOID RATIO	0.82	0.82
WET DENSITY (lb/ft^3)	113.51	113.51
DRY DENSITY (lb/ft^3)	93.63	93.63
DEGREE OF SATURATION (%)	70.76	70.76

Maximum Shear Stress = 199.86 (lb/in^2) at a Vertical Strain of 2.47 %



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	531 PSI	530-531 FT	PB2-531	PB2-531.UU

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-531
Boring No. : PB-2
Test Date : 06/27/97
Tested by : S. CAPPS
Sample No. : 531 PSI
Depth : 530-531 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Height : 3.780 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.09 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 11.69 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.09	0.00	0.00	0.00	0.00	531.00	531.00
2)	0.004	0.11	3.10	0.00	97.02	97.02	31.32	562.32	562.32
3)	0.008	0.21	3.10	0.00	301.46	301.46	97.15	628.15	628.15
4)	0.011	0.29	3.11	0.00	414.65	414.65	133.45	664.45	664.45
5)	0.015	0.40	3.11	0.00	493.19	493.19	158.45	689.45	689.45
6)	0.019	0.50	3.12	0.00	575.19	575.19	184.47	715.47	715.47
7)	0.028	0.74	3.13	0.00	768.08	768.08	245.34	776.34	776.34
8)	0.038	1.01	3.14	0.00	920.54	920.54	292.73	823.73	823.73
9)	0.057	1.51	3.17	0.00	1172.33	1172.33	369.62	900.62	900.62
10)	0.076	2.01	3.20	0.00	1269.35	1269.35	396.77	927.77	927.77
11)	0.094	2.49	3.23	0.00	1352.51	1352.51	419.29	950.29	950.29
12)	0.113	2.99	3.25	0.00	1425.27	1425.27	437.99	968.99	968.99
13)	0.132	3.49	3.28	0.00	1364.06	1364.06	415.48	946.48	946.48
14)	0.151	3.99	3.31	0.00	1168.86	1168.86	352.86	883.86	883.86
15)	0.189	5.00	3.37	0.00	1129.59	1129.59	334.88	865.88	865.88
16)	0.227	6.01	3.44	0.00	1075.31	1075.31	312.96	843.96	843.96
17)	0.265	7.01	3.50	0.00	1009.47	1009.47	288.33	819.33	819.33
18)	0.302	7.99	3.57	0.00	971.36	971.36	272.32	803.32	803.32
19)	0.340	8.99	3.64	0.00	937.86	937.86	257.85	788.85	788.85
20)	0.378	10.00	3.71	0.00	890.51	890.51	240.00	771.00	771.00
21)	0.454	12.01	3.87	0.00	811.97	811.97	210.04	741.04	741.04
22)	0.529	13.99	4.03	0.00	738.05	738.05	183.02	714.02	714.02
23)	0.606	16.03	4.22	0.00	676.83	676.83	160.41	691.41	691.41
24)	0.680	17.99	4.42	0.00	620.24	620.24	140.45	671.45	671.45
25)	0.756	20.00	4.64	0.00	568.26	568.26	122.52	653.52	653.52

Mon Jun 30 08:13:41 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-531
Boring No. : PB-2
Test Date : 06/27/97
Tested by : S. CAPPS
Sample No. : 531 PSI
Depth : 530-531 FT
Checked by : C. WASON
Sample Type : CORE
Elevation :
Soil Description : BROWN SILTY CLAY/CLAYEY SILT
Remarks :

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.73

	WATER CONTENT BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	351.32	351.32	0.00
WT CONTAINER + DRY SOIL (gm)	292.26	292.26	0.00
WT WATER (gm)	59.06	59.06	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	292.26	292.26	0.00
WATER CONTENT (%)	20.21	20.21	0.00

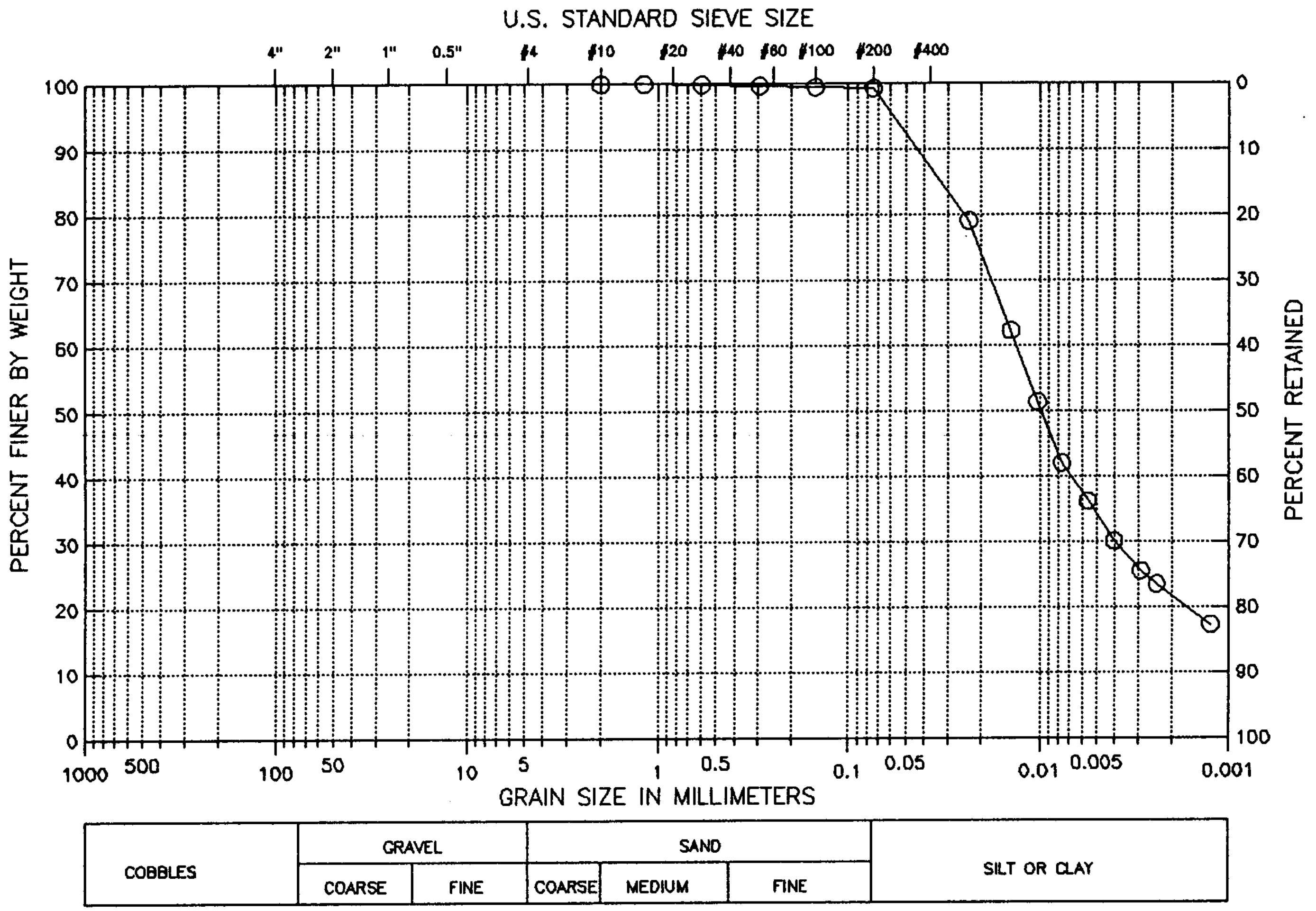
	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	20.21	20.21
VOID RATIO	0.79	0.79
WET DENSITY (lb/ft^3)	114.51	114.51
DRY DENSITY (lb/ft^3)	95.26	95.26
DEGREE OF SATURATION (%)	69.99	69.99

Maximum Shear Stress = 218.99 (lb/in^2) at a Vertical Strain of 2.99 %

Woodward-Clyde

Boring No. : PB-2
Sample No.: 530-531
Tested by : C. WASON
Filename : PB2-530

Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Tue Jul 01 1997



Classification :
(CH) fat clay
Visual Description :
BROWN SILTY CLAY

Remarks :
530-531 FEET

Figure 3

Tue Jul 01 12:59:38 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 530-531
Location : PICKLES BUTTE LANDFILL
Soil Description : BROWN SILTY CLAY
Remarks : 530-531 FEET

Depth : 530-531 FEET
Test Date : 06/30/97
Test Method : ASTM D4318/422

Filename : PB2-530
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

HYDROMETER

Hydrometer ID : 1734
Weight of air-dried soil = 70 gm
Specific Gravity = 2.73

Hydroscopic Moisture Content :
Weight of Wet Soil = 70 gm
Weight of Dry Soil = 64.46 gm
Moisture Content = 0.0859448

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
2.00	60.00	22.40	51.80	0.023	79	0.023
7.00	49.00	22.40	40.80	0.014	62	0.014
15.00	42.00	22.10	33.67	0.010	51	0.010
30.00	36.00	21.80	27.53	0.008	42	0.008
60.00	32.20	21.80	23.73	0.006	36	0.006
120.00	28.00	22.20	19.71	0.004	30	0.004
240.00	25.00	22.20	16.71	0.003	26	0.003
360.00	23.50	22.60	15.40	0.002	24	0.002
1440.00	20.00	21.40	11.34	0.001	17	0.001

FINE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#10	0.079	2.00	0.00	0.00	100
#16	0.047	1.19	0.00	0.00	100
#30	0.023	0.60	0.05	0.05	100
#50	0.012	0.30	0.14	0.19	100
#100	0.006	0.15	0.13	0.32	100
#200	0.003	0.07	0.12	0.44	99
Pan			64.02	64.46	0

Total Wet Weight of Sample = 64.46
Total Dry Weight of Sample = 64.46
Moisture Content = 0.0859448

D85 : 0.0326 mm
D60 : 0.0132 mm
D50 : 0.0099 mm
D30 : 0.0040 mm
D15 : N/A
D10 : N/A

Soil Classification
ASTM Group Symbol : CH
ASTM Group Name : fat clay
AASHTO Group Symbol : A-7-6(38)
AASHTO Group Name : Clayey Soils

ATTERBERG LIMITS

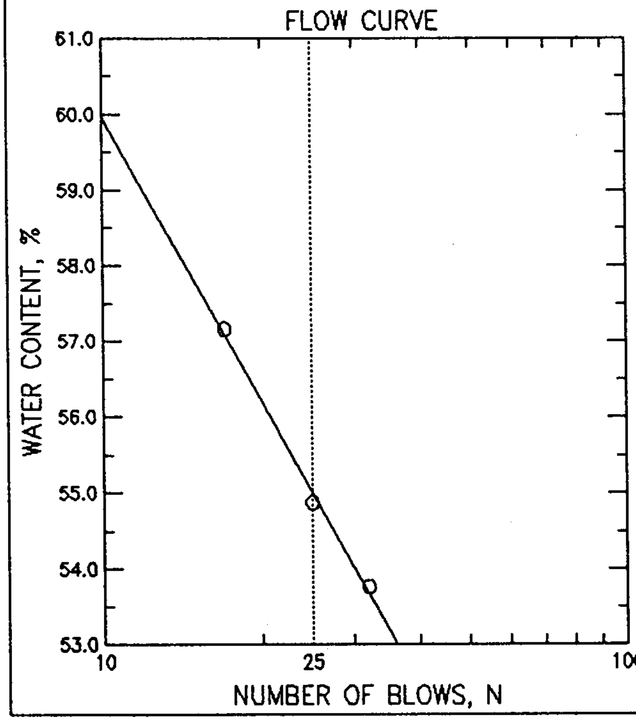
PROJECT HOLLADAY ENGINEERING CO. 030496	PROJECT NUMBER 971144NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL		CHECKED BY S. CAPPS	SAMPLE NUMBER 530-531
SAMPLE DESCRIPTION BROWN SILTY CLAY		DATE Tue Jul 01 1997	FILENAME PB2-530

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	J	14	33		
WT. WET SOIL + TARE	28.24	27.4	27.99		
WT. DRY SOIL + TARE	22.17	21.54	21.72		
WT. WATER	6.07	5.86	6.27		
TARE WT.	10.88	10.86	10.75		
WT. DRY SOIL	11.29	10.68	10.97		
WATER CONTENT, W_N (%)	53.76	54.87	57.16		
NUMBER OF BLOWS, N	32	25	17		
ONE-POINT LIQUID LIMIT, LL	55.39	54.87	54.55		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	98				
WT. WET SOIL + TARE	26.22				
WT. DRY SOIL + TARE	24.15				
WT. WATER	2.07				
TARE WT.	15.63				
WT. DRY SOIL	8.52				
WATER CONTENT (%)	24.30				



SUMMARY OF RESULTS	
NATURAL WATER CONTENT, W (%)	
LIQUID LIMIT, LL	55.0
PLASTIC LIMIT, PL	24.3
PLASTICITY INDEX, PI	30.7
LIQUIDITY INDEX, LI*	

*LI = (W − PL)/PI

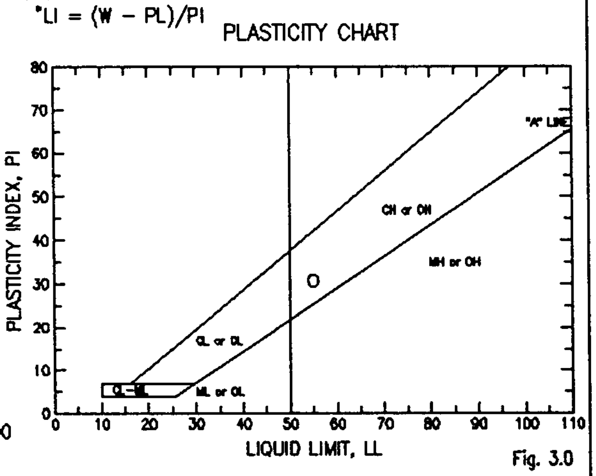


Fig. 3.0

Tue Jul 01 12:59:38 1997

GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Boring No. : PB-2
Sample No. : 530-531
Location : PICKLES BUTTE LANDFILL
Soil Description : BROWN SILTY CLAY
Remarks : 530-531 FEET

Depth : 530-531 FEET
Test Date : 06/30/97
Test Method : ASTM D4318/422

Filename : PB2-530
Elevation : NA
Tested by : C. WASON
Checked by : S. CAPPS

Plastic Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Moisture Content (%)
1) 98	15.63	26.22	24.15	24.30

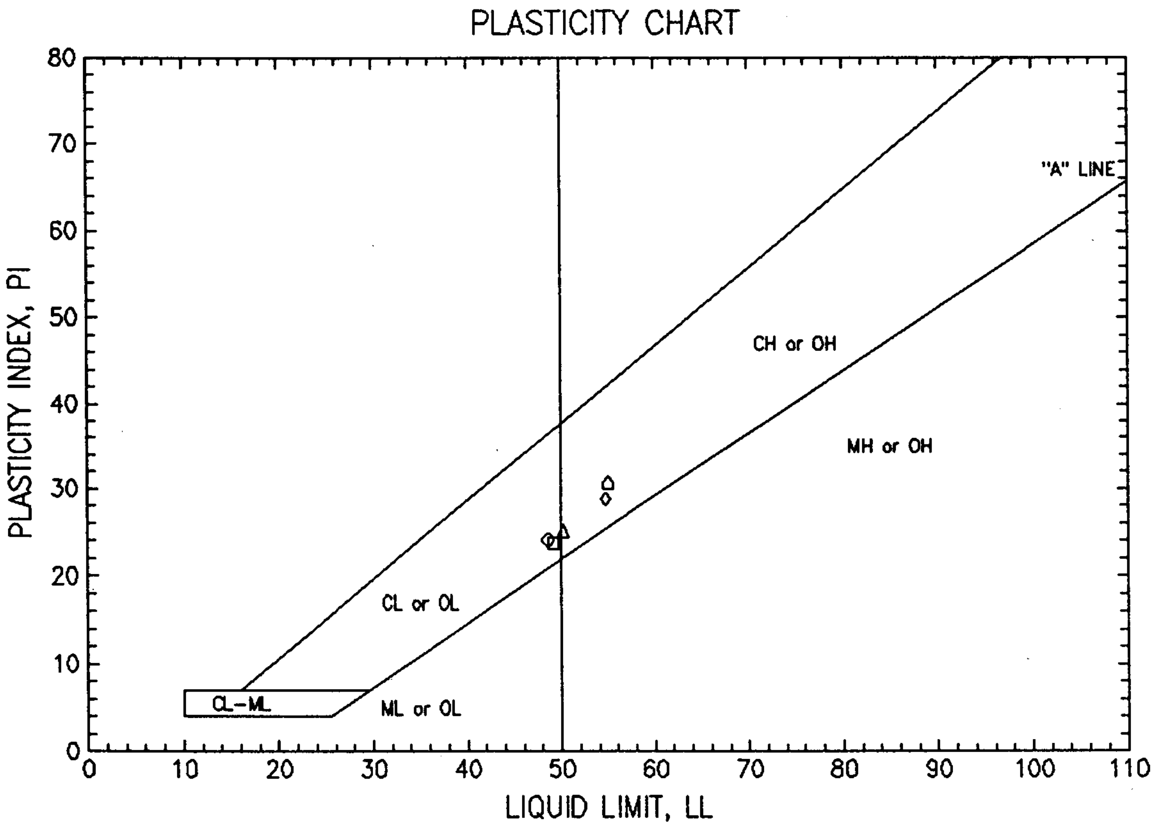
Plastic Limit = 24.30

Liquid Limit

Moisture Content ID	Mass of Container (gm)	Mass of Container and Moist Soil (gm)	Mass of Container and Dried Soil (gm)	Number of Drops	Moisture Content (%)
1) J	10.88	28.24	22.17	32	53.76
2) 14	10.86	27.40	21.54	25	54.87
3) 33	10.75	27.99	21.72	17	57.16

Liquid Limit = 55.01
Plastic Index = 30.72

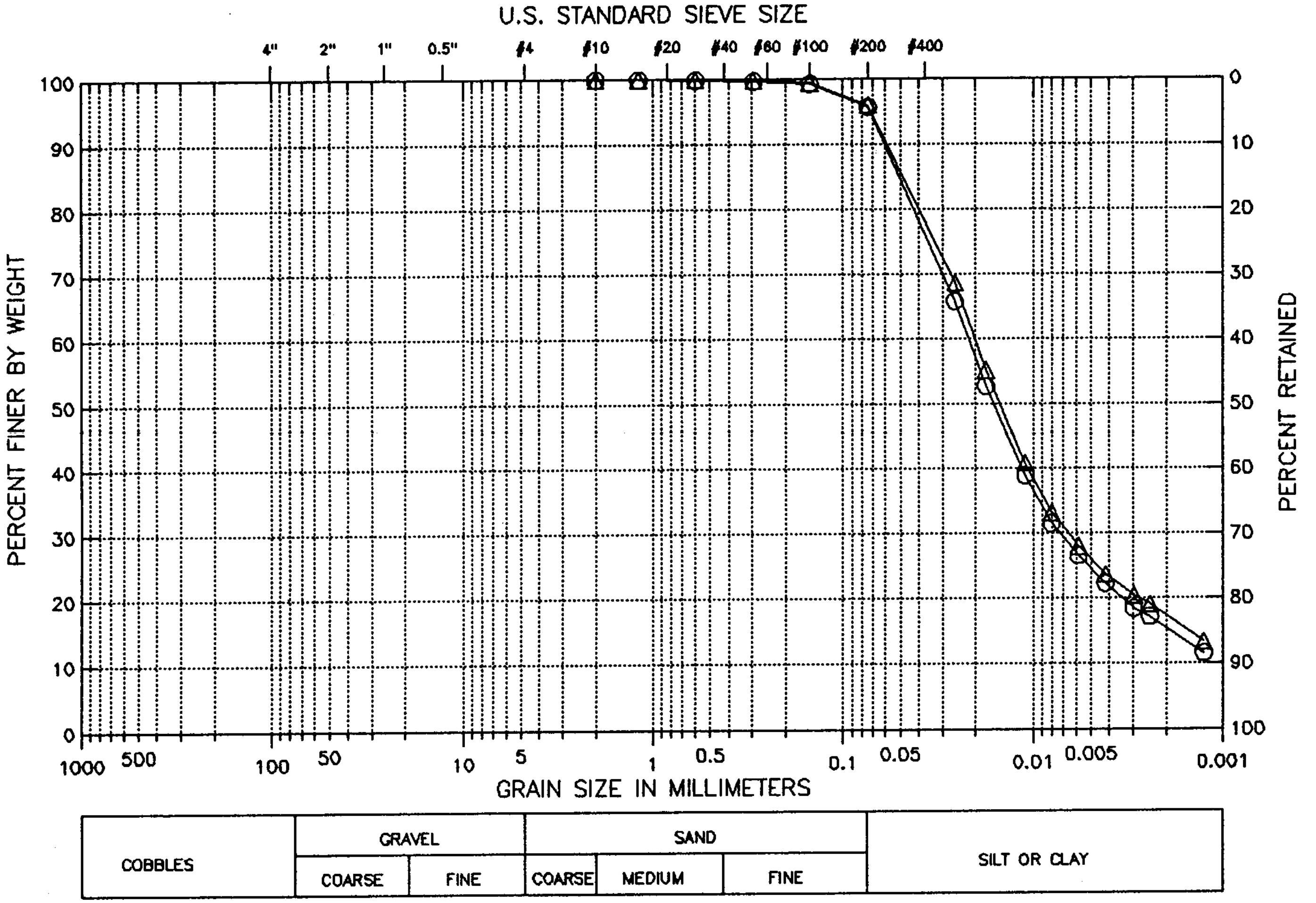
Project : HOLLADAY ENGINEERING CO. 030496
Project No. : 971144NA
Location : PICKLES BUTTE LANDFILL
Date : Thu Jul 03 1997



Symbol	Boring No.	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
○	PB-2	429-430 FT	48.57	24.51	24.06
△	PB-2	456-457	50.19	25.08	25.11
□	PB-2	458-460	49.21	25.51	23.70
◇	PB-2	474-475 FT	54.76	25.96	28.80
⌂	PB-2	530-531	55.01	24.30	30.72

Figure 1

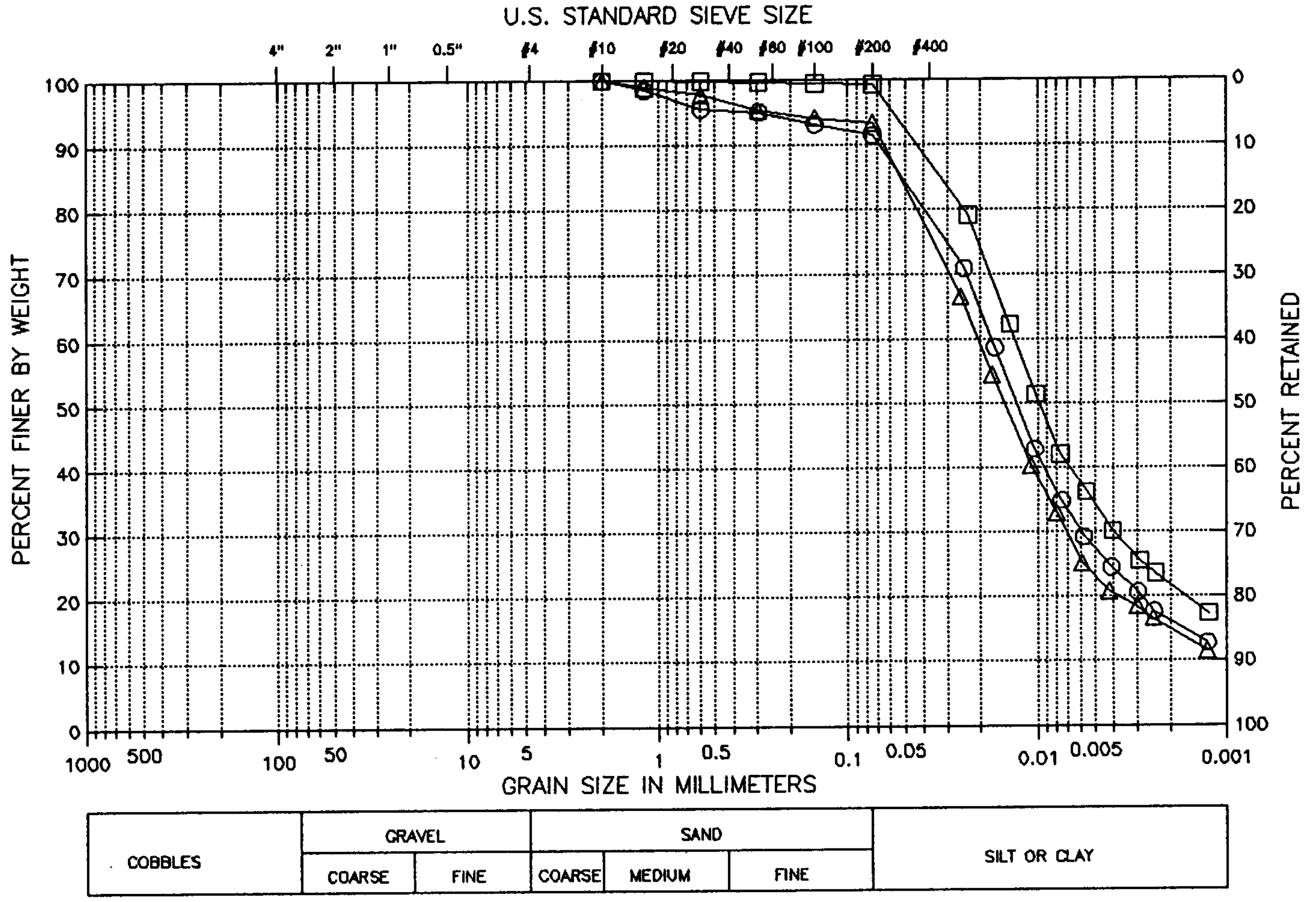
Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Thu Jul 03 1997



Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description	
—○—	PB-2	429–430 FT	429–430 FEET	PB2–430	CL	lean clay
—△—	PB-2	474–475 FT	474–475 FEET	PB2–475	CH	fat clay

Figure 1

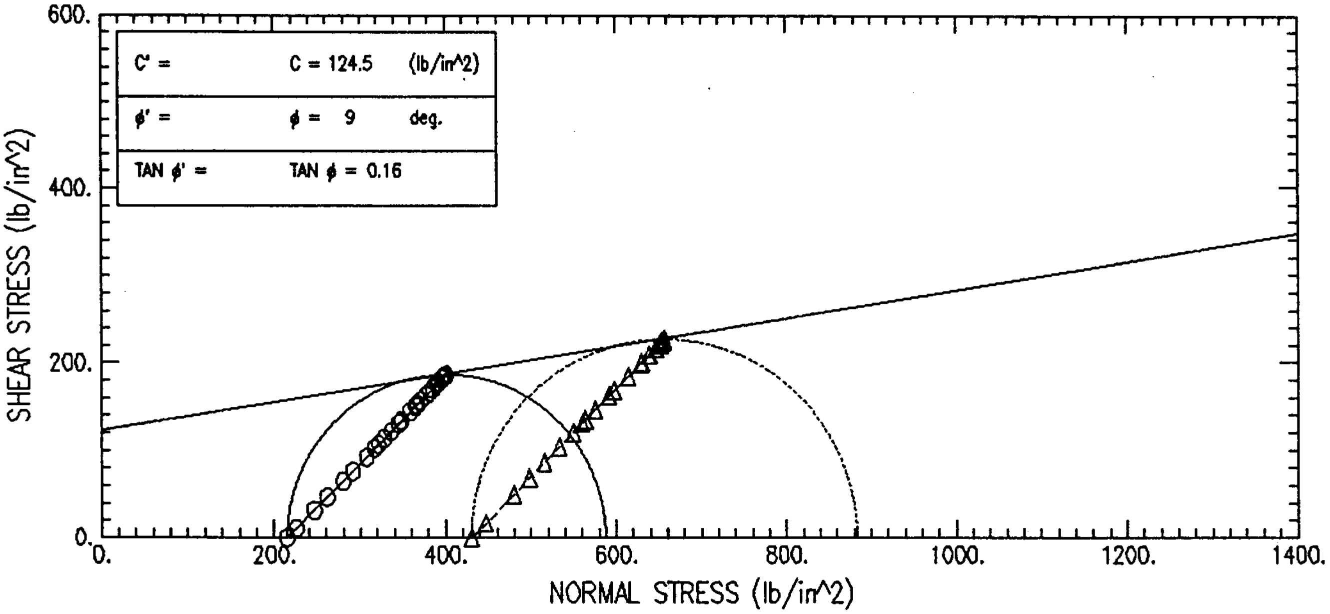
Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Thu Jul 03 1997



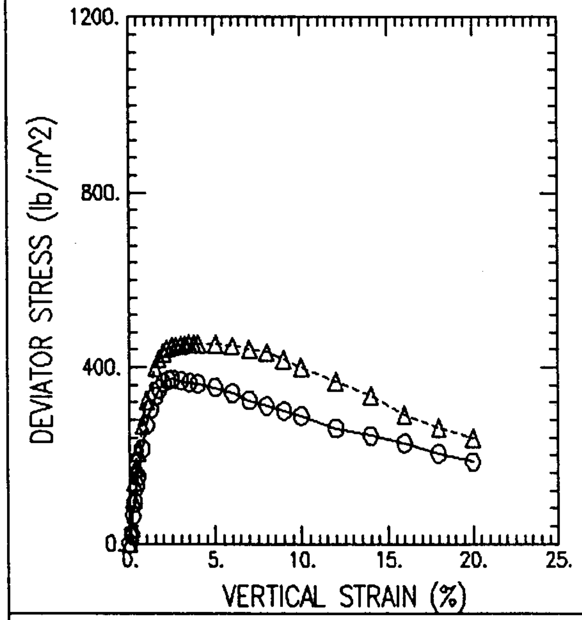
Symbol	Boring No.	Sample No.	Depth	Filename	Classification / Description	
○	PB-2	456-457	456-457 FEET	PB2-456	CH	fat clay
△	PB-2	458-460	458-460 FEET	PB2-460	CL	lean clay
□	PB-2	530-531	530-531 FEET	PB2-530	CH	fat clay

Figure 1

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		O	Δ		
TEST NO.		PB2-215	PB2-430		
INITIAL	WATER CONTENT (%)	22.98	23.31		
	DRY DENSITY (lb/ft^3)	93.27	93.10		
	SATURATION (%)	75.90	76.71		
	VOID RATIO	0.826	0.830		
BEFORE SHEAR	WATER CONTENT (%)	22.98	23.31		
	DRY DENSITY (lb/ft^3)	93.27	93.10		
	SATURATION (%)	75.90	76.71		
	VOID RATIO	0.826	0.830		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		215.00	430.00		
MAX. DEV. STRESS (lb/in^2)		372.81	453.61		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		2.10	2.09		
INITIAL HEIGHT (in)		4.69	4.37		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) GRAYISH BROWN SI CLAY / CLAYEY SILT 2) GRAYISH BROWN SI CLAY / CLAYEY SILT

LL 48.57	PL 24.51	PI 24.06	GS 2.73	TYPE OF SPECIMEN CORE	TYPE OF TEST UNDRAINED

REMARKS:

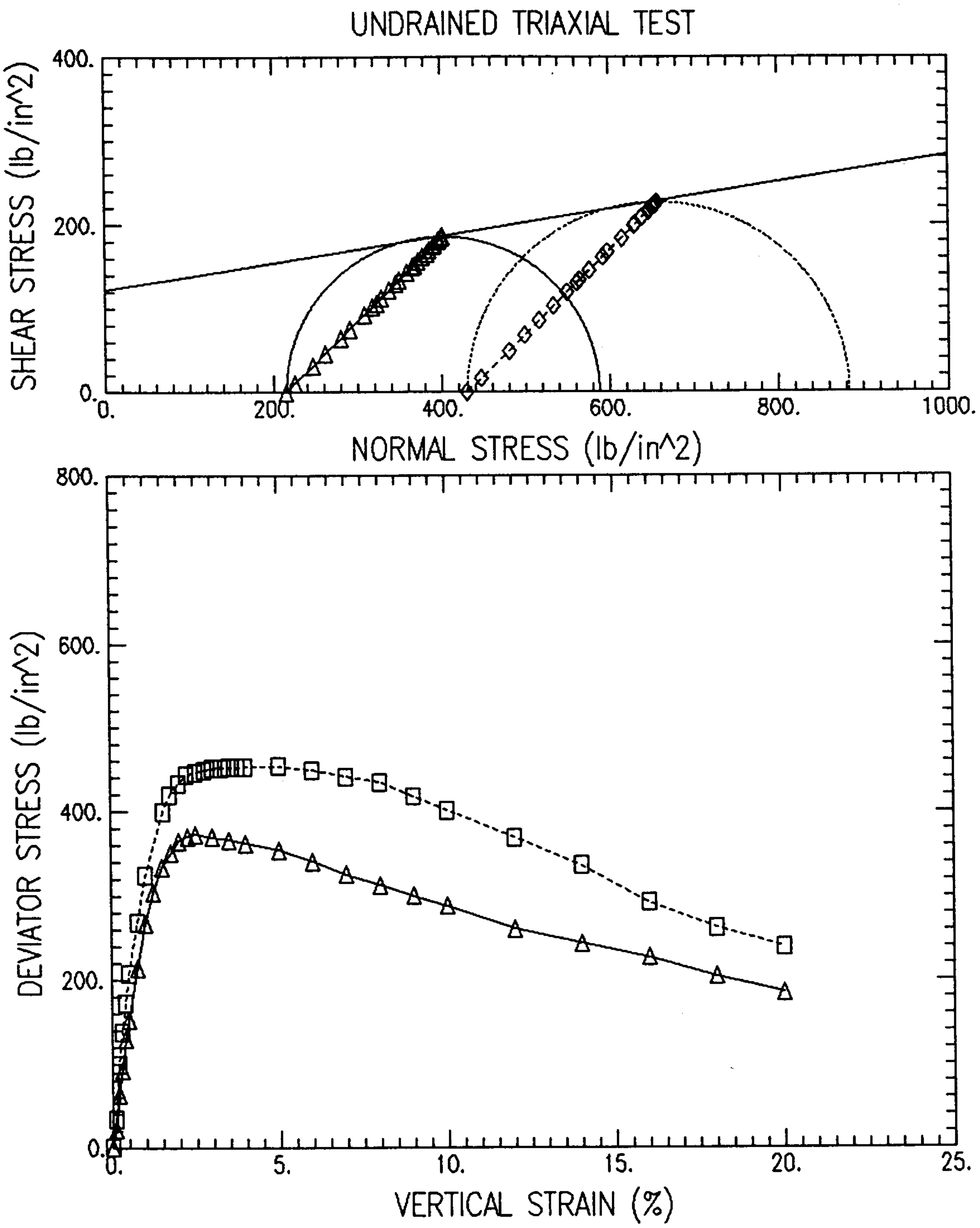
1)

2)

PROJECT HOLLADAY ENGINEERING CO.

BORING NO. PB-2	SAMPLE NO.	215 PSI	430 PSI		
TECH. C. WASON	DEPTH/ELEV	429-430 FT	429-430 FT		
LABORATORY	DATE	07/01/97	07/01/97		

TRIAXIAL COMPRESSION TEST REPORT



Project Name : HOLLADAY ENGINEERING CO.

Boring No:	Sample No	Depth	Test No	Filename
PB-2	215 PSI	429-430 FT	PB2-215	PB2-215.UU
PB-2	430 PSI	429-430 FT	PB2-430	PB2-430.UU

Failure Criteria: Peak Deviator Stress

Thu Jul 03 14:40:36 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-215
Boring No. : PB-2
Test Date : 07/01/97
Tested by : C. WASON
Sample No. : 215 PSI
Depth : 429-430 FT
Checked by : C. CAPPS
Sample Type : CORE
Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Height : 4.685 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.47 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 16.25 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.47	0.00	0.00	0.00	0.00	215.00	215.00
2)	0.005	0.11	3.47	0.00	75.08	75.08	21.61	236.61	236.61
3)	0.009	0.19	3.48	0.00	219.45	219.45	63.08	278.08	278.08
4)	0.014	0.30	3.49	0.00	324.56	324.56	93.12	308.12	308.12
5)	0.019	0.41	3.49	0.00	452.76	452.76	129.67	344.67	344.67
6)	0.023	0.49	3.50	0.00	532.46	532.46	152.28	367.28	367.28
7)	0.035	0.75	3.51	0.00	751.91	751.91	214.11	429.11	429.11
8)	0.047	1.00	3.53	0.00	944.79	944.79	267.88	482.88	482.88
9)	0.058	1.24	3.54	0.00	1078.77	1078.77	304.65	519.65	519.65
10)	0.070	1.49	3.56	0.00	1188.50	1188.50	334.17	549.17	549.17
11)	0.082	1.75	3.57	0.00	1254.33	1254.33	351.14	566.14	566.14
12)	0.094	2.01	3.59	0.00	1308.62	1308.62	364.72	579.72	579.72
13)	0.106	2.26	3.60	0.00	1334.03	1334.03	370.16	585.16	585.16
14)	0.117	2.50	3.62	0.00	1349.04	1349.04	372.81	587.81	587.81
15)	0.141	3.01	3.65	0.00	1349.04	1349.04	369.48	584.48	584.48
16)	0.164	3.50	3.68	0.00	1347.89	1347.89	365.99	580.99	580.99
17)	0.187	3.99	3.72	0.00	1346.73	1346.73	362.50	577.50	577.50
18)	0.234	4.99	3.78	0.00	1340.96	1340.96	354.48	569.48	569.48
19)	0.281	6.00	3.85	0.00	1313.24	1313.24	340.82	555.82	555.82
20)	0.328	7.00	3.93	0.00	1277.43	1277.43	325.37	540.37	540.37
21)	0.375	8.00	4.00	0.00	1253.18	1253.18	313.15	528.15	528.15
22)	0.422	9.01	4.08	0.00	1226.61	1226.61	300.60	515.60	515.60
23)	0.469	10.01	4.16	0.00	1200.05	1200.05	288.30	503.30	503.30
24)	0.562	12.00	4.33	0.00	1130.75	1130.75	260.86	475.86	475.86
25)	0.656	14.00	4.52	0.00	1103.03	1103.03	243.83	458.83	458.83
26)	0.750	16.01	4.73	0.00	1073.00	1073.00	226.85	441.85	441.85
27)	0.843	17.99	4.95	0.00	1011.78	1011.78	204.25	419.25	419.25
28)	0.937	20.00	5.20	0.00	963.27	963.27	185.17	400.17	400.17

Thu Jul 03 14:40:36 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.	Location : PICKLES BUTTE LANDFILL	
Project No. : 971144NA	Test No. : PB2-215	
Boring No. : PB-2	Test Date : 07/01/97	Tested by : C. WASON
Sample No. : 215 PSI	Depth : 429-430 FT	Checked by : C. CAPPS
Sample Type : CORE	Elevation :	

Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Liquid Limit : 48.57   Plastic Limit : 24.51   Specific Gravity : 2.73

	WATER CONTENT BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	489.20	489.20	0.00
WT CONTAINER + DRY SOIL (gm)	397.80	397.80	0.00
WT WATER (gm)	91.40	91.40	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	397.80	397.80	0.00
WATER CONTENT (%)	22.98	22.98	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	22.98	22.98
VOID RATIO	0.83	0.83
WET DENSITY (lb/ft^3)	114.70	114.70
DRY DENSITY (lb/ft^3)	93.27	93.27
DEGREE OF SATURATION (%)	75.90	75.90

Maximum Shear Stress = 186.40 (lb/in^2) at a Vertical Strain of 2.50 %

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-430
Boring No. : PB-2
Test Date : 07/01/97
Tested by : C. WASON
Sample No. : 430 PSI
Depth : 429-430 FT
Checked by : C. CAPPS
Sample Type : CORE
Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Height : 4.370 (in)
Piston Diameter : 0.000 (in)
Filter Correction : 0.00 (lb/in^2)
Area : 3.44 (in^2)
Piston Friction : 0.00 (lb)
Membrane Correction : 0.00 (lb/in)
Volume : 15.04 (in^3)
Piston Weight : 0.00 (gm)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	3.44	0.00	0.00	0.00	0.00	430.00	430.00
2)	0.004	0.09	3.45	0.00	114.35	114.35	33.17	463.17	463.17
3)	0.009	0.21	3.45	0.00	343.04	343.04	99.32	529.32	529.32
4)	0.013	0.30	3.46	0.00	475.86	475.86	137.57	567.57	567.57
5)	0.017	0.39	3.46	0.00	597.14	597.14	172.36	602.36	602.36
6)	0.022	0.50	3.47	0.00	718.41	718.41	206.97	636.97	636.97
7)	0.033	0.76	3.49	0.00	937.86	937.86	269.05	699.05	699.05
8)	0.044	1.01	3.50	0.00	1135.37	1135.37	324.32	754.32	754.32
9)	0.066	1.51	3.53	0.00	1410.26	1410.26	399.41	829.41	829.41
10)	0.076	1.74	3.54	0.00	1485.33	1485.33	419.02	849.02	849.02
11)	0.087	1.99	3.56	0.00	1540.77	1540.77	432.79	862.79	862.79
12)	0.097	2.22	3.57	0.00	1582.35	1582.35	442.71	872.71	872.71
13)	0.109	2.49	3.59	0.00	1603.14	1603.14	446.40	876.40	876.40
14)	0.120	2.75	3.61	0.00	1620.47	1620.47	449.25	879.25	879.25
15)	0.131	3.00	3.62	0.00	1633.17	1633.17	450.78	880.78	880.78
16)	0.142	3.25	3.64	0.00	1644.72	1644.72	451.96	881.96	881.96
17)	0.153	3.50	3.66	0.00	1653.96	1653.96	452.48	882.48	882.48
18)	0.164	3.75	3.67	0.00	1662.05	1662.05	452.67	882.67	882.67
19)	0.175	4.00	3.69	0.00	1670.13	1670.13	452.84	882.84	882.84
20)	0.219	5.01	3.76	0.00	1703.63	1703.63	453.61	883.61	883.61
21)	0.262	6.00	3.82	0.00	1716.33	1716.33	448.82	878.82	878.82
22)	0.306	7.00	3.90	0.00	1719.80	1719.80	441.34	871.34	871.34
23)	0.350	8.01	3.97	0.00	1725.57	1725.57	434.41	864.41	864.41
24)	0.393	8.99	4.05	0.00	1689.77	1689.77	417.34	847.34	847.34
25)	0.437	10.00	4.13	0.00	1657.43	1657.43	401.27	831.27	831.27
26)	0.524	11.99	4.30	0.00	1585.82	1585.82	368.65	798.65	798.65
27)	0.612	14.00	4.49	0.00	1509.59	1509.59	336.21	766.21	766.21
28)	0.699	16.00	4.69	0.00	1372.14	1372.14	292.37	722.37	722.37
29)	0.787	18.01	4.92	0.00	1291.29	1291.29	262.55	692.55	692.55
30)	0.874	20.00	5.16	0.00	1238.16	1238.16	239.81	669.81	669.81

Thu Jul 03 14:38:41 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : HOLLADAY ENGINEERING CO.
Location : PICKLES BUTTE LANDFILL
Project No. : 971144NA
Test No. : PB2-430
Boring No. : PB-2
Test Date : 07/01/97
Tested by : C. WASON
Sample No. : 430 PSI
Depth : 429-430 FT
Checked by : C. CAPPS
Sample Type : CORE
Elevation :
Soil Description : GRAYISH BROWN SI CLAY / CLAYEY SILT
Remarks :

Liquid Limit : 48.57
Plastic Limit : 24.51
Specific Gravity : 2.73

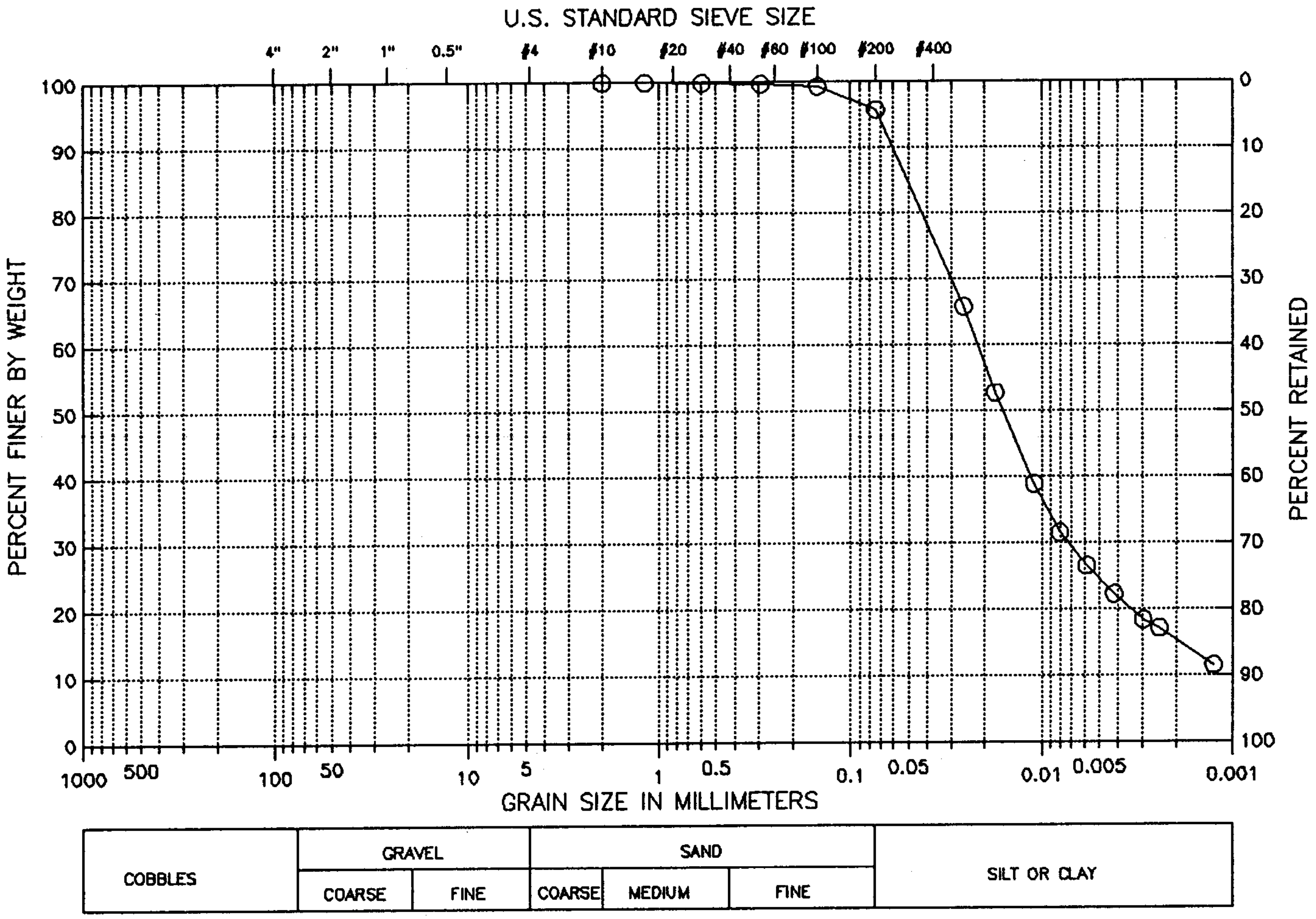
	WATER CONTENT BEFORE TEST	WATER CONTENT AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	453.30	453.30	0.00
WT CONTAINER + DRY SOIL (gm)	367.60	367.60	0.00
WT WATER (gm)	85.70	85.70	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	367.60	367.60	0.00
WATER CONTENT (%)	23.31	23.31	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	23.31	23.31
VOID RATIO	0.83	0.83
WET DENSITY (lb/ft^3)	114.81	114.81
DRY DENSITY (lb/ft^3)	93.10	93.10
DEGREE OF SATURATION (%)	76.71	76.71

Maximum Shear Stress = 226.81 (lb/in^2) at a Vertical Strain of 5.01 %

Boring No. : PB-2
Sample No.: 429-430 FT
Tested by : C. WASON
Filename : PB2-430

Project : HOLLADAY ENGINEERING CO. 030496
Project No.: 971144NA
Location: PICKLES BUTTE LANDFILL
Date : Thu Jul 03 1997



Classification :
(CL) lean clay
Visual Description :
GRAYISH BROWN SILTY CLAY

Remarks :
429-430 FEET

Figure 1

```
Thu Jul 03 14:15:56 1997                                                          Page :  1

                                  GEOTECHNICAL LABORATORY TEST DATA

Project : HOLLADAY ENGINEERING CO.  030496                      Filename : PB2-430
Project No. : 971144NA              Depth : 429-430 FEET        Elevation : NA
Boring No. : PB-2                   Test Date : 07/02/97        Tested by : C. WASON
Sample No. : 429-430 FT             Test Method : ASTM D4318/422 Checked by : S. CAPPS
Location : PICKLES BUTTE LANDFILL
Soil Description : GRAYISH BROWN SILTY CLAY
Remarks : 429-430 FEET

                                      HYDROMETER
Hydrometer ID : 1734
Weight of air-dried soil = 70 gm
Specific Gravity         = 2.73

Hydroscopic Moisture Content :
   Weight of Wet Soil = 70 gm
   Weight of Dry Soil = 64.59 gm
   Moisture Content   = 0.0837591

Elapsed       Reading       Temperature    Corrected     Particle     Percent      Adjusted
Time (min)                  (deg. C)       Reading       Size (mm)    Finer (%)    Particle Size
----------    ----------    ------------   ----------    ----------   ---------    -------------
      2.00         51.30          22.50         43.15         0.026          66          0.026
      5.00         42.80          22.40         34.60         0.018          53          0.018
     15.00         33.80          22.30         25.56         0.011          39          0.011
     30.00         29.00          22.10         20.67         0.008          32          0.008
     60.00         25.80          22.00         17.42         0.006          27          0.006
    120.00         23.00          22.00         14.62         0.004          22          0.004
    245.00         20.20          22.50         12.05         0.003          18          0.003
    362.00         19.20          22.90         11.23         0.002          17          0.002
   1440.00         16.00          21.90          7.57         0.001          12          0.001


                                     FINE SIEVE SET
Sieve         Sieve Openings          Weight         Cumulative          Percent
Mesh          Inches  Millimeters     Retained       Weight Retained     Finer
                                      (gm)           (gm)                (%)
----------    ------  -----------     --------       ---------------     -------
#10            0.079         2.00         0.00                  0.00         100
#16            0.047         1.19         0.00                  0.00         100
#30            0.023         0.60         0.08                  0.08         100
#50            0.012         0.30         0.09                  0.17         100
#100           0.006         0.15         0.24                  0.41          99
#200           0.003         0.07         2.33                  2.74          96
Pan                                      61.85                 64.59           0
     Total Wet Weight of Sample = 70
     Total Dry Weight of Sample = 64.59
     Moisture Content            = 0.0837591

 D85 : 0.0506 mm
 D60 : 0.0218 mm
 D50 : 0.0161 mm
 D30 : 0.0073 mm
 D15 : 0.0019 mm
 D10 : 0.0011 mm

 Soil Classification
        ASTM Group Symbol    : CL
        ASTM Group Name      : lean clay
        AASHTO Group Symbol  : A-7-6(28)
        AASHTO Group Name    : Clayey Soils
```

ATTERBERG LIMITS

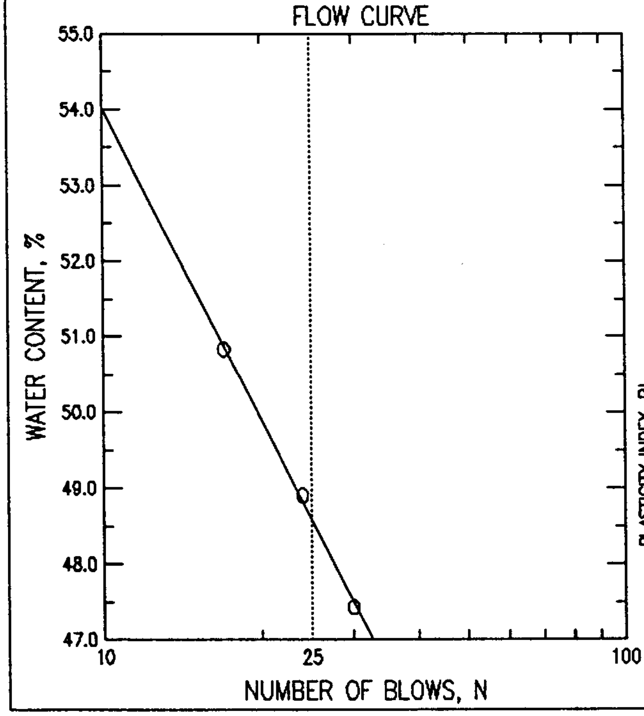
PROJECT HOLLADAY ENGINEERING CO. 030496	PROJECT NUMBER 971144NA	TESTED BY C. WASON	BORING NUMBER PB-2
LOCATION PICKLES BUTTE LANDFILL		CHECKED BY S. CAPPS	SAMPLE NUMBER 429-430 FT
SAMPLE DESCRIPTION GRAYISH BROWN SILTY CLAY		DATE Thu Jul 03 1997	FILENAME PB2-430

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER	8	F	90		
WT. WET SOIL + TARE	27.18	28.5	28.49		
WT. DRY SOIL + TARE	22.01	22.69	22.64		
WT. WATER	5.17	5.81	5.85		
TARE WT.	11.11	10.81	11.13		
WT. DRY SOIL	10.9	11.88	11.51		
WATER CONTENT, W_N (%)	47.43	48.91	50.83		
NUMBER OF BLOWS, N	30	24	17		
ONE-POINT LIQUID LIMIT, LL	48.49	48.66	48.51		

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER	10				
WT. WET SOIL + TARE	27.09				
WT. DRY SOIL + TARE	24.95				
WT. WATER	2.14				
TARE WT.	16.22				
WT. DRY SOIL	8.73				
WATER CONTENT (%)	24.51				



SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	
LIQUID LIMIT, LL	48.6
PLASTIC LIMIT, PL	24.5
PLASTICITY INDEX, PI	24.1
LIQUIDITY INDEX, LI*	

*LI = (W − PL)/PI

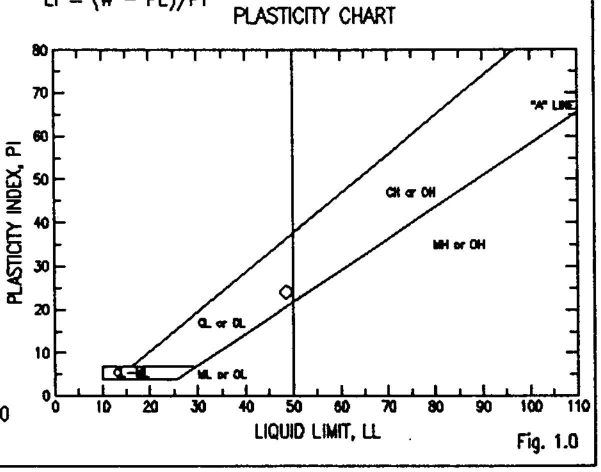
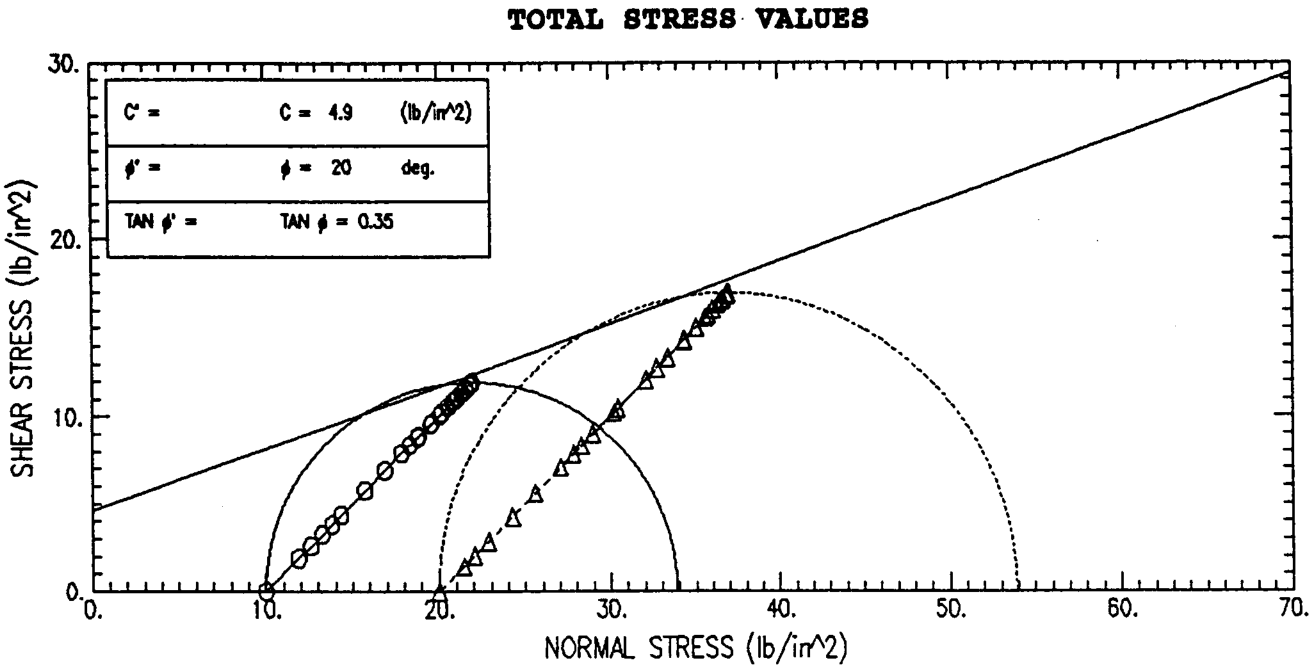
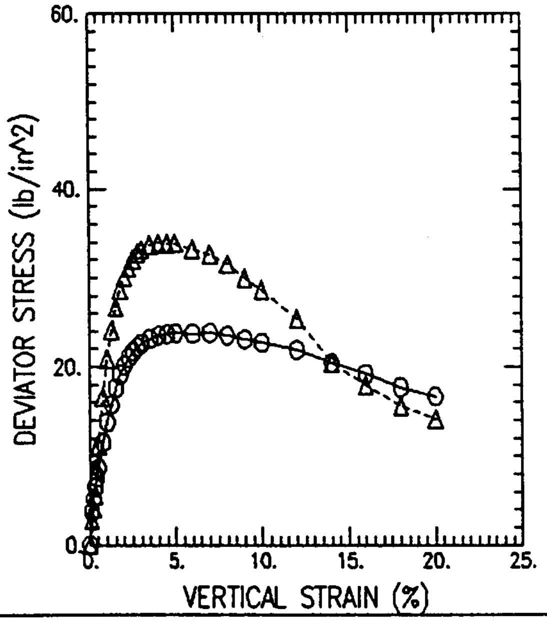


Fig. 1.0

TOTAL STRESS VALUES



Failure Criteria: Peak Deviator Stress



SYMBOL		○	Δ		
TEST NO.		GT1-TOP	GT1-BOTTOM		
INITIAL	WATER CONTENT (%)	11.70	9.95		
	DRY DENSITY (lb/ft^3)	100.69	103.33		
	SATURATION (%)	46.42	42.10		
	VOID RATIO	0.686	0.643		
BEFORE SHEAR	WATER CONTENT (%)	11.70	9.95		
	DRY DENSITY (lb/ft^3)	100.69	103.33		
	SATURATION (%)	46.42	42.10		
	VOID RATIO	0.686	0.643		
	BACK PRESS. (lb/in^2)	0.00	0.00		
MINOR PRIN. STRESS (lb/in^2)		10.00	20.00		
MAX. DEV. STRESS (lb/in^2)		23.86	33.89		
TIME TO FAILURE (min)					
RATE OF STRAIN INCR (%/min)		0.00	0.00		
INITIAL DIAMETER (in)		2.86	2.86		
INITIAL HEIGHT (in)		5.98	5.98		

CONTROLLED STRAIN TEST

DESCRIPTION OF SPECIMENS: 1) BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA 2) BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA

LL	PL	PI	GS 2.72	TYPE OF SPECIMEN SHELBY	TYPE OF TEST UNDRAINED

REMARKS:

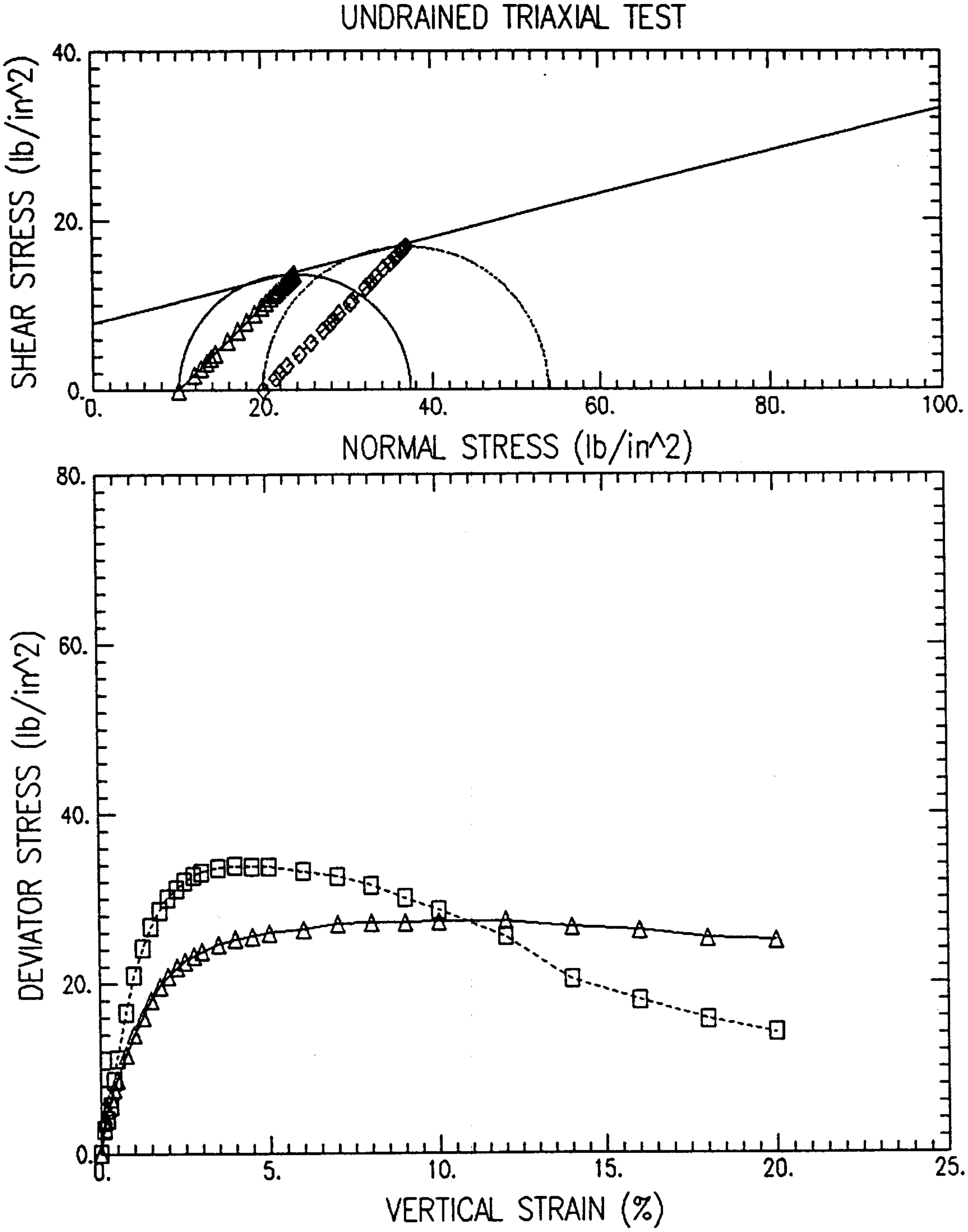
1) TXUU TEST WITH CONFINING PRESSURE OF 10 PSI

2) TXUU TEST WITH CONFINING PRESSURE OF 20 PSI

PROJECT C. E. L. P.O. #3689

BORING NO. GT-1	SAMPLE NO.	TOP	BOTTOM		
TECH. C. WASON	DEPTH/ELEV	10-12 FEET	10-12 FEET		
LABORATORY	DATE	03/06/97	03/06/97		

TRIAXIAL COMPRESSION TEST REPORT



Project Name : C. E. L. P.O. #3689

Boring No:	Sample No	Depth	Test No	Filename
GT-1	TOP	10-12 FEET	GT1-TOP	GT1A-10.UU
GT-1	BOTTOM	10-12 FEET	GT1-BOTTOM	GT1B-10.UU

Failure Criteria: Peak Deviator Stress

Wed Mar 19 16:49:15 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-1
Sample No. : TOP
Sample Type : SHELBY

Location : PICKLES BUTTE L/F, IDAHO
Test No. : GT1-TOP
Test Date : 03/06/97
Depth : 10-12 FEET
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Soil Description : BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 10 PSI

Height : 5.984 (in)
Area : 6.42 (in^2)
Volume : 38.44 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : None

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	6.42	0.00	0.00	0.00	0.00	10.00	10.00
2)	0.006	0.10	6.42	0.00	24.13	24.13	3.76	13.76	13.76
3)	0.012	0.20	6.42	0.00	33.32	33.32	5.19	15.19	15.19
4)	0.018	0.30	6.42	0.00	41.94	41.94	6.53	16.53	16.53
5)	0.024	0.40	6.42	0.00	49.41	49.41	7.69	17.69	17.69
6)	0.030	0.50	6.42	0.00	56.30	56.30	8.76	18.76	18.76
7)	0.045	0.75	6.42	0.00	74.69	74.69	11.63	21.63	21.63
8)	0.060	1.00	6.42	0.00	90.20	90.20	14.04	24.04	24.04
9)	0.075	1.25	6.42	0.00	103.41	103.41	16.10	26.10	26.10
10)	0.090	1.50	6.42	0.00	116.05	116.05	18.06	28.06	28.06
11)	0.105	1.75	6.42	0.00	126.39	126.39	19.67	29.67	29.67
12)	0.120	2.01	6.42	0.00	133.86	133.86	20.84	30.84	30.84
13)	0.135	2.26	6.42	0.00	140.75	140.75	21.91	31.91	31.91
14)	0.150	2.51	6.42	0.00	145.35	145.35	22.63	32.63	32.63
15)	0.165	2.76	6.42	0.00	149.37	149.37	23.25	33.25	33.25
16)	0.180	3.01	6.42	0.00	152.82	152.82	23.79	33.79	33.79
17)	0.209	3.49	6.42	0.00	157.99	157.99	24.59	34.59	34.59
18)	0.239	3.99	6.42	0.00	162.01	162.01	25.22	35.22	35.22
19)	0.269	4.50	6.42	0.00	164.31	164.31	25.58	35.58	35.58
20)	0.299	5.00	6.42	0.00	166.61	166.61	25.93	35.93	35.93
21)	0.359	6.00	6.42	0.00	169.48	169.48	26.38	36.38	36.38
22)	0.419	7.00	6.42	0.00	173.50	173.50	27.01	37.01	37.01
23)	0.479	8.00	6.42	0.00	174.65	174.65	27.19	37.19	37.19
24)	0.539	9.01	6.42	0.00	174.65	174.65	27.19	37.19	37.19
25)	0.598	9.99	6.42	0.00	175.22	175.22	27.28	37.28	37.28
26)	0.718	12.00	6.42	0.00	175.80	175.80	27.37	37.37	37.37
27)	0.838	14.00	6.42	0.00	171.20	171.20	26.65	36.65	36.65
28)	0.957	15.99	6.42	0.00	168.33	168.33	26.20	36.20	36.20
29)	1.077	18.00	6.42	0.00	162.58	162.58	25.31	35.31	35.31
30)	1.197	20.00	6.42	0.00	160.86	160.86	25.04	35.04	35.04

Wed Mar 19 17:38:48 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F, IDAHO
Project No. : 941138NA
Test No. : GT1-TOP
Boring No. : GT-1
Test Date : 03/06/97
Tested by : C. WASON
Sample No. : TOP
Depth : 10-12 FEET
Checked by : C. CAPPS
Sample Type : SHELBY
Elevation : NA
Soil Description : BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 10 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	1134.90	1134.90	0.00
WT CONTAINER + DRY SOIL (gm)	1016.00	1016.00	0.00
WT WATER (gm)	118.90	118.90	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	1016.00	1016.00	0.00
WATER CONTENT (%)	11.70	11.70	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	11.70	11.70
VOID RATIO	0.69	0.69
WET DENSITY (lb/ft^3)	112.47	112.47
DRY DENSITY (lb/ft^3)	100.69	100.69
DEGREE OF SATURATION (%)	46.42	46.42

Maximum Shear Stress = 13.68 (lb/in^2) at a Vertical Strain of 12.00 %

Wed Mar 19 16:48:23 1997

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Project No. : 941138NA
Boring No. : GT-1
Sample No. : BOTTOM
Sample Type : SHELBY

Location : PICKLES BUTTE L/F- IDAHO
Test No. : GT1-BOTTOM
Test Date : 03/06/97
Depth : 10-12 FEET
Elevation : NA

Tested by : C. WASON
Checked by : C. CAPPS

Soil Description : BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 20 PSI

Height : 5.984 (in)
Area : 6.42 (in^2)
Volume : 38.44 (in^3)

Piston Diameter : 0.000 (in)
Piston Friction : 0.00 (lb)
Piston Weight : 0.00 (gm)

Filter Correction : 0.00 (lb/in^2)
Membrane Correction : 0.00 (lb/in)
Area Correction : Parabolic

	CHANGE IN LENGTH (in)	VERTICAL STRAIN (%)	CORR. AREA (in^2)	PORE PRESSURE (lb/in^2)	DEV. LOAD (lb)	CORR. DEV. LOAD (lb)	DEV. STRESS (lb/in^2)	TOTAL VERTICAL STRESS (lb/in^2)	EFFECTIVE VERTICAL STRESS (lb/in^2)
1)	0.000	0.00	6.42	0.00	0.00	0.00	0.00	20.00	20.00
2)	0.006	0.10	6.43	0.00	18.38	18.38	2.86	22.86	22.86
3)	0.012	0.20	6.45	0.00	26.43	26.43	4.10	24.10	24.10
4)	0.018	0.30	6.46	0.00	36.77	36.77	5.69	25.69	25.69
5)	0.024	0.40	6.47	0.00	55.15	55.15	8.53	28.53	28.53
6)	0.030	0.50	6.48	0.00	72.39	72.39	11.17	31.17	31.17
7)	0.045	0.75	6.51	0.00	108.01	108.01	16.60	36.60	36.60
8)	0.060	1.00	6.53	0.00	136.73	136.73	20.93	40.93	40.93
9)	0.075	1.25	6.56	0.00	158.56	158.56	24.17	44.17	44.17
10)	0.090	1.50	6.59	0.00	175.80	175.80	26.68	46.68	46.68
11)	0.105	1.75	6.62	0.00	189.59	189.59	28.65	48.65	48.65
12)	0.120	2.01	6.65	0.00	199.93	199.93	30.08	50.08	50.08
13)	0.135	2.26	6.67	0.00	207.97	207.97	31.16	51.16	51.16
14)	0.150	2.51	6.70	0.00	214.86	214.86	32.05	52.05	52.05
15)	0.165	2.76	6.73	0.00	220.61	220.61	32.76	52.76	52.76
16)	0.180	3.01	6.76	0.00	224.06	224.06	33.13	53.13	53.13
17)	0.209	3.49	6.82	0.00	229.80	229.80	33.69	53.69	53.69
18)	0.239	3.99	6.88	0.00	233.25	233.25	33.89	53.89	53.89
19)	0.269	4.50	6.94	0.00	234.97	234.97	33.84	53.84	53.84
20)	0.299	5.00	7.01	0.00	237.27	237.27	33.86	53.86	53.86
21)	0.359	6.00	7.14	0.00	237.27	237.27	33.24	53.24	53.24
22)	0.419	7.00	7.27	0.00	237.27	237.27	32.62	52.62	52.62
23)	0.479	8.00	7.41	0.00	233.82	233.82	31.54	51.54	51.54
24)	0.539	9.01	7.56	0.00	226.93	226.93	30.02	50.02	50.02
25)	0.598	9.99	7.71	0.00	220.61	220.61	28.62	48.62	48.62
26)	0.718	12.00	8.03	0.00	204.52	204.52	25.47	45.47	45.47
27)	0.838	14.00	8.38	0.00	171.20	171.20	20.43	40.43	40.43
28)	0.957	15.99	8.76	0.00	157.41	157.41	17.97	37.97	37.97
29)	1.077	18.00	9.18	0.00	143.63	143.63	15.65	35.65	35.65
30)	1.197	20.00	9.64	0.00	136.16	136.16	14.13	34.13	34.13

UNDRAINED TRIAXIAL COMPRESSION TEST

Project : C. E. L. P.O. #3689
Location : PICKLES BUTTE L/F- IDAHO
Project No. : 941138NA
Test No. : GT1-BOTTOM
Boring No. : GT-1
Test Date : 03/06/97
Tested by : C. WASON
Sample No. : BOTTOM
Depth : 10-12 FEET
Checked by : C. CAPPS
Sample Type : SHELBY
Elevation : NA
Soil Description : BROWN SI-SAND TO SA-SILT W/ TRACES OF CLAY & MICA
Remarks : TXUU TEST WITH CONFINING PRESSURE OF 20 PSI

Liquid Limit : 0
Plastic Limit : 0
Specific Gravity : 2.72

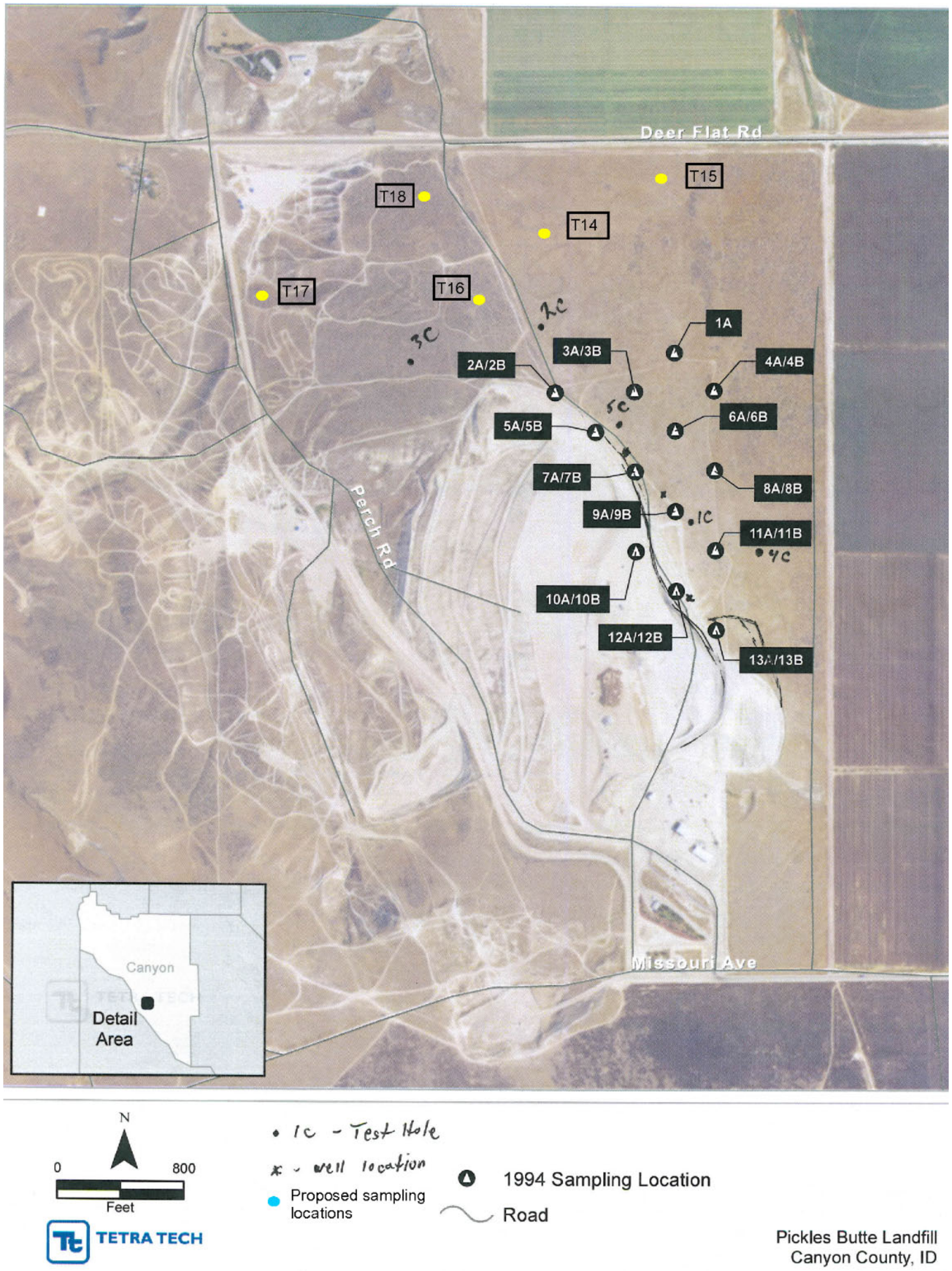
	WATER CONTENT		
	BEFORE TEST	AFTER TEST	TRIMMINGS
CONTAINER NO.			
WT CONTAINER + WET SOIL (gm)	1146.40	1146.40	0.00
WT CONTAINER + DRY SOIL (gm)	1042.70	1042.70	0.00
WT WATER (gm)	103.70	103.70	0.00
WT CONTAINER (gm)	0.00	0.00	0.00
WT DRY SOIL (gm)	1042.70	1042.70	0.00
WATER CONTENT (%)	9.95	9.95	0.00

	INITIAL	AT CONSOLIDATION
WATER CONTENT (%)	9.95	9.95
VOID RATIO	0.64	0.64
WET DENSITY (lb/ft^3)	113.61	113.61
DRY DENSITY (lb/ft^3)	103.33	103.33
DEGREE OF SATURATION (%)	42.10	42.10

Maximum Shear Stress = 16.95 (lb/in^2) at a Vertical Strain of 3.99 %

Sample Results for Pickles
Butte Landfill, Canyon County, Idaho

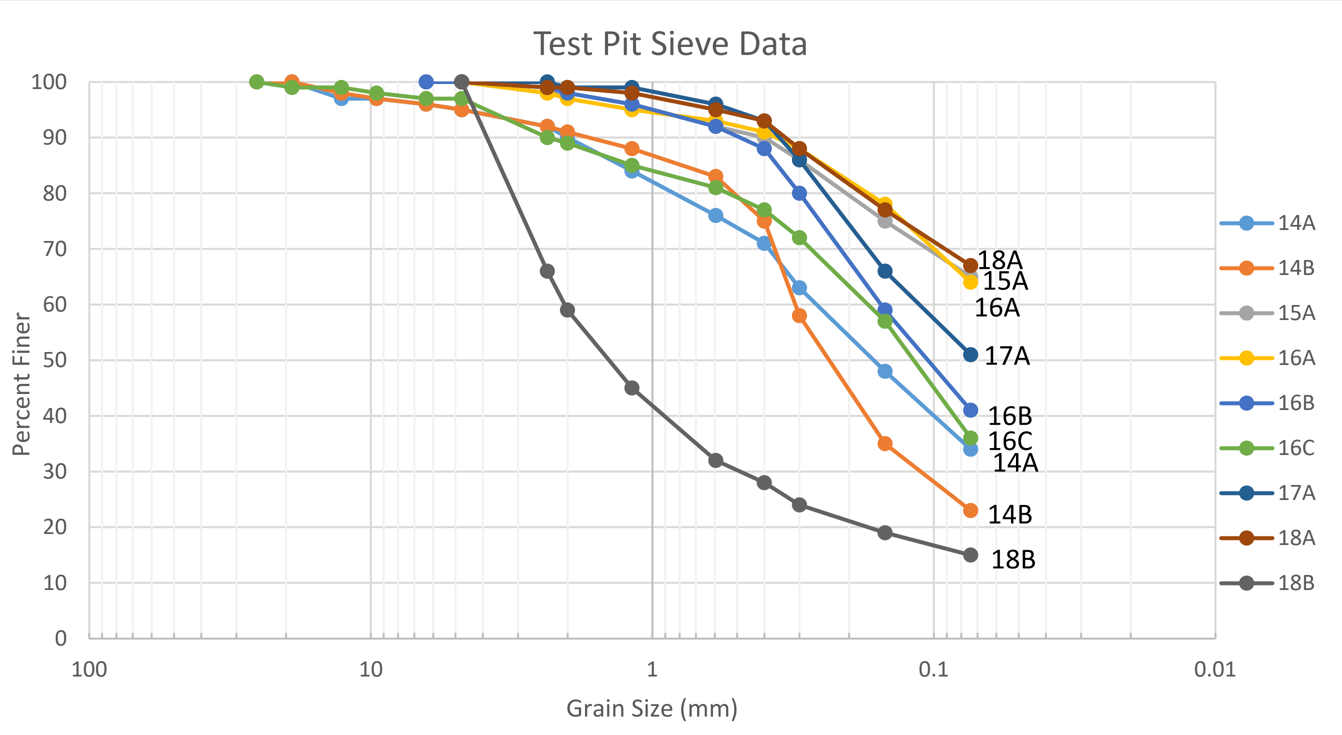
The Pickles Butte Landfill is evaluating the use of a Monolithic Cover rather than the Capillary Barrier Cover approved as part of the original landfill design. Soil samples were collected to analyze soil that could potentially be part of the final landfill cover from the area east of Perch Road, North of the existing landfill, and south of Deer Flat Rd at the sample locations marked on the figure.



Samples were selected for analysis of capillary rise, permeability, modified proctor compaction, and sieve analysis. Laboratory test were not conducted on all samples.

Based on various test, the best soil for the final cover is ML (silt with low plasticity). Soil sample 15A represents the ML material for permeability. The sample has a permeability of 4.24 E-5 cm/s, and the percent passing a 200 sieve is 65%. This material is present below the topsoil/organic material and varies in thickness between two to six feet across the site. The estimated area for borrow material for the final cover is approximately 70 acres. If the landfill CAP for a 116 area landfill is 3 feet thick that means that the average depth of the borrow material would need to be 4.9 feet to have enough material for the CAP. So there is sufficient material available for the CAP.

Sample 18B was not selected because, although the permeability is low, the compaction test indicates that the material does not compact well or at a sufficient pressure to be used for cover. The differences between samples can be seen well in the sieve data. Samples 18A, 15A, 16A and 17A are all ML samples that exhibit a high percentage of fines (>50%). The other material is not as well suited for the cover. So sieve data, along with field observations can be used to delineate ML material in the field. These results are consistent with the analysis conducted in 2014 that indicates that ML material is in the upper layer below the topsoil, and that when the percent fines is >50% the material is generally classified as ML for this site.



Modeling decision:

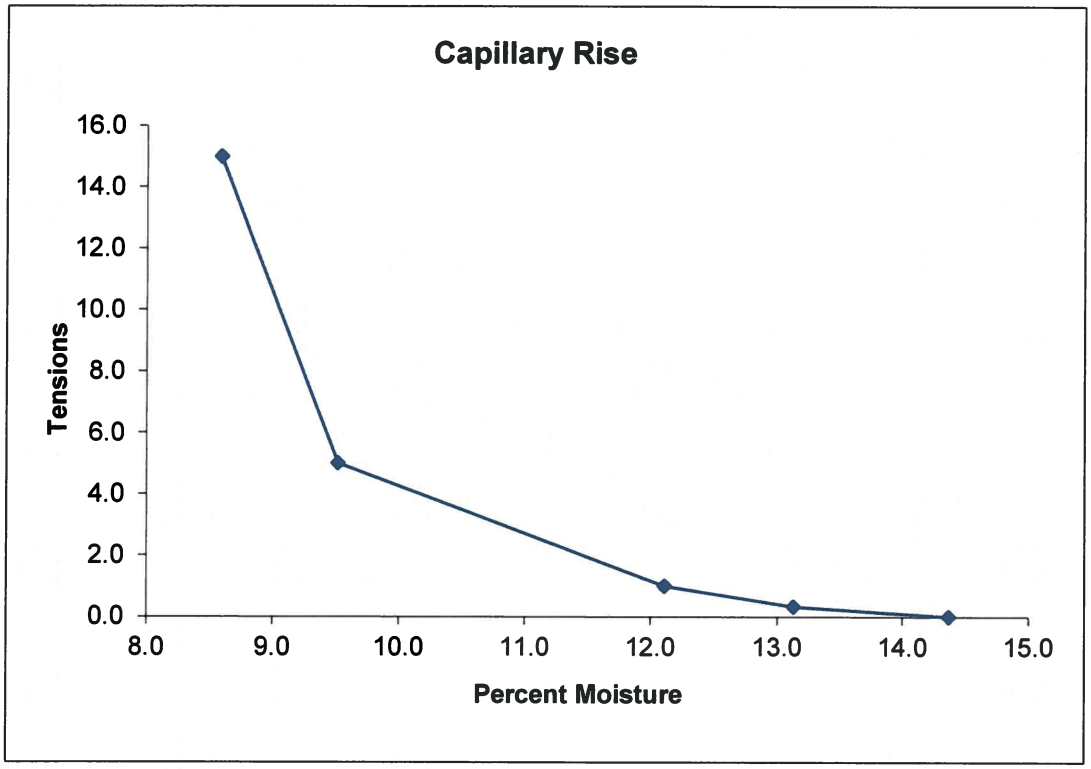
- For 3 feet of CAP use the permeability and capillary rise properties for sample T15A.
- For 1 foot of intermediate cover, conservatively assume properties of SM material found below the ML and use the permeability and capillary properties from sample T16B.

IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Date: April 28, 2016
Submitted by: Tetra Tech
Report to: Keith A. Johnson
Report #: 6652671
Date Received: April 18, 2016

Lab#: 884
Sender ID: T14B



Moisture	Equivalent Pressure		Tension	
%	psi	mmHg	Bars	
14.37	1.5	76	0.0	
13.13	4.9	251	0.33	***Field Capacity***
12.11	29.4	1520	1.0	
9.52	73.5	3800	5.0	
8.59	220.5	11400	15.0	***Wilting Point***

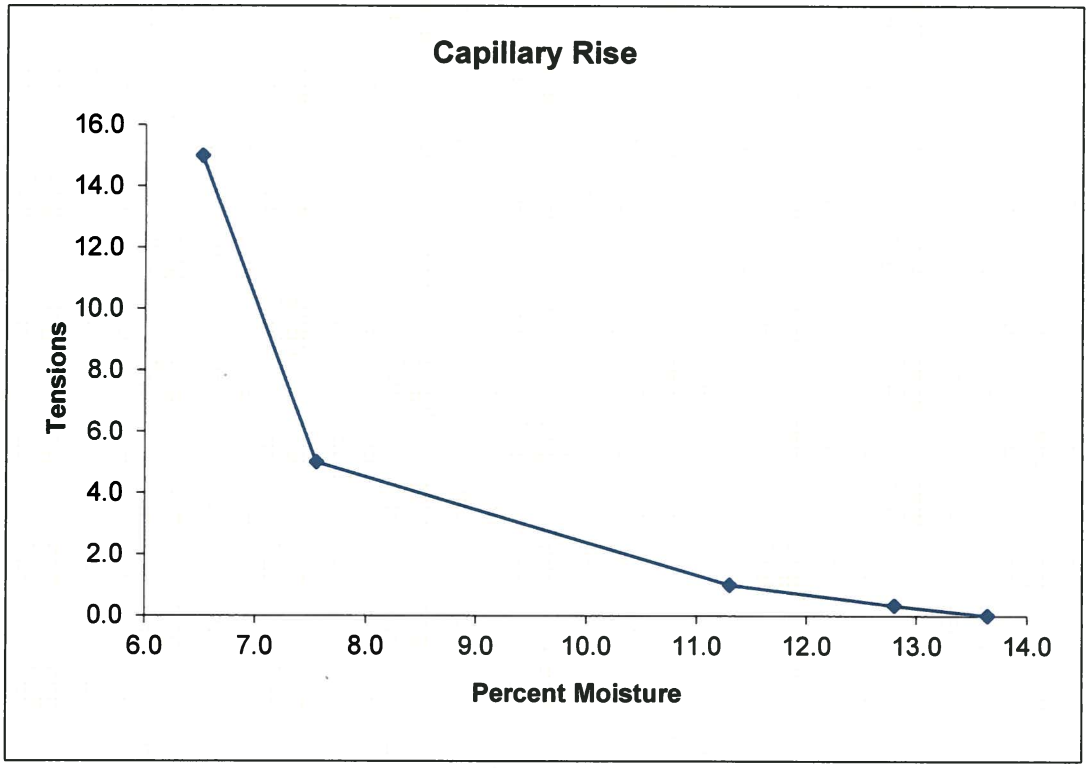
Analysis modified ASTM D3152 and ASTM D2325

IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Date: April 28, 2016
Submitted by: Tetra Tech
Report to: Keith A. Johnson
Report #: 6652671
Date Received: April 18, 2016

Lab#: 887
Sender ID: T17A



Moisture	Equivalent Pressure		Tension	
%	psi	mmHg	Bars	
13.64	1.5	76	0.0	
12.80	4.9	251	0.33	***Field Capacity***
11.30	29.4	1520	1.0	
7.55	73.5	3800	5.0	
6.52	220.5	11400	15.0	***Wilting Point***

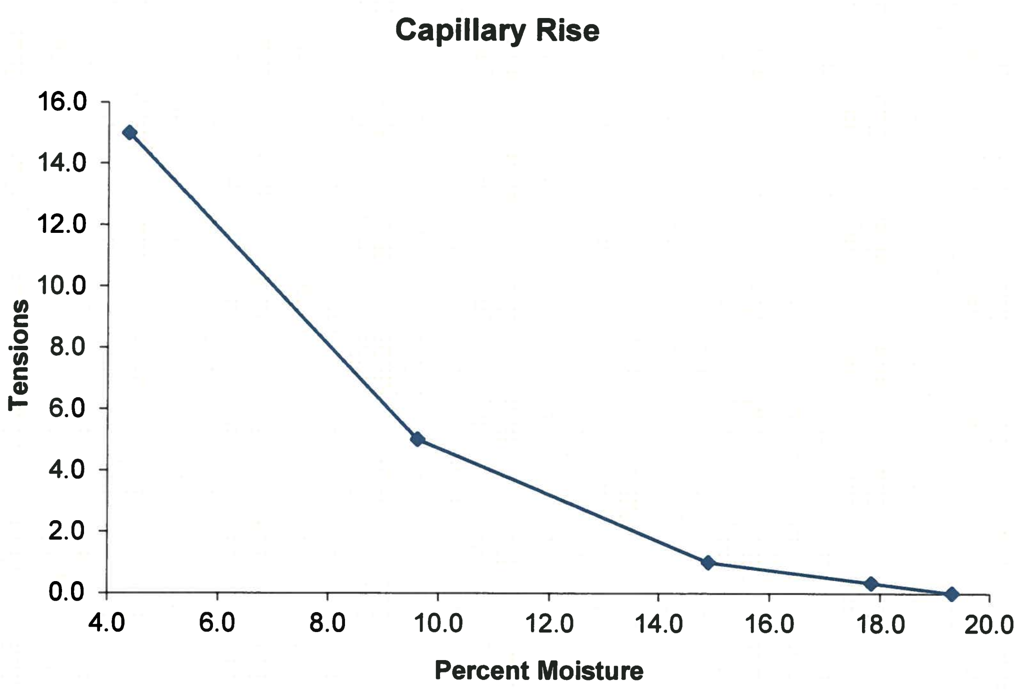
Analysis modified ASTM D3152 and ASTM D2325

IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Date: April 28, 2016
Submitted by: Tetra Tech
Report to: Keith A. Johnson
Report #: 6652671
Date Received: April 18, 2016

Lab#: 885
Sender ID: T15A



Moisture	Equivalent Pressure		Tension	
%	psi	mmHg	Bars	
19.31	1.5	76	0.0	
17.84	4.9	251	0.33	***Field Capacity***
14.90	29.4	1520	1.0	
9.62	73.5	3800	5.0	
4.37	220.5	11400	15.0	***Wilting Point***

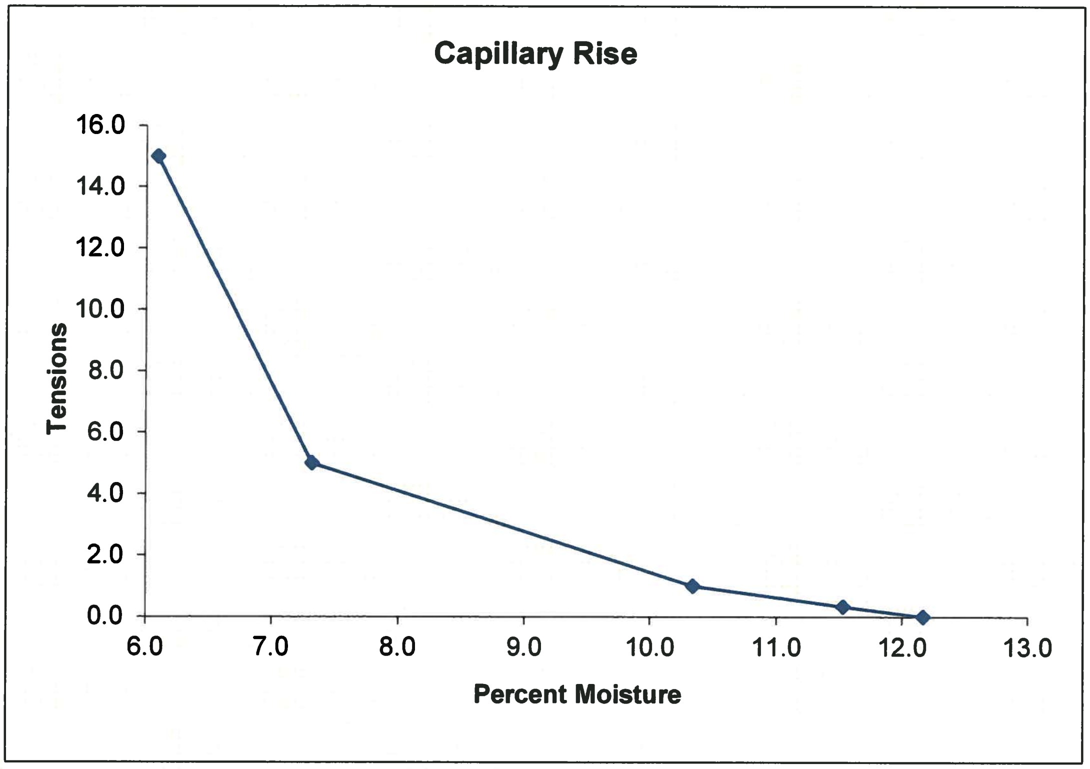
Analysis modified ASTM D3152 and ASTM D2325

IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Date: April 28, 2016
Submitted by: Tetra Tech
Report to: Keith A. Johnson
Report #: 6652671
Date Received: April 18, 2016

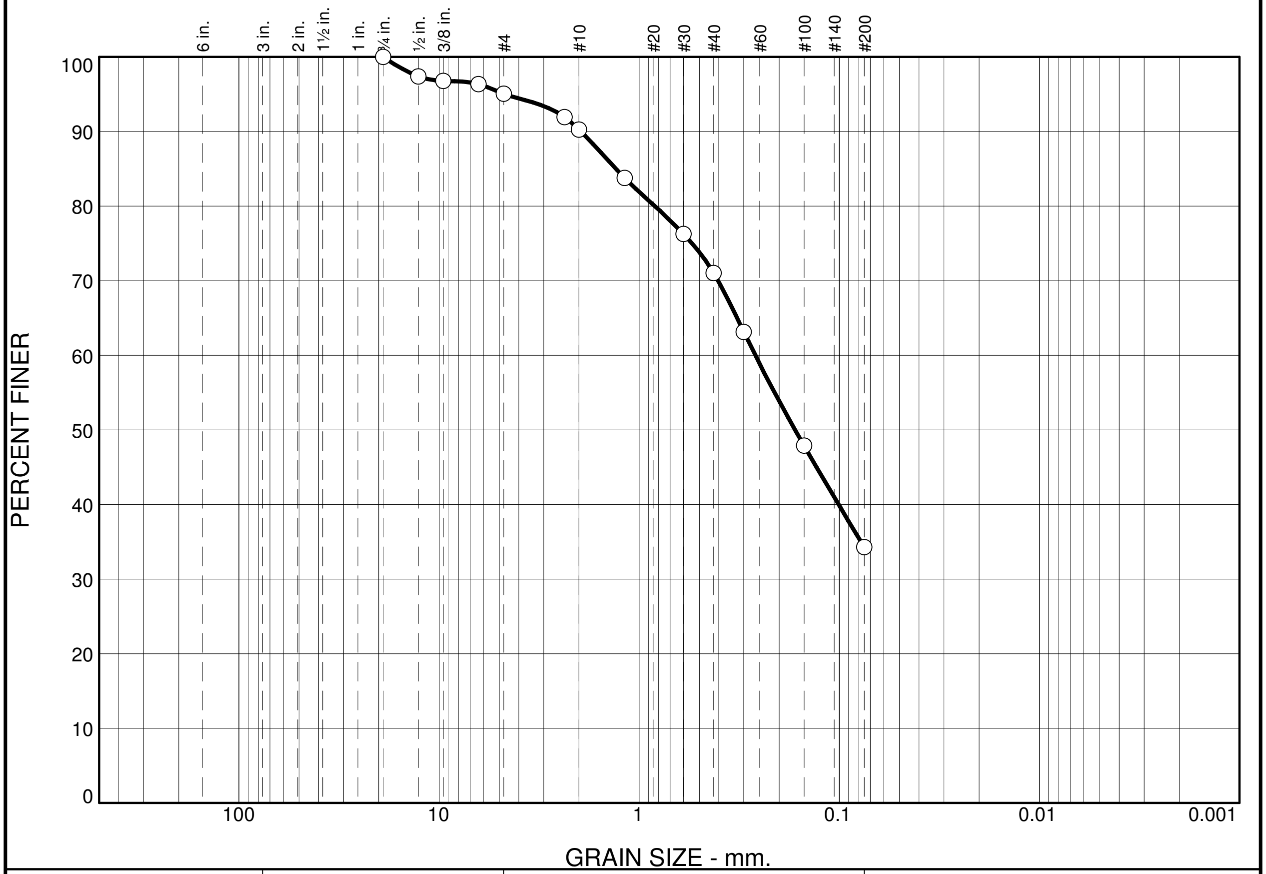
Lab#: 886
Sender ID: T16B



Moisture	Equivalent Pressure		Tension	
%	psi	mmHg	Bars	
12.17	1.5	76	0.0	
11.53	4.9	251	0.33	***Field Capacity***
10.34	29.4	1520	1.0	
7.32	73.5	3800	5.0	
6.09	220.5	11400	15.0	***Wilting Point***

Analysis modified ASTM D3152 and ASTM D2325

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	5	19	37	34	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	97		
3/8"	97		
1/4"	96		
#4	95		
#8	92		
#10	90		
#16	84		
#30	76		
#40	71		
#50	63		
#100	48		
#200	34		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.9557 D_{85}= 1.3048 D_{60}= 0.2628
D_{50}= 0.1663 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

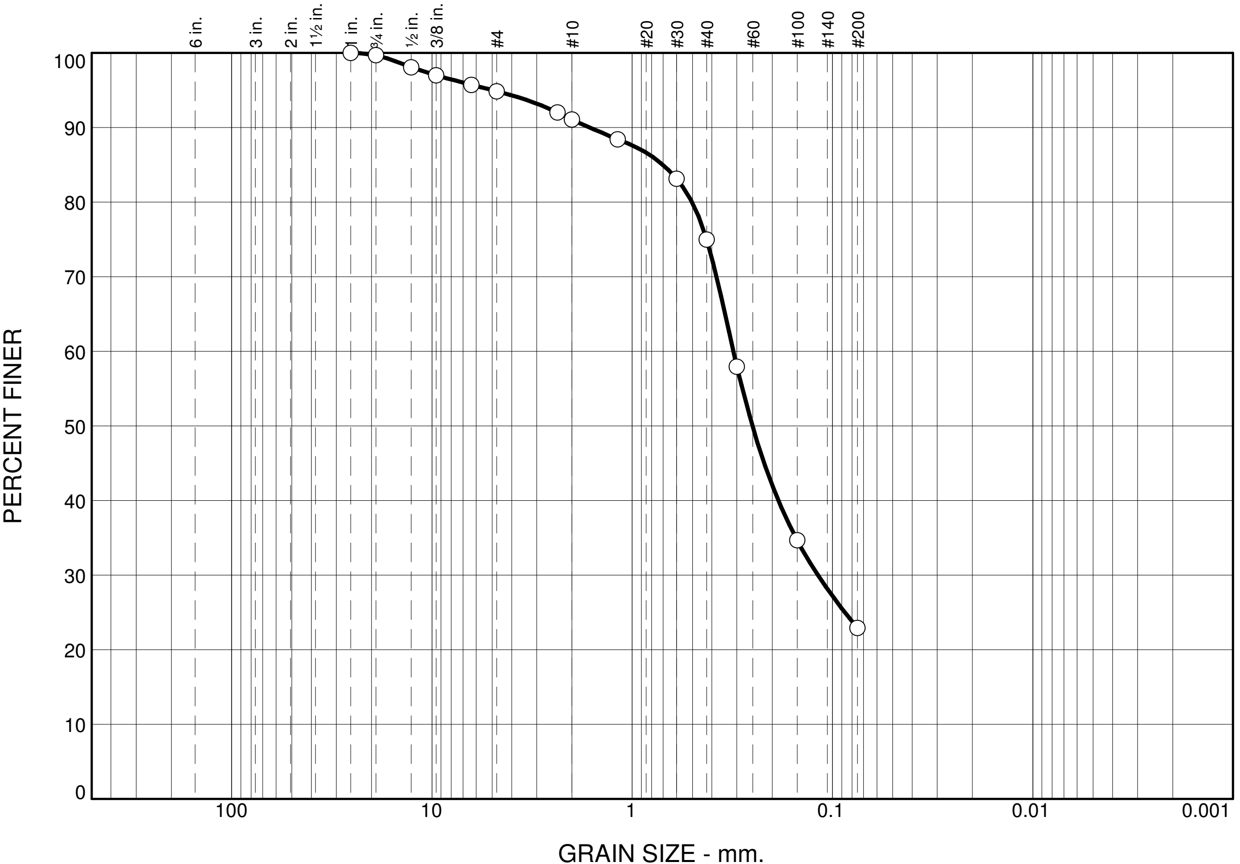
Location: T14A
Sample Number: 16L0094
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0094

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	4	16	52	23	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	100		
1/2"	98		
3/8"	97		
1/4"	96		
#4	95		
#8	92		
#10	91		
#16	88		
#30	83		
#40	75		
#50	58		
#100	35		
#200	23		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.6326 D_{85}= 0.7020 D_{60}= 0.3125

D_{50}= 0.2508 D_{30}= 0.1185 D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Location: T14B

Sample Number: 16L0095

Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

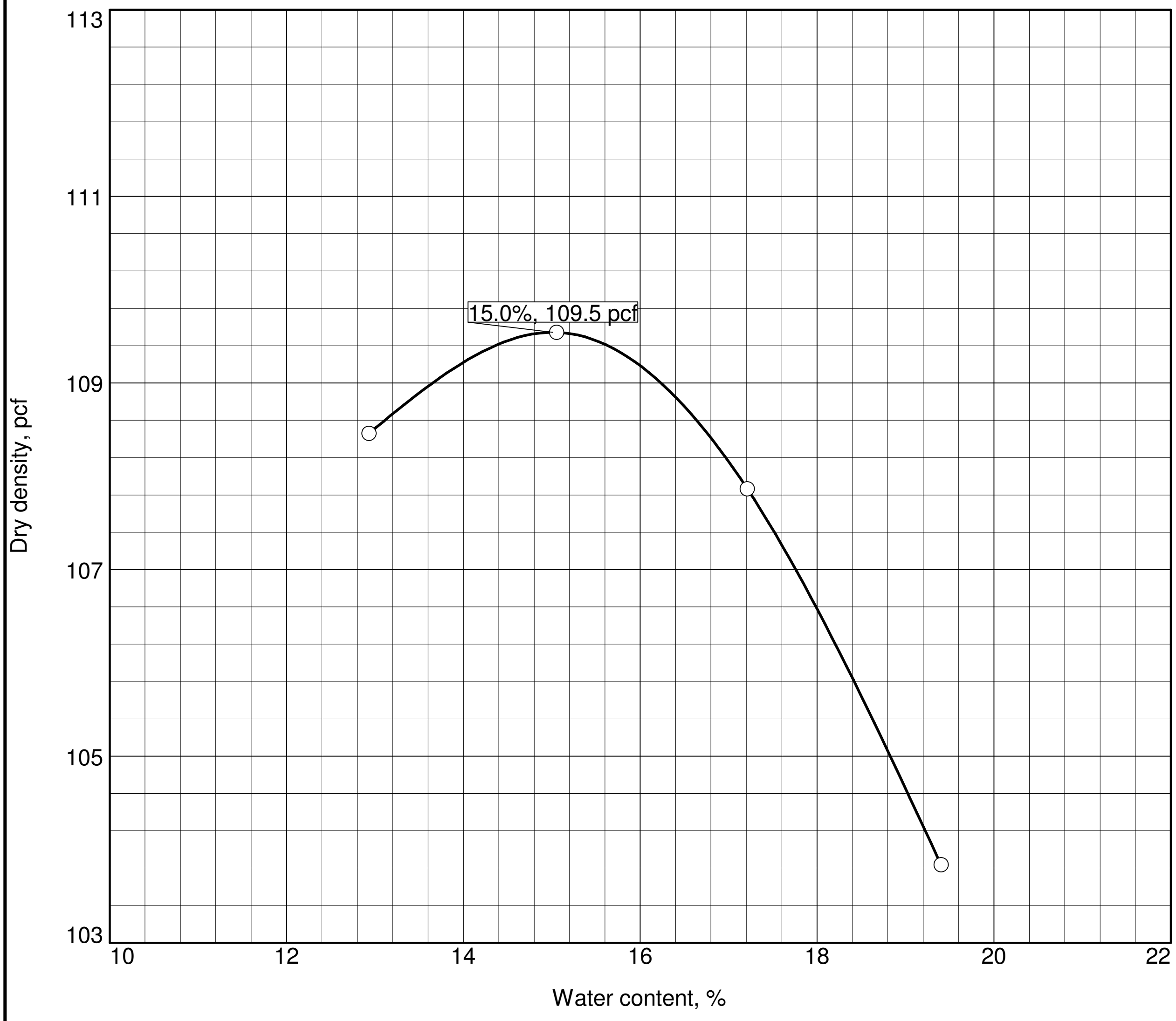
Client: Tetra Tech

Project: Pickles Butte Landfill

Project No: 16042 **Lab Number** 16L0095

Tested By: AJ **Checked By:** TT

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-2-4(0)			NV	NP	5	23

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 109.5 pcf Optimum moisture = 15.0 %	silty sand

Project No. 16042 **Client:** Tetra Tech

Project: Pickles Butte Landfill

○ **Location:** T14B **Sample Number:** 16L0095

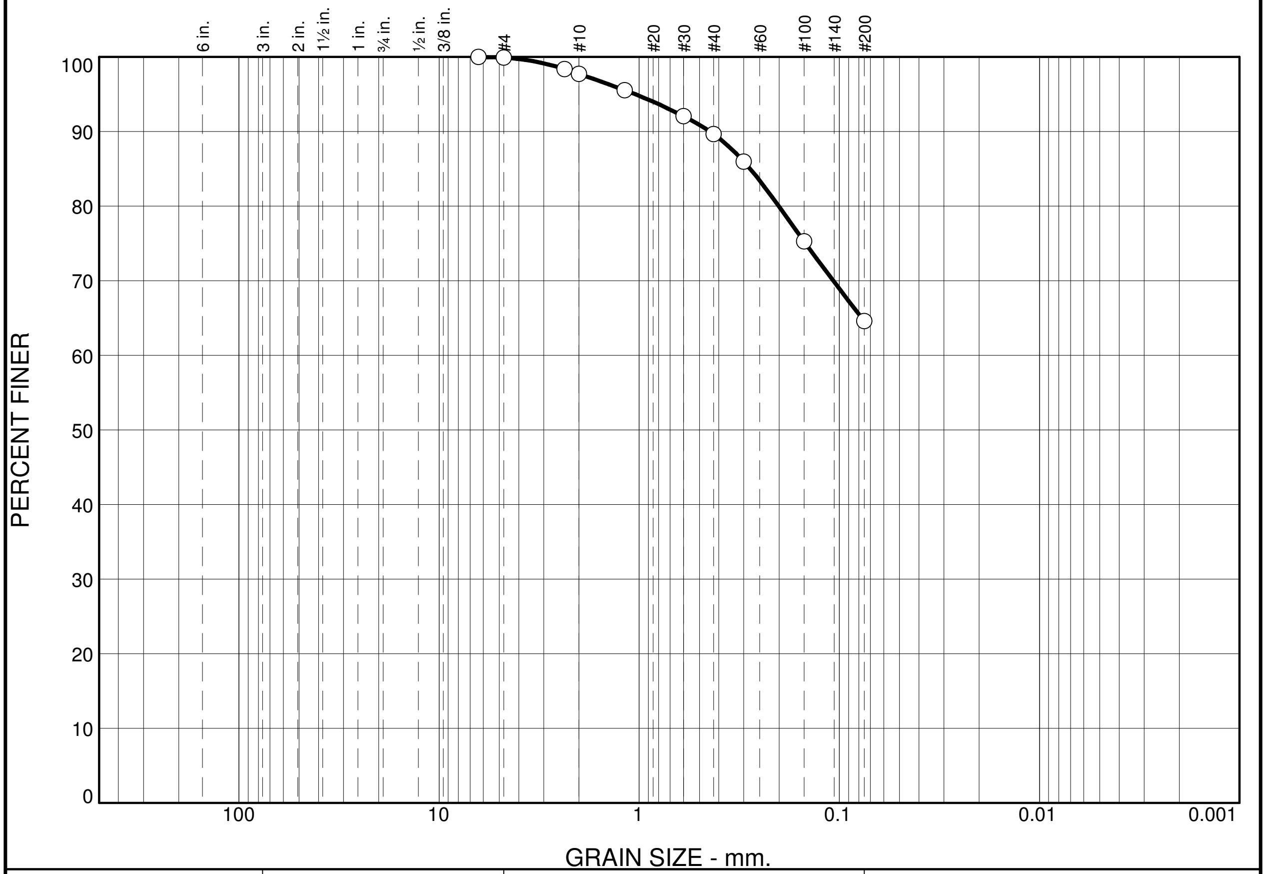
Remarks:

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Lab Number 16L0095

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	8	25	65	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/4"	100		
#4	100		
#8	98		
#10	98		
#16	96		
#30	92		
#40	90		
#50	86		
#100	75		
#200	65		

* (no specification provided)

Soil Description

sandy silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4430 D_{85}= 0.2793 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

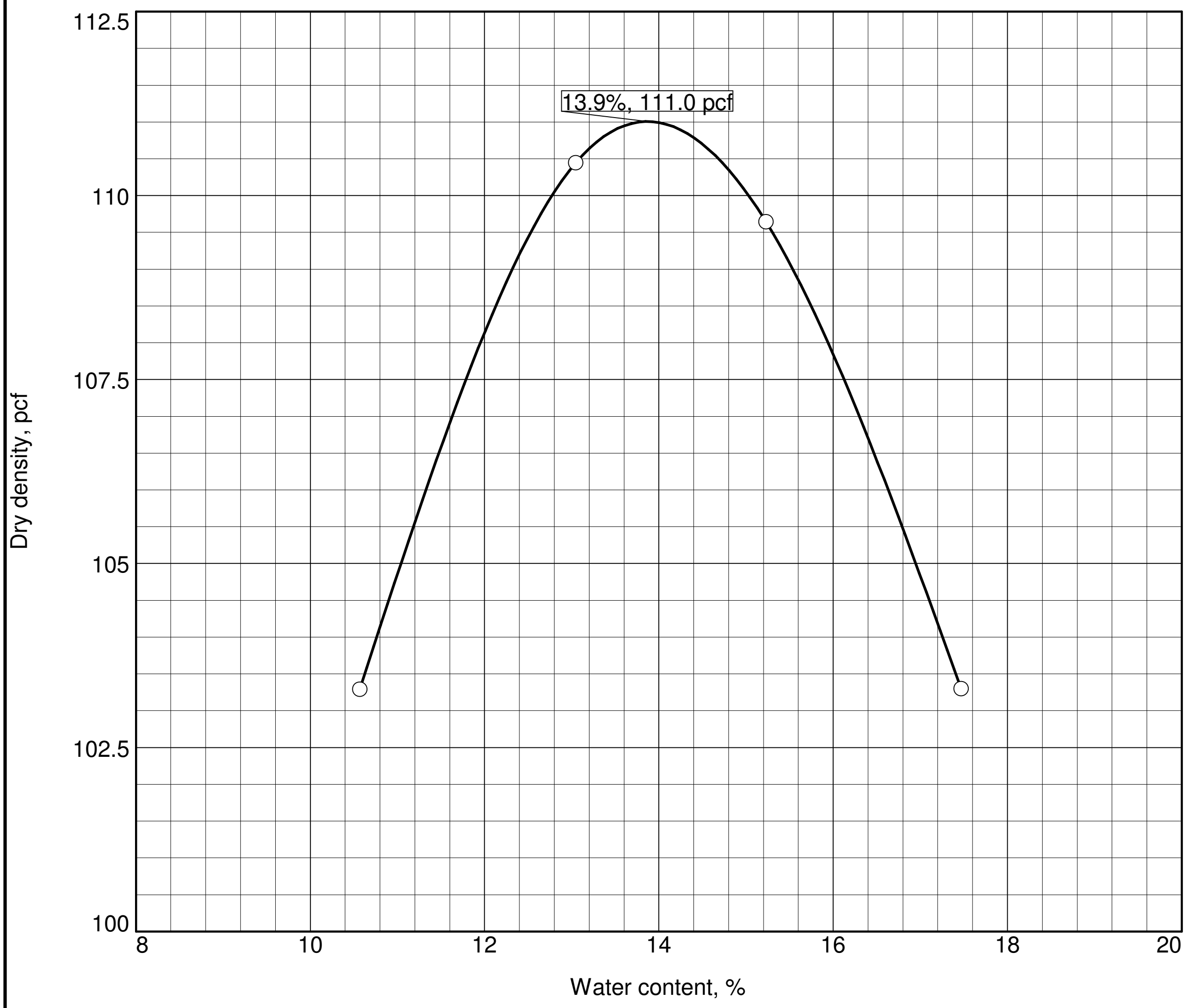
Location: T15A
Sample Number: 16L0096
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0096

Tested By: AJ **Checked By:** TT

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(0)			NV	NP	0	65

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 111.0 pcf Optimum moisture = 13.9 %	sandy silt

Project No. 16042 **Client:** Tetra Tech

Project: Pickles Butte Landfill

○ **Location:** T15A **Sample Number:** 16L0096

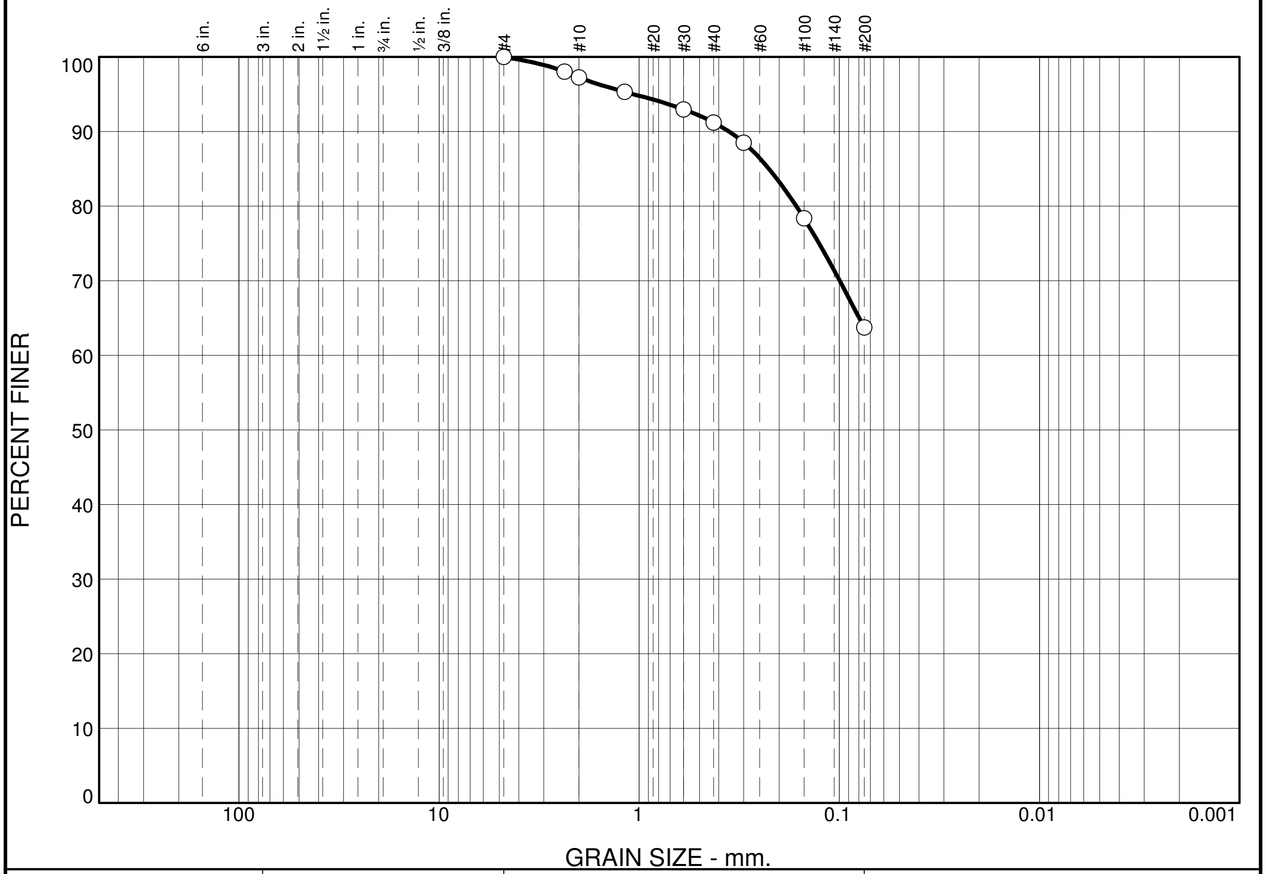
Remarks:

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Lab Number 16L0096

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	3	6	27	64	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	98		
#10	97		
#16	95		
#30	93		
#40	91		
#50	88		
#100	78		
#200	64		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3558 D_{85}= 0.2245 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

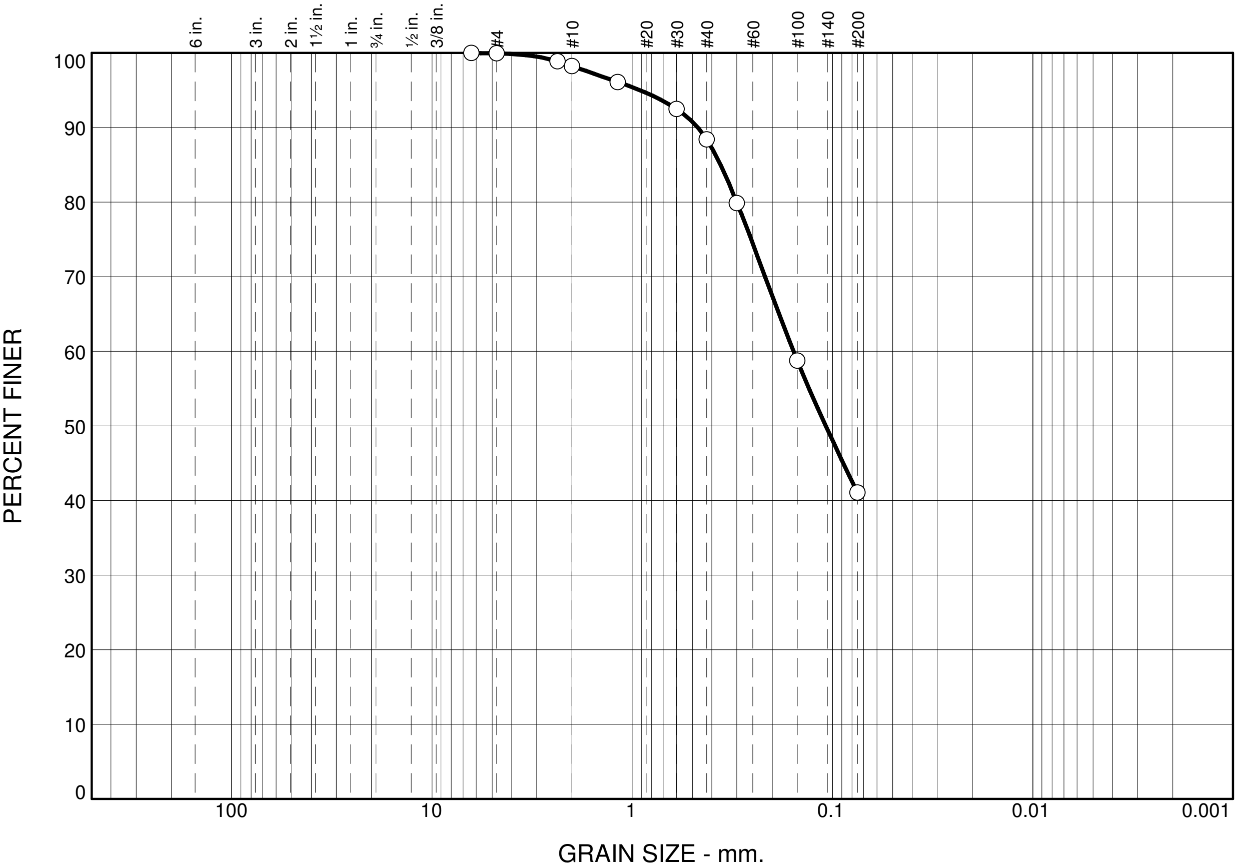
Location: T16A
Sample Number: 16L0097 **Date:** 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0097

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	10	47	41	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/4"	100		
#4	100		
#8	99		
#10	98		
#16	96		
#30	92		
#40	88		
#50	80		
#100	59		
#200	41		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4697 D_{85}= 0.3623 D_{60}= 0.1565
D_{50}= 0.1082 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

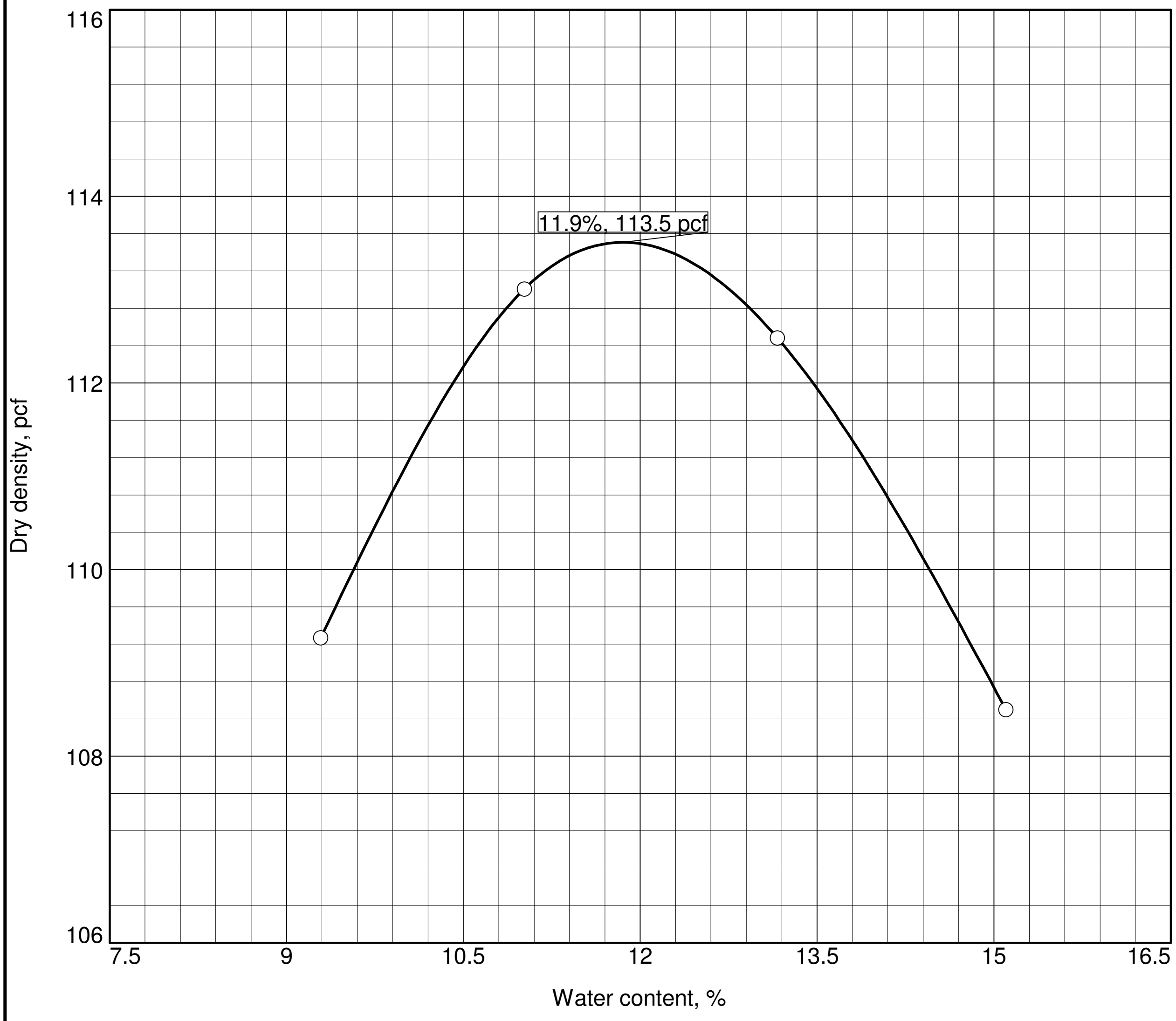
Location: T16B
Sample Number: 16L0098
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0098

Tested By: AJ **Checked By:** TT

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-4(0)			NV	NP	0	41

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.5 pcf Optimum moisture = 11.9 %	silty sand

Project No. 16042 **Client:** Tetra Tech

Project: Pickles Butte Landfill

○ **Location:** T16B **Sample Number:** 16L0098

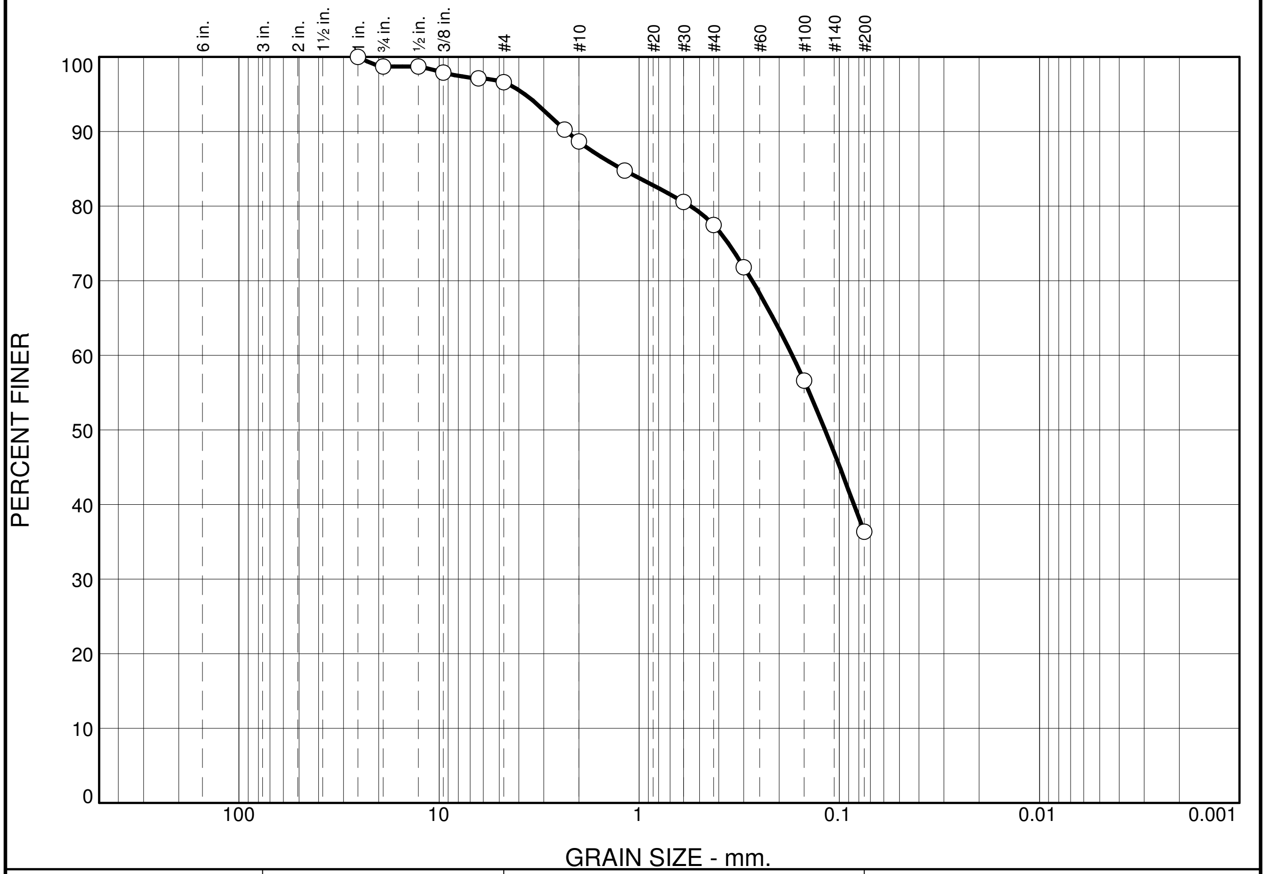
Remarks:

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Lab Number 16L0098

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	1	2	8	12	41	36	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	99		
1/2"	99		
3/8"	98		
1/4"	97		
#4	97		
#8	90		
#10	89		
#16	85		
#30	81		
#40	77		
#50	72		
#100	57		
#200	36		

* (no specification provided)

Soil Description

Atterberg Limits

PL=
LL=
PI=

Coefficients

D_{90}= 2.2967
D_{85}= 1.2234
D_{60}= 0.1719
D_{50}= 0.1180
D_{30}=
D_{15}=
D_{10}=
C_u=
C_c=

Classification

USCS=
AASHTO=

Remarks

Location: T16C
Sample Number: 16L0099

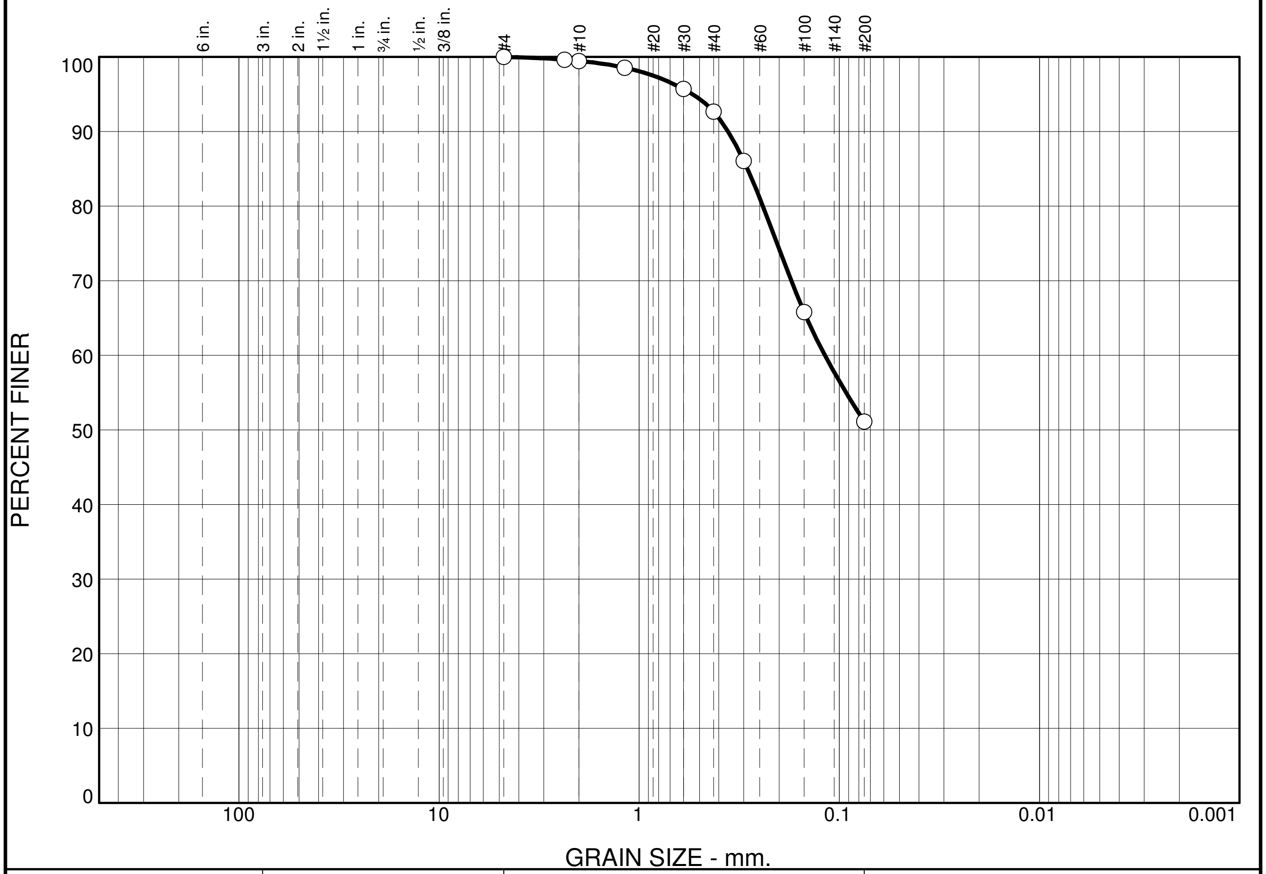
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042
Lab Number 16L0099

Tested By: AJ
Checked By: TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	6	42	51	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	100		
#10	99		
#16	99		
#30	96		
#40	93		
#50	86		
#100	66		
#200	51		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3599 D_{85}= 0.2880 D_{60}= 0.1182

D_{50}= D_{30}= D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: T17A
Sample Number: 16L0100

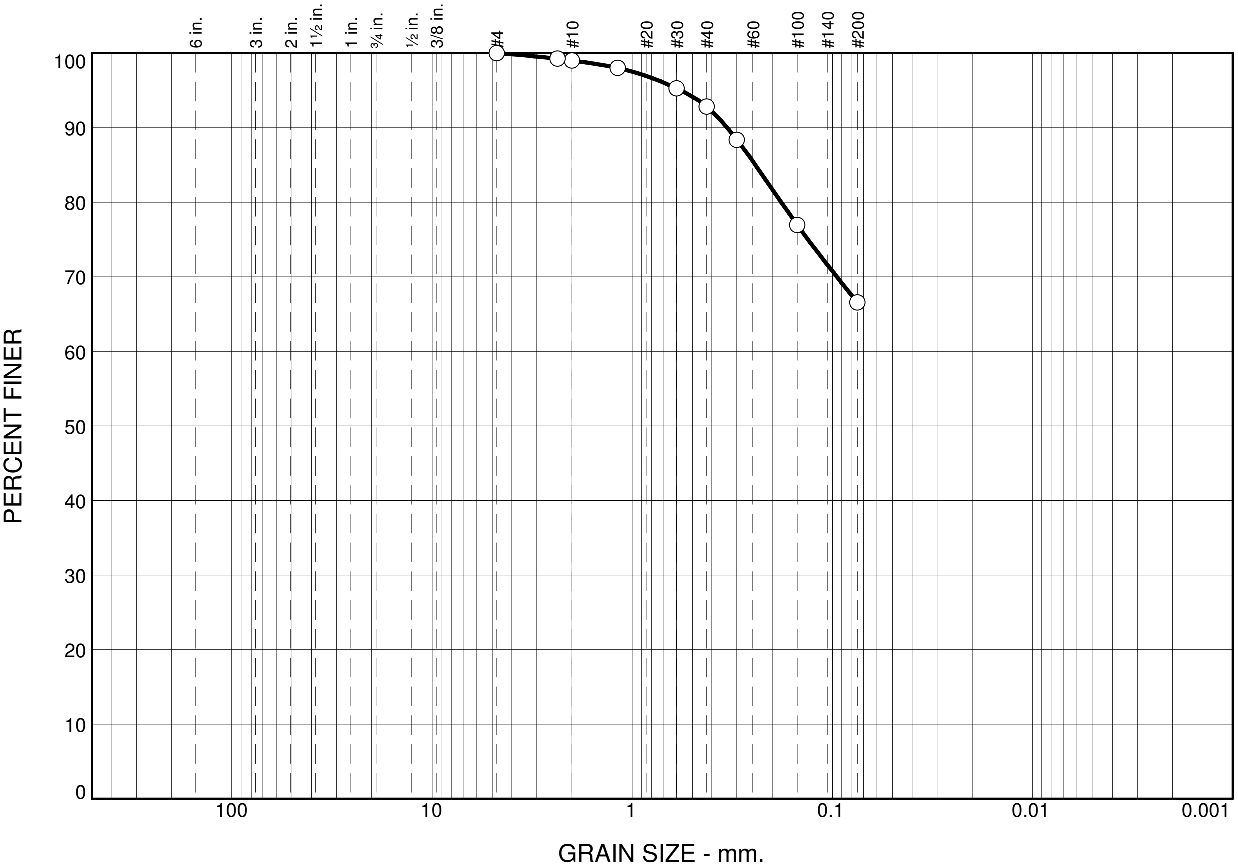
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0100

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	6	26	67	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	99		
#10	99		
#16	98		
#30	95		
#40	93		
#50	88		
#100	77		
#200	67		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3360 D_{85}= 0.2425 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

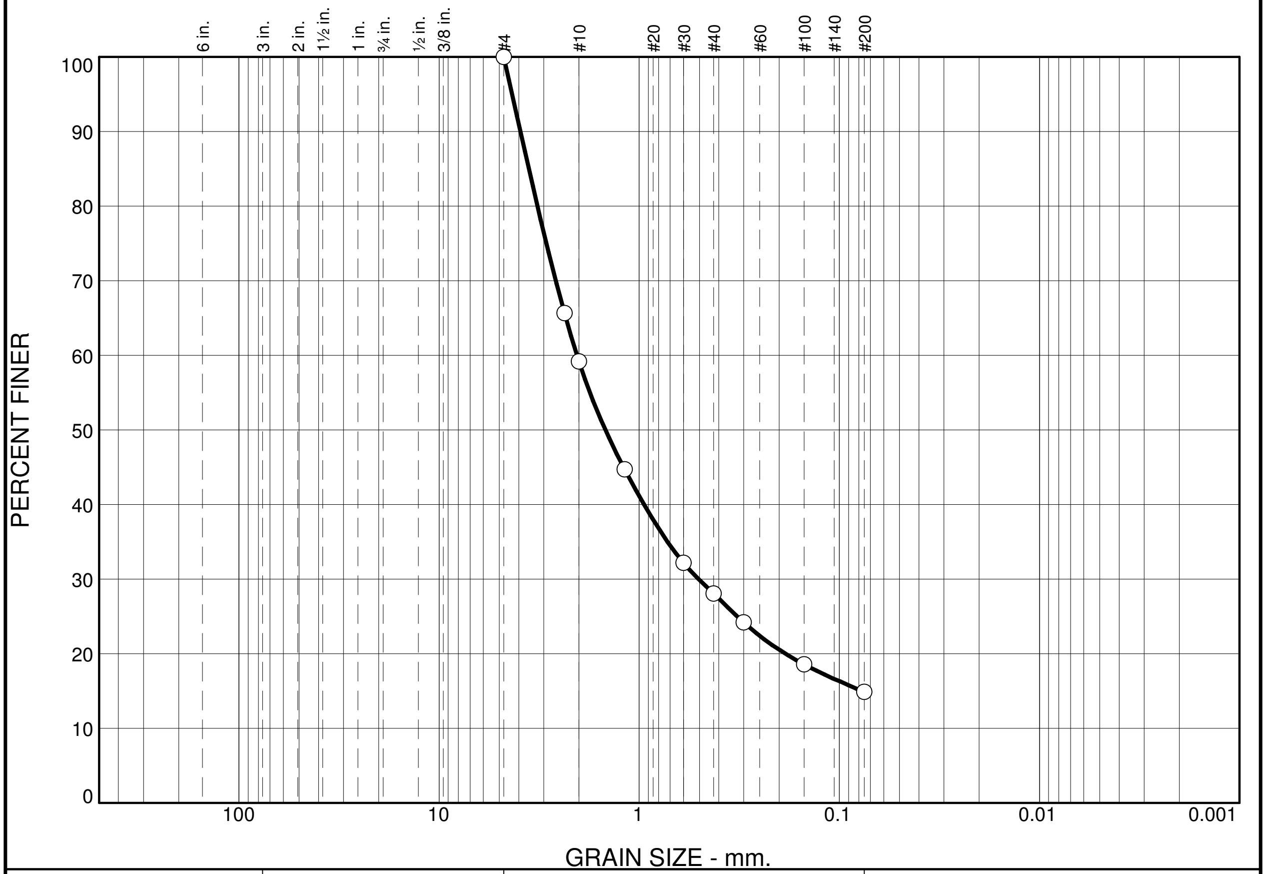
Location: T18A
Sample Number: 16L0101
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0101

Tested By: AJ **Checked By:** TT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	41	31	13	15	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	66		
#10	59		
#16	45		
#30	32		
#40	28		
#50	24		
#100	19		
#200	15		

* (no specification provided)

Soil Description

silty sand

Atterberg Limits

PL= 42 LL= 64 PI= 22

Coefficients

D_{90}= 3.9244 D_{85}= 3.5604 D_{60}= 2.0461
D_{50}= 1.4768 D_{30}= 0.5046 D_{15}= 0.0768
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-7(0)

Remarks

Location: T18B
Sample Number: 16L0102

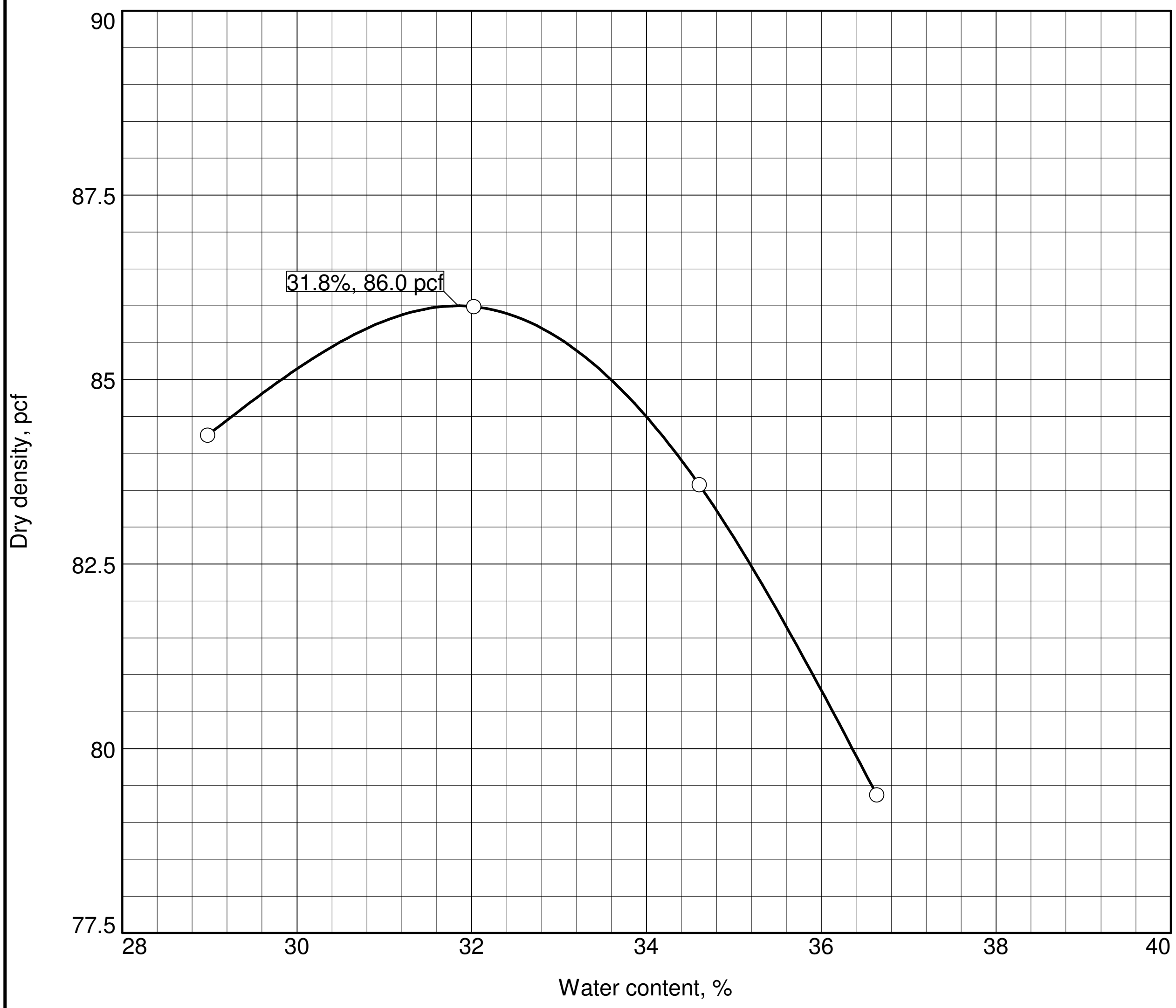
Date: 4-16-16

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Client: Tetra Tech
Project: Pickles Butte Landfill
Project No: 16042 **Lab Number** 16L0102

Tested By: AJ **Checked By:** TT

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-2-7(0)			64	22	0	15

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 86.0 pcf Optimum moisture = 31.8 %	silty sand

Project No. 16042 **Client:** Tetra Tech

Project: Pickles Butte Landfill

○ **Location:** T18B **Sample Number:** 16L0102

Hoque & Associates, Inc.
4325 South 34th Street
Phoenix, Arizona 85040

Remarks:

Lab Number 16L0102

Tested By: AJ **Checked By:** TT

PERMEABILITY

HOQUE
& ASSOCIATES
4325 South 34th Street
Phoenix, Arizona 85040
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0095
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T14B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	4/28/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0095
Dry density (pcf):	96.3
Moisture Content:	15.6%

Cell Pressure (psi):	66.0	Volume of flow (cm^3):	24.3
Top Pressure (psi):	60.0	Length of sample (cm):	11.7
Bottom Pressure (psi):	61.0	Area of sample (cm^2):	41.5
Bias Pressure (psi):	1.0	Time of flow (sec):	173.0

Permeability, k = 7.98E-01 in/hr 5.63E-04 cm/sec)

PERMEABILITY

HOQUE & ASSOCIATES
4325 South 34th Street
Phoenix, Arizona 85040
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0096
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Sandy Silt	Method:	ASTM D5084
Mat. Source :	T15A	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/10/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0096
Dry density (pcf):	96.3
Moisture Content:	14.6%

Cell Pressure (psi):	67.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	62.0
Bias Pressure (psi):	2.0

Volume of flow (cm^3):	23.7
Length of sample (cm):	12.2
Area of sample (cm^2):	40.2
Time of flow (sec):	1200.0

Permeability, k = 6.01E-02 in/hr 4.24E-05 cm/sec)

PERMEABILITY

HOQUE & ASSOCIATES
4325 South 34th Street
Phoenix, Arizona 85040
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0098
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T16B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/12/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0098
Dry density (pcf):	95.3
Moisture Content:	12.0%

Cell Pressure (psi):	67.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	62.0
Bias Pressure (psi):	2.0

Volume of flow (cm^3):	24.0
Length of sample (cm):	12.5
Area of sample (cm^2):	40.8
Time of flow (sec):	300.0

Permeability, k = 2.46E-01 in/hr 1.74E-04 cm/sec)

PERMEABILITY

HOQUE
& ASSOCIATES
4325 South 34th Street
Phoenix, Arizona 85040
Tel : 480-921-1368
Fax : 480-921-0194

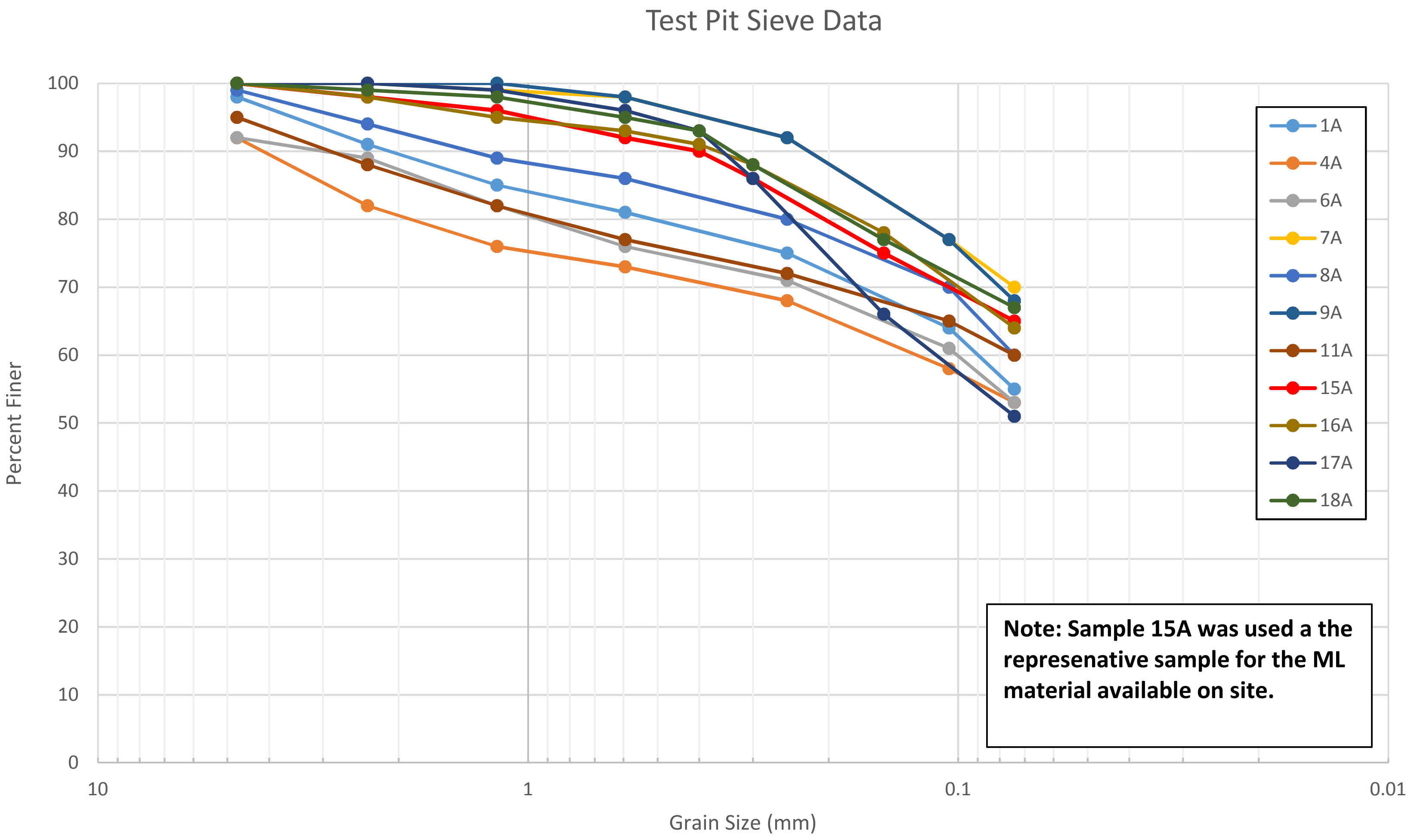
Client :	Tetra Tech BAS	HA Project No. :	16042
Project :	Pickles Butte Sanitary Landfill	HA Lab No.:	16L0102
Location:	Nampa, ID	Date Received :	4/16/16
		Test Type:	
Material :	Silty Sand	Method:	ASTM D5084
Mat. Source :	T18B	Tested By :	AJ/TT
Sampled By :	Client	Test Dates :	5/13/2016
Sampled Date :		Notes:	
Submitted by :	Client		

Sample No.:	16L0102
Dry density (pcf):	79.6
Moisture Content:	32.6%

Cell Pressure (psi):	68.0
Top Pressure (psi):	60.0
Bottom Pressure (psi):	63.0
Bias Pressure (psi):	3.0

Volume of flow (cm^3):	16.1
Length of sample (cm):	12.2
Area of sample (cm^2):	41.0
Time of flow (sec):	1860.0

Permeability, k = 1.73E-02 in/hr 1.22E-05 cm/sec)



Note: Sample 15A was used a the represenative sample for the ML material available on site.

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T14

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** North of active landfill

Date Started: 4/8/2016 **Date Completed:** 4/8/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Randy

Excavation Method: Backhoe **Test Pit size (ft.)** 3 x 12 **Total Depth Excavated (ft.):** 12.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.75 feet. Depth to bottom of usable material = 3.5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Sample Collected
0	Topsoil, organic material (roots)	
0.75	SILT with lean clay, firm to stiff, moist, some weak cementation, brown (ML)	14A (5 gallon bucket)
	Becomes lighter brown with a little more cementation near 3 feet deep	
3.5	Silty SAND; loose, moist, poorly graded, fine grained, some weak cementation, light	14B (5 gallon bucket)
	brown to tan (SM)	
5.5	Poorly Graded Sand; loose, slightly moist to moist, fine grained, trace silt, tan to	14C (4 x 1 gallon bags)
	light brown (SP)	
	moisture content decreases with depth, as does the silt content	
12.5	Bottom of Hole - Sidewalls sluffing at depth - caves as fast as he digs	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T15

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** North of active landfill, close to Deer Flat Road

Date Started: 4/8/2016 **Date Completed:** 4/8/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Randy

Excavation Method: Backhoe **Test Pit size (ft.)** 3 x 16 **Total Depth Excavated (ft.):** 13.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 7.5 feet.

Depth (FT) below ground surface	**LITHOLOGIC DESCRIPTION**	**Sample Collected**
0	Topsoil, organic material (roots)	
0.5	SILT with sand; stiff to hard at 12", moist, non plastic. Trace clay, sand is fine	15A (5 gallon bucket)
	grained, a few cemented nodules and layers beginning at about 12", cementation is	
	moderate, then out of the harder cementation by 3.8 feet. Weaker cementation below	
	that (ML)	
5.0	SILT; hard, slightly moist, non-plastic, moderately to weakly cemented. Most	15B (1 gallon bag of
	cemented pieces crumble with moderate to firm thumb pressure. However there are	cemented pieces)
	layers, usually ~1" thick, that are strongly cemented and cannot be broken by hand.(ML)	
7.5	SILT with sand; as above, but there has been a gradual increase in fine sand. (ML)	
9.5	Silty SAND; dense, slightly moist, poorly graded, fine grained. Cementation present,	15C (5 gallon bucket)
	~10% to 15% of spoils are cemented pieces, usually strong, very light brown (SM)	
12.0	Sand/silt ratio increases with depth, by ~12 feet I would classify as Poorly Graded	
	SAND with silt. Still fine grained, but grain size has increased. Cementation still	
	present as described in the layer from 9.5 to 12 feet.	
13.5	Bottom of Hole	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T16

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** North of landfill, near top of slope to west

Date Started: 4/8/2016 **Date Completed:** 4/8/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Randy

Excavation Method: Backhoe **Test Pit size (ft.)** 3 x 16 **Total Depth Excavated (ft.):** 12.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.33 feet. Depth to bottom of usable material = 5.5 feet.
The material from 8.5 to 10.5 couild also be useful, but it is under 3 feet of unusable material.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Sample Collected
0	Topsoil, organic material (roots)	
0.33	SILT with sand and clay; firm to stiff, moist, non plastic, medium to dark brown	16A (5 gallon bucket)
	(ML)	(from 6 to 18")
	some cementation beginning at 1.5 feet, then stronger at 2 feet	
	Lighter color (medium brown) below 3.5 feet but still similar material. Sand content	
	probably increases at that depth. Moderately hard to dig, but cemented pieces break	16B (5 gallon bucket)
	with moderate to firm thumb pressure	(from 4 to 5.5')
5.5	Silty SAND: loose to medium dense, slightly moist, fine grained, poorly graded, some	
	cementation, light brown (SM)	
7.3	Cemented SILT; hard, dry, very light brown (typical SW Idaho 'hardpan')	
8.5	Back into Sandy SILT. Quite similar to the material from 3.5 to 5.5, with smaller	16C (4 - 1 gallon bags)
	blocks in the spoils, and a lighter color. Blocks crumble easily. Silt/Sand ratio	(8.5 to 9.5)
	increases with depth, becoming SILT with sand then SILT	
	Stronger cementation again below 10.5 feet, continues to bottom of hole	
12.5	Bottom of Hole	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T17

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Northwest of Landfill, near Perch Road

Date Started: 4/8/2016 **Date Completed:** 4/8/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Randy

Excavation Method: Backhoe **Test Pit size (ft.)** 3 x 16 **Total Depth Excavated (ft.):** 9.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 5.5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Sample Collected
0	Topsoil, organic material (roots)	
0.5	SILT with sand; stiff, slightly moist, non plastic, light brown, sand is very fine (ML)	
1.5	SILT with sand and clay; firm to stiff, moist, non-plastic, very fine sand, a bit blocky in	17A (5 gallon bucket)
	the spoils (ML)	(1.5 to 5.5 feet)
5.5	Transitions to Silty SAND; medium dense, moist, poorly graded, fine grained, brown	
	(SM)	
8.5	Transitions to Poorly Graded Sand with some silt; medium dense, moist to slightly	
	moist, fine grained, brown (SP-SM)	
9.5	Bottom of Hole	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T18

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** N. of LF, near top of slope to W and Deer Flat Rd.

Date Started: 4/8/2016 **Date Completed:** 4/8/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Randy

Excavation Method: Backhoe **Test Pit size (ft.)** 3 x 16 **Total Depth Excavated (ft.):** 10 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 3.9 feet.

Depth (FT) below ground surface	**LITHOLOGIC DESCRIPTION**	**Sample Collected**
0	Topsoil, organic material (roots)	
0.5	SILT with sand and clay; firm to very stiff, moist, non plastic, brown (ML)	
	weakly cemented beginning at 2 feet	18A (5 gallon bucket)
3.2	SILT with fine sand; hard, slightly moist to dry, moderately cemented brown (ML)	(2 to 3.2 feet)
	strongly cemented and light brown beginning at 3.9 feet	
6.75	Lean CLAY; hard, slightly moist, moderately cemented (otherwise might be slightly	18B (5 gallon bucket)
	plastic), green (CL)	
10.0	Bottom of Hole	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T19

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** North of LF, NW part of potential borrow area

Date Started: 7/6/2016 **Date Completed:** 7/6/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 10.6 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 1.2 feet. Depth to bottom of usable material = 4 feet.
Material from 4 to 6.7 may also be usable.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.3	Poorly graded Sand with silt; loose, slightly moist, very fine grained, some roots, (SP-SM)	
1.2	Sandy SILT to SILT with sand; stiff to hard, non-plastic, weakly to moderately cemented, then becomes moderately to strongly cemented below 1.8 feet. Cementation from 1.2 to 1.8 feet is mostly nodules, then mostly the whole matrix below that. Light brown to light tan (SM/ML)	1.4 - 2.3
4	SILT with Sand, very stiff to hard, slightly moist, non plastic, very fine grained sand, moderately cemented - comes out in chunks up to 4". A scraper should have no trouble with this material.	5 - 5.8
	Less cementation and more sand with depth	
6.7	Silty SAND; dense, slightly moist, fine grained, weak cementation in matrix, and some stronger cementation in nodules to 1" diameter. These break easily with moderate pressure. (SM)	
10.6	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T20

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** NE corner of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 13.3 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.5 feet. Depth to bottom of usable material = 5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), Silty SAND	
0.5	SILT; stiff, dry, non-plastic, small cemented nodules (ML)	0.8 - 1.6
1.7	Cemented SILT; very stiff to hard, dry, non-plastic, cementation varies from moderate to hard, pieces generally break with effort. (ML)	
5	Cemented SILT; hard, dry, non-plastic, light tan (ML)	
	even harder below 5.7 feet	
6.7	Cemented SILT with fine sand; hard slightly moist, non-plastic, brown. (ML). Cementation is not as strong as the material above. Chunks can be broken without much effort. (ML)	
9.5	grades to Sandy SILT. Still cemented but weaker.	
12.5	Poorly graded GRAVEL with sand.	
13.3	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T21

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Western part of potential borrow area

Date Started: 7/6/2016 **Date Completed:** 7/6/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 9 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: The good usable material was not found at this location. The material from 5 to 7.5 *may* be usable.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), clean fine sand.	
0.5	Poorly graded SAND; loose, slightly moist to dry, very fine to fine grained, brown (SP)	
1.3	Silty SAND; loose to medium dense, slightly moist, fine to very fine grained, brown (SP-SM)	1.3 - 2
5	grades siltier - might be classified as Sandy SILT, slightly cohesive, slightly moist to moist, firm, non-plastic	5.8 - 6.6
7.5	Poorly graded SAND; dense, slightly moist, fine grained, brown (SP)	
9.0	Bottom of Excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T22

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** W-Central part of northern potential borrow area

Date Started: 7/6/2016 **Date Completed:** 7/6/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** ______ **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: The good usable material was not found at this location.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, roots, fine sand	
0.4	Poorly graded SAND; loose, slightly moist, fine to very fine grained, trace silt, some roots to 16" deep. Non-cohesive but excavation walls do stand open (SP)	
4.0	Poorly graded SAND with silt - as above but with some silt and weak cementation	
6	Poorly graded SAND; loose, slightly moist, medium to fine grained, clean, brown (darker than above), some iron staining.	
7.0	Bottom of Excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T23

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______________ **Descriptive Location:** Center of northern part of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 10.8 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.6 feet. Depth to bottom of usable material = 10 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.2		
0.6	SILT; stiff to very stiff, slightly moist, some fine sand, non-plastic, blocky but not cemented, brown (ML)	0.8 - 1.6
2.2	SILT; hard, slightly moist, non-plastic, light brown (ML). It is hard but not cemented.	
2.5	SILT; hard, slightly moist to dry, non-plastic, light brown, strongly cemented (generally), but not CaCO3, difficult digging but a scraper would not have trouble with it.	
5	Easier digging below 5 feet, material still comes out in chunks but they break easier than the material above.	
	slightly sandier below 7.7 feet	7.7 - 8
10.0	Cemented SILT with sand; very stiff, fine grained sand, weak to moderate CaCO3 cementation, probably too sandy to use as cover material (ML)	
10.8	Bottom of Excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T24

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______________ **Descriptive Location:** W Central part of northern potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 6 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 1.1 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), Silty SAND	
0.4	SILT with sand; firm, slightly moist, non to slightly plastic, slightly blocky, brown (ML)	
1.1	Cemented SILT; very stiff to hard, slightly moist to dry, non plastic, weak to moderate cementation but not really the same as the cementation found in adjacent test pits 20 and 23 - this is more CaCO3 type, color is light brown (ML)	1.5 - 2.5
3.2	Cemented SILT; harder, CaCO3 cementation (ML)	3.4 - 3.5
3.5	Cemented SILT; as directly above, but harder still. Digging is difficult. Material comes out in layers. (ML)	
4.8	Cemented SILT; weaker than above, brown (ML)	
5.8	Silty GRAVEL with sand; poorly graded, very dense, slightly moist (GM)	
6.0	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T25

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** SW corner of northern potential borrow area

Date Started: 7/6/2016 **Date Completed:** 7/6/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 7.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Good usable material not found. Material from 2 feet to 6.7 *may* be usable.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.33	Poorly graded SAND; loose to dense, slightly moist, fine to very fine grained, some silt, uncohesive but walls of excavation stand, brown (SP)	
2.0	Slightly higher silt content beginning at 2 feet. Weak cementation from 5 to 6.7 feet	2 - 2.5
6.7	Poorly graded SAND; loose to dense, slightly moist (but more moisture than the upper layer), fine grained, clean - very little silt, brown (SP)	
7.5	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T26

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Near the middle of the potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 5.6 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 4.2 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.25	SILT; firm, slightly moist, non-plastic, trace fine sand, brown (ML)	
0.75	becomes light brown	0.75 - 2.2
1.8	weakly cemented nodules in a layer from 1.8 to 2.2 feet	
3.8	becomes weakly to moderately cemented	
4.2	Poorly graded SAND; dense, slightly moist, very fine grained, trace silt, brown (SP)	
5.6	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T27

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Eastern edge of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 8.3 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 5.5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), Silty SAND	
0.4	Silt with sand; firm to stiff, slightly moist, non-plastic, sand is very fine grained (ML)	0.8 - 2.5
3.0	SILT with sand. As above except that the material is variably cemented. Mostly weak to moderate cementation. Does not impeded the digging and the blocks mostly break easily. (ML)	
5.5	Cemented SILT; hard, dry to slightly moist, light tan, CaCO3 cementation, hard digging (ML)	
6.0	color changes back to brown at about 6 feet, not quite as hard as the material above it	
8.3	Poorly graded GRAVEL - tagged the top of it and stopped excavating	
8.3	Bottom of Excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T28

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Near the middle of the potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 10.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 4.2 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.25	SILT with fine sand; stiff, slightly moist, non-plastic, brown (ML)	
1.0	As above but with weakly cemented nodules in the matrix, generally 1/2 inch diameter or smaller	1 - 2
2.4	Same as 0.25 to 1.0	
4.2	Poorly graded SAND; dense, slightly moist, very fine grained, trace silt, some cementation with depth (SP)	
10.50	Bottom of Excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T29

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Eastern edge of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 8.5 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 5.5 feet.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), silty SAND	
0.25	SILT with sand; firm to stiff, slightly moist, non-plastic, sand is very fine grained, brown (ML)	0.7 - 1.5
2.3	As above, but weakly cemented	
5.5	Cemented SILT with sand; hard, slightly moist, non-plastic (ML). CaCO3 cementation, but it is not hard enough that digging is impeded.	
8.3	Poorly Graded GRAVEL; went just a few inches into it to verify it's presence (GP)	
8.50	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T30

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Southern part of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 5.8 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.7 feet. Depth to bottom of usable material = 1.9 feet.
Material from 1.9 to 3 feet *may* be usable.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), Sandy SILT to silty SAND	
0.7	SILT with fine sand; stiff, slightly moist, non-plastic, blocky and very weakly cemented, brown (ML)	0.7 - 1.4
1.4	SILT with fine sand; firm, slightly moist, non-plastic, non-cemented, lighter brown than the material above (ML)	
1.9	Becomes cemented. Matrix is moderately cemented and contains harder (more strongly cemented) nodules	
3.0	Strongly cemented	
4.6	Contains scattered gravel	
5.4	Poorly graded SAND with Gravel (SP-SG)	
5.8	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T31

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Southern extent of potential borrow area

Date Started: 7/5/2016 **Date Completed:** 7/5/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 2 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.25 feet. Depth to bottom of usable material = 1.4 feet.
Excavation was moved north of proposed location due to topography

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots)	
0.25	SILT with fine sand; firm to stiff, slightly moist, non-plastic, brown (ML)	0.5 - 1.3
1.4	Transition zone to gravel, silt is blocky and weakly cemented	
1.6	Silty GRAVEL with fine sand; hard, slightly moist, some weak cementation in matrix, gravel is subangular, brown (GM)	
2.0	Bottom of excavation	

TEST PIT LITHOLOGIC LOG

Project No. 114-571040 **Project Name:** Pickles Butte Sanitary Landfill Monolithic Cover Design

City: South of Nampa **State:** ID **County:** Canyon **Test Pit No.:** T32

Legal Location: **T** ______ **R** ______ **S** ______ **Tract** ______ **Descriptive Location:** Northwest central part of borrow area

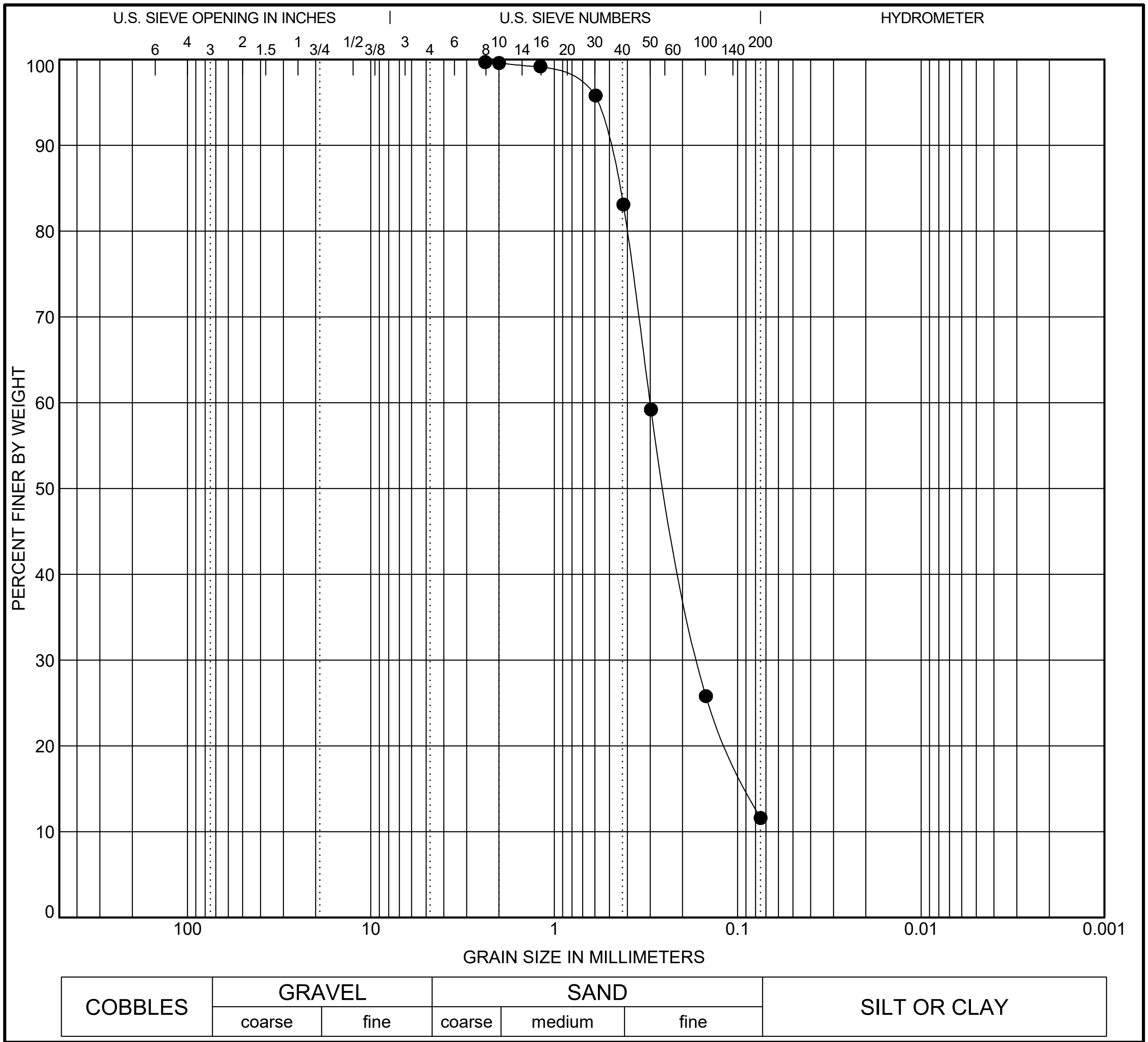
Date Started: 7/6/2016 **Date Completed:** 7/6/2016 **Excavation Company/ Operator:** Canyon County Solid Waste / Daniel

Excavation Method: Backhoe **Approx. Test Pit size (ft.)** 3 x 15 **Total Depth Excavated (ft.):** 7.7 **Logged by:** R. Phillips

Groundwater Encountered? N **Approx. Depth:** NA **Groundwater Samples Collected?** NA

REMARKS: Depth to top of usable material = 0.4 feet. Depth to bottom of usable material = 2.5 feet.
Material from 2.5 to 6.8 feet *may* be usable.

Depth (FT) below ground surface	LITHOLOGIC DESCRIPTION	Depth of Sample Collected (Quart bags)
0	Topsoil, organic material (roots), fine sand	
0.4	Poorly graded SAND with silt; loose, slightly moist to moist, very fine grained, brown (SP-SM)	
1.1	SILT with fine sand; stiff to very stiff, slightly moist to moist, non-plastic, scattered weakly cemented nodules, brown (ML)	
2.3	SILT; hard, slightly moist, some fine sand, cemented throughout matrix, but a scraper would not have trouble with it (ML)	
2.5	Silty SAND; medium dense, slightly moist to moist, brown (SM)	3.3 - 5
6.8	SILT with sand; hard, dry to slightly moist, strong CaCO3 cementation, very light brown (ML)	
7.7	Bottom of excavation	



SIEVE SIZE	% PASSING
No. 8	99.7
No. 10	99.6
No. 16	99.2
No. 30	95.8
No. 40	83.1
No. 50	59.2
No. 100	25.8
No. 200	11.6

Specimen Identification
B2021-1 - (3 - 6 ft)

Classification	LL	PL	PI	Cc	Cu
POORLY GRADED SAND with SILT(SP-SM)	**NV**	**NV**	**NP**	**1.27**	**4.33**

% Gravel	% Sand	% Silt	% Clay
0	88	12	

D100	D60	D30	D10
2.38	0.3	0.163	

TETRA TECH

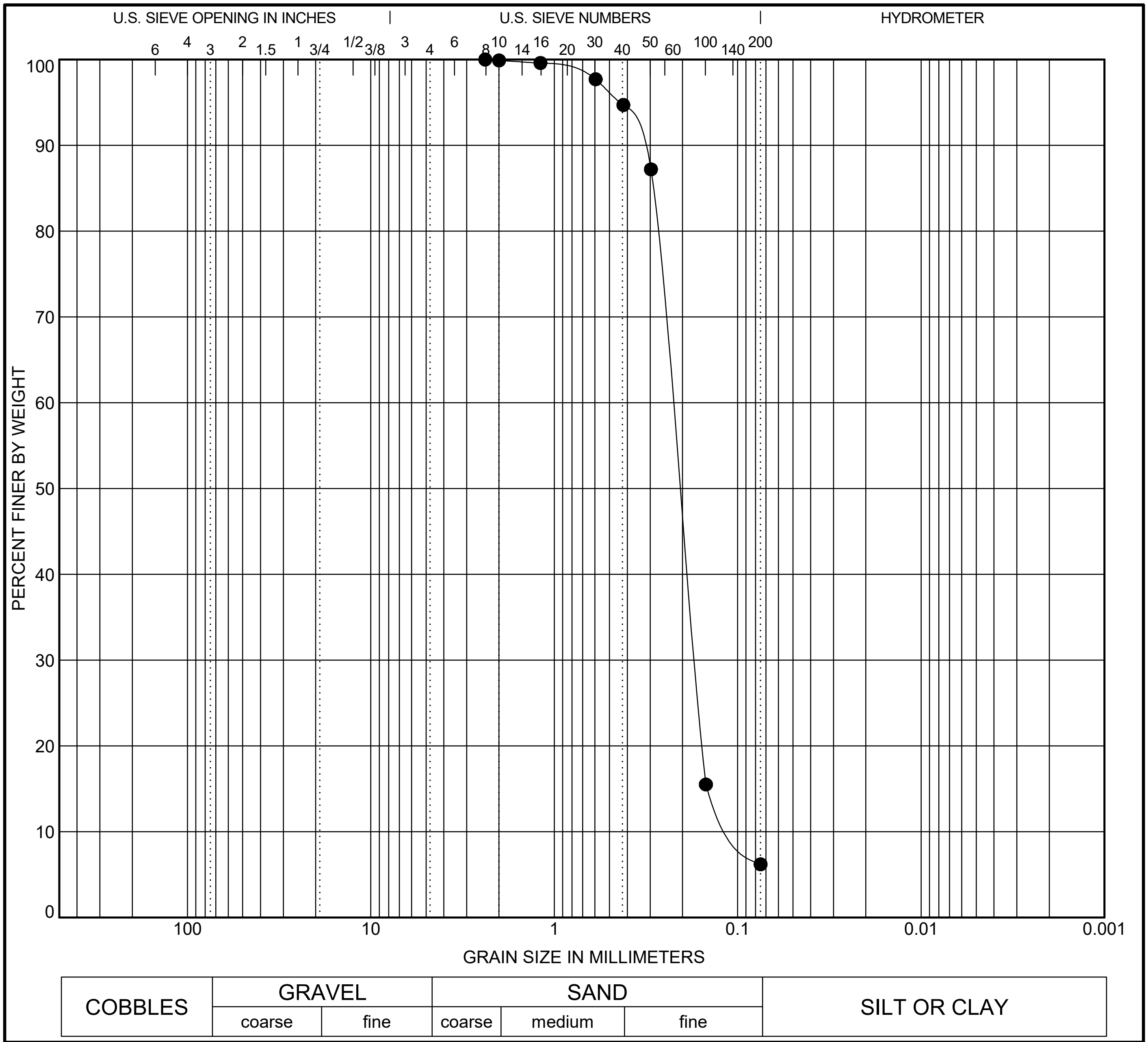
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 9



SIEVE SIZE	% PASSING
No. 8	**100**
No. 10	**99.9**
No. 16	**99.6**
No. 30	**97.7**
No. 40	**94.7**
No. 50	**87.2**
No. 100	**15.5**
No. 200	**6.2**

Specimen Identification

B2021-1 - (25 - 27 ft)

Classification
POORLY GRADED SAND with
SILT(SP-SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**	**1.29**	**2.30**

% Gravel	% Sand	% Silt	% Clay
0	94	6	

D100	D60	D30	D10
2.38	0.229	0.171	0.099

TETRA TECH

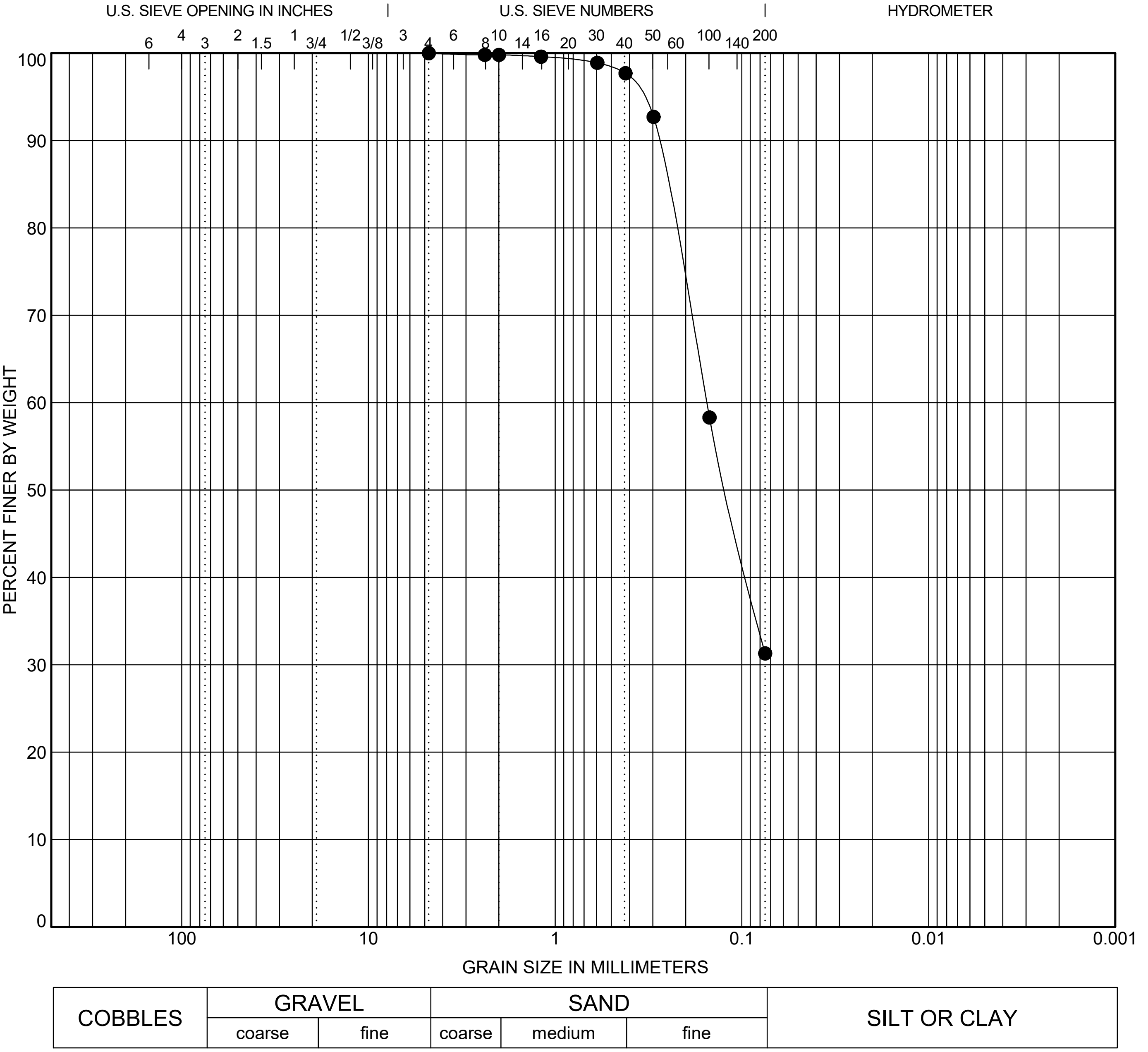
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 10



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.8
No. 10	99.8
No. 16	99.6
No. 30	98.9
No. 40	97.7
No. 50	92.7
No. 100	58.3
No. 200	31.3

Specimen Identification
B2021-3 - (25 - 27 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	69	31	

D100	D60	D30	D10
4.75	0.154		

TETRA TECH

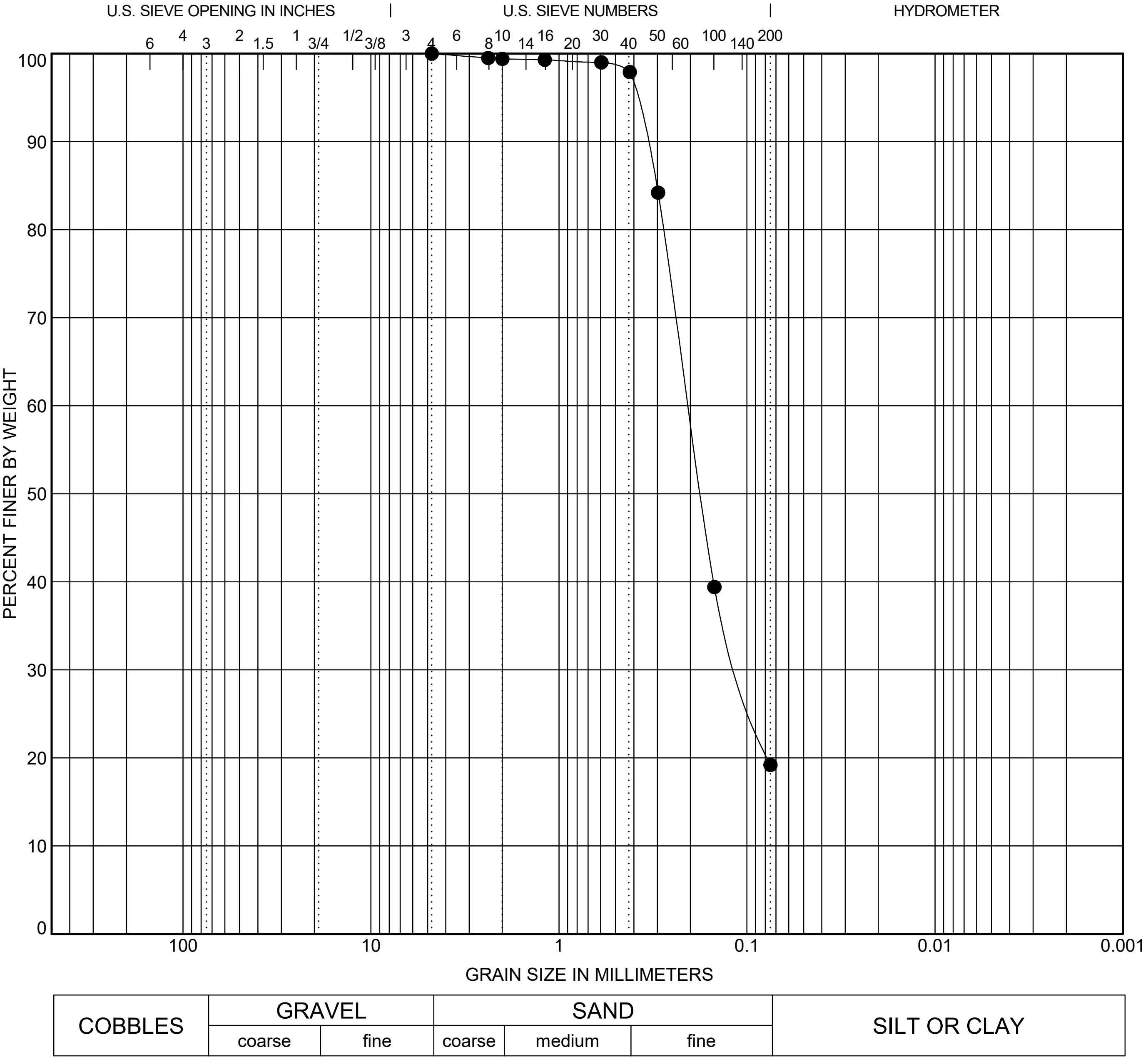
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 11



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.5
No. 10	99.4
No. 16	99.3
No. 30	99
No. 40	97.9
No. 50	84.2
No. 100	39.4
No. 200	19.2

Specimen Identification
B2021-3 - (60 - 62 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	81	19	

D100	D60	D30	D10
4.75	0.205	0.108	

TETRA TECH

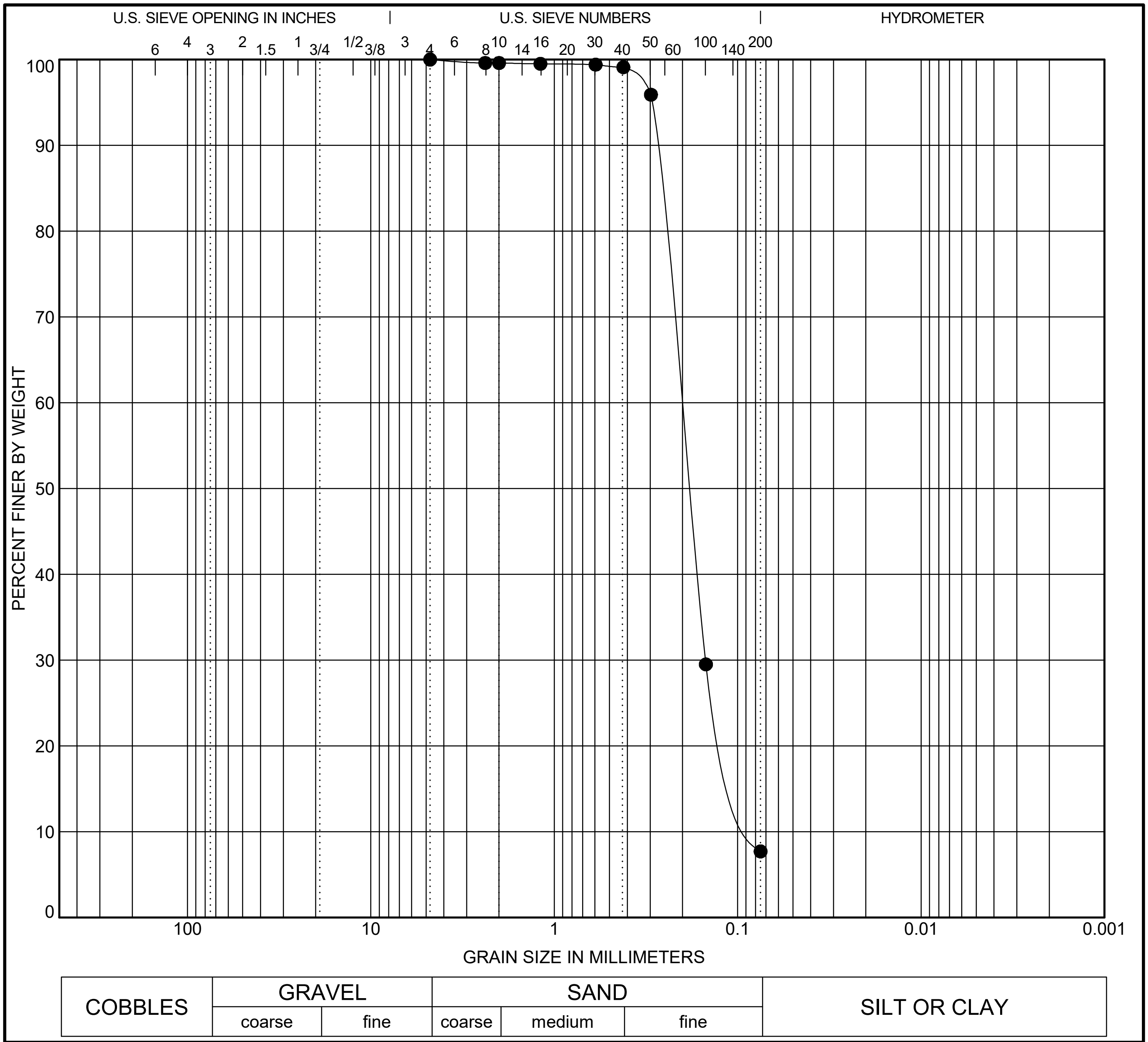
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 12



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.6
No. 10	99.6
No. 16	99.5
No. 30	99.4
No. 40	99.1
No. 50	95.9
No. 100	29.5
No. 200	7.7

Specimen Identification
B2021-3 - (61 - 65 ft)

Classification	LL	PL	PI	Cc	Cu
POORLY GRADED SAND with SILT(SP-SM)	**NV**	**NV**	**NP**	**1.36**	**2.54**

% Gravel	% Sand	% Silt	% Clay
0	92	8	

D100	D60	D30	D10
4.75	0.205	0.15	0.081

TETRA TECH

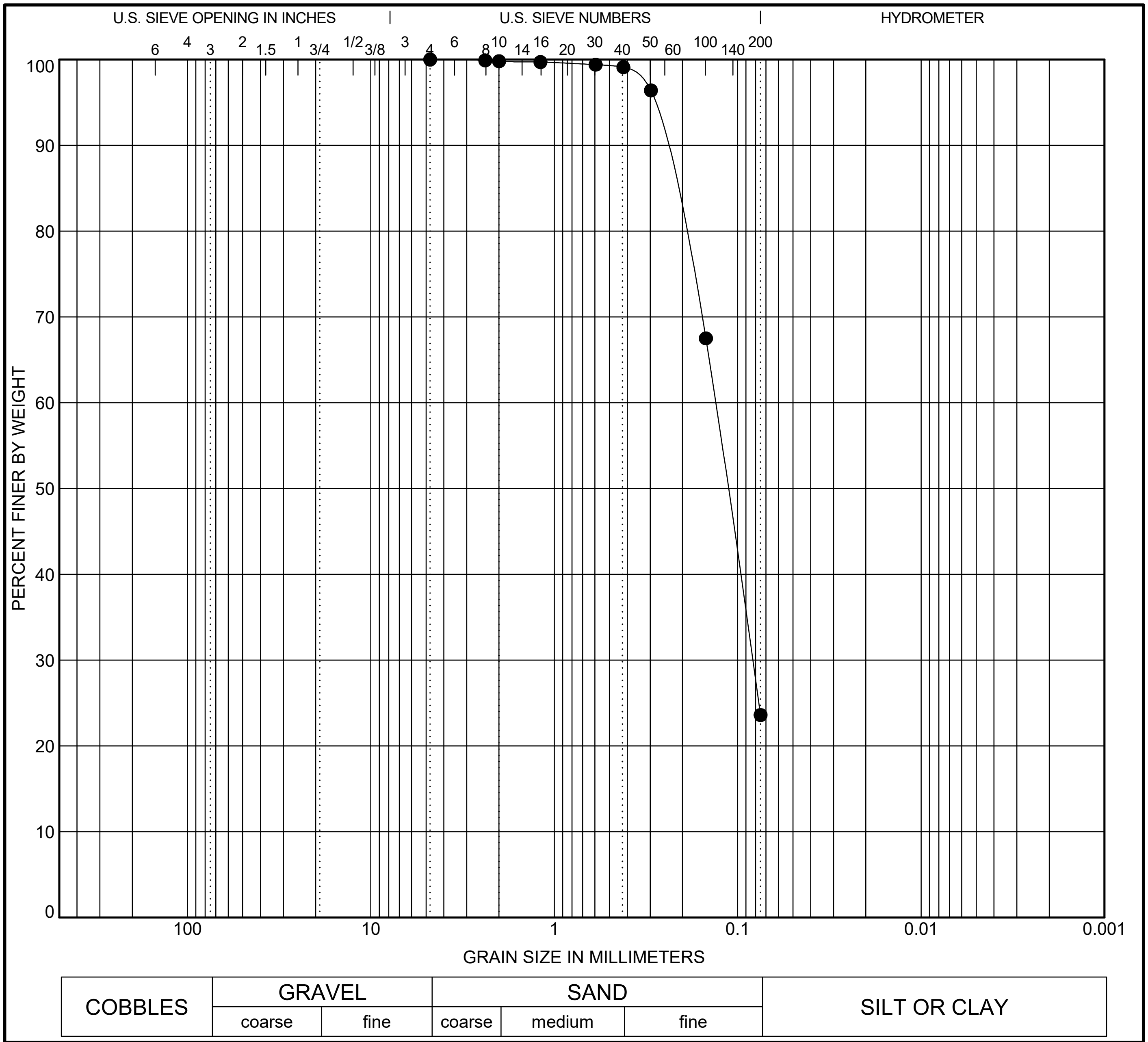
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 13



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.8
No. 16	99.7
No. 30	99.4
No. 40	99.1
No. 50	96.4
No. 100	67.5
No. 200	23.6

Specimen Identification
B2021-3 - (80 - 82 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	76	24	

D100	D60	D30	D10
4.75	0.133	0.083	

TETRA TECH

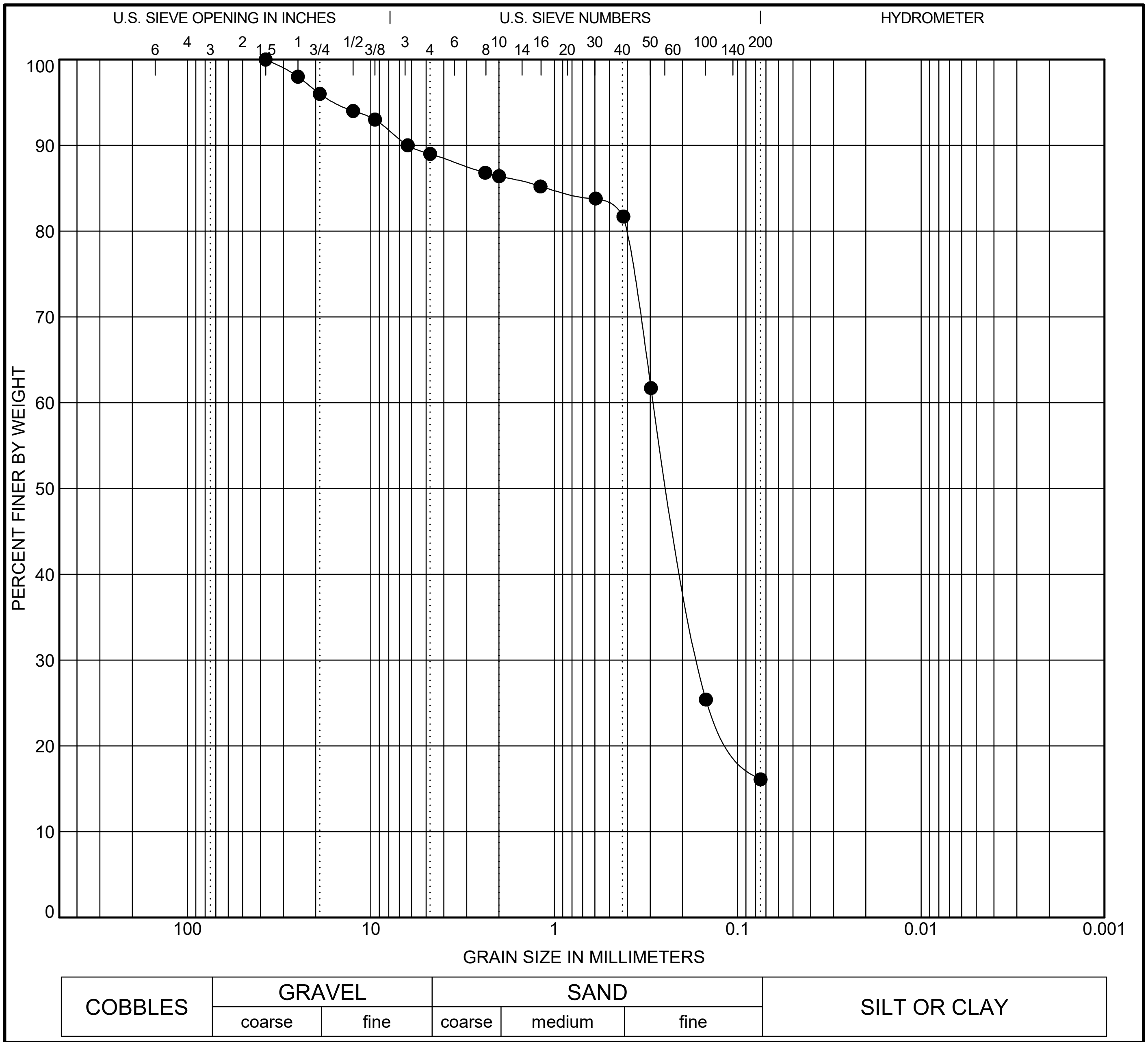
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 14



SIEVE SIZE	% PASSING
1.5 in	100
1 in	98
3/4 in	96
1/2 in	94
3/8 in	93
1/4 in	90
No. 4	89
No. 8	86.8
No. 10	86.4
No. 16	85.2
No. 30	83.8
No. 40	81.7
No. 50	61.7
No. 100	25.4
No. 200	16.1

Specimen Identification
B2021-3 - (116 - 120 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
11	73	16	

D100	D60	D30	D10
37.5	0.288	0.163	

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

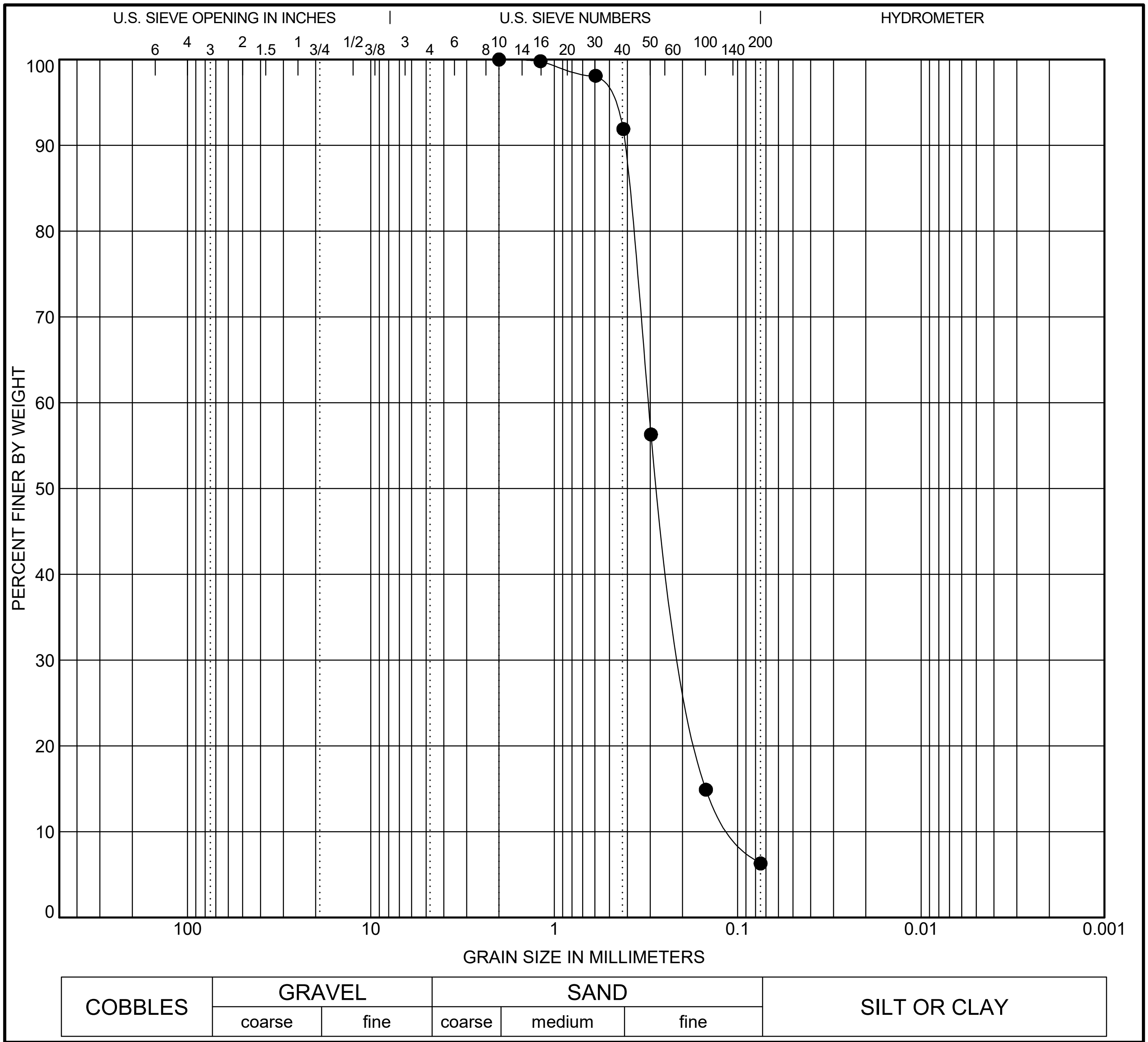
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 15

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 10	100
No. 16	99.8
No. 30	98.1
No. 40	91.9
No. 50	56.3
No. 100	14.9
No. 200	6.3

Specimen Identification
B2021-4 - (50 - 51.5 ft)

Classification
POORLY GRADED SAND with SILT(SP-SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**	**1.18**	**3.06**

% Gravel	% Sand	% Silt	% Clay
0	94	6	

D100	D60	D30	D10
2	0.308	0.192	0.101

TETRA TECH

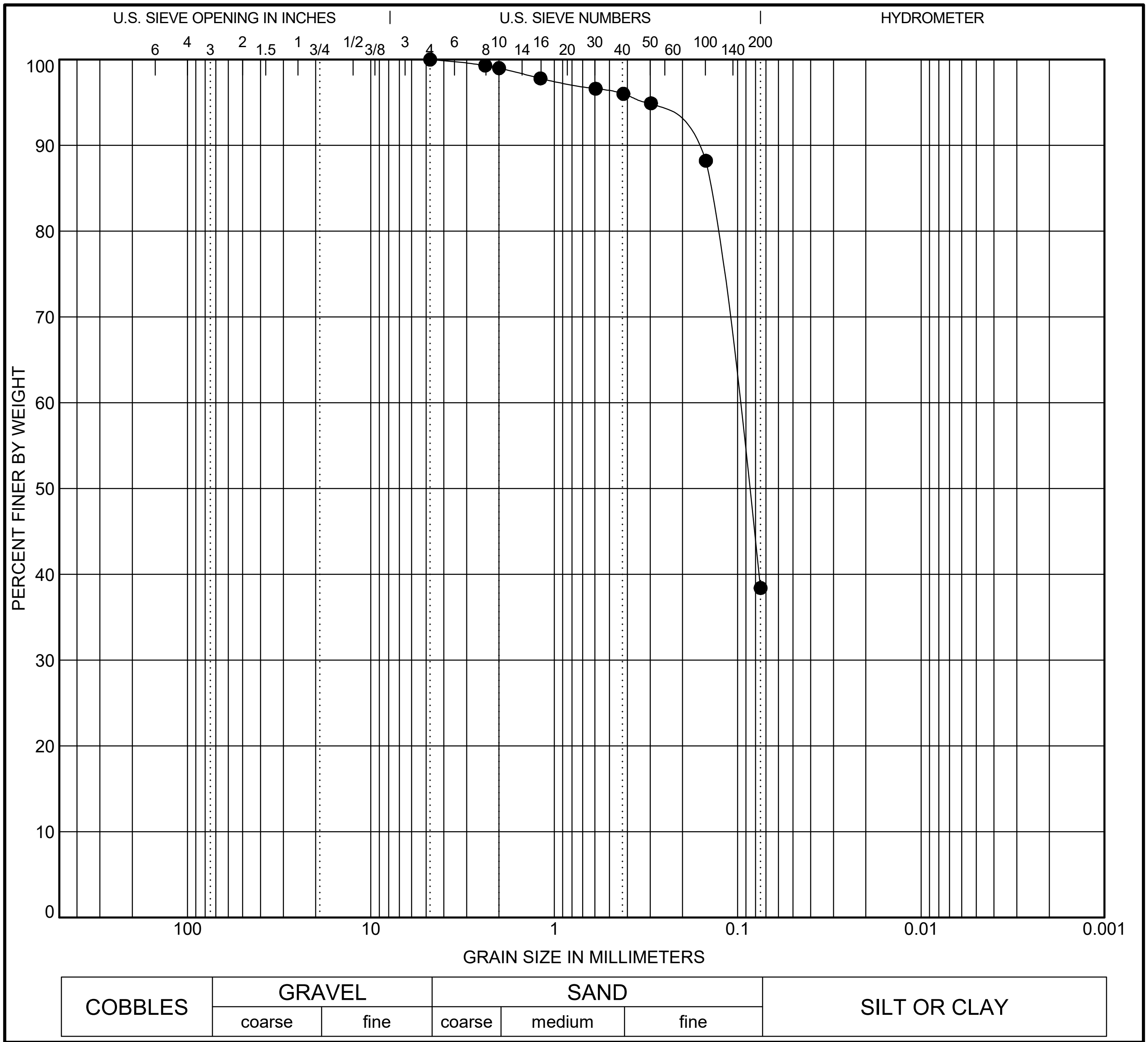
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 16



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.3
No. 10	99
No. 16	97.8
No. 30	96.6
No. 40	96
No. 50	94.9
No. 100	88.2
No. 200	38.4

Specimen Identification
B2021-4 - (90 - 91.5 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	62	38	

D100	D60	D30	D10
4.75	0.101		

TETRA TECH

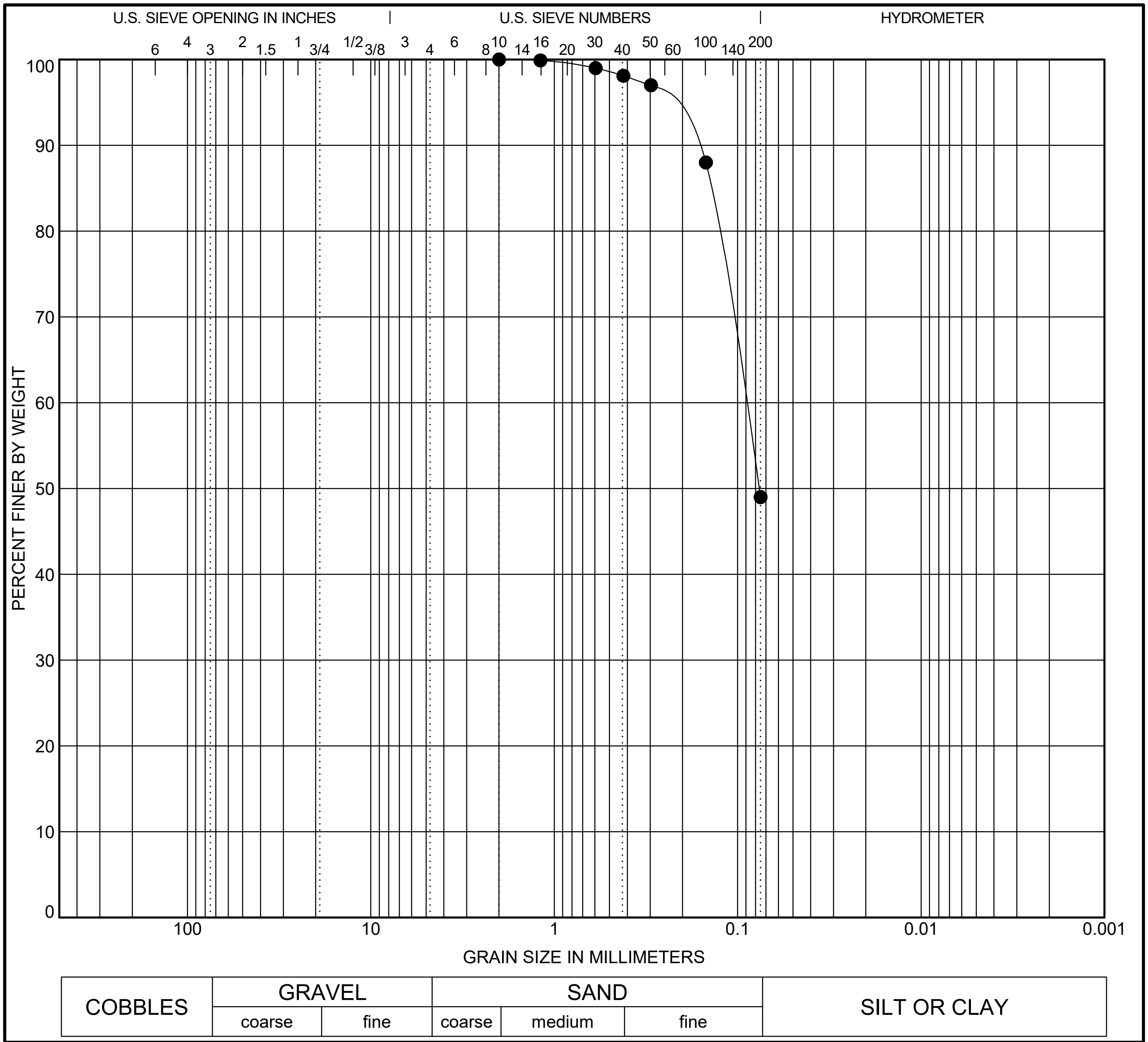
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 17



SIEVE SIZE	% PASSING
No. 10	100
No. 16	99.9
No. 30	99
No. 40	98.1
No. 50	97
No. 100	88
No. 200	49

Specimen Identification

B2021-4 - (120 - 120.9 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	51	49	

D100	D60	D30	D10
2	0.091		

TETRA TECH

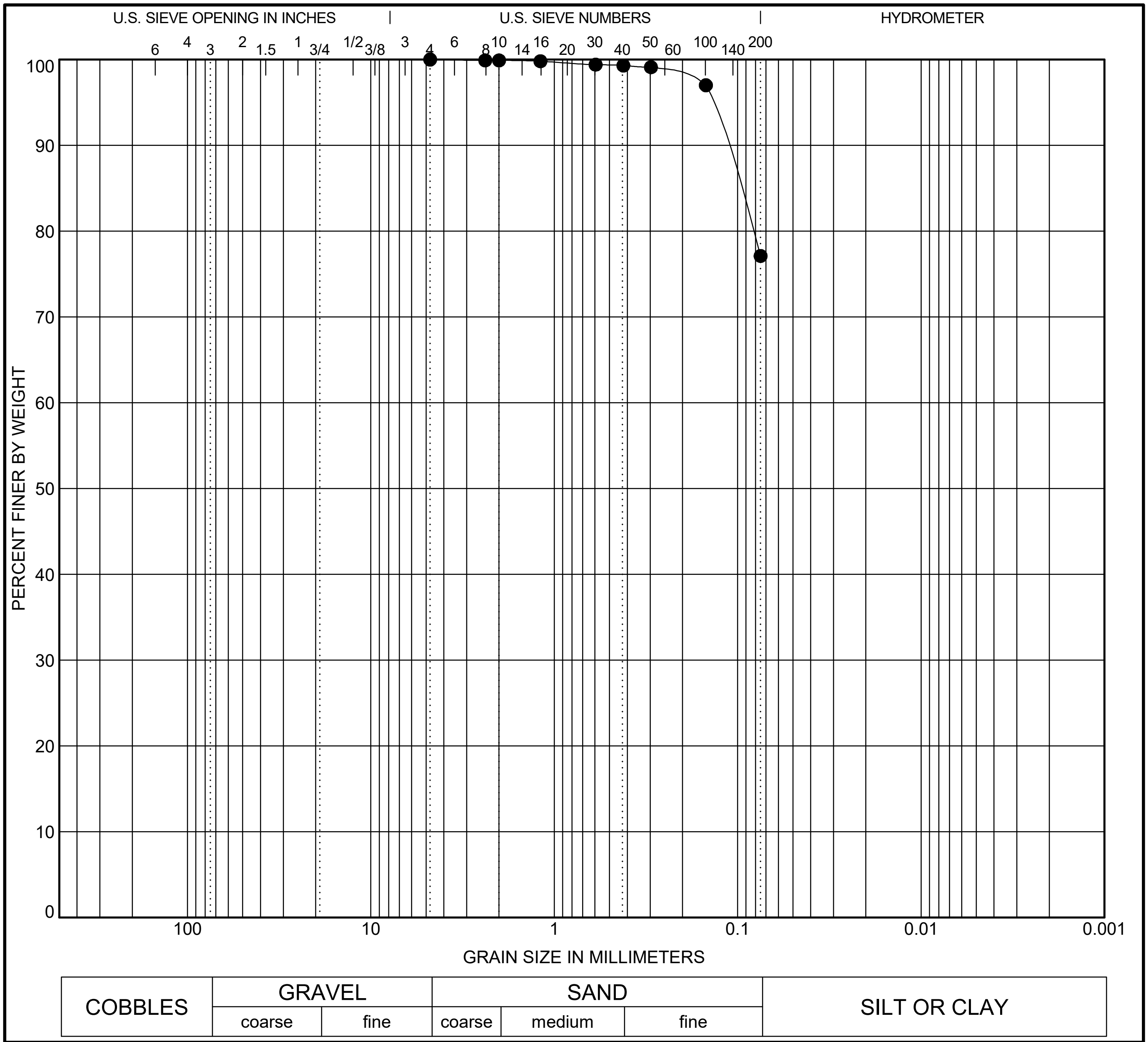
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 18



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.9
No. 16	99.8
No. 30	99.4
No. 40	99.3
No. 50	99.1
No. 100	97
No. 200	77.1

Specimen Identification
B2021-5 - (69 - 70 ft)

Classification
SILT with SAND(ML)

LL	PL	PI	Cc	Cu
27	**20**	**7**		

% Gravel	% Sand	% Silt	% Clay
0	23	77	

D100	D60	D30	D10
4.75			

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

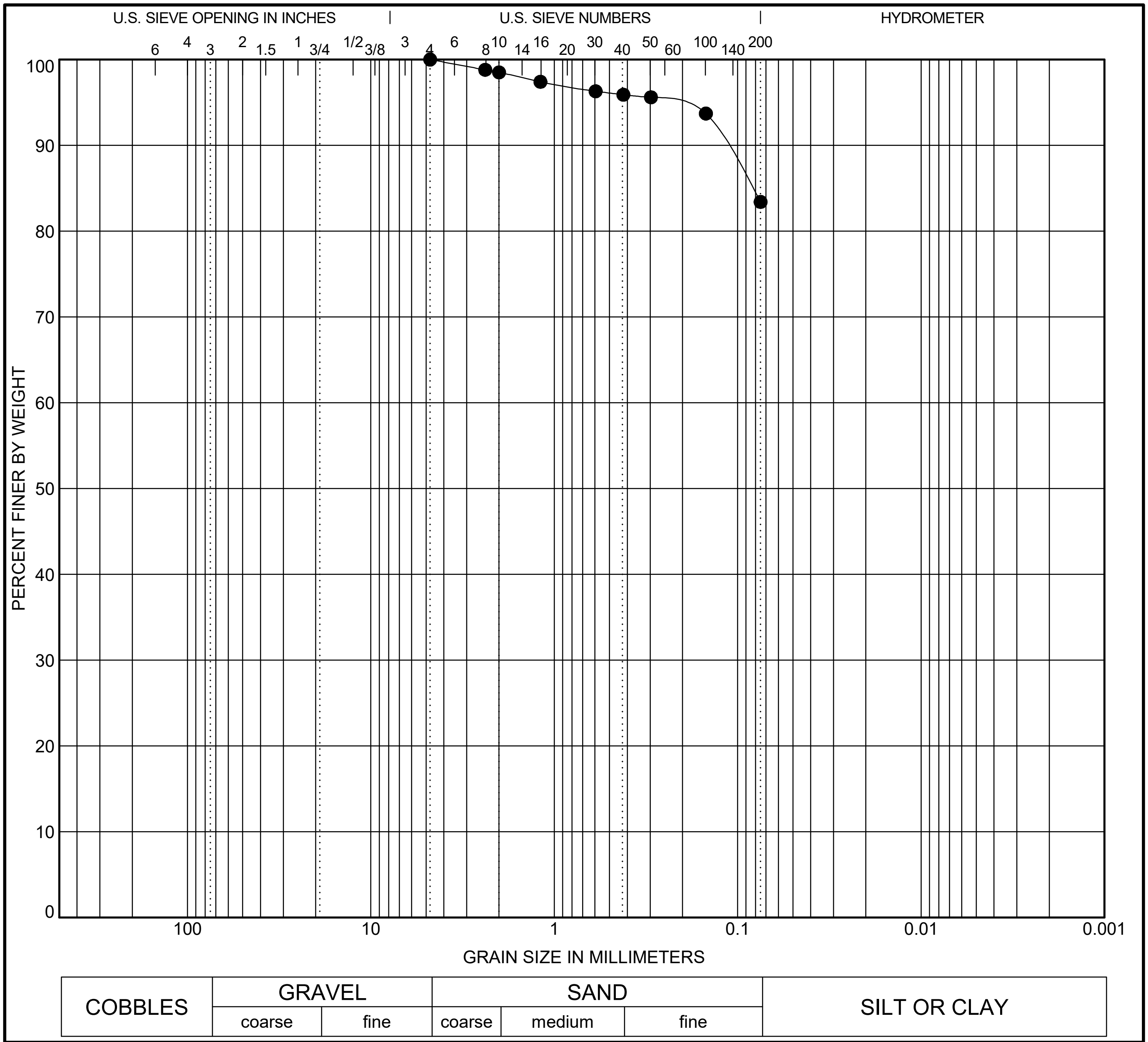
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 19

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 4	100
No. 8	98.8
No. 10	98.5
No. 16	97.4
No. 30	96.3
No. 40	95.9
No. 50	95.6
No. 100	93.7
No. 200	83.4

Specimen Identification

B2021-5 - (80 - 81.5 ft)

Classification
LEAN CLAY with SAND(CL)

LL	PL	PI	Cc	Cu
35	**21**	**14**		

% Gravel	% Sand	% Silt	% Clay
0	17	83	

D100	D60	D30	D10
4.75			

TETRA TECH

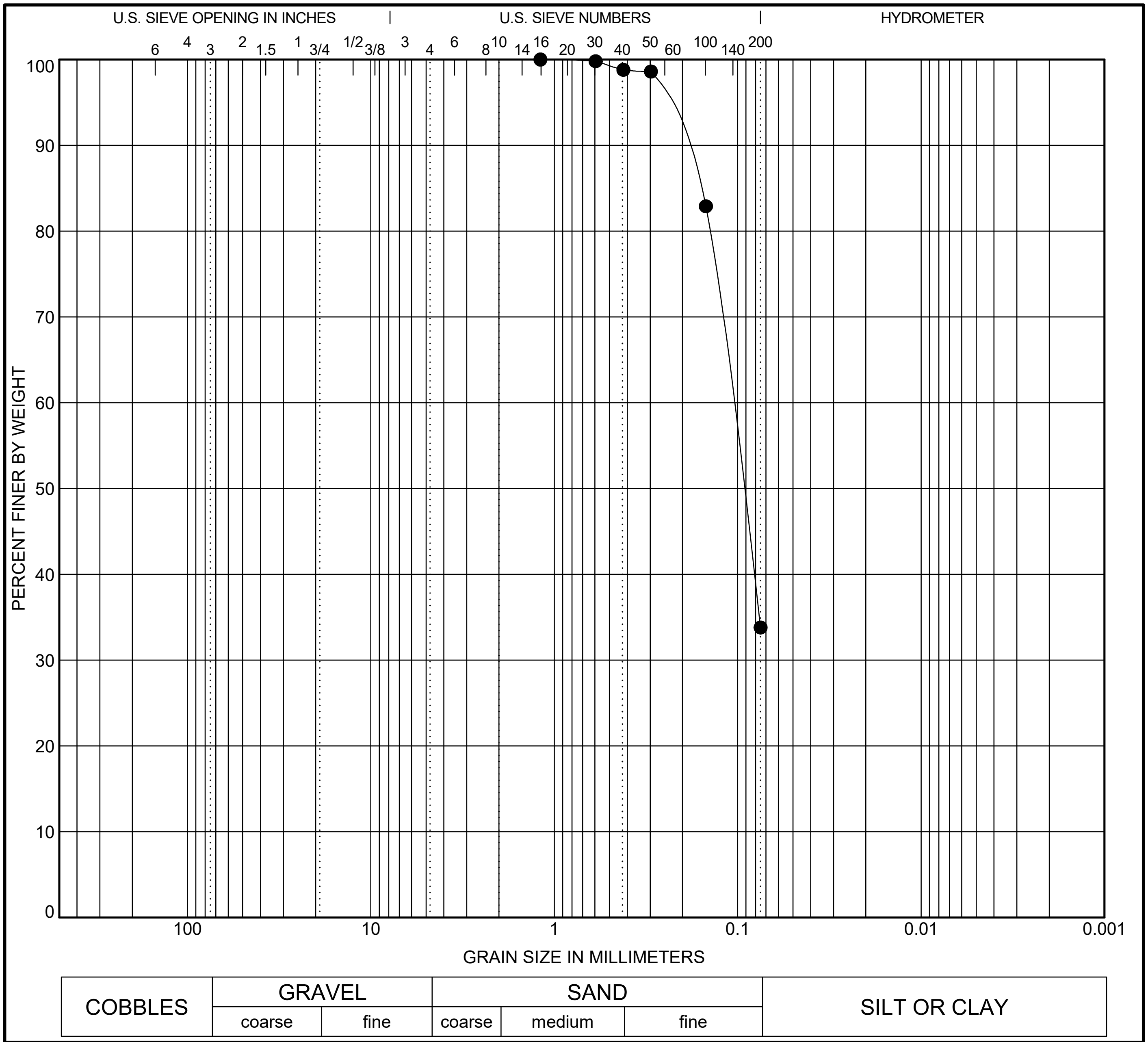
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 20



SIEVE SIZE	% PASSING
No. 16	100
No. 30	99.8
No. 40	98.8
No. 50	98.6
No. 100	82.9
No. 200	33.8

Specimen Identification

B2021-5 - (90 - 91.5 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	66	34	

D100	D60	D30	D10
1.19	0.108		

TETRA TECH

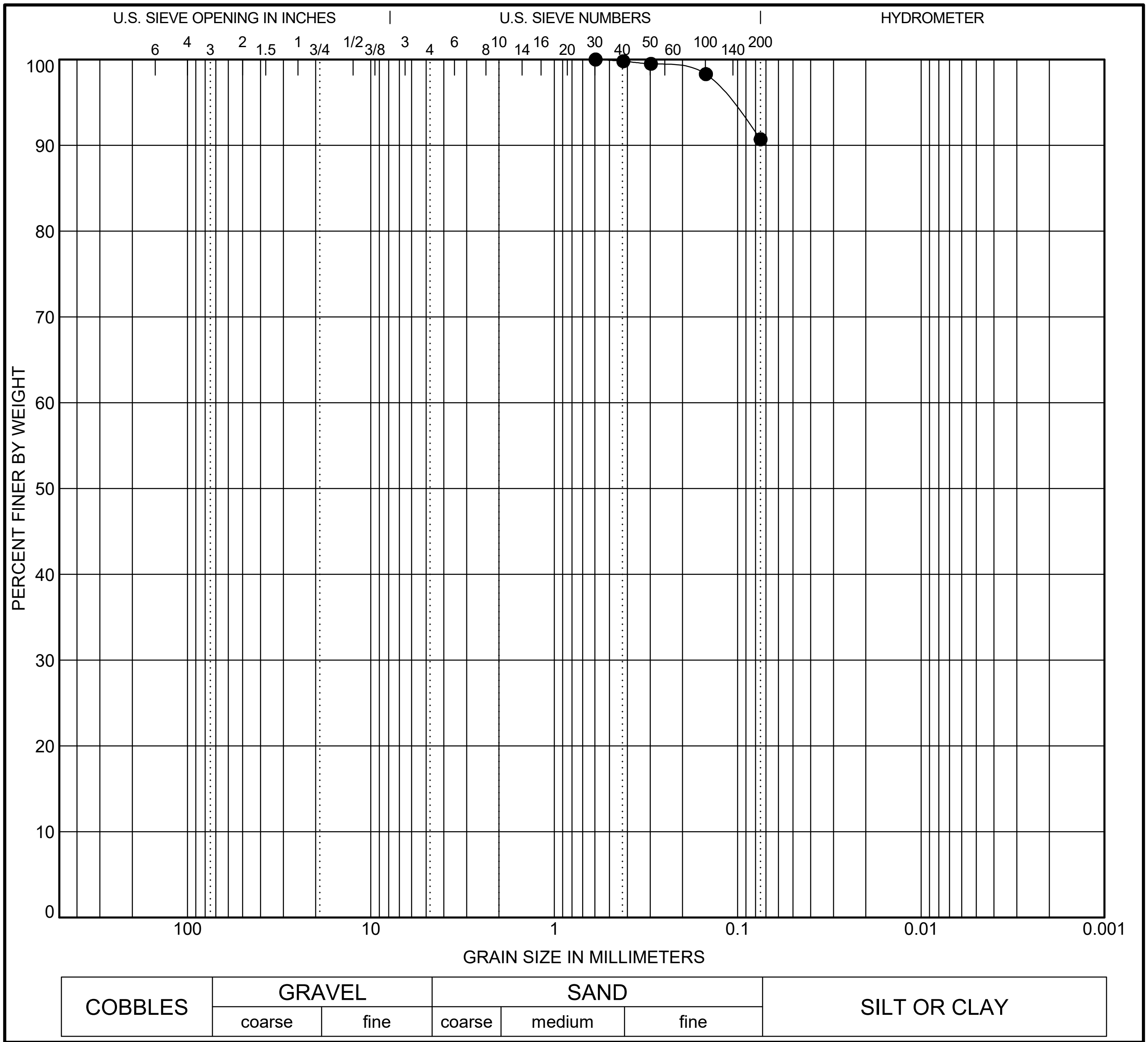
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 21



SIEVE SIZE	% PASSING
No. 30	100
No. 40	99.8
No. 50	99.5
No. 100	98.3
No. 200	90.7

Specimen Identification
B2021-6 - (79 - 81 ft)

Classification
FAT CLAY(CH)

LL	PL	PI	Cc	Cu
67	**19**	**48**		

% Gravel	% Sand	% Silt	% Clay
0	9	91	

D100	D60	D30	D10
0.595			

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

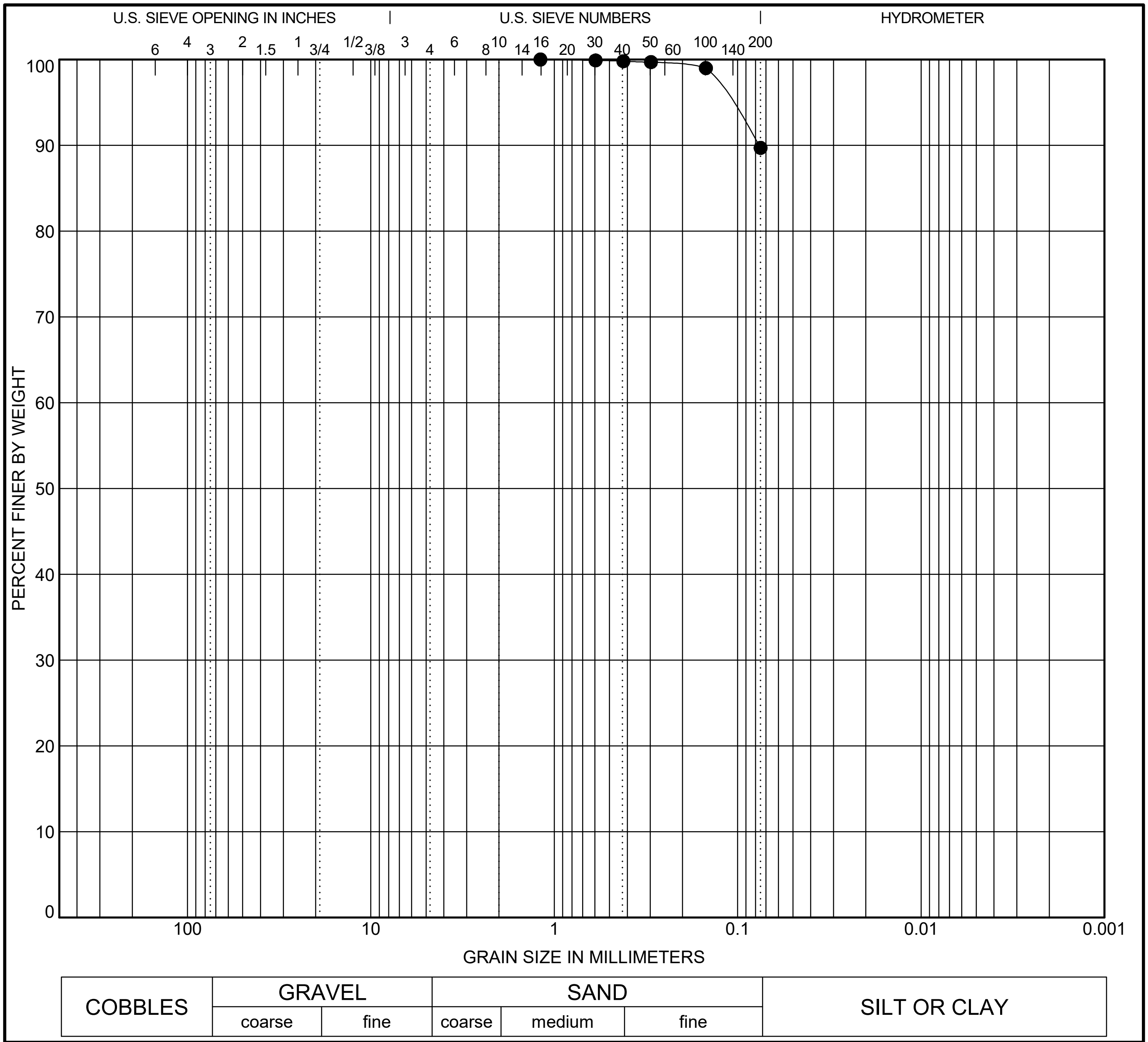
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 22

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 16	100
No. 30	99.9
No. 40	99.8
No. 50	99.7
No. 100	99
No. 200	89.7

Specimen Identification
B2021-6 - (99 - 102 ft)

Classification	LL	PL	PI	Cc	Cu
FAT CLAY(CH)					
	56	**22**	**34**		

% Gravel	% Sand	% Silt	% Clay
0	10	90	

D100	D60	D30	D10
1.19			

GRAIN SIZE DISTRIBUTION

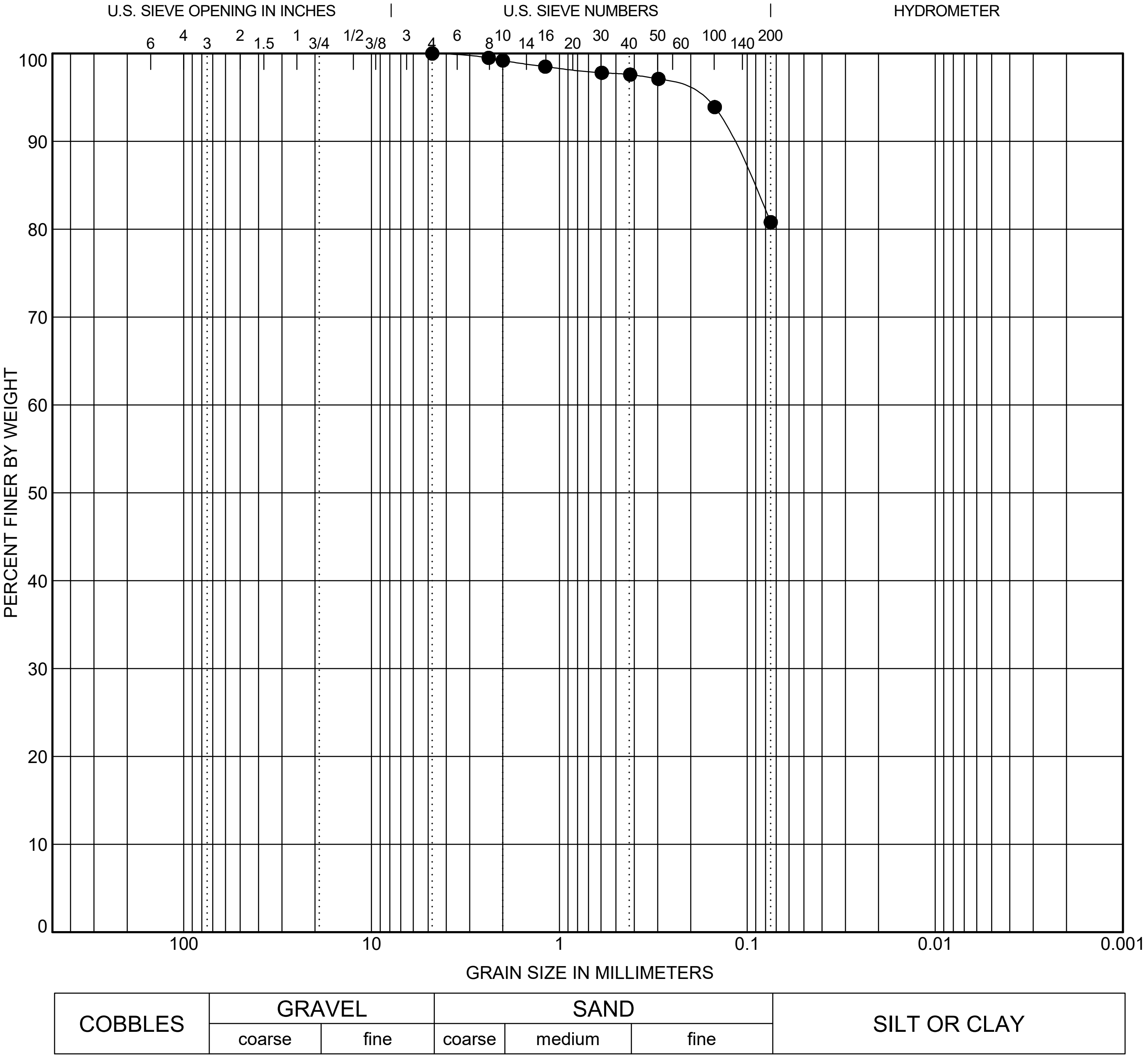
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 23



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.5
No. 10	99.2
No. 16	98.5
No. 30	97.8
No. 40	97.6
No. 50	97.1
No. 100	93.9
No. 200	80.8

Specimen Identification
B2021-6 - (106 - 107 ft)

Classification					
LEAN CLAY with SAND(CL)	LL	PL	PI	Cc	Cu
	47	**22**	**25**		

% Gravel	% Sand	% Silt	% Clay
0	19	81	

D100	D60	D30	D10
4.75			

GRAIN SIZE DISTRIBUTION

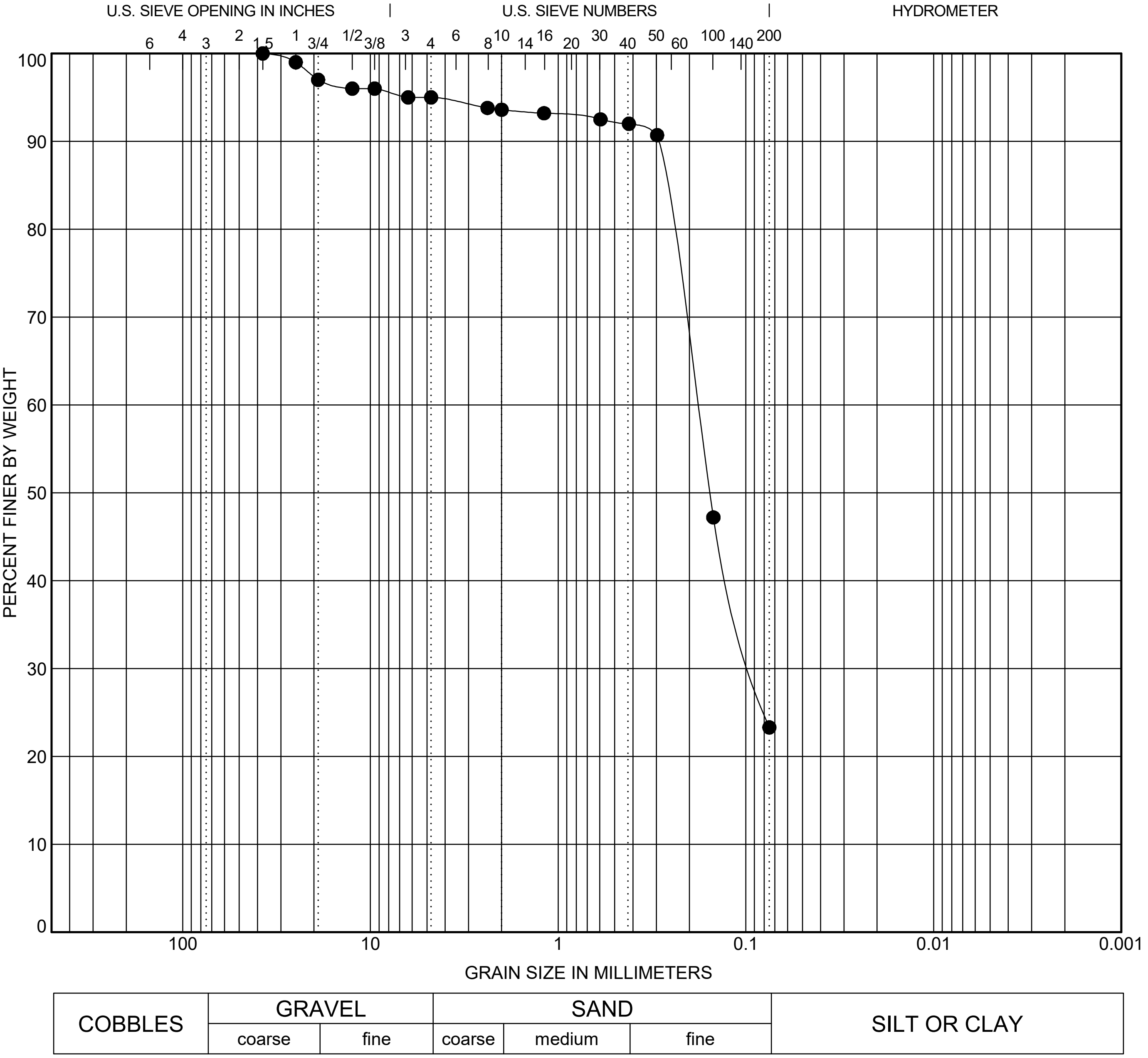
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 24



SIEVE SIZE	% PASSING
1.5 in	100
1 in	99
3/4 in	97
1/2 in	96
3/8 in	96
1/4 in	95
No. 4	95
No. 8	93.8
No. 10	93.6
No. 16	93.2
No. 30	92.5
No. 40	92
No. 50	90.7
No. 100	47.2
No. 200	23.3

Specimen Identification
B2021-7 - (39 - 41 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
5	72	23	

D100	D60	D30	D10
37.5	0.183	0.091	

TETRA TECH

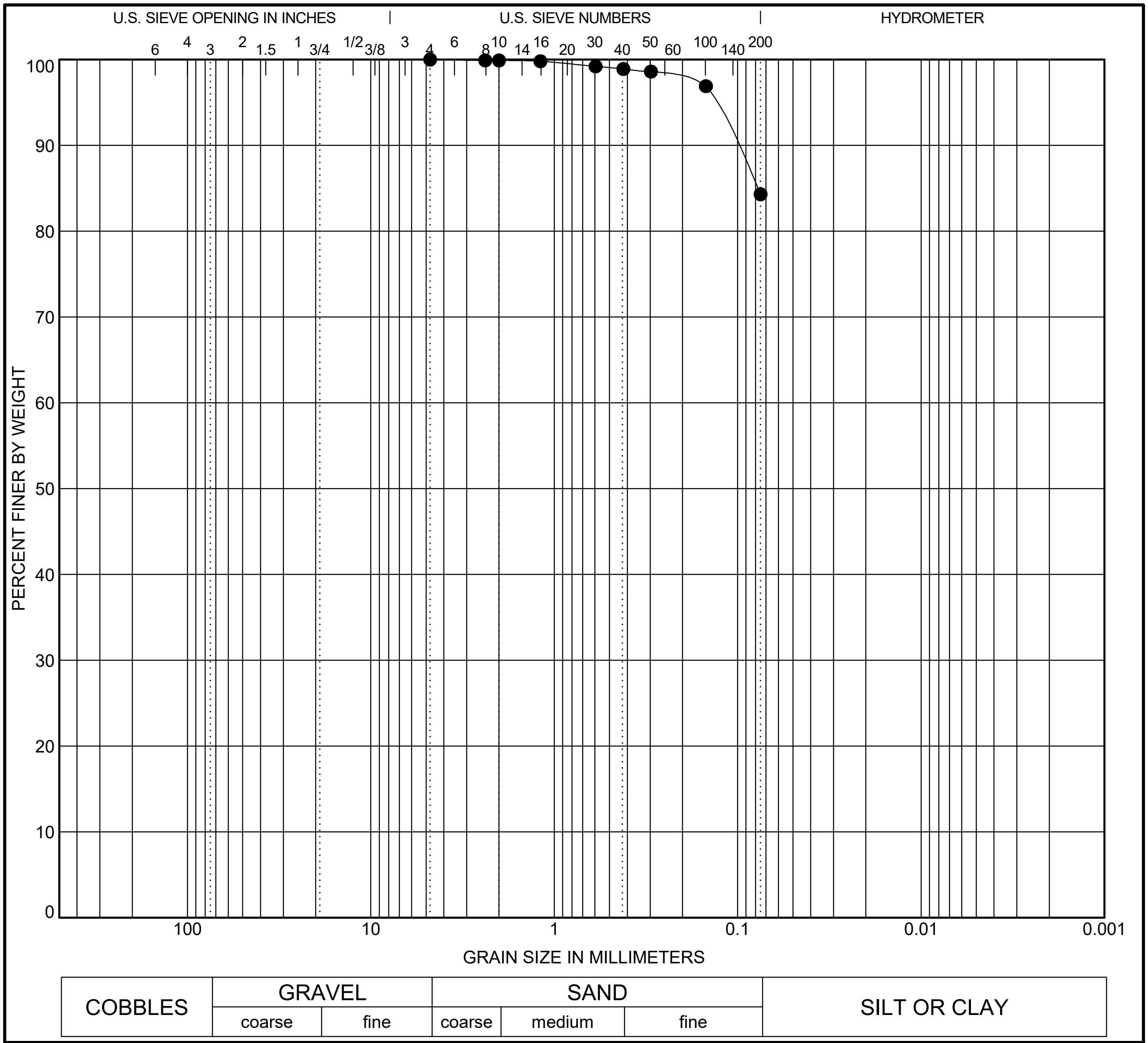
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 25



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.9
No. 16	99.8
No. 30	99.2
No. 40	98.9
No. 50	98.6
No. 100	96.9
No. 200	84.3

Specimen Identification
B2021-7 - (59 - 60 ft)

Classification	LL	PL	PI	Cc	Cu
SILT with SAND(ML)					
	NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	16	84	

D100	D60	D30	D10
4.75			

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

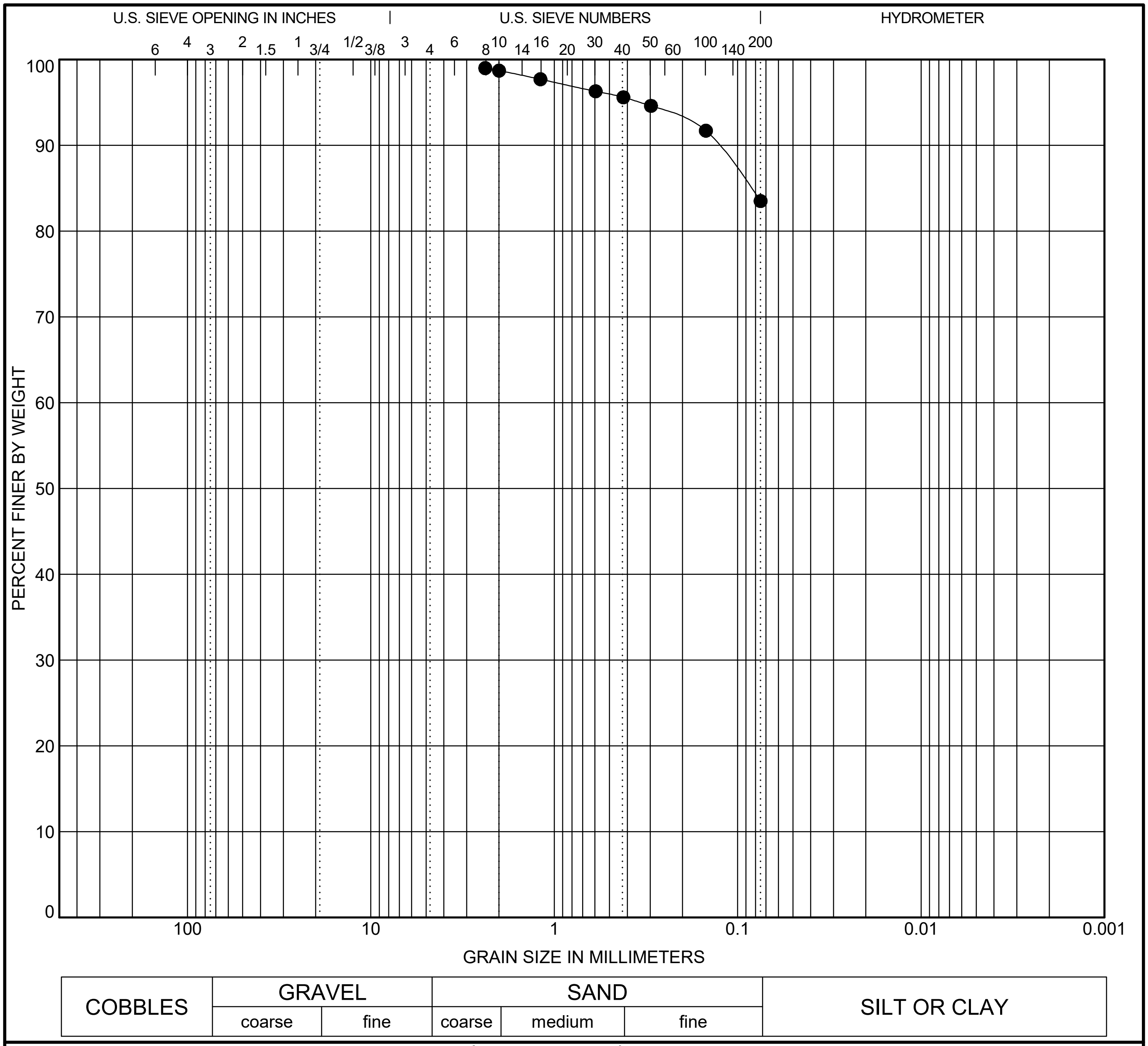
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 26

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 8	99
No. 10	98.7
No. 16	97.7
No. 30	96.3
No. 40	95.6
No. 50	94.6
No. 100	91.7
No. 200	83.5

Specimen Identification
B2021-8 - (1 - 4 ft)

Classification	LL	PL	PI	Cc	Cu
SILT with SAND(ML)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	15	84	

D100	D60	D30	D10
2.38			

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

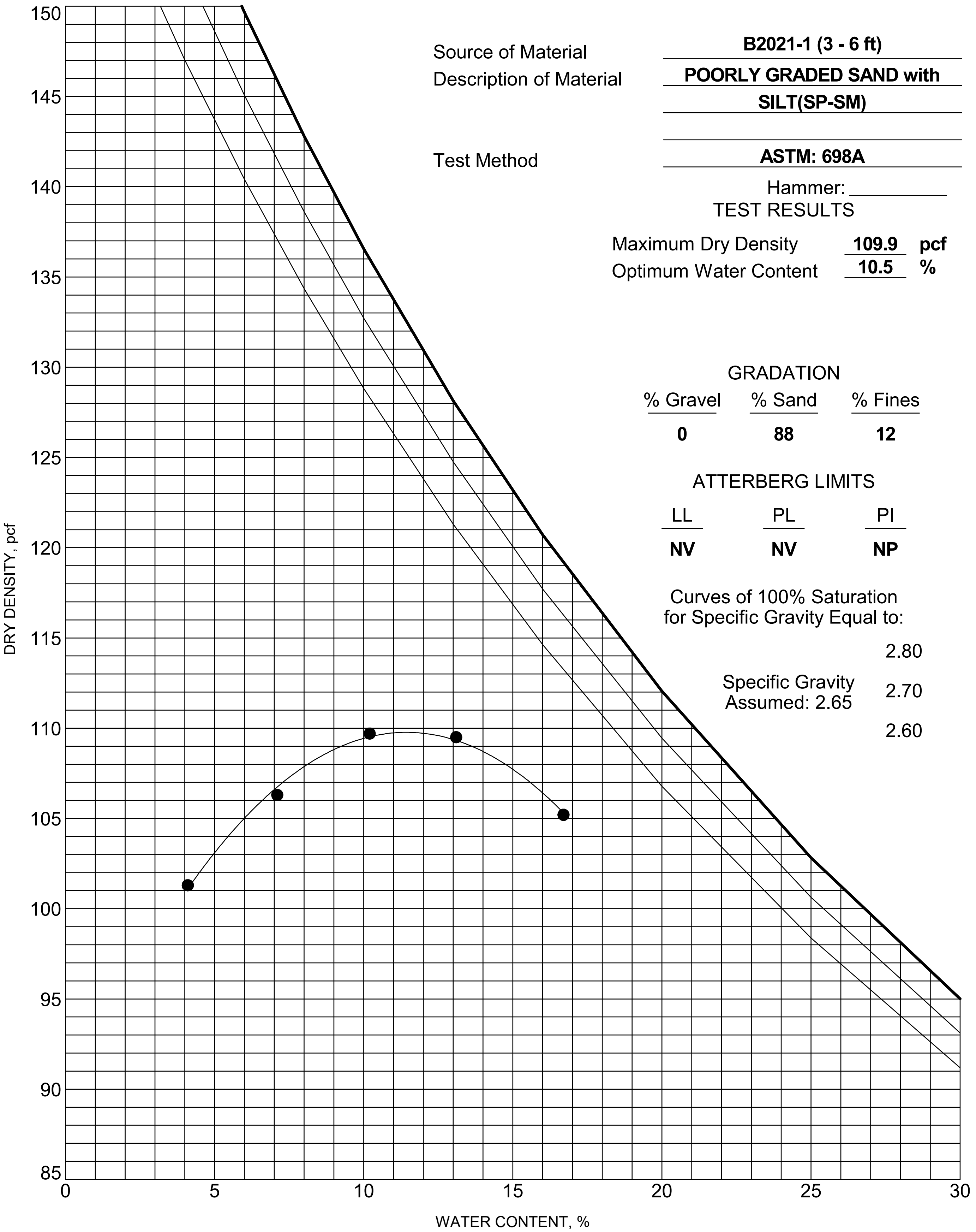
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 27

Revised 1-23-08 (MAT)



Source of Material **B2021-1 (3 - 6 ft)**

Description of Material **POORLY GRADED SAND with SILT(SP-SM)**

Test Method **ASTM: 698A**

Hammer: ___________

TEST RESULTS

Maximum Dry Density	**109.9**	**pcf**
Optimum Water Content	**10.5**	**%**

GRADATION

% Gravel	% Sand	% Fines
0	**88**	**12**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

TETRA TECH

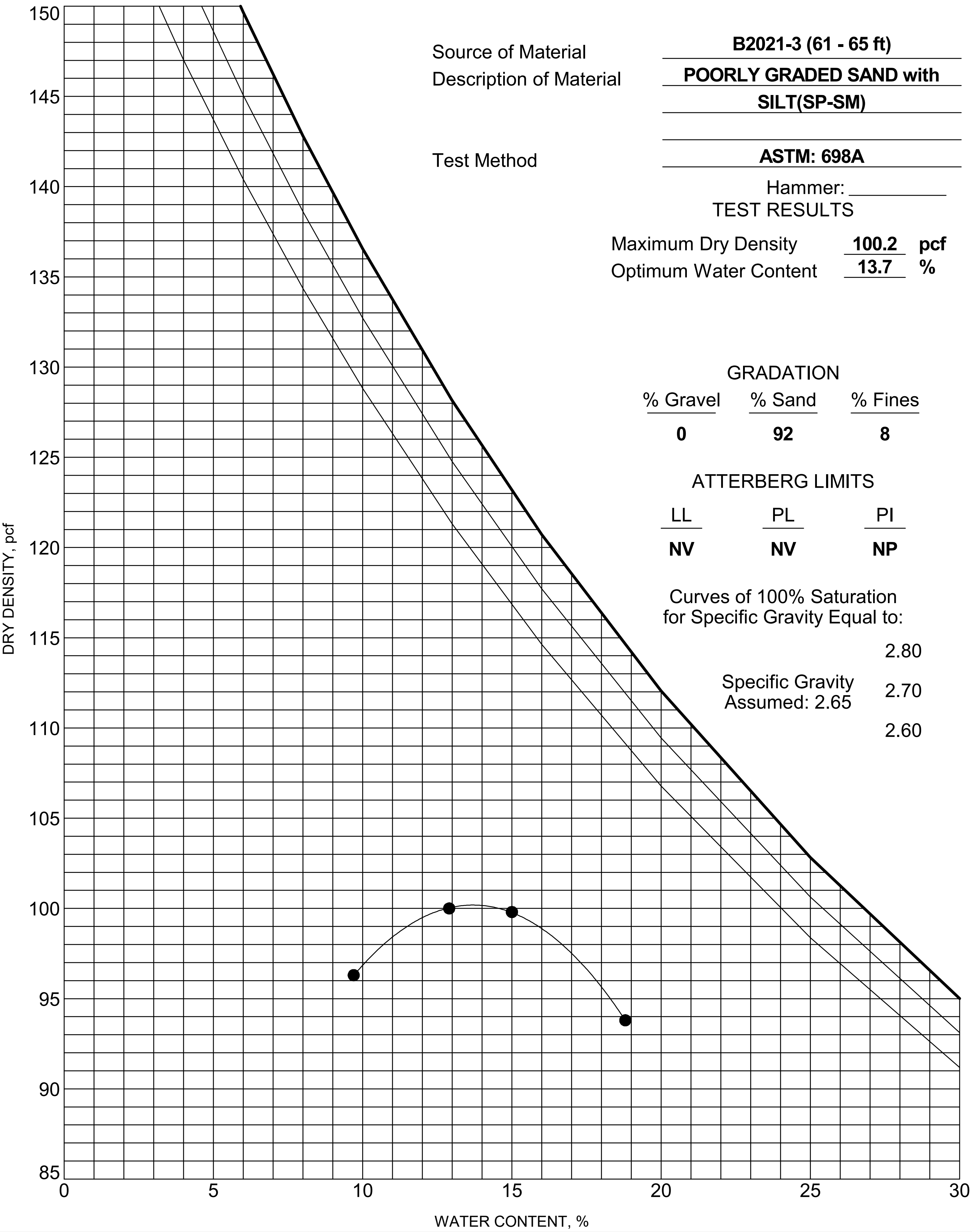
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 28



Source of Material **B2021-3 (61 - 65 ft)**

Description of Material **POORLY GRADED SAND with SILT(SP-SM)**

Test Method **ASTM: 698A**

Hammer: ______

TEST RESULTS

Maximum Dry Density **100.2** pcf

Optimum Water Content **13.7** %

GRADATION

% Gravel	% Sand	% Fines
0	**92**	**8**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

TETRA TECH

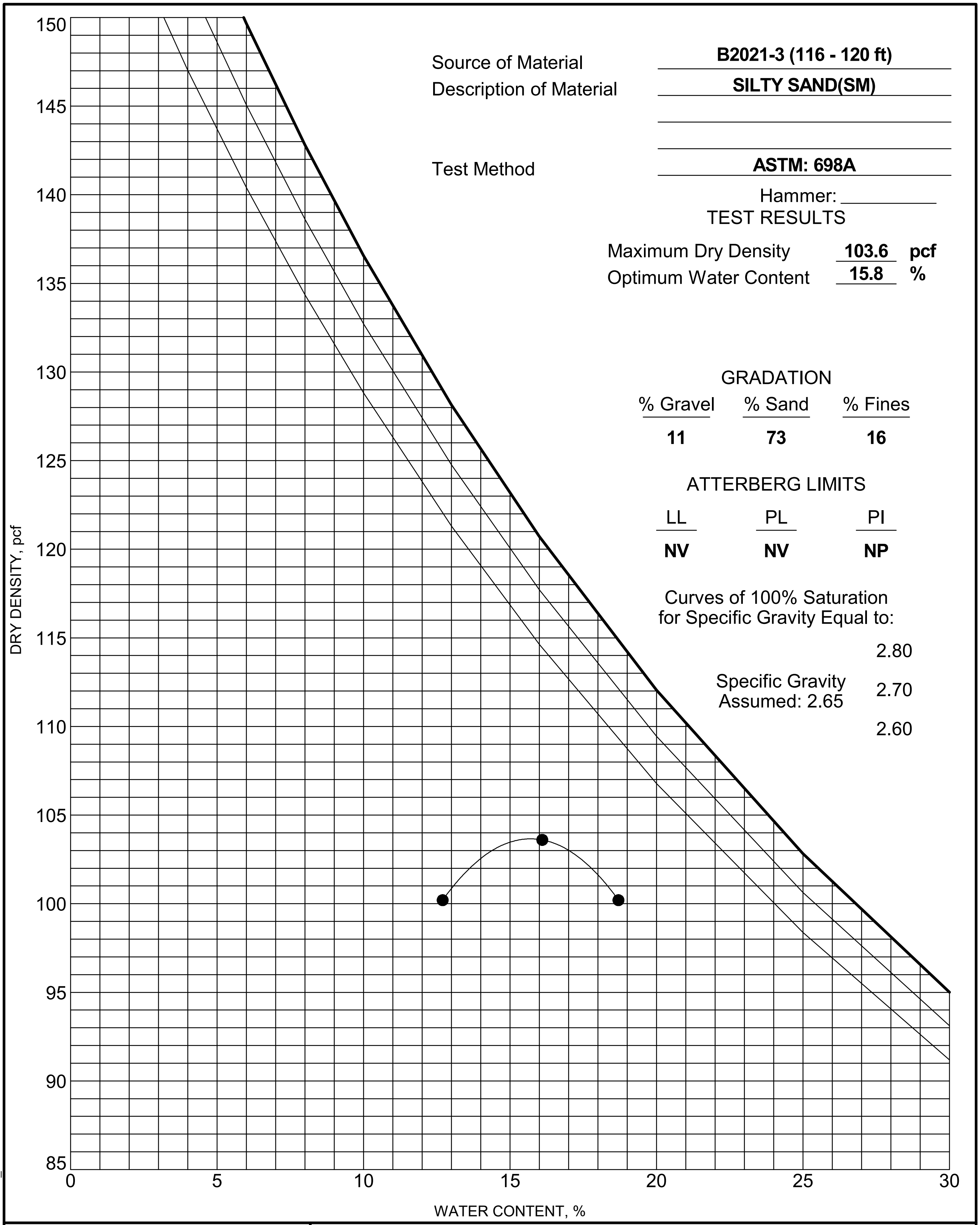
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 29



Source of Material: **B2021-3 (116 - 120 ft)**

Description of Material: **SILTY SAND(SM)**

Test Method: **ASTM: 698A**

Hammer: ___________

TEST RESULTS

Maximum Dry Density **103.6** **pcf**

Optimum Water Content **15.8** **%**

GRADATION

% Gravel	% Sand	% Fines
11	**73**	**16**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80

2.70

2.60

Specific Gravity
Assumed: 2.65

MOISTURE-DENSITY RELATIONSHIP

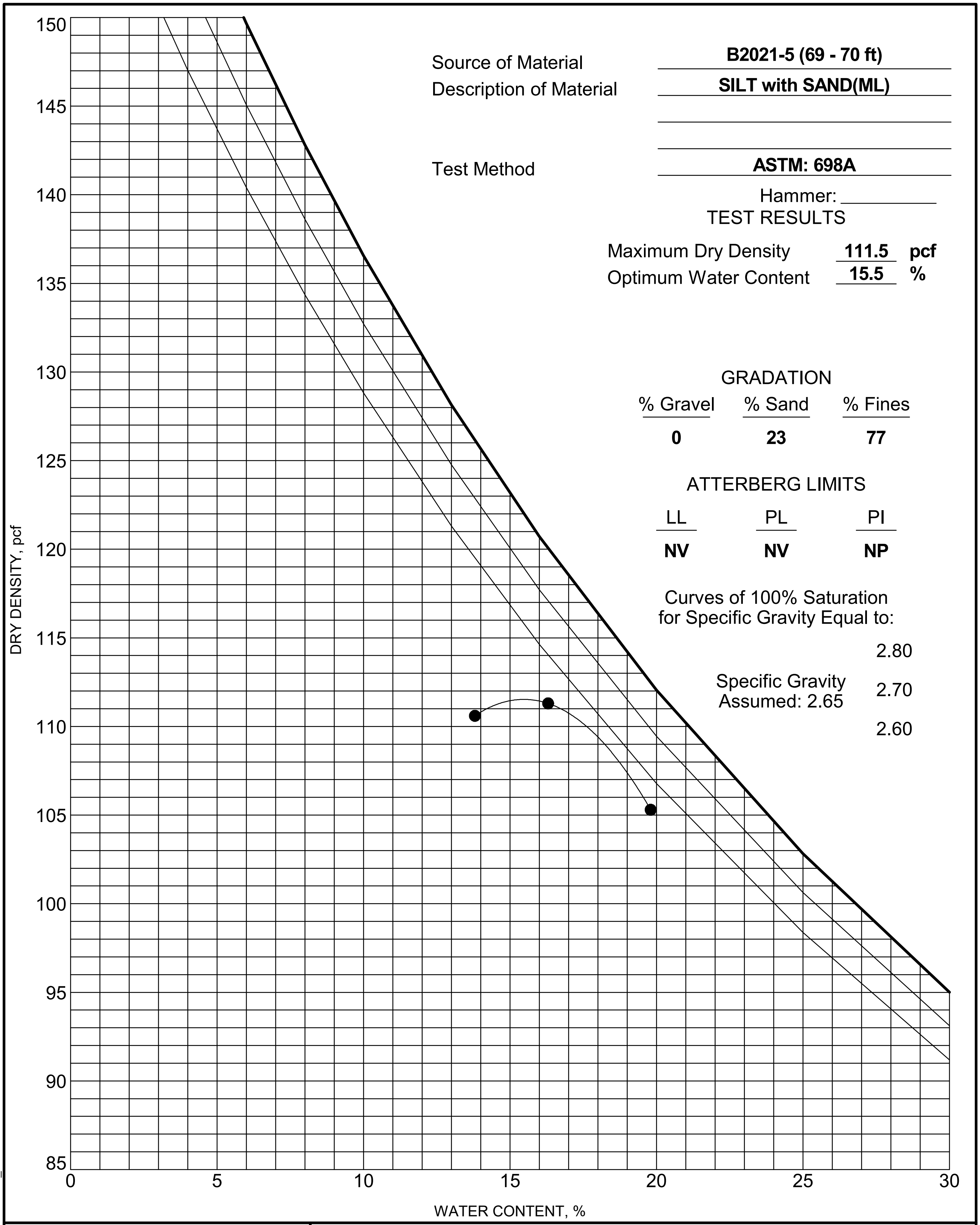
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 30



Source of Material **B2021-5 (69 - 70 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ___

TEST RESULTS

Maximum Dry Density **111.5** pcf

Optimum Water Content **15.5** %

GRADATION

% Gravel	% Sand	% Fines
0	**23**	**77**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

Specific Gravity
Assumed: 2.65

MOISTURE-DENSITY RELATIONSHIP

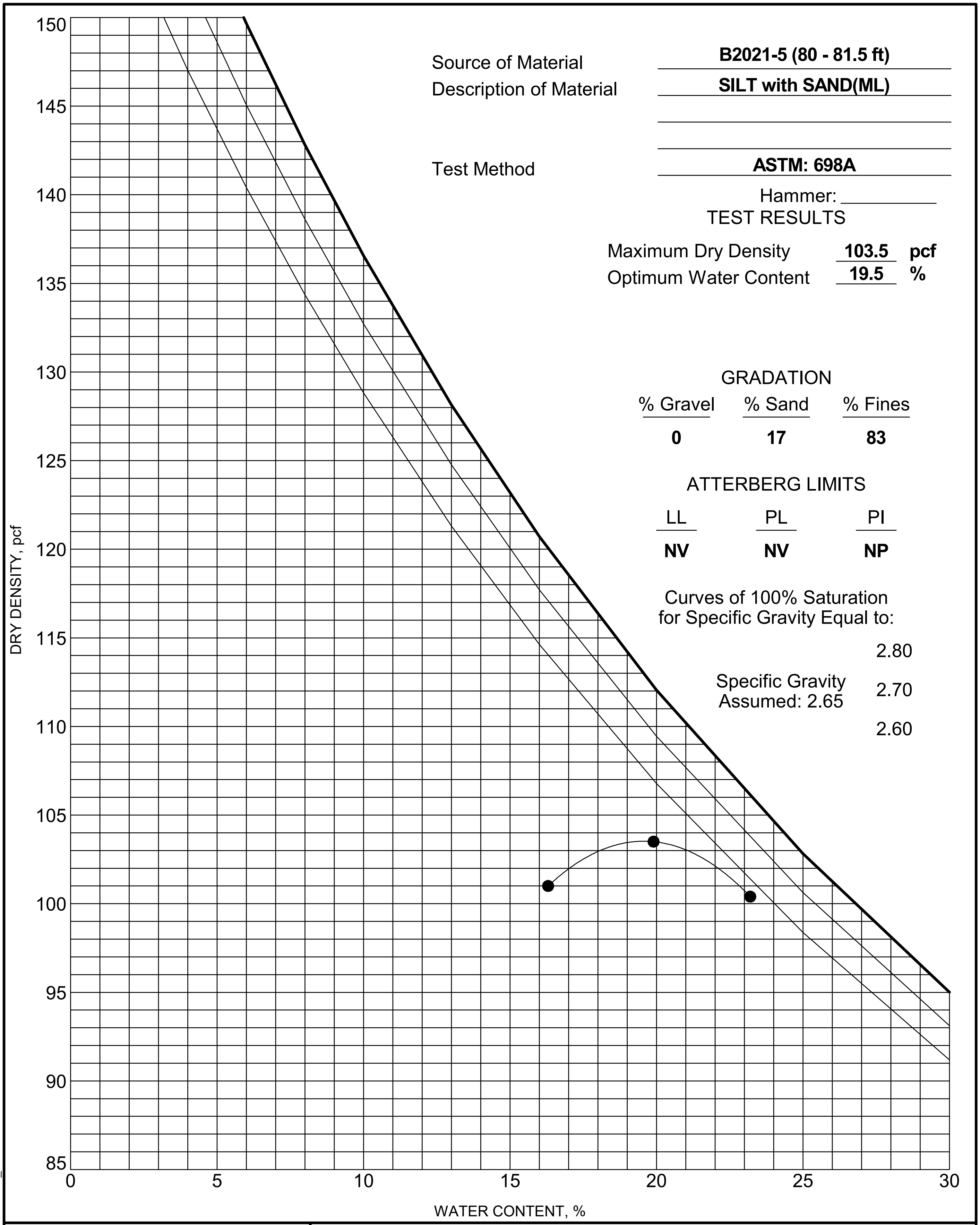
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 31



Source of Material **B2021-5 (80 - 81.5 ft)**
Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ______

TEST RESULTS

Maximum Dry Density **103.5** **pcf**
Optimum Water Content **19.5** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**17**	**83**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

TETRA TECH

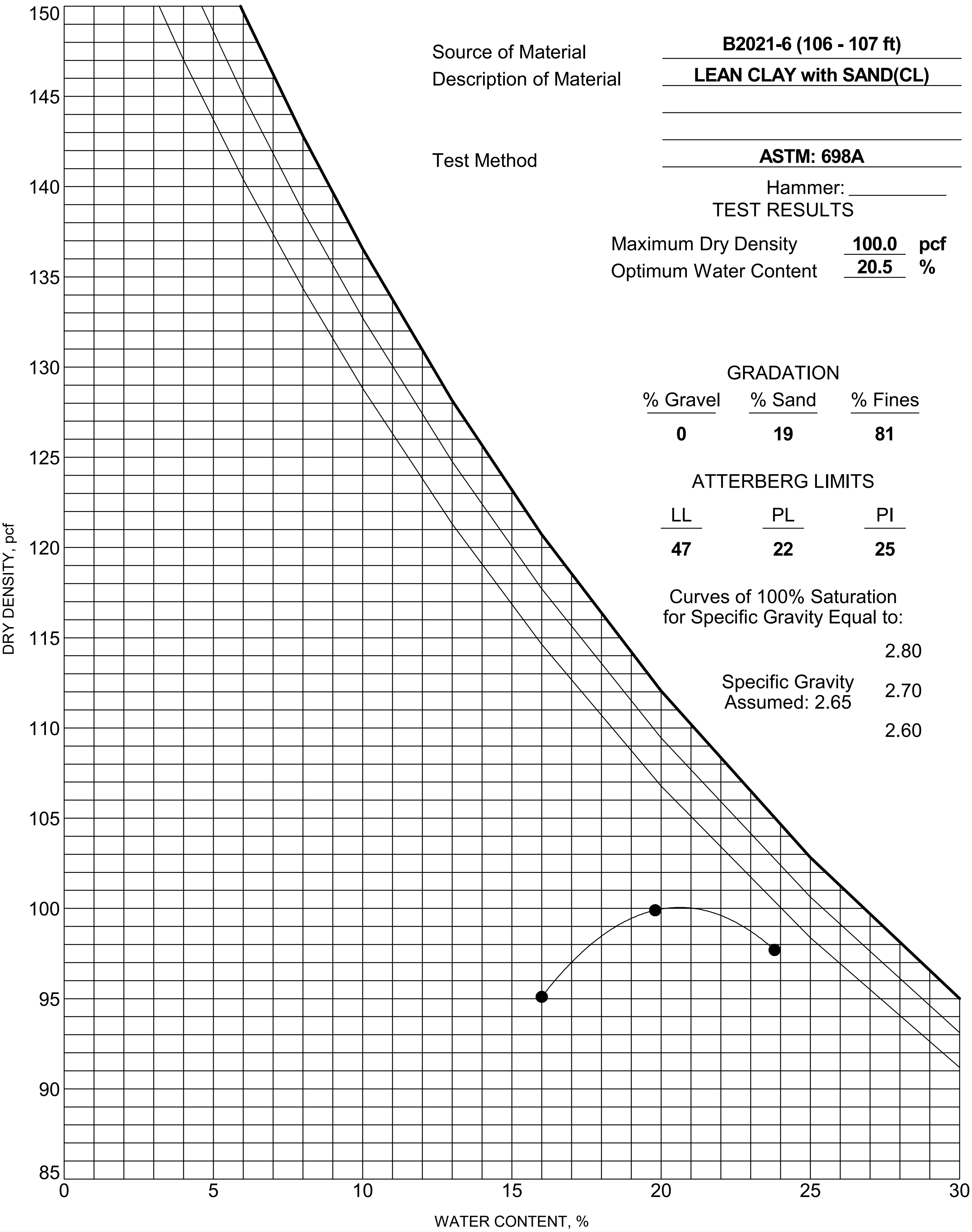
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 32



Source of Material **B2021-6 (106 - 107 ft)**

Description of Material **LEAN CLAY with SAND(CL)**

Test Method **ASTM: 698A**

Hammer: ___________

TEST RESULTS

Maximum Dry Density **100.0** **pcf**

Optimum Water Content **20.5** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**19**	**81**

ATTERBERG LIMITS

LL	PL	PI
47	**22**	**25**

MOISTURE-DENSITY RELATIONSHIP

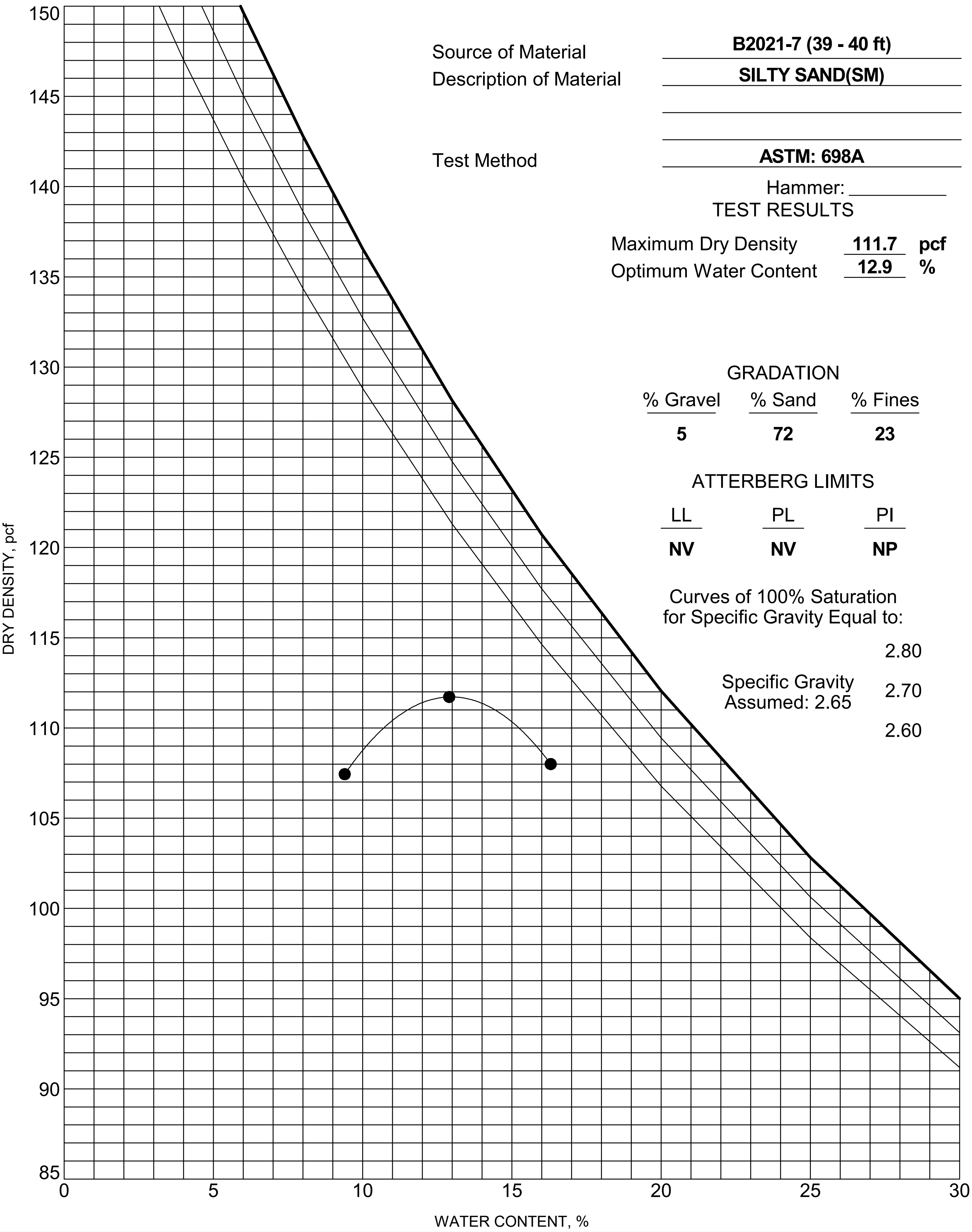
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 33



Source of Material **B2021-7 (39 - 40 ft)**

Description of Material **SILTY SAND(SM)**

Test Method **ASTM: 698A**

Hammer: ____________

TEST RESULTS

Maximum Dry Density **111.7** **pcf**

Optimum Water Content **12.9** **%**

GRADATION

% Gravel	% Sand	% Fines
5	**72**	**23**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

TETRA TECH

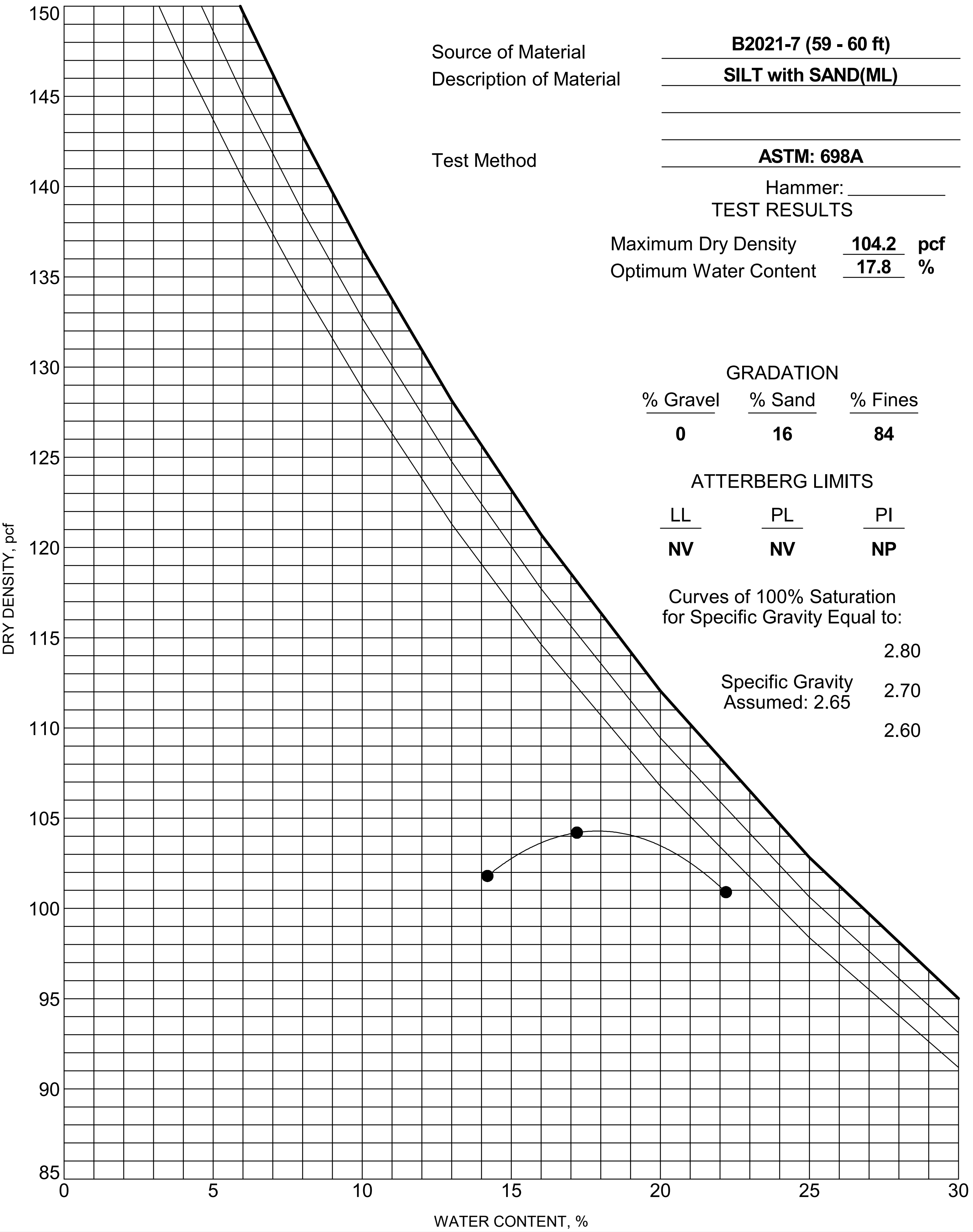
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 34



Source of Material **B2021-7 (59 - 60 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: __________

TEST RESULTS

Maximum Dry Density **104.2** **pcf**

Optimum Water Content **17.8** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**16**	**84**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80

2.70

2.60

Specific Gravity
Assumed: 2.65

TETRA TECH

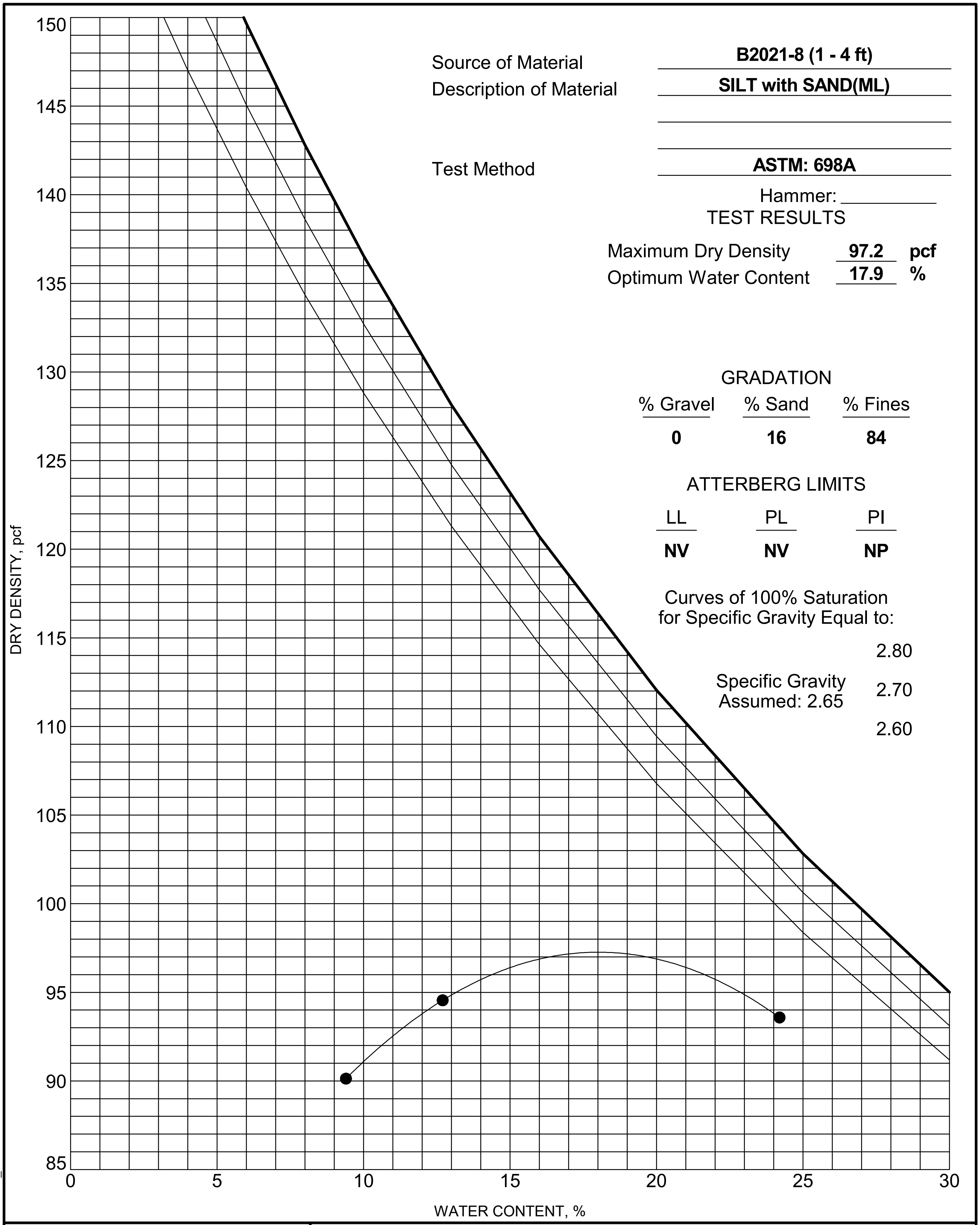
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 35



Source of Material **B2021-8 (1 - 4 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ____________

TEST RESULTS

Maximum Dry Density **97.2** **pcf**

Optimum Water Content **17.9** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**16**	**84**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80

2.70

2.60

Specific Gravity
Assumed: 2.65

MOISTURE-DENSITY RELATIONSHIP

TETRA TECH

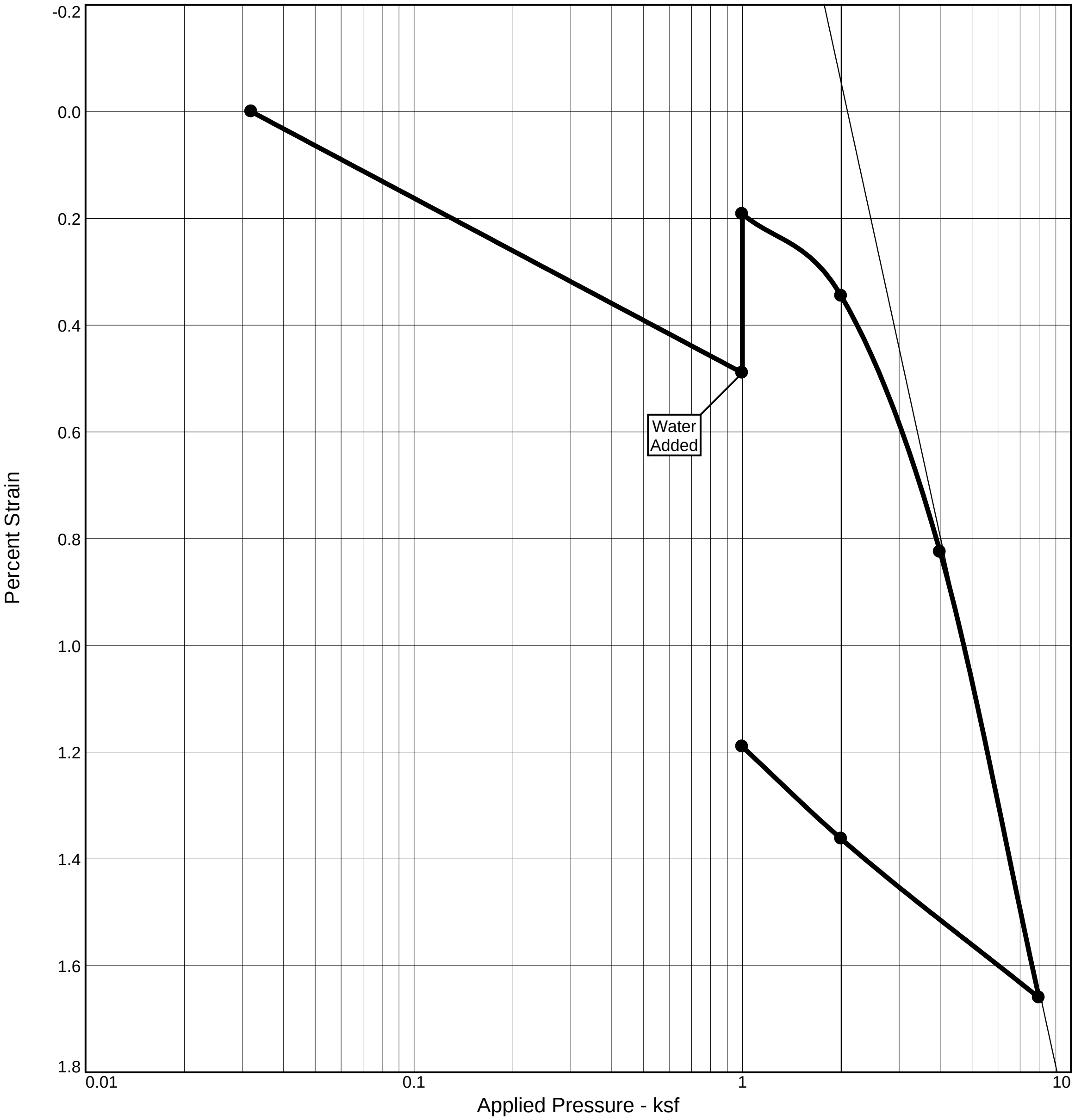
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 36

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
24.8 %	3.5 %	120.1	NV	NP	2.65		3.0	0.04	0.01	2.6	0.3	0.375

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Sand	SM	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-3 **Depth:** 25-27 ft

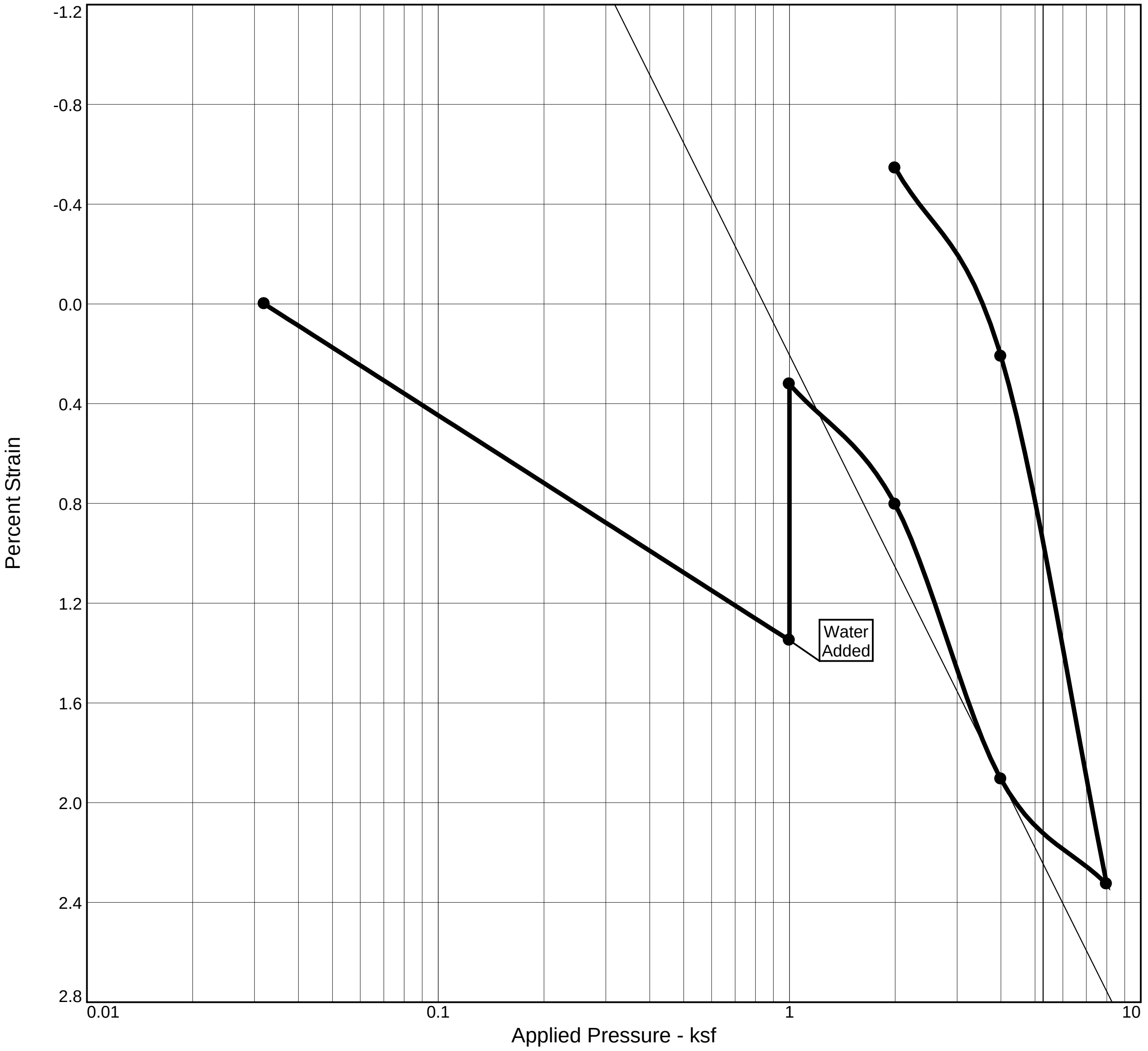
Tetra Tech

Missoula, MT

Remarks:

Figure 37

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
63.8 %	23.7 %	90.1	54	30	2.65		4.8	0.06	0.09	2.8	1.0	0.984

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Clay	CL-ML	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-5 **Depth:** 50-51.5 ft

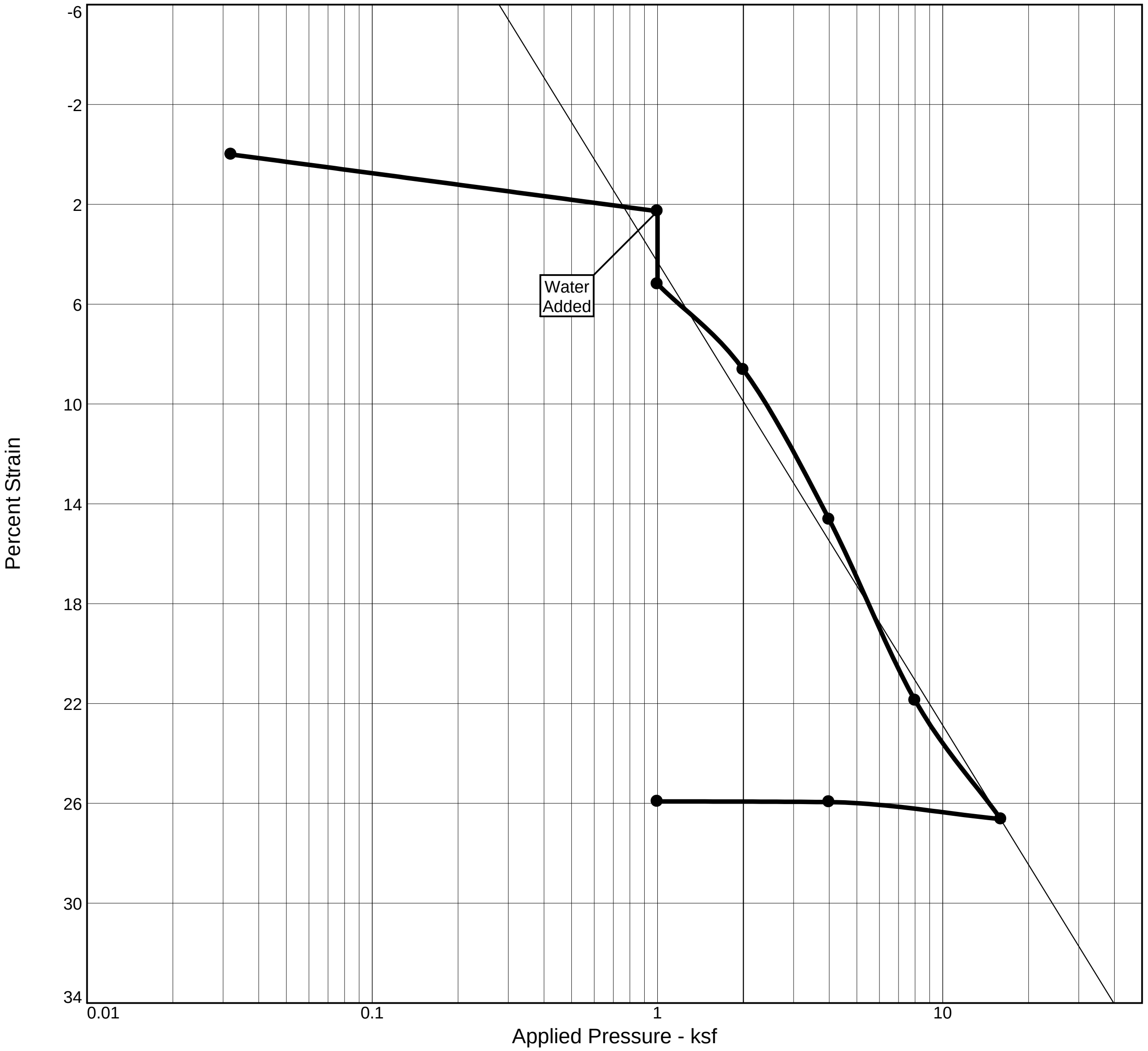
Tetra Tech

Missoula, MT

Remarks:

Figure 38

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
52.0 %	20.4 %	83.5	33	10	2.65		1.5	0.38	0.01	0	2.9	1.038

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Clay	CL-ML	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-7 **Depth:** 120-121.3 ft

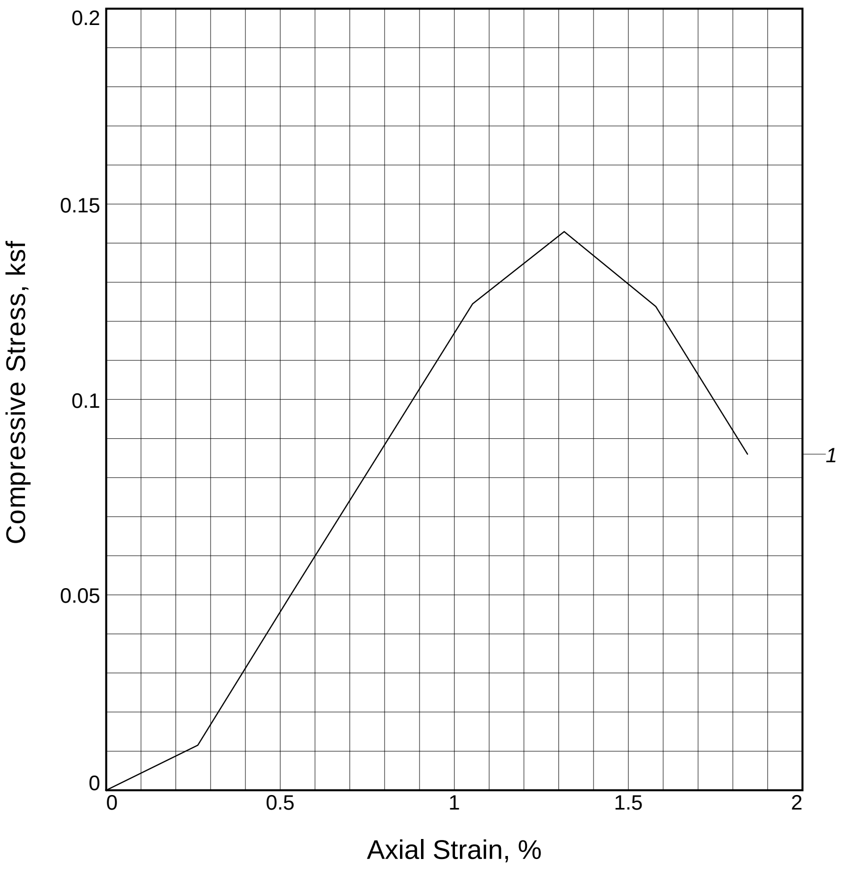
Remarks:

Tetra Tech

Missoula, MT

Figure 39

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.143			
Undrained shear strength, ksf	0.071			
Failure strain, %	1.3			
Strain rate, in./min.	0.030			
Water content, %	8.3			
Wet density, pcf	103.1			
Dry density, pcf	95.2			
Saturation, %	29.7			
Void ratio	0.7369			
Specimen diameter, in.	2.790			
Specimen height, in.	5.700			
Height/diameter ratio	2.04			

Description: bulk

LL = NV | **PL =** NV | **PI =** NV | **Assumed GS=** 2.65 | **Type:** SP

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 40

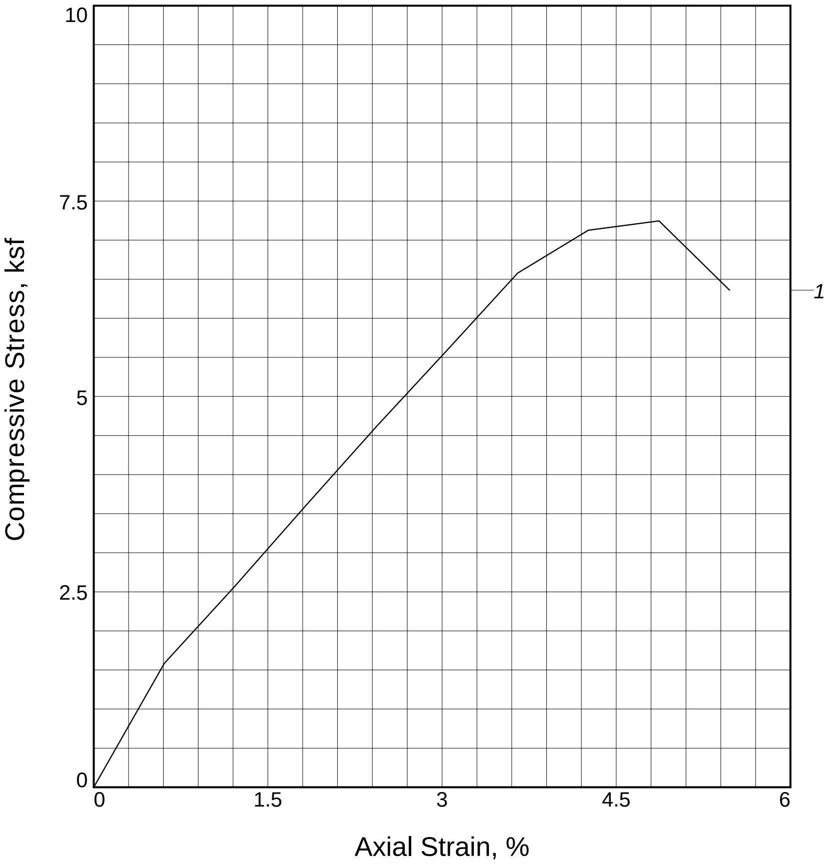
Project: Pickles Butte

Source of Sample: B2021-3

Depth: 61-65 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	7.246			
Undrained shear strength, ksf	3.623			
Failure strain, %	4.9			
Strain rate, in./min.	0.060			
Water content, %	24.0			
Wet density, pcf	119.4			
Dry density, pcf	96.3			
Saturation, %	88.5			
Void ratio	0.7184			
Specimen diameter, in.	2.450			
Specimen height, in.	4.930			
Height/diameter ratio	2.01			

Description: Special

LL = N/A	**PL =** N/A	**PI =** N/A	**Assumed GS=** 2.65	**Type:** ML

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 41

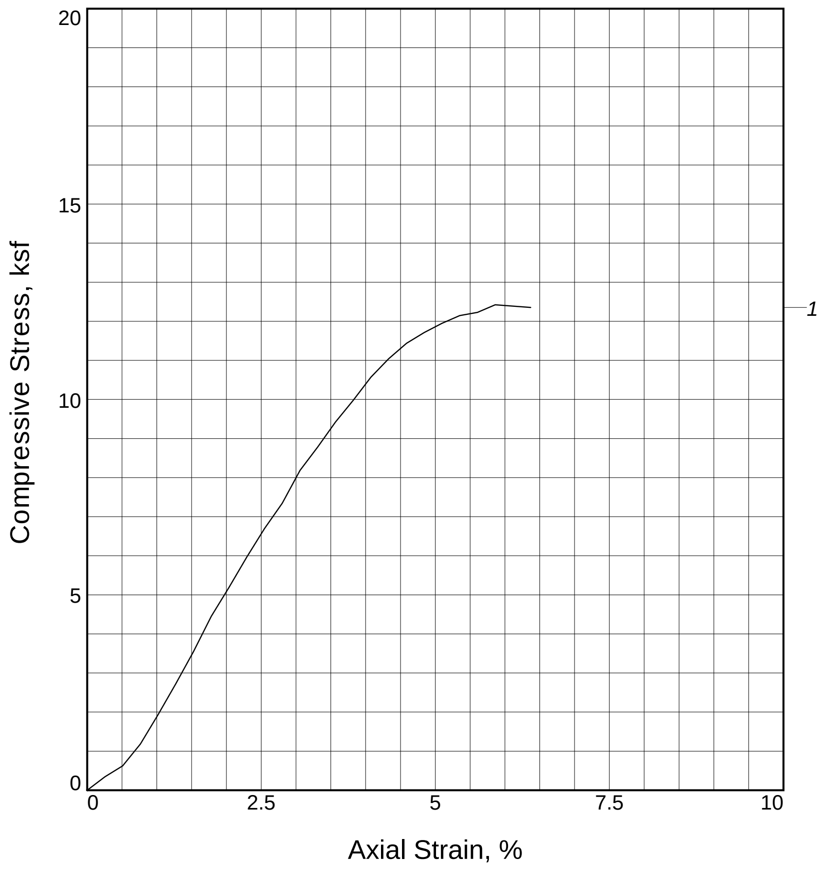
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 57-58 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	12.421			
Undrained shear strength, ksf	6.211			
Failure strain, %	5.9			
Strain rate, in./min.	0.020			
Water content, %	24.6			
Wet density, pcf	124.9			
Dry density, pcf	100.2			
Saturation, %	100.3			
Void ratio	0.6508			
Specimen diameter, in.	1.918			
Specimen height, in.	3.925			
Height/diameter ratio	2.05			

Description: Special

LL = 67 | **PL =** 19 | **PI =** 48 | **Assumed GS=** 2.65 | **Type:** CH

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 42

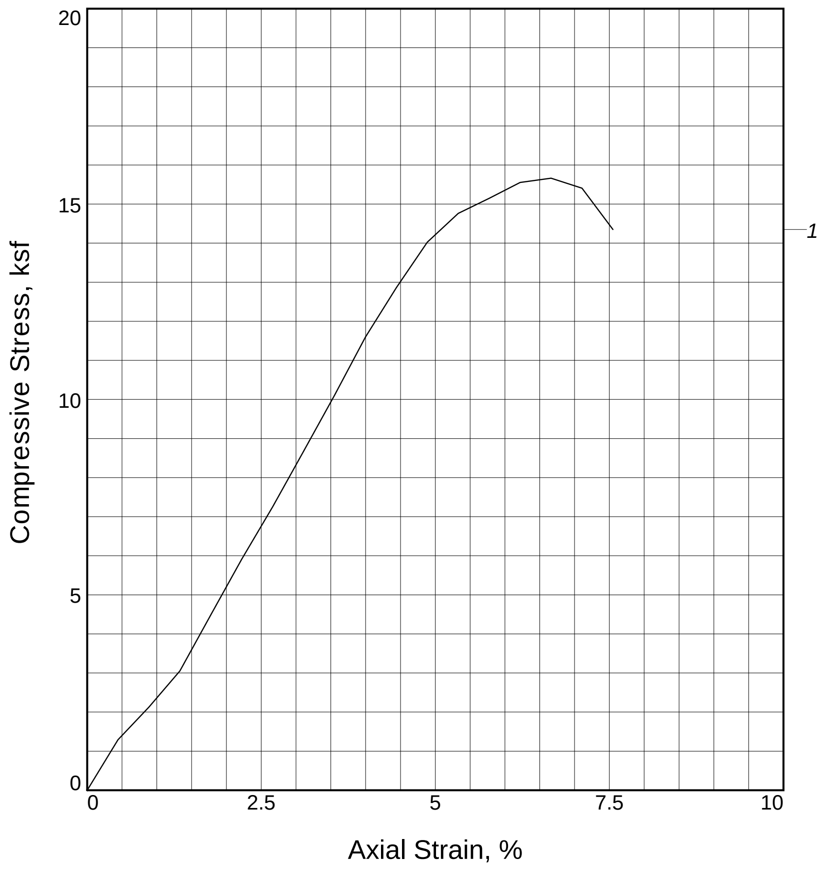
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 79-81 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	15.661			
Undrained shear strength, ksf	7.831			
Failure strain, %	6.7			
Strain rate, in./min.	0.050			
Water content, %	22.8			
Wet density, pcf	122.8			
Dry density, pcf	100.0			
Saturation, %	92.4			
Void ratio	0.6550			
Specimen diameter, in.	2.473			
Specimen height, in.	5.629			
Height/diameter ratio	2.28			

Description: Special

LL = 56	**PL =** 22	**PI =** 34	**Assumed GS=** 2.65	**Type:** CH

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 43

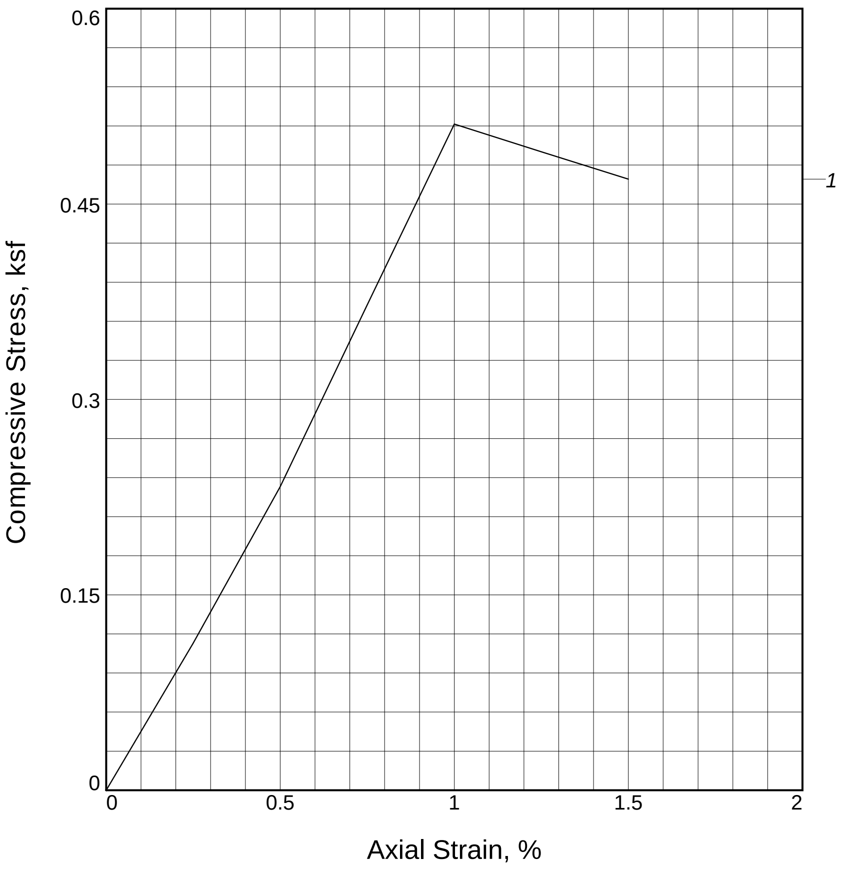
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 99-102 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.511			
Undrained shear strength, ksf	0.256			
Failure strain, %	1.0			
Strain rate, in./min.	0.030			
Water content, %	4.5			
Wet density, pcf	109.9			
Dry density, pcf	105.2			
Saturation, %	20.8			
Void ratio	0.5722			
Specimen diameter, in.	2.710			
Specimen height, in.	6.000			
Height/diameter ratio	2.21			

Description: grab

LL = NV **PL =** NV **PI =** NV **Assumed GS=** 2.65 **Type:** SP

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 44

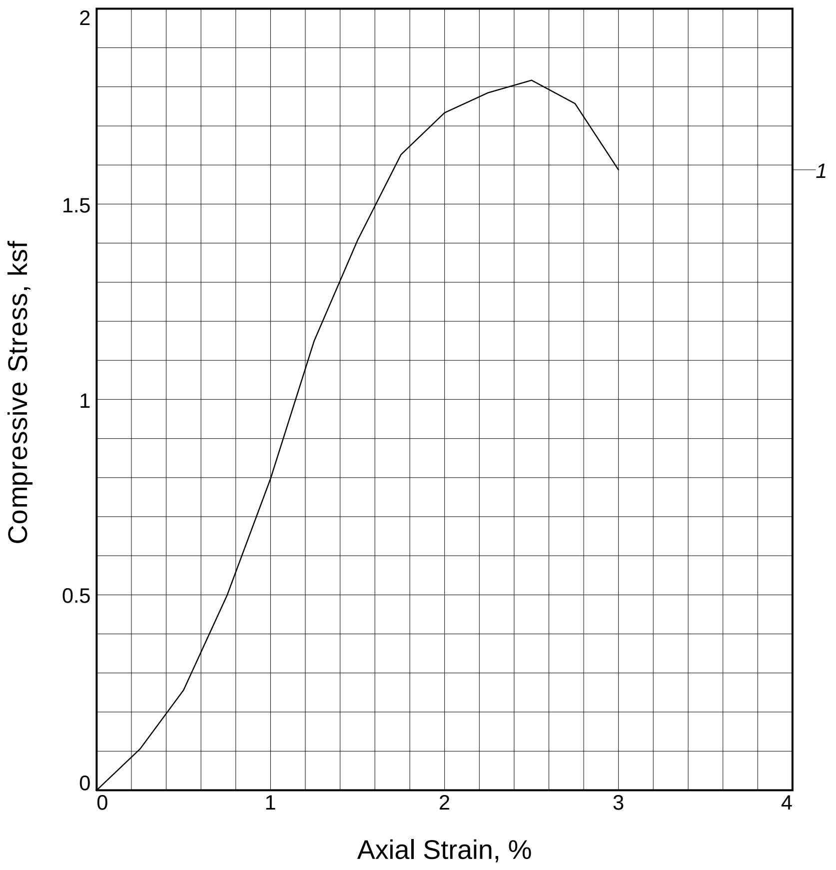
Project: Pickles Butte

Source of Sample: B2021-7

Depth: 39-40 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.817			
Undrained shear strength, ksf	0.908			
Failure strain, %	2.5			
Strain rate, in./min.	0.030			
Water content, %	19.9			
Wet density, pcf	112.4			
Dry density, pcf	93.8			
Saturation, %	68.9			
Void ratio	0.7646			
Specimen diameter, in.	2.800			
Specimen height, in.	6.000			
Height/diameter ratio	2.14			

Description: grab

LL = NV **PL =** NV **PI =** NV **Assumed GS=** 2.65 **Type:** ML

Project No.: 1145710402022

Date Sampled:

Remarks:

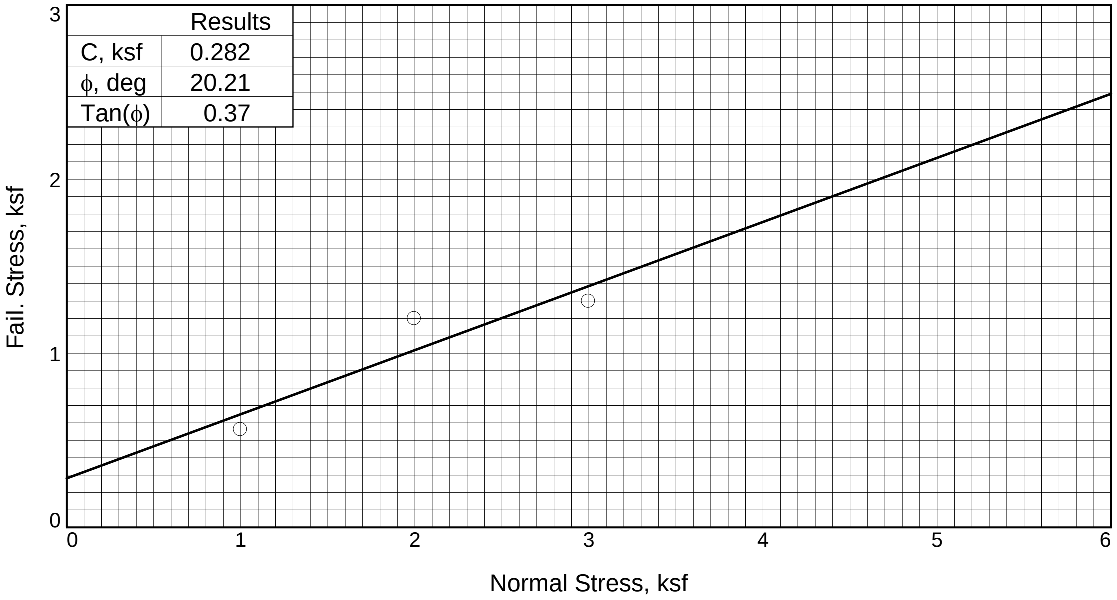
Figure 45

Project: Pickles Butte

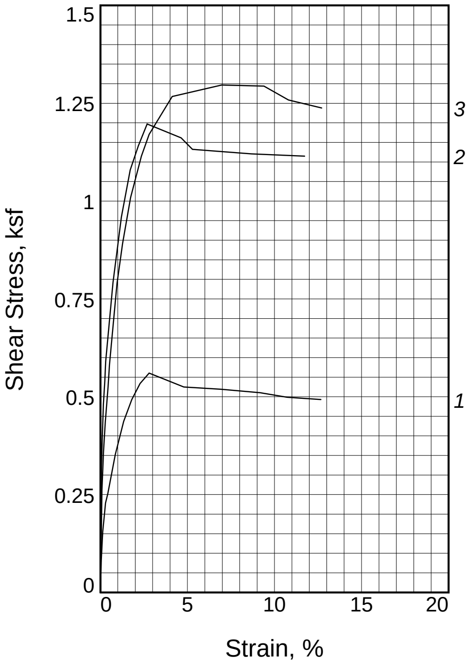
Source of Sample: B2021-7

Depth: 59-60 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT



	Results
C, ksf	0.282
ϕ, deg	20.21
Tan(ϕ)	0.37



	Sample No.	1	2	3
Initial	Water Content, %	12.2	11.6	12.3
	Dry Density, pcf	104.5	106.4	101.5
	Saturation, %	55.7	55.5	51.6
	Void Ratio	0.5829	0.5554	0.6306
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.210	1.200	1.259
At Test	Water Content, %	16.4	17.4	18.2
	Dry Density, pcf	104.6	106.6	104.8
	Saturation, %	74.7	83.4	83.5
	Void Ratio	0.5816	0.5524	0.5787
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.209	1.198	1.219
	Normal Stress, ksf	1.000	2.000	3.000
	Fail. Stress, ksf	0.560	1.197	1.297
	Strain, %	2.8	2.7	7.0
	Ult. Stress, ksf			
	Strain, %			
	Strain rate, in./min.	0.001	0.001	0.001

Sample Type: Shelby

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 46

Project: Pickles Butte

Source of Sample: B2021-3

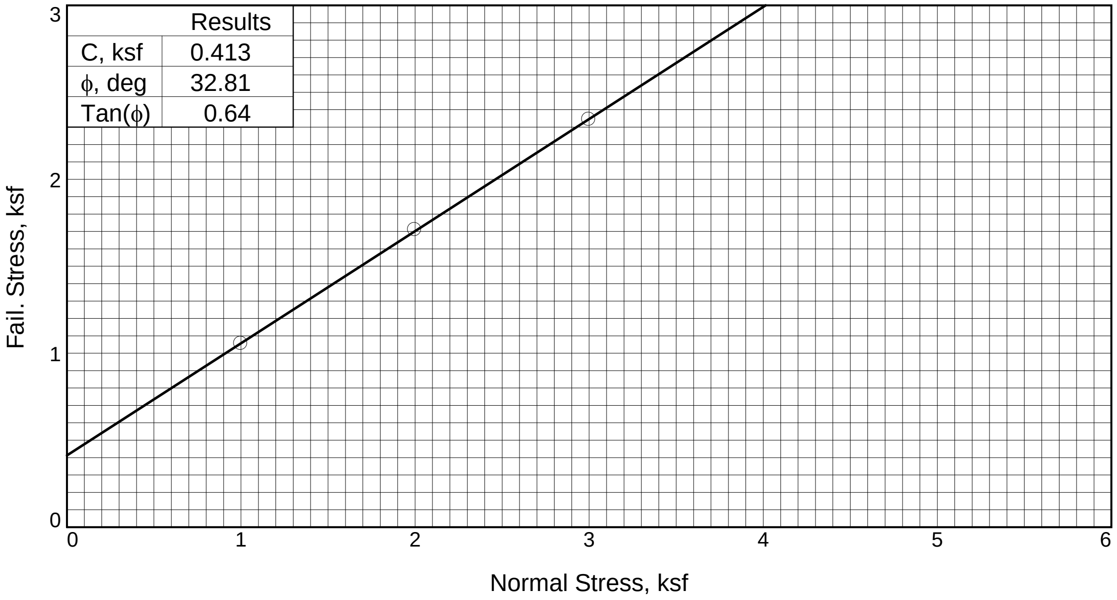
Proj. No.: 1145710402022 **Depth:** 60-62 ft

Date Sampled:

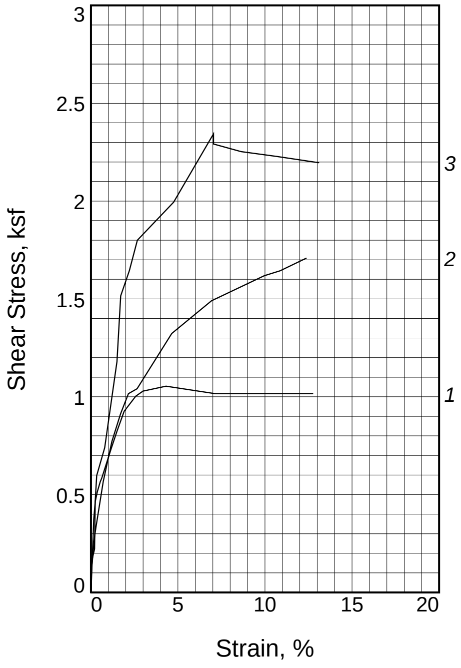
DIRECT SHEAR TEST REPORT

Tetra Tech

Missoula, MT



	Results
C, ksf	0.413
ϕ, deg	32.81
Tan(ϕ)	0.64



Sample No.		1	2	3
Initial	Water Content, %	13.7	12.8	13.0
	Dry Density, pcf	104.1	92.2	84.3
	Saturation, %	61.7	42.7	35.9
	Void Ratio	0.5892	0.7944	0.9626
	Diameter, in.	2.410	2.410	2.400
	Height, in.	0.934	1.068	1.240
At Test	Water Content, %	21.2	22.3	20.2
	Dry Density, pcf	105.2	96.7	84.8
	Saturation, %	98.1	83.1	56.4
	Void Ratio	0.5722	0.7104	0.9499
	Diameter, in.	2.410	2.410	2.400
	Height, in.	0.924	1.018	1.232
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		1.054	1.708	2.343
Strain, %		4.3	12.4	7.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Shelby

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 47

Project: Pickles Butte

Source of Sample: B2021-3

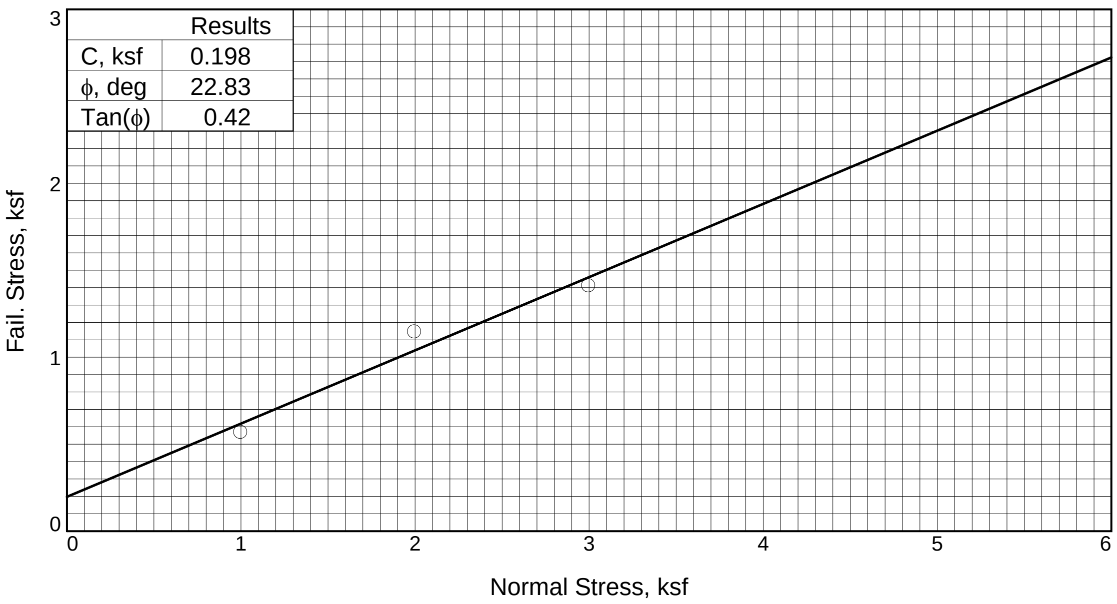
Proj. No.: 1145710402022 **Depth:** 80-82 ft

Date Sampled:

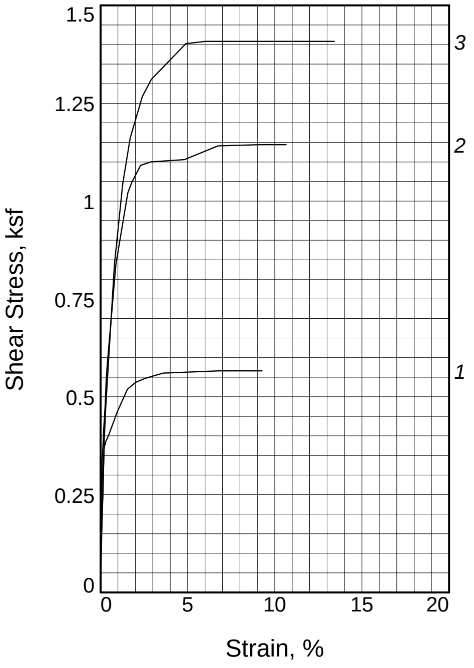
DIRECT SHEAR TEST REPORT

Tetra Tech

Missoula, MT



	Results
C, ksf	0.198
ϕ, deg	22.83
Tan(ϕ)	0.42



	Sample No.	1	2	3
Initial	Water Content, %	15.0	15.0	15.0
	Dry Density, pcf	97.7	89.6	96.1
	Saturation, %	57.4	47.0	55.1
	Void Ratio	0.6932	0.8458	0.7217
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.210	1.310	1.210
At Test	Water Content, %	29.0	29.5	28.0
	Dry Density, pcf	97.8	89.9	96.3
	Saturation, %	111.2	93.0	103.2
	Void Ratio	0.6910	0.8400	0.7180
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.208	1.306	1.207
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		0.566	1.144	1.408
Strain, %		6.8	9.2	6.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: MC

Description: Silty Sand

LL= NV **PI=** NP

Assumed Specific Gravity= 2.65

Remarks:

Figure 48

Project: Pickles Butte

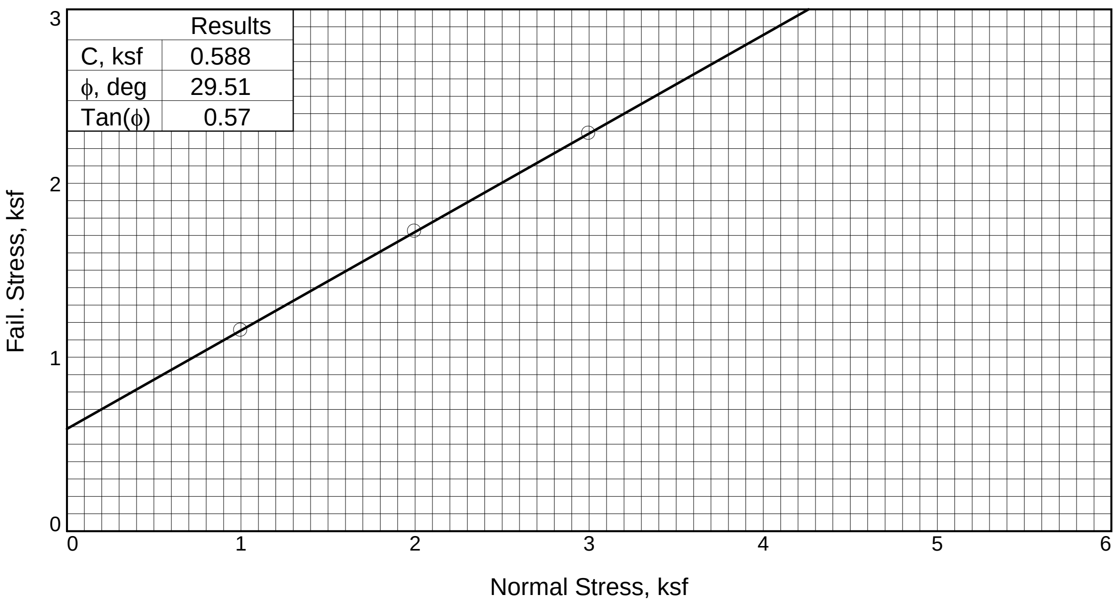
Source of Sample: B2021-4

Proj. No.: 1145710402022 **Depth:** 90-91.5 ft

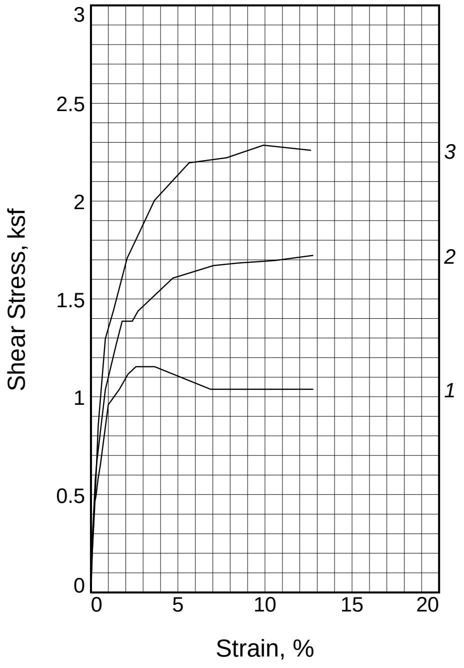
Date Sampled:

DIRECT SHEAR TEST REPORT

Tetra Tech
Missoula, MT



	Results
C, ksf	0.588
ϕ, deg	29.51
Tan(ϕ)	0.57



	Sample No.	1	2	3
Initial	Water Content, %	6.9	6.2	6.2
	Dry Density, pcf	89.6	94.1	95.0
	Saturation, %	21.8	21.8	22.3
	Void Ratio	0.8457	0.7582	0.7415
	Diameter, in.	2.400	2.400	2.410
	Height, in.	1.150	1.138	1.122
At Test	Water Content, %	28.7	27.7	25.8
	Dry Density, pcf	90.0	96.2	100.9
	Saturation, %	90.8	101.9	107.0
	Void Ratio	0.8377	0.7195	0.6390
	Diameter, in.	2.400	2.400	2.410
	Height, in.	1.145	1.113	1.056
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		1.153	1.723	2.285
Strain, %		2.6	12.8	9.9
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: MC
Description: Silty Sand

Assumed Specific Gravity= 2.65
Remarks: Remolded

Project: Pickles Butte

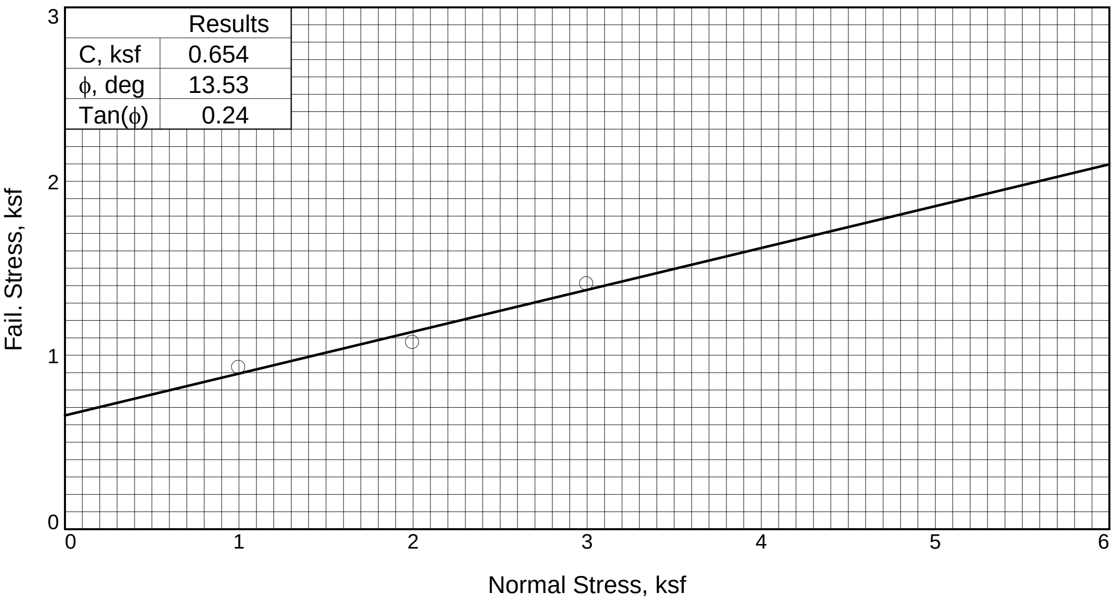
Source of Sample: B2021-4

Proj. No.: 1145710402022 **Depth:** 120-120.9 ft

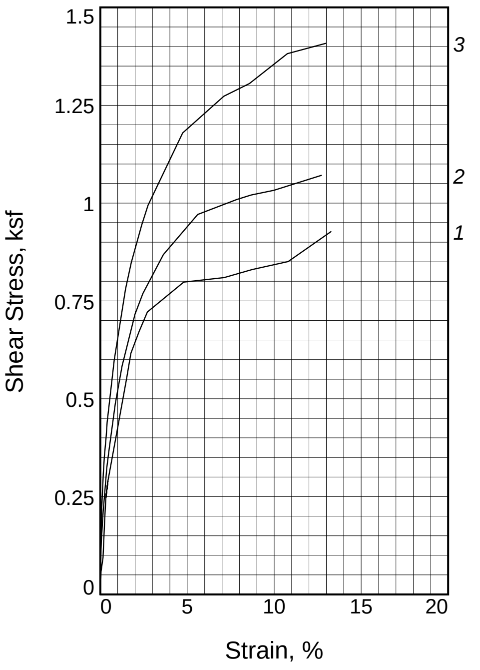
Date Sampled:

DIRECT SHEAR TEST REPORT
Tetra Tech
Missoula, MT

Figure 49



	Results
C, ksf	0.654
ϕ, deg	13.53
Tan(ϕ)	0.24



Sample No.		1	2	3
Initial	Water Content, %	11.3	11.3	11.2
	Dry Density, pcf	99.2	98.3	98.8
	Saturation, %	44.6	43.7	43.8
	Void Ratio	0.6682	0.6829	0.6750
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.200	1.190	1.206
At Test	Water Content, %	27.5	25.7	27.1
	Dry Density, pcf	101.9	102.9	102.0
	Saturation, %	117.0	112.1	115.6
	Void Ratio	0.6233	0.6075	0.6217
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.168	1.137	1.168
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		0.927	1.071	1.408
Strain, %		13.3	12.7	13.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: MC

Description: Lean Clay With Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 50

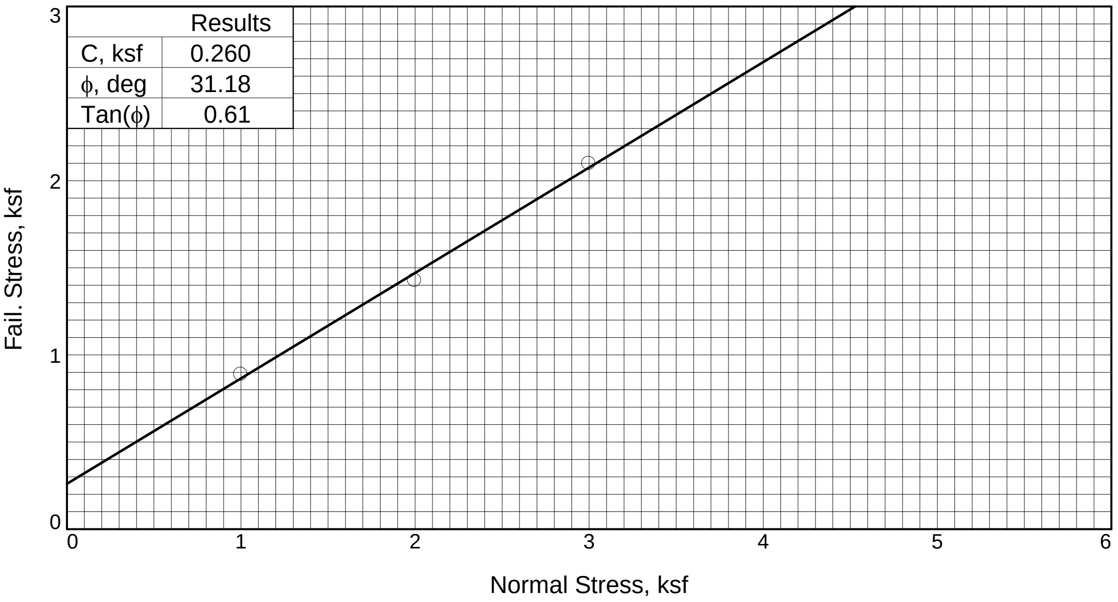
Project: Pickles Butte

Source of Sample: B2021-5

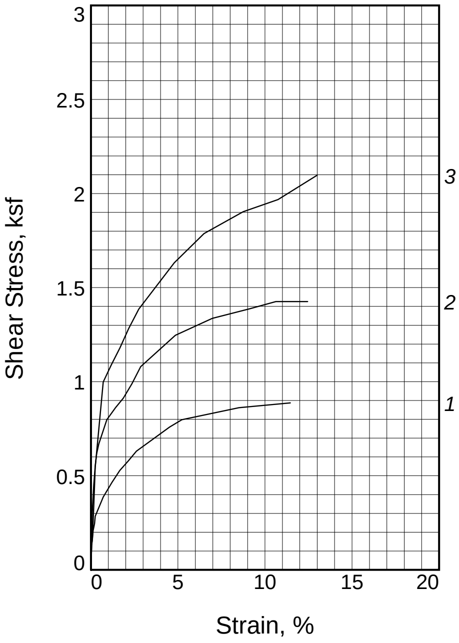
Proj. No.: 1145710402022 **Depth:** 80.0-81.5 ft

Date Sampled:

DIRECT SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.260
ϕ, deg	31.18
Tan(ϕ)	0.61



Sample No.		1	2	3
Initial	Water Content, %	18.0	18.2	18.3
	Dry Density, pcf	80.6	84.6	78.3
	Saturation, %	45.3	50.4	43.7
	Void Ratio	1.0522	0.9546	1.1118
	Diameter, in.	2.410	2.410	2.400
	Height, in.	1.240	1.190	1.250
At Test	Water Content, %	25.0	24.1	24.1
	Dry Density, pcf	82.7	87.5	82.3
	Saturation, %	66.2	71.7	63.1
	Void Ratio	1.0009	0.8905	1.0104
	Diameter, in.	2.410	2.410	2.400
	Height, in.	1.209	1.151	1.190
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		0.887	1.426	2.098
Strain, %		11.5	10.6	13.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: MC

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 51

Project: Pickles Butte

Source of Sample: B2021-5

Proj. No.: 1145710402022 **Depth:** 90-91.5 ft

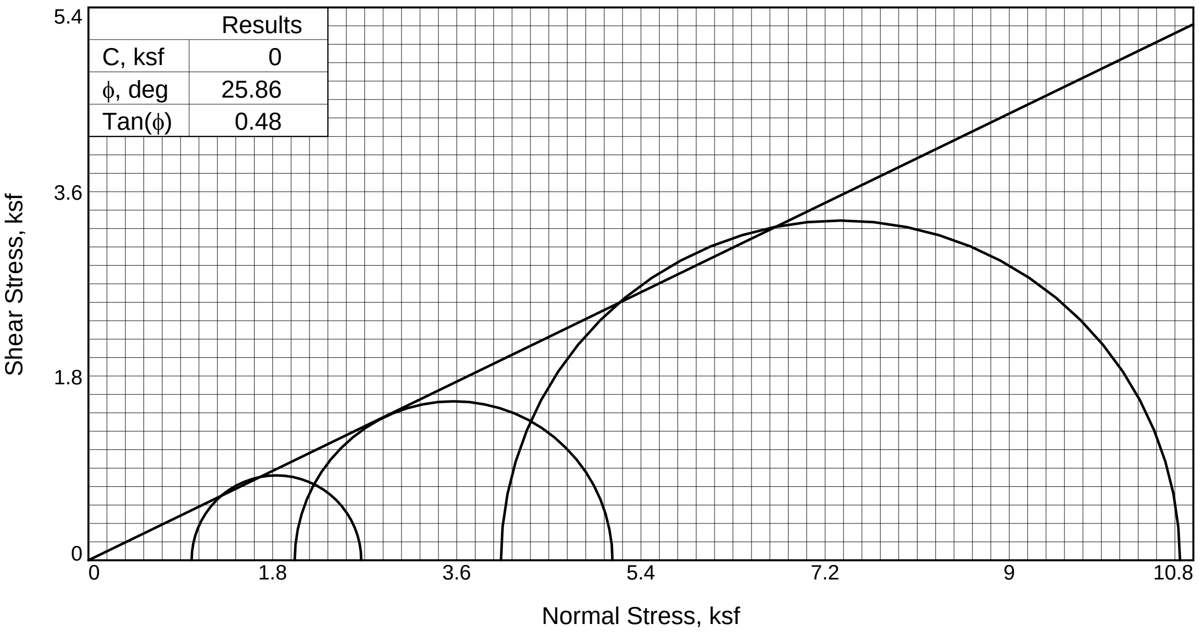
Date Sampled:

DIRECT SHEAR TEST REPORT

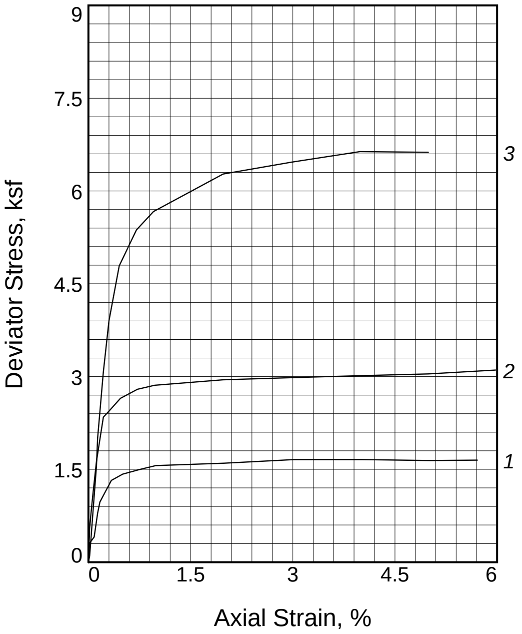
Tetra Tech

Missoula, MT

Tested By: DB **Checked By:** LP



	Results
C, ksf	0
ϕ, deg	25.86
Tan(ϕ)	0.48



	Sample No.	1	2	3
Initial	Water Content, %	5.0	5.0	5.0
	Dry Density, pcf	100.9	100.9	100.9
	Saturation, %	20.7	20.7	20.7
	Void Ratio	0.6394	0.6394	0.6394
	Diameter, in.	2.803	2.803	2.803
	Height, in.	6.001	6.001	6.001
At Test	Water Content, %	22.7	21.8	20.9
	Dry Density, pcf	101.4	102.9	104.6
	Saturation, %	95.4	95.2	95.0
	Void Ratio	0.6312	0.6074	0.5820
	Diameter, in.	2.803	2.869	2.945
	Height, in.	5.972	5.616	5.247
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	85.000	85.000	85.000
	Cell Pressure, psi	92.000	99.000	113.000
	Fail. Stress, ksf	1.66	3.11	6.64
	Ult. Stress, ksf			
	σ_1 Failure, ksf	2.67	5.12	10.67
	σ_3 Failure, ksf	1.01	2.02	4.03

Type of Test:
Consolidated Undrained

Description: Silty Sand

Assumed Specific Gravity=
2.65 **Remarks:**

Figure 52

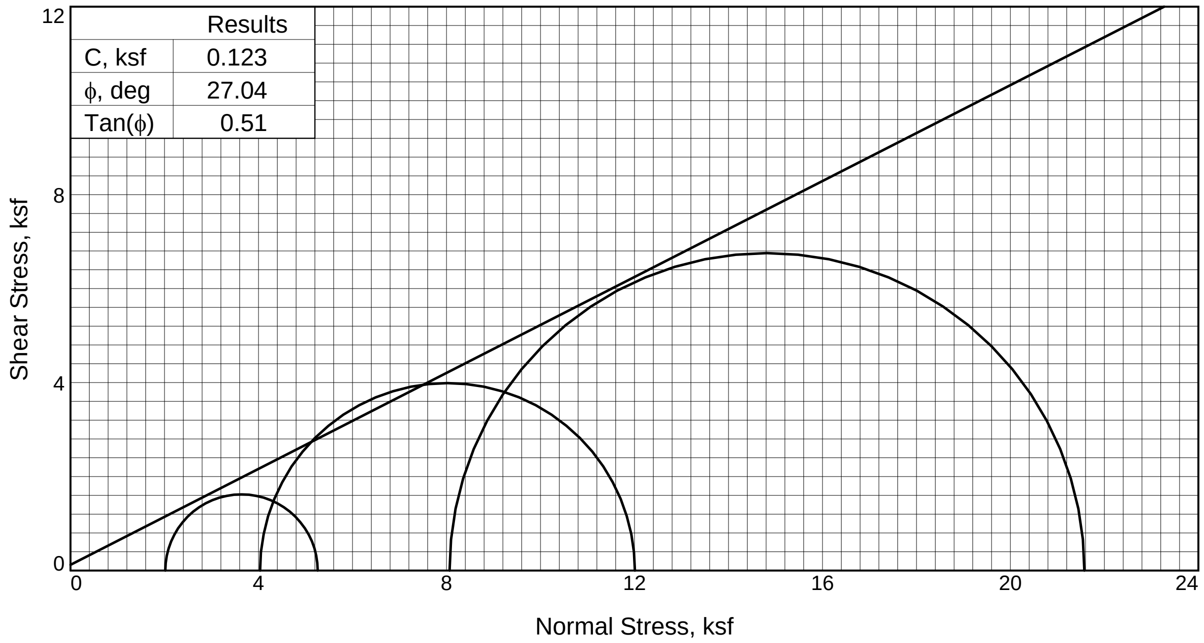
Project: Pickles Butte

Source of Sample: B2021-3

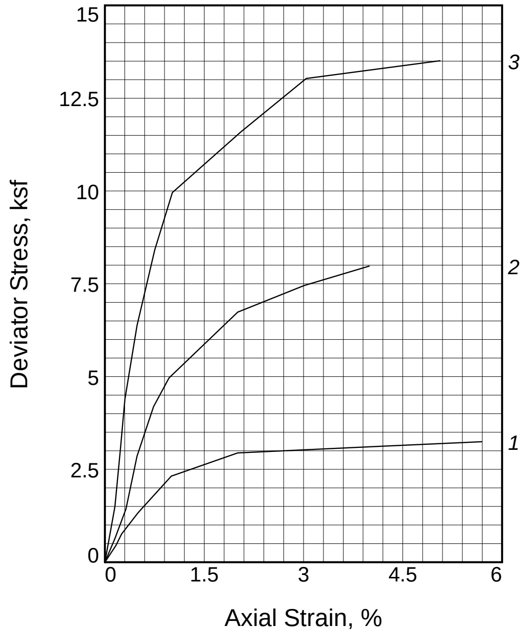
Proj. No.: 1145710402022 **Depth:** 25-27 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.123
ϕ, deg	27.04
Tan(ϕ)	0.51



	Sample No.	1	2	3
Initial	Water Content, %	5.0	5.0	5.0
	Dry Density, pcf	100.4	100.4	100.4
	Saturation, %	20.5	20.5	20.5
	Void Ratio	0.6481	0.6481	0.6481
	Diameter, in.	2.801	2.801	2.801
	Height, in.	6.001	6.001	6.001
At Test	Water Content, %	23.2	22.3	20.9
	Dry Density, pcf	100.7	102.2	104.5
	Saturation, %	95.5	95.3	95.0
	Void Ratio	0.6431	0.6195	0.5836
	Diameter, in.	2.800	2.865	2.895
	Height, in.	5.986	5.638	5.397
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	103.000	103.000	103.000
	Cell Pressure, psi	117.000	131.000	159.000
	Fail. Stress, ksf	3.24	7.98	13.51
	Ult. Stress, ksf			
	σ_1 Failure, ksf	5.26	12.01	21.57
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:

Consolidated Undrained

Description: Poorly Graded Sand with Silt

Assumed Specific Gravity= 2.65

Remarks:

Figure 53

Project: Pickles Butte

Source of Sample: B2021-4

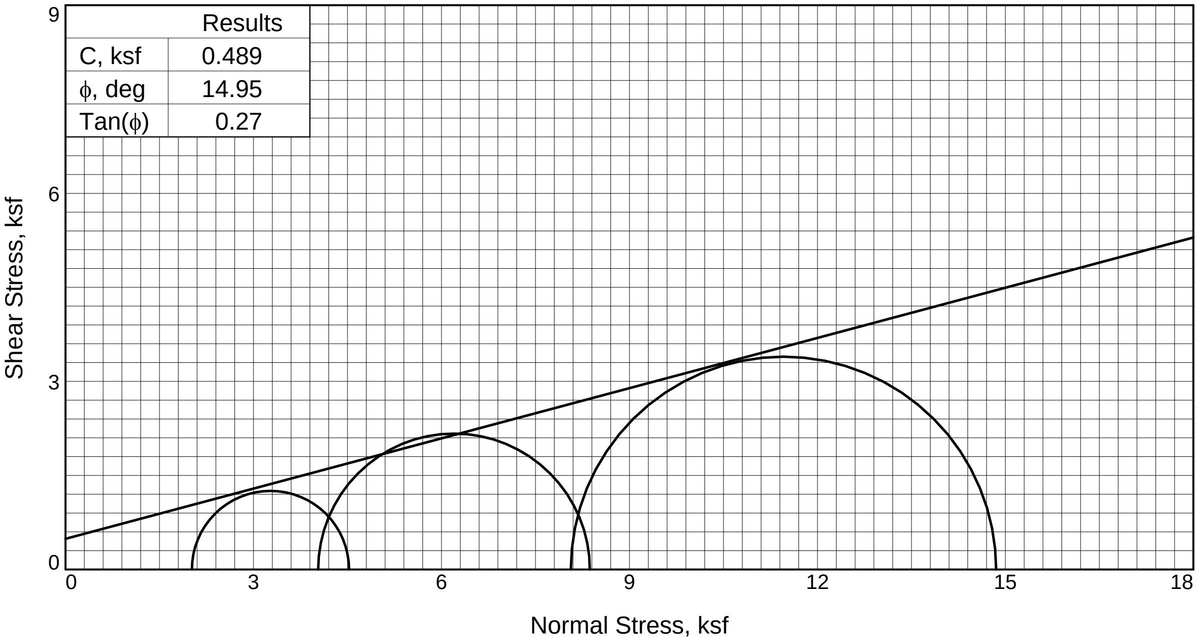
Proj. No.: 1145710402022 **Depth:** 50-51.5 ft

Date Sampled:

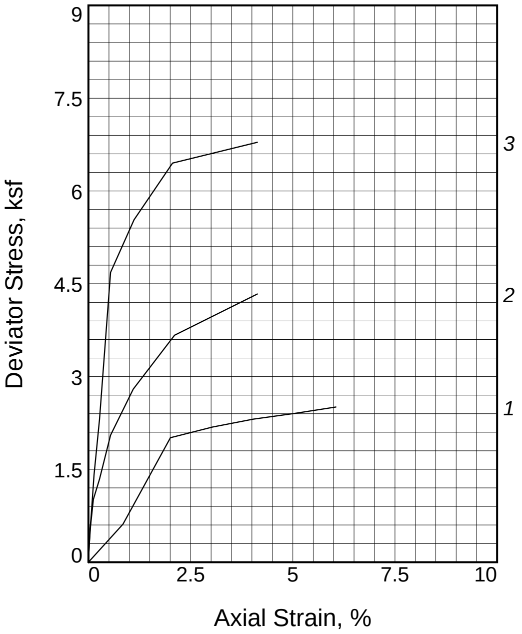
TRIAXIAL SHEAR TEST REPORT

Tetra Tech

Missoula, MT



	Results
C, ksf	0.489
ϕ, deg	14.95
Tan(ϕ)	0.27



	Sample No.	1	2	3
Initial	Water Content, %	23.0	23.0	23.0
	Dry Density, pcf	90.1	90.1	90.1
	Saturation, %	73.0	73.0	73.0
	Void Ratio	0.8354	0.8354	0.8354
	Diameter, in.	2.800	2.800	2.800
	Height, in.	6.030	6.030	6.030
At Test	Water Content, %	27.4	23.7	21.3
	Dry Density, pcf	95.2	100.9	104.9
	Saturation, %	98.4	98.2	98.0
	Void Ratio	0.7372	0.6404	0.5770
	Diameter, in.	2.747	2.776	2.793
	Height, in.	5.930	5.481	5.206
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	63.000	63.000	63.000
	Cell Pressure, psi	77.000	91.000	119.000
	Fail. Stress, ksf	2.51	4.34	6.79
	Ult. Stress, ksf			
	σ_1 Failure, ksf	4.52	8.37	14.85
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:
Consolidated Undrained

Description: Silty Clay

Assumed Specific Gravity= 2.65

Remarks:

Figure 54

Project: Pickles Butte

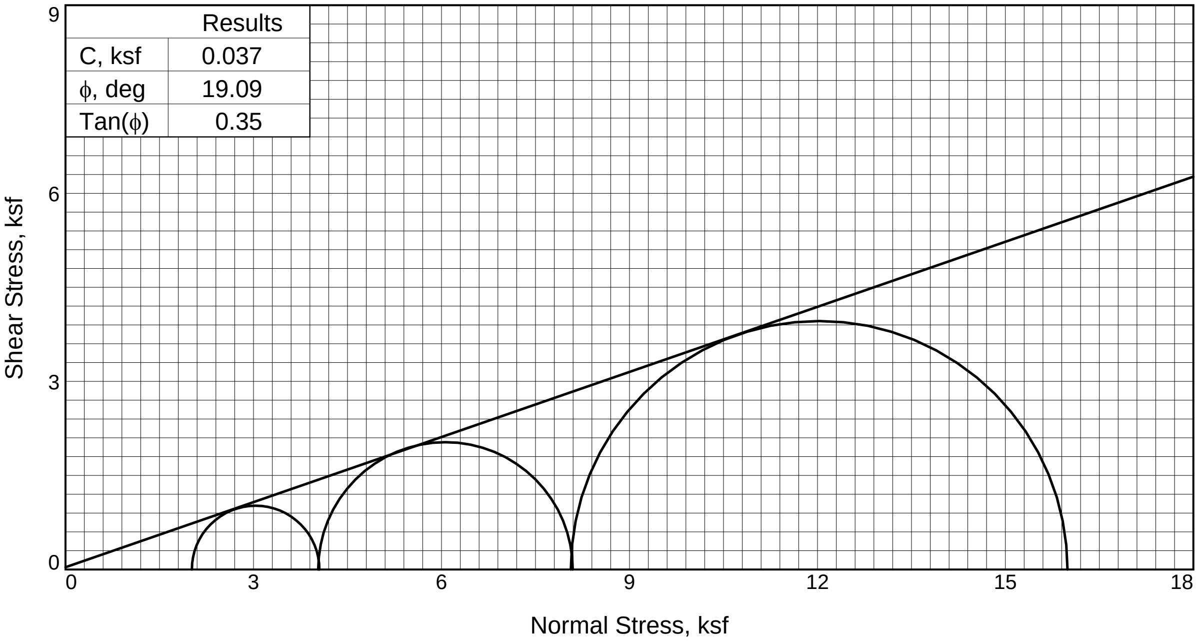
Source of Sample: B2021-5

Proj. No.: 1145710402022

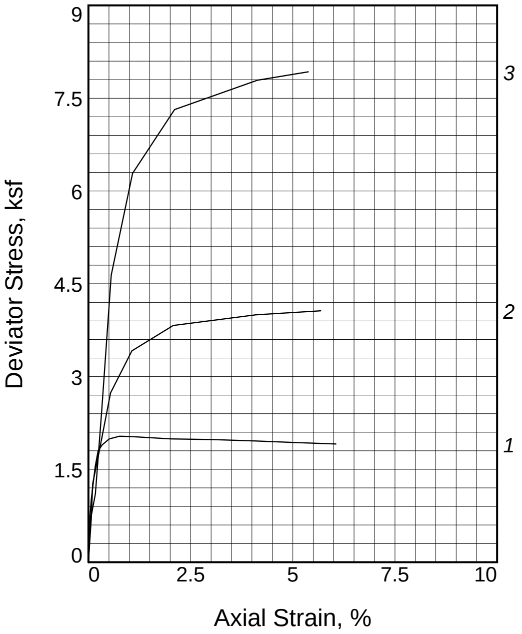
Depth: 50-51.5 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.037
ϕ, deg	19.09
Tan(ϕ)	0.35



	Sample No.	1	2	3
Initial	Water Content, %	16.2	16.2	16.2
	Dry Density, pcf	101.9	101.9	101.9
	Saturation, %	69.1	69.1	69.1
	Void Ratio	0.6231	0.6231	0.6231
	Diameter, in.	2.790	2.790	2.790
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	22.2	21.2	19.2
	Dry Density, pcf	102.4	104.1	107.8
	Saturation, %	95.7	95.5	95.0
	Void Ratio	0.6160	0.5892	0.5344
	Diameter, in.	2.800	2.873	2.924
	Height, in.	5.930	5.541	5.164
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	53.000	53.000	53.000
	Cell Pressure, psi	67.000	81.000	109.000
	Fail. Stress, ksf	2.03	4.06	7.93
	Ult. Stress, ksf			
	σ_1 Failure, ksf	4.05	8.09	15.99
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:
Consolidated Undrained

Description: Silt

Assumed Specific Gravity= 2.65

Remarks:

Figure 55

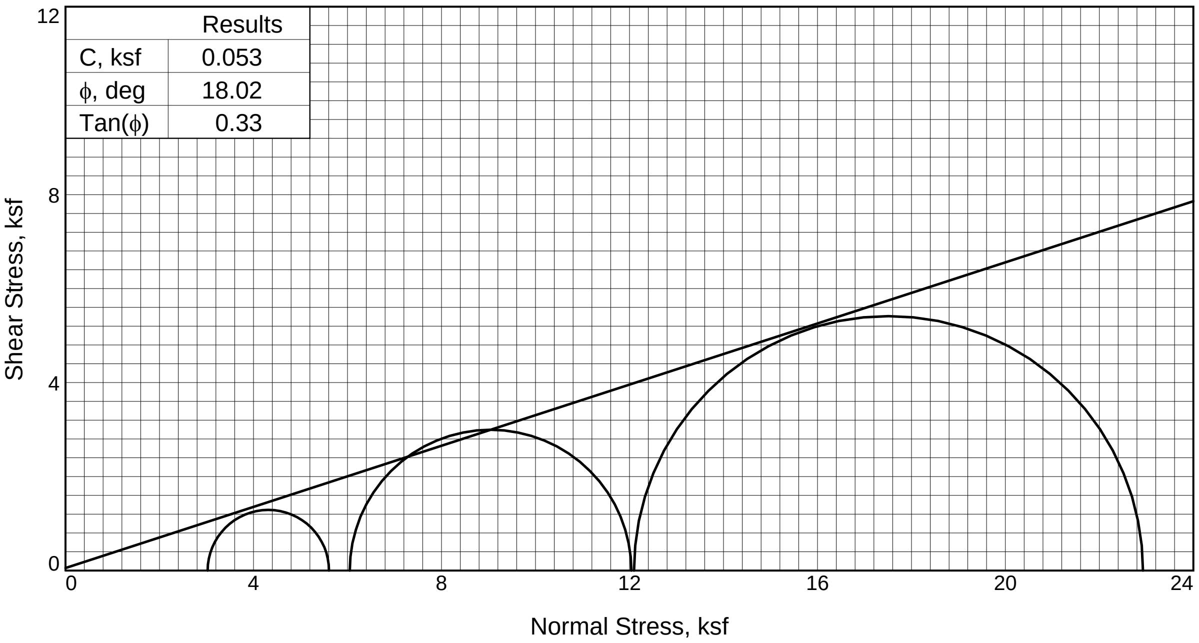
Project: Pickles Butte

Source of Sample: B2021-5

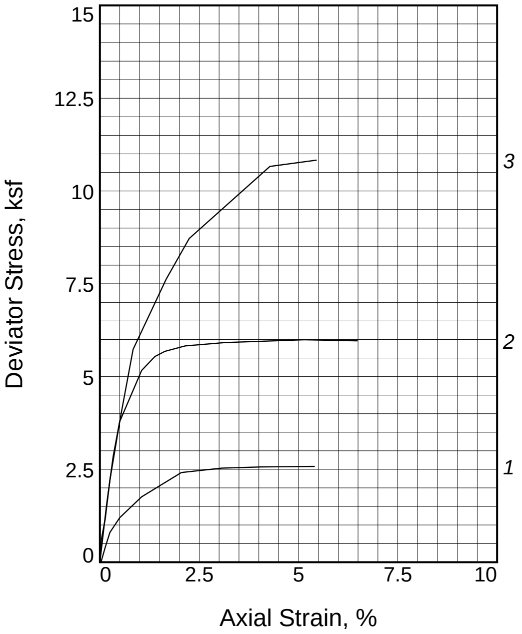
Proj. No.: 1145710402022 **Depth:** 69-70 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.053
ϕ, deg	18.02
Tan(ϕ)	0.33



	Sample No.	1	2	3
Initial	Water Content, %	18.1	18.1	18.1
	Dry Density, pcf	85.7	85.7	85.7
	Saturation, %	51.4	51.4	51.4
	Void Ratio	0.9314	0.9314	0.9314
	Diameter, in.	2.801	2.801	2.801
	Height, in.	6.020	6.020	6.020
At Test	Water Content, %	24.5	24.5	24.5
	Dry Density, pcf	98.3	98.3	98.3
	Saturation, %	95.0	95.0	95.0
	Void Ratio	0.6826	0.6826	0.6826
	Diameter, in.	2.618	2.694	2.795
	Height, in.	6.004	5.670	5.268
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	65.000	65.000	65.000
	Cell Pressure, psi	86.000	107.000	149.000
	Fail. Stress, ksf	2.58	5.99	10.83
	Ult. Stress, ksf			
	σ_1 Failure, ksf	5.61	12.04	22.93
	σ_3 Failure, ksf	3.02	6.05	12.10

Type of Test:
Consolidated Undrained

Description: Clay

Assumed Specific Gravity= 2.65

Remarks:

Project: Pickles Butte

Source of Sample: B2021-7

Proj. No.: 1145710402022 **Depth:** 120-121.3 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT

Figure 56

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	0 - 1.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	2 - 3.5										9										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	-		NV	NP		99.6	83.1	11.6	110	109.9		10.5									
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	4 - 5.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	6 - 7.5										8										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	8 - 9.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	10 - 11.5										6										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	15 - 16.5										5										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	20 - 21.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	25 - 27		NV	NP		99.9	94.7	6.2	113								0.03				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	27 - 28.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	30 - 31.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	0 - 1.5										7										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	2 - 3.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	4 - 5.5										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	6 - 7.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	8 - 9.5										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	10 - 11.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	15 - 16.5										5										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	20 - 21										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	25 - 26.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	30 - 31.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	5 - 6.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	10 - 11.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	15 - 16.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	20 - 21.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	25 - 27		NV	NP		99.8	97.7	31.3					25.86	0			0.04				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	26 - 30																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	27 - 28.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	30 - 31.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	35 - 36.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	40 - 41.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	45 - 46.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	50 - 51.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	60 - 62		NV	NP		99.4	97.9	19.2					20.21	0.282							
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	61 - 65		NV	NP		99.6	99.1	7.7	100	100.2		13.7			0.143						
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	70 - 71.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	80 - 82		NV	NP		99.8	99.1	23.6					32.81	0.413							
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	82 - 83.5										2										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	90 - 91.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	100 - 100.2																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	101 - 107																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	110 - 110.7																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	112 - 115																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	116 - 120		NV	NP		86.4	81.7	16.1	104	103.6		15.75									
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	121 - 121.8										4										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	135 - 138																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	139 - 142																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	140 - 141.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	147 - 151																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	150 - 151.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	159 - 161																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	160 - 161.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	5 - 6.5										6										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	9 - 10																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	10 - 11.5																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	15 - 16.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	20 - 21.5										5										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	25 - 26.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	30 - 31.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	35 - 36.5										8										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	40 - 41.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	44 - 45																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	45 - 46.5										16										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	50 - 51.5		NV	NP		100	91.9	6.3					27.04	0.123							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	51 - 52																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	60 - 61.5										2										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	69 - 70																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	70 - 71.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	79 - 80																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	80 - 81.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	89 - 90																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	90 - 91.5		NV	NP		99	96	38.4					22.83	0.198							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	98 - 99																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	99 - 100.5										22										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	109 - 110																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	110 - 111.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	119 - 120																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	120 - 120.9		NV	NP		100	98.1	49					29.51	0.588							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	129 - 130																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	130 - 131.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	139 - 140																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	140 - 141.5										2										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	149 - 150																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	150 - 150.9																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	157 - 159																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	160 - 160.9																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	169 - 170																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	170 - 170.8																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	175 - 177																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	179 - 180																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	189 - 190																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	5 - 6.5										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	9 - 10																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	10 - 11.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	15 - 16.5										3										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	19 - 20																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	20 - 21.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	27 - 28																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	30 - 31.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	35 - 36.5										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	39 - 40																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	40 - 41																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	45 - 46.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	49 - 50																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	50 - 51.5		54	30									14.95	0.489			0.06				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	59 - 60																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	60 - 60.6										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	69 - 70		NV	NP		99.9	99.3	77.1	112	111.5		15.5	19.09	0.037							
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	70 - 71.5										29										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	79 - 80																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	80 - 81.5		35	14	0.000	98.5	95.9	83.4	104	103.5	21	19.5	31.18	0.26							

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	89 - 90																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	90 - 90.8		NV	NP			98.8	33.8					13.53	0.654							
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	99 - 100										11										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	100 - 101.3																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	109 - 110																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	110 - 110.6																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	119 - 120																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	120 - 121.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	126 - 127																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	130 - 131.4																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	139 - 140																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	140 - 140.9																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	149 - 150																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	150 - 151.4																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	159 - 160																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	160 - 160.6																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	169 - 170																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	170 - 171.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	174 - 175																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	179 - 180																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	189 - 190																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	199 - 200																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	204 - 205																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	209 - 210																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	5 - 6.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	9 - 11																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	10 - 11.5										6										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	20 - 21.5																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022 **PROJECT NAME** Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	25 - 26.5										18										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	39 - 41																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	40 - 41.5										22										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	45 - 46.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	50 - 51.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	57 - 58														7.246						
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	59 - 61																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	60 - 61.5										25										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	68 - 69																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	69 - 71																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	70 - 71.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	75 - 76																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	79 - 81		67	48			99.8	90.7													
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	80 - 81.1																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	84 - 85																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	89 - 91																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	90 - 91.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	99 - 102		56	34			99.8	89.7							15.661						
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	100 - 101.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	106 - 107		47	25		99.2	97.6	80.8	100	100		20.5									
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	110 - 111.5										21										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	120 - 121.5										22										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	129 - 130																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	130 - 131.3																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	140 - 141.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	149 - 150																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	150 - 151.4																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	159 - 160																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	160 - 161.3																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	164 - 165																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	5 - 6.5										4										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	10 - 11.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	15 - 16.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	19 - 20																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	25 - 26.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	30 - 30.6																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	35 - 35.8																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	39 - 40		NV	NP		93.6	92	23.3	112	111.7		12.9			0.511						
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	40 - 41.4										23										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	45 - 46.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	49 - 50																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	50 - 51.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	59 - 60		NV	NP		99.9	98.9	84.3	104	104.2		17.8			1.817						
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	60 - 61.4										12										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	69 - 70																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	70 - 71.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	79 - 80																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	80 - 80.7																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	89 - 90																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	90 - 90.3																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	99 - 100																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	100 - 101.5										20										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	110 - 111.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	120 - 121.3		33	10									18.02	0.053			0.38				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	125 - 126																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	129 - 130																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	130 - 131.5										19										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	139 - 140																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	140 - 141.5										24										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	149 - 150																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	150 - 151.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	160 - 161.4																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	169 - 170																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	170 - 171.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	179 - 180																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	189 - 190																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	199 - 200																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	0 - 1.5										11										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	1 - 4		NV	NP		98.7	95.6	83.5	97	97.2		17.9									
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	2 - 3.5																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	4 - 5.5										11										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	8 - 10										12										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	10 - 11.5										6										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	11 - 15																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	15 - 16.5										5										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	20 - 21.5										5										

IAS LABORATORIES

2515 East University Drive
Phoenix, AZ 85034
Office: (602) 273-7248
Fax: (602) 275-3836
www.iaslabs.com

November 15, 2022

Maureen McGraw
Tetra Tech
3822 E University
Phoenix, AZ 85034

Project: Pickles Butte Landfill

Enclosed are the results of analyses for samples received by our laboratory on 10/17/2022. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sheri McLane
Certified Professional Agronomist
Certified Crop Advisor
License #359920

Date Received: October 17, 2022
Work Order: 22J0250
Submitted By: Maureen McGraw
Report To: Tetra Tech
Project: Pickles Butte Landfill

Sample Results

Sample Name: PBSL-TP-3 (2-3)
IAS Lab ID: 22J0250-01 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar) **Time Analyzed:** 11/1/2022 3:09:18PM	35.2	<0.01	%	ASTM D6836
SMR - (2 Bar) **Time Analyzed:** 11/4/2022 5:16:09PM	11.5	<0.01	%	ASTM D6836
SMR - (5 Bar) **Time Analyzed:** 11/8/2022 10:31:13AM	10.1	<0.01	%	ASTM D6836
SMR - (10 Bar) **Time Analyzed:** 11/4/2022 5:17:26PM	9.73	<0.01	%	ASTM D6836
SMR - Wilting Point (15 Bar) **Time Analyzed:** 11/1/2022 3:11:10PM	8.85	<0.01	%	ASTM D6836
Physical Properties				
Porosity **Time Analyzed:** 10/28/2022 4:47:45PM	48.44	<0.01	%	Methods of Soil Analysis - ASA/SSSA

MRL: Minimum Reporting Limit

ND: None Detected

Sample Results

Sample Name: PBSL-TP-4 (4-5)
IAS Lab ID: 22J0250-02 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	37.6	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	9.78	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:16:09PM				
SMR - (5 Bar)	8.34	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:31:13AM				
SMR - (10 Bar)	6.65	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:17:26PM				
SMR - Wilting Point (15 Bar)	6.10	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	51.82	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

Date Received:	October 17, 2022	**Submitted By:**	Maureen McGraw
Work Order:	22J0250	**Report To:**	Tetra Tech
		Project:	Pickles Butte Landfill

Sample Results

Sample Name: PBSL-TP-7 (5-4)
IAS Lab ID: 22J0250-03 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	36.3	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	8.51	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:16:09PM				
SMR - (5 Bar)	7.07	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:31:13AM				
SMR - (10 Bar)	7.05	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:17:26PM				
SMR - Wilting Point (15 Bar)	6.60	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	48.67	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

Sample Results

Sample Name: PBSL-TP-9 (4-8)
IAS Lab ID: 22J0250-04 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	41.6	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	9.61	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:16:09PM				
SMR - (5 Bar)	8.39	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:31:13AM				
SMR - (10 Bar)	7.37	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:17:26PM				
SMR - Wilting Point (15 Bar)	7.15	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	53.14	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

Sample Results

Sample Name: PBSL-TP-10 (5-6)
IAS Lab ID: 22J0250-05 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	37.4	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	10.1	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:16:09PM				
SMR - (5 Bar)	8.87	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:31:13AM				
SMR - (10 Bar)	8.69	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:17:26PM				
SMR - Wilting Point (15 Bar)	8.43	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	49.85	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

Sample Results

Sample Name: PBSL-TP-14 (4-5)
IAS Lab ID: 22J0250-06 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	36.6	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	12.0	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:16:09PM				
SMR - (5 Bar)	10.2	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:31:13AM				
SMR - (10 Bar)	9.73	<0.01	%	ASTM D6836
Time Analyzed: 11/4/2022 5:17:26PM				
SMR - Wilting Point (15 Bar)	10.8	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	50.86	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

Sample Results

Sample Name: PBSL-TP-16 (4-8)
IAS Lab ID: 22J0250-07 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar) **Time Analyzed:** 11/1/2022 3:09:18PM	40.8	<0.01	%	ASTM D6836
SMR - (2 Bar) **Time Analyzed:** 11/4/2022 5:16:09PM	11.4	<0.01	%	ASTM D6836
SMR - (5 Bar) **Time Analyzed:** 11/8/2022 10:31:13AM	9.95	<0.01	%	ASTM D6836
SMR - (10 Bar) **Time Analyzed:** 11/4/2022 5:17:26PM	9.72	<0.01	%	ASTM D6836
SMR - Wilting Point (15 Bar) **Time Analyzed:** 11/1/2022 3:11:10PM	8.11	<0.01	%	ASTM D6836
Physical Properties				
Porosity **Time Analyzed:** 10/28/2022 4:47:45PM	53.68	<0.01	%	Methods of Soil Analysis - ASA/SSSA

MRL: Minimum Reporting Limit

ND: None Detected

Date Received:	October 17, 2022	**Submitted By:**	Maureen McGraw
Work Order:	22J0250	**Report To:**	Tetra Tech
		Project:	Pickles Butte Landfill

Sample Results

Sample Name: PBSL-TP-17 (1-3)
IAS Lab ID: 22J0250-08 (Soil)

	Result	MRL	Units	Method
Chemical Properties				
SMR - Field Capacity (1/3 Bar)	37.7	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:09:18PM				
SMR - (2 Bar)	8.28	<0.01	%	ASTM D6836
Time Analyzed: 11/8/2022 10:45:44AM				
SMR - (5 Bar)	7.49	<0.01	%	ASTM D6836
Time Analyzed: 11/11/2022 12:28:41PM				
SMR - (10 Bar)	7.15	<0.01	%	ASTM D6836
Time Analyzed: 11/15/2022 11:11:48AM				
SMR - Wilting Point (15 Bar)	6.96	<0.01	%	ASTM D6836
Time Analyzed: 11/1/2022 3:11:10PM				
Physical Properties				
Porosity	51.15	<0.01	%	Methods of Soil Analysis - ASA/SSSA
Time Analyzed: 10/28/2022 4:47:45PM				

MRL: Minimum Reporting Limit

ND: None Detected

RECEIVED
OCT 17 2022
By__________

22J0250

IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Chain of Custody

(Print and send in with Samples)

Date 12 October 2022
Time

Name Maureen A. McGraw, Tetra Tech
Address 3380 Americana Terrace, Suite 201
Boise, ID 83706

Email: maureen.mcgraw@tetratech.com
Phone 406-546-7839

Sample ID	Sample Description (What are your concerns)	Lab No	Test Required
PBSL-TP-3 (2-3)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-4 (4-5)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-7 (5-4)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-9 (4-8)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-10 (5-6)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-14 (4-5)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-16 (4-8)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity
PBSL-TP-17 (1-3)	Landfill cover material evaluation		Capillary Rise (field capacity & wilting point), porosity

Method of Shipment

Relinquished by: Maureen A. McGraw

Payment
Paypal, CC#, Check #

Print Name: Maureen A. McGraw

IAS Labs

From: McGraw, Maureen <Maureen.McGraw@tetratech.com>
Sent: Friday, October 14, 2022 9:32 AM
To: IAS Labs
Subject: Pickles Butte Landfill Samples
Attachments: PBSL Cover Soil IAS COC 111222.pdf

Hi Shari,

I wanted to let you know that we shipped soil samples to you yesterday that are expected to arrive on Monday the 17th. There are 8 samples for Pickles Butte Landfill. I have attached the COC to the email. Similar for Bear Lake and IDAWY, the invoice for these samples should come to me. Please let me know if you need anything else.

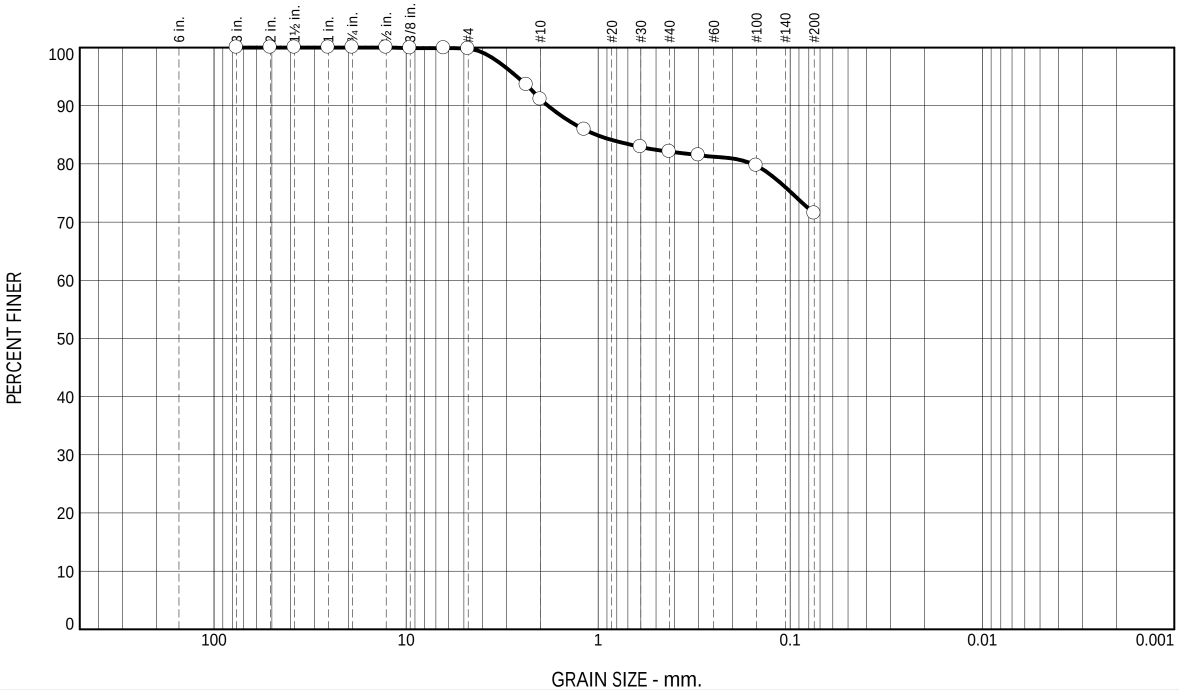
Maureen

Maureen McGraw, Ph.D., PE (ID, MT, NM) | Project Manager/Senior Engineer
406.546.7839 Cell, 208.389.1030 Office, 208.489.2826 Direct
maureen.mcgraw@tetratech.com

Tetra Tech | *Leading with Science®* | Environmental Commercial Accounts (ECA)
3380 Americana Terrace, Suite 201 | Boise, ID 83706 | www.tetratech.com

TETRA TECH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	8.7	9.0	10.6	71.5	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	99.9		
.25	99.9		
#4	99.8		
#8	93.6		
#10	91.1		
#16	85.9		
#30	82.9		
#40	82.1		
#50	81.5		
#100	79.7		
#200	71.5		

* (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 1.8253 D_{85}= 1.0229

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 11-9-22 Technician: PL/AB

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

USCS (ASTM D2487)

ML

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-01
Depth: 2-3 ft

Tetra Tech

Missoula, MT

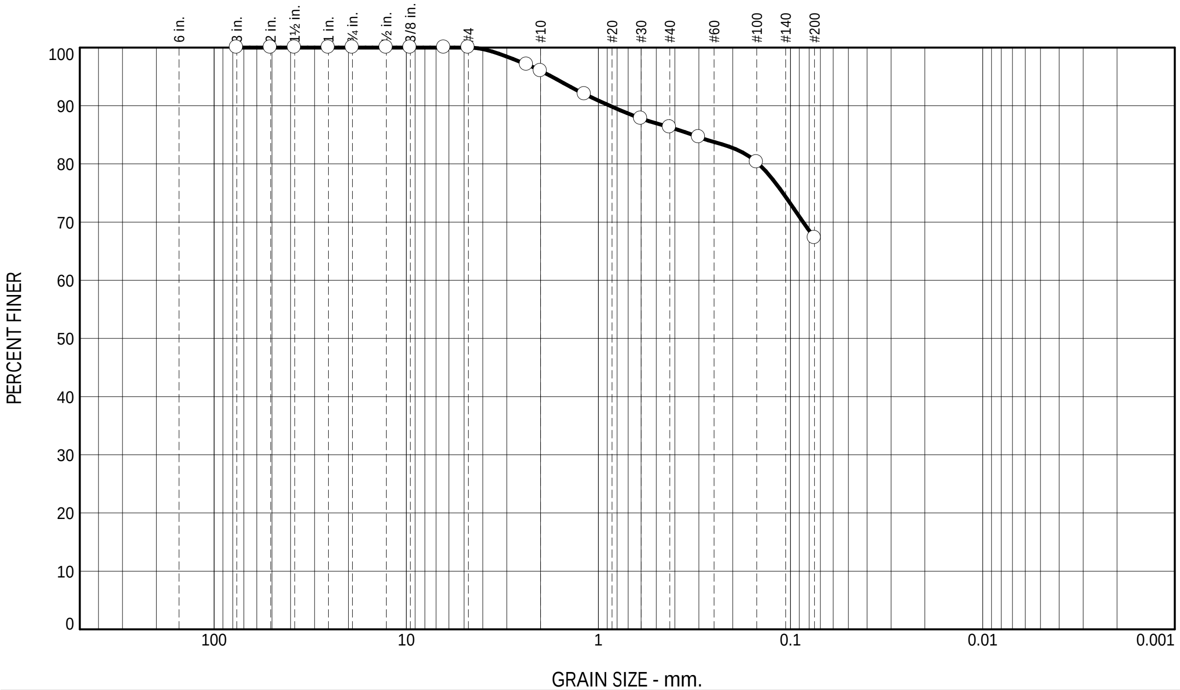
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	4.0	9.7	19.0	67.3	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	97.1		
#10	96.0		
#16	92.0		
#30	87.8		
#40	86.3		
#50	84.6		
#100	80.3		
#200	67.3		

· (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-10-22 Technician: PM

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Atterberg (ASTM D4318)

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.8735 D_{85}= 0.3234
D_{60}= D_{50}=
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

USCS (ASTM D2487)

ML

Date Sampled: ______
Date Received: ______
Checked By: LP
Title: ______

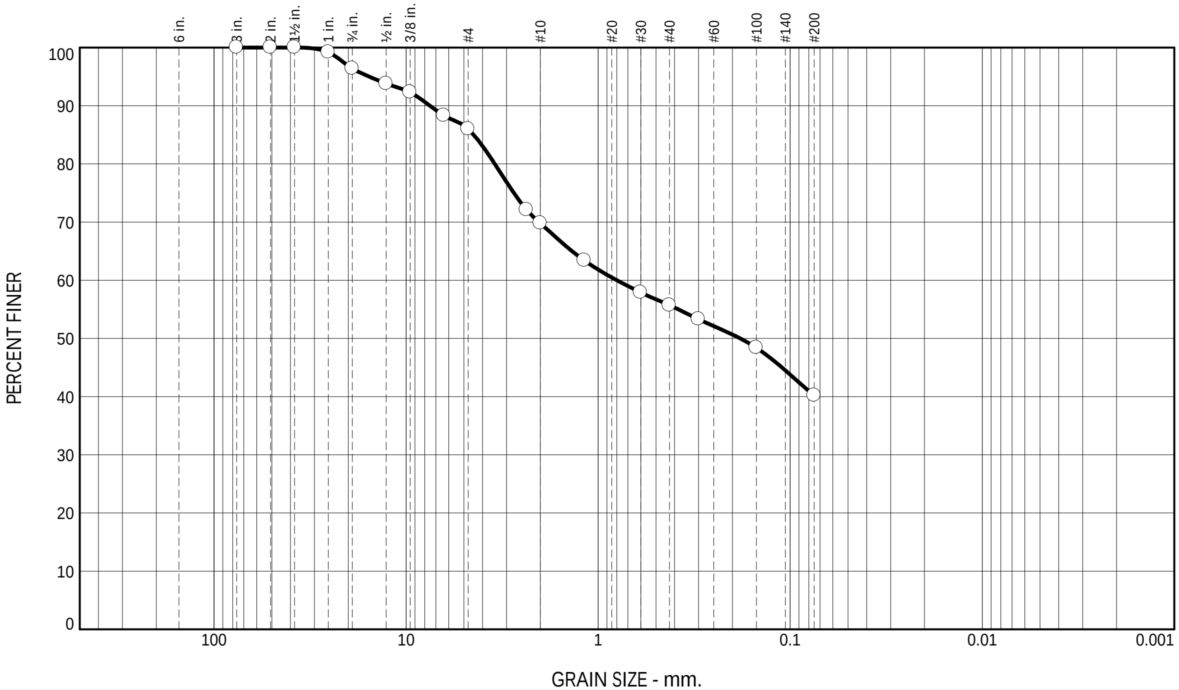
Location: TP-02
Depth: 6-8 ft

Tetra Tech

Missoula, MT

Client:
Project: Pickles Butte
Project No: 114-571040-2023
Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	10.4	16.2	14.1	15.5	40.2	

Test Results (ASTM D422)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	99.2		
.75	96.4		
.5	93.8		
.375	92.3		
.25	88.3		
#4	86.0		
#8	72.1		
#10	69.8		
#16	63.4		
#30	57.9		
#40	55.7		
#50	53.3		
#100	48.4		
#200	40.2		

· (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}= 7.5143 D_{85}= 4.4480

D_{60}= 0.7984 D_{50}= 0.1818

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 11-14-22 Technician: AB/PM

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

USCS (ASTM D2487)

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-03
Depth: 2-3 ft

Tetra Tech

Missoula, MT

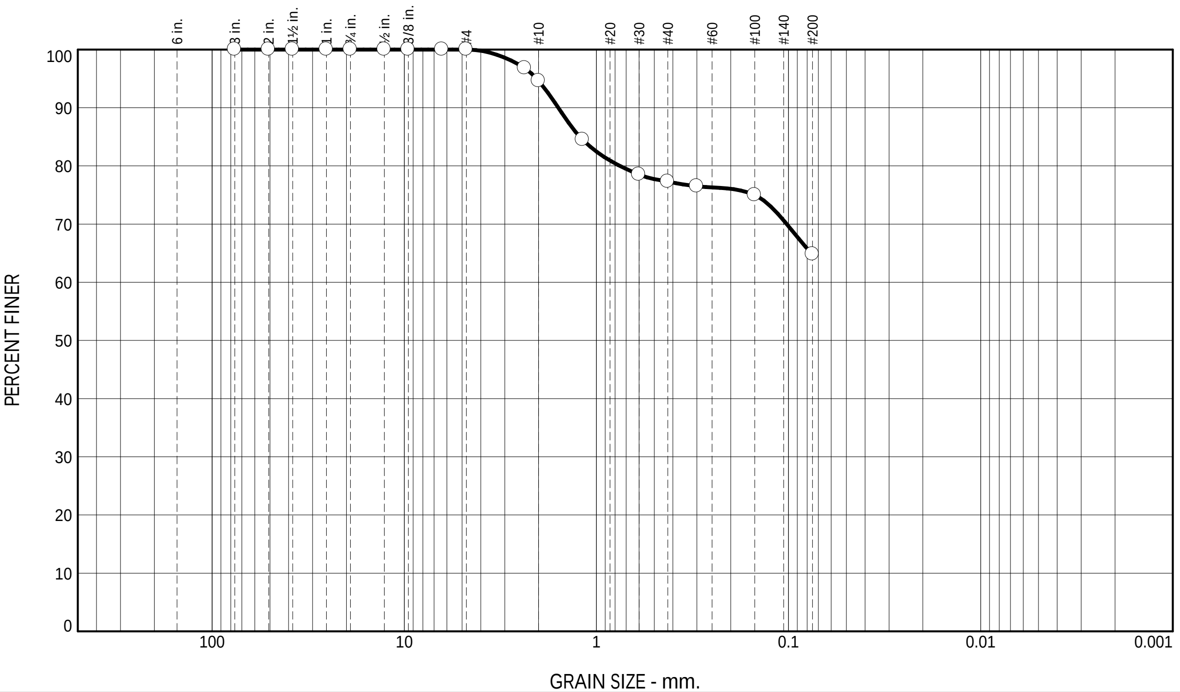
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	5.4	17.3	12.5	64.8	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	96.8		
#10	94.6		
#16	84.5		
#30	78.5		
#40	77.3		
#50	76.5		
#100	75.0		
#200	64.8		

· (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-15-22 Technician: AB

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}= 1.5800 D_{85}= 1.2205

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

USCS (ASTM D2487)

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-04
Depth: 4-5 ft

Tetra Tech

Missoula, MT

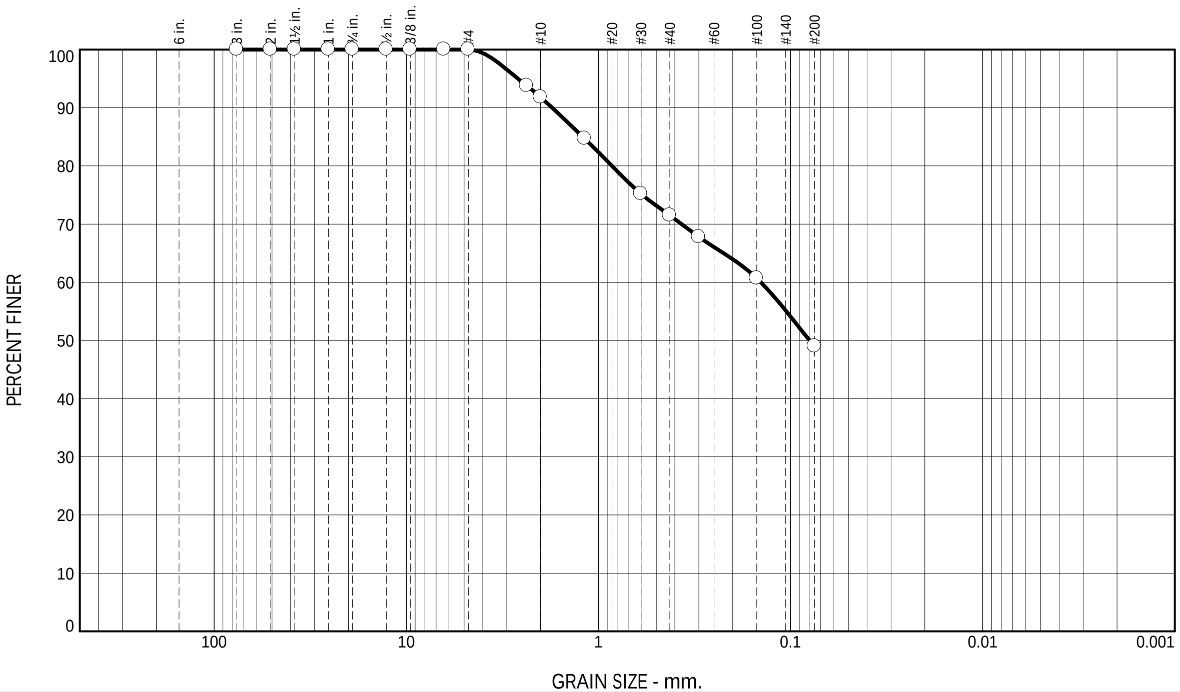
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	8.2	20.3	22.5	49.0	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	93.8		
#10	91.8		
#16	84.7		
#30	75.2		
#40	71.5		
#50	67.8		
#100	60.7		
#200	49.0		

* (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-10-22 Technician: PM/TL

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Atterberg (ASTM D4318)

PL= NP LL= NP PI= NP

Coefficients

D_{90}=	1.7419	D_{85}=	1.2060
D_{60}=	0.1427	D_{50}=	0.0795
D_{30}=		D_{15}=	
D_{10}=			
C_u=		C_c=	

USCS (ASTM D2487)

SM

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-05
Depth: 2-3 ft

Tetra Tech

Missoula, MT

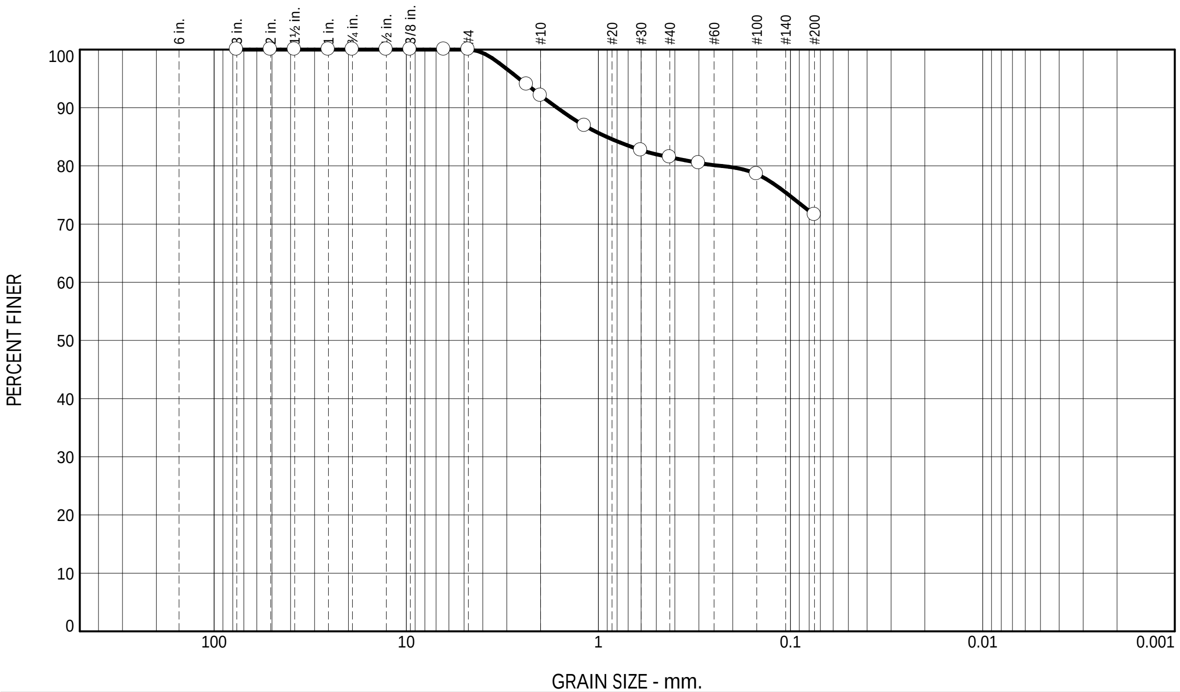
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	7.9	10.6	9.9	71.6	

Test Results (ASTM D422)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	94.0		
#10	92.1		
#16	86.9		
#30	82.7		
#40	81.5		
#50	80.5		
#100	78.6		
#200	71.6		

* (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D90= 1.6405 D85= 0.9068

D60= D50=

D30= D15=

D10=

Cu= Cc=

Sieve Test (ASTM D422)

Test Date: 11-16-22 Technician: SH/AB

Test Notes

USCS (ASTM D2487)

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-06
Depth: 2-3 ft

Tetra Tech

Missoula, MT

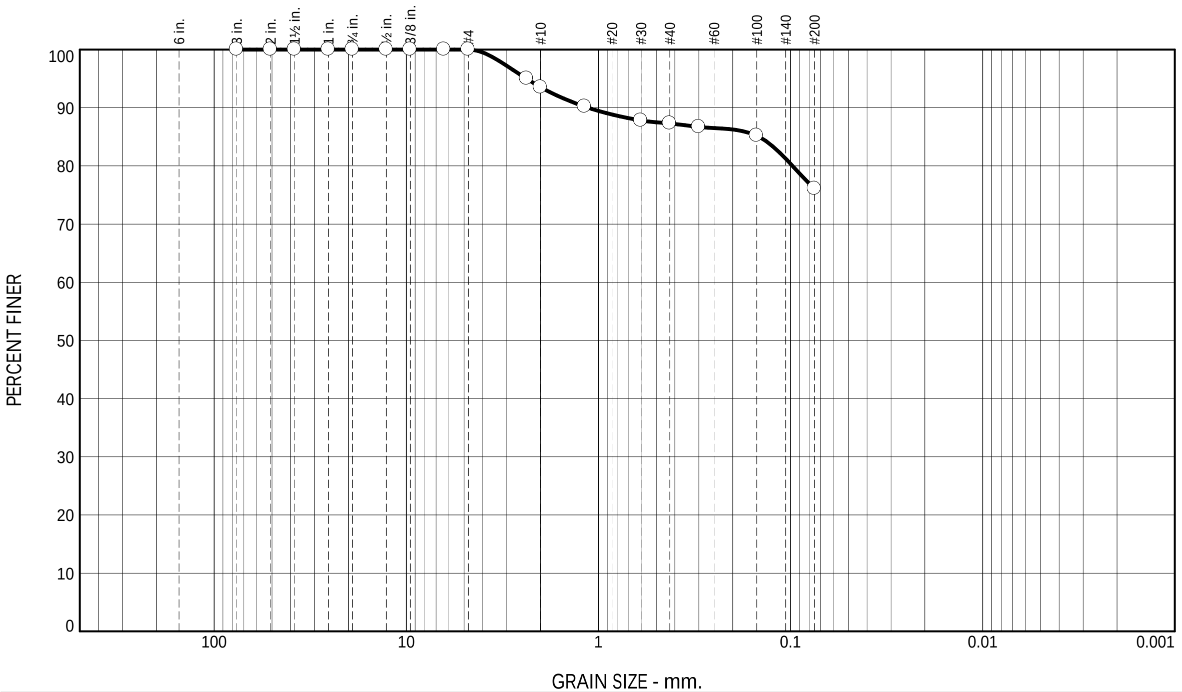
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	6.5	6.2	11.2	76.1	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	95.0		
#10	93.5		
#16	90.2		
#30	87.8		
#40	87.3		
#50	86.7		
#100	85.2		
#200	76.1		

* (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}= 1.1318 D_{85}= 0.1457

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 11-14-22 Technician: TL/PM

Test Notes

Hydrometer Test

Test Date: ____________ Technician: ______________

Test Notes

USCS (ASTM D2487)

Date Sampled: ________________

Date Received: ________________

Checked By: LP

Title: ________________

Location: TP-07
Depth: 4-5 ft

Tetra Tech

Missoula, MT

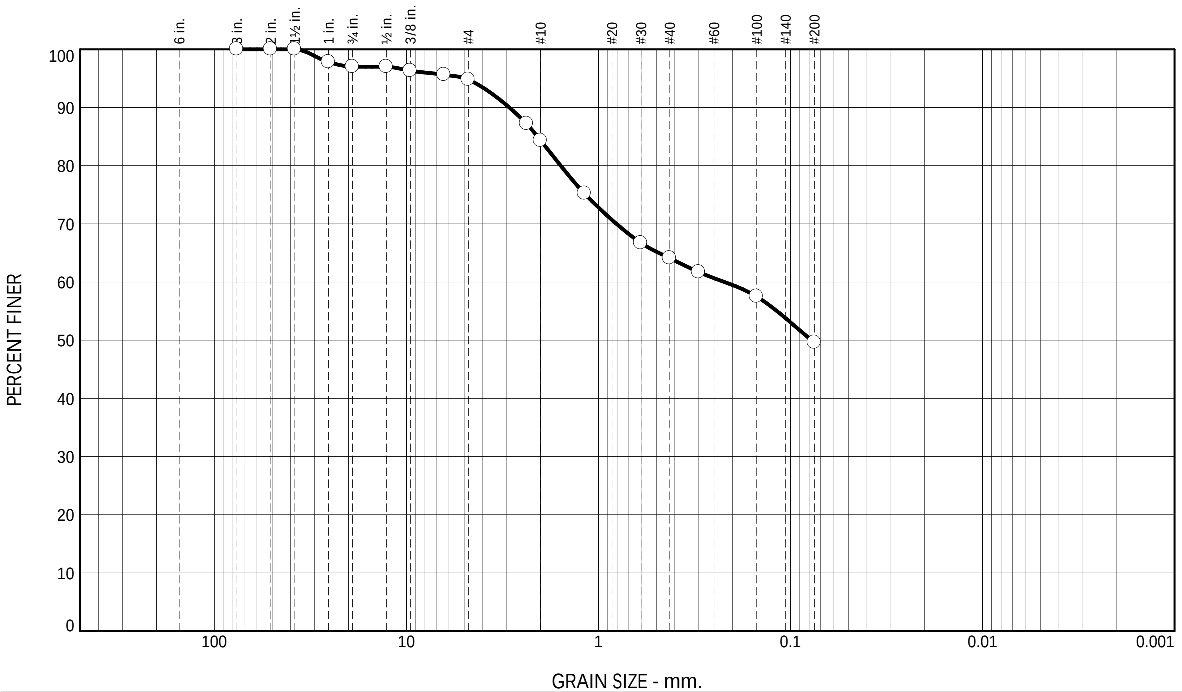
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.0	2.2	10.5	20.2	14.5	49.6	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	97.8		
.75	97.0		
.5	97.0		
.375	96.3		
.25	95.6		
#4	94.8		
#8	87.2		
#10	84.3		
#16	75.2		
#30	66.7		
#40	64.1		
#50	61.7		
#100	57.5		
#200	49.6		

* (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-15-22 Technician: TL/AB

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}=	2.9108	D_{85}=	2.0791
D_{60}=	0.2206	D_{50}=	0.0776
D_{30}=		D_{15}=	
D_{10}=			
C_u=		C_c=	

USCS (ASTM D2487)

Date Sampled: ______

Date Received: ______

Checked By: LP

Title: ______

Location: TP-08
Depth: 2-3 ft

Tetra Tech

Missoula, MT

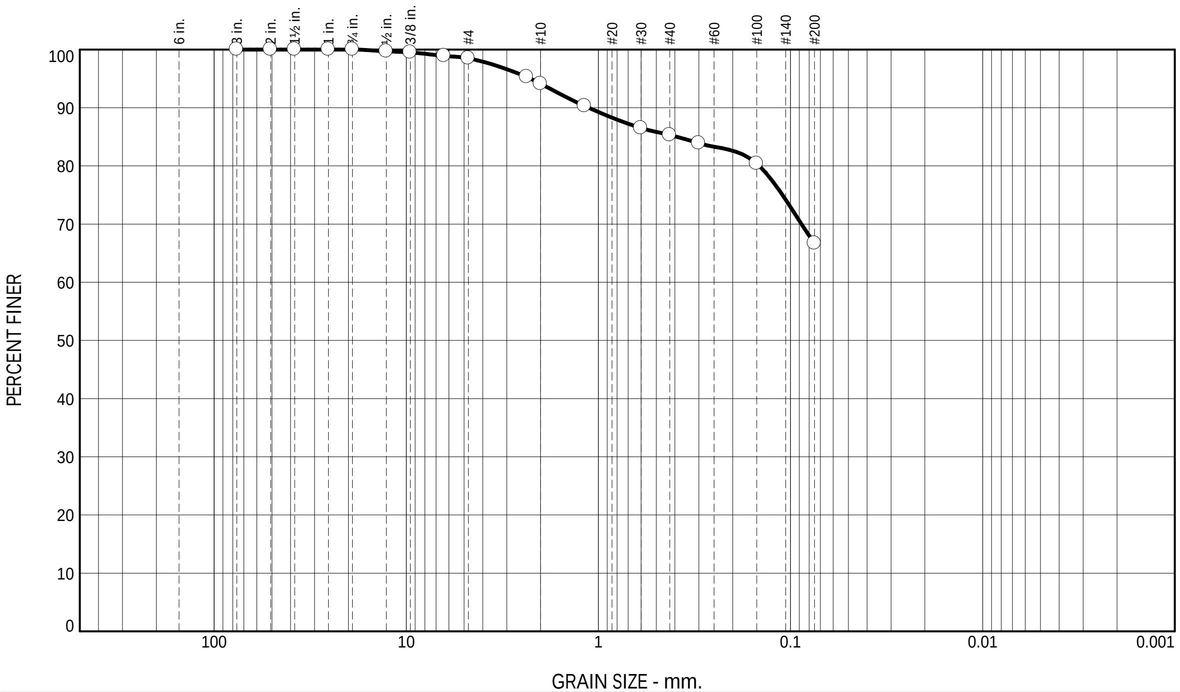
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	4.4	8.8	18.6	66.7	

Test Results (ASTM D422)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	99.7		
.375	99.5		
.25	98.9		
#4	98.5		
#8	95.3		
#10	94.1		
#16	90.3		
#30	86.5		
#40	85.3		
#50	83.9		
#100	80.4		
#200	66.7		

* (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}= 1.1257 D_{85}= 0.3925

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 11-16-22 Technician: AB

Test Notes

Hydrometer Test

Test Date: ________ Technician: ________

Test Notes

USCS (ASTM D2487)

Date Sampled: ________

Date Received: ________

Checked By: LP

Title: ________

Location: TP-10
Depth: 5-6 ft

Tetra Tech

Missoula, MT

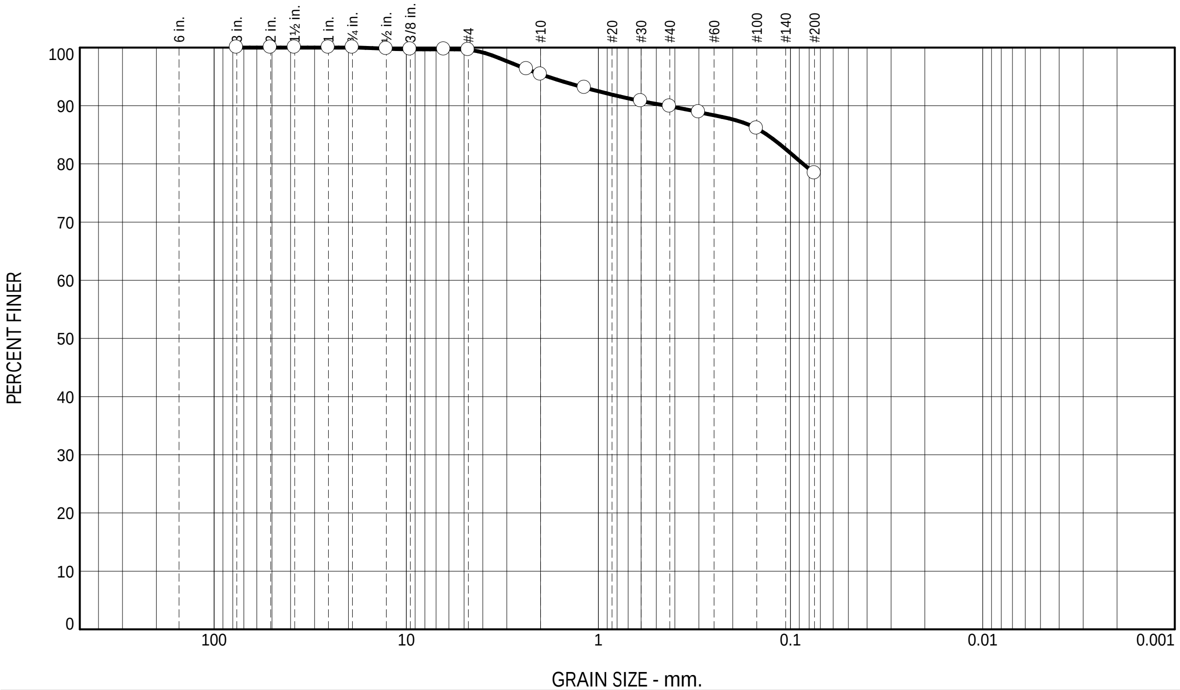
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	4.2	5.5	11.5	78.4	

Test Results (ASTM D422)			
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	99.8		
.375	99.7		
.25	99.7		
#4	99.6		
#8	96.3		
#10	95.4		
#16	93.1		
#30	90.8		
#40	89.9		
#50	88.9		
#100	86.1		
#200	78.4		

* (no specification provided)

Material Description

Atterberg (ASTM D4318)

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.4412 D_{85}= 0.1323

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

Sieve Test (ASTM D422)

Test Date: 11-10-22 Technician: SH/TL

Test Notes

Hydrometer Test

Test Date: ____________ Technician: ______________

Test Notes

USCS (ASTM D2487)

ML

Date Sampled: ______________

Date Received: ______________

Checked By: LP

Title: ______________

Location: TP-14
Depth: 4-5 ft

Tetra Tech

Missoula, MT

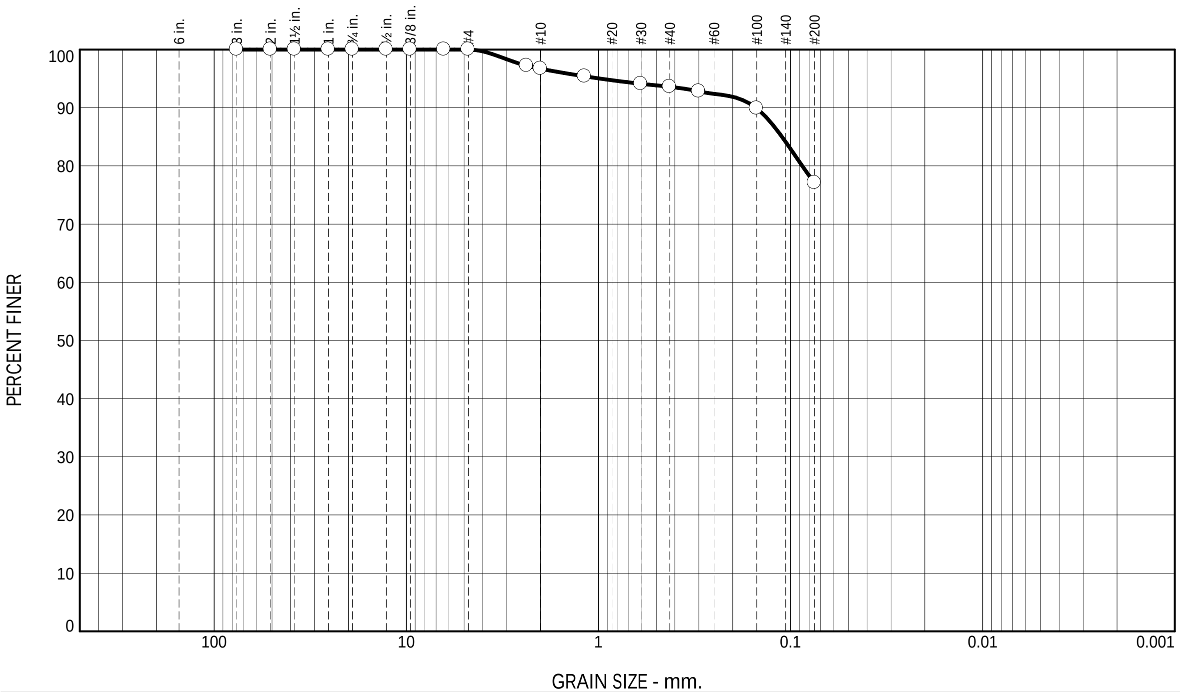
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.3	3.1	16.5	77.1	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	97.2		
#10	96.7		
#16	95.4		
#30	94.1		
#40	93.6		
#50	92.8		
#100	89.9		
#200	77.1		

* (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-17-22 Technician: TL/AB

Test Notes

Hydrometer Test

Test Date: ________ Technician: ________

Test Notes

Atterberg (ASTM D4318)

PL= LL= PI=

Coefficients

D_{90}= 0.1514 D_{85}= 0.1108

D_{60}= D_{50}=

D_{30}= D_{15}=

D_{10}=

C_u= C_c=

USCS (ASTM D2487)

Date Sampled: ________

Date Received: ________

Checked By: LP

Title: ________

Location: TP-15
Depth: 2-3 ft

Tetra Tech

Missoula, MT

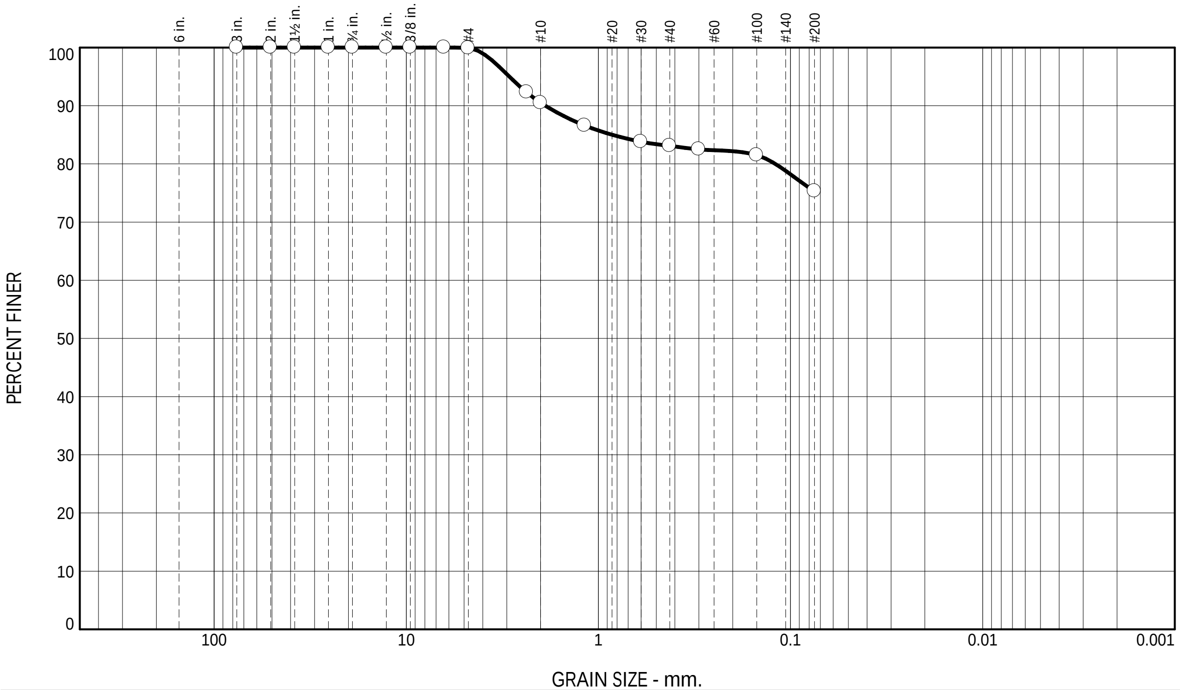
Client:

Project: Pickles Butte

Project No: 114-571040-2023

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	9.4	7.4	7.8	75.3	

Test Results (ASTM D422)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.9		
#8	92.3		
#10	90.5		
#16	86.6		
#30	83.8		
#40	83.1		
#50	82.5		
#100	81.5		
#200	75.3		

· (no specification provided)

Material Description

Sieve Test (ASTM D422)

Test Date: 11-9-22 Technician: TL/AB

Test Notes

Hydrometer Test

Test Date: ______ Technician: ______

Test Notes

Atterberg (ASTM D4318)

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 1.8912 D_{85}= 0.8470
D_{60}= D_{50}=
D_{30}= D_{15}=
D_{10}=
C_u= C_c=

USCS (ASTM D2487)

ML

Date Sampled: ______
Date Received: ______
Checked By: LP
Title: ______

Location: TP-16
Depth: 4-8 ft

Tetra Tech

Missoula, MT

Client:
Project: Pickles Butte

Project No: 114-571040-2023 Figure

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-01

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: ML AASHTO: A-4(0)

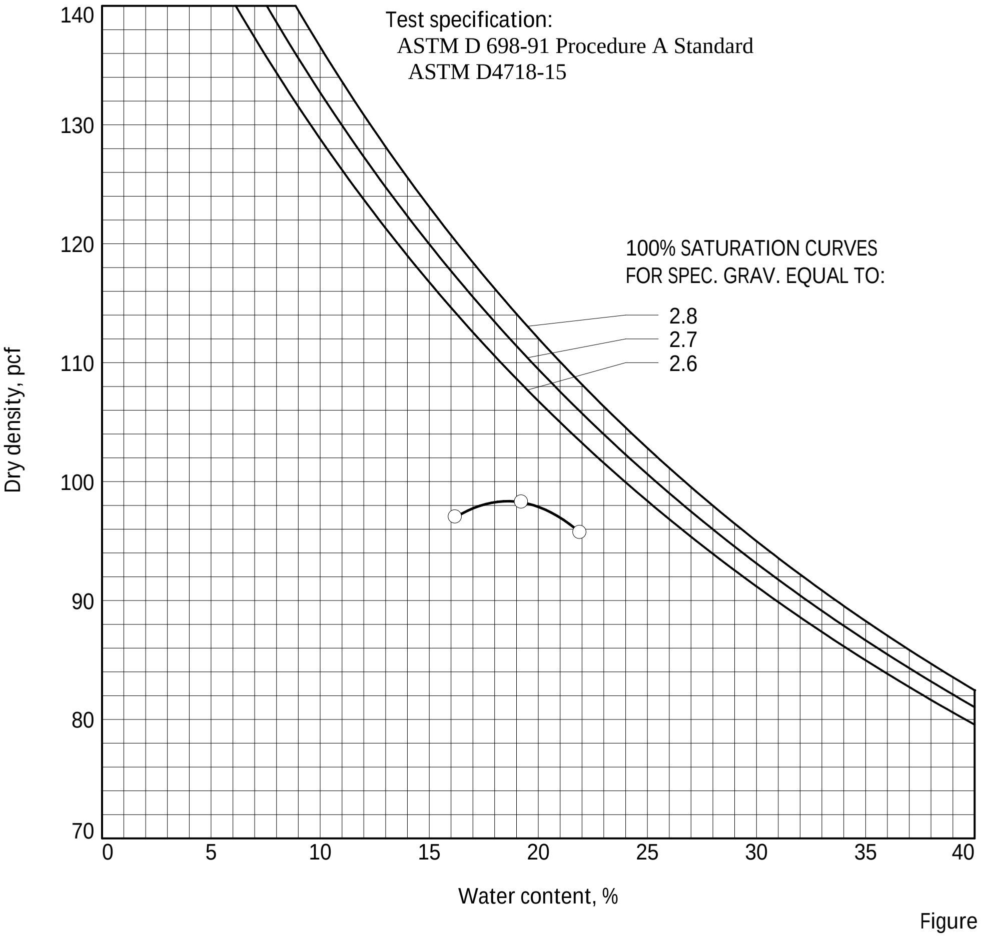
Nat. Moist. = Sp.G. = 2.65

Liquid Limit = NP Plasticity Index = NP

%<No.10 = 91.1 % %<No.40 = 82.1 %

%<No.60 = 81.2 % %<No.200 = 71.5 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 98.4 pcf	98.4 pcf
Optimum moisture = 18.6 %	18.6 %



Figure

Tetra Tech

Tested By: TL Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023

Date:

Project: Pickles Butte

Client:

Location: TP-02

Depth: 6-8 ft

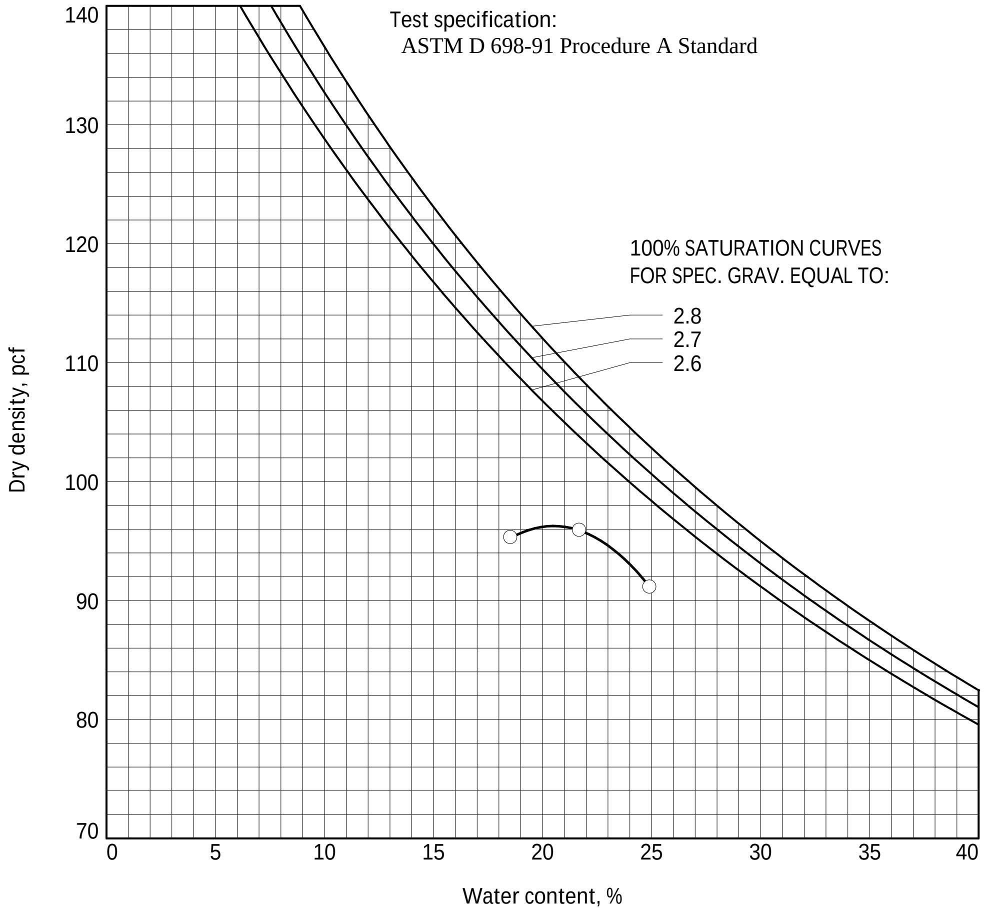
Remarks:

MATERIAL DESCRIPTION

Description:

Classifications -	USCS: ML	AASHTO:	A-4(0)
Nat. Moist. =		Sp.G. =	2.65
Liquid Limit =	NP	Plasticity Index =	NP
%<No.10 =	96.0 %	%<No.40 =	86.3 %
%<No.60 =	83.8 %	%<No.200 =	67.3 %

TEST RESULTS
Maximum dry density = 96.3 pcf
Optimum moisture = 20.5 %



Figure

Tetra Tech

Tested By: PM

Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023

Date:

Project: Pickles Butte

Client:

Location: TP-03

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

Nat. Moist. =

Sp.G. = 2.65

Liquid Limit =

Plasticity Index =

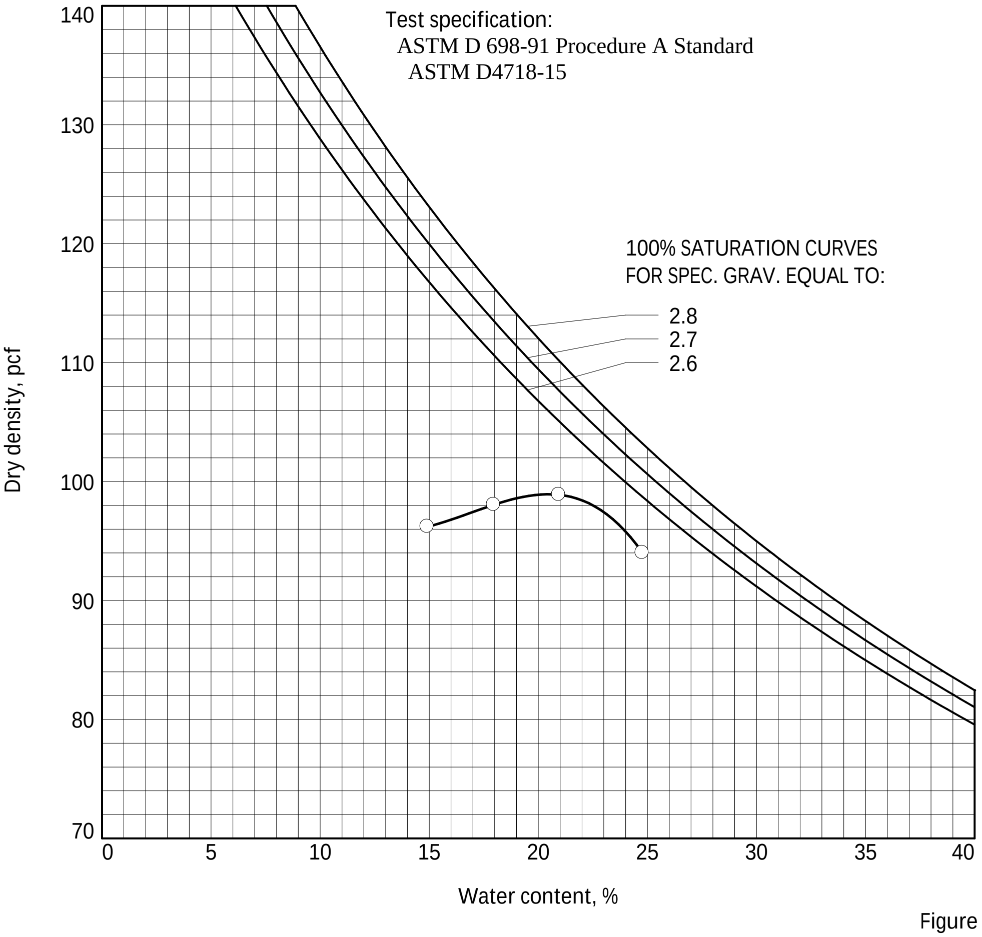
%<No.10 = 69.8 %

%<No.40 = 55.7 %

%<No.60 = 52.1 %

%<No.200 = 40.2 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 104.8 pcf	98.9 pcf
Optimum moisture = 17.6 %	20.5 %



Figure

Tetra Tech

Tested By: AB

Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-04

Depth: 4-5 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

Nat. Moist. =

Sp.G. = 2.65

Liquid Limit =

Plasticity Index =

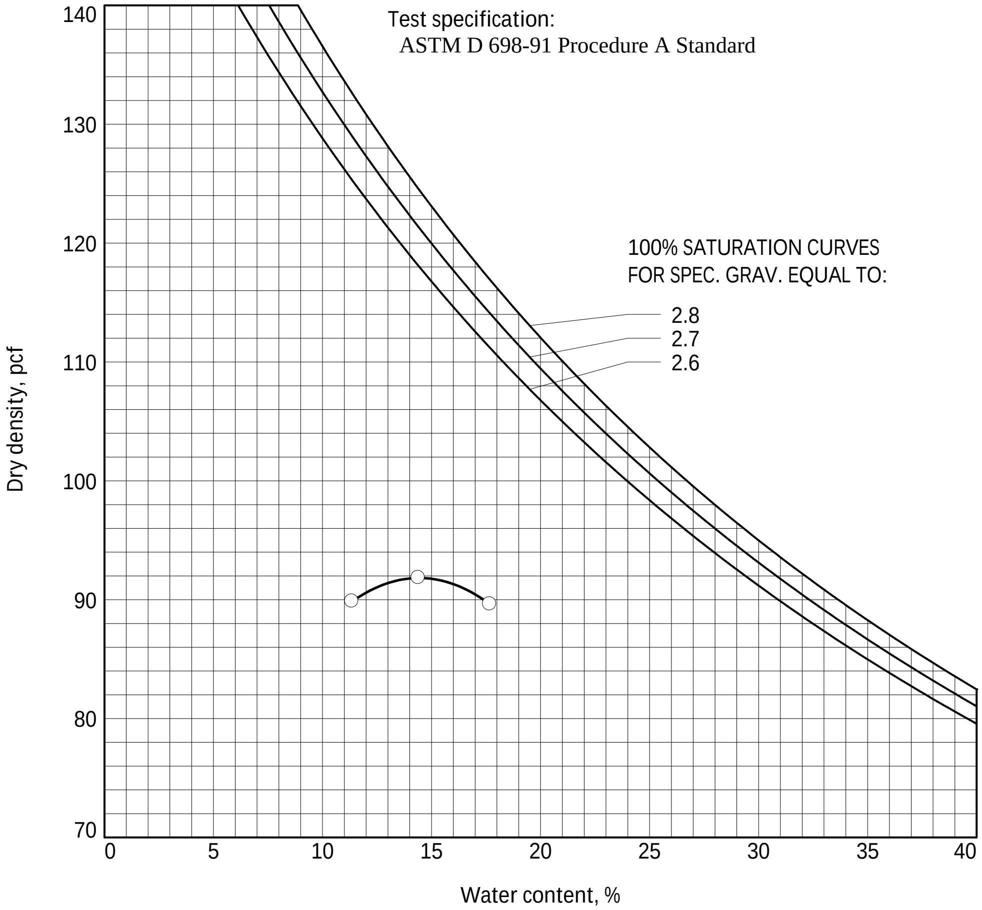
%<No.10 = 94.6 %

%<No.40 = 77.3 %

%<No.60 = 76.3 %

%<No.200 = 64.8 %

TEST RESULTS
Maximum dry density = 91.8 pcf
Optimum moisture = 14.4 %



Figure

Tetra Tech

Tested By: BA

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-05

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

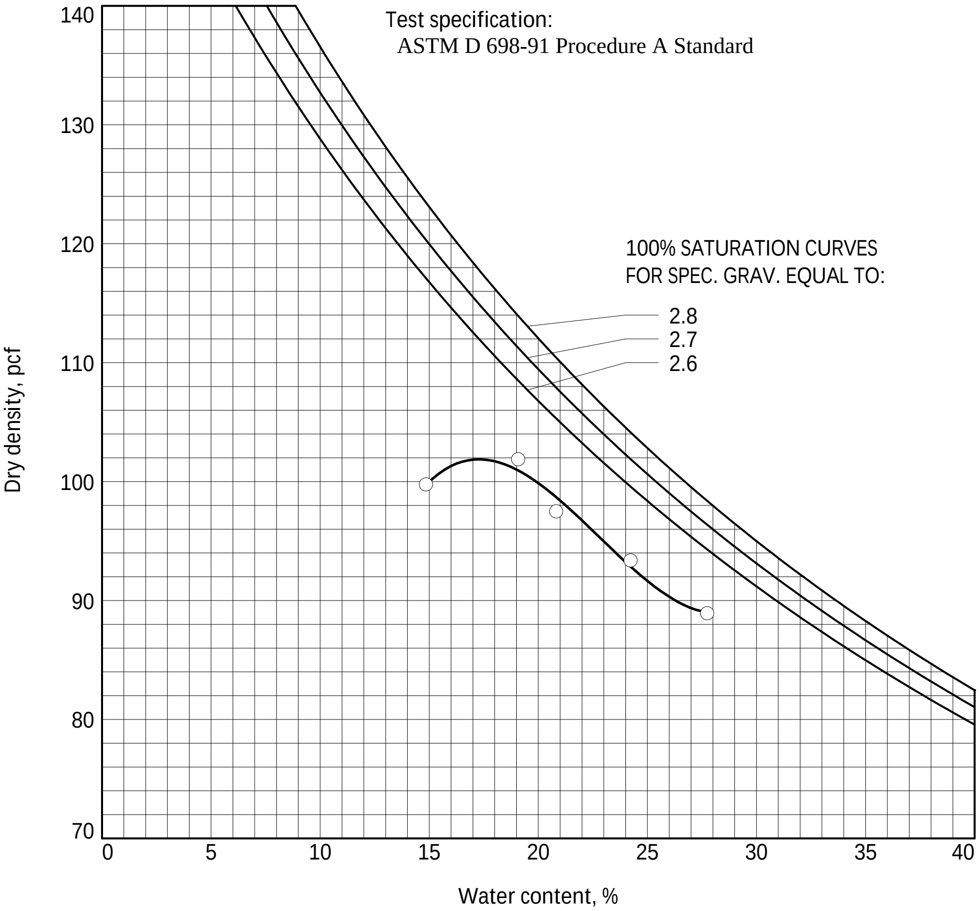
Classifications - USCS: SM AASHTO: A-4(0)

Nat. Moist. =		Sp.G. =	2.65
Liquid Limit =	NP	Plasticity Index =	NP
%<No.10 =	91.8 %	%<No.40 =	71.5 %
%<No.60 =	66.0 %	%<No.200 =	49.0 %

TEST RESULTS

Maximum dry density = 101.9 pcf

Optimum moisture = 17.3 %



Figure

Tetra Tech

Tested By: AB Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-06

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

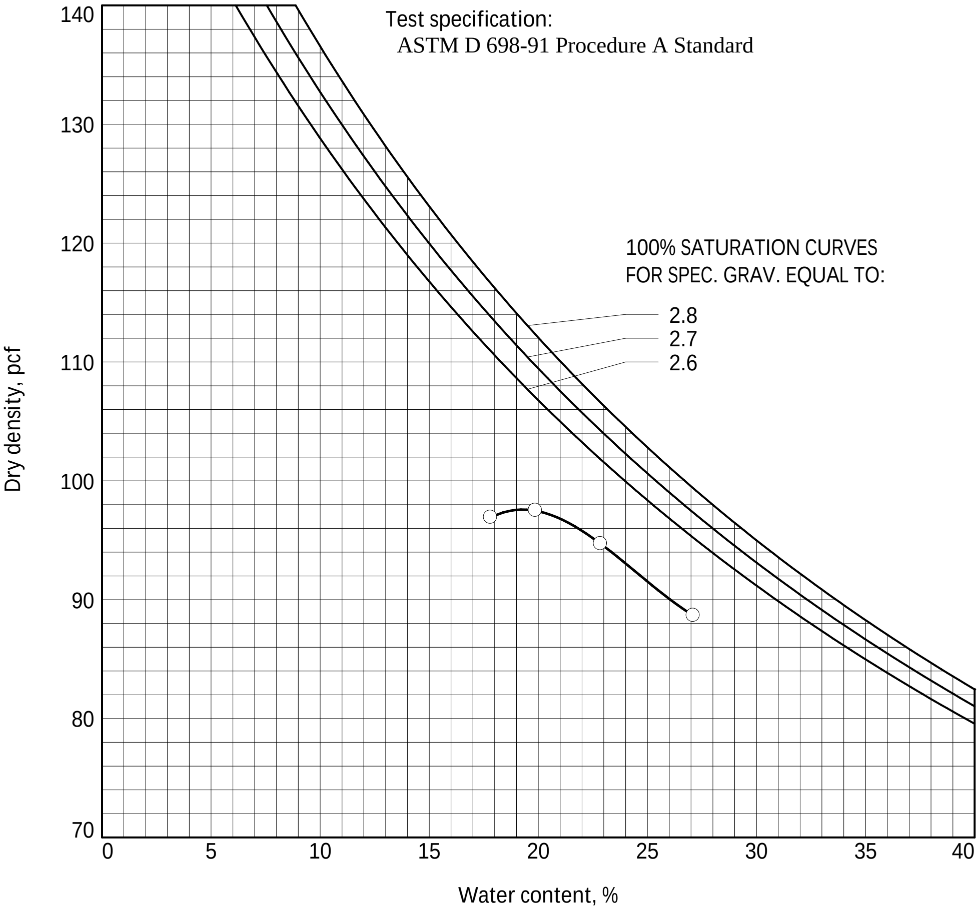
Nat. Moist. = Sp.G. = 2.65

Liquid Limit = Plasticity Index =

%<No.10 = 92.1 % %<No.40 = 81.5 %

%<No.60 = 80.1 % %<No.200 = 71.6 %

TEST RESULTS
Maximum dry density = 97.6 pcf
Optimum moisture = 19.3 %



Figure

Tetra Tech

Tested By: SH Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-07

Depth: 4-5 ft

Remarks:

MATERIAL DESCRIPTION

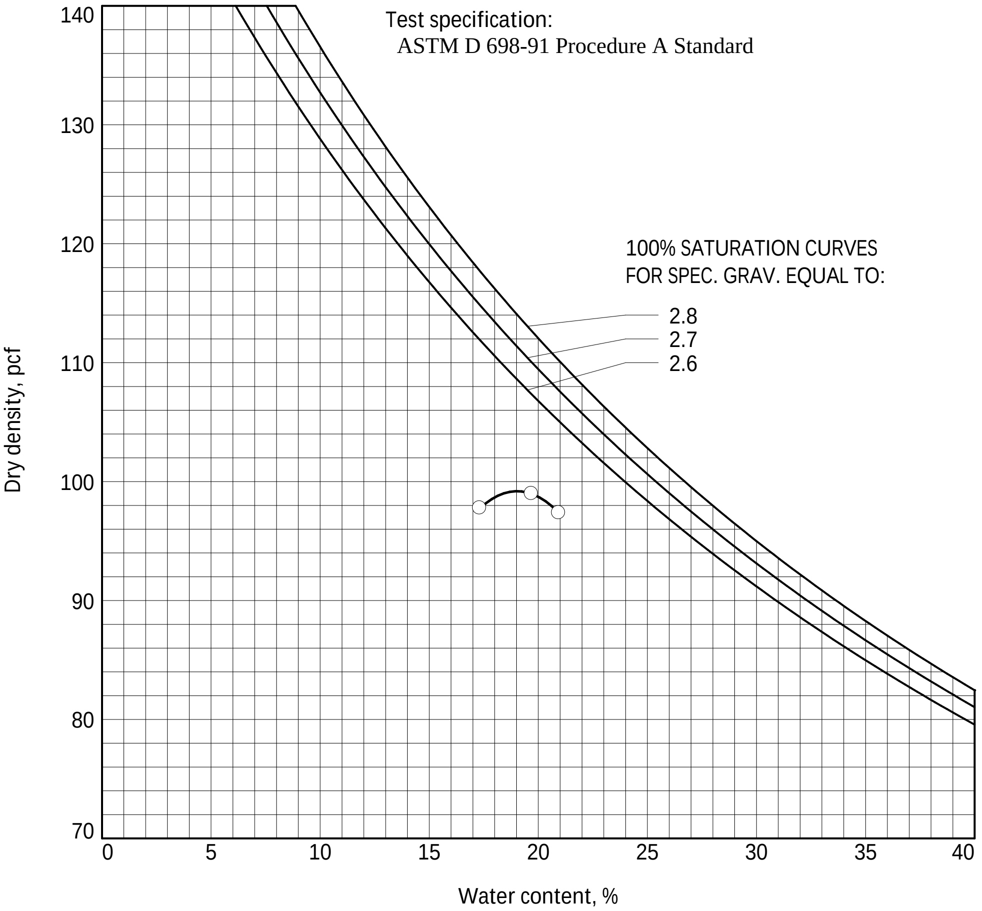
Description:

Classifications -	USCS:		AASHTO:
Nat. Moist. =		Sp.G. =	2.65
Liquid Limit =		Plasticity Index =	
%<No.10 =	93.5 %	%<No.40 =	87.3 %
%<No.60 =	86.5 %	%<No.200 =	76.1 %

TEST RESULTS

Maximum dry density = 99.2 pcf

Optimum moisture = 19.0 %



Figure

Tetra Tech

Tested By: SH Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-08

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

Nat. Moist. =

Sp.G. = 2.65

Liquid Limit =

Plasticity Index =

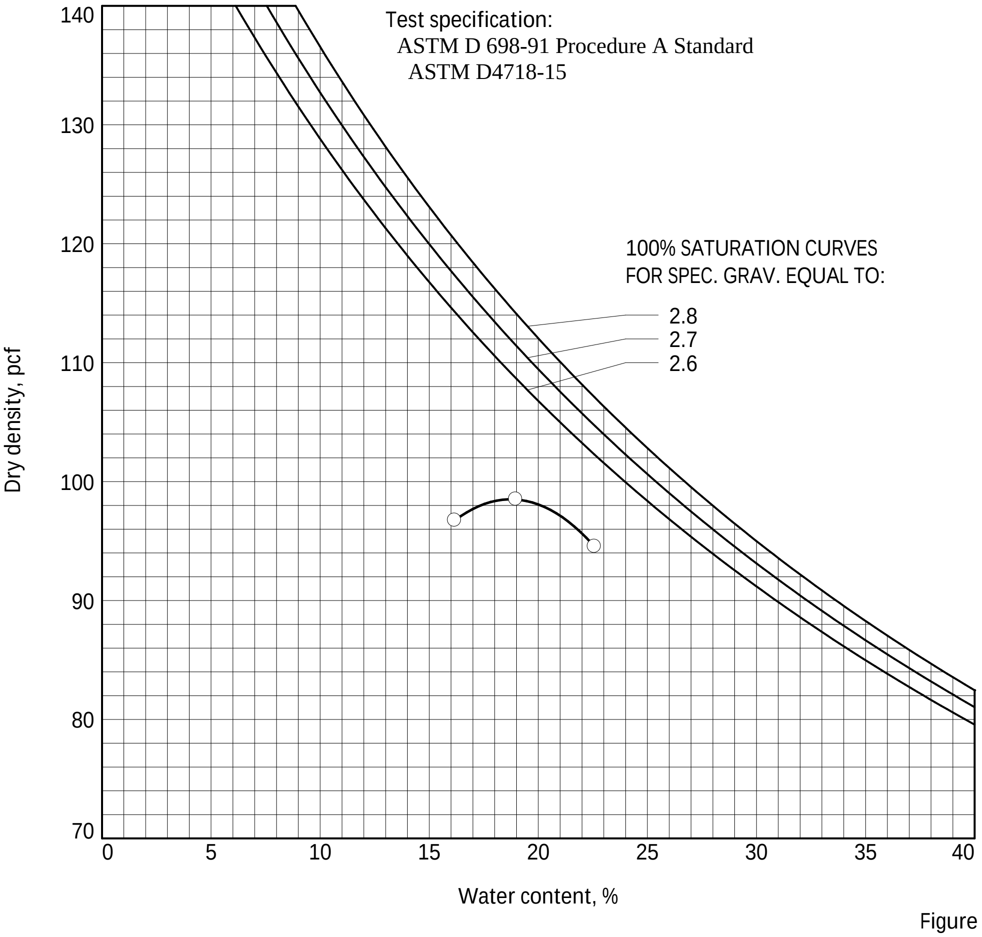
%<No.10 = 84.3 %

%<No.40 = 64.1 %

%<No.60 = 60.6 %

%<No.200 = 49.6 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 100.6 pcf	98.5 pcf
Optimum moisture = 17.8 %	18.7 %



Figure

Tetra Tech

Tested By: TL Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023

Date:

Project: Pickles Butte

Client:

Location: TP-09

Depth: 4-8 ft

Remarks:

MATERIAL DESCRIPTION

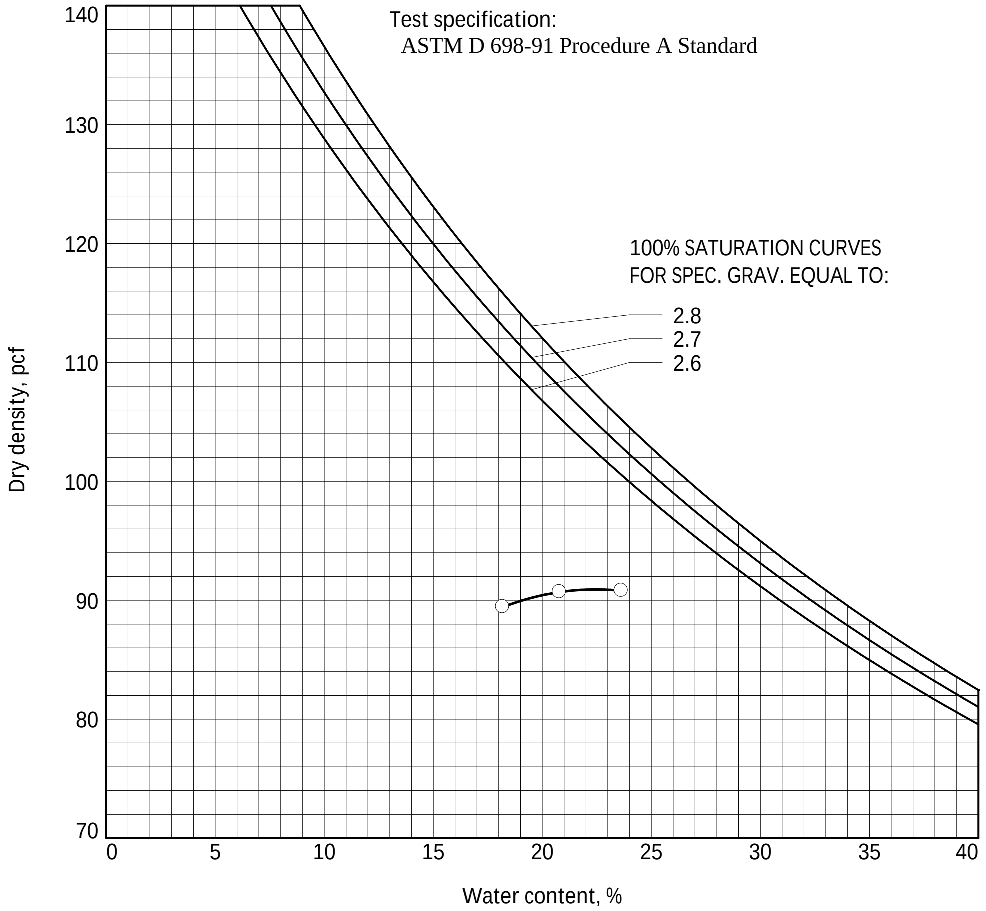
Description:

Classifications -	USCS:	AASHTO:
Nat. Moist. =		Sp.G. = 2.65
Liquid Limit =		Plasticity Index =
%<No.10 =		%<No.40 =
%<No.60 =		%<No.200 =

TEST RESULTS

Maximum dry density = 90.9 pcf

Optimum moisture = 22.4 %



Figure

Tetra Tech

Tested By: AB

Checked By: LP

COMPACTION TEST REPORT

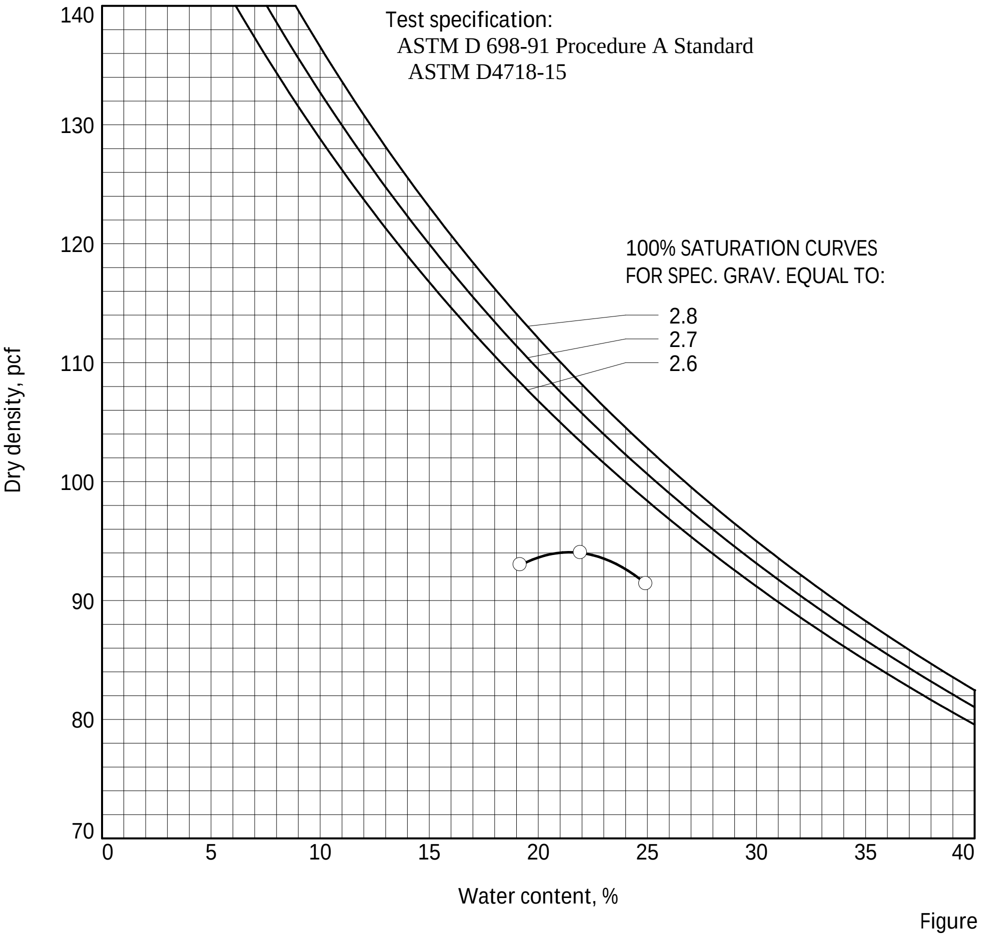
Project No.: 114-571040-2023 Date:
Project: Pickles Butte
Client:
Location: TP-10
Depth: 5-6 ft
Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:
Nat. Moist. =
Sp.G. = 2.65
Liquid Limit =
Plasticity Index =
%<No.10 = 94.1 %
%<No.40 = 85.3 %
%<No.60 = 83.3 %
%<No.200 = 66.7 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 94.7 pcf	94.1 pcf
Optimum moisture = 21.1 %	21.4 %



Figure

Tetra Tech

Tested By: AB Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-14

Depth: 4-5 ft

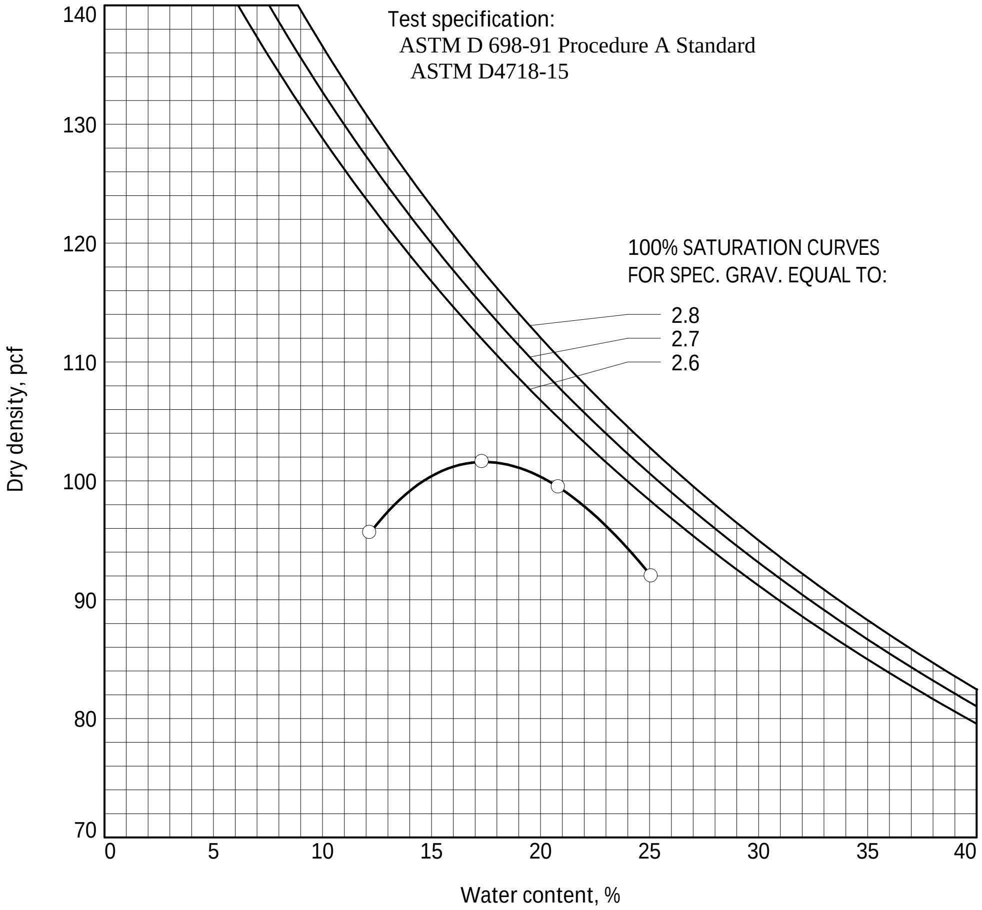
Remarks:

MATERIAL DESCRIPTION

Description:

Classifications -	USCS: ML	AASHTO:	A-4(0)
Nat. Moist. =		Sp.G. =	2.65
Liquid Limit =	NP	Plasticity Index =	NP
%<No.10 =	95.4 %	%<No.40 =	89.9 %
%<No.60 =	88.3 %	%<No.200 =	78.4 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 101.7 pcf	101.6 pcf
Optimum moisture = 17.3 %	17.4 %



Figure

Tetra Tech

Tested By: SH Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-15

Depth: 2-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

Nat. Moist. =

Sp.G. = 2.65

Liquid Limit =

Plasticity Index =

%<No.10 = 96.7 %

%<No.40 = 93.6 %

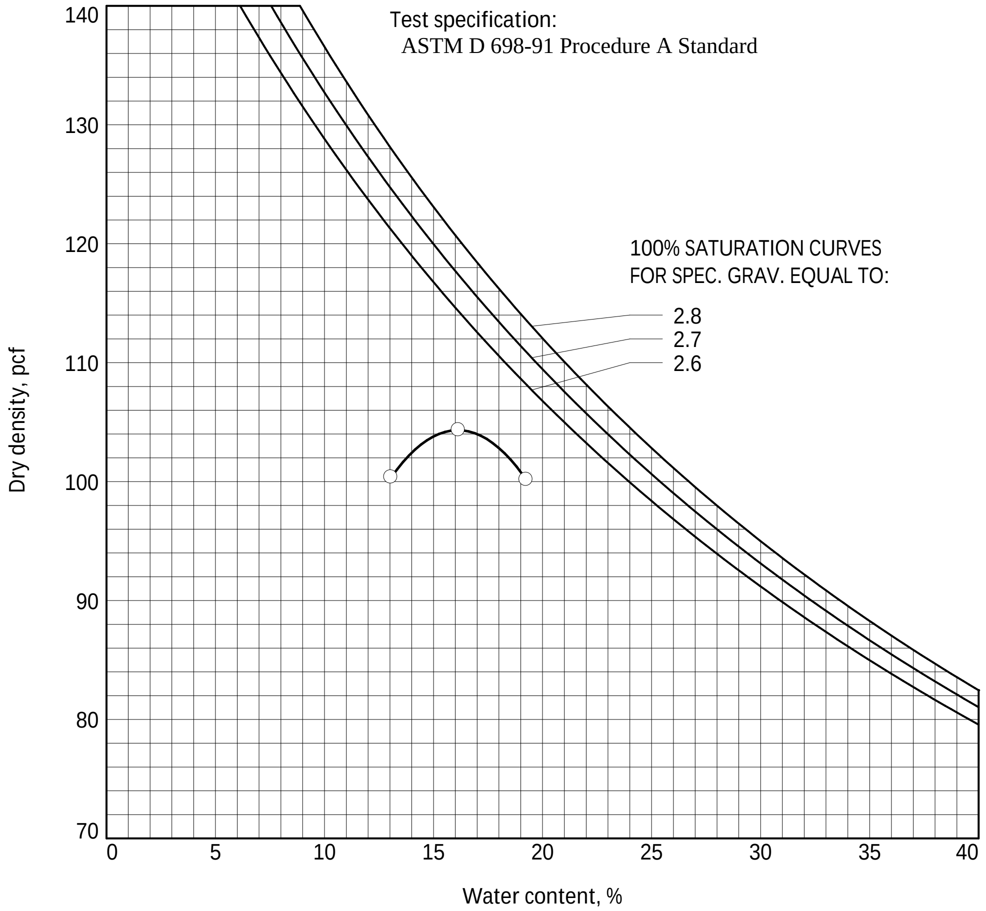
%<No.60 = 92.4 %

%<No.200 = 77.1 %

TEST RESULTS

Maximum dry density = 104.3 pcf

Optimum moisture = 16.1 %



Figure

Tetra Tech

Tested By: TL

Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023 Date:

Project: Pickles Butte

Client:

Location: TP-16

Depth: 4-8 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: ML AASHTO: A-4(0)

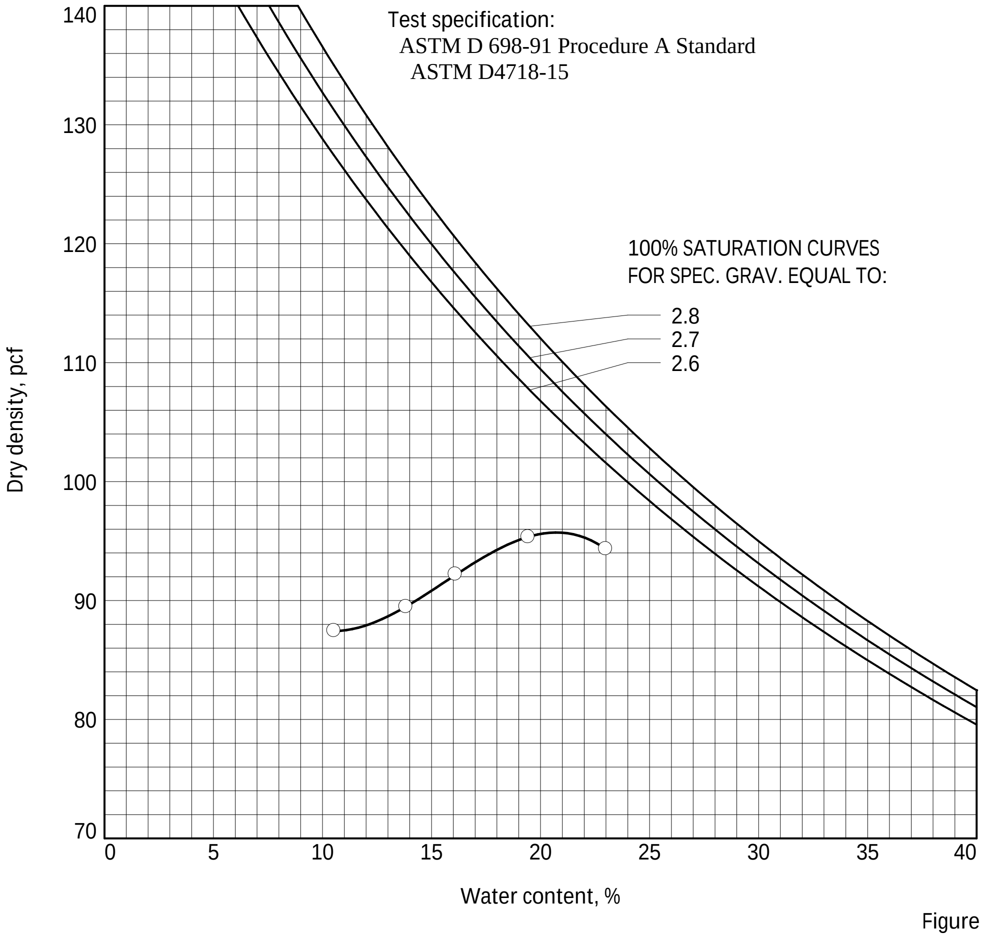
Nat. Moist. = Sp.G. = 2.65

Liquid Limit = NP Plasticity Index = NP

%<No.10 = 90.5 % %<No.40 = 83.1 %

%<No.60 = 82.4 % %<No.200 = 75.3 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 95.8 pcf	95.7 pcf
Optimum moisture = 20.7 %	20.7 %



Figure

Tetra Tech

Tested By: PM Checked By: LP

COMPACTION TEST REPORT

Project No.: 114-571040-2023

Date:

Project: Pickles Butte

Client:

Location: TP-17

Depth: 1-3 ft

Remarks:

MATERIAL DESCRIPTION

Description:

Classifications - USCS: AASHTO:

Nat. Moist. =

Sp.G. = 2.65

Liquid Limit =

Plasticity Index =

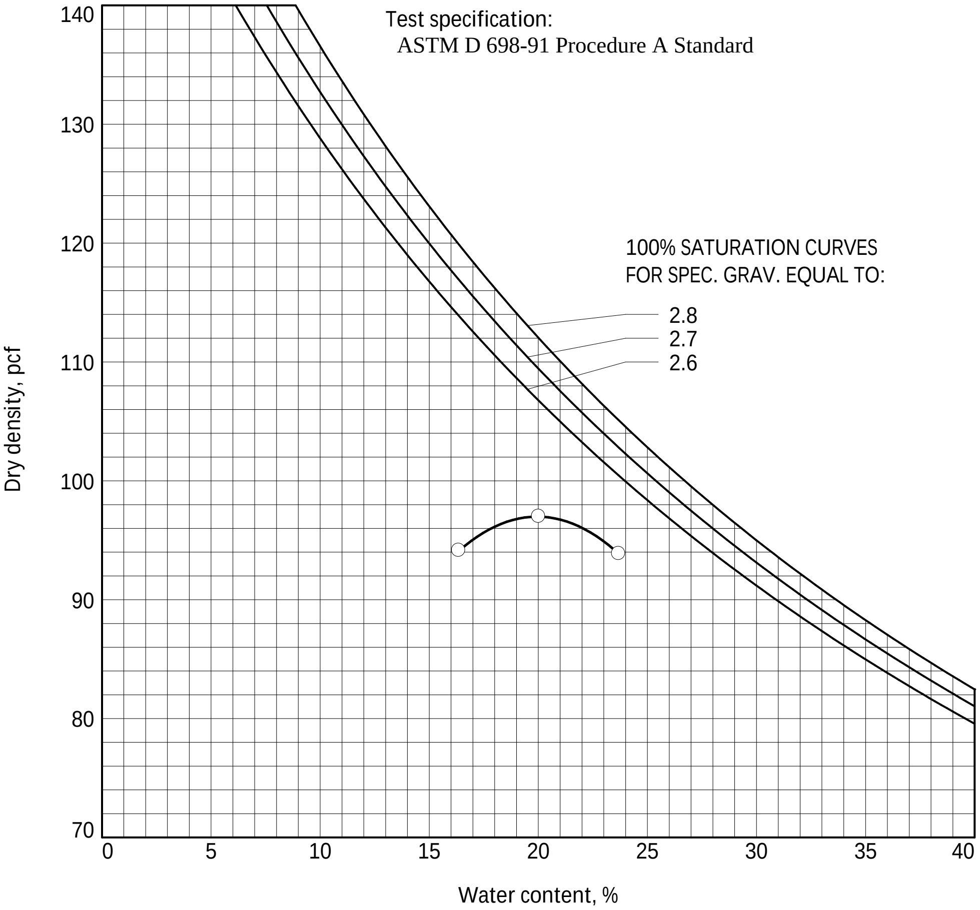
%<No.10 =

%<No.40 =

%<No.60 =

%<No.200 =

TEST RESULTS
Maximum dry density = 97.0 pcf
Optimum moisture = 19.9 %



Figure

Tetra Tech

Tested By: SH

Checked By: LP

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

Sheet 1 of 1

TP-01

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48655227 ft Long: -116.71010948 ft

Station:
Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	**Sample Type**	**MC (%)**	**LL**	**PL**	**-200 (%)**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**Remarks and Other Tests**
							SILT (ML), moist, tan.	3.5	
							SILT, dry, tan, Soft, breakable by hand.	4.2	
5							SILT (ML), moist, tan.	6.2	
							Silty SAND (SM), slightly moist, tan, Increasing sand content with depth.	8.5	

Test Pit Depth: 8.5 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-02

Sheet 1 of 1

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48770692 ft Long: -116.69973327 ft

Station:

Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							(ML), moist, tan.	3.5	
							SILT, dry, tan, Soft, breakable by hand.	4.6	
5							(ML), moist, tan.	5.5	
	▨						Silty SAND (SM), slightly moist, tan, Increasing sand content with depth.	9.6	

Test Pit Depth: 9.6 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TP-03

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48138965 ft Long: -116.70383105 ft

Station:
Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
						▥	Sandy SILT (ML), slightly moist, tan.		
	▨					▥			
5						▩	Poorly-Graded SAND with gravel (SP), slightly moist, brown to black, fine to coarse grained, angular.	4.7	
								6.0	

Test Pit Depth: 6.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-04

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.485193 ft Long: -116.71111918 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							SILT (ML), slightly moist.		
							SILT (ML), dry, tan.	2.0	
							SILT (ML), slightly moist.	3.2	
5	▨								
							Silty SAND (SM), slightly moist, brown, fine grained.	8.7	
								9.5	

Test Pit Depth: 9.5 ft, *Elevation:*

		Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-05

Sheet 1 of 1

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48138965 ft
Long: -116.70383105 ft

Station:
Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							Sandy SILT (ML), slightly moist, tan.		
5							Poorly-Graded SAND with gravel (SP), slightly moist, brown to black, fine to coarse grained, angular.	4.7	
								7.8	

Test Pit Depth: 7.8 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-06

Sheet 1 of 1

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48443481 ft Long: -116.70762806 ft

Station:
Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							SILT (ML), slightly moist, tan.		
5									
							Silty SAND (SM), moist, tan, very fine grained, Borderline silt.	7.3	
10								10.0	

Test Pit Depth: 10.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-07

Sheet 1 of 1

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48449268 ft Long: -116.70415019 ft

Station:
Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) *Elev. (ft)*	**Sample Type**	**MC (%)**	**LL**	**PL**	**-200 (%)**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**Remarks and Other Tests**
							SILT (ML), slightly moist, tan.	2.5	
							SILT (ML), dry, tan.	3.3	
5							SILT (ML), slightly moist, tan.	5.5	
							Silty SAND (SM), moist, very fine grained, Increasing sand with depth.	8.5	

Test Pit Depth: 8.5 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-08

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48743981 ft Long: -116.69702086 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
	▨						Sandy SILT (ML), slightly moist, tan.		
5							Poorly-Graded SAND with gravel (SP), slightly moist, brown to black, fine to coarse grained, angular.	4.2	
								6.0	

Test Pit Depth: 6.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-09

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48360081 ft Long: -116.70130153 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							SILT (ML), slightly moist, tan.	3.0	
							SILT (ML), dry, tan.	4.5	
5							SILT (ML), moist, tan.	6.0	
							Silty SAND (SM), moist, brown, very fine grained.	8.5	
							Black. Pieces of basalt.	9.0	

Test Pit Depth: 9.0 ft, *Elevation:*

		Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-10

Sheet 1 of 1

Project: Pickles butte test pits
Rig: CAT 312D
Location Coordinates Lat: 43.48282091 ft Long: -116.69717814 ft
Station:
Offset:

Project Number: Pickles butte test pits
UPN:
Dimensions:
System: Decimal Degrees
Datum: NAD83
Top of Surface Elevation:

Date Started: 10/11/22
Date Finished: 10/11/22
Abandonment Method: Backfilled with Cuttings
Location Source: Handheld GPS, Uncorrected
Elevation Source:

Contractor: Client
Logger: Tetra Tech
Comments:

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
						▥	Sandy SILT (ML), slightly moist, tan.		
5	▨					▥			
						░	Poorly-Graded SAND with silt (SP-SM), slightly moist, brown to red, fine to medium grained, angular.	8.0	
								9.0	

Test Pit Depth: 9.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-11

Sheet 1 of 1

Project: Pickles butte test pits	**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48090709 ft Long: -116.69796449 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits **UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22 **Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech	**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							SILT with gravel (ML), slightly moist, tan, Pieces of basalt.	0.9	
							BASALT, black.	1.0	

Test Pit Depth: 1.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-12

Sheet 1 of 1

Project: Pickles butte test pits

Rig: CAT 312D

Location Coordinates Lat: 43.48134636 ft Long: -116.70124308 ft

Station:

Offset:

Project Number: Pickles butte test pits

UPN:

Dimensions:

System: Decimal Degrees

Datum: NAD83

Top of Surface Elevation:

Date Started: 10/11/22

Date Finished: 10/11/22

Abandonment Method: Backfilled with Cuttings

Location Source: Handheld GPS, Uncorrected

Elevation Source:

Contractor: Client

Logger: Tetra Tech

Comments:

Depth (ft) ***Elev. (ft)***	**Sample Type**	**MC (%)**	**LL**	**PL**	**-200 (%)**	**Lithology**	**Material Description**	**Depth (ft)** ***Elev. (ft)***	**Remarks and Other Tests**
							SILT with gravel (ML), slightly moist, tan, Pieces of basalt.	1.5	
							Poorly-Graded SAND with silt and gravel (SP-SM), slightly moist, brown to black, fine to coarse grained, angular.	4.0	

Test Pit Depth: 4.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-13 B

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48138965 ft Long: -116.70383105 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
						▨	Silty SAND with gravel (SM), slightly moist, tan, Pieces of basalt.	1.5	
							BASALT, black.	1.5	
5									

Test Pit Depth: 6.0 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-14

Sheet 1 of 1

Project: Pickles butte test pits	**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48138965 ft Long: -116.70383105 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits **UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22 **Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech	**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							Sandy SILT (ML), slightly moist, tan.		
5	▨							5.0	
							Poorly-Graded SAND with gravel (SP), slightly moist, brown to black, fine to coarse grained, angular.	6.9	

Test Pit Depth: 6.9 ft, *Elevation:*

		Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-15

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.47849928 ft Long: -116.69774994 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
						‖‖	SILT (ML), slightly moist, tan.		
	▨					‖‖			
5						‖‖			
						░	Silty SAND (SM), moist, brown, very fine grained.	6.2	
								8.2	

Test Pit Depth: 8.2 ft, *Elevation:*

Remarks:

618 South 25th Street
Billings, MT 59101
Phone: (406) 248-9161
Fax:

TETRA TECH

TP-16

Sheet 1 of 1

Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.48443481 ft Long: -116.70762806 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) ***Elev. (ft)***	**Sample Type**	**MC (%)**	**LL**	**PL**	**-200 (%)**	**Lithology**	**Material Description**	**Depth (ft)** ***Elev. (ft)***	**Remarks and Other Tests**
							SILT (ML), slightly moist, tan.		
5								6.2	
							Silty SAND (SM), moist, tan, very fine grained.	9.1	

Test Pit Depth: 9.2 ft, *Elevation:*

		Remarks:

TP-17

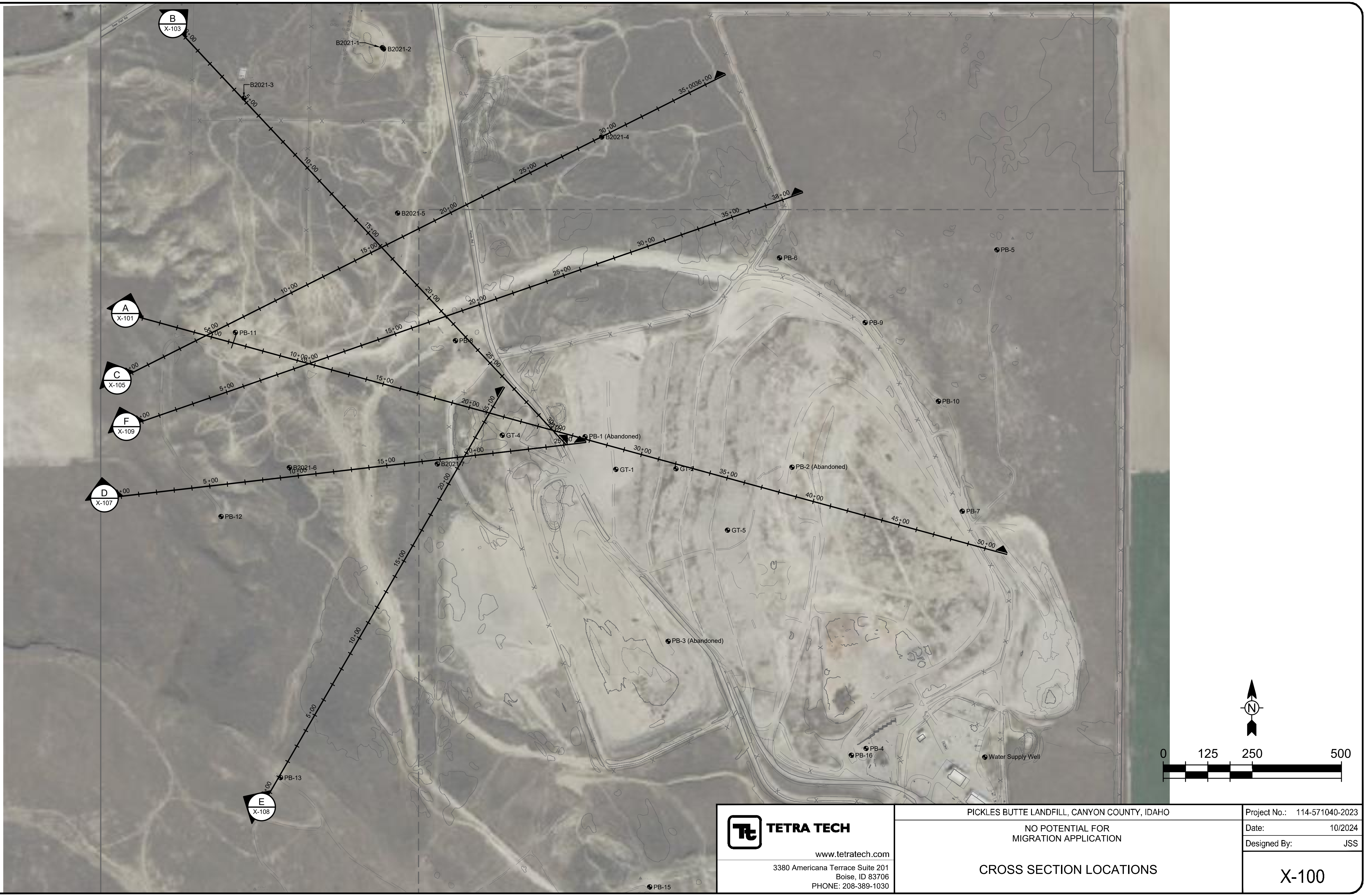
Project: Pickles butte test pits		**Rig:** CAT 312D	**Location Coordinates** Lat: 43.47849928 ft Long: -116.69774994 ft	**Station:** **Offset:**
Project Number: Pickles butte test pits	**UPN:**	**Dimensions:**	**System:** Decimal Degrees **Datum:** NAD83	**Top of Surface Elevation:**
Date Started: 10/11/22	**Date Finished:** 10/11/22	**Abandonment Method:** Backfilled with Cuttings	**Location Source:** Handheld GPS, Uncorrected	**Elevation Source:**
Contractor: Client **Logger:** Tetra Tech		**Comments:**		

Depth (ft) *Elev. (ft)*	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) *Elev. (ft)*	Remarks and Other Tests
							SILT (ML), slightly moist, tan.	3.9	
5							Poorly-Graded SAND (SP), moist, red to black, medium to coarse grained.	6.2	

Test Pit Depth: 6.2 ft, *Elevation:*

		Remarks:

APPENDIX D: GEOLOGIC CROSS SECTIONS



TETRA TECH

www.tetratech.com

3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION LOCATIONS

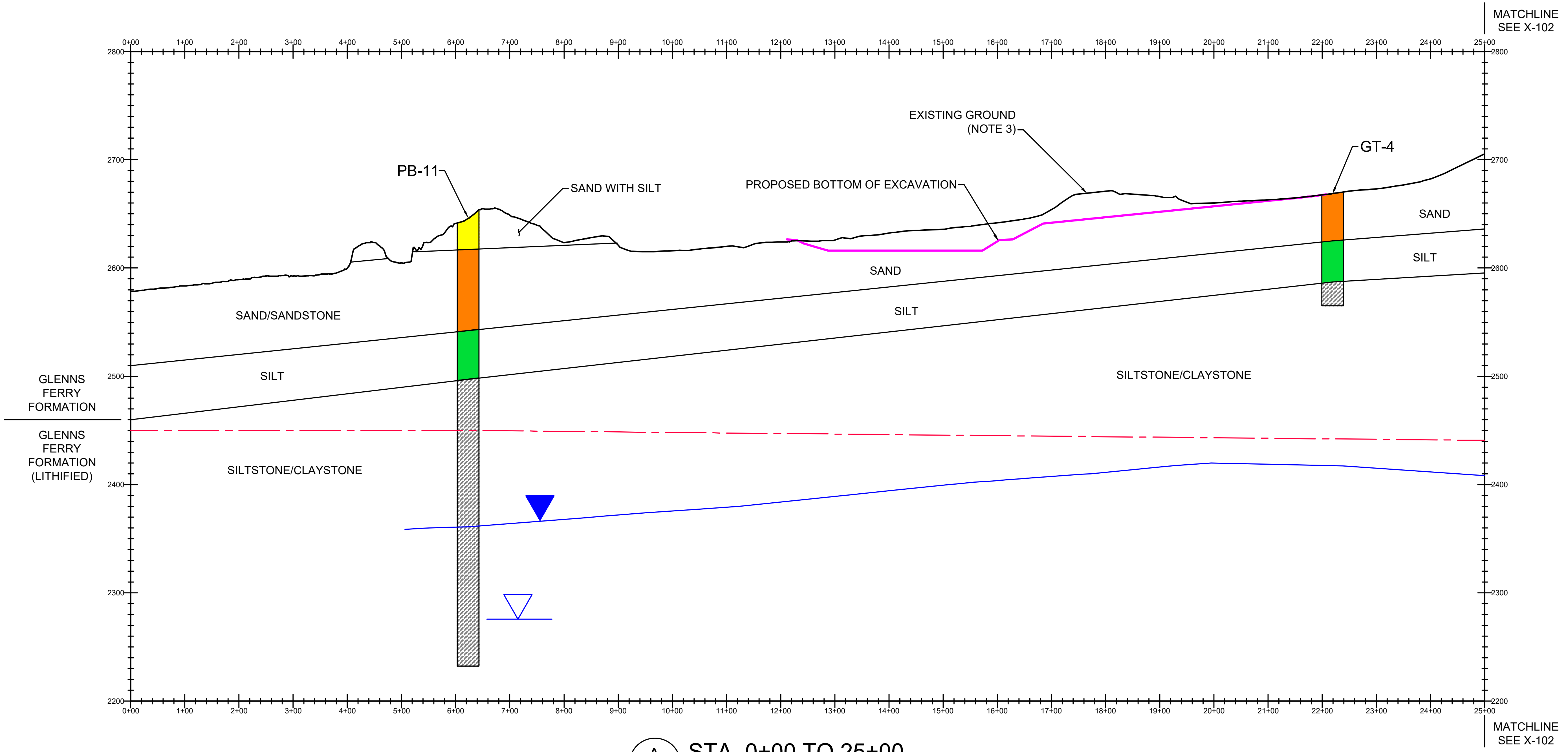
Project No.:	114-571040-2023
Date:	10/2024
Designed By:	JSS

X-100

Bar Measures 1 inch

Copyright Tetra Tech

10/1/2024 2:35 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSSECTIONS.DWG



A
X-100

STA. 0+00 TO 25+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

LEGEND

🟧 POORLY GRADED SAND - SP
🟨 SAND WITH SILT - SM
▨ POORLY GRADED GRAVEL - GP
🟩 SILT - ML
▤ CLAY - CL
▨ SILTSTONE/CLAYSTONE
🟦 BASALT
— — — ASSUMED LOCATION
▼ POTENTIOMETRIC SURFACE
▽ APPROXIMATE TOP OF WATER BEARING ZONE
— · — REDOX BOUNDARY
— PROPOSED BOTTOM OF LANDFILL

NOTES:

1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

0 100 200 400
SCALE: 1" = 200'

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION A
STA. 0+00 TO 25+00

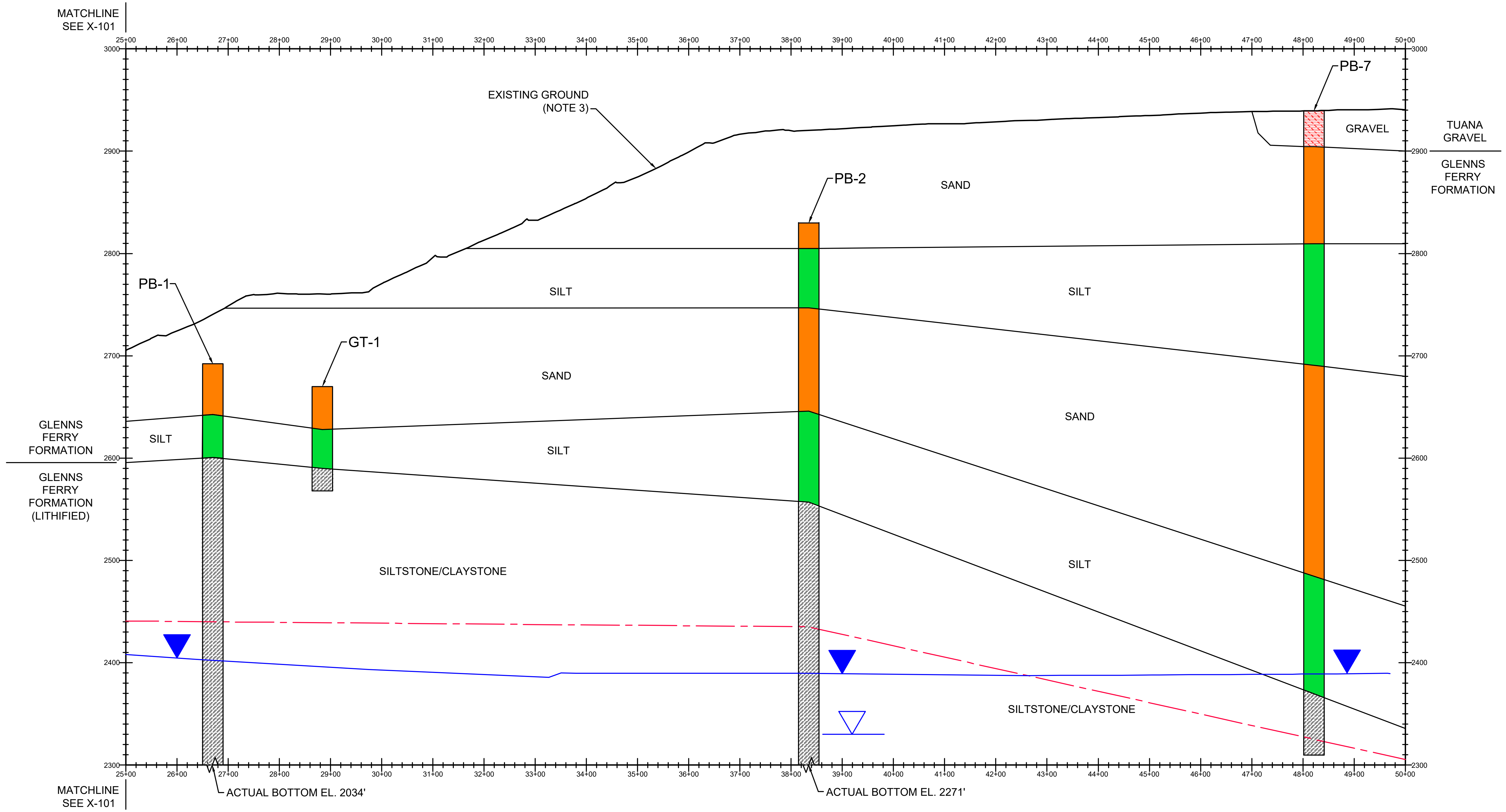
Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-101

Bar Measures 1 inch

10/1/2024 2:34 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSECTIONS.DWG

10/1/2024 2:34 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSSECTIONS.DWG



STA. 25+00 TO 50+00

A
X-100

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400

SCALE: 1" = 200'

LEGEND

🟧	POORLY GRADED SAND - SP	▤	CLAY - CL	▼	POTENTIOMETRIC SURFACE
🟨	SAND WITH SILT - SM	▨	SILTSTONE/CLAYSTONE	▽	APPROXIMATE TOP OF WATER BEARING ZONE
▨	POORLY GRADED GRAVEL - GP	🟦	BASALT	— - —	REDOX BOUNDARY
🟩	SILT - ML	— — —	ASSUMED LOCATION	━━	PROPOSED BOTTOM OF LANDFILL

NOTES:

1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH

www.tetratech.com

3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

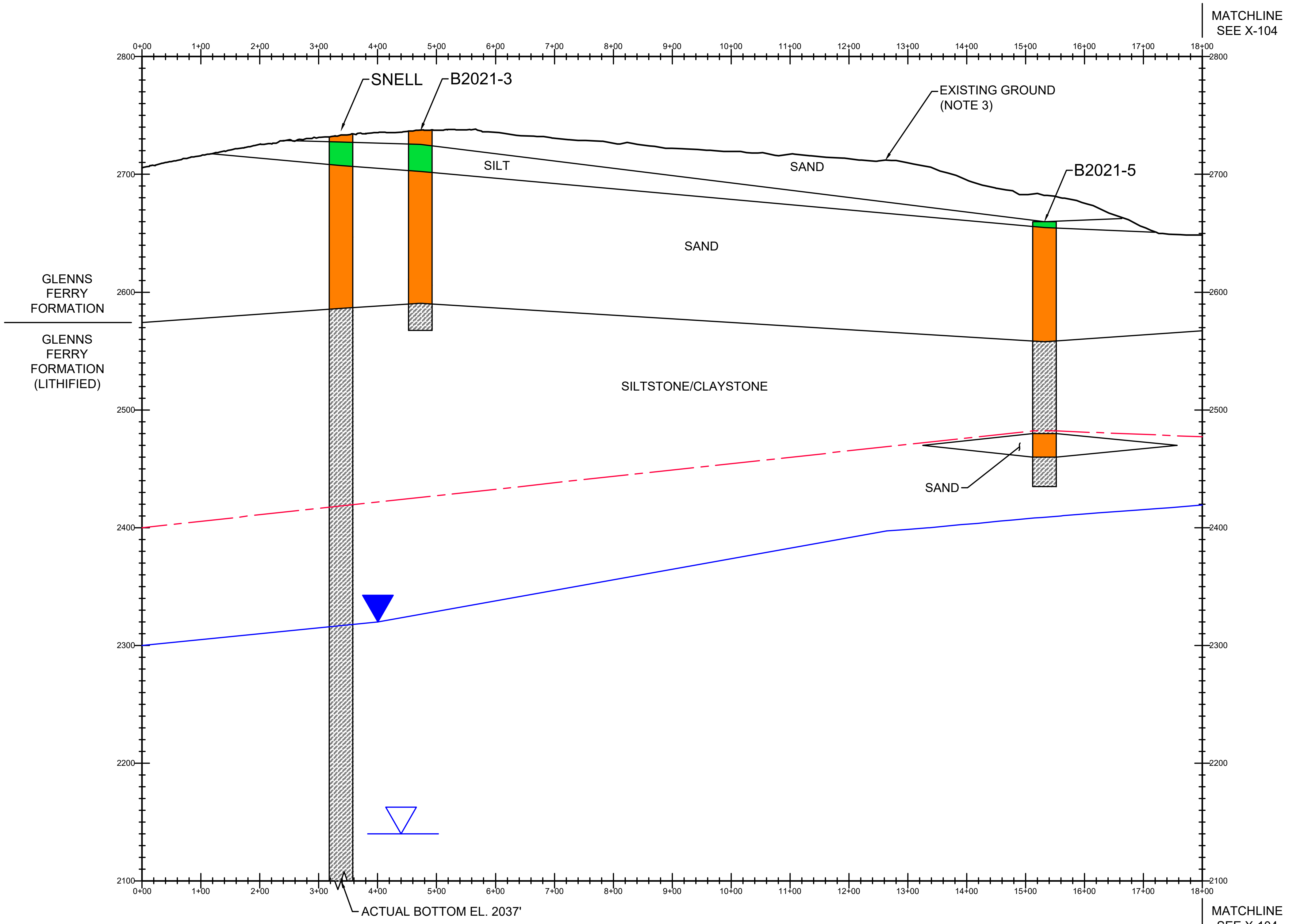
CROSS SECTION A
STA. 25+00 TO 50+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-102

Bar Measures 1 inch

10/1/2024 2:34 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSECTIONS.DWG



B
X-100

STA. 0+00 TO 18+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400

SCALE: 1" = 200'

LEGEND

🟧	POORLY GRADED SAND - SP	▤	CLAY - CL	▼	POTENTIOMETRIC SURFACE
🟨	SAND WITH SILT - SM	▨	SILTSTONE/CLAYSTONE	▽	APPROXIMATE TOP OF WATER BEARING ZONE
▨	POORLY GRADED GRAVEL - GP	🟦	BASALT	-·-	REDOX BOUNDARY
🟩	SILT - ML	— —	ASSUMED LOCATION	—	PROPOSED BOTTOM OF LANDFILL

NOTES:

1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

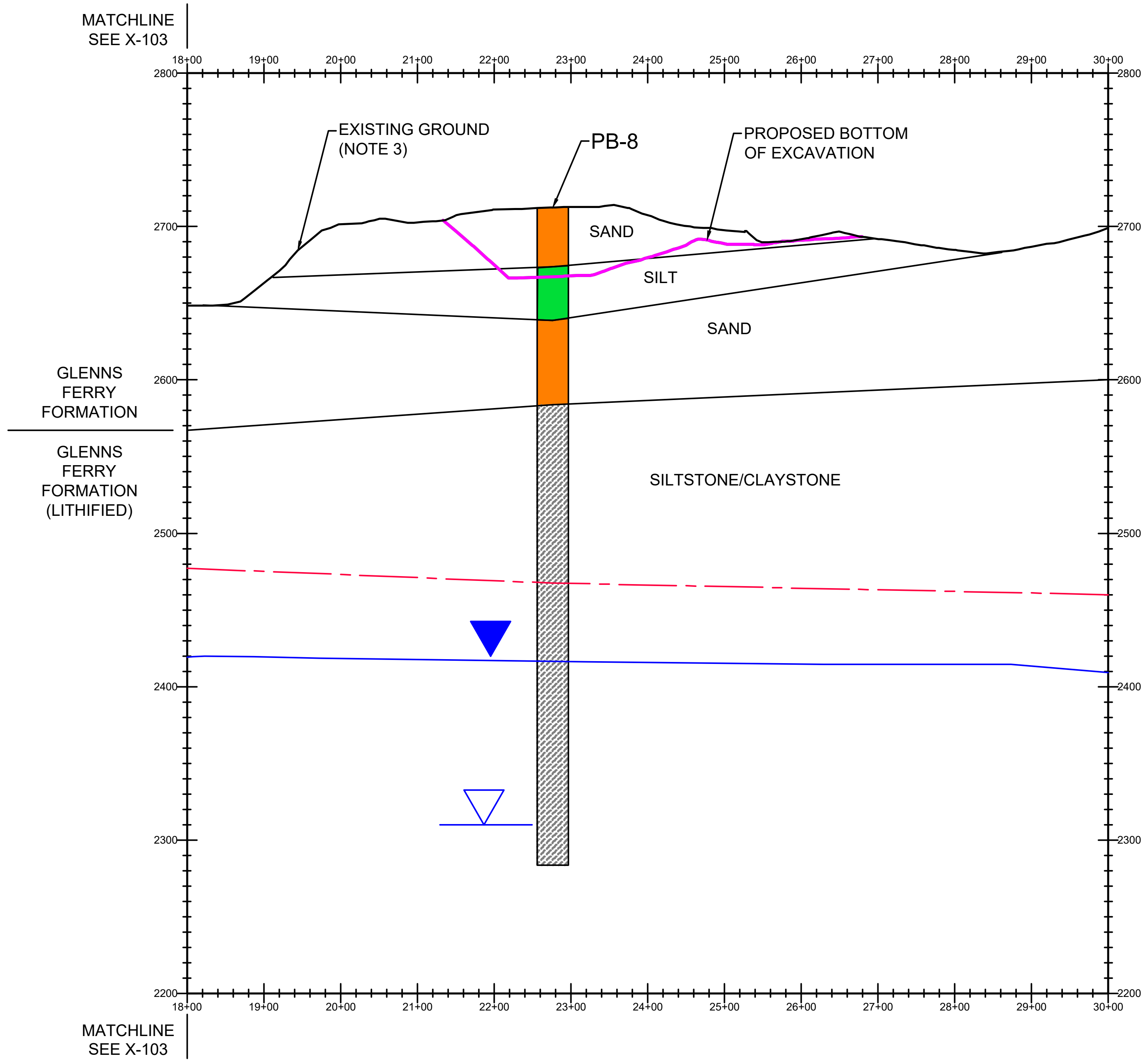
NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION B
STA. 0+00 TO 18+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-103

Bar Measures 1 inch



B
X-100

STA. 18+00 TO 30+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400
SCALE: 1" = 200'

LEGEND

🟧	POORLY GRADED SAND - SP	▤	CLAY - CL	▼	POTENTIOMETRIC SURFACE
🟨	SAND WITH SILT - SM	▨	SILTSTONE/CLAYSTONE	▽	APPROXIMATE TOP OF WATER BEARING ZONE
▦	POORLY GRADED GRAVEL - GP	▩	BASALT	— - —	REDOX BOUNDARY
🟩	SILT - ML	— — —	ASSUMED LOCATION	—	PROPOSED BOTTOM OF LANDFILL

NOTES:
1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

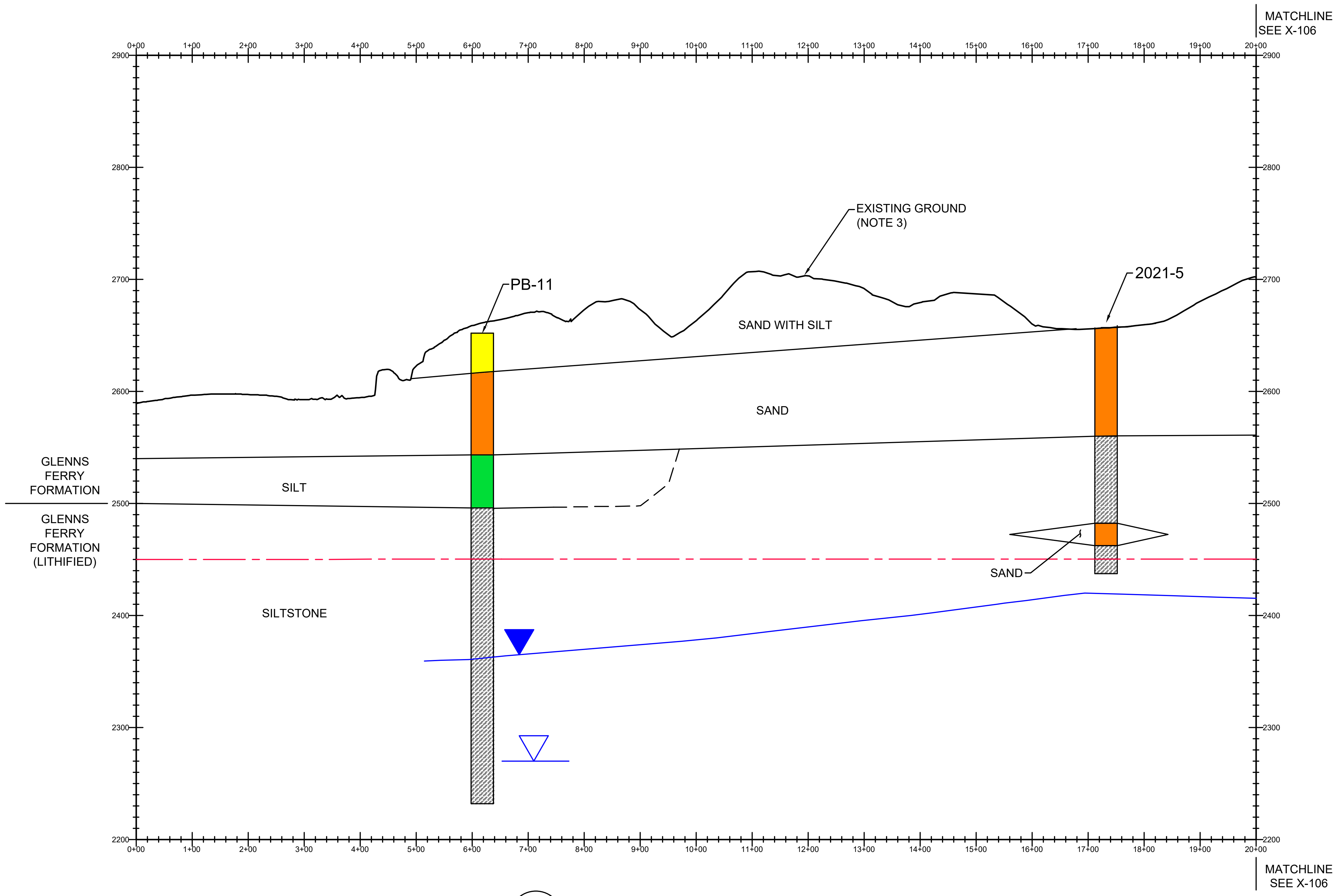
CROSS SECTION B
STA. 18+00 TO 30+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-104

Bar Measures 1 inch

10/1/2024 2:33 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSSECTIONS.DWG



C
X-100

STA. 0+00 TO 20+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400

SCALE: 1" = 200'

LEGEND

🟧 POORLY GRADED SAND - SP
🟨 SAND WITH SILT - SM
▨ POORLY GRADED GRAVEL - GP
🟩 SILT - ML
▤ CLAY - CL
▨ SILTSTONE/CLAYSTONE
▭ BASALT
— — — ASSUMED LOCATION
▼ POTENTIOMETRIC SURFACE
▽ APPROXIMATE TOP OF WATER BEARING ZONE
–·– REDOX BOUNDARY
—— PROPOSED BOTTOM OF LANDFILL

NOTES:
1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

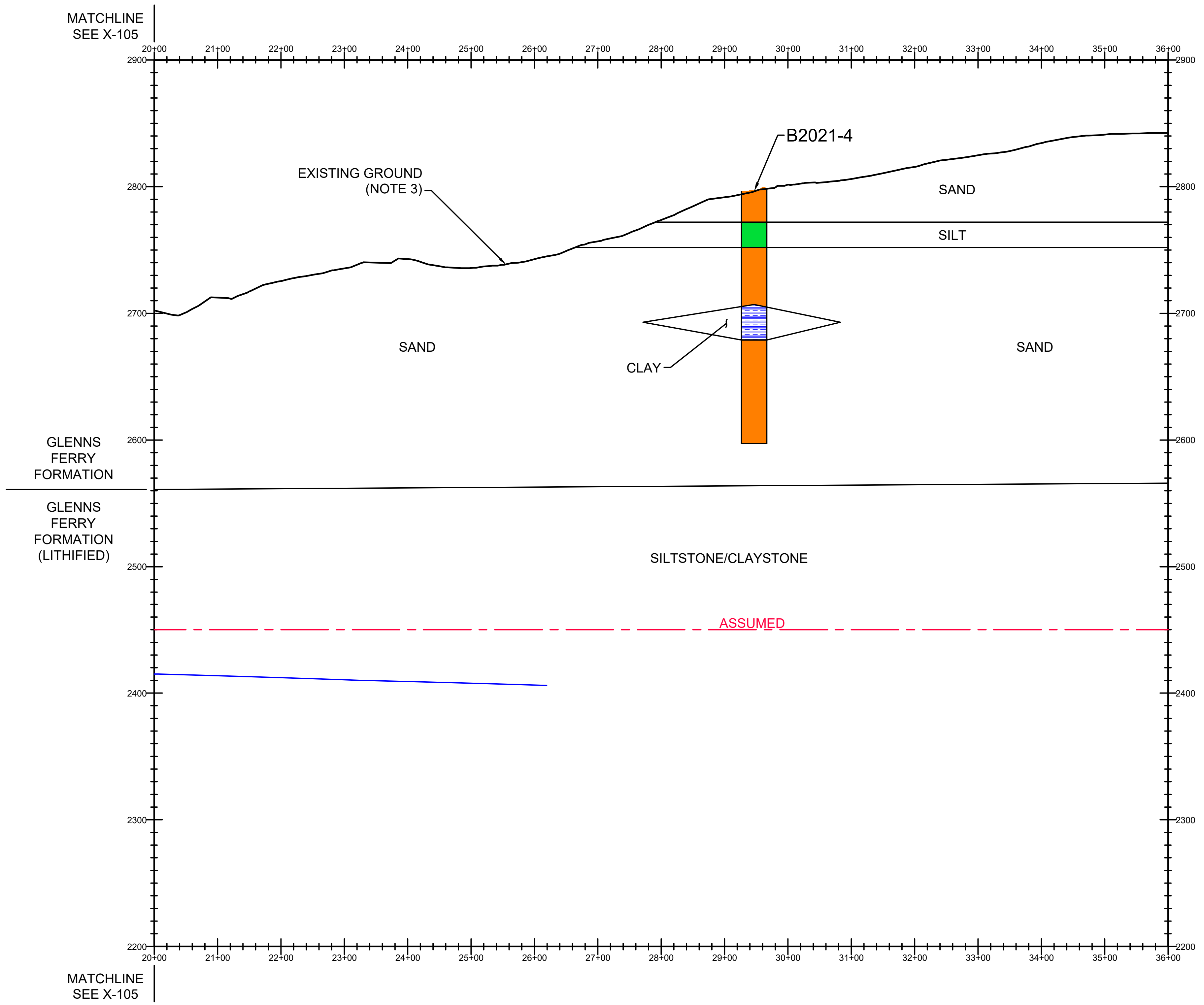
NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION C
STA. 0+00 TO 20+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-105

Bar Measures 1 inch



C
X-100

STA. 20+00 TO 30+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400

SCALE: 1" = 200'

LEGEND

- 🟧 POORLY GRADED SAND - SP
- 🟨 SAND WITH SILT - SM
- ▨ POORLY GRADED GRAVEL - GP
- 🟩 SILT - ML
- ▤ CLAY - CL
- ▨ SILTSTONE/CLAYSTONE
- 🟦 BASALT
- — — — ASSUMED LOCATION
- ▼ POTENTIOMETRIC SURFACE
- ▽ APPROXIMATE TOP OF WATER BEARING ZONE
- —·— REDOX BOUNDARY
- — PROPOSED BOTTOM OF LANDFILL

NOTES:
1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

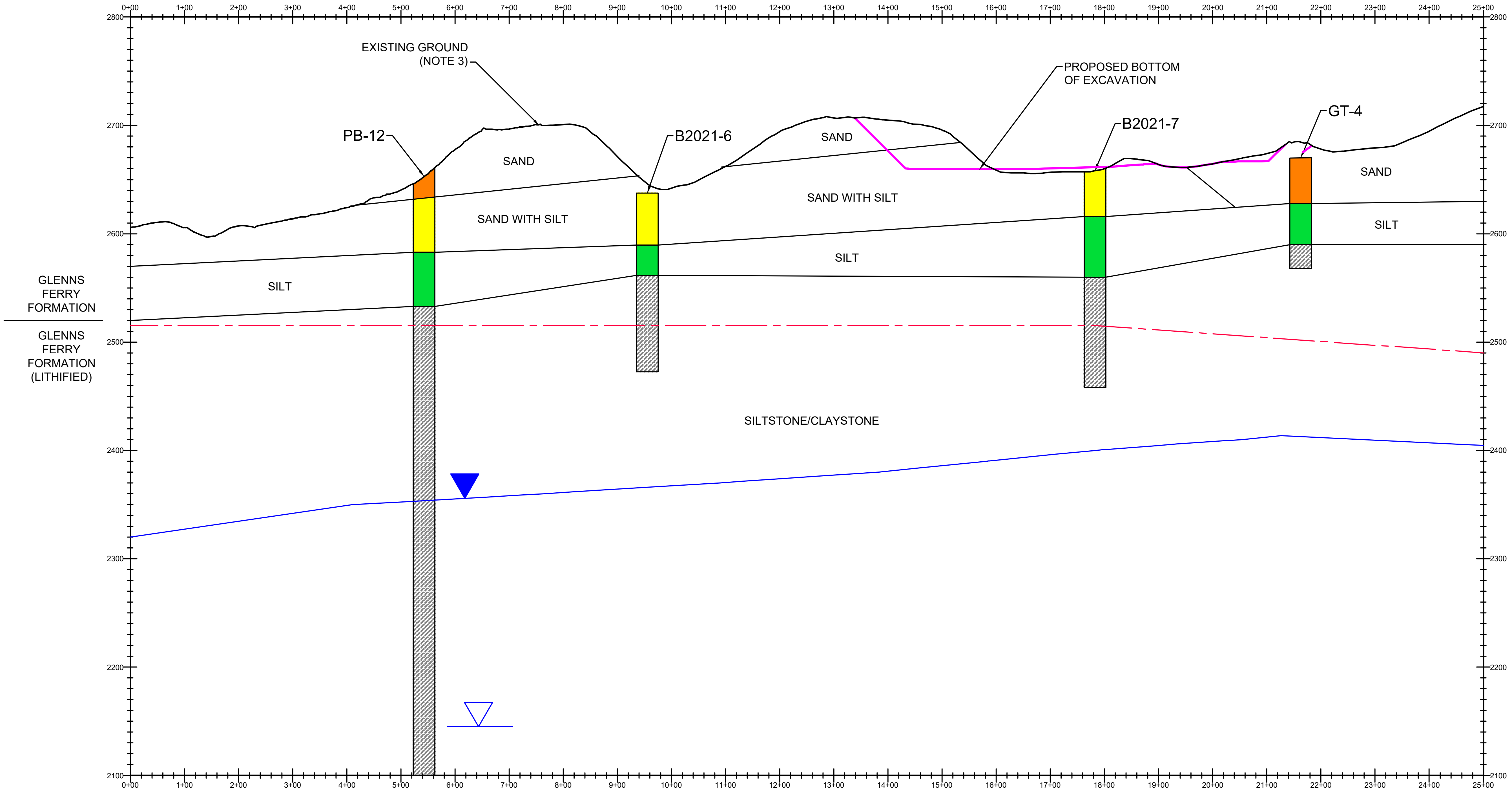
CROSS SECTION C
STA. 20+00 TO 30+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-106

Bar Measures 1 inch

10/1/2024 2:33 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSSECTIONS.DWG



SECTION D

D
X-100

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

LEGEND

🟧	POORLY GRADED SAND - SP	▤	CLAY - CL	▼	POTENTIOMETRIC SURFACE
🟨	SAND WITH SILT - SM	▨	SILTSTONE/CLAYSTONE	▽	APPROXIMATE TOP OF WATER BEARING ZONE
▨	POORLY GRADED GRAVEL - GP	🟦	BASALT	—·—	REDOX BOUNDARY
🟩	SILT - ML	— — —	ASSUMED LOCATION	—	PROPOSED BOTTOM OF LANDFILL

NOTES:

1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

0 100 200 400

SCALE: 1" = 200'

TETRA TECH
www.tetratech.com
380 Americana Terracem Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

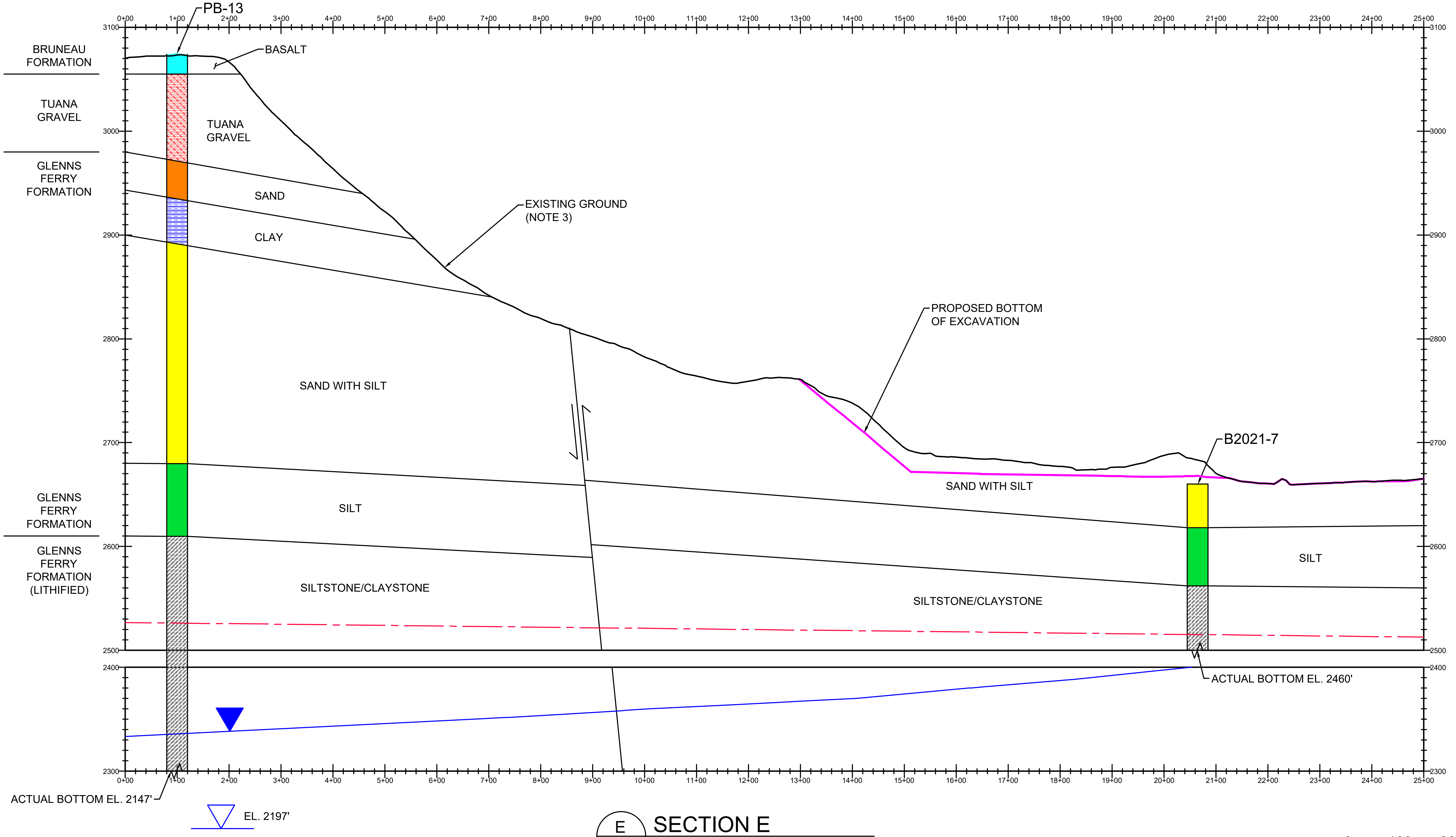
NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION D

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-107

Bar Measures 1 inch



SECTION E

E
FIG 1

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400
SCALE: 1" = 200'

LEGEND

🟧	POORLY GRADED SAND - SP	▤	CLAY - CL	▼	POTENTIOMETRIC SURFACE		
🟨	SAND WITH SILT - SM	▨	SILTSTONE/CLAYSTONE	▽	APPROXIMATE TOP OF WATER BEARING ZONE		
▨	POORLY GRADED GRAVEL - GP	▭	BASALT	— · —	REDOX BOUNDARY		
🟩	SILT - ML	— — —	ASSUMED LOCATION	——	PROPOSED BOTTOM OF LANDFILL		

NOTES:
1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

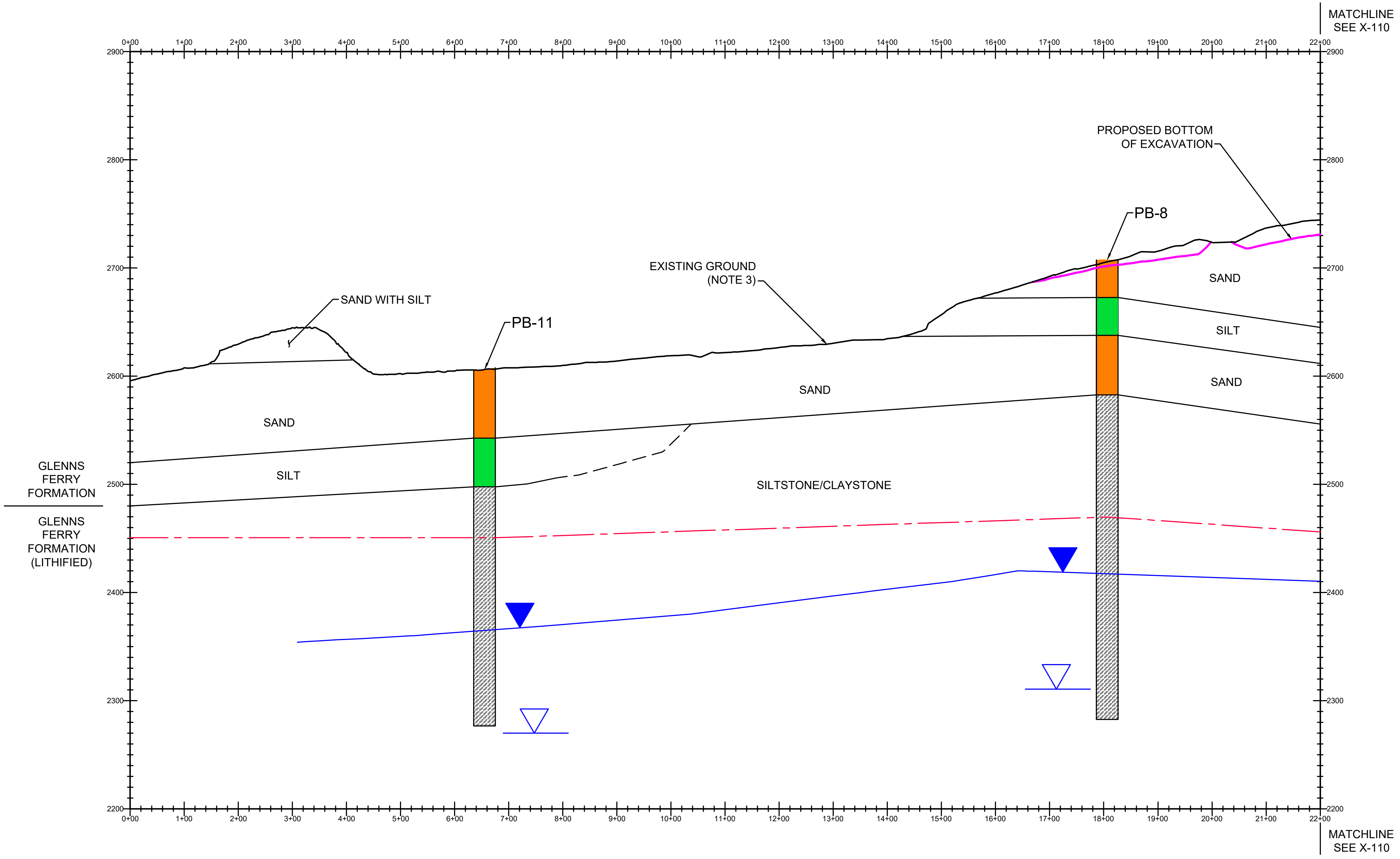
CROSS SECTION E

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-108

Bar Measures 1 inch

10/1/2024 2:33 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\GEOTECH\GEOTECH CROSSSECTIONS.DWG



F
X-100

STA. 0+00 TO 22+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'

0 100 200 400
SCALE: 1" = 200'

LEGEND

🟧 POORLY GRADED SAND - SP
🟨 SAND WITH SILT - SM
▨ POORLY GRADED GRAVEL - GP
🟩 SILT - ML

▤ CLAY - CL
▨ SILTSTONE/CLAYSTONE
▭ BASALT
— — ASSUMED LOCATION

▼ POTENTIOMETRIC SURFACE
▽ APPROXIMATE TOP OF WATER BEARING ZONE
-·- REDOX BOUNDARY
— PROPOSED BOTTOM OF LANDFILL

NOTES:
1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

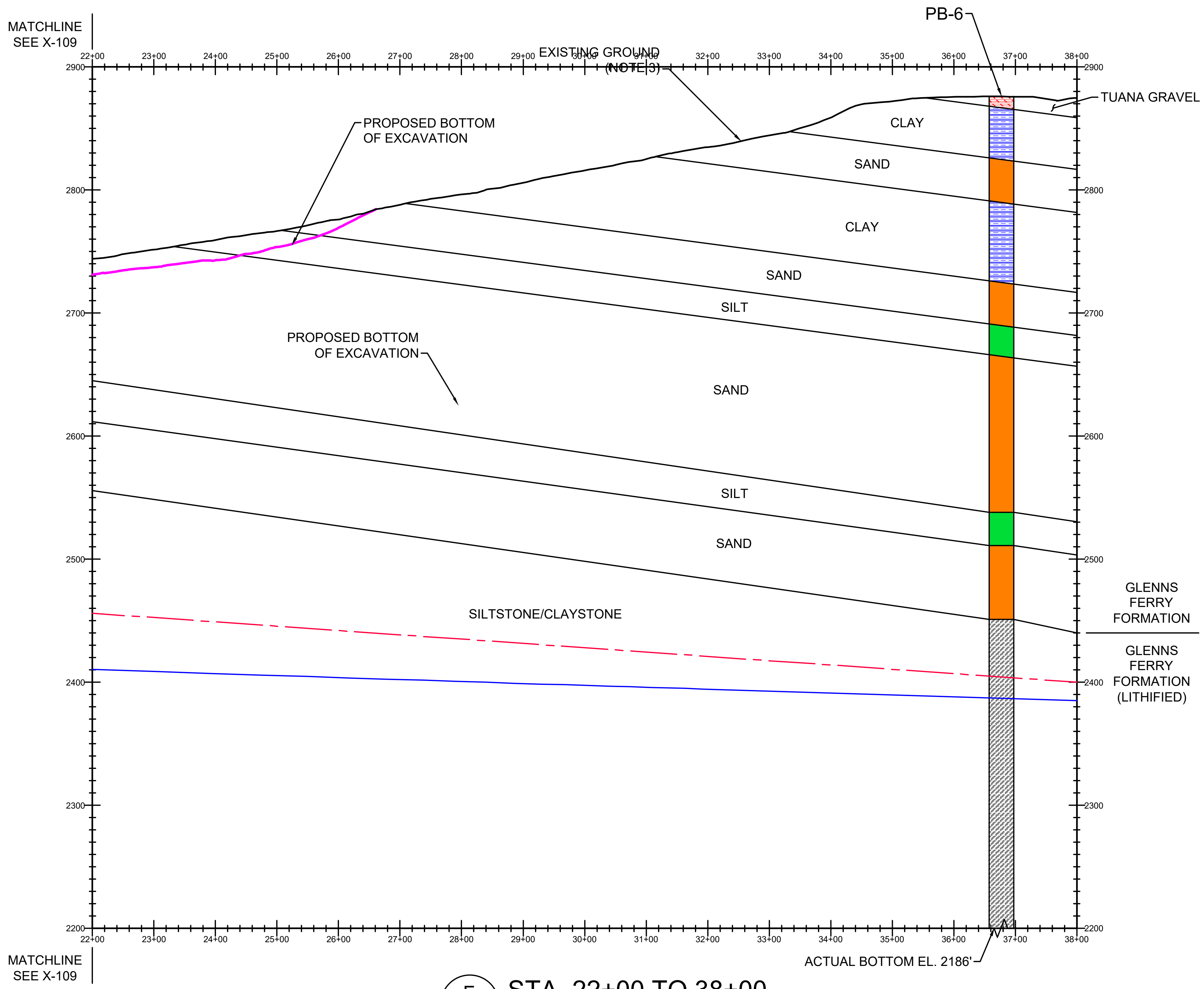
NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION F
STA. 0+00 TO 22+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-109

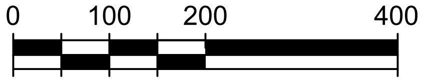
Bar Measures 1 inch



F
X-100

STA. 22+00 TO 38+00

SCALE: HORIZ. 1" = 200' VERT. 1" = 100'



SCALE: 1" = 200'

LEGEND

🟧 POORLY GRADED SAND - SP
🟨 SAND WITH SILT - SM
🟥 POORLY GRADED GRAVEL - GP
🟩 SILT - ML

▤ CLAY - CL
▨ SILTSTONE/CLAYSTONE
🟦 BASALT
— — — ASSUMED LOCATION

▼ POTENTIOMETRIC SURFACE
▽ APPROXIMATE TOP OF WATER BEARING ZONE
—·— REDOX BOUNDARY
— PROPOSED BOTTOM OF LANDFILL

NOTES:

1. THIN LAYERS AND INTERBEDS MAY NOT BE SHOWN. THIN LAYERS MAY BE COMBINED WITH THE DOMINANT UNITS FOR THE PURPOSE OF CLARITY. THE INDIVIDUAL WELL AND BORING LOGS SHOULD BE REFERENCED FOR COMPLETE LITHOLOGIC DETAILS.
2. SEE X-100 FOR CROSS-SECTION LOCATIONS.
3. EXISTING GROUND IS BASED ON 2023 AERIAL SURVEY.

TETRA TECH
www.tetratech.com
3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

NO POTENTIAL FOR
MIGRATION APPLICATION

CROSS SECTION F
STA. 22+00 TO 38+00

Project No.: 114-571040-2023
Date: 10/2024
Designed By: JSS

X-110

Bar Measures 1 inch

APPENDIX E: WELL AND BORING LOGS

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Water Resources

PB-1 Original Shop Well

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, **Department of Water Resources within 30** days after the completion or abandonment of the well.

1. WELL OWNER

Name CANYON COUNTY

Address CALdWeLL, IdAHo

Owner's Permit No. ______

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)

☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 20 inches Total depth 658 feet

Casing schedule: ☒ Steel ☐ Concrete

Thickness		Diameter		From		To	
.375	inches	16	inches	+2	feet	575	feet
.250	inches	10	inches	537	feet	577	feet
.250	inches	10	inches	637	feet	658	feet
	inches		inches		feet		feet
	inches		inches		feet		feet

Was casing drive shoe used? ☒ Yes ☐ No

Was a packer or seal used? ☒ Yes ☐ No

Perforated? ☐ Yes ☐ No

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation ______ inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No

Manufacturer's name JOHNSON

Type STAINLeSS Model No. ______

PS Diameter 10 Slot size 25 Set from 577 feet to 637 feet

Diameter ___ Slot size ___ Set from ______ feet to ______ feet

Gravel packed? ☒ Yes ☐ No Size of gravel NO16 DeLMonTe

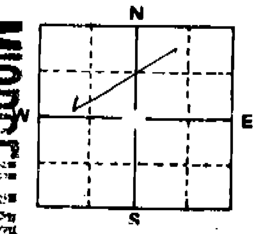
Placed from 537 feet to 658 feet

Surface seal depth 20 **Material used in seal** ☒ **Cement grout** ☐ **Puddling clay** ☐ **Well cuttings**

Sealing procedure used ☐ **Slurry pit** ☒ **Temporary surface casing** ☐ **Overbore to seal depth**

6. LOCATION OF WELL

Sketch map location must agree with written location. 63



Subdivision Name ______

Lot No. ______ **Block No.** ______

County CANYON

SW ¼ NW ¼ Sec. 21, T. 2 N/~~S~~, R. 3 ~~E~~/W

7. WATER LEVEL

Static water level 339 feet below land surface

Flowing? ☐ Yes ☐ No G.P.M. flow ______

Temperature ______ ° F. Quality ______

Artesian closed-in pressure ______ p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☒ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
8 GPM	161	3

9. LITHOLOGIC LOG

106783

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
20"	0	3	Top Soil		
"	3	48	SAND 20% CLAY		
"	48	152	SANDy CLAY		
"	152	205	yeLLow CLAY		
"	205	251	GRAY CLAY STicKY		
20	251	297	BLueL SHALe		
20	297	327	BLue CLAY 10% SAND		
20	327	520	BLue CLAY (SHALe)		
18	520	595	GRey SHALe.		
16	595	640	SHALe, SANdy	✓	
16	640	658	BLue CLAY		

RECEIVED
FEB 23 1978
Department of Water Resources
Western Regional Office

10.

Work started 10/4/77 finished 2/10/78

11. DRILLERS CERTIFICATION

Firm Name WiTT Drilling **Firm No.** 55

Address CALdweLL, Ida **Date** 2/10/78

Signed by (Firm Official) Kenneth Witt

and

(Operator) Claude DuFoe.

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE COPY TO THE DEPARTMENT

RECEIVED
MAR 2 1993
Department of Water Resources

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

USE TYPEWRITER OR BALLPOINT PEN

HOLE # PB-2

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER PICKLES BUTTE

Name CANYON COUNTY LANDFILL
Address 1115 ALBANY, CALDWELL, ID 83605
Drilling Permit No. 63-92-W-275-001
Water Right Permit No. ____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☒ Mud ☐ Other ____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☐ Steel ☐ Concrete ☒ Other STAINLESS STEEL

Thickness		Diameter			From		To	
SCH 10	inches	4"	inches	+	0	feet	408	feet
SCH 10	inches	4"	inches		420	feet	518	feet
	inches		inches			feet		feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ____ inches by ____ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No
Manufacturer HOUSTON SCREEN Type WIRE WRAP
Top Packer or Headpipe —
Bottom of Tailpipe —

Diameter 4" Slot size .020" Set from 409 feet to 419 feet
Diameter 4" Slot size .020" Set from 519 feet to 589 feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10/20
Placed from 530 feet to 515 feet
420 407

Surface seal depth 407 Material used in seal: ☒ Cement grout ☒ Bentonite ☐ Puddling clay ☐ ____
Sealing procedure used: ☒ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata

Describe access port WELL TOP

6. LOCATION OF WELL

Sketch map location **must** agree with written location.

Subdivision Name NE 1/4 SW 1/4 SECTION 21, T2N, R3W
Lot No. ____ Block No. ____
County CANYON
Address of Well Site PICKLES BUTTE LANDFILL
(give at least name of road)
NE 1/4 SW 1/4 Sec. 21, T. 2N N ☐ or S ☐, R. 3W E ☐ or W ☐

7. WATER LEVEL

Static water level 392.0 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ____
Artesian closed-in pressure ____ p.s.i.
Controlled by: ☐ Valve ☒ Cap ☐ Plug
Temperature 90 °F. Quality POOR-VERY HARD
Describe artesian or temperature zones below.

8. WELL TEST DATA N/A

☐ Pump ☐ Bailer ☐ Air ☐ Other ____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG 075106

Bore	Depth		Material	Water	
Diam.	From	To		Yes	No
12 1/4	0	100	TAN SILTY FINE SAND		✓
12 1/4	100	140	TAN SILT		✓
12 1/4	140	160	TAN CLAY SILT		✓
12 1/4	160	185	TAN SILTY CLAY		✓
12 1/4	185	215	TAN CLAY STONE SILTY		✓
12 1/4	215	262	TAN CLAY STONE		✓
8	262	400	GRAY CLAY STONE	✓	
8	400	440	GRAY CLAY STONE	✓	
8	440	520	GRAY CLAY STONE		✓
8	520	823	GRAY CLAY STONE	✓	
8	823	860	GREEN GRAY FINE SANDY CLAY	✓	

MICROFILMED
AUG 1 8 1997

10.

Work started 8-29-92 finished 10-23-92

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name BOYLES BROS. Firm No. 503
Address BOX 25068 SALT LAKE CITY, UT 84125 Date 11-9-92
Signed by Drilling Supervisor Barry K Hill
and
(Operator) ____ *(If different than the Drilling Supervisor)*

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

RECEIVED
MAR 2 1993
Department of Water Resources

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED
FEB 4 1993
Department of Water Resources

USE TYPEWRITER OR
BALLPOINT PEN

WELL DRILLER'S REPORT

HOLE # PB-3

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER PICKLES BUTTE

Name CANYON COUNTY LANDFILL

Address 1115 ALBANY, CALDWELL, ID 83605

Drilling Permit No. 63-92-W-275-002

Water Right Permit No. ____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ____ (specify type)

4. METHOD DRILLED

☒ Rotary ☐ Air ☐ Auger ☐ Reverse rotary
☐ Cable ☐ Mud ☐ Other ____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel S.S. ☐ Concrete ☐ Other ____

Thickness		Diameter		From		To	
SCH 10	inches	4"	inches	+ 0'	feet	560'	feet
SCH 10	inches	4	inches	586'	feet	604'	feet
	inches		inches		feet		feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☒ Yes ☐ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ____ inches by ____ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No
Manufacturer HOUSTON MONITER FLOW Type STAINLESS
Top Packer or Headpipe —
Bottom of Tailpipe —

Diameter 4" Slot size .020 Set from 610' feet to 625' feet
Diameter 4" Slot size .020 Set from 565' feet to 580' feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10-20
Placed from 605'-645' feet to 560'-585' feet

Surface seal depth 560 Material used in seal: ☒ Cement grout
☒ Bentonite ☐ Puddling clay ☐ ____
Sealing procedure used: ☒ Slurry pit
☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port TOP OF CASING

6. LOCATION OF WELL

Sketch map location **must** agree with written location.

N
W E
S

Subdivision Name ____

Lot No. ____ Block No. ____

County CANYON

Address of Well Site PICKLES BUTTE LANDFILL
(give at least name of road)

T. 2N N ☒ or S ☐
NE ¼ SW ¼ Sec. 21 , R. 3 W E ☐ or W ☒

7. WATER LEVEL

Static water level 605 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow —
Artesian closed-in pressure — p.s.i.
Controlled by: ☐ Valve ☒ Cap ☐ Plug
Temperature 90 °F. Quality POOR
Describe artesian or temperature zones below.

8. WELL TEST DATA N/A

☐ Pump ☐ Bailer ☐ Air ☐ Other ____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG 075107

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
9 5/8	0'	300'	ALLUVIUM SAND & SILT		X
8"	300'	420'	CLAY		X
8"	420'	610'	CLAY STONE		X
8"	610'	680'	CLAY STONE	X	

MICROFILMED

10. AUG 1 8 1997
Work started SEPT 21, 1992 finished OCT 26, 1992

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name BOYLES BROS. Firm No. 503

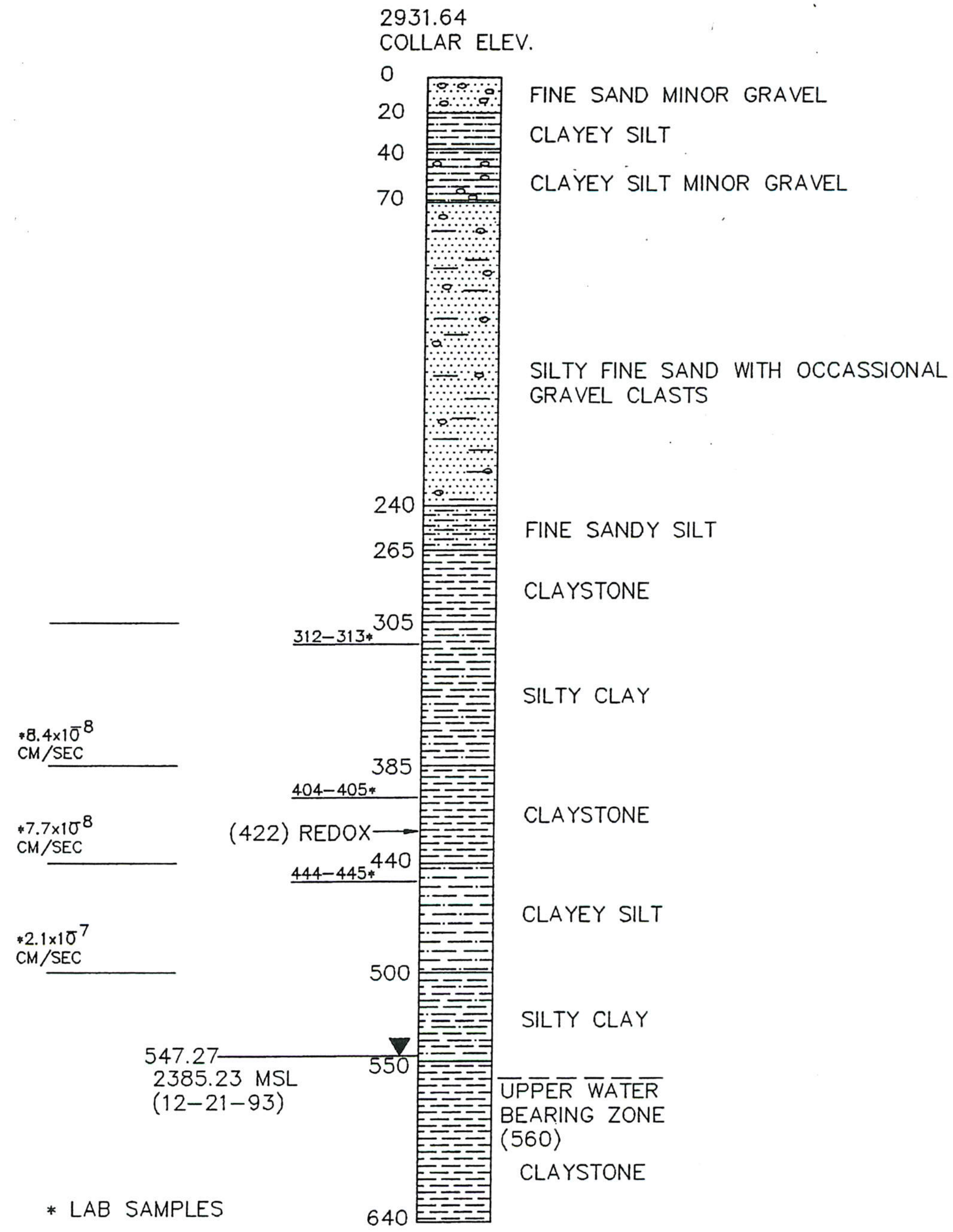
Address BOX 25068 Date 11-9-92
SALT LAKE CITY, UT 84105

Signed by Drilling Supervisor Mark Hill

and

(Operator) ____
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT



LINER TOP ELEV. 2934.98

1" = 100' VERT. FEET

HOLLADAY ENGINEERING CO.
ENGINEERS ○ CONSULTANTS

1431 HWY. 95, BUS. ALT.
P. O. BOX 235
PAYETTE, IDAHO 83661
208–642–3304
FAX; 208–642–2159

GEOLOGIC SCHEMATIC OF BOREHOLE

PB–4

JOB NO. 120491D

DATE: 4–93

TIME:

DN SLG

CK WBS

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

USE TYPEWRITER OR BALLPOINT PEN

PB-5

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL
Address 115 Albany, Caldwell, ID 83605
Drilling Permit No. 63-93-W-0554-~~001~~004
Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other ______

Thickness	Diameter	From	To
.25 inches	4 inches	+ 2.5 feet	512.5 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ______ inches by ______ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☐ No
Manufacturer Houston Type Pre-pack
Top Packer or Headpipe
Bottom of Tailpipe

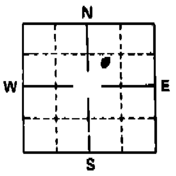
Diameter 4 Slot size .020 Set from 512.5 feet to 522.5 feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10/20
Placed from 496 feet to 535 feet

Surface seal depth 400-496 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ ______
Sealing procedure used: ☒ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with locking cap and protective cover

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Landfill
Lot No. ______ Block No. ______
County Canyon
Address of Well Site Perch Road, Pickles Butte
(give at least name of road)

SW ¼ NE ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 514 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ______
Artesian closed-in pressure ______ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 77 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ______

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

70568

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12¾	0	40	tan fine sandy silt		
"	40	48	brown sandy gravel		
"	48	140	tan silty clay		
"	140	185	gray silty fine sand		
"	185	225	gray fine to med sand		
"	225	240	light gray clayey silt		
"	240	250	light gray silty fine sand		
"	250	275	tan clay		
"	275	320	fine to med sand		
"	320		mixed gray fine sand and		
"		400	tan clayey silts		
"	400	435	gray fine sand		
12¾	435	455	no sample		
10"	455	485	tan gray silty claystone		
10"	485	560	gray brown silty fine sand	x	
5¼"	560	620	clayey silt and fine sand	x	
5¼"	620	660	blue gray claystone		

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

FEB 09 1994

10.

Work started 7-7-93 finished 11-23-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address Box 25608 Salt Lake, Ut Date 11-23-93
Signed by Drilling Supervisor
and
(Operator) ______
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

USE TYPEWRITER OR BALLPOINT PEN

PB-6

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL
Address 6284 Perch Road, Caldwell
Drilling Permit No. 63-93-W-0554-001
Water Right Permit No. ______

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other ______

Thickness		Diameter		From		To	
.25	inches	4	inches	+ 2.5	feet	487.5	feet
	inches		inches		feet		feet
	inches		inches		feet		feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ______ inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☐ Yes ☐ No
Manufacturer Houston Type Stainless Steel
Top Packer or Headpipe ______
Bottom of Tailpipe ______

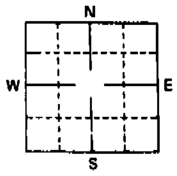
Diameter 4 Slot size .020 Set from 487.5 feet to 497.5 feet
Diameter ______ Slot size ______ Set from ______ feet to ______ feet
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel ______
Placed from 478 feet to 515 feet

Surface seal depth 478 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ ______
Sealing procedure used: ☐ Slurry pit
☒ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with locking cap and protective cover.

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Landfill
Lot No. ______ Block No. ______
County Canyon
Address of Well Site 6284 Perch Road
(give at least name of road)
SE ¼ NW ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 491 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ______
Artesian closed-in pressure ______ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 75 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ______

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

70567

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12 3/4	0	17	silty sand		
"	17	18	sandy gravel		
"	18	60	tan silty clay		
"	60	95	med sand		
"	95	125	tan calyey silt		
"	125	160	tan clay		
12 3/4	160	195	fine sand		
7 7/8	195	220	silty clay		
"	220	360	fine and med sand		
"	360	380	tan clayey silt		
"	380	435	fine sand		
"	435	510	435-490 tan, 490-510 gray silt x		
"	510	620	gray silty clay		
"	620	690	gray clay stone		
7 7/8	690	700	gray silty clay		

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

10.

Work started 7-31-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address ______ Date 11-23-93
Signed by Drilling Supervisor Gary K Hill
and
(Operator) ______
(If different than the Drilling Supervisor)

MICROFILMED
09 1994

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

PB-7

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL
Address 6284 Perch Road, Caldwell
Drilling Permit No. 63-93-w-0554-~~001~~ 003
Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness		Diameter			From		To	
.25	inches	4	inches	+	2.2	feet	535	feet
	inches		inches			feet		feet
	inches		inches			feet		feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? inches by inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No
Manufacturer Houston Type Wire Wrap
Top Packer or Headpipe
Bottom of Tailpipe

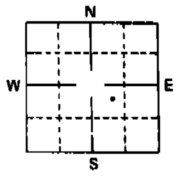
Diameter 4" Slot size .02 Set from 535 feet to 555 feet
Diameter Slot size Set from feet to feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10/20
Placed from 525 feet to 566 feet

Surface seal depth 520 Material used in seal: ☒ Cement grout
☐ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit
☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with protective cover and lock

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Landfill
Lot No. Block No.
County Canyon
Address of Well Site 6284 Perch Road
(give at least name of road)
NW ¼ SE ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

FEB 09 1994

7. WATER LEVEL

Static water level 539' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed-in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 77 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

70565

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12¾	0	25	tan clayey sand		
"	25	35	sandy gravel		
"	35	55	fine sand		
"	55	65	tan clayey silt		
"	65	130	fine and med sand		
"	130	185	tan clay		
"	185	210	clayey fine sand		
"	210	250	silty clay		
"	250	260	fine sand		
"	260	280	clayey silt		
"	280	370	fine sand		
"	370	390	clayey silt		
12¾	390	455	fine sand		
10"	455	515	silt		
"	515	525	tan clayey silt		
"	525	540	gray clayey silt	x	
10"	540	570	gray clay	x	
5¼"	570	600	gray silty clay		
5¼"	600	630	blue gray clay		

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

10.

Work started 10-01-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address Date 11-23-93
Signed by Drilling Supervisor Doug Hill
and
(Operator)
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

C

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

PB-8

70566

1. WELL OWNER

Name CANYON COUNTY (PICKLES BUTTE LANDFILL)
Address 115 Albany, Caldwell, ID 83605
Drilling Permit No. 63-93-W-0554-~~001~~ 002
Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☐ Steel ☐ Concrete ☒ Other Stainless

Thickness	Diameter	From	To
.25 inches	4 inches	+ 2.5 feet	377 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☒ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? .020 inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No
Manufacturer Houston Type Stainless Steel
Top Packer or Headpipe
Bottom of Tailpipe 10' S.S. Sump

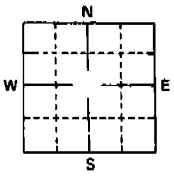
Diameter 4" Slot size .020 Set from 377 feet to 407 feet
Diameter ______ Slot size ______ Set from ______ feet to ______ feet
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel ______
Placed from 299 feet to 424 feet

Surface seal depth 294 Material used in seal: ☒ Cement grout
☒ Bentonite ☐ Puddling clay ☐ ______
Sealing procedure used: ☐ Slurry pit
☒ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with protective cover and locking cap.

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Sanitary Landfill
Lot No. ______ Block No. ______
County Canyon
Address of Well Site Perch Road, Pickle Butte
(give at least name of road)
SW ¼ NW ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

FEB 09 1994

7. WATER LEVEL

Static water level 393' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ______
Artesian closed-in pressure ______ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 74 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ______

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12¾	0	10	tan silty sand		x
"	10	25	tan clayey silt		x
"	25	35	fine sand		x
"	35	50	tan clayey silt		x
"	50	70	tan clay		x
"	70	100	silty fine sand		x
"	100	105	clay		x
"	105	115	fine sand		x
"	115	120	tan clay		x
"	120	125	fine sand		x
"	125	145	tan silty clay		x
"	145	150	sand with cobbles		x
"	150	240	tan silty clay		x
"	240	365	gray clay		x
12¾	365	424	gray clay	x	

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

10.

Work started 10-26-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address ______ Date 11-23-93
Signed by Drilling Supervisor Hill
and
(Operator) ______
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD TH[illegible] TO THE DEPART[illegible]T

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

63855

Use Typewriter
or
Ball Point Pen

PB-9

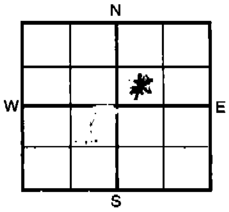
1 of 2

1. DRILLING PERMIT NO. 63-95-W-0564-001
Other IDWR No.

2. OWNER: County of Canyon
Name HOLLADAY ENGINEERING
Address 1431 BUS ALT HWY 95
City PAYETTE State ID Zip 83661

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.



Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, SW 1/4 NE 1/4 ___ 1/4
10 acres 40 acres 160 acres
Gov't Lot ___ County Canyon

Address of Well Site Pickle Butte Dump
PB #9 City
(Give at least name of road + Distance to Road or Landmark)

Lt. ___ Blk. ___ Sub. Name ___

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
Bentonite	0	381	12000#	Pour

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y ☐ N ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
4"	+3	508		Stainless	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ___ Length of Tailpipe 5'

9. PERFORATIONS/SCREENS
☐ Perforations Method
☒ Screens Screen Type HUSTON

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
508	543	.020		4"	SS	☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
513.11 ft. Toc below ground Artesian pressure ___ lb.
Depth flow encountered ___ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
		RECEIVED	
		NOV 27 1995	

Water Temp. ___ Bottom hole temp. ___
Department of Water Resources
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
12	1	10	TOP SOIL & DUST		
	10	17	GRAVEL IN HARD PAN		
	17	28	LARGER GRAVEL & HARD PAN		
	28	30	CLAY & SMALL GRAVEL		
	30	32	MORE GRAVEL LOOSER		
	32	40	CLAY - TIGHT IN SMALL GRAVEL		
10	40	90	CLAY - TIGHT IN SMALL GRAVEL		
	90	95	COARSE SAND IN CLAY		
	95	112	SANDY CLAY		
	112	120	CLAY		
	120	135	CLAY W/COARSE SAND		
	135	180	HARD CLAY		
	180	182	SUPER HARD CLAY		
	182	205	CLAY		
	205	210	COARSE SAND & CLAY		
	210	263	VERY HARD CLAY THRU REG		
	263	265	VERY HARD CLAY		
	265	305	SOFT CLAY/SANDY CLAY		
	305	315	SAND		
	315	375	CLAY		
	375	400	VERY HARD CLAY (CLAY ROCK)		
	400	405	SOFT SANDY CLAY / CLAY		
	405	430	REG CLAY		
	430	435	SOFT CLAY OR SANDY CLAY		
	435	445	CLAY REG TYPE		
	445	455	HARD CLAY W/DARK PEA GRAVEL/COARSE	SAND	
	455	465	SAME " " " " "		"
	465	470	SOFT CLAY LIKE SANDY CLAY		
	470	475	CLAY		
	475	480	CLAYSTONE & SANDSTONE LIKE	PCS	
8	480	487	" " " " "	"	
	487	510	GRAY BLUE CLAY		
			CONTINUED		

Completed Depth 544 MAR 07 1996 (Measurable)
Date: Started ___ Completed ___

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON PUMP & DRILLING Firm No. 0457

Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

C

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

63856

Use Typewriter
or
Ball Point Pen

PG 2082

PB-9

1. DRILLING PERMIT NO. 63-95-W-0564-001
Other IDWR No.

2. OWNER:
Name
Address
City State Zip

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, ____ 1/4 (10 acres) SW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County Canyon

Address of Well Site
City
(Give at least name of road + Distance to Road or Landmark)

Lt. Blk. Sub. Name

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y ☐ N ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
____ ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. Bottom hole temp.
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	510	511	FRAC GRAY & BLUE CLAY		
	511	518	REG. " / " "		
	519	528	FRAC CLAY		
	528	528.6	VERY HARD CLAY BLUE/GRAY		
	528.6	530	REG.		
	530	531	FRAC/HARD DRILLING CLAY POS		
	531	544	REG CLAY BLUE/GRAY		

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 27 1995
Department of Water Resources

MAR 07 1996

Completed Depth 544 (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON Pump Drilling Firm No. 0457
Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
7/94

C

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter
or
Ball Point Pen

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

63657

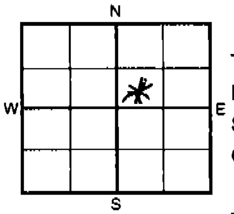
Pg 1 of 2

PB-10

1. DRILLING PERMIT NO. 63-95-W-0565-001
Other IDWR No.

2. OWNER: County of Canyon
Name HOLLADAY ENGINEERING CO
Address 1431 BUS. ALT HWY 95
City PAYETTE State ID Zip 83661

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.



Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, SW 1/4 NE 1/4 ___ 1/4
10 acres 40 acres 160 acres
Gov't Lot ___ County Canyon

Address of Well Site 15500 MISSOURI, PICKLE BUTTE LANDFILL City
(Give at least name of road + Distance to Road or Landmark)
Lt. ___ Blk. ___ Sub. Name PB10

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
BENTONITE		20	12000	POUR

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y☐ N☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10	0	140	.25	STEEL	☒	☐	☐	☐
8	+2	500	.25	STEEL	☒	☐	☐	☐
4	+2	504		STAINLESS	☐	☐	☐	☐

Length of Headpipe ___ Length of Tailpipe ___

9. PERFORATIONS/SCREENS
☐ Perforations Method
☒ Screens Screen Type HOUSTON

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
504	534	.020		4"	STAINLESS	☐	☐
						☐	☐
						☐	☐

MAR 07 1996

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
___ ft. below ground Artesian pressure ___ lb.
Depth flow encountered ___ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

RECEIVED
NOV 27 1995
Department of Water Resources

Water Temp. ___ Bottom hole temp. ___
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
12	1	5	TOP SOIL		
12	5	10	CLAY W/SMALL GRAVEL		
12	10	20	GRAVEL & SAND		
10	20	31	GRAVEL & SAND		
	31	45	CLAY W/SOME SMALL GRAVEL		
	45	55	" " " COARSE SAND		
	55	73	COARSE SAND W/SOME CLAY (SLOW DRILLING)		
	73	100	CLAY		
	100	105	SAND		
	105	115	SAND (COARSE) W/CLAY SOFT & HARD		
	115	120	COARSE SAND / SMALL GRAVEL W/CLAY		
	120	125	SAND W/GRAVEL-SMALL & Clay		
	125	130	SAND W/LITTLE CLAY		
	130	135	SAND & MORE CLAY		
	135	136	VERY HARD CLAY		
	136	205	REG CLAY		
8	205	210	SANDY CLAY		
	210	215	SANDY CLAY W/HARD PCS CLAY		
	215	220	SANDY CLAY - VERY HARD DRILLING		
	220	275	SANDY CLAY - MORE CLAY		
	275	300	SANDY CLAY W/HARD PCS of CLAY TAKING FORM		
	300	305	SAND		
	305	339	CLAY		
	339	341	VERY HARD CLAY		
	341	430	CLAY		
	430	455	VERY HARD CLAY (DRILLING SLOWER)		
	455	457	"SUPER" VERY HARD CLAY		
	457	465	REG. CLAY		
	465	470	CLAY W/SMALL GRAVEL		
	470	515	CLAY W/IRON SPOTS)		
	515	518	TURNING GRY		
	518	525	BROWN CLAY		
	525	540	SAND COARSE W/CLAY		

Completed Depth CONTINUED (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON PUMP & DRILLING Firm No. 0457
Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

C

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter
or
Ball Point Pen

63858 C PG 2 of 2
PB-10

1. DRILLING PERMIT NO. 63-95-W-0565-001
Other IDWR No.

2. OWNER:
Name HOLLADAY ENGINEERING CO
Address
City PB#10 State Zip

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, ___ 1/4 (10 acres) SW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ___ County Canyon
Address of Well Site
(Give at least name of road + Distance to Road or Landmark) City
Lt. Blk. Sub. Name

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y☐ N☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

MAR 07 1996

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
___ ft. below ground Artesian pressure ___ lb.
Depth flow encountered ___ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. Bottom hole temp.
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	540	560	TURNING BLUE CLAY W/		
			COARSE SAND		
			CAVED IN TO 544		

RECEIVED
NOV 27 1995
Department of Water Resources

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

Completed Depth 544 (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Firm No.
Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
6/07

03

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

861196
PB-11

1. WELL TAG NO. D 0059190

Drilling Permit No. 912544 - 861196

Water right or injection well #

2. OWNER:

Name Canyon County Solid Waste Department
Address 15500 Missouri Avenue
City Nampa State ID Zip 83686

3. WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 3 East ☐ or West ☒

Sec. 20 NW 1/4 (10 acres) SE 1/4 (40 acres) NE 1/4 (160 acres)

Gov't Lot County Canyon

Lat. 43 ° 29.836 (Deg. and Decimal minutes)

Long. 116 ° 43.013 (Deg. and Decimal minutes)

Address of Well Site 15500 Missouri Avenue City Nampa
(Give at least name of road + Distance to Road or Landmark)

Lot. Blk. Sub. Name

4. USE:

☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method/procedure
3/8 Pellets	308'	330'	17 - 5 Gal	Buckets Tremie
Neat Cement	60'	308'	6 yards	Tremie

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
4"	+2	340'	sch 40	SS	☒	☐	☐	☒
4"	400'	405'	sch 40	SS	☒	☐	☐	☒
10"	+2	-3	250	Steel	☒	☐	☐	☒
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☐ N Method

Manufactured screen ☒ Y ☐ N Type Johnson

Method of installation Overbore

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
340'	400'	.020		4"	SS	N/A

Length of Headpipe Length of Tailpipe 5'

Packer ☐ Y ☒ N Type

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method
10-20 sand	330'	420'	84 bags	Tremie

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG)

Describe control device

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 380' Static water level (ft) 293

Water temp. (^{0}F) Bottom hole temp. (^{0}F) 70.8 F

Describe access port Monitor Well Cap / Locking Lid

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
N/A		

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
19"	0'	5'	Sandy Clay		
19"	5'	10'	Sand		
19"	10'	24'	Sandy Clay		
19"	24'	36'	Sand		
19"	36'	50'	Clay		
10"	50'	52'	Clay		
10"	52'	55'	Orange Sand		
10"	55'	93'	Sandy Clay		
10"	93'	96'	Sand		
10"	96'	103'	Yellow Clay		
10"	103'	129'	Blue Clay		
10"	129'	133'	Yellow Clay		
10"	133'	176'	Blue Sandy Clay		
10"	176'	420'	Blue Clay	X	
			Additional Sealing Procedures:		
			3/4 Bentonite Chips from 0' to 60' -		
			95 bags		

RECEIVED
FEB 10 2012
WATER RESOURCES
WESTERN REGION

Completed Depth (Measurable): 405'

Date Started: Jun 13, 2011 Date Completed: Jul 1, 2011

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling Co. No. 457

*Principal Driller Dave Adamson Date 2-8-12

*Driller Matt Steffen Date 2-3-12

*Operator II Date

Operator I Date

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

03

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

861197

PB-12

1. WELL TAG NO. D 0059191

Drilling Permit No. 912545- 861197

Water right or injection well # —

2. OWNER:

Name Canyon County Solid Waste Department

Address 15500 Missouri Avenue

City Nampa State ID Zip 83686

3.WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 3 ~~East~~ ☒ or West ☒

Sec. 20 NW 1/4 (10 acres) NE 1/4 (40 acres) SE 1/4 (160 acres)

Gov't Lot ____ County Canyon

Lat. 43 ° 29.666 (Deg. and Decimal minutes)

Long. 116 ° 43.030 (Deg. and Decimal minutes)

Address of Well Site 15500 Missouri Avenue City Nampa

(Give at least name of road + Distance to Road or Landmark)

Lot. ____ Blk. ____ Sub. Name ____

4. USE:

☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other ____

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method/procedure
Coated pellets	450	469.5	17 - 5 Gal	Buckets Tremie
Neat Cement	97	450	6.5 yds	Tremie

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
4"	+2	480	sch40	SS	☒	☐	☐	☒
10"	+2	-3	250	Steel	☐	☐	☐	☒
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) ____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method ____

Manufactured screen ☒ Y ☐ N Type Johnson

Method of installation Overbore

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
480	540	.020		4"	SS	N/A

Length of Headpipe ____ Length of Tailpipe 5'

Packer ☐ Y ☒ N Type ____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method
10-20 sand	469.5	550	83 bags	Tremie

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) ____

Describe control device ____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 500' Static water level (ft) 313'

Water temp. (°F) ____ Bottom hole temp. (°F) 76.8

Describe access port Monitor Well Cap / Locking Lid

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
N/A		

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments: ____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
19"	0'	17'	Sand		
19"	17'	32'	Sandy Clay		
19"	32'	38'	Sand		
19"	38'	41'	Sandy Clay		
19"	41'	50'	Sand		
10"	50'	79'	Sandy Clay		
10"	79'	81'	Yellow Clay		
10"	81'	126'	Brown Sandy Clay		
10"	126'	180'	Blue Clay Sandstone		
10"	180'	500'	Blue Hard Clay		
10"	500'	540'	Blue Clay with Sand Strips	X	
10"	540'	560'	Blue Sand	X	
			Additional Sealing Procedures:		
			3/4 Bentonite from 0' to 97' -		
			91 bags		

RECEIVED
FEB 10 2012
WATER RESOURCES
WESTERN REGION

Completed Depth (Measurable): 545'

Date Started: Jul 5, 2011 Date Completed: Jul 15, 2011

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling Co. No. 457

*Principal Driller Dave Adamson Date 2-8-12

*Driller Matt Steffel Date 2-3-12

*Operator II ____ Date ____

Operator I ____ Date ____

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

U3

861198

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

PB-13

1. WELL TAG NO. D 0059192
Drilling Permit No. 912546 - 861198
Water right or injection well #

2. OWNER:
Name Canyon County Solid Waste Department
Address 15500 Missouri Avenue
City Nampa State ID Zip 83686

3.WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 3 East ☐ or West ☒
Sec. 20 NW 1/4 (10 acres) SE 1/4 (40 acres) SE 1/4 (160 acres)
Gov't Lot ____ County Canyon
Lat. 43 ° 29.425 (Deg. and Decimal minutes)
Long. 116 ° 42.949 (Deg. and Decimal minutes)
Address of Well Site 15500 Missouri Avenue
(Give at least name of road + Distance to Road or Landmark) City Nampa
Lot. ____ Blk. ____ Sub. Name ____

4. USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other ____

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other ____

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method/procedure
Coated pellets	820	800	12 - 5 Gal	Bucket Tremie
Neat Cement	800	+1	20 yards	Tremie/Pump

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
10"	+2	440	.250	Steel	☒	☐	☐	☒
8"	+2	558	.250	Steel	☒	☐	☐	☒
4"	+2	840	.258	SS	☒	☐	☐	☒
4"	900	905	.258	SS	☐	☐	☐	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) ____

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☐ N Method ____
Manufactured screen ☒ Y ☐ N Type Johnson
Method of installation Overbore

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
900'	840'	.020		4"	SS	N/A

Length of Headpipe ____ Length of Tailpipe 5'
Packer ☐ Y ☒ N Type ____

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method
10-20 sand	905'	820'	72 bags	Tremie

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) ____
Describe control device ____

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) ____ Static water level (ft) 732'
Water temp. (°F) ____ Bottom hole temp. (°F) 80
Describe access port Monitor Well Cap / Locking Lid

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
N/A		

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments: ____

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
10"	0'	25'	Frac Basalt		
10"	25	85	Gravel		
10"	85	160	mud stone		
10"	160'	210	Fine Sand		
10"	210	255	Brown Clay		
10"	255	380	Yellow Clay		
10"	380	420	Brown Clay		
10"	420'	460'	Light Brown Clay		
10"	460'	500'	Gray Clay		
10"	500'	560'	Silty Gray Clay		
10"	560'	800	Gray Clay		
10"	800	803	Silty Clay		
10"	803	920	Gray Clay	X	

RECEIVED
FEB 10 2012
WATER RESOURCES
WESTERN REGION

Completed Depth (Measurable): 905'
Date Started: Nov 1, 2011 Date Completed: Feb ~~14~~, 2012
4

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling Co. No. 457
*Principal Driller Dave Adamson Date 2-8-12
*Driller John Date ____
*Operator II ____ Date ____
Operator I Sam Navarro Date 2-6-12

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

W3

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

PB - 14
861199

1. WELL TAG NO. D 0059193
Drilling Permit No. 912547 - 861199
Water right or injection well #

2. OWNER:
Name Canyon County Solid Waste Department
Address 15500 Missouri Avenue
City Nampa State ID Zip 83686

3.WELL LOCATION:
Twp. 2 North ☒ or South ☐ Rge. 3 East ☐ or West ☒
Sec. 21 SW 1/4 (10 acres) SW 1/4 (40 acres) SW 1/4 (160 acres)
Gov't Lot County Canyon
Lat. 43 ° 29.314 (Deg. and Decimal minutes)
Long. 116 ° 42.731 (Deg. and Decimal minutes)
Address of Well Site 15500 Missouri Avenue City Nampa
(Give at least name of road + Distance to Road or Landmark)
Lot. Blk. Sub. Name

4. USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☒ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure
Coated pellets	807	834	17 - 5 Gal	Bucket Tremie
Neat Cement	0'	807	22 yards	Tremie/Pump

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
10"	+1	480	.250	Steel	☒	☐	☐	☒
4"	+2	845	.258	SS	☒	☐	☐	☒
4"	905	910	.258	SS	☒	☐	☐	☒
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☐ N Method
Manufactured screen ☒ Y ☐ N Type Johnson
Method of installation Overbore

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
845'	905'	.020		4"	SS	N/A

Length of Headpipe Length of Tailpipe 5'
Packer ☐ Y ☒ N Type

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method
10-20 sand	834'	902'	62 bags	Tremie

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG)
Describe control device

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 830' Static water level (ft) 716'
Water temp. (°F) Bottom hole temp. (°F) 84
Describe access port Monitor Well Cap / Locking Lid

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
N/A		

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
15.25	0	31	Gravel Cemented		
15.25	31	43	Sand		
15.25	43	51	Clay w/Sand		
15.25	51	104	Fine Sand w/clay streaks		
15.25	104	158	Gravel and Sand		
15.25	158	182	Sand		
15.25	182	207	Sandy Clay		
15.25	207	245	Sticky Brown Clay		
15.25	245	267	Clay w/Sand Streaks		
15.25	267	481	Sticky Brown Clay		
10"	481	523	Sticky Blue Clay		
10"	523	550	Sandy Blue Clay		
10"	550	771	Sticky Blue Clay		
10"	771	774	Sand Stone Layer		
10"	774	826	Sticky Blue Clay		
10"	826	831	Sand Stone Layer	X	
10"	831	920	Sticky Blue Clay	X	

RECEIVED
FEB 10 2012
WATER RESOURCES
WESTERN REGION

Completed Depth (Measurable): 910'
Date Started: Jul 19, 2011 Date Completed: Oct 12, 2011

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling Co. No. 457
*Principal Driller Dave Adamson Date 2-8-12
*Driller Matt Steffen Date 2-3-12
*Operator II Date
Operator I Date

*** Signature of Principal Driller and rig operator are required.**

Form 238-7
6/07

WB

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

PB-15

861200

1. WELL TAG NO. D 0059194

Drilling Permit No. 912548-861200

Water right or injection well # —

2. OWNER:

Name Canyon County Solid Waste Department

Address 15500 Missouri Avenue

City Nampa State ID Zip 83686

3.WELL LOCATION:

Twp. 2 North ☒ or South ☐ Rge. 3 East ☐ or West ☒

Sec. 21 SE 1/4 SW 1/4 SW 1/4
10 acres 40 acres 160 acres

Gov't Lot ___ County Canyon

Lat. 43 ° 29.329 (Deg. and Decimal minutes)

Long. 116 ° 42.480 (Deg. and Decimal minutes)

Address of Well Site 15500 Missouri Avenue City Nampa
(Give at least name of road + Distance to Road or Landmark)

Lot. ___ Blk. ___ Sub. Name ___

4. USE:

☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other ___

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other ___

6. DRILL METHOD:

☒ Air Rotary ☒ Mud Rotary ☐ Cable ☐ Other ___

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method/procedure
Coated pellets	757	777	17 - 5 Gal	Bucket Tremie
Neat Cement	0'	757	15 yards	Tremie/Pump

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
4"	+2	790	.258	SS	☒	☐	☐	☒
4"	850	855	.258	SS	☐	☐	☐	☐
10"	+3	400'	.250	Steel	☒	☐	☐	☒
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) ___

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method ___

Manufactured screen ☒ Y ☐ N Type Johnson

Method of installation Overbore

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
790	850	.020		4"	SS	N/A

Length of Headpipe ___ Length of Tailpipe 5'

Packer ☐ Y ☒ N Type ___

10.FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft^3)	Placement method
10-20 sand	777	866	75 bags	Tremie

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG) ___

Describe control device ___

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 800 Static water level (ft) 665

Water temp. (°F) ___ Bottom hole temp. (°F) 84

Describe access port Monitor Well Cap / Locking Lid

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
N/A		

Test method:

Pump	Bailer	Air	Flowing artesian
☐	☐	☐	☐
☐	☐	☐	☐

Water quality test or comments: ___

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
15.25	0	10	Coarse Sand / Some Gravel		
15.25	10	42	Medium to Coarse Sand		
15.25	42	74	Silty Clay - Brown Yellow		
15.25	74	87	Yellow Sand		
15.25	87	102	Brown Sand		
15.25	102	106	Brown Clay		
15.25	106	186	Brown Clay		
15.25	186	261	Brown Sand		
15.25	261	281	Brown Clay		
15.25	281	296	Brown Sand		
15.25	296	307	Brown Fine Sand		
15.25	307	311	Brown Clay		
15.25	311	358	Brown Sandy Clay		
15.25	358	400	Blue Clay		
10"	400'	423	Blue Clay		
10"	423	431	Brown Sandstone		
10"	431	435	Brown Sand		
10"	435	476	Blue Clay		
10"	476	785	Blue Sandstone		
10"	785	855	Blue Sandstone w/cracks	X	

RECEIVED
FEB 10 2012
WATER RESOURCES
WESTERN REGION

Completed Depth (Measurable): 855

Date Started: Aug 22, 2011 Date Completed: Oct 27, 2011

14. DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Adamson Pump & Drilling Co. No. 457

*Principal Driller Dave Adamson Date 2-8-12

*Driller John Date ___

*Operator II ___ Date ___

Operator I ___ Date ___

*** Signature of Principal Driller and rig operator are required.**

MONITORING WELL LITHOLOGIC LOG AND COMPLETION DETAILS

Project Name: Pickles Butte Landfill   Project No: 114-571040   Well No: PB-16

Location of Well: Approximately 85 feet southwest of PB-4. N 43º29'27.1279", W 116º42'13.5342"

Date Started: Feb 19, 2020   Date Completed: Mar 11, 2020   Tt Geologist: R. Phillips

Drilling Company: Granite (Layne)   Driller Name: Charles Johnson

Drilling Method: Rotary   Boring Diameter: 9.5 to 22", See Diagram   Fluids Used: Mud, water, foam

Depth Drilled: 597'   Depth Cased: 597'   Casing Dia. and Type: 4" stainless steel

Depth to Top of Screen: 572'   Screened Section Length: 20   Slot Size: 0.02

Filter Pack Type and Size: Silica sand, 10/20 and 12/20   Depth From: 562'   To: 597'

Seal Description (Types and Depths): Granular bentonite (560' to 562'), Neat cement grout (surface to 560')

Surface Completion and Security: Concrete pad, 10" dia. above-ground casing protector, locking cover

Top of Casing Elevation: 2927.30' Relative [✓ Absolute]   TOC Relative to GS: 2.75'   Depth to GW: 550.67'

Well Development Method: Surging and bailing (March 11, 25, & 27)   Amount Purged: ~300 gallons

Notes: Lithology shown below is generalized. Tetra Tech personnel were not present for the upper 279 feet of drilling, and rotary drilling techniques did not allow for detailed observations within the stratigraphic units.

Depth (ft)	Soil or Rock Description; Water Notes	Notes
0	SAND, fine grained, with gravel	Feb 19: 0 to 25'
10	SAND, fine grained with silt	Boring Diameter: 22",
20	CLAY	0 to 40 feet.
25	CLAY with sand	Mud and water used,
35	SAND	upper 300 feet
		Feb 20: 25' to 40'
40	SAND with silt lenses	Boring Diameter:
		14.75", 40 to 279 ft.
		Feb 22: 40' to 159'
163	SAND with silt	Feb 24: 159' to 239'
240	SAND, fine grained	Feb 25: 239' to 279'
262	CLAYSTONE with silt; clay is slightly plastic, trace amount of fine sand,	Boring Diameter:
	weakly consolidated, estimate 80% clay and 20% silt, brown.	9.5" 279 to 597 ft.
330	CLAY with silt, less consolidated than claystone above and below, brown	Feb. 28: 279' - 427'
	to dark tan.	Drill foam used 300' to
350	Slightly more consolidated, Reddish brown color on some fragments	500'
	below 350 feet.	
370	CLAYSTONE; contains some silt and trace fine sand, clay is slightly plasti	
	weakly to moderately consolidated, estimate 80% clay and 20% silt,	
	brown with occasional red-brown color.	
390	Color changes to green-brown, then more green below 430'	
445	SILTSTONE; trace clay and fine sand, weakly consolidated, green-grey	Feb 29: 427' - 497'
	color indicates the redox boundary.	
465	More brown fragments, moderate consolidation	
475	Fewer brown fragments, overall color grades to darker green	

485	SILT with clay, dark green to dark grey; some fine sand, weakly	
	consolidated.	
520	CLAY with silt; slightly plastic, slightly moist, dark green to dark grey	March 5: 497' - 577'
	Possibly a bit more moisture below 535	
	Water check at 557': No water after 90 minutes	
565	CLAYSTONE; less moisture than above material, moderately consolidated	
	dark grey	
	Water check at 577': No water after sitting overnight, but some water	
	returned with air when drilling resumed the morning of March 6.	
	Water check at 597': Water measured at approx. 590' BGS	March 6: 577'-597'
	Overdrill with 9.5" bit from 279' to 597' on March 7; drill foam used.	March 7: Redrill 279'-
		597' with 9.5 inch bit
597	Bottom of Boring	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 1
LOG OF BORING
Boring B2021-1

TETRA TECH

Sheet 1 of 1

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.502927 E: -116.624204	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2740.4 ft
Date Started: 11/15/21 **Date Finished:** 11/15/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) / Elev. (ft)	Material Description
0.0 / 2740.4 – 0.3 / 2740.1	TOPSOIL, moist, tan/brown.
0.3 / 2740.1 – 5.3 / 2735.1	Poorly-Graded SAND with silt (SP-SM), loose, moist, brown to gray, fine to medium grained, subangular.
5.3 / 2735.1 – 11.2 / 2729.2	Poorly-Graded SAND (SP), loose to medium dense, moist, gray to tan, medium grained, subangular to angular.
11.2 / 2729.2 – 14.1 / 2726.3	Silty SAND (SM), medium dense, moist, gray to tan, fine grained, medium plasticity, Pockets of clay.
14.1 / 2726.3 – 24.1 / 2716.3	Poorly-Graded SAND (SP), medium dense, slightly moist, gray, fine to medium grained, subangular to angular, medium plasticity, Small pockets of grey clay.
24.1 / 2716.3 – 31.5 / 2708.9	Poorly-Graded SAND with silt (SP-SM), dense to very dense, slightly moist, gray, fine to medium grained.

Depth (ft)	Recovery (%)	RQD (%)	Blow Count	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
0	100		3 - 3 - 4						
2	100		2 - 3 - 3	9	NV	NP	12	110	
4	100		2 - 3 - 5						
6	100		3 - 6 - 9	8					
8	100		9 - 13 - 13						
10	100		8 - 11 - 13	6					
15	100		10 - 13 - 15	5					
20	100		10 - 12 - 13						
25	100				NV	NP	6	113	Cc= 0.03
27	100		13 - 21 - 23						
30	100		13 - 25 - 34						

Boring Depth: 31.5 ft, *Elevation: 2708.9 ft*

Water Level Observations		Remarks:
	▽ During Drilling: Not Encountered	
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 2

LOG OF BORING

Boring B2021-2

TETRA TECH

Sheet 1 of 1

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.501658 E: -116.713829	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2739.0 ft
Date Started: 11/16/21	**Date Finished:** 11/16/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		2 - 1 - 3		Silty SAND (SM), very loose, slightly moist, brown to tan, fine grained, subangular to angular.		7					
			100		2 - 1 - 1		Poorly-Graded SAND with silt (SP-SM), very loose to very dense, slightly moist to moist, brown to gray, fine to medium grained, angular to subangular.	2.3 *2736.7*						
5 *2734.0*			100		3 - 3 - 4				3					
			100		2 - 4 - 6									
			100		7 - 10 - 14				3					
10 *2729.0*			100		10 - 15 - 20									
15 *2724.0*			100		7 - 11 - 17				5					
20 *2719.0*			150		11 - 17 - 21				3					
25 *2714.0*			100		11 - 16 - 21									
30 *2709.0*			100		15 - 25 - 34									
								31.5 *2707.5*						

Boring Depth: 31.5 ft, *Elevation: 2707.5 ft*

Water Level Observations	▽ During Drilling: Not Encountered	Remarks:
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

TT LOG OF BORING - MDT_REVISED_2009+ GDT - 6/20/22 17:01 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB_LOGS\BORING LOGS.GPJ

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.500874 E: -116.716768	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2737.7 ft
Date Started: 11/16/21 **Date Finished:** 11/22/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Slightly moist, tan.	0.7 *2737.0*						
							SILT (ML), stiff, slightly moist, light tan, low plasticity.							
5 *2732.7*		☒	100		2 - 3 - 7									
							Silty SAND (SM), loose to medium dense, slightly moist to slightly moist, light tan, very fine grained.	8.0 *2729.7*						
10 *2727.7*		☒	100		7 - 9 - 9									
15 *2722.7*		☒	100		11 - 11 - 12									
20 *2717.7*		☒	93		10 - 12 - 13				3					
25 *2712.7*			80							NV	NP	29		
		☒	100		11 - 15 - 15									
30 *2707.7*		☒	100		10 - 12 - 14				3					
35 *2702.7*		☒	100		11 - 14 - 21									
40 *2697.7*		☒	93		10 - 14 - 16									
							SILT (ML), very stiff, slightly moist, gray, low plasticity.	41.1 *2696.6*						
							Silty SAND (SM), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.	41.9 *2695.8*						
45 *2692.7*		☒	100		12 - 12 - 12									
							SILT (ML), very stiff, slightly moist, gray, low plasticity.	47.0 *2690.7*						
							Silty SAND (SM), medium dense to	47.7 *2690.0*						
50 *2687.7*		☒							3					

Water Level Observations	▽ **During Drilling:** Not Encountered	Remarks:
▼ **After Drilling:** Not Recorded	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

TETRA TECH

Sheet 2 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.500874 E: -116.716768
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2737.7 ft
Date Started: 11/16/21
Date Finished: 11/22/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		4 - 18 - 19		dense, slightly moist, tan to gray, fine grained, subangular to angular.	52.0 *2685.7*						
55 *2682.7*							SILT (ML), very stiff, slightly moist, gray to tan, low plasticity, Hard consolidated pieces.	56.2 *2681.5*						
60 *2677.7*			100				Silty SAND (SM), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.			NV NV	NP NP	19 7	100	Friction Angle= 20.21 degrees Cohesion= 0.282 ksf
65 *2672.7*														
70 *2667.7*			100		15 - 25 - 50									
75 *2662.7*								76.5 *2661.2*						
							Sandy SILT (ML), stiff, dry, gray to red, fine grained, Broken siltstone.	78.5 *2659.2*						
80 *2657.7*			75				Silty SAND (SM), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.	81.2 *2656.5*		NV	NP	24		Friction Angle= 32.81 degrees Cohesion= 0.413 ksf
			100		4 - 11 - 50		Poorly-Graded SAND (SP), very dense, dry, salt & pepper, fine to medium grained, subangular to angular.		2					
85 *2652.7*														
90 *2647.7*			100		23 - 40 - 50									
95 *2642.7*								95.0 *2642.7*						
							Poorly-Graded SAND with silt (SP-SM), very stiff, dry, tan, fine to medium grained, subangular, Large amounts of broken sandstone.	100.0 *2637.7*						
100 *2637.7*			0		50/0.2ft		Silty SAND (SM), very dense, dry, gray to red, fine to coarse grained,							

Water Level Observations

During Drilling: Not Encountered

After Drilling: Not Recorded

After Drilling: Not Recorded

Remarks:

TT LOG OF BORING - MDT_REVISED_2009+ GDT - 6/20/22 17:01 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB_LOGS\BORING LOGS.GPJ

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.500874 E: -116.716768	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2737.7 ft
Date Started: 11/16/21	**Date Finished:** 11/22/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							subangular, Mixed with large pieces of siltstone.							
105 *2632.7*														
110 *2627.7*			143		31 - 50/0.2ft									
115 *2622.7*							Silty SAND (SM), very dense, dry to moist, salt & pepper to gray, fine to medium grained, subangular to angular, Minimal pieces of sandstone. Decreasing with depth.	115.0 *2622.7*		NV	NP	15	104	
120 *2617.7*			88		47 - 50/0.3ft				4					
125 *2612.7*														
130 *2607.7*														
135 *2602.7*							Poorly-Graded SAND with silt (SP-SM), very stiff, dry, tan, fine to coarse grained, subangular, Large amounts of broken sandstone and siltstone.	135.0 *2602.7*						
							Poorly-Graded SAND (SP), very dense, dry to moist, salt & pepper to gray, fine to medium grained, subangular to angular, Minimal pieces of sandstone..	138.6 *2599.1*						
140 *2597.7*			100		14 - 33 - 50									
145 *2592.7*														
							Silty CLAY (CL-ML), hard, very moist, gray, high plasticity.	146.5 *2591.2*						
150 *2587.7*			100		16 - 33 - 50									

Water Level Observations	▽ **During Drilling:** Not Encountered	Remarks:
▼ **After Drilling:** Not Recorded	▼ **After Drilling:** Not Recorded	

Figure No. 3
LOG OF BORING
Boring B2021-3

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.500874 E: -116.716768	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2737.7 ft
Date Started: 11/16/21 **Date Finished:** 11/22/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155 *2582.7*														
160 *2577.7*		☒	100		16 - 24 - 36									
165 *2572.7*														
170 *2567.7*								170.0 *2567.7*						

Boring Depth: 170.0 ft, *Elevation: 2567.7 ft*

Water Level Observations	▽ During Drilling: Not Encountered	Remarks:
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4
LOG OF BORING
Boring B2021-4

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							TOPSOIL, moist, dark brown.	0.7 *2796.5*						
							Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular.							
5 *2792.2*		☒	67		2 - 9 - 7				6					
10 *2787.2*		✋ ☒	67		5 - 9 - 7									
15 *2782.2*		☒	80		5 - 12 - 14		SILT (ML), very stiff, slightly moist, tan, low plasticity.	15.0 *2782.2*						
20 *2777.2*		☒	100		18 - 37 - 48		Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained.	20.0 *2777.2*	5					
25 *2772.2*		☒	100		16 - 35 - 48		Silty CLAY (CL-ML), very stiff, slightly moist, tan, medium plasticity.	25.2 *2772.0*						
							SILT (ML), very stiff, slightly moist, tan, low plasticity.	27.7 *2769.5*						
30 *2767.2*		☒	100		16 - 27 - 33									
35 *2762.2*		☒	80		15 - 30 - 34				8					
40 *2757.2*		☒	100		11 - 23 - 18		Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular to subangular.	40.0 *2757.2*						
							Silty CLAY (CL-ML), very stiff, slightly moist, tan to black, medium plasticity, Broken pieces of consolidated clay and sit.	41.0 *2756.2*						
45 *2752.2*		✋ ☒	100		9 - 13 - 13				16					
50 *2747.2*		⧓					Poorly-Graded SAND with silt (SP-SM),	50.0				6		

Water Level Observations	▽ During Drilling: Not Recorded	Remarks:
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

LOG OF BORING

Boring B2021-4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21 — **Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
		■	100		9 - 26 - 41		medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	*2747.2*						
55 *2742.2*														
60 *2737.2*		☒	80		2 - 5 - 18				2					
65 *2732.2*														
70 *2727.2*		☒	67		6 - 13 - 23									
							Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular to subangular.	73.0 *2724.2*						
75 *2722.2*														
80 *2717.2*		☒	80		2 - 7 - 23									
85 *2712.2*														
							Poorly-Graded SAND (SP), stiff, dry, tan to yellow, fine to medium grained, angular to subangular.	87.0 *2710.2*						
90 *2707.2*		■	100		13 - 40 - 50		Silty SAND (SM), hard, moist, tan to brown, fine grained, angular to subangular, Broken pieces of consolidated clay.	90.0 *2707.2*		NV	NP	32		
95 *2702.2*														
100 *2697.2*		☒	100		9 - 18 - 20				22					

Water Level Observations		Remarks:
After Drilling: Not Encountered	During Drilling: Not Recorded After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Sandy SILT (ML), very stiff, slightly moist, tan, low plasticity.	104.0 *2693.2*						
105 *2692.2*							Silty CLAY (CL-ML), hard, moist, tan to brown, medium plasticity, Broken pieces of consolidated clay.	105.0 *2692.2*						
110 *2687.2*			100		6 - 12 - 20									
115 *2682.2*														
							Sandy SILT (ML), very stiff, slightly moist, tan, low plasticity.	117.5 *2679.7*						
120 *2677.2*			100		31 - 70/0.4ft		Silty SAND (SM), medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	120.0 *2677.2*		NV	NP	44		Friction Angle= 29.51 degrees Cohesion= 0.588 ksf
125 *2672.2*														
							Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	129.0 *2668.2*						
130 *2667.2*			100		9 - 21 - 26									
135 *2662.2*														
140 *2657.2*			100		30 - 48 - 44				2					
145 *2652.2*							Sandy SILT (ML), very stiff, slightly moist, tan to brown, low plasticity.	145.0 *2652.2*						
150 *2647.2*			111		31 - 50/0.4ft									

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

TETRA TECH

Sheet 4 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155.0 *2642.2*							Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	155.0 *2642.2*						
157.0 *2640.2*							Sandy SILT (ML), very stiff, slightly moist, tan to brown, low plasticity.	157.0 *2640.2*						
159.0 *2638.2*			111 88		29 - 50/0.4ft 50 - 50/0.3ft		Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	159.0 *2638.2*						
175.0 *2622.2*							Silty SAND (SM), very stiff, dry, gray, fine grained, angular to subangular.	175.0 *2622.2*						
177.0 *2620.2*							Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	177.0 *2620.2*						
183.0 *2614.2*							Silty SAND (SM), very stiff, dry, gray to gray, fine grained, angular to subangular.	183.0 *2614.2*						
190.0 *2607.2*							Poorly-Graded SAND with silt (SP-SM), medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	190.0 *2607.2*						
200 *2597.2*							Boring Depth: 200.0 ft, *Elevation: 2597.2 ft*	200.0 *2597.2*						

Water Level Observations		
	▽ During Drilling: Not Recorded	Remarks:
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

Boring B2021-5

TETRA TECH

Sheet 1 of 5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.499133 E: -116.713491
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2661.6 ft
Date Started: 12/14/21
Date Finished: 12/19/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Recovery (%)	RQD (%)	Blow Count	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
				TOPSOIL, moist, brown.	0.7 *2660.9*						
				Sandy SILT (ML), stiff, slightly moist, tan, fine grained, angular to subangular.	10.0 *2651.6*						
5 *2656.6*	100		6 - 8 - 5			4					
10 *2651.6*	100		12 - 21 - 43	Poorly-Graded SAND (SP), medium dense to very dense, moist, tan to red, fine to medium grained, angular to subangular.	27.0 *2634.6*						
15 *2646.6*	100		5 - 7 - 16			3					
20 *2641.6*	100		10 - 21 - 26								
25 *2636.6*											
				Silty CLAY (CL-ML), medium stiff, slightly moist, white to gray, high plasticity.	29.0 *2632.6*						
30 *2631.6*	100		10 - 27 - 40	Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, salt & pepper to red, fine to medium grained, angular to subangular.	37.0 *2624.6*						
35 *2626.6*	100		10 - 22 - 35			4					
				SILT (ML), hard, slightly moist, tan to gray, low plasticity.	42.0 *2619.6*						
40 *2621.6*	150		27 - 33 - 45/0.0ft								
				Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, salt & pepper to red, fine to medium grained, angular to subangular.	44.0 *2617.6*						
45 *2616.6*	100		23 - 39 - 42	SILT (ML), hard, slightly moist, tan to gray, low plasticity.	45.0 *2616.6*						
				Silty SAND (SM), medium dense to very dense, slightly moist, gray to brown, fine	50.0						
50 *2611.6*											

Water Level Observations	▽ **During Drilling:** Not Recorded
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

Boring B2021-5

TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21	**Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		27 - 38 - 50		grained, angular to subangular.	*2611.6*						
							Silty CLAY (CL-ML), hard, slightly moist, tan, high plasticity.	51.0 *2610.6*						
55 *2606.6*							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, gray to tan, fine to medium grained, angular to subangular.	54.0 *2607.6* 55.0 *2606.6*						
60 *2601.6*			100		34 - 50/0.1ft		Silty SAND (SM), medium stiff, slightly moist, tan, fine grained.	60.0 *2601.6*	4					
65 *2596.6*							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, gray to tan, fine to medium grained, angular to subangular.	65.5 *2596.1*						
70 *2591.6*			100		10 - 30 - 20		Poorly-Graded SAND with silt (SP-SM), very dense, moist, gray, fine grained, Varying amounts of silt. Thin viens of silty clay.		29	27	21	74	112	
							SILT with sand (ML), hard, slightly moist, white to gray, non plastic, Broken pieces of consolidated clay.	71.5 *2590.1*						
75 *2586.6*							Silty SAND (SM), very stiff, slightly moist, tan, fine grained.	73.5 *2588.1*						
							CLAY with sand (CL), hard, slightly moist, white to gray, non plastic, Broken pieces of consolidated clay.							
80 *2581.6*			100		10 - 18 - 27				21	35	21	80	104	Friction Angle= 31.18 degrees Cohesion= 0.26 ksf
85 *2576.6*							Silty SAND (SM), very dense, slightly moist, tan to red, fine grained, angular to subangular.	86.0 *2575.6*						
90 *2571.6*			100		49 - 50/0.3ft					NV	NP	29		Friction Angle= 13.53 degrees Cohesion= 0.654 ksf
95 *2566.6*														
100 *2561.6*			115		21 - 46 - 50/0.3ft				11					

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

Boring B2021-5

TETRA TECH

Sheet 3 of 5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21	**Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Silty CLAY (CL-ML), very stiff, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	102.0 *2559.6*						
105 *2556.6*														
110 *2551.6*			100		30 - 50/0.1ft		Silty SAND (SM), very dense, slightly moist, tan to red, fine grained, angular to subangular.	110.0 *2551.6*						
							Silty CLAY (CL-ML), very stiff, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	111.0 *2550.6*						
115 *2546.6*														
							Silty SAND (SM), medium dense to very dense, slightly moist, gray to brown, fine grained, angular to subangular.	115.5 *2546.1*						
							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	116.5 *2545.1*						
120 *2541.6*			100		9 - 17 - 36									
125 *2536.6*														
							Sandy SILT (ML), hard, slightly moist, red to brown, fine grained, low plasticity, Very fine sand. Some consolidated clay mixed.	126.0 *2535.6*						
								127.0 *2534.6*						
								129.5 *2532.1*						
130 *2531.6*			107		26 - 50 - 50/0.4ft		Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.							
								131.5 *2530.1*						
135 *2526.6*							Silty SAND (SM), very dense, slightly moist, tan, very fine grained, Very fine sand. Some consolidated clay mixed. Less clay with depth.	134.5 *2527.1*						
							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.							
140 *2521.6*			111		42 - 50/0.4ft			140.0 *2521.6*						
							Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	141.0 *2520.6*						
								143.0 *2518.6*						
145 *2516.6*							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	145.0 *2516.6*						
							Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	147.0 *2514.6*						
150 *2511.6*			107		8 - 17 - 50/0.4ft									
							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken							

Water Level Observations		Remarks:
	▽ During Drilling: Not Recorded	
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

Figure No. 5
LOG OF BORING
Boring B2021-5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21 **Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							pieces of consolidated clay.							
155 *2506.6*							Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	156.0 *2505.6*						
160 *2501.6*			83		46 - 50/0.1ft		Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	157.0 *2504.6* 160.0 *2501.6*						
							Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	163.5 *2498.1*						
165 *2496.6*							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay. Higher silt content than previous.	164.5 *2497.1* 167.0 *2494.6*						
170 *2491.6*			100		9 - 17 - 50		CLAY (CL), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	170.0 *2491.6*						
							Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt..							
175 *2486.6*							CLAY (CL), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.							
180 *2481.6*							Silty SAND (SM), slightly moist, tan, fine grained, angular to subangular.	180.0 *2481.6*						
							Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Varying levels of silt content.							
185 *2476.6* 190 *2471.6* 195 *2466.6*							Silty SAND (SM), slightly moist, tan, fine grained, angular to subangular.							
200 *2461.6*							CLAY (CL), hard, slightly moist to moist, gray to blue, high plasticity, consolidated clay.	200.0 *2461.6*						

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

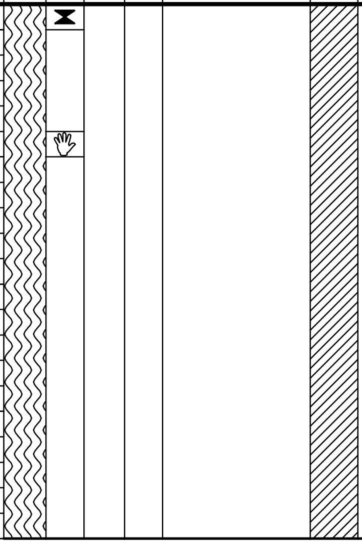
Boring B2021-5

TETRA TECH

Sheet 5 of 5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21	**Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
205 *2456.6*														
210 *2451.6*														
215 *2446.6*														
220 *2441.6*														
225 *2436.6*								225.0 *2436.6*						



Boring Depth: 225.0 ft, *Elevation: 2436.6 ft*

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6
LOG OF BORING
Boring B2021-6

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Rig: TS150 Crawler
Hammer: Auto

Boring Location Coordinates N: 43.495196 E: -116.715718

Project Number: 114-571040-2022

Boring Diameter: 6 in

System: Decimal Degrees
Datum: NAD83

Top of Boring Elevation: 2636.7 ft

Date Started: 11/22/21

Date Finished: 12/2/21

Drilling Fluid: None

Abandonment Method: Grout

Driller: Holt Services
Logger: Matt Adams

Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							TOPSOIL, very moist, brown.	0.6 *2636.1*						
							Silty SAND (SM), loose to medium dense, slightly moist, tan to red, fine grained, subangular.	15.0 *2621.7*						
5 *2631.7*			67		4 - 5 - 5									
10 *2626.7*			73		7 - 7 - 7				6					
15 *2621.7*														
							Poorly-Graded SAND (SP), very dense, slightly moist, gray, fine to medium grained, subangular.	21.0 *2615.7*						
20 *2616.7*			100		11 - 31 - 42									
							Silty SAND (SM), loose to medium dense, slightly moist, gray, fine grained, subangular.	27.0 *2609.7*						
25 *2611.7*			100		12 - 22 - 42				18					
							Poorly-Graded SAND (SP), very dense, slightly moist, gray, fine to medium grained, subangular.	33.0 *2603.7*						
30 *2606.7*														
							Silty SAND (SM), loose to medium dense, slightly moist to moist, gray, fine grained, Pieces of siltstone increasing with depth.	48.0 *2588.7*						
35 *2601.7*														
40 *2596.7*			100		8 - 18 - 37				22					
45 *2591.7*			100		39 - 42 - 50									
							Sandy SILT (ML), hard, slightly moist, gray, fine grained.							
50 *2586.7*														

Water Level Observations

▽ During Drilling: Not Recorded

▼ After Drilling: Not Encountered

▼ After Drilling: Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6
LOG OF BORING
Boring B2021-6

TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.495196 E: -116.715718
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2636.7 ft
Date Started: 11/22/21
Date Finished: 12/2/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		14 - 28 - 43									
55 2581.7														
60 2576.7			100		6 - 13 - 27				25					
65 2571.7														
70 2566.7			100		7 - 20 - 27									
75 2561.7														
							CLAY (CH), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	76.0 2560.7						
80 2556.7			91		8 - 18 - 50/0.1ft					67	19	83		
85 2551.7														
90 2546.7			100		9 - 14 - 40									
95 2541.7														
										56	22	83		
100 2536.7			100		11 - 23 - 26		Sandy SILT (ML), hard, slightly moist, gray, medium plasticity.	100.0 2536.7						

Water Level Observations

▽ During Drilling: Not Recorded

▼ After Drilling: Not Recorded

▼ After Drilling: Not Encountered

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6

LOG OF BORING

Boring B2021-6

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.495196 E: -116.715718	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2636.7 ft
Date Started: 11/22/21	**Date Finished:** 12/2/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Silty CLAY (CL-ML), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	102.8 *2533.9*						
105 *2531.7*														
		✋					CLAY with sand (CL), hard, slightly moist, gray, medium plasticity.	106.0 *2530.7*		47	22	78	100	
							Silty CLAY (CL-ML), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	106.9 *2529.8*						
110 *2526.7*		☒	100		9 - 19 - 28				21					
							Sandy SILT (ML), hard, slightly moist, gray, medium plasticity.	110.8 *2525.9*						
							Silty CLAY (CL-ML), hard, slightly moist, very dark gray to blue, high plasticity, Almost claystone very consolidated.	112.0 *2524.7*						
115 *2521.7*														
120 *2516.7*		☒	100		10 - 18 - 33				22					
125 *2511.7*														
130 *2506.7*		✋ ⧓	115		28 - 47 - 50/0.3ft									
135 *2501.7*														
140 *2496.7*		☒	100		6 - 16 - 31									
145 *2491.7*														
150 *2486.7*		⧗ ☒	107		11 - 19 - 50/0.4ft									

Water Level Observations

▽ **During Drilling:** Not Recorded

▼ **After Drilling:** Not Recorded

▼ **After Drilling:** Not Encountered

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6

LOG OF BORING

Boring B2021-6

TETRA TECH

Sheet 4 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.495196 E: -116.715718
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2636.7 ft
Date Started: 11/22/21
Date Finished: 12/2/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	**Operation**	**Sample Type**	Recovery (%)	**RQD (%)**	**Blow Count**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**MC (%)**	**LL**	**PL**	**-200 (%)**	**DD (pcf)**	**Remarks and Other Tests**
155 *2481.7*														
160 *2476.7*			115		29 - 50 - 50/0.3ft									
165 *2471.7*								165.0 *2471.7*						

Boring Depth: 165.0 ft, *Elevation: 2471.7 ft*

Water Level Observations	▽ During Drilling: Not Recorded	Remarks:
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Rig: TS150 Crawler

Hammer: Auto

Boring Location Coordinates N: 43.49528 E: -116.712592

Project Number: 114-571040-2022

Boring Diameter: 6 in

System: Decimal Degrees

Datum: NAD83

Top of Boring Elevation: 2659.5 ft

Date Started: 12/2/21

Date Finished: 12/7/21

Drilling Fluid: None

Abandonment Method: Grout

Driller: Holt Services

Logger: Matt Adams

Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Slightly moist, dark brown.	0.6 *2658.9*						
							Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.							
5 *2654.5*		☒	60		2 - 2 - 3				4					
10 *2649.5*		☒	67		10 - 8 - 5									
15 *2644.5*		☒	80		8 - 18 - 18									
							Poorly-Graded SAND (SP), dense, moist, tan, fine to medium grained, angular to subangular.	16.4 *2643.1*						
20 *2639.5*		✋												
25 *2634.5*		☒	100		13 - 40 - 50		Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	25.0 *2634.5*						
30 *2629.5*		⧓	0		26 - 50/0.1ft									
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.	30.3 *2629.2*						
							Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	31.3 *2628.2* 32.3 *2627.2*						
35 *2624.5*		⧓	0		35 - 50/0.3ft									
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.	33.8 *2625.7*						
		✋								NV	NP	21	112	
40 *2619.5*		☒	107		16 - 28 - 50/0.4ft		Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	39.6 *2619.9*	23					
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.	41.4 *2618.1* 43.6 *2615.9*						
45 *2614.5*		☒	100		19 - 37 - 48									
							Silty CLAY (CL-ML), very stiff, moist, tan, high plasticity, Broken pieces of consolidated clay.	46.1 *2613.4*						
50 *2609.5*		✋ ☒					Silty SAND (SM), very dense, slightly	50.0						

Water Level Observations

During Drilling: Not Encountered

After Drilling: Not Recorded

After Drilling: Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.49528 E: -116.712592	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2659.5 ft
Date Started: 12/2/21	**Date Finished:** 12/7/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	**Operation**	**Sample Type**	Recovery (%)	**RQD (%)**	**Blow Count**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**MC (%)**	**LL**	**PL**	**-200 (%)**	**DD (pcf)**	**Remarks and Other Tests**
			100		29 - 49 - 37		moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	*2609.5*						
55 *2604.5*							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay.	54.0 *2605.5* 55.6 *2603.9*						
60 *2599.5*			107		21 - 41 - 50/0.4ft		Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	58.5 *2601.0*	12	NV	NP	82	104	
							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..							
65 *2594.5*							Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	66.0 *2593.5*						
70 *2589.5*			100		9 - 23 - 35		SAND with sand (ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..							
75 *2584.5*							CLAY (CL), hard, moist, tan, high plasticity.							
80 *2579.5*			0		78 - 70/0.2ft		Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	80.0 *2579.5*						
85 *2574.5*							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..	85.0 *2574.5*						
90 *2569.5*			0		70/0.3ft									
95 *2564.5*														
100 *2559.5*			100		28 - 28 - 28		CLAY (CL-ML), hard, moist, tan, high plasticity.	97.7 *2561.8*	20					

Water Level Observations		
▽ **During Drilling:** Not Encountered		Remarks:
▼ **After Drilling:** Not Recorded	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Rig: TS150 Crawler

Hammer: Auto

Boring Location Coordinates N: 43.49528 E: -116.712592

Project Number: 114-571040-2022

Boring Diameter: 6 in

System: Decimal Degrees

Datum: NAD83

Top of Boring Elevation: 2659.5 ft

Date Started: 12/2/21

Date Finished: 12/7/21

Drilling Fluid: None

Abandonment Method: Grout

Driller: Holt Services

Logger: Matt Adams

Location: Refer to site map.

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
105 2554.5														
110 2549.5			100		6 - 12 - 22.									
115 2544.5														
120 2539.5			77		22 - 41 - 50/0.3ft									
							SILT (ML), hard, dry, tan, low plasticity, Broken pieces.	121.5 2538.0						
							Silty CLAY (CL-ML), hard, moist, gray, high plasticity, Broken pieces of consolidated clay..	122.2 2537.3						
125 2534.5														
							Sandy SILT (ML), hard, dry, tan, low plasticity, Broken pieces.	128.5 2531.0						
							Silty CLAY (CL-ML), hard, moist, gray, high plasticity, Broken pieces of consolidated clay..	129.1 2530.4	19					
130 2529.5			100		12 - 33 - 48									
135 2524.5														
140 2519.5			100		9 - 18 - 50				24					
145 2514.5							CLAY (CL), hard, moist, gray to blue, high plasticity.	145.0 2514.5						
150 2509.5			100		9 - 18 - 31									

Water Level Observations

▽ **During Drilling:** Not Encountered

▼ **After Drilling:** Not Recorded

▼ **After Drilling:** Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 4 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.49528 E: -116.712592
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2659.5 ft
Date Started: 12/2/21	**Date Finished:** 12/7/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155 *2504.5*														
160 *2499.5*			107		21 - 48 - 50/0.4ft									
165 *2494.5*														
170 *2489.5*			100		14 - 18 - 28									
175 *2484.5*														
180 *2479.5*														
185 *2474.5*														
190 *2469.5*														
195 *2464.5*														
200 *2459.5*								200.0 *2459.5*						

Boring Depth: 200.0 ft, *Elevation: 2459.5 ft*

Water Level Observations	▽ **During Drilling:** Not Encountered	Remarks:
▼ **After Drilling:** Not Recorded	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 8
LOG OF BORING
Boring B2021-8

TETRA TECH

Sheet 1 of 1

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.48988 E: -116.703147	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2956.6 ft
Date Started: 11/15/21	**Date Finished:** 11/15/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		5 - 5 - 12		TOPSOIL, moist, brown.	0.6 2956.0	11					
							SILT with sand (ML), very stiff, slightly moist to moist, tan.			NV	NP	84	97	
			100		10 - 16 - 13									
			100		8 - 8 - 10				11					
5 *2951.6*														
									12					
			100											
10 *2946.6*														
			100		7 - 9 - 11		Silty SAND (SM), medium dense, slightly moist, tan to gray, fine grained, subangular, scattered gravel.	10.1 *2946.5*	6					
15 *2941.6*			87		6 - 7 - 9				5					
20 *2936.6*			87		9 - 13 - 15		Poorly-Graded SAND (SP), medium dense, slightly moist, tan to yellow, fine to medium grained, subangular to angular.	20.0 *2936.6*	5					
								21.5 *2935.1*						

Boring Depth: 21.5 ft, *Elevation: 2935.1 ft*

Water Level Observations	During Drilling: Not Encountered	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded	

$* N' = N \cdot \sqrt{1/\sigma}$

Where σ = .05 T/ft² per ft depth

(φ + stiffness based on table 13.2 & 13.8)

HOLLADAY ENGINEERING COMPANY

HOLE NUMBER GT-1 JOB NUMBER 030496

PAGE 1 OF 4

PROJECT Dickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC. ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W @ 50' from toe of fill in drainage

LOGGED BY STROWD DATE START 11/4/96 DATE FINISHED 11/4/96 HOLE DEPTH 90½ ANGLE ~90 DRILL METHOD Hollow Stem Auger SPT DIAMETER 8" Auger Splitspoon DRILL MODEL [illegible] 81

INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	LITHOLOGY GRAPHIC	GEOPHYSICS LOG	GRAIN SIZE REL PERCENT CLY	SLT	SAND	GRAV	GRAIN ROUNDING ANG	WK	MOD	WELL	HYDRAULIC PROPERTIES EST.	MEAS.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS BLOW COUNTS
		11:50	Tan Tan	fine sand	⋯															
4-5½	loose SAMPLE			fine sand w/ some occas. gravel pebbles ≤ 1"	⋯	I			▨	▨								4-5½ I	moist	2 3 and 3 4-5½ 1" clast rounded (slumped) 2 1st 6" 3 2nd 6" N = 12 * 3 3rd 6" (30°) N=5 N' = 7 (30°)
10-11½	loose SAMPLE @ 10'-11½' + drive shelby tube ~ 200 lbs first 6"		Tan to f. olive brn	fine sand minor mica.	⋯				▨									10-11½ I	moist	10-11½ 2, 3, 2 very weakly consolidated breaks up easily
15-16½	loose		lt olive brn	fine sand	⋯				▨									15-16½ I	moist	N = 3, 3, 2 N' = 6 (29°) V. W. CONS.
20-21½		12:10	lt brn	fine sand	⋯				▨									20-21½ I	moist	N = 4, 2, 3 N' = 5 V. W. CONS. (28°)
25-26½		12:21	lt brn	fine sand	⋯				▨									I	moist	N = 2, 3, 2 N' = 5 (28°) V. W. CONS
30-31½		12:23	lt brn	fine sand	⋯				▨									I		N = 3, 4, 6 N' = 8 (32) ditto
35-36½		[illegible]:35	lt brn	fine to med sand some coarse grain + gravel	⋯				▨	▨								I		N = 6, 7, 13 N' = 15 ditto (35°)
40 - 42	SHELBY TUBE NO Sample			(push tube)																push 10" in to 700 lbs (check bending of [illegible]) lost sample down hole as ~~[illegible]~~
45-46½	brass rings (in sample) use SPT [illegible]		tan	silt & sand med sand w/ some fine sand [illegible] bottom is fine sand		I 45-46½			▨								drier weakly cement			push 2½" @ 1000 lbs max (shoe + rings filled w/ sample) 12, 23, 32 = N N' = 37 (40°)

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 4

PROJECT Dirkles [illegible] Gerlach OWNER ____ LOCATION: CO. ____ SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY STROUD DATE START 11/4/96 DATE FINISHED 11/6/96 HOLE DEPTH 201½ ANGLE -90° DRILL METHOD Hollow Stem Auger SPT [illegible] Hammer DIAMETER 8" Auger DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		Blow counts N
50-51½	11/4	1:20	gry-	tan fine sand					▨								med. loose		drier, weakly moist	18, 32, 41 N = 46 (42°)
	55-56½	1:40		gry-tan fine to medium sand			▨	▨	▨											13, 25, 36 N = 36 minor clay (40°)
	60-61½ shut down had lunch ½ hr	1:55	tan-gry	fine to medium sand			▨		▨								med loose		dry	18 30 37 N = 37 (40°)
	65-66½	2:20	tan/some orange FeOx	fine sand					▨								med. loose		dry	25 42 41 N = 46 (42°)
	70-71½	2:40	tan/some orange FeOx	fine sand					▨								med loose breaks on easily		minor moisture	25 40 44 N = 45 (42°)
	75-76½	2:55	tan	fine sand					▨								mod. loose		slightly moist	25 37 41 N = 40 (42°)
	80-81½	3:05	tan	fine sand to very fine sand with silt (lower)				▨	▨								ditto		ditto	26 36 50 N = 43 (42°)
	85-86½	3:20	tan	thin very fine [illegible] - silt [illegible] silt			▨	▨	▨								[illegible]		ditto	28 47 25 47 [illegible] N = 42 (42°)
	90-91½ [illegible] FOS	3:45	tan	fine silt sand				▨	▨								[illegible]		slightly moist	13 40 50 N = 42 (42°)
95-96½	11:00	11/5 start	lite tan	SILT to 96' Clay @ 96'			▨	▨	▨										very slightly damp	19 28 47 N = 34 (hard)

10

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 3 OF 4

PROJECT Pickles Butte Geotech OWNER Canyon LOCATION: CO.___ SEC.___ 1/4___ OF 1/4___ T___ N R___ W

LOGGED BY STROWD DATE START 11-4-96 DATE FINISHED___ HOLE DEPTH___ ANGLE 90° DRILL METHOD Hollow Stem / SPT DIAMETER 8" Auger DRILL MODEL BK-51

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
100-101½ *	11-5 Brass Rings 1½" ID SPT	11:40	lite tan green	clay		2 Brass No Full													slightly damp	N = 11 18 27 N = 20 stiff perhaps trace clay & 2 brass rings samples
? 105-106½ 106½	NO RINGS	12:00	lt tan	1 ft clay 6" fine sand 3" clay																12 32 34 N = 29 very stiff penetrometer unconfined 3.0 T/ft²; confined in brass ring 4.0 T/ft²
110-111½ *	BRASS RINGS	12:25	tan	Clay 8" fine sandy silt 10"		1 Brass No Full													weakly moist penetrometer in brass ring	13 32 50@6" N = 35 hard *1 brass ring sample clay 1.5 for fine sand (T/ft²) 4.0 T/ft² for clayey silt
	115-116½ NO brass rings	12:45	light tan green clay . sand lite gray	interbedded very fine silty sand with clay (bdes ~6")															very weakly moist (almost dry)	11 41 50 N = 38 (40) confined ring penetrometer in clay > 4.5 Tons/ft²
	120-121½ NO RINGS	1:10	tan	silty clay															weakly moist	12 30 48 2-4 Tons/ft² N = 32 Very stiff
125-126½	first H₂O addon NO RINGS	2:00		cly contact very fine silty sand to 126															add water very slightly damp	add five gallons water 20 42 50@5" N = 37 hard
*	130-131½ RINGS	2:25		clay clayey silt w/ very fine sand silty clay		4 Brass [illegible] 2 No Full											Moderate Consl.		slightly to moderately damp	30(?) 32 50@5" * 4 brass rings N = 32 Very stiff
135-136½	NO Rings	3:00	grayish green	Clay w/ trace silt													wk-mod. CONSL.		add water	add five gallons water 11 21 37 N = 22 penetrometer 1.75-2.75 Very stiff
140-141½	* RINGS	3:45	greenish gray	clay & silty clay interbdd		[illegible]											moderately Consl.		add water moderately moist (38%?)	19 27 38 N = 25 * 4 rings (test both clay & silty clay) Very Stiff
145-146½	No Rings EOS	4:30 5:00	grn-gry	top 6" clay lower 12" silty clay													WK-MOD		MODERATE MOISTURE ~35%	23 23 28 N = 19 Very stiff

18

& fill
@ 33°

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 4 OF 4

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY STROUD DATE START 11-4-96 DATE FINISHED 11-6-96 HOLE DEPTH 201½ ANGLE -90 DRILL METHOD Hollow Stem Auger ~~SPT/split spoon~~ DIAMETER ____ DRILL MODEL BK-71

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
150-151½ *	START Sample RING	9:115 9:45	grn-gry	clay w/ interbdd silt/fine sand		1 Brass No-Full	▨	▨	▨								WK-MOD CONSOL CLY WK CONSL for silt/sand		clay mod damp silt almost dry ADD ~7 gal H₂O before each 5 ft AUGER Run MOD. DAMP	SILT ~ 1.5 T/ft in ring CLAY ~ 4-4.5 T/ft in Ring * ONE BRASS RING CLY & SLT
155-156½	NO RINGS	10:30	grn-gry	clay ditto			▨										WK CONSL PLASTIC			15 22 25 pure clay GOOD CORE SAMPLE N' = 17 stiff
160-161½ *	RINGS	11:00	grn-gry	pure clay		3 Brass 1 almost 2 - No Full	▨										WK CONSOL PLASTIC		ADD 5 gals MOD DAMP ~ 38-42%	18 22 24 * 3 perfect samples in Rings of clay N' = 16 stiff
165-166½	NO RINGS	11:45	grn-gry	pure clay w/ 3" bd of very fine sand			▨		▨								MOD-MOD STG CONSOL (EXCPT SAND)		ADD 5 gal H₂O MOD DAMP ~ 40%	18 44 50 @ 5" N' = 33 Very stiff
170-171½	NO RINGS	12:30	grn-gry	Pure clay w/ 1" silt bed			▨										MOD CONSL		~ 40% add water Same	17 31 33 N' = 22 Very stiff
175-176½	NO RINGS	1:45	grn-gry	clayey silt			▨	▨									WK CONSOL		35% moist add 5 gal	13 22 32 2 T/ft² Penetrometer N = 18 Stiff
180-181½ *	BRASS RINGS	2:25	grn-gry	SILTY CLAY		2 Brass No Full	▨	▨									WK-MOD CONSOL		~35% ADD 5 gal	14 22 28 N = 17 * 2 BRASS RINGS · Stiff 1.5 - 2.0 T/ft² Penetr.
185-186½	NO RINGS	3:05	grn-gray	SILTY CLAY			▨	▨									WK MOD CONSOL		~ 35% ADD FIVE Gals	13 27 44 N' = 23 1.5 T/ft² Very stiff
190-191½ *	RINGS	3:40	grn-Gray	SILTY CLAY		1 Brass No Full	▨	▨									WK-MOD		~ 35-38%	15 22 36 * 1 Brass RING 3.0 T/ft² [illegible] N' = 19 Stiff
195-196½		4:20		clayey silt			▨	▨									wk		~ 30-35%	14 17 23 2.5 T/ft² N' = 13 Stiff
11/7/96	ABANDON BENTONITE	HOLE with CHIPS	Bottom																	
200-201½	to TOP	5:00		silty clay		2 Brass [illegible]	▨	▨												12 17 20 / 4.5 T/ft² ' = [illegible] stiff

15

HOLE NUMBER GT-2 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 1 OF 1

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. (see map) SEC____ 1/4____ OF 1/4____ T____ N R____ W

LOGGED BY STRAND DATE START 11-7-96 DATE FINISHED 11-7-96 HOLE DEPTH 25½' ANGLE -90 DRILL METHOD Hollow stem Auger ~~SAT~~ DIAMETER 8"/ DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS,VOIDS,ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	START	11-7-96		sand cover																
	12:25			↓															slightly	
				garbage															damp	check for methane - none
																				smells 0%
5-6½		12:35																		15 8 7
2	BRASS			soil + trash																Dirt + trash
	RING																			
10-11½	NO	12:55		soil + trash															BARELY	7,7,12 SAMP A - SOIL
	RINGS			2/3 1/3															DAMP	NO METHANE / SAMP B - Trash
																			OUTSIDE	
15-16½	RINGS	1:05		all garbage															SPLITSPOON	17 14 10
				diaper, wood															WET	5% LEL in Auger Stem quickly
				newspaper																drops to 1% LEL
				etc.																Two RINGS forged together
20-21½	NO	1:20		80% Trash															MODERATELY	8 8 14
	RINGS			20% soil															DAMP	
																				19 13 12
24-25½	BRASS	1:35		MOSTLY GRASS															DAMP	100% LEL METHANE
	RINGS	EOH																		SHUT RIG DOWN FLOOD
																				HOLLOW STEM W/ WATER
																				BACK OUT OF HOLE

HOLE NUMBER GT-3 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

437 67

across road

PAGE 1 OF 2

3½ Sand PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY STROUD DATE START 11/8/96 DATE FINISHED 11/8/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD SPT/AUGER DIAMETER 8"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	11-8-96	8:30																		
5-6½	NO RINGS	8:40	tan	silty very fine sand			▨	▨	▨								loose		slightly damp	2 3 2
10-12	SHELBY TUBE	8:50	tan	fine sand					▨								med loose		dry	200 lbs last 6"
15-16½	NO RINGS	9:00	tan	fine sand				▨	▨								loose		medium damp	5 12 19 minor silt
20-21½	BRASS RINGS	9:10	lite brn	fine sand		3-BRASS No-Fill		▨	▨								Mod. loose		DAMP	13 21 23
25-26½	NO RINGS	9:20	lite brn	fine-med. sand					▨								loose		VERY DAMP	13 19 29
30-31½	BRASS & RINGS	9:30	lite brn	fine-med sand		3 Brass No-Fill			▨								mod loose		very damp	14 21 33 * 3 rings
35-36½	NO RINGS	10:00	lite gry-brn	fine to med. sand					▨								loose w/ [illegible] Fe Ox "Veins"		almost saturated	23 37 33
40-41½	BRASS RINGS	10:10	lite gry brn + orange	fine sand some med. limonite cemented clay		3-Brass No-Fill	▨		▨								[illegible] loose Fe Ox Clay [illegible]		very damp	16 25 37
45-46½	NO RINGS	10:20	lite gry-brn	fine sand minor Fe Ox stn					▨								wk consol.		very damp	22 30 35

3:45

15.

HOLE NUMBER GT-3 JOB NUMBER 430476

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 2

PROJECT PB Geotech OWNER Canyon Co. LOCATION: CO. Canyon SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY Strowd DATE START 11/8/96 DATE FINISHED 11/8/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger DIAMETER 8" / 2" DRILL MODEL BE-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
50-51½	11-8-96 * RINGS	10:25	gry tan	very fine silty sand		3 BRASS 1 - FULL 2 - NO FULL											WK-MOD CONSOL		moderately damp	18 31 37 *3 RINGS
55-56½	NO RINGS	10:40	gry-tan	very fine silty sand													WK-MOD CONSOL		MOD-STR damp	16 29 40
60-61½	RINGS	10:50	gry-tan	very fine sand/borderline silt		3-BRASS NO-FULL											WK-MOD CONSL		MOD damp	20 35 44
65-66½	NO RINGS	11:00	gry-tan grn-grey	top 3" silty fine sand bottom 10" clay													SAND WK MOD-STR CONSOL FOR CLAY		MOD DAMP	40 29 34
70-71½	RINGS	11:15	Gray tan gry	Top 2" clay bottom 10" fine sand		2-BRASS NO FULL											MOD CLY MOD SAND		WK to MOD DAMPNESS	18 20 37 2 RINGS - BOTH OF SAND
75-76½	NO RINGS	11:30	grn-gry	silty clay, clayey silt (varves)													WK-CONSOL		WK DAMP	14 21 27 [illegible]
80-81½	RINGS	11:45	gry-tan	interbdd fine sand-silt-silty clay		2-BRASS No-Full											MOD-STR		slightly damp	15 44 50@5" 2 RING CLAY/silty sand
65-86½	NO RINGS hard [illegible]	12:00	tan-gry	very fine silty sand													MOD-STR		slightly damp	21 48 50 [illegible] 3" bd w/ 50 [illegible]
90-91½	RINGS	12:45	tan-gry	fine silty sand w 2" clay bed		2-BRASS no-Full											MOD-STR		slightly damp	16 40 50
95-96½	NO RINGS	1:00	tan-gry	10" silt top 1" silty clay													MOD CONSL		slightly damp	22 36 40
100-101½	2 RINGS	1:20	tan grey	fine sand		2-BRASS [illegible]											MOD CONSOL		very slight	14 32 50 END HOLE

HOLE NUMBER GT-4 JOB NUMBER D30496

HOLLADAY ENGINEERING COMPANY

PAGE 1 OF 2

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon (large motorcycle parking lot) SEC___ 1/4___ OF 1/4___ T___ N R___ W

LOGGED BY Strawf DATE START 11-11-96 DATE FINISHED 11-11-96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger DIAMETER 2"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
		11-11-96																		
5-6½	Rings	10:00	tan	fine to med sand w/ minor clay/silt			▨	▨	▨								very loose but w/ thin [illegible] caliche		moderately damp	2 1 1 2 rings
10-11½	No Rings	10:07	tan	clayey silt w/ minor very fine sand			▨	▨	▨								loose		mod. damp	3 2 1
15-16½	Shelby tube	10:15	?	? ?																
20-21½	No. Rings	10:25	tan	clayey fine sand			▨	▨	▨								loose		somewhat damp	5 6 8 driven w/ brass rings but used as [illegible]
25-26½	No Rings	10:30	tan	silty fine sand			▨	▨	▨								mod loose		weak dampness	6 12 23
30-31½	RINGS	10:40	dry-tan	silty fine sand		2-CRKS? NO-FULL		▨	▨								med dense		almost dry	15 23 37 2 rings
35-36½	NO RINGS	10:50	gry-tan	fine sand				▨	▨								wk-mod dense		almost dry	12 21 32
40-40.75	Shelby tube	11:05	gry-tan	fine sand			▨	▨	▨										almost dry	[illegible] 8" sample left some minor silt & clay
45-46½		11:15	gry-tan	interbedded fine sand & silt			▨	▨	▨								wk-med dense		moist	[illegible] 4-6" [illegible] 20 27 32

15-17'

HOLE NUMBER GT-4 JOB NUMBER D30496

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 2

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W

LOGGED BY [illegible] DATE START 11/11/96 DATE FINISHED 11/11/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow stem Auger DIAMETER 3½" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES	11-11-96		ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
50-51½	Brass Rings	11:25		Silt w/ 1" clay interbeds		2-Brass Almost	▨	▨	▨								MOD-STR CONSOL		[illegible] damp	16-30 50 minor fine sand
55-56½	NO RINGS	11:40	gry-tan sand. silt clay tan-gry	fine sand ½" silt - 4" clay 10"			▨	▨	▨								WK-MOD CONSOL		wk damp	11 18 31
60-61½	RINGS	11:55	gry-tan w/ orange	fine sandy silt + 1" Feld cemented		2-BRASS No-Full	▨	▨	▨								MOD CONSOL		almost dry	23 37 50 2 Rings
65-66½	NO RINGS	12:10	gry-tan	Grade from top to bottom w/ fine sand, silt, clay			▨	▨	▨								MOD CONSOL		slightly moist	19 34 45
70-71½	RINGS	12:25	tan-gry	fine sandy silt		2-BRASS No Full	▨	▨	▨								MOD CONSOL		MODERATELY MOIST	21 42 50
75-76½	NO RINGS WINCH BREAK	12:40	tan-gray	fine sand + silt			▨	▨	▨								MOD STR CONSOL		MODERATELY MOIST	20 37 42
80-81½	NO RINGS	1:10	tan-gry	Varved clay interbdd silt & fine sand			▨	▨	▨								MOD STR		SLIGHTLY MOIST	22 32 50
85-86½	NO RINGS	1:30	gry-tan	Varved clay & minor sand			▨	▨									MOD ST		slightly moist	[illegible] 33 44
90-91½	BRASS RINGS	1:45	gry-tan	varved silt, clay		2-BRASS Almost	▨	▨									MOD STR		[illegible] [illegible]	15 40 47 2 rings
95-96½	NO RINGS	2:10	gry-tan	varved clay with ½" fine sand intrbd			▨	▨	▨								MOD. STR		drill water added	16 32 50 don't use sample for moisture (drill water)
100-101½	RINGS	2:30	gry-grn	[illegible] fine sand, clay		3-Brass Almost	▨	▨	▨								STR-[illegible]		Somewhat moist	23 47 50 END OF HOLE

17

HOLE NUMBER GT-5 JOB NUMBER 030496 **HOLLADAY ENGINEERING COMPANY** PAGE 1 OF 2

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon Center of Landfill SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY STROUD DATE START 11/12/96 DATE FINISHED 11/14/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger SPT DIAMETER 8"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
0-1½	11/12/96	10:05		COVER &															MOIST	SHELBY TUBE THRU INTER
	SHELBY			TRASH												Ex LEL	0%		TO	COVER CLAY/SILT & TRASH
																Check thru bolt			DRY	1½ ft @ 500 lbs
																hole in hollow stem				mashed end of tube
																& @ outside collar				
5-6½	NO	10:15		COVER &												after augering			MOIST	15 5 4
	RINGS			TRASH												Ex LEL	0%			MOST OF SAMPLE NOT
																ditto procedures				RECOVERED (SHOE BLOCKAGE)
10-11½	NO	10:30		TRASH												Ex LEL	0%		slightly	27 10 8
	RINGS																		damp	POOR RECOVERY (~3-4" SAMPL
15-16½	NO	10:40		TRASH												Ex LEL	0%		almost dry	70 @ 4 inches
	RINGS																			wood, plastic, paper
20-21½	NO	10:55		TRASH												Ex LEL	0%		almost dry	12 9 19
	RINGS																			GOOD RECOVERY ~ 20"
																				NEWSPAPER CINDER (RED)
25-26½	NO	11:10		Trash												Ex LEL	0%			50 @ 4½"
	RINGS																			SHUT DOWN WAITING ON
		ECS																		DELIVERY OF BRASS RINGS
		11-13-96																		
30-31½	BRASS	11:25		Trash												Ex LEL	0%			16 7 12 [illegible]
	RINGS																			2 brass rings
35-36½	Auger			trash												Ex LEL	100% in			NO MORE BLOW COUNTS
	thru																hollow stem			ex hazard
	NO SAMPLE																@ collar			
40-41	2½"	2:50		trash												Ex LEL	100%			1 large brass ring
	BRASS																			
	RING																			
45	grab sample			trash												Ex LEL	100%			~ 8" sample
		2:15																		
		4:05																		
50	[illegible]	2" ring		trash												Ex LEL	100%		~	3" sample [illegible] bag

HOLE NUMBER GT-5 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 2

PROJECT Pilot Butte Geotech OWNER [illegible] LOCATION: CO. [illegible] SEC. ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W

LOGGED BY [illegible] DATE START 11/12/96 DATE FINISHED 11/14/96 HOLE DEPTH 101½ ANGLE -90° DRILL METHOD Hollow Stem DIAMETER 8½" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
		11-13-96																		
55	grab	4:30		fine sd																called SR on bag
56 }	[illegible]		56'	in [illegible]																
58 }																				
60	Ring &	4:55	tan-gray	Sand (med)																1 ring + 3" in bag
	grab	EOS"																		sand [illegible] & top
		11-14-96																		
65 →	grab &	9:30	gray	sand (med)															fairly damp	
65-65.5	2½"																sand fell			
	split-spoon	9:45	+ grab														[illegible]			1100 lbs [illegible] 6"
65.5-67	standard 2"																[illegible]			11 19 26 SPT
	split spoon [illegible]																in 2½ spoon			
																	low-MOD		mod moist	
70-71½	SPT	10:20	tan-gray	silty fine sand													CONSOL.			13 34 42
75-76½	SPT	10:40	tan-gray	sand &															moderately	13 30 41
			grn-gray	clay													[illegible]		moist	sand-clay [illegible]
																	mod well			
																	CONSOL.			
																	sand mod [illegible]			
80-81½	SPT	11:00	tan-gray	silty, fine sand													as above		moist	30 35 46
85-86½	SPT	11:15	tan-gray	fine-to-med sand													MOD well		moist	20 37 50
																	CONSOL.			
90-91½	SPT	11:35	tan-gray	med-grained													[illegible]		quite	16 12 22
				sand													MOD CONSOL.		damp	
																			(not saturated or wet)	
95-96½	SPT	11:50	tan-gray	med sand													MOD [illegible]		[illegible]	18 32 32
																	[illegible]		damp + [illegible]	
	[illegible]																		[illegible]	
100-101½	[illegible]		tan-gray	fine & med sand													[illegible]		[illegible]	15 31 45

APPENDIX F: GEOTECHNICAL INVESTIGATION REPORT

Report of Geotechnical Investigation and Analysis

Slope Stability Evaluation
Pickles Butte Sanitary Landfill Expansion
Canyon County, Idaho

Tetra Tech Project No. 114-571040-2022

August 16, 2022

PRESENTED TO

David M. Loper, REHS/RS
Canyon County Solid Waste Director
15500 Missouri Avenue
Nampa, Idaho 83686

PRESENTED BY

Tetra Tech
2525 Palmer Street,
Suite 2
Missoula, Idaho 59808

P +1-406-543-3045
F +1-406-543-3088
tetratech.com

Prepared by:

Sarah R.P. Garland

Sarah Garland, P.E.
Geotechnical Engineer

Reviewed by:

Marco Fellin, P.E.
Senior Geotechnical Engineer

PROFESSIONAL ENGINEER
LICENSED
19512
STATE OF IDAHO
KRISTEN DANIEL

8/16/2022

Kristen Daniel, P.E.
Principal Civil Engineer

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

ACRONYMS/ABBREVIATIONS

Acronyms/ Abbreviations	Definition
AASHTO	American Association of State Highway and Transportation Officials
ASTM	ASTM International (formerly known as American Society for Testing and Materials)
bgs	Below ground surface
CFR	Code of Federal Regulations
IDEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
FS	factors of safety
ksf	kips per square foot
MCE	Maximum Credible Earthquake
mm	millimeter
MSWLF	Municipal Solid Waste Landfills
PBSL	Pickles Butte Sanitary Landfill
PGA	Peak Ground Acceleration
PSHA	Peak spectral horizontal acceleration
SPT	Standard Penetration Testing
USGS	United States Geological Survey

EXECUTIVE SUMMARY

The Pickles Butte Sanitary Landfill is developing a plan for the expansion of the landfill to include an additional four phases, (Phase 5 through Phase 8). The proposed expansion consists of approximately 231 acres of unlined cells pending the approval of an arid exemption. Proposed permanent excavation slopes are planned to be on the order of 3H:1V to 4H:1V, with maximum cut depths on the order of 150 to 165 feet.

Tetra Tech previously completed a slope stability evaluation that included static and seismic stability evaluations for Phases 2 through 4 of the Canyon County Landfill (October 7, 2015). Tetra Tech also reviewed the previous evaluations conducted by Holladay Engineering Company for the Pickles Butte Sanitary Landfill, dated 1998, and conducted a seismic survey that was dated February 21, 2022 titled, 'Pickles Butte Sanitary Landfill 3D Seismic Survey Report'. The survey was designed to image and delineate a suspected fault in support of the proposed expansion program at the PBSL.

For this stability evaluation, Tetra Tech incorporated the following information: 1) the soils strength data available from previous analysis, 2) materials strength properties assigned based on the laboratory testing of the geotechnical samples collected in 2021 and also correlated from the Standard Penetration Testing (SPT) N-value (blow count) data collected during the geotechnical drilling and previous well installation reports.

Based on findings from former and 2021 site investigations, the subsurface conditions beneath the areas of proposed landfill expansion are assumed to generally consist of silty and clayey sand, clay, and gravel overlying the Glenns Ferry Formation (300 to 950 feet thick), which includes younger lacustrine and fluvial sediments. The surrounding local geology includes an igneous basalt group of the Hat Butte-McElroy Butte type[1] that was not encountered in area of the proposed expansion.

Slope stability and pseudo-static analyses were performed using the computer program Slide2 (2020), developed by Rocscience, Inc., to determine the factors of safety (FS) of critical slip surfaces using both circular (rotational) and block failure analyses and vertical slice limit equilibrium methods. Circular failures can be viewed as a soil 'slump' with a remnant head 'scarp' or drop in elevation where the slide started, and a resultant 'hump' or bulge at the slide terminus. A block failure represents a large mass or 'chunk' of soil failing outwardly as a larger intact mass. Where the pseudo-static analysis indicated a factor of safety of equal to or less than 1.3 (industry standard for pseudo-static factor of safety for landfills), the internal slope of the landfill cell prior to waste emplacement was evaluated using the Newmark displacement analysis method to determine a range of potential seismic-induced deformations of the refuse mass.

Results of the slope stability evaluations indicate that the preliminary design for the expansion phases will meet the requirements of the Idaho Administrative Rules IDAPA 58.01.06 for the Idaho DEQ's administration of municipal solid waste landfills (MSWLF). The analyses indicate static FS values on the order of 1.38 to 2.43, and 1.83 to 3.11 for circular and block failure respectively, while the pseudo-static FS values were on the order of 0.99 to 1.88, and 1.45 to 2.16 for circular and block failure, respectively. Subsequent seismic deformation analyses indicate maximum probable displacements on the order of 0.25 to 3.19 inches (0.5 to 8 cm) for the anticipated peak ground acceleration of 0.12g generated during the design seismic event at the project site. In general, the seismic displacement analyses indicate permanent seismic-induced displacements within the tolerances 6 to 12 inches (15 to 30 cm) that are typically considered acceptable for design of landfill systems with no liner.

Multiple slope angles were considered for Tetra Tech's slope analyses, ranging from 2.5:1 to 4:1 depending on the soil and bedrock types at each location. Based on Tetra Tech's analysis and the required FS's, the following two slope angles are recommended for the preliminary landfill site grading plans:

3H:1V: for the majority of the site slopes

4H:1V: where silt is encountered (Section F discussed below)

---

[1] Mancos - Macrostrat.org

The 4:1 slope was analyzed and recommended for Section F because silt was interbedded between poorly-graded sand and fine sand and created a weakened soil profile. In areas where a high concentration of silt is predominant during construction, a slope of 4H:1V is recommended for cut areas. The soil profile within Section F was identified as having a high concentration of silt in the upper 135 feet of the proposed slope cut, thus decreasing the factor of safety. There are other areas where the silt was present; however, based on the analysis the proposed cut slope of 3H:1V was allowable for the silts as they were interbedded into stronger soil deposits. As the stratification is exposed during excavation of future cells, it is recommended that the soil conditions be reviewed to verify they match the design criteria.

The slope with compacted refuse were modeled to confirm the slope angles that were allowable during the backfilling process. Slopes of 3H:1V are recommended as a maximum angle for the backfill process. A steeper slope of 2.75H:1V was modeled as an iteration to confirm the recommendations, and in this situation the pseudo static conditions produced a factor of safety below 1.3 and is not recommended.

Portions of the soil profile were defined as claystone, and have unconfined compression strengths higher than the site soils; however, the claystone had interbedded layers of softer soils, and for this reason Tetra tech has treated these areas as a soil rather than a rock and also recommends a slope cut of 3H:1V for the claystone zones.

This executive summary has been prepared solely to provide a general overview and should not be relied upon for any purpose except for that for which it was prepared. The full geotechnical report must be referenced for information about findings, recommendations, and other concerns.

1. INTRODUCTION AND BACKGROUND

The following report is the geotechnical evaluation of the slope stability that provides recommendations for the planned lateral expansion of the landfill. The Pickles Butte Sanitary Landfill (PBSL) is located at 15500 Missouri Ave. in Nampa, Idaho. The landfill is located approximately 6-miles south of Nampa, north of Missouri Avenue, south of Deer Flat Road, and ¼- mile west of Farner Road. Canyon County (County) owns approximately 1,180 acres of land in the area, which includes the active area of the PBSL. The County has operated the landfill since it began accepting waste in April 1983. PBSL currently services the residents of Canyon and Owyhee Counties.

The Idaho Department of Environmental Quality (DEQ) approved the original design and operating plan for the PBSL in June 1973, and reconfirmed approval in May 1975 (Holladay, 1994). The Southwest District Health Department approved the landfill in December 1979. Then when Subtitle D was implemented, the County obtained a site certification for the landfill from the DEQ in August 1993 for 116.7 acre. The County applied to modify the site certification boundary in 2020 and received approval from DEQ in February 2021 for approximately 600 acres. The current waste disposal area occupies the original footprint of approximately 116.7 acres, which has a natural soil liner. The Site Certification for the planned lateral expansion was approved on February 26, 2021.

The DEQ Site Certification approval included a request that engineering design considerations be evaluated for resisting peak ground accelerations, prior to the design and construction of containment structures. This report addresses that request and discusses the seismic considerations and slope stability. After the approval was received, a data gaps analysis was conducted in 2021 to identify missing or additional data required for the design focusing on geotechnical and seismic considerations. The evaluation identified locations where additional data would be beneficial and proposed a geotechnical drilling program that was initiated in November 2021 to collect additional data for the analysis.

This report is organized as follows: **Section 1** presents the introduction and background; **Section 2** presents the purpose and the scope; **Section 3** provides information on the proposed expansion; **Section 4** provides highlights of the field exploration; **Section 5** provides information on the geotechnical laboratory testing; **Section 7** discusses the engineering analysis and recommendations; **Section 8 Section 9** provides limitations of the study; and **Section 10** provides references. **Appendix A** provides miscellaneous figures and details, **Appendix B** provides exploratory boring logs, **Appendix C** provides the laboratory testing, **Appendix D** provides slope analysis, **Appendix E** provides deformation analysis, and **Appendix F** provides previous boring logs.

2. PURPOSE AND SCOPE OF STUDY

Tetra Tech performed stability analyses and seismic evaluations of the proposed expansion cell geometries to verify adequate stability or to indicate if flatter slopes are required to achieve stability. The analyses were performed in accordance with Tetra Tech's proposal and contract with Canyon County Solid Waste.

The regulatory requirements for the stability analysis are discussed in the administrative rules for the Idaho Solid Waste Facilities Act (Idaho Statutes, Title 39 – Health and Safety, Chapter 74, Section 39-7407) for the Idaho Department of Environmental Quality's (IDEQ) administration of municipal solid waste landfills (MSWLF) and are discussed further in **Section 7.1**.

The purpose of this study is to demonstrate that slope stability requirements are met for the conceptual design of the following containment structures:

- Phase 5-1, 5-2, 5-3 Temporary Cut Slope, Maximum Section (Section E)
- Phase 6-1, 6-2, 6-3 Temporary Cut Slope, Maximum Sections (Sections C and F)
- Phase 7-1, 7-2, 7-3 Temporary Cut Slope, Maximum Section (Sections B, C, D, F, G)
- Phase 8-1, 8-2, 8-3 Temporary Cut Slope, Maximum Section (Sections B, C, D, F, G)

- Final Slope with Waste Backfilled (Section A was used to represent final slope criteria).

This report details and summarizes the analyses, the material properties selected for the analyses, the seismic design criteria, and presents conclusions based on the existing subsurface conditions and proposed landfill design and construction.

3. PROPOSED EXPANSION

The proposed area for the expansion has been sectioned into smaller units and labeled as the phases listed in Figure 1040-1, Data Gap Areas & Proposed Boring Plan (**Appendix A**). The proposed conceptual expansion of Phases 5 through Phase 8 will consist of approximately 231.4 acres of unlined cells. Proposed fill slopes are planned to be on the order of 5.3H:1V (horizontal to vertical) to 4H:1V, with maximum waste fill depths on the order of 254 feet. Proposed excavation slopes are planned to be on the order of 3H:1V to 4H:1V, with maximum cut depths on the order of 150 to 165 feet. The finished fill slopes will consist of a sequence of slopes with 20-foot-wide storm water/erosion-control benches for every 40 to 60 feet of elevation gain. The purpose for selecting flatter slopes includes more effective erosion and stormwater control on the final slopes.

If the design, locations, or conditions are significantly different from those described above, Tetra Tech should be notified to reevaluate the recommendations contained in this report.

4. FIELD EXPLORATION

Tetra Tech conducted a field investigation for Phases 5 through 8 between the dates of November 15 and December 19, 2021. The field investigation consisted of drilling eight boreholes to explore subsurface conditions at the locations shown on Figure 1040-1 (Data Gap Areas & Proposed boring Plan, **Appendix A**). Figure 1040-1 includes the conceptual expansion cells for the landfill, the locations of the exploration borings, and the location of borings drilled in previous phases. Prior to mobilization, Tetra Tech contacted Idaho One Call to request the location and clearance of public underground utilities before performing drilling. Well logs from the previous well installations are included in **Appendix F**, and they include extracted pages from the Geotechnical Evaluation by Holiday Engineering Company (Holiday), Borehole Logs GT-1 through GT-5, and the combination of Well Driller's Reports and Well Logs PB logs 5 through 15 by Holiday and Daniel B. Stephens & Associates, Inc. The logs provide general descriptions and depths of the site soils at each location.

Canyon County's drilling subcontracted with Holt Drilling to advance the borings through overburden soils with a track-mounted TS150 Crawler drilling rig equipped with auger, 6-inch diameter outer casing and core barrel. The TS150 Crawler provides very accurate and detailed soil profiles when compared to other drilling methods like auger. Tetra Tech's field engineer provided technical oversight during the field investigation, logged the borings, and obtained samples. The borings were backfilled with grout.

Sampling of the borings included determination of the N values, collection of split spoon samples, and bulk samples. Split-spoon samplers were driven into the various strata using a 140-pound hammer falling 30 inches. Sampling was done every 2 feet in the first 10 feet to obtain accurate soil strengths in the depths most critical to the evaluation of the dust control system and landfill gas flare pad. After 10 feet sampling was done every 5 feet to the final depth. For the expansion design sampling was done every 5 feet done to a depth of 50 feet and every 10 feet to 170 feet to collect information about the relative densities of the soil stratum.

The number of blows required to advance the sampler each of three successive 6-inch increments was recorded. When using the split-spoon sampler, the total number of blows required to advance the sampler the second and third 6-inch increments is the penetration resistance (N value), as described by ASTM International (ASTM) Method D1586. Penetration resistance values generally indicate the relative density or consistency of the subsurface soils.

Samples of the subsurface materials were obtained with both 2-inch and 2.5-inch outside- diameter split-spoon samplers. Bulk, Shelby tube and modified California samples were collected at various layers by the field engineer under the direction of a senior geotechnical engineer. More specific drilling and subsurface information regarding individual borings is listed below. Bulk samples of soil were obtained from cuttings based on visual observations in the field.

B2021-1/B2021-2

- Geotechnical borings for dust control system drilled to 30 ft
- Deep layer of poorly graded sand

B2021-3

- Geotechnical boring for landfill expansion
- Winch line snapped imbedding sampling rod deep into a clay layer at 170 feet.

B2021-4

- Geotechnical boring for landfill expansion
- Thick layers of loose sand extended to 90 feet, which created an issue with keeping the hole open. The hole collapse was especially problematic between 50 - 90 feet.
- The deep clay layers were not encountered as in all other deep borings.

B2021-5

- This boring was sited after geophysical seismic testing
- Samples were collected for analysis in the zone geophysics indicated the fault splay was located
- No visual evidence was found during drilling to confirm the existence of a fault plane

B2021-6

- Geotechnical boring for landfill expansion
- Altering layers silt and sand were encountered till 75 feet
- Dense clay to 200 feet with occasional silt seams between 100 - 110 feet

B2021-7

- Geotechnical boring for landfill expansion
- Altering layers of dense sand and silt were encountered till approximately 65 feet followed by dense clay with varying amounts of silt to 145 feet.
- Dense blue-gray clay continued to 200 feet.

B2021-8

- Geotechnical boring for Landfill Gas Flare Station
- Type II cement should be used for concrete in contact with silt soils

Boring logs were prepared noting the borehole location, equipment and drill methods used, subsurface profile and descriptions per ASTM D2487. Groundwater was not encountered in any of the borings. Boring depths are referenced to the existing ground surface elevation. Depths at which the samples were obtained along with the penetration resistance values are shown on the logs of exploratory borings, presented in **Appendix B** (Figures 1-B through 8-B).

5. LABORATORY TESTING

Samples obtained during the field exploration were taken to Tetra Tech's accredited laboratory, where they were observed and visually classified in accordance with ASTM Method D2488, which is based on the Unified Soil Classification System.

Following the field exploration, a senior Tetra Tech geotechnical engineer reviewed all the boring logs and samples obtained and created an inventory of samples available for testing. The senior engineer reviewed the potential depths of cut, and locations of fill, and selected samples along the depths of each boring for testing. The tests assigned in each boring were intended primarily to identify the precise type of soil at each depth, as well as the associated strength properties of each soil type, with the ultimate goal of incorporating all of the strength testing directly into the slope stability models in each cross section analyzed. The laboratory testing data was directly utilized in the slope stability models to determine the resultant factor of safety at each cross-section location.

The laboratory testing was performed in general accordance with the Idaho Materials Manual of Test Procedures, American Association of State Highway and Transportation Officials (AASHTO), ASTM, or other approved procedures. Tetra Tech's laboratory is an AASHTO Materials Reference Laboratory (AMRL) and Concrete and Cement Reference Laboratory (CCRL) accredited facility conforming to ASTM E 329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

Table 1 describes laboratory testing performed for this investigation, and their purpose:

Table 1. Laboratory Testing Completed by Tetra Tech

Test Conducted:	To Determine:	Test Procedure:
Natural Moisture Content	Moisture content representative of field conditions at the time samples were taken.	ATM D2216
Grain-size Distribution	Size and distribution of soil particles (i.e., clay, silt, sand, and gravel).	ASTM D6913
Natural Moisture Content	Moisture content representative of field conditions at the time samples were collected.	ATM D2216
Atterberg Limits	The effect of varying water content on the consistency of fine-grained soils.	ASTM D4318
Moisture-Density Relationship	The optimum moisture content for compacting soil and the maximum dry unit weight (density) for a given compactive effort.	MT 210-16 MT 230-16
Unconfined Compression	Unconfined compressive strength of soil and rock.	ASTM D2166 ASTM D7012
Direct Shear	Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions	ASTM D3080
Triaxial Shear	Consolidated-Undrained soil strength properties.	ASTM D4767
Resistivity and pH	The combination of these characteristics determines the potential of soil to corrode metal.	ASTM G187/D4972 MT 232-16
Consolidation	The amount a soil sample compresses with loading and the influence of wetting on its behavior. For use in settlement analysis, determining expansive potential and foundation design.	ASTM D2435

Field and laboratory test results are presented graphically and summarized in **Appendix C**. This data, along with the field information, were used to prepare the exploration boring logs in **Appendix B**.

6. SUBSURFACE CONDITIONS

Subsurface soil conditions are variable throughout the boring depths; elevations ranged between 2956.6 to 2436.6 feet. The borings contained interbedded layers of poorly graded sand, poorly graded sand with silt, silty sand, silty with sand, silt, lean clay with sand, and silty clay. One layer of fat clay was observed in boring B2021-6 as described below. Given the variability of the site soils, other variations in the soil classifications are entirely possible. The top elevation of the individual borings varied, so the boring descriptions were broken into sections based on elevation for a more defined classification throughout the proposed cells.

Subsurface soils were classified in accordance with standards set by AASHTO. Descriptive terms were obtained using the ASTM Soil Classification System. Both the AASHTO and ASTM classifications are noted on the logs and laboratory data presented in **Appendix C** for each soil sample. **Appendix C** includes a summary of all the soil types and properties obtained in the borings drilled along the project length. Each soil type encountered is briefly described below.

6.1 Sand

Sand was encountered in all borings, B2021-1 through B2021-7, at depths ranging in elevations on the order of 2799 to 2470 feet. The sand gradations included poorly-graded sand, poorly-graded sand with silt, and silty sand. The poorly-graded sand generally consisted of a fine to medium-grained matrix, while the silty sand was fine-grained. In Boring B2021-8, the sand included 10 feet of fine-grained, silty sand, and 2.5 feet of a poorly-graded fine to medium grained sand.

Penetration resistance values in the sand ranged from 2 to greater than 50 blows per foot which indicates a potentially very loose to very dense soil stratum. The looser densities were encountered near the surface, with an increase in density at depths of approximately 10 feet and deeper. The natural moisture contents in the sand ranged from 2 to 22 percent at the time of drilling.

Laboratory testing performed on bulk and split spoon samples of the sands indicated a range of maximum dry density between 100.2 and 111.7 pcf, and an optimum moisture content between 11 and 16 percent. (**Appendix C**). Results of the Unconfined Compression Test for boring B2021-3 between 61 and 65 feet indicates an unconfined compression strength on the order of 0.143 kips per square foot (ksf). Direct shear testing of the sand in Boring B2021-3 between 60 to 62 feet indicates a cohesion of 0.282 ksf and a friction angle of 20.2 degrees, and between 80 and 82 feet a cohesion of 0.413 ksf, and a friction angle of 32.81 degrees. Consolidation testing indicated an under-consolidated soil in with preconsolidation pressure 3.0 ksf and a swell pressure of 2.6 percent. (**Appendix C**).

In Boring B2021-4 between 90 and 91 feet, the direct shear testing indicated a cohesion of 0.198 ksf, and a friction angle of 22.83 degrees, and between 120 and 120.9 feet, the cohesion was on the order of 0.588 ksf, with a friction angle on the order of 29.51 degrees. Direct shear testing in Boring B2021-5 between 90 and 91.5 feet indicated a cohesion of 0.260 ksf, and a friction angle of 31.18 degrees.

In Boring B2021-3 between 25 and 27 feet, the triaxial shear testing indicated a cohesion of 0 ksf, and a friction angle of 25.86 degrees. Triaxial shear testing of the soil in Boring B2021-5 between 50 and 51.5 feet indicated a cohesion of 0.123 ksf, and a friction angle of 27.04 degrees.

6.2 Silt

Silt was encountered in Borings B2021-3 through B2021-7 at depths ranging in elevations from 2,784 to 2,490 feet. The silt classifications varied between silt and silt with sand. The silt and silt with sand layers varied in thickness between 1 and 28 feet.

Generally the silt was tan to gray and had low plasticity. Penetration resistance values in the silt ranged from 10 to greater than 50 blows per foot which indicates a potentially stiff to hard matrix soil stratum.

Laboratory testing performed on bulk and split spoon samples of the silt soils indicated natural moisture content of samples ranged from 4 to 29 percent at the time of drilling. Boring B2021-5 was sited to attempt to intersect the suspected fault in the area. In Boring B2021-5 at 70 feet, the liquid limits were on the order of 27 with a plastic index of 21 and a dry density of 112 pounds per cubic feet (pcf). The soils and soil matrix in this boring did not differ substantially from the other borings, and therefore there was not conclusive evidence to indicate the presence of a fault. In Boring 2021-8 at 100 feet the liquid limits were non plastic, and the dry density was 97 pcf.

In Boring the B2021-5 between 69 and 70 feet, the triaxial shear testing indicated a cohesion of 0.037 ksf, and a friction angle of 19.09 degrees (**Appendix C**).

6.3 Lean Clay

Lean Clay and lean clay with sand was encountered in Borings B2021-5 through B2021-7, at depths ranging in elevations on the order of 2,615 to 2,456 feet. The clay layers varied between 1 foot and 54 feet thick. Penetration resistance values in the lean clay ranged from 45 to greater than 50 blows per foot which indicates a potentially hard to very hard soil stratum. The clay color was gray to tan to blue and had high plasticity.

Laboratory testing performed on bulk and split spoon samples of the clay soils indicated natural moisture content of samples ranged from 20 to 21 percent at the time of drilling. In Boring B2021-5 between 80 and 81.5 feet, the liquid limits were on the order of 35 with a plastic index of 14. In Boring 2021-6 at 106 feet the liquid limit was 47 with a plastic Index of 25, with a maximum dry density of 100.0 pcf and an optimum water content of 20.5 percent.

In Boring the B2021-7 between 120 and 121.3 feet, the triaxial shear testing indicated a cohesion of 0.053 ksf, and a friction angle of 18.02 degrees (**Appendix C**).

6.4 Silty Clay

Silty clay was encountered in Borings B2021-4 through B2021-7, at elevations on the order of 2,774 to 2,510 feet. The layers of silty clay were not as prevalent as the other soil types and averaged in thicknesses between 2 and 15 feet.

Generally, the silt clay was tan to gray and has higher plasticity. Penetration resistance values in the silt ranged from 26 to greater than 50 blows per foot which indicates a potentially hard to very hard soil stratum.

Laboratory testing performed on Shelby, bulk and split spoon samples of the silt soils indicated natural moisture content of samples ranged from 16 to 24 percent at the time of drilling. In Boring B2021-5 at 50 feet, and in Boring B2021-7 at 120 feet, the consolidation testing indicated an under-consolidated soil in with pre-consolidation pressures of 4.8 and 1.5 ksf. Boring B2021-5 had a swell pressure of 2.8 percent.

In Boring B2021-5 between 50 and 51.5 feet the triaxial shear testing indicated a cohesion of 0.489 ksf, and a friction angle of 14.95 degrees (**Appendix C**).

Boring B2021-5 was sited to attempt to intersect the suspected fault in the area. The soils and soil matrix in this boring did not differ substantially from the other borings, and therefore there was not conclusive evidence to indicate the presence of a fault.

6.5 Fat Clay

Silty clay was encountered in Boring B2021-6 from elevations 2,555 to 2,531 feet. The fat clay was very dark gray, had a high plasticity, and consolidated similar to claystone. It was identified in this single boring; however, may exist in surrounding areas. Penetration resistance values were greater than 50 blows per foot which indicates a potentially very hard soil stratum.

Laboratory testing performed on split spoon samples of the fat clay indicated liquid limits were on the order of 56 to 67 with a plastic index of 19 to 22. (**Appendix C**).

6.6 Groundwater

Groundwater was not encountered in any of the previous or more current borings drilled at this site. Based on the well data presented in previous reports, the natural groundwater elevation is assumed to be below the proposed excavation depths of up to 200 to 250 feet for the proposed landfill expansion. Numerous factors contribute to groundwater fluctuations, and evaluation of such factors is beyond the scope of this report.

7. ENGINEERING ANALYSIS AND RECOMMENDATIONS

7.1 Seismic Impact Zone Characterization

The seismic evaluation of the landfill was completed to comply with the Idaho Department of Environmental Quality's administration of municipal solid waste landfills. The Canyon County Landfill is located within a "seismic impact zone" as defined by the Administrative Rules for the for the Idaho Solid Waste Facilities Act (Idaho Statutes, Title 39 – Health and Safety, Chapter 74, Section 39-7407) that states:

> *"A MSWLF unit shall not be located: …(ii)within seismic impact zones except as provided in 40 CFR §258.14;".*

The United States Environmental Protection Agency (EPA) 40 CFR §258.14 defines a seismic impact zone as;

> *"…an area with a ten percent or greater probability that the maximum horizontal acceleration…will exceed 0.10g in 250 years."*

The EPA requires that MSWLF units located within a seismic impact zone shall demonstrate that all landfill containment structures are designed to resist the maximum horizontal acceleration in lithified earth material for the site. Based on the United States Geological Survey (USGS) National Seismic Hazard Mapping application, the peak horizontal ground acceleration at the project site having a 10 percent probability of exceedance in any 250-year period is 0.12g, which exceeds the criteria above and therefore classifies or designates the site by rule definition to be within a seismic impact zone.

The results for the USGS National Seismic Hazard Mapping application were based on a risk category II, with the landfill as a moderate risk to human life determined based on the normal-day operations with human operators processing and covering the trash. The soil conditions were considered Site Class D for stiff soils with Standard penetration Resistance, N values, between 15 and 50.

Tetra Tech reviewed the most recent published USGS probabilistic earthquake hazard information for seismic events with a 10 percent probability of exceedance in a 250-year period (USGS 2008 NSHMP PSHA Interactive Deaggregation Web Application), as current state of practice warrants, to select a peak spectral horizontal acceleration (PSHA). Based on our review of the USGS probabilistic earthquake hazard information, including site specific deaggregation characteristics of the Maximum Credible Earthquake (MCE), including magnitude, distance, and probability, a PSHA of 0.23g was selected to represent the extreme seismic case.

Based on recommendations in the EPA's Seismic Design Guidance for Municipal Solid Waste Landfill Facilities (1995), the maximum horizontal acceleration was reduced by 50 percent to represent the average horizontal acceleration for the given slope. In this case, 50 percent of the maximum horizontal acceleration (0.23g) yields an average horizontal acceleration of 0.115g. An adjusted horizontal acceleration of 0.12g was applied for pseudo-static analysis of the modeled slope configurations. The above acceleration values were applied for pseudo-static analysis of the modeled slope configurations.

To model the proposed slope cuts an initial angle between 2.25H:1V to 2.75:H:1V was removed to the proposed base elevation and the factor of safety for slope stability was calculated. The slope angle was adjusted using iterations of the same process until a resulting factor of safety was established that was above the criteria of 1.5 for static, and 1.3 for pseudo-static. The proposed fill was then added into the cut section and iterations were used with varied slopes between 2.75H:1V and 3H:1V to achieve a long-term factor of safety as described.

7.2 Material Strength Properties

Tetra Tech previously completed a slope stability evaluation that included static and seismic stability evaluations for Phases 2 through 4 of the Canyon County Landfill (October 7, 2015). Additionally, Tetra Tech reviewed the previous evaluations from Holladay Engineering Company for the Pickles Butte Sanitary Landfill, dated 1998.

For this stability evaluation, Tetra Tech incorporated the following information: 1) the soils strength data available from the previous analysis, 2) materials strength properties assigned based on the laboratory testing of the geotechnical samples collected in 2021 and correlated data from the SPT N-value (blow count) data collected during the geotechnical drilling and well installation.

As discussed in the laboratory testing section, Tetra Tech's senior geotechnical engineer specifically selected samples for testing in each boring to directly incorporate into the slope stability models at each cross-section location. An attempt was also made to provide duplicate or crossover testing to identify variations in strength parameters for similar soil types. Several different tests were also performed to obtain a range of soil strength properties for each soil type. **Tables 2** and **3** presents a detailed breakdown of some of the data utilized to analyze the cross sections.

Conservative (lower bound) shear strength values were used to evaluate slope stability for static and seismic conditions. The following **Tables 2** and **3** present the material values that were assumed for this analysis.

Table 2. Material Strength Properties - Soil

Material	ASTM Classification	Unit Weight (pcf)	Friction Angle (deg)	Cohesion (psf)
Waste Fill		75	28	300
Poorly-Graded Silty Sand	SP-SM	110	20	280
Poorly-Graded Silty Sand	SP-SM	110	27	123
Silt (B,C)	ML	110	19	37
Silt (D,E)	ML	110	0	908
Lean Clay	CL	130	14	2000
Lean Clay-Silty Clay	CL-ML	109	15	489
Clay (Hard)	CL	125	0	6211
Clay (Hard)	CL	125	10	7831
Silty Sand - B3	SP-SM	115	32	400
Silty Sand - _B4	SP-SM	115	30	580
Sand B3	SP	110	36.2	0
Sand/Gravel Interbedded	GW	135	37	0
Clayey Gravel	GW	138	36	1

Table 3. Material Strength Properties - Rock

Generalized Hoek-Brown Material	UCS (ksf)	GSI	mi	Unit Weight (pcf)
Basalt	3,500	30	25	146
Claystone	7,000	10	4	135

7.3 Slope Stability Analyses

Slope stability and pseudo-static analyses were performed using the computer program Slide2 v.9.023, developed by Rocscience, Inc., to determine the factors of safety of critical slip surfaces using both circular and block failure searches and vertical slice limit equilibrium methods. Because the proposed expansion of the landfill would be unlined, the potential of a critical interface between the waste fill and the natural subgrade soil is low. Therefore, circular failure analyses were performed at the critical sections. A screening analysis for block failure was performed to verify the potential for failure along the waste-soil interface is low compared to circular failure through the waste fill.

The EPA recommends a minimum FS of 1.5 for static slope stability analysis and a FS of 1.3 for pseudo-static slope stability analysis, based on Table 2-4 of the EPA's Solid Waste Disposal Facility Criteria Technical Manual (1998). For temporary cut slopes, a minimum FS of 1.2 is typically considered acceptable. Tetra Tech did not analyze temporary slopes given that it is anticipated that most all of the cut slopes will be open for a minimum of 6 months to 1 year, which per geotechnical standard of practice, are considered permanent slopes for purposes of slope analyses. Higher values for the FS indicate that the design is less likely to fail.

The cross-sections were created in the areas with the highest proposed cut and fill slopes where the critical soil slope conditions were identified, and in the areas incorporating the existing landfill with the proposed additional cells. There are seven section profile views, A through G, shown on Figures 2D to 5D, and included in **Appendix D**. A summary of the slope stability analysis results are presented in **Table 4** below and the corresponding output plots are Figures 6D through 37D in **Appendix D**.

Table 4. Factors of Safety for Slope Stability Analyses

		Factor of Safety			
Section	**Analyzed Slope Long term**	**Static Analysis, Circular Failure**	**Pseudo-Static Analysis, Circular Failure**	**Static Analysis, Block Failure**	**Pseudo-Static Analysis, Block Failure**
A	3H:1V	2.3	1.53	2.85	2.02
A – Final Slope Configuration	2.75H:1V 3H:1V	1.73 1.94	1.28 1.40	- 2.21	- 1.68
B	2.27H:1V	2.43	1.88	2.52	2.00
C	2.85H:1V	1.85	1.35	2.16	1.63
D	2.87H:1V	1.93	1.37	3.11	2.33
E	2.27H:1V	1.96	1.51	-	-
E	1.87H:1V	1.66	1.34	1.77	1.45
F	3H:1V	1.38	0.99	-	-
F- 2 Tier	3H:1V on lower, and 4H:1V on upper	1.81	1.19	2.14	1.53
F	4H:1V	2.06	1.35	1.83	1.69
G	2.6H:1V	2.22	1.68	2.65	2.16

The analysis as represented above indicates FS values for the static determinate loading on the order of 1.38 to 2.43, and 1.83 to 3.11 for circular and block failure, respectively. The seismic FS values were on the order of 0.99 to 1.88, and 1.45 to 2.16 for circular and block failure, respectively. The silty soils within the proposed cut in Section F produced a FS below 1 for the seismic loading condition. The slope was modeled with 4H:1V slope cut and a FS of 1.35 was obtained which met the minimum requirements of 1.3. Various degrees of slope cuts were modeled in an iterative manner to define the most effective slope cut for the soil conditions. The final slope configuration was modeled on Section A and was representative of the backfill method and slope for the remaining project area. An iterative process was used to define which slope complied with the required factor of safety criteria of 1.5 for static stability and 1.3 for pseudo-static stability.

7.4 Pseudo-static

When the pseudo-static analysis indicates a factor of safety of equal to or less than 1.3, the containment structure is required to be evaluated utilizing at least two independent methods to estimate permanent seismic induced displacement of the refuse mass. The displacement analysis methods are typically used as a screening method to evaluate if the structure or slope under analysis is within the range of critical displacement. For design of municipal solid waste landfill facilities, a maximum displacement less than 0.5 to 1.2 inches (1 to 3 cm) is typically acceptable for design. Where the pseudo-static analysis indicated a factor of safety of equal to or less than 1.3, the containment structure was evaluated using the Newmark displacement analysis method to determine a range of seismic-induced deformation. There was one cross-section, Section F, where the pseudo-static analyses indicated a factor of safety below 1.3. Yield accelerations were performed using Slide2 and are provided in the **Table 5** below.

The Slide2 program calculates the Newmark displacement based on the program SLAMMER (2013), developed by the USGS. The Slide2 program allows the user to enter a seismic record directly (time and acceleration data) or choose from a database of available historical seismic records. For the seismic analysis, a historical earthquake record was selected based on comparison to the design seismic event stated above. The earthquake record selected was the Mammoth Lakes – 1 1980, CVK-090 record, with a magnitude of 6.1 and Peak Ground Acceleration (PGA) of 0.416g, and represents an average high magnitude earthquake in similar soil conditions.

The performance of landfills subjected to strong earthquake ground motions is an extremely complicated process for which all of the variables affecting the behavior are not yet fully understood or capable of being analyzed. The historical performance of landfills subjected to seismic events similar to the design earthquake generally indicates satisfactory performance for the landfills studied.

For Section F, a conceptual slope was evaluated based on the methods above. Two different slope angles were analyzed, 3H:1V (20.8- degrees) and 4H:1V (14-degrees) with the 0.12g peak ground acceleration and the section F geometry. A summary of the analyses results is presented in **Table 5** and the corresponding output plots (Figures 1E through 12E) are included in **Appendix E**.

Table 5. Section F Stability Analysis Results for Displacement

	Static Analysis		Pseudo-static Analysis	
Slope 3H:1V	**Circular Failure**	**Block Failure**	**Circular Failure**	**Block Failure**
Factor of Safety	1.38	1.90	0.99	1.41
Yield Acceleration (%g)	-	-	-	0.12
Estimated Displacement (in)	-	-	-	3.19
Slope 4H:1V				
Factor of Safety	2.06	2.49	1.35	1.69
Yield Acceleration (%g)	-	-	-	0.23
Estimated Displacement (in)	-	-	-	0.25

7.5 Comprehensive Seismic Survey for Fault identification

Tetra Tech prepared a 3D Seismic Survey report dated February 21, 2022. The project site is located within the Western Snake River Plain (WSRP) fault system and a portion of an undifferentiated Quaternary aged northeast-dipping WSRP normal fault is mapped within the project boundaries, extending northwest through the proposed expansion area. The mapped fault is labeled as a normal fault with an approximate slip rate of less than 0.2

mm/year. Proposed excavations within the fault areas are expected to extend up to 150 feet below ground surface, potentially intercepting this fault.

The report prepared by Tetra Tech presented the results from an active-source 3D seismic survey. The seismic survey was designed to image and delineate the suspected fault. Seismic imaging over the suspected fault area was attained by using 3D seismic velocity tomography and reflection processing. Seismic reflection is a reliable method for imaging faults when present and can help to orient the faults and subsurface structure. The 3D seismic tomography provides the information needed to accurately convert seismic reflection data in time to depth and elevation. The information gained from this survey was used to site the location of Boring B5 to aid in the evaluation of the fault.

The summary of the seismic investigation and report were as follows:

1) The USGS NW-striking NE-dipping WSRP normal fault that is mapped as extending into the project site from the northwest does not appear to displace ~100ka age sedimentary units.
2) From a probabilistic perspective there seems to be little possibility of significant shallow (< 200 feet) faulting within the project site southeast of the west edges of the mapped tip splay faults.
3) To best characterize the potential movement and absolute location of faulting would require geologic mapping during excavation of the future landfill cell. This area of the proposed landfill expansion would be constructed in >50 years in the future. When the area is excavated for cover material in the future before waste is placed in this area it is recommended that geologic mapping of the fault is conducted, with particular attention to identifying narrow fault zones with evidence of recent activity and areas of potential materials suitable to date the most recent age of fault activity to determine if any detected fault activity is recent (unlikely) or > 100 ka in age (most likely).

Tetra Tech's slope evaluation recommendations presented in **Section 7.3** are not affected or altered by the results of the results of the February Seismic Survey Report. We suggest that a geotechnical engineer observe the slope cuts in the future to determine the potential presence of a faulted area. Should a faulted area be identified, the geotechnical engineer should determine at that time whether further investigation or analysis is required for the specific cells in the suspect fault area.

7.6 Conclusions and Recommendations

The material strength properties incorporated in the geotechnical analyses were based on lower bound shear strength values and are considered conservative estimates. The stability analyses performed are considered to be the worst-case slope configurations with conservative material strengths and resulted in the factors of safety and displacements indicated above.

Results of the geotechnical investigation and analyses indicate that the proposed excavation and design as shown on Figure 1D in **Appendix D** will meet the Factor of Safety requirements of the Idaho Administrative Rules for the Idaho Solid Waste Facilities Act for the Idaho DEQ's administration of MSWLF.

Multiple slope angles were considered for Tetra Tech's slope analyses, ranging from 2.5:1 to 4:1 depending on the soil and bedrock types at each location. Based on Tetra Tech's analysis and the required FS's, the following two slope angles are recommended for the preliminary landfill site grading plans:

3H:1V: for the majority of the site slopes

4H:1V: where silt is encountered (Section F)

The 4:1 slope was analyzed and recommended for Section F because silt was interbedded between poorly-graded sand and fine sand and created a weakened soil profile. In areas where a high concentration of silt is predominant during construction, a slope of 4H:1V is recommended for cut areas. For now, Section F is the only area identified as having a high concentration of silt.

If it can be confirmed that bedrock exists for the entire depth of cut during construction, a 2:1 slope may be utilized. However, if there are any soft silt or clay seams interbedded withing the bedrock layer at any location along the cut, a 3:1 slope must be used. If slope angles are proposed to be steepened to a 2:1 slope during construction, a licensed geotechnical engineer from Tetra Tech must observe and evaluate the slope prior to make the determination if the slopes can be steepened, otherwise the slope must remain at 3:1.

In general, the seismic displacement analyses indicate permanent seismic-induced displacements are within the tolerances of 6 to 12 inches (15 to 30 cm) that are typically considered acceptable for landfill design. The preliminary seismic evaluation presented above was performed in accordance with generally accepted standards of the geotechnical engineering profession.

Because it is anticipated that most all of the cut slopes will be exposed for a minimum of 6 months to 1 year, Tetra Tech analyzed all slopes as permanent, and did not consider reducing the factor of safety for temporary slopes.

Some states specify the maximum allowable steepness of landfill cut or fill slopes, sometimes also based on the height of the slopes. In Pennsylvania for example, the maximum allowable slope steepness is 3:1. Other states have varying specifications or slope steepness limits for short term or longer-term slope exposures. The requirements are based both on historical slope failure data and slope analysis data, along with added factors of safety. Therefore, states have somewhat calibrated requirements based on the soil types and rainfall. The 3:1 maximum slope steepness for Pennsylvania landfills matches that determined for this investigation.

8. CONTINUING SERVICES

Two additional elements of geotechnical engineering service are important to the successful completion of this project.

1) **Design Phase**. During the design phase, it is essential to ensure that the intent of the recommendations is incorporated in design decisions related to the project and that changes in the design concept consider geotechnical aspects. If issues arise, Tetra Tech's geotechnical engineers should be consulted for clarification and additional analysis on an as needed basis.

2) **Observation and monitoring during construction**. PBSL Operations should be trained to observe the types of materials encountered during the earthwork phases of the project, including the site grading and landfill cell excavations, to determine that the subsurface conditions are compatible with those used in the analysis and design. If conditions change, a geotechnical engineer should be consulted to evaluate the stability or potential impact on the design. During site grading, placement of fill should be observed and tested to confirm that the proper compaction has been achieved. PBSL should continue the annual aerial evaluation of the site and performance analysis to verify that the compaction remains consistent.

9. LIMITATIONS

The subsurface conditions and recommendations presented in this document are based on conditions encountered at the boring locations and based on the laboratory analysis. Due to the complexity and variability of natural earth and rock formations and materials, significant variations may occur between and around these locations or with time. Because these data represent a very small statistical sampling of subsurface conditions, it is possible that conditions may be encountered that are substantially different from those indicated. In these instances, modification and adjustment to the recommendations presented may be warranted.

This study has been conducted in accordance with generally accepted geotechnical engineering practices in the region where the work was conducted. The conclusions and recommendations submitted in this report are based upon project information collected and provided to Tetra Tech. The nature and extent of subsurface variations across the site may not become evident until construction. Tetra Tech should be on site during construction, to verify that actual subsurface conditions are consistent with those described herein.

This report has been prepared exclusively for the client. This report and the data included herein shall not be used by any third party without the express written consent of both the client and Tetra Tech. Tetra Tech is not responsible for technical interpretations by others. As the project evolves, Tetra Tech or another qualified geotechnical engineer should provide continued consultation and field services during construction to review and monitor the implementation of the recommendations and verify that the recommendations have been appropriately interpreted. Significant design changes may require additional analysis or modifications of the recommendations presented herein. On-site observation of excavations and foundation bearing strata and testing of fill should be performed by a representative of the geotechnical engineer.

10. REFERENCES

Ambraseys N.N., Menu J.M. (1988). Earthquake-Induced Ground Displacements. Journal of Earthquake Engineering and Structural Dynamics 16: 985-1006.

Bray, J.D., Zekkos, D., Kavazanjian, E., Jr., Athanasopoulos, G.A., Riemer, M.F. (2009). “Shear Strength of Municipal Solid Waste.” Journal of Geotechnical and Geoenvironmental Engineering, June.

Bray J.D., Rathje E.M. (1998). Earthquake-induced displacements of solid-waste landfills. Journal of Geotechnical and Geoenvironmental Engineering, ASCE 124(3): 242-253.

Holladay Engineering Company, February 1998. “Geotechnical Evaluation Pickles Butte Sanitary Landfill, Canyon County, Idaho.”

Koerner, R.N. and Soong, T.-Y. (1998). “Analysis and Design of Veneer Cover Soils”, 6th International Conference on Geosynthetics.

Makdisi F.J., Seed H.B., (1978). Simplified Procedure for Estimating Dam and Embankment Earthquake-Induced Deformations. Journal of Geotechnical Engineering 104(7): 849-867.

Petersen, Mark D., et al, 2008, Documentation for the 2008 Update of the United States National Seismic Hazard Maps: U.S. Geological Survey Open-File Report 2008–1128, 61 p.

Tetra Tech, September 2015. Technical Memorandum. “Pickles Butte Sanitary Landfill, Canyon County, Idaho. Draft Conceptual Fill Plan Report & Capacity Estimate.”

US Environmental Protection Agency, 1995. “RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities”. EPA/600/R-95/051.

US Environmental Protection Agency, 1998. “Solid Waste Disposal Facility Criteria Technical Manual”. EPA530-R-93-017.

USGS, 2008. National Seismic Hazard Mapping Project (NSHMP) PSHA Interactive Deaggregation Web Application. https://earthquake.usgs.gov/hazards/interactive/

APPENDIX A: MISCELLANEOUS FIGURES AND DETAILS

Important Information About Your Geotechnical Engineering Report (Published by ASFE)

Tetra Tech Boring Log Descriptive Terminology Key to Soil and Rock Symbols and Descriptive Terms

Classification of Soils for Engineering Purposes

Tetra Tech Exploratory Boring Locatsions – Figure 1040-1

APPENDIX B: LOGS OF EXPLORATORY BORINGS

Figures 1-B through 16-B

APPENDIX C: LABORATORY TESTING

Summary of Laboratory Results - Table 1-C

Sieve Analysis Results

Moisture Density Relationship Results

Consolidation Tests

Unconfined Compressive Strength Results

Triaxial Tests

APPENDIX D: SLOPE ANALYSIS

Figures 1D through 43D

APPENDIX E: DEFORMATION ANALYSIS

Figures 1E through 12E

Static and Pseudo-Static Slope Stability Stability Analyses with Associated Circular and Block Failure Factor of Safety, Newmark Displacement, and Critical Acceleration for Slope 3H:1V
Figures 1E through 6E

Static and Pseudo-Static Slope Stability Stability Analyses with Associated Circular and Block Failure Factor of Safety, Newmark Displacement, and Critical Acceleration for Slope 4H:1V
Figures 7E through 12E

APPENDIX F: PREVIOUS BORING LOGS

Logs GT-1 through GT-8

Logs PB-5 through PB-15

APPENDIX A: Miscellaneous Figures and Details

Important Information about Your Geotechnical Engineering Report (Published by ASFE/GBA)

Tetra Tech Boring Log Descriptive Terminology Key to Soil and Rock Symbols and Terms

Classification of Soils for Engineering Purposes

Figure No. 2001-1 – Location of Exploratory Borings

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the Geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A Geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting Geotechnical engineer indicates otherwise, *your Geotechnical engineer report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified:
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their reports' development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by Geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no Geotechnical engineer, no matter how qualified, and not subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be fare more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their Geotechnical consultants through the construction stage*, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a Geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a Geotechnical engineering report whose adequacy may have been affected by time.* Speak with the Geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as flood, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the* *geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plants based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by geotechnical engineers based upon their interpretation of field logs (assembled by site personnel) and laboratory evalution of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report* prepared or authorized for their use. Those who do not provide such access may proceed under the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist geotechnical engineers' liabilities onto someone else. Rather, they are definitive clauses which identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, ASFE as developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory.

Published by

ASFE
THE ASSOCIATION
OF ENGINEERING FIRMS
PRACTICING IN THE
GEOSCIENCES

8811 Colesville Road/Suite G106/Silver Spring, Maryland 20910/(301)565-2733

Tetra Tech Boring Log Descriptive Terminology
Key to Soil Symbols and Terms

12/06/12

TETRA TECH

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	▨	GW	Well-graded gravels, gravel sand mixtures, little or no fines.
			▨	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▨	GM	Silty gravels, gravel-sand-silt mixtures.
			▨	GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	▨	SW	Well-graded sands, gravelly sands, little or no fines.
			▨	SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▨	SM	Silty sands, sand-silt mixtures.
			▨	SC	Clayey sands, sand-clay mixures.
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▨	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			▨	OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▨	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			▨	CH	Inorganic clays of high plasticity, fat clays.
			▨	OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			▨	PT	Peat and other highly organic soils.

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Notes

See Soil Boring Information Special Provision.

SPT (Standard Penetration Test-ASTM D1586):
The number of blows of a 140 lb (63.6 kg) hammer falling 2.5 ft (750 mm) used to drive a 2 in (50 mm) O.D. Split Spoon sampler for a total of 1.5 ft (0.45 m) of penetration.
Written as follows:
first 0.5 ft (0.15 m) - second 0.5 ft (0.15 m) - third 0.5 ft (0.15 m) (ex: 1-3-9)
Note: if the number of blows exceeds 50 before 0.5 ft (0.15 m) of penetration is achieved, the actual penetration rounded to the nearest 0.1 ft (0.03 m) follows the number of blows in parentheses (ex: 12-24-50 (0.09 m), 34-50 (0.4 ft), or 100 (0.3 ft)).WR denotes a zero blow count with the weight of the rods only.
WH denotes a zero blow count with the weight of the rods plus the weight of the hammer.

MC=Moisture Content, LL=Liquid limit, PL=Plastic Limit
-200%=percent soil passing 200 sieve, DD=Dry Density

Soil Classifications are Based on the Unified Soil Classification System, ASTM D2487 and D2488. Also included are the AASHTO group classifications (M145). Descriptions are based on visual observation, except where they have been modified to reflect results of laboratory tests as deemed appropriate.

Order of Descriptors

- Group Name
- Consistency or Relative Density
- Moisture Condition
- Color
- Particle size descriptor(s) (coarse grained soils only)
- Angularity of coarse grained soils
- Other relevant notes

Criteria For Descriptors

Consistency of Fine Grained Soils

Consistency	N-Value (uncorrected)
Very Soft	< 2
Soft	2 - 4
Medium Stiff	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	> 30

Apparent Density of Coarse Grained Soils

Relative Density	N-Value (uncorrected)
Very Loose	< 4
Loose	4 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

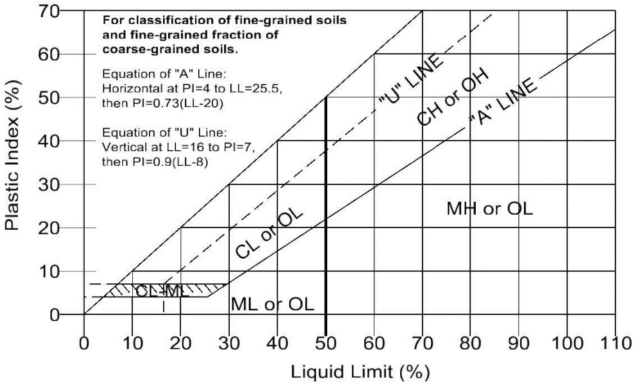
Moisture Condition

Dry -Absence of moisture, dusty, dry to the touch.
Moist -Damp, but no visible water.
Wet -Visible free water.

Definition of Particle Size Ranges

Soil Component	Size Range
Boulder	> 12 in (300 mm)
Cobble	3 in (75 mm) - 12 in (300 mm)
Gravel	No. 4 Sieve (4.75 mm) to 3 in (75 mm)
Sand	No. 200 (0.075 mm) to No. 4 Sieves (4.75 mm)
Silt	< No. 200 Sieve (0.075 mm)*
Clay	< No. 200 Sieve (0.075 mm)*

*Atterberg limits and chart below to differentiate between silt and clay.



Angularity of Coarse-Grained Particles

Angular -Particles have sharp edges and relative plane sides with unpolished surfaces.
Subangular -Particles are similar to angular description, but have rounded edges.
Subrounded-Particles have nearly plane sides, but have no edges.
Rounded -Particles have smoothly curved sides and well-rounded corners and edges.

Example soil description: Sandy FAT CLAY (CH), soft, wet, brown. (A-7)

Tetra Tech Boring Log Descriptive Terminology
Key to Rock Symbols and Terms

12/06/12

TETRA TECH

Rock Type	Symbol	Rock Type	Symbol	Rock Type	Symbol
Argillite	☰	Dolomite	▱	Quartzite	∿
Basalt	⬡	Gneiss	≋	Rhyolite	◌
Bedrock (other)	▨	Granitic	⁘	Sandstone	⁙
Breccia	△	Limestone	▦	Schist	≋
Claystone	☰	Siltstone	⁙	Shale	≡
		Conglomerate	○		

Order of Descriptors

- Rock Type
- Color
- Grain size (if applicable)
- Stratification/Foliation (as applicable)
- Field Hardness
- Other relevant notes

Criteria For Descriptors

Grain Size

Description	Characteristic
Coarse Grained	-Individual grains can be easily distinguished by eye
Fine Grained	-Individual grains can be distinguished with difficulty

Stratum Thickness

Thickly Bedded	3-10 ft (1-3 m)
Medium Bedded	1-3 ft (300 mm - 1 m)
Thinly Bedded	2-12 in (50-300 mm)
Very Thinly Bedded	< 2 in (50 mm)

Rock Field Hardness

Very Soft	-Can be carved with knife. Can be excavated readily with point of rock hammer. Can be scratched readily by fingernail.
Soft	-Can be grooved or gouged readily by knife or point of rock hammer. Can be excavated in fragments from chips to several inches in size by moderate blows of the point of a rock hammer.
Medium	-Can be grooved or gouged 0.05 in (2 mm) deep by firm pressure of knife or rock hammer point. Can be excavated in small chips to pieces about 1 in (25 mm) maximum size by hard blows of the point of a rock hammer.
Moderately hard	-Can be scratched with knife or pick. Gouges or grooves to 0.25 in (6 mm) can be excavated by hard blow of rock hammer. Hand specimen can be detached by moderate blows.
Hard	-Can be scratched with knife or pick only with difficulty. Hard hammer blows required to detach hand specimen.
Very Hard	-Cannot be scratched with knife or sharp rock hammer point. Breaking of hand specimens requires several hard blows of a rock hammer.

Notes:

UCS = Unconfined Compressive Strength obtained from laboratory testing at the given depth.

See Soil Boring Information Special Provision.

Miscellaneous Soil/Rock Symbols and Terms

⁘	Concrete
■	Asphalt
≈	Water
●	Boulders and Cobbles
■	Coal
▩	Fill
▓	Millings
⁙	Topsoil

Explanation of Text Fields in Boring Logs:

Material Description: Lithologic Description of soil or rock encountered.

Remarks: Comments on drilling, including method, bit type, and problems encountered.

Unless stated on logs as being surveyed by district survey, all locations are considered approximate.

General Notes

- Descriptions on these boring logs apply only at the specific boring, and at the time the time the borings were made. These logs are not warranted to be representative of subsurface conditions at other locations or times.
- Water level observations apply only at the specific boring, and at the time the borings were made. Due to the variability of groundwater measurements given the type of drilling used, and the stratification of the soil in the boring, these logs are not warranted to be representative of groundwater conditions at other locations or times.
- Other terms may be used as descriptors, as defined by the profession.

-Soil and Rock descriptions are based on visual observation, except where they have been modified to reflect results of laboratory tests as deemed appropriate.

Operation Types:

◧	Auger
≋	Casing Advancer
▮	Core Barrel
▽	Drive Casing

Sample Types:

☒	Split Spoon	≚	Cone Penetrometer
■	Shelby	◫	Vane Shear
▨	Bulk Sample	⧗	Special Samplers
✋	Grab Sample	☰	Testpit

Example Rock Log

SANDSTONE, gray, fine grained, thickly bedded, hard field hardness.

TETRA TECH

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 – 83

(Based on Unified Soil Classification System)

MAJOR DIVISIONS				GROUP SYMBOL	GROUP NAME
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines	Cu ≥ 4 and 1 ≤ Cc ≤ 3^{E}	GW	Well graded gravel ^{F}
			Cu < 4 and/or 1 > Cc > 3^{E}	GP	Poorly graded gravel ^{F}
		Gravels with Fines More than 12% fines	Fines classify as ML or MH	GM	Silty gravel ^{FGH}
			Fines classify as CL or CH	GC	Clayey gravel ^{FGH}
	Sands 50% or more of coarse faction passes No. 4 sieve	Clean Sands Less than 5% fines	Cu ≥ 6 and 1 ≤ Cc ≤ 3^{E}	SW	Well-graded sand ^{I}
			Cu < 6 and/or 1 > Cc > 3^{E}	SP	Poorly graded sand ^{I}
		Sands with Fines More than 12% fines	Fines classify as ML or MH	SM	Silty Sand ^{GHI}
			Fines classify as CL or CH	SC	Clayey sand ^{GHI}
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above “A” line	CL	Lean clay ^{KLM}
			PI < 4 or plots below “A” line	ML	Silt ^{KLM}
		Organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OL	Organic clay ^{KLMN} Organic silt ^{KLMO}
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above “A” line	CH	Fat clay ^{KLM}
			PI plots below “A” line	MH	Elastic silt ^{KLM}
		Organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OH	Organic clay ^{KLMO} Organic silt ^{KLMO}
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add “with cobbles or boulders, or both” to group name.

[C] Gravels with 5 to 12% require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $Cc=(D_{30})^2 / (D_{10} \text{ x } D_{90})$

[F] If soil contains ≥15% sand, add “with sand” to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add “with organic fines” to group name.

[I] If soil contains ≥15% gravel, add “with gravel” to group name.
If soil contains ≥ 15% gravel, add “with gravel” to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K]. If soil contains 15 to 29% plus No. 200, add “with sand” or “with gravel”, whichever is predominant.

[L] If solid contains ≥ 30% plus No. 200, predominantly sand, add “sandy” to group name.

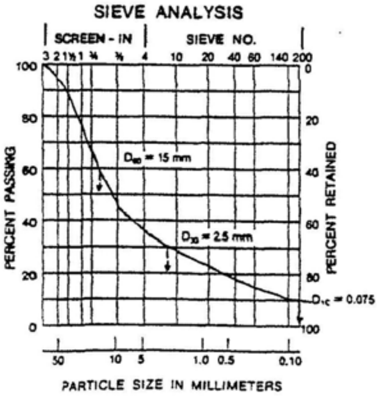
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add “gravelly” to group name.

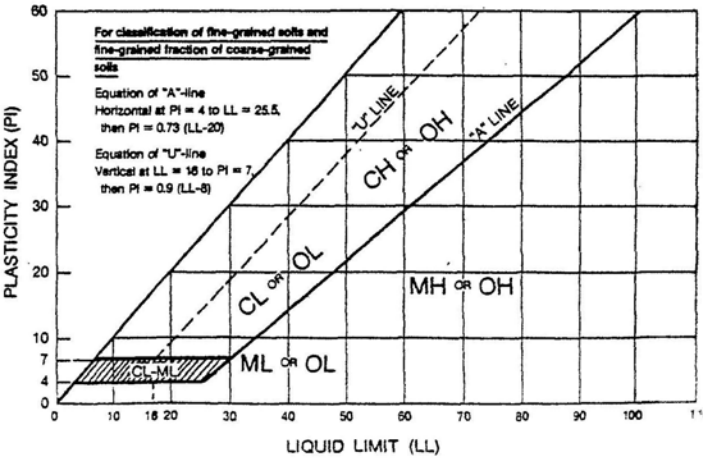
[N] PI ≥ 4 and plots on or above “A” line.

[O] PI < 4 or plots below “A: line.

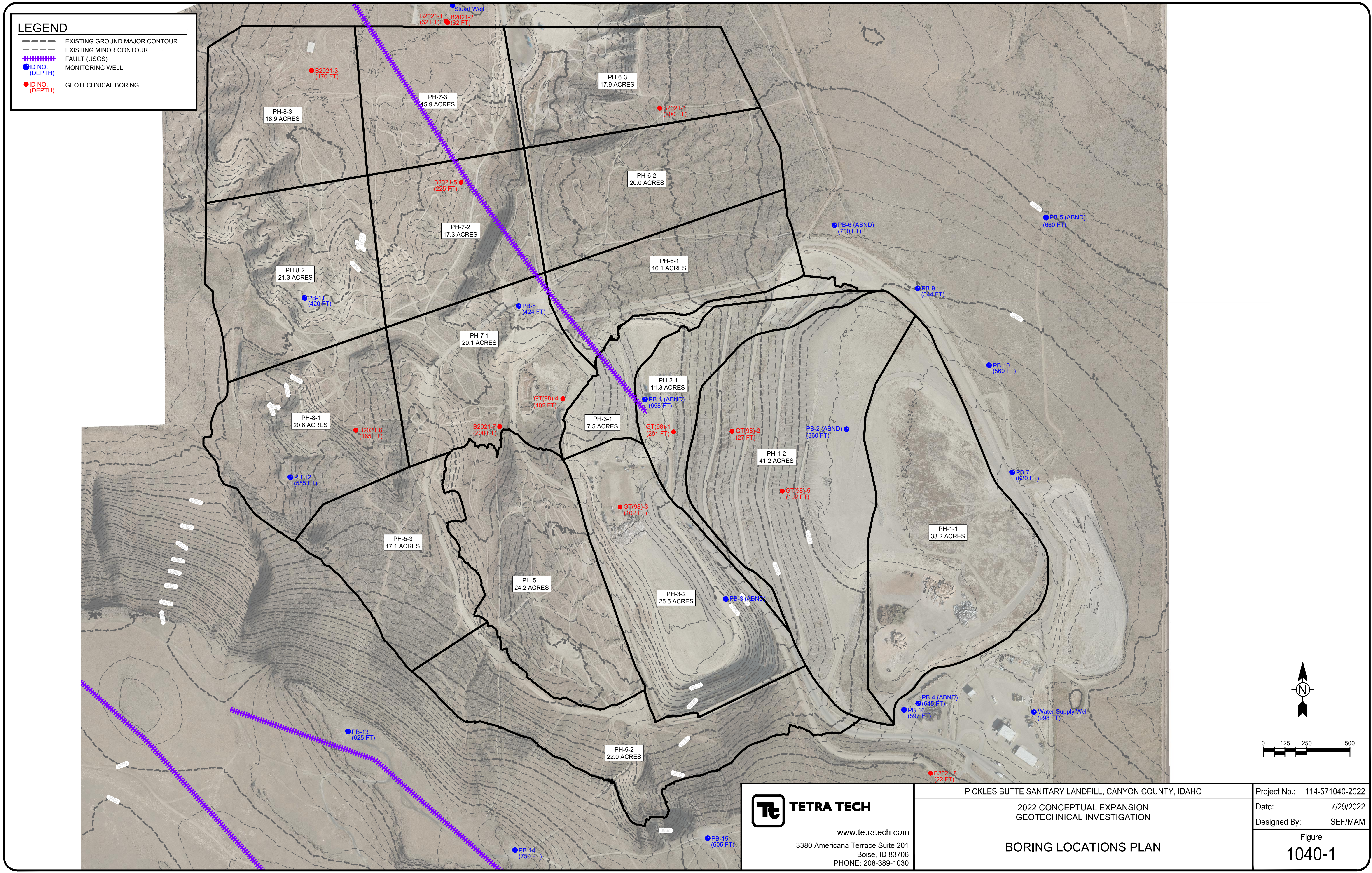
[P] PI plots on or above “A: line.

[Q] PI plots below “A: line.





$C_u = \frac{D_{50}}{D_{1e}} = \frac{15}{0.075} = 200$ $C_c = \frac{(D_{30})2}{D_{12} \text{ x } 10_{36}} + \frac{(2.5)-}{0.075 \text{ x } 15} = 5.6$



TETRA TECH

www.tetratech.com

3380 Americana Terrace Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE SANITARY LANDFILL, CANYON COUNTY, IDAHO

2022 CONCEPTUAL EXPANSION
GEOTECHNICAL INVESTIGATION

BORING LOCATIONS PLAN

Project No.:	114-571040-2022
Date:	7/29/2022
Designed By:	SEF/MAM

Figure
1040-1

Bar Measures 1 inch

8/1/2022 3:05 PM - O:\T-Z\TT\MISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-1040-1 BORING LOCATIONS.DWG

APPENDIX B: Logs of Exploratory Borings

Figures 1 through 8

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 1

LOG OF BORING

Boring B2021-1

TETRA TECH

Sheet 1 of 1

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.502927 E: -116.624204	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2740.4 ft
Date Started: 11/15/21	**Date Finished:** 11/15/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		3 - 3 - 4		TOPSOIL, moist, tan/brown.	0.3 2740.1						
							Poorly-Graded SAND with silt (SP-SM), loose, moist, brown to gray, fine to medium grained, subangular.							
			100		2 - 3 - 3				9					
										NV	NP	12	110	
5 2735.4			100		2 - 3 - 5			5.3 2735.1						
			100		3 - 6 - 9		Poorly-Graded SAND (SP), loose to medium dense, moist, gray to tan, medium grained, subangular to angular.		8					
			100		9 - 13 - 13									
10 2730.4			100		8 - 11 - 13				6					
							Silty SAND (SM), medium dense, moist, gray to tan, fine grained, medium plasticity, Pockets of clay.	11.2 2729.2						
								14.1 2726.3						
15 2725.4			100		10 - 13 - 15		Poorly-Graded SAND (SP), medium dense, slightly moist, gray, fine to medium grained, subangular to angular, medium plasticity, Small pockets of grey clay.		5					
20 2720.4			100		10 - 12 - 13									
								24.1 2716.3						
25 2715.4		■	100				Poorly-Graded SAND with silt (SP-SM), dense to very dense, slightly moist, gray, fine to medium grained.			NV	NP	6	113	Cc= 0.03
			100		13 - 21 - 23									
30 2710.4			100		13 - 25 - 34			31.5 2708.9						

Boring Depth: 31.5 ft, *Elevation: 2708.9 ft*

Water Level Observations		Remarks:
	During Drilling: Not Encountered	
After Drilling: Not Recorded	After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 2

LOG OF BORING

Boring B2021-2

TETRA TECH

Sheet 1 of 1

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.501658 E: -116.713829
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2739.0 ft
Date Started: 11/16/21	**Date Finished:** 11/16/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		2 - 1 - 3		Silty SAND (SM), very loose, slightly moist, brown to tan, fine grained, subangular to angular.		7					
			100		2 - 1 - 1		Poorly-Graded SAND with silt (SP-SM), very loose to very dense, slightly moist to moist, brown to gray, fine to medium grained, angular to subangular.	2.3 *2736.7*						
5 *2734.0*			100		3 - 3 - 4				3					
			100		2 - 4 - 6									
			100		7 - 10 - 14				3					
10 *2729.0*			100		10 - 15 - 20									
15 *2724.0*			100		7 - 11 - 17				5					
20 *2719.0*			150		11 - 17 - 21				3					
25 *2714.0*			100		11 - 16 - 21									
30 *2709.0*			100		15 - 25 - 34			31.5 *2707.5*						

Boring Depth: 31.5 ft, *Elevation: 2707.5 ft*

Water Level Observations	▽ **During Drilling:** Not Encountered	Remarks:
▼ **After Drilling:** Not Recorded	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.500874 E: -116.716768
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2737.7 ft
Date Started: 11/16/21
Date Finished: 11/22/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Recovery (%)	RQD (%)	Blow Count	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
				Slightly moist, tan.	0.7 *2737.0*						
				SILT (ML), stiff, slightly moist, light tan, low plasticity.							
5 *2732.7*	100		2 - 3 - 7								
				Silty SAND (SM), loose to medium dense, slightly moist to slightly moist, light tan, very fine grained.	8.0 *2729.7*						
10 *2727.7*	100		7 - 9 - 9								
15 *2722.7*	100		11 - 11 - 12								
20 *2717.7*	93		10 - 12 - 13			3					
25 *2712.7*	80						NV	NP	29		Friction Angle= 25.86 degrees Cohesion= 0 ksf Cc= 0.04
	100		11 - 15 - 15								
30 *2707.7*	100		10 - 12 - 14			3					
35 *2702.7*	100		11 - 14 - 21								
40 *2697.7*	93		10 - 14 - 16								
				SILT (ML), very stiff, slightly moist, gray, low plasticity.	41.1 *2696.6*						
				Silty SAND (SM), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.	41.9 *2695.8*						
45 *2692.7*	100		12 - 12 - 12								
				SILT (ML), very stiff, slightly moist, gray, low plasticity.	47.0 *2690.7*						
				Silty SAND (SM), medium dense to	47.7 *2690.0*						
50 *2687.7*						3					

Water Level Observations		Remarks:
	▽ During Drilling: Not Encountered	
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.500874 E: -116.716768
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2737.7 ft
Date Started: 11/16/21
Date Finished: 11/22/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		4 - 18 - 19		dense, slightly moist, tan to gray, fine grained, subangular to angular.	52.0 *2685.7*						
55 *2682.7*							SILT (ML), very stiff, slightly moist, gray to tan, low plasticity, Hard consolidated pieces.	56.2 *2681.5*						
60 *2677.7* 65 *2672.7* 70 *2667.7* 75 *2662.7*			100 100		 15 - 25 - 50		Poorly-Graded SAND with silt (SP), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.	76.5 *2661.2*		NV NV	NP NP	19 8	 100	Friction Angle= 20.21 degrees Cohesion= 0.282 ksf UCS= 0.143 ksf
							Sandy SILT (ML), stiff, dry, gray to red, fine grained, Broken siltstone.	78.5 *2659.2*						
80 *2657.7*			75				Silty SAND (SM), medium dense to dense, slightly moist, tan to gray, fine grained, subangular to angular.	82.0 *2655.7*		NV	NP	24		Friction Angle= 32.81 degrees Cohesion= 0.413 ksf
85 *2652.7* 90 *2647.7* 95 *2642.7*			100 100		4 - 11 - 50 23 - 40 - 50		Poorly-Graded SAND (SP), very dense, dry, salt & pepper, fine to medium grained, subangular to angular.	95.0 *2642.7*	2					
100 *2637.7*			0		50/0.2ft		Poorly-Graded SAND with silt (SP-SM), very stiff, dry, tan, fine to medium grained, subangular, Large amounts of broken sandstone.	100.0 *2637.7*						
							Silty SAND (SM), very dense, dry, gray to red, fine to coarse grained,							

Water Level Observations

▽ **During Drilling:** Not Encountered

▼ **After Drilling:** Not Recorded

▼ **After Drilling:** Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3

LOG OF BORING

Boring B2021-3

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.500874 E: -116.716768	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2737.7 ft
Date Started: 11/16/21 **Date Finished:** 11/22/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							subangular, Mixed with large pieces of siltstone.							
105 *2632.7*														
110 *2627.7*			143		31 - 50/0.2ft									
115 *2622.7*							Silty SAND (SM), very dense, dry to moist, salt & pepper to gray, fine to medium grained, subangular to angular, Minimal pieces of sandstone. Decreasing with depth.	115.0 *2622.7*		NV	NP	16	104	
120 *2617.7*			88		47 - 50/0.3ft				4					
125 *2612.7*														
130 *2607.7*														
135 *2602.7*							Poorly-Graded SAND with silt (SP-SM), very stiff, dry, tan, fine to coarse grained, subangular, Large amounts of broken sandstone and siltstone.	135.0 *2602.7*						
							Poorly-Graded SAND (SP), very dense, dry to moist, salt & pepper to gray, fine to medium grained, subangular to angular, Minimal pieces of sandstone..	138.6 *2599.1*						
140 *2597.7*			100		14 - 33 - 50									
145 *2592.7*							Silty CLAY (CL-ML), hard, very moist, gray, high plasticity.	146.5 *2591.2*						
150 *2587.7*			100		16 - 33 - 50									

Water Level Observations

▽ During Drilling: Not Encountered

▼ After Drilling: Not Recorded

▼ After Drilling: Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 3
LOG OF BORING
Boring B2021-3

Sheet 4 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.500874 E: -116.716768	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2737.7 ft
Date Started: 11/16/21	**Date Finished:** 11/22/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155 *2582.7*														
160 *2577.7*		⊠	100		16 - 24 - 36									
165 *2572.7*														
170 *2567.7*								170.0 *2567.7*						

Boring Depth: 170.0 ft, *Elevation: 2567.7 ft*

Water Level Observations	During Drilling: Not Encountered	Remarks:
After Drilling: Not Recorded	After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Rig: TS150 Crawler
Hammer: Auto

Boring Location Coordinates N: 43.665364 E: -116.688388

Project Number: 114-571040-2022

Boring Diameter: 6 in

System: Decimal Degrees
Datum: NAD83

Top of Boring Elevation: 2797.2 ft

Date Started: 12/8/21

Date Finished: 12/14/21

Drilling Fluid: None

Abandonment Method: Grout

Driller: Holt Services
Logger: Matt Adams

Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							TOPSOIL, moist, dark brown.	0.7 *2796.5*						
							Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular.							
5 *2792.2*			67		2 - 9 - 7				6					
10 *2787.2*			67		5 - 9 - 7									
15 *2782.2*			80		5 - 12 - 14		SILT (ML), very stiff, slightly moist, tan, low plasticity.	15.0 *2782.2*						
20 *2777.2*			100		18 - 37 - 48		Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained.	20.0 *2777.2*	5					
25 *2772.2*			100		16 - 35 - 48		Silty CLAY (CL-ML), very stiff, slightly moist, tan, medium plasticity.	25.2 *2772.0*						
							SILT (ML), very stiff, slightly moist, tan, low plasticity.	27.7 *2769.5*						
30 *2767.2*			100		16 - 27 - 33									
35 *2762.2*			80		15 - 30 - 34				8					
40 *2757.2*			100		11 - 23 - 18		Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular to subangular.	40.0 *2757.2*						
							Silty CLAY (CL-ML), very stiff, slightly moist, tan to black, medium plasticity, Broken pieces of consolidated clay and sit.	41.0 *2756.2*						
45 *2752.2*			100		9 - 13 - 13				16					
50 *2747.2*							Poorly-Graded SAND with silt (SP-SM),	50.0		NV	NP	6		Friction Angle= 27.04

Water Level Observations

▽ During Drilling: Not Recorded

▼ After Drilling: Not Encountered

▼ After Drilling: Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

TETRA TECH

Sheet 2 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
		☒	100		9 - 26 - 41		medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	*2747.2*						degrees Cohesion= 0.123 ksf
55 *2742.2*														
60 *2737.2*		☒	80		2 - 5 - 18				2					
65 *2732.2*														
70 *2727.2*		☒	67		6 - 13 - 23									
							Silty SAND (SM), medium dense, moist to slightly moist, tan, fine grained, angular to subangular.	73.0 *2724.2*						
75 *2722.2*														
80 *2717.2*		☒	80		2 - 7 - 23									
85 *2712.2*														
							Poorly-Graded SAND (SP), stiff, dry, tan to yellow, fine to medium grained, angular to subangular.	87.0 *2710.2*						
90 *2707.2*		☒	100		13 - 40 - 50		Silty SAND (SM), hard, moist, tan to brown, fine grained, angular to subangular, Broken pieces of consolidated clay.	90.0 *2707.2*		NV	NP	38		Friction Angle= 22.83 degrees Cohesion= 0.198 ksf
95 *2702.2*														
100 *2697.2*		☒	100		9 - 18 - 20				22					

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
105 *2692.2*							Sandy SILT (ML), very stiff, slightly moist, tan, low plasticity.	104.0 *2693.2*						
							Silty CLAY (CL-ML), hard, moist, tan to brown, medium plasticity, Broken pieces of consolidated clay.	105.0 *2692.2*						
110 *2687.2*			100		6 - 12 - 20									
115 *2682.2*														
							Sandy SILT (ML), very stiff, slightly moist, tan, low plasticity.	117.5 *2679.7*						
120 *2677.2*			100		31 - 70/0.4ft		Silty SAND (SM), medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	120.0 *2677.2*		NV	NP	49		Friction Angle= 29.51 degrees Cohesion= 0.588 ksf
125 *2672.2*														
130 *2667.2*			100		9 - 21 - 26		Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	129.0 *2668.2*						
135 *2662.2*														
140 *2657.2*			100		30 - 48 - 44				2					
145 *2652.2*							Sandy SILT (ML), very stiff, slightly moist, tan to brown, low plasticity.	145.0 *2652.2*						
150 *2647.2*			111		31 - 50/0.4ft									

Water Level Observations	▽ **During Drilling:** Not Recorded	Remarks:
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

TT LOG OF BORING - MDT_REVISED_2009+.GDT - 7/27/22 09:44 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB_LOGS\BORING LOGS.GPJ

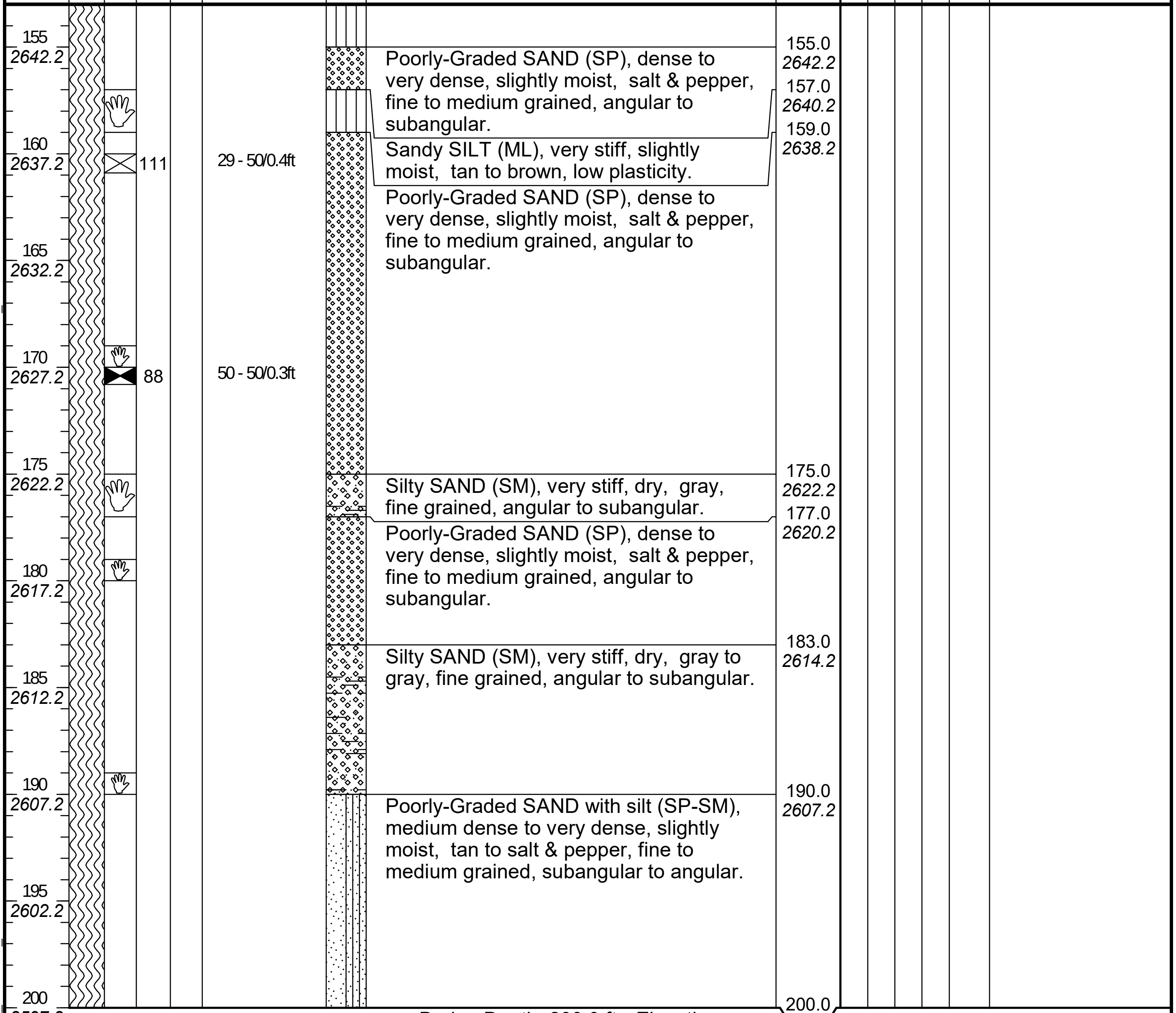
2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 4

LOG OF BORING

Boring B2021-4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID		**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.665364 E: -116.688388
Project Number: 114-571040-2022		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83 **Top of Boring Elevation:** 2797.2 ft
Date Started: 12/8/21	**Date Finished:** 12/14/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	



Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155 / 2642.2						Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	155.0 / 2642.2						
						Sandy SILT (ML), very stiff, slightly moist, tan to brown, low plasticity.	157.0 / 2640.2						
160 / 2637.2			111		29 - 50/0.4ft	Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	159.0 / 2638.2						
170 / 2627.2			88		50 - 50/0.3ft								
175 / 2622.2						Silty SAND (SM), very stiff, dry, gray, fine grained, angular to subangular.	175.0 / 2622.2						
						Poorly-Graded SAND (SP), dense to very dense, slightly moist, salt & pepper, fine to medium grained, angular to subangular.	177.0 / 2620.2						
						Silty SAND (SM), very stiff, dry, gray to gray, fine grained, angular to subangular.	183.0 / 2614.2						
190 / 2607.2						Poorly-Graded SAND with silt (SP-SM), medium dense to very dense, slightly moist, tan to salt & pepper, fine to medium grained, subangular to angular.	190.0 / 2607.2						
200 / 2597.2							200.0 / 2597.2						

Boring Depth: 200.0 ft, *Elevation: 2597.2 ft*

Water Level Observations		
	During Drilling: Not Recorded	Remarks:
After Drilling: Not Encountered	**After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

Boring B2021-5

TETRA TECH

Sheet 1 of 5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.499133 E: -116.713491
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2661.6 ft
Date Started: 12/14/21
Date Finished: 12/19/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							TOPSOIL, moist, brown.	0.7 2660.9						
							Sandy SILT (ML), stiff, slightly moist, tan, fine grained, angular to subangular.							
5 2656.6		☒	100		6 - 8 - 5				4					
10 2651.6		✋ ☒	100		12 - 21 - 43		Poorly-Graded SAND (SP), medium dense to very dense, moist, tan to red, fine to medium grained, angular to subangular.	10.0 2651.6						
15 2646.6		☒	100		5 - 7 - 16				3					
20 2641.6		✋ ☒	100		10 - 21 - 26									
25 2636.6														
		✋					Silty CLAY (CL-ML), medium stiff, slightly moist, white to gray, high plasticity.	27.0 2634.6						
							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, salt & pepper to red, fine to medium grained, angular to subangular.	29.0 2632.6						
30 2631.6		☒	100		10 - 27 - 40									
35 2626.6		☒	100		10 - 22 - 35				4					
							SILT (ML), hard, slightly moist, tan to gray, low plasticity.	37.0 2624.6						
40 2621.6		✋ ☒	150		27 - 33 - 45/0.0ft									
							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, salt & pepper to red, fine to medium grained, angular to subangular.	42.0 2619.6						
							SILT (ML), hard, slightly moist, tan to gray, low plasticity.	44.0 2617.6						
45 2616.6		☒	100		23 - 39 - 42		Silty SAND (SM), medium dense to very dense, slightly moist, gray to brown, fine	45.0 2616.6						
50 2611.6		✋ ⧓						50.0		54	24			Friction Angle= 14.95

Water Level Observations		
	During Drilling: Not Recorded	Remarks:
After Drilling: Not Encountered	After Drilling: Not Recorded	

Figure No. 5
LOG OF BORING
Boring B2021-5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21 / **Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		27 - 38 - 50		grained, angular to subangular.	*2611.6*						degrees Cohesion= 0.489 ksf Cc= 0.06
							Silty CLAY (CL-ML), hard, slightly moist, tan, high plasticity.	51.0 *2610.6*						
55 *2606.6*							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, gray to tan, fine to medium grained, angular to subangular.	54.0 *2607.6* 55.0 *2606.6*						
							Silty SAND (SM), medium stiff, slightly moist, tan, fine grained.							
60 *2601.6*			100		34 - 50/0.1ft			60.0 *2601.6*	4					
							Poorly-Graded SAND (SP), medium dense to very dense, slightly moist, gray to tan, fine to medium grained, angular to subangular.							
65 *2596.6*							Poorly-Graded SAND with silt (SP-SM), very dense, moist, gray, fine grained, Varying amounts of silt. Thin viens of silty clay.	65.5 *2596.1*						
70 *2591.6*			100		10 - 30 - 20		SILT with sand (ML), hard, slightly moist, white to gray, non plastic, Broken pieces of consolidated clay.		29	NV	NP	77	112	Friction Angle= 19.09 degrees Cohesion= 0.037 ksf
							Silty SAND (SM), very stiff, slightly moist, tan, fine grained.	71.5 *2590.1*						
75 *2586.6*							CLAY with sand (CL), hard, slightly moist, white to gray, non plastic, Broken pieces of consolidated clay.	73.5 *2588.1*						
80 *2581.6*			100		10 - 18 - 27				21	35	21	83	104	Friction Angle= 31.18 degrees Cohesion= 0.26 ksf
85 *2576.6*														
							Silty SAND (SM), very dense, slightly moist, tan to red, fine grained, angular to subangular.	86.0 *2575.6*						
90 *2571.6*			100		49 - 50/0.3ft					NV	NP	34		Friction Angle= 13.53 degrees Cohesion= 0.654 ksf
95 *2566.6*														
100 *2561.6*			115		21 - 46 - 50/0.3ft				11					

Water Level Observations	**During Drilling:** Not Recorded	Remarks:
After Drilling: Not Encountered	**After Drilling:** Not Recorded	

TT LOG OF BORING - MDT_REVISED_2009+ GDT - 7/27/22 09:44 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB LOGS\BORING LOGS.GPJ

Figure No. 5

LOG OF BORING

Boring B2021-5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21	**Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	Recovery (%)	RQD (%)	Blow Count
105 *2556.6*			
110 *2551.6*	100		30 - 50/0.1ft
115 *2546.6*			
120 *2541.6*	100		9 - 17 - 36
125 *2536.6*			
130 *2531.6*	107		26 - 50 - 50/0.4ft
135 *2526.6*			
140 *2521.6*	111		42 - 50/0.4ft
145 *2516.6*			
150 *2511.6*	107		8 - 17 - 50/0.4ft

Material Description

Silty CLAY (CL-ML), very stiff, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Silty SAND (SM), very dense, slightly moist, tan to red, fine grained, angular to subangular.

Silty CLAY (CL-ML), very stiff, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Silty SAND (SM), medium dense to very dense, slightly moist, gray to brown, fine grained, angular to subangular.

Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Sandy SILT (ML), hard, slightly moist, red to brown, fine grained, low plasticity, Very fine sand. Some consolidated clay mixed.

Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Silty SAND (SM), very dense, slightly moist, tan, very fine grained, Very fine sand. Some consolidated clay mixed. Less clay with depth.

Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.

Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.

Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.

Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken

Depth (ft)	*Elev. (ft)*
102.0	*2559.6*
110.0	*2551.6*
111.0	*2550.6*
115.5	*2546.1*
116.5	*2545.1*
126.0	*2535.6*
127.0	*2534.6*
129.5	*2532.1*
131.5	*2530.1*
134.5	*2527.1*
140.0	*2521.6*
141.0	*2520.6*
143.0	*2518.6*
145.0	*2516.6*
147.0	*2514.6*

MC (%) | LL | PL | -200 (%) | DD (pcf) | Remarks and Other Tests

Water Level Observations

During Drilling: Not Recorded

After Drilling: Not Encountered

After Drilling: Not Recorded

Remarks:

Figure No. 5
LOG OF BORING
Boring B2021-5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21 **Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology
155 *2506.6*						
160 *2501.6*			83		46 - 50/0.1ft	
165 *2496.6*						
170 *2491.6*			100		9 - 17 - 50	
175 *2486.6*						
180 *2481.6*						
185 *2476.6*						
190 *2471.6*						
195 *2466.6*						
200 *2461.6*						

Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
pieces of consolidated clay.							
Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	156.0 *2505.6*						
Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	157.0 *2504.6*						
Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt. Seams of varying clay content.	160.0 *2501.6*						
Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay. Higher silt content than previous.	163.5 *2498.1*						
CLAY (CL), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	164.5 *2497.1*						
Sandy SILT (ML), hard, slightly moist, tan, low plasticity, Some consolidated silt..	167.0 *2494.6*						
CLAY (CL), hard, slightly moist, gray to blue, high plasticity, Broken pieces of consolidated clay.	170.0 *2491.6*						
Silty SAND (SM), slightly moist, tan, fine grained, angular to subangular.							
Silty CLAY (CL-ML), hard, slightly moist, gray to blue, high plasticity, Varying levels of silt content.	180.0 *2481.6*						
Silty SAND (SM), slightly moist, tan, fine grained, angular to subangular.							
CLAY (CL), hard, slightly moist to moist, gray to blue, high plasticity, consolidated clay.	200.0 *2461.6*						

Water Level Observations		
After Drilling: Not Encountered	**During Drilling:** Not Recorded **After Drilling:** Not Recorded	Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 5

LOG OF BORING

Boring B2021-5

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.499133 E: -116.713491	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2661.6 ft
Date Started: 12/14/21	**Date Finished:** 12/19/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

Depth (ft) *Elev. (ft)*	**Operation**	**Sample Type**	Recovery (%)	**RQD (%)**	**Blow Count**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**MC (%)**	**LL**	**PL**	**-200 (%)**	**DD (pcf)**	**Remarks and Other Tests**
205 *2456.6*														
210 *2451.6*														
215 *2446.6*														
220 *2441.6*														
225 *2436.6*								225.0 *2436.6*						

Boring Depth: 225.0 ft, *Elevation: 2436.6 ft*

Water Level Observations	▽ During Drilling: Not Recorded	Remarks:
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6
LOG OF BORING
Boring B2021-6

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.495196 E: -116.715718	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2636.7 ft
Date Started: 11/22/21 — **Date Finished:** 12/2/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							TOPSOIL, very moist, brown.	0.6 *2636.1*						
							Silty SAND (SM), loose to medium dense, slightly moist, tan to red, fine grained, subangular.							
5 *2631.7*		☒	67		4 - 5 - 5									
10 *2626.7*		☒	73		7 - 7 - 7				6					
15 *2621.7*							Poorly-Graded SAND (SP), very dense, slightly moist, gray, fine to medium grained, subangular.	15.0 *2621.7*						
20 *2616.7*		☒	100		11 - 31 - 42									
							Silty SAND (SM), loose to medium dense, slightly moist, gray, fine grained, subangular.	21.0 *2615.7*						
25 *2611.7*		☒	100		12 - 22 - 42				18					
							Poorly-Graded SAND (SP), very dense, slightly moist, gray, fine to medium grained, subangular.	27.0 *2609.7*						
30 *2606.7*														
							Silty SAND (SM), loose to medium dense, slightly moist to moist, gray, fine grained, Pieces of siltstone increasing with depth.	33.0 *2603.7*						
35 *2601.7*														
40 *2596.7*		☒	100		8 - 18 - 37				22					
45 *2591.7*		☒	100		39 - 42 - 50									
							Sandy SILT (ML), hard, slightly moist, gray, fine grained.	48.0 *2588.7*						
50 *2586.7*		☒												

Water Level Observations		Remarks:
	▽ **During Drilling:** Not Recorded	
▼ **After Drilling:** Not Encountered	▼ **After Drilling:** Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6

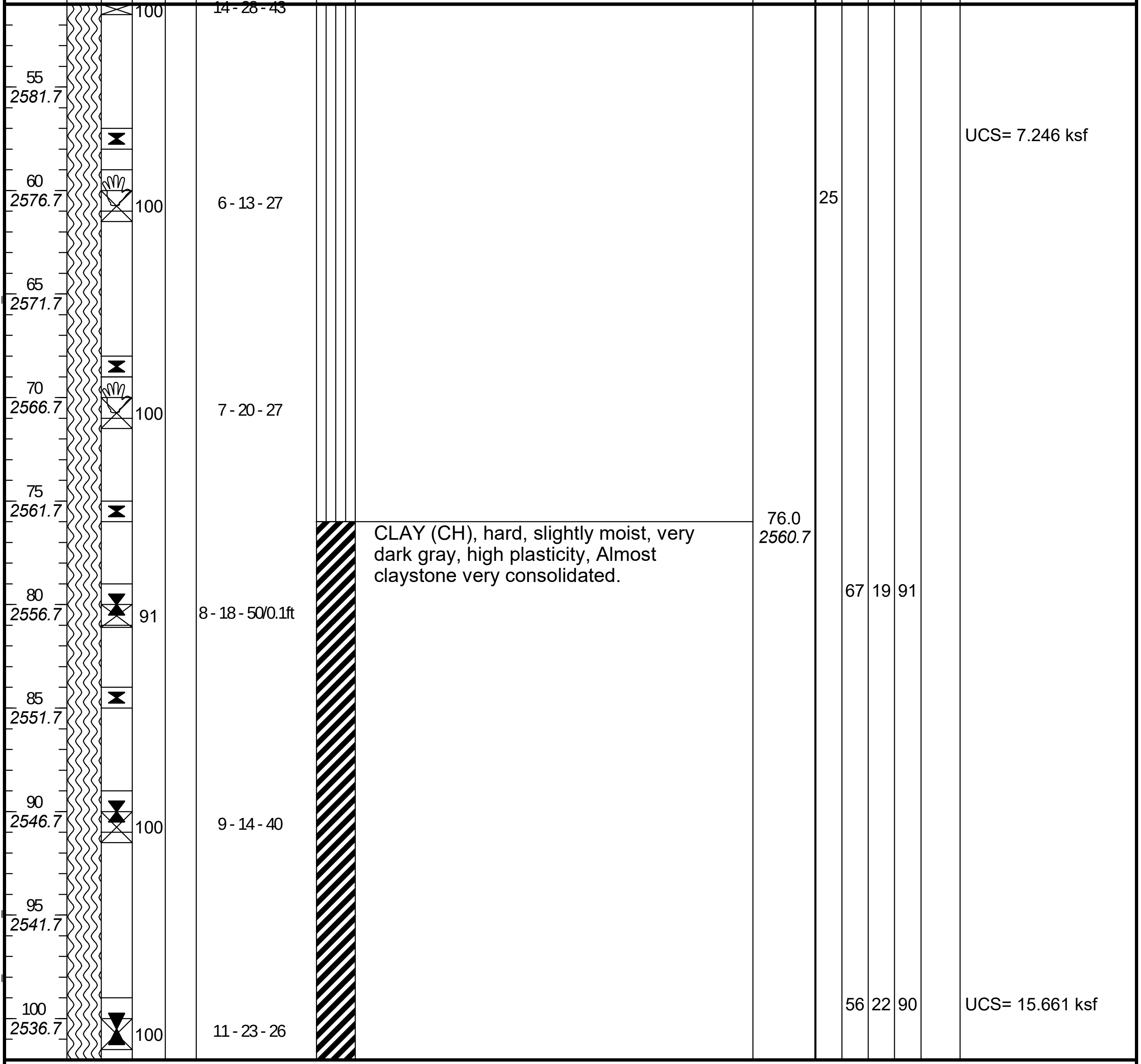
LOG OF BORING

Boring B2021-6

TETRA TECH

Sheet 2 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.495196 E: -116.715718
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2636.7 ft
Date Started: 11/22/21
Date Finished: 12/2/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.



Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		14 - 28 - 43									
55 2581.7														
														UCS= 7.246 ksf
60 2576.7			100		6 - 13 - 27				25					
65 2571.7														
70 2566.7			100		7 - 20 - 27									
75 2561.7														
							CLAY (CH), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	76.0 2560.7						
80 2556.7			91		8 - 18 - 50/0.1ft					67	19	91		
85 2551.7														
90 2546.7			100		9 - 14 - 40									
95 2541.7														
100 2536.7			100		11 - 23 - 26					56	22	90		UCS= 15.661 ksf

Water Level Observations

During Drilling: Not Recorded

After Drilling: Not Encountered

After Drilling: Not Recorded

Remarks:

TT LOG OF BORING - MDT_REVISED 2009+ GDT - 7/27/22 09:44 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB LOGS\BORING LOGS.GPJ

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 6

LOG OF BORING

Boring B2021-6

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.495196 E: -116.715718
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2636.7 ft
Date Started: 11/22/21
Date Finished: 12/2/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Sandy SILT (ML), hard, slightly moist, gray, medium plasticity.	102.0 *2534.7*						
105 *2531.7*							Silty CLAY (CL-ML), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	102.8 *2533.9*						
		✋						106.0 *2530.7*		47	22	91	100	
							CLAY with sand (CL), hard, slightly moist, gray, medium plasticity.	106.9 *2529.8*						
110 *2526.7*		☒	100		9 - 19 - 28		Silty CLAY (CL-ML), hard, slightly moist, very dark gray, high plasticity, Almost claystone very consolidated.	110.8 *2525.9*	21					
							Sandy SILT (ML), hard, slightly moist, gray, medium plasticity.	112.0 *2524.7*						
115 *2521.7*							Silty CLAY (CL-ML), hard, slightly moist, very dark gray to blue, high plasticity, Almost claystone very consolidated.							
120 *2516.7*		☒	100		10 - 18 - 33				22					
125 *2511.7*														
130 *2506.7*		✋ ☒	115		28 - 47 - 50/0.3ft									
135 *2501.7*														
140 *2496.7*		☒	100		6 - 16 - 31									
145 *2491.7*														
150 *2486.7*		⧗ ☒	107		11 - 19 - 50/0.4ft									

Water Level Observations

▽ **During Drilling:** Not Recorded
▼ **After Drilling:** Not Encountered
▼ **After Drilling:** Not Recorded

Remarks:

TT LOG OF BORING - MDT_REVISED_2009+ GDT - 7/27/22 09:44 - N:\GEOTECH\REPORTS\REPORT 2022\PICKLES BUTTE LANDFILL\LAB_LOGS\BORING LOGS.GPJ

Figure No. 6

LOG OF BORING

Boring B2021-6

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.495196 E: -116.715718
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2636.7 ft
Date Started: 11/22/21
Date Finished: 12/2/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
155 *2481.7*														
160 *2476.7*		⧗	115		29 - 50 - 50/0.3ft									
165 *2471.7*		⧗						165.0 *2471.7*						

Boring Depth: 165.0 ft, *Elevation: 2471.7 ft*

Water Level Observations		Remarks:
	▽ During Drilling: Not Recorded	
▼ After Drilling: Not Encountered	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 1 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID
Rig: TS150 Crawler
Hammer: Auto
Boring Location Coordinates N: 43.49528 E: -116.712592
Project Number: 114-571040-2022
Boring Diameter: 6 in
System: Decimal Degrees
Datum: NAD83
Top of Boring Elevation: 2659.5 ft
Date Started: 12/2/21
Date Finished: 12/7/21
Drilling Fluid: None
Abandonment Method: Grout
Driller: Holt Services
Logger: Matt Adams
Location: Refer to site map.

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
							Slightly moist, dark brown.	0.6 *2658.9*						
							Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.							
5 *2654.5*		☒	60		2 - 2 - 3				4					
10 *2649.5*		☒	67		10 - 8 - 5									
15 *2644.5*		☒	80		8 - 18 - 18									
							Poorly-Graded SAND (SP), dense, moist, tan, fine to medium grained, angular to subangular.	16.4 *2643.1*						
20 *2639.5*		✋												
25 *2634.5*		☒	100		13 - 40 - 50		Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	25.0 *2634.5*						
30 *2629.5*		⧓	0		26 - 50/0.1ft			30.3 *2629.2*						
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.	31.3 *2628.2*						
							Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	32.3 *2627.2* 33.8 *2625.7*						
35 *2624.5*		⧓	0		35 - 50/0.3ft									
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.							
40 *2619.5*		✋						39.6 *2619.9*		NV	NP	23	112	UCS= 0.511 ksf
		☒	107		16 - 28 - 50/0.4ft		Silty SAND (SM), loose to dense, very moist, tan, fine grained, angular to subangular.	41.4 *2618.1*	23					
							Poorly-Graded SAND (SP), dense, moist, gray, fine to medium grained, angular to subangular.	43.6 *2615.9*						
45 *2614.5*		☒	100		19 - 37 - 48									
							Silty CLAY (CL-ML), very stiff, moist, tan, high plasticity, Broken pieces of consolidated clay.	46.1 *2613.4*						
50 *2609.5*		✋ ☒					Silty SAND (SM), very dense, slightly	50.0						

Water Level Observations

▽ **During Drilling:** Not Encountered

▼ **After Drilling:** Not Recorded

▼ **After Drilling:** Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 2 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.49528 E: -116.712592	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2659.5 ft
Date Started: 12/2/21 **Date Finished:** 12/7/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		29 - 49 - 37		moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	*2609.5*						
55 *2604.5*							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay.	54.0 *2605.5* 55.6 *2603.9*						
60 *2599.5*			107		21 - 41 - 50/0.4ft		Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	58.5 *2601.0*	12	NV	NP	84	104	UCS= 1.817 ksf
65 *2594.5*							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..							
							Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	66.0 *2593.5*						
70 *2589.5*			100		9 - 23 - 35		Sandy SILT (ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..							
75 *2584.5*							CLAY (CL), hard, moist, tan, high plasticity.							
80 *2579.5*			0		78 - 70/0.2ft		Silty SAND (SM), very dense, slightly moist, tan, fine grained, angular to subangular, Broken pieces of siltstone and sandstone.	80.0 *2579.5*						
85 *2574.5*							Silty CLAY (CL-ML), hard, moist, tan, high plasticity, Broken pieces of consolidated clay..	85.0 *2574.5*						
90 *2569.5*			0		70/0.3ft									
95 *2564.5*														
100 *2559.5*			100		28 - 28 - 28		CLAY (CL), hard, moist, tan, high plasticity.	97.7 *2561.8*	20					

Water Level Observations		Remarks:
▽ During Drilling: Not Encountered		
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 3 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Rig: TS150 Crawler

Hammer: Auto

Boring Location Coordinates N: 43.49528 E: -116.712592

Project Number: 114-571040-2022

Boring Diameter: 6 in

System: Decimal Degrees

Datum: NAD83

Top of Boring Elevation: 2659.5 ft

Date Started: 12/2/21

Date Finished: 12/7/21

Drilling Fluid: None

Abandonment Method: Grout

Driller: Holt Services

Logger: Matt Adams

Location: Refer to site map.

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
105 2554.5														
110 2549.5			100		6 - 12 - 22.									
115 2544.5														
120 2539.5			77		22 - 41 - 50/0.3ft					33	23			Friction Angle= 18.02 degrees Cohesion= 0.053 ksf Cc= 0.38
							SILT (ML), hard, dry, tan, low plasticity, Broken pieces.	121.5 2538.0						
							Silty CLAY (CL-ML), hard, moist, gray, high plasticity, Broken pieces of consolidated clay..	122.2 2537.3						
125 2534.5														
							Sandy SILT (ML), hard, dry, tan, low plasticity, Broken pieces.	128.5 2531.0						
							Silty CLAY (CL-ML), hard, moist, gray, high plasticity, Broken pieces of consolidated clay..	129.1 2530.4	19					
130 2529.5			100		12 - 33 - 48									
135 2524.5														
140 2519.5			100		9 - 18 - 50				24					
145 2514.5							CLAY (CL), hard, moist, gray to blue, high plasticity.	145.0 2514.5						
150 2509.5			100		9 - 18 - 31									

Water Level Observations

▽ During Drilling: Not Encountered

▼ After Drilling: Not Recorded

▼ After Drilling: Not Recorded

Remarks:

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 7

LOG OF BORING

Boring B2021-7

TETRA TECH

Sheet 4 of 4

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.49528 E: -116.712592	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2659.5 ft
Date Started: 12/2/21 · **Date Finished:** 12/7/21	**Drilling Fluid:** None	**Abandonment Method:** Grout	
Driller: Holt Services **Logger:** Matt Adams	**Location:** Refer to site map.		

Depth (ft) *Elev. (ft)*	**Operation**	**Sample Type**	Recovery (%)	**RQD (%)**	**Blow Count**	**Lithology**	**Material Description**	**Depth (ft)** *Elev. (ft)*	**MC (%)**	**LL**	**PL**	**-200 (%)**	**DD (pcf)**	**Remarks and Other Tests**
155 *2504.5*														
160 *2499.5*			107		21 - 48 - 50/0.4ft									
165 *2494.5*														
170 *2489.5*			100		14 - 18 - 28									
175 *2484.5*														
180 *2479.5*														
185 *2474.5*														
190 *2469.5*														
195 *2464.5*														
200 *2459.5*								200.0 *2459.5*						

Boring Depth: 200.0 ft, *Elevation: 2459.5 ft*

Water Level Observations		Remarks:
	▽ During Drilling: Not Encountered	
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

2525 Palmer St
59808
Phone: 406-543-3045
Fax:

Figure No. 8

LOG OF BORING

Boring B2021-8

Project: Pickles Butte Sanitary Landfill - Canyon County, ID	**Rig:** TS150 Crawler **Hammer:** Auto	**Boring Location Coordinates** N: 43.48988 E: -116.703147	
Project Number: 114-571040-2022	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** NAD83	**Top of Boring Elevation:** 2956.6 ft
Date Started: 11/15/21	**Date Finished:** 11/15/21	**Drilling Fluid:** None	**Abandonment Method:** Grout
Driller: Holt Services **Logger:** Matt Adams		**Location:** Refer to site map.	

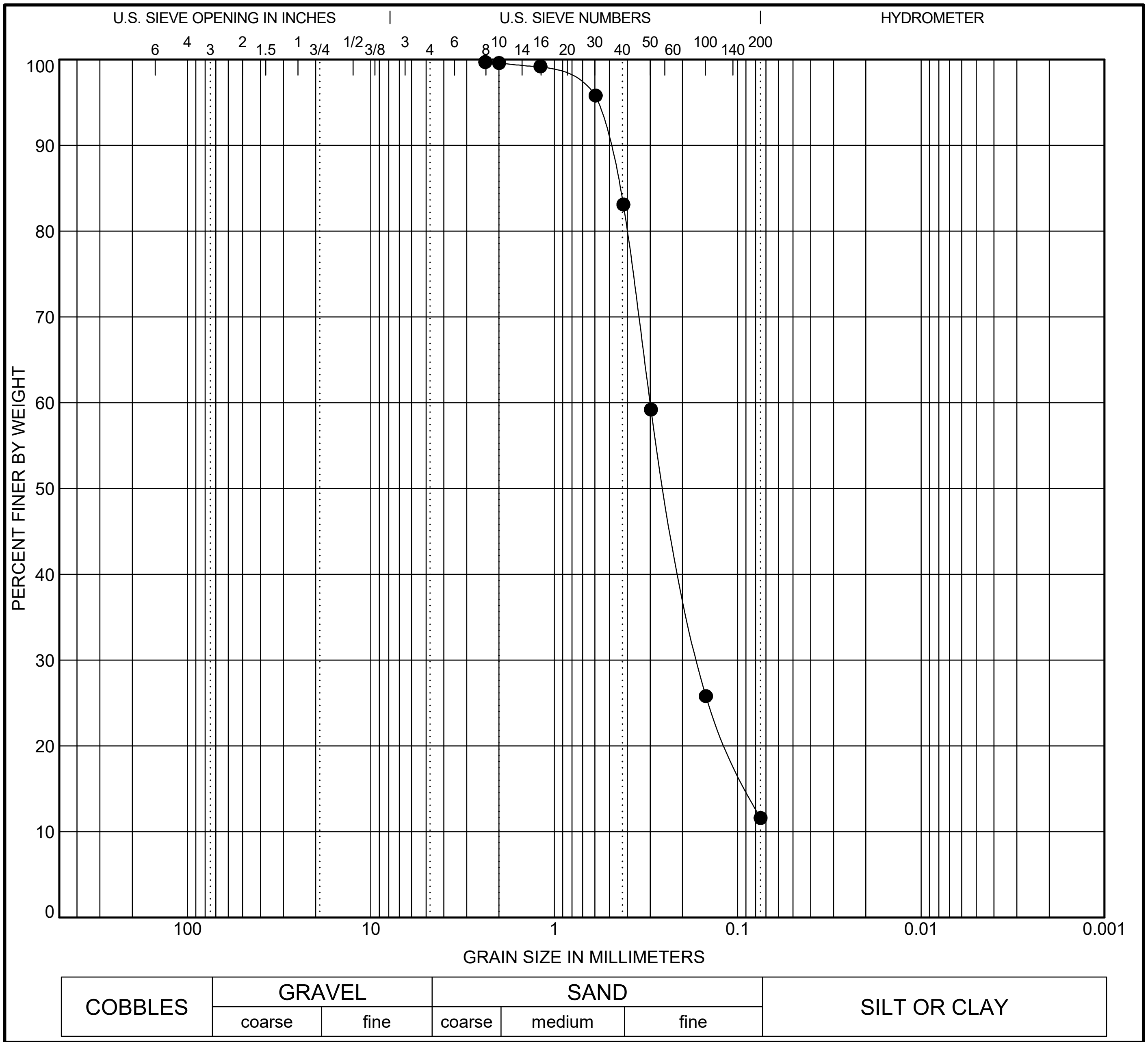
Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD (pcf)	Remarks and Other Tests
			100		5 - 5 - 12		TOPSOIL, moist, brown.	0.6	11					
							SILT with sand (ML), very stiff, slightly moist to moist, tan.	*2956.0*		NV	NP	84	97	
			100		10 - 16 - 13									
5 *2951.6*			100		8 - 8 - 10				11					
									12					
			100											
10 *2946.6*			100		7 - 9 - 11		Silty SAND (SM), medium dense, slightly moist, tan to gray, fine grained, subangular, scattered gravel.	10.1 *2946.5*	6					
15 *2941.6*			87		6 - 7 - 9				5					
20 *2936.6*			87		9 - 13 - 15		Poorly-Graded SAND (SP), medium dense, slightly moist, tan to yellow, fine to medium grained, subangular to angular.	20.0 *2936.6* 21.5 *2935.1*	5					

Boring Depth: 21.5 ft, *Elevation: 2935.1 ft*

Water Level Observations	▽ During Drilling: Not Encountered	Remarks:
▼ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

APPENDIX C: Laboratory Testing

Figures 9 through 56



SIEVE SIZE	% PASSING
No. 8	99.7
No. 10	99.6
No. 16	99.2
No. 30	95.8
No. 40	83.1
No. 50	59.2
No. 100	25.8
No. 200	11.6

Specimen Identification
B2021-1 - (3 - 6 ft)

Classification	LL	PL	PI	Cc	Cu
POORLY GRADED SAND with SILT(SP-SM)	**NV**	**NV**	**NP**	**1.27**	**4.33**

% Gravel	% Sand	% Silt	% Clay
0	88	12	

D100	D60	D30	D10
2.38	0.3	0.163	

TETRA TECH

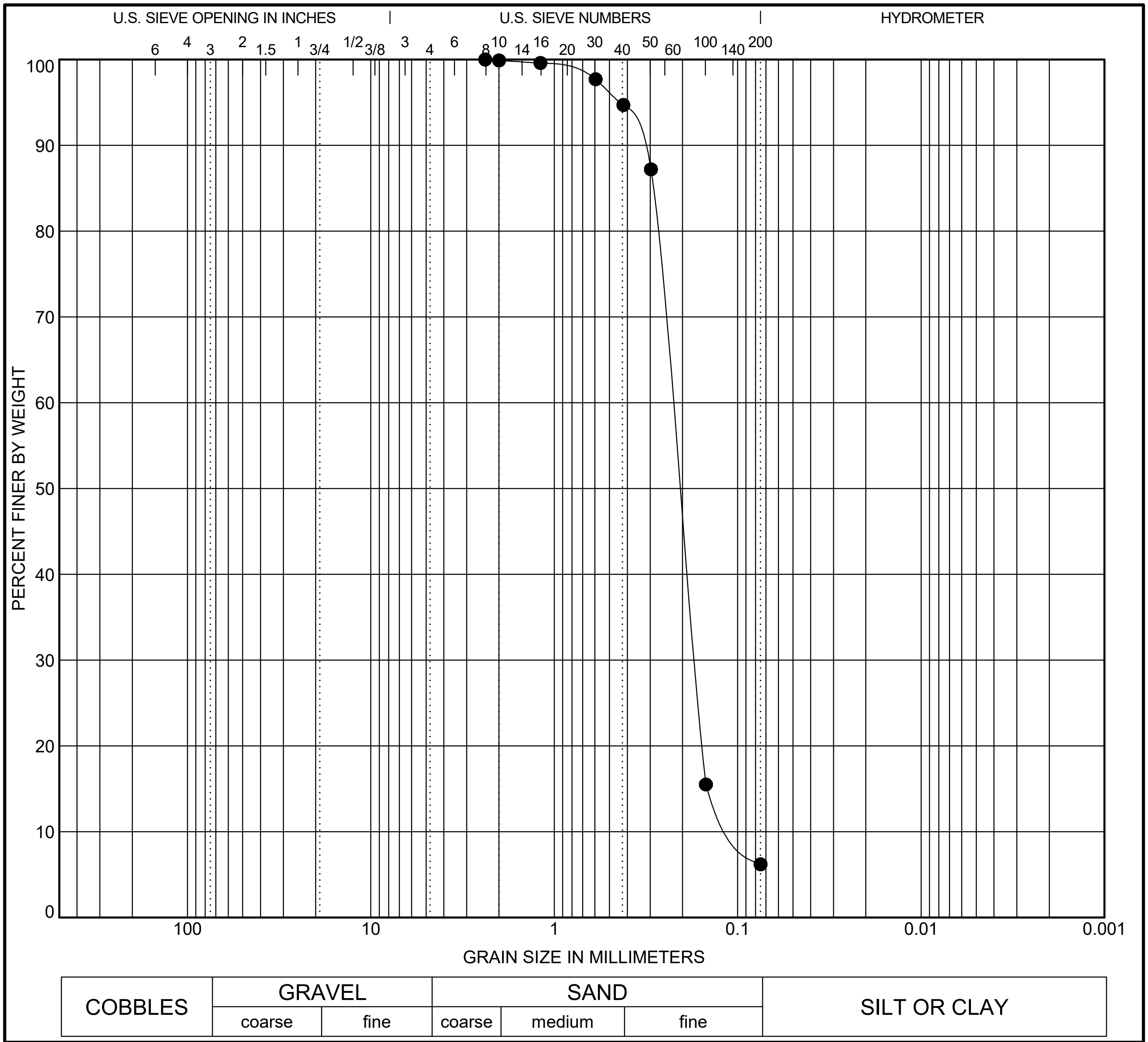
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 9



SIEVE SIZE	% PASSING
No. 8	100
No. 10	99.9
No. 16	99.6
No. 30	97.7
No. 40	94.7
No. 50	87.2
No. 100	15.5
No. 200	6.2

Specimen Identification
B2021-1 - (25 - 27 ft)

Classification	LL	PL	PI	Cc	Cu
POORLY GRADED SAND with SILT(SP-SM)	**NV**	**NV**	**NP**	**1.29**	**2.30**

% Gravel	% Sand	% Silt	% Clay
0	94	6	

D100	D60	D30	D10
2.38	0.229	0.171	0.099

TETRA TECH

GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

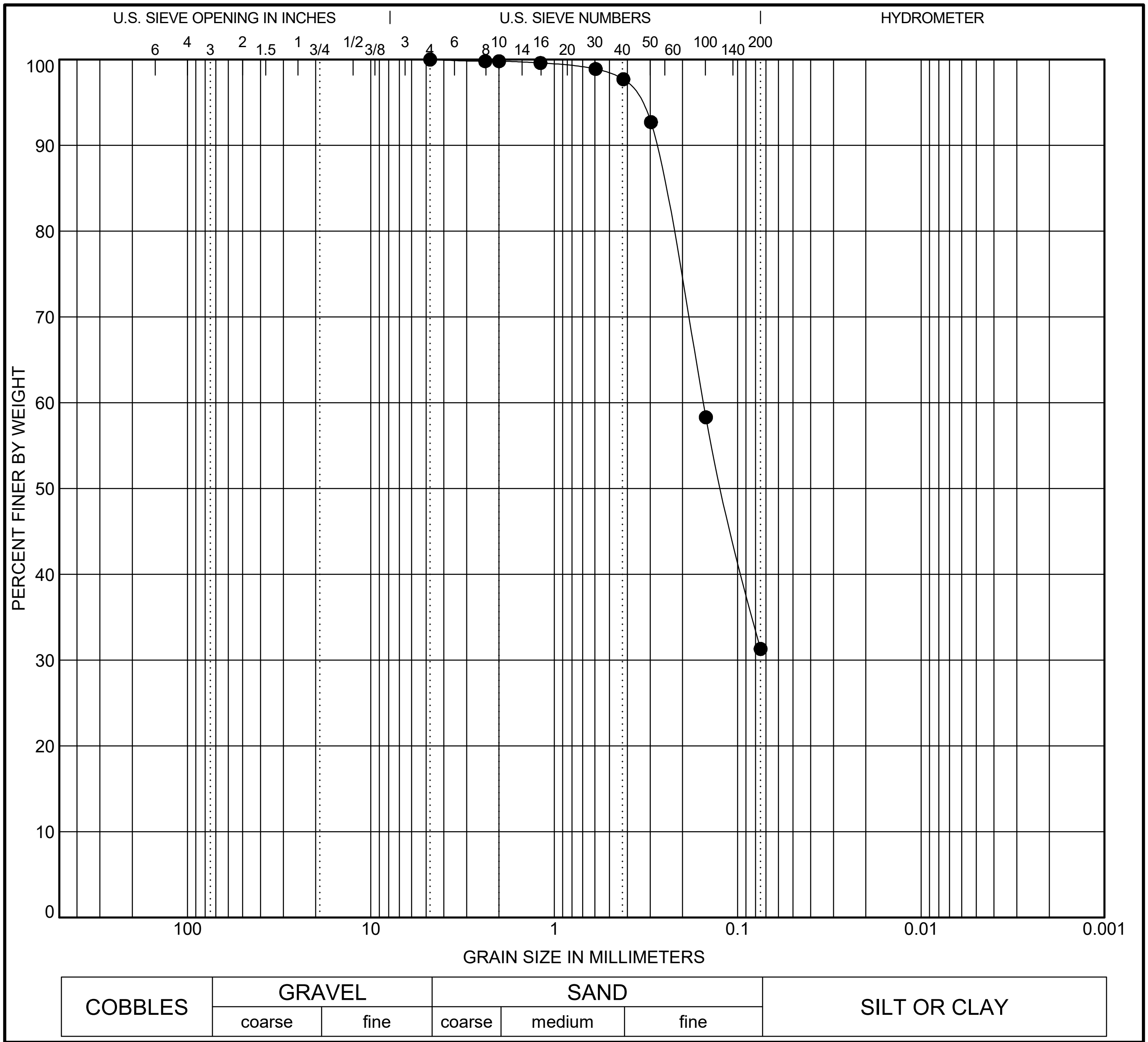
Location: Refer to site map.

Number: 114-571040-2022

Figure No. 10

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.8
No. 10	99.8
No. 16	99.6
No. 30	98.9
No. 40	97.7
No. 50	92.7
No. 100	58.3
No. 200	31.3

Specimen Identification
B2021-3 - (25 - 27 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	69	31	

D100	D60	D30	D10
4.75	0.154		

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

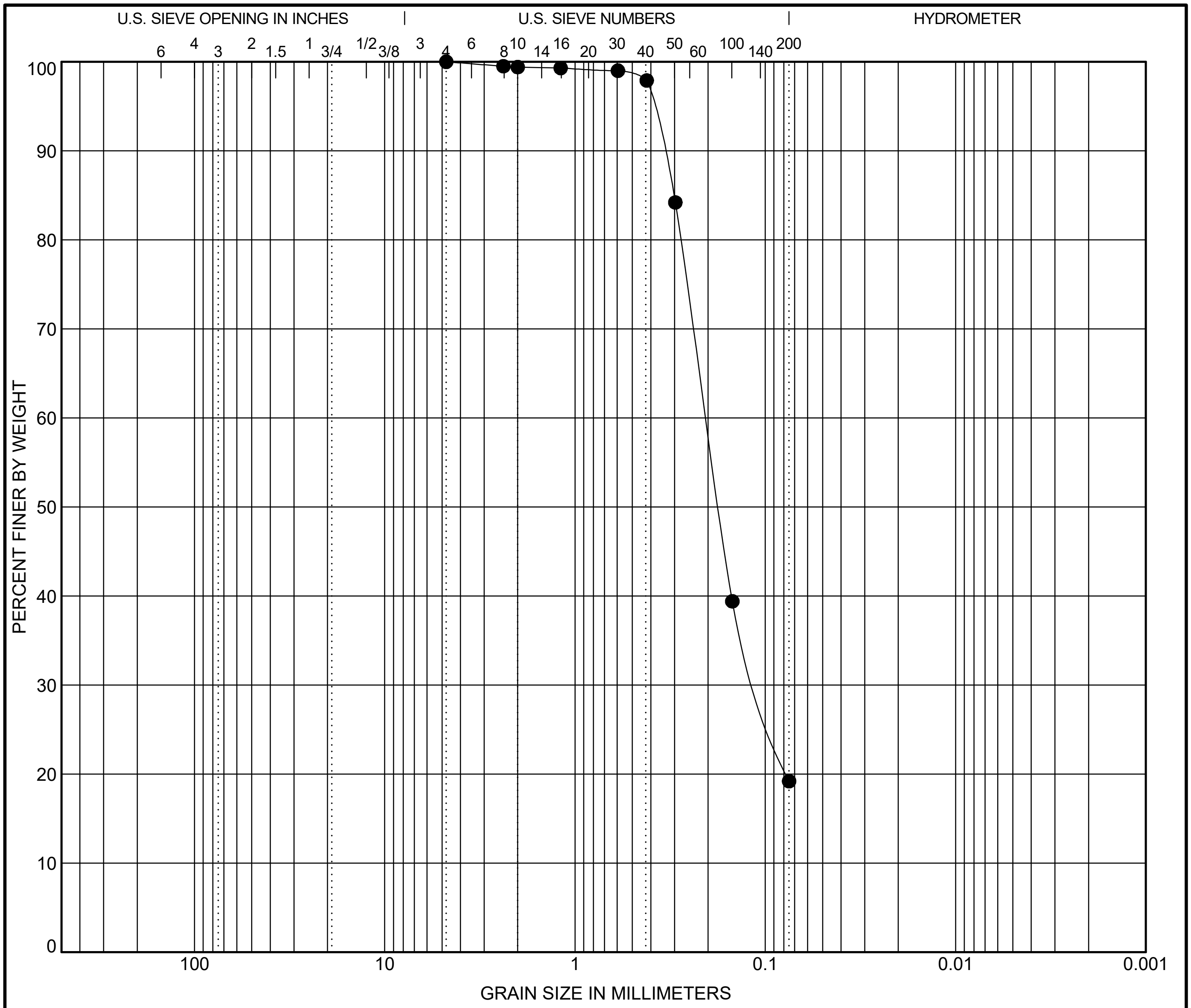
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 11

Revised 1-23-08 (MAT)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.5
No. 10	99.4
No. 16	99.3
No. 30	99
No. 40	97.9
No. 50	84.2
No. 100	39.4
No. 200	19.2

Specimen Identification
B2021-3 - (60 - 62 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)					
	NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	81	19	

D100	D60	D30	D10
4.75	0.205	0.108	

TETRA TECH

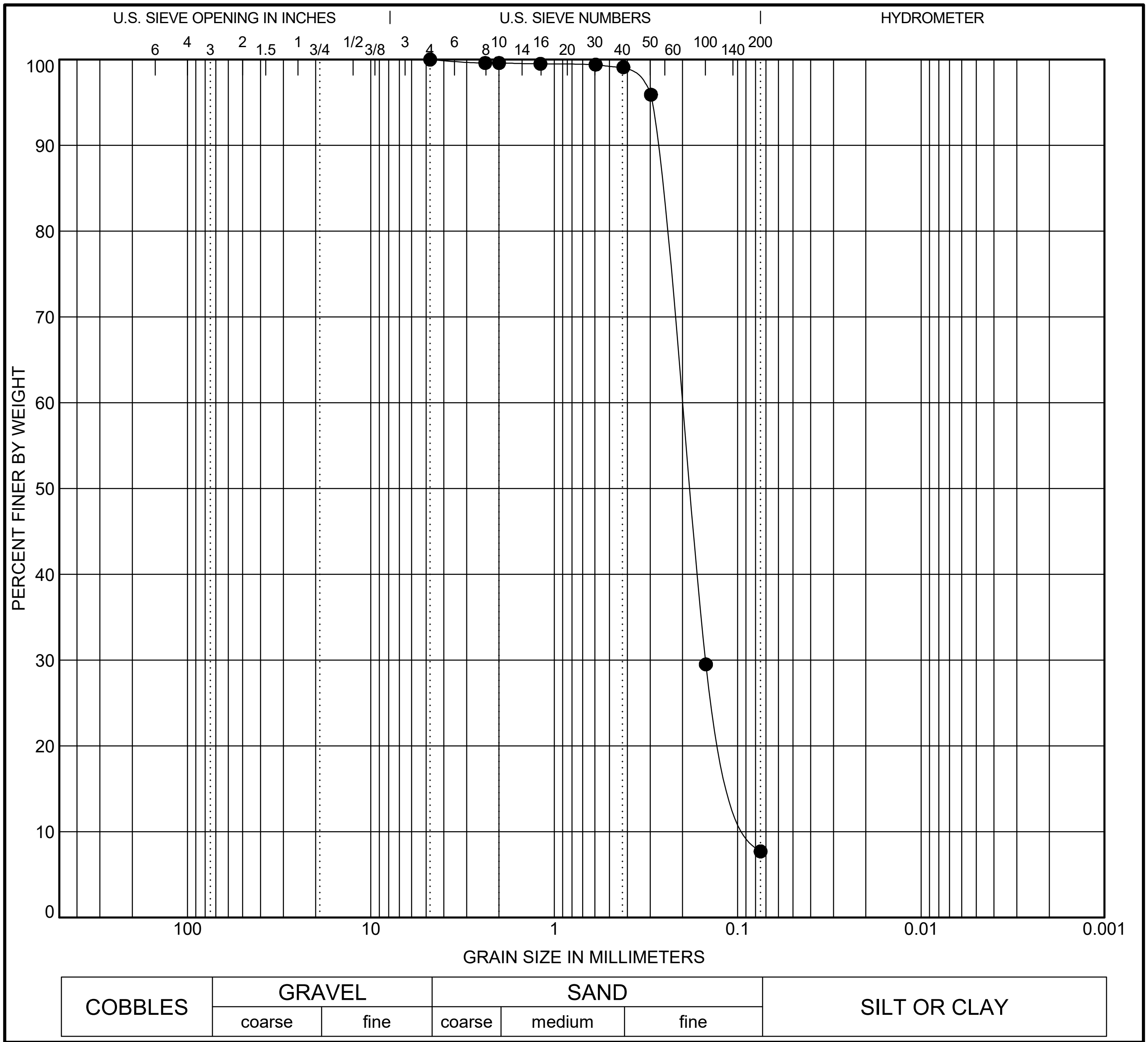
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 12



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.6
No. 10	99.6
No. 16	99.5
No. 30	99.4
No. 40	99.1
No. 50	95.9
No. 100	29.5
No. 200	7.7

Specimen Identification

B2021-3 - (61 - 65 ft)

Classification	LL	PL	PI	Cc	Cu
POORLY GRADED SAND with SILT(SP-SM)	**NV**	**NV**	**NP**	**1.36**	**2.54**

% Gravel	% Sand	% Silt	% Clay
0	92	8	

D100	D60	D30	D10
4.75	0.205	0.15	0.081

TETRA TECH

GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

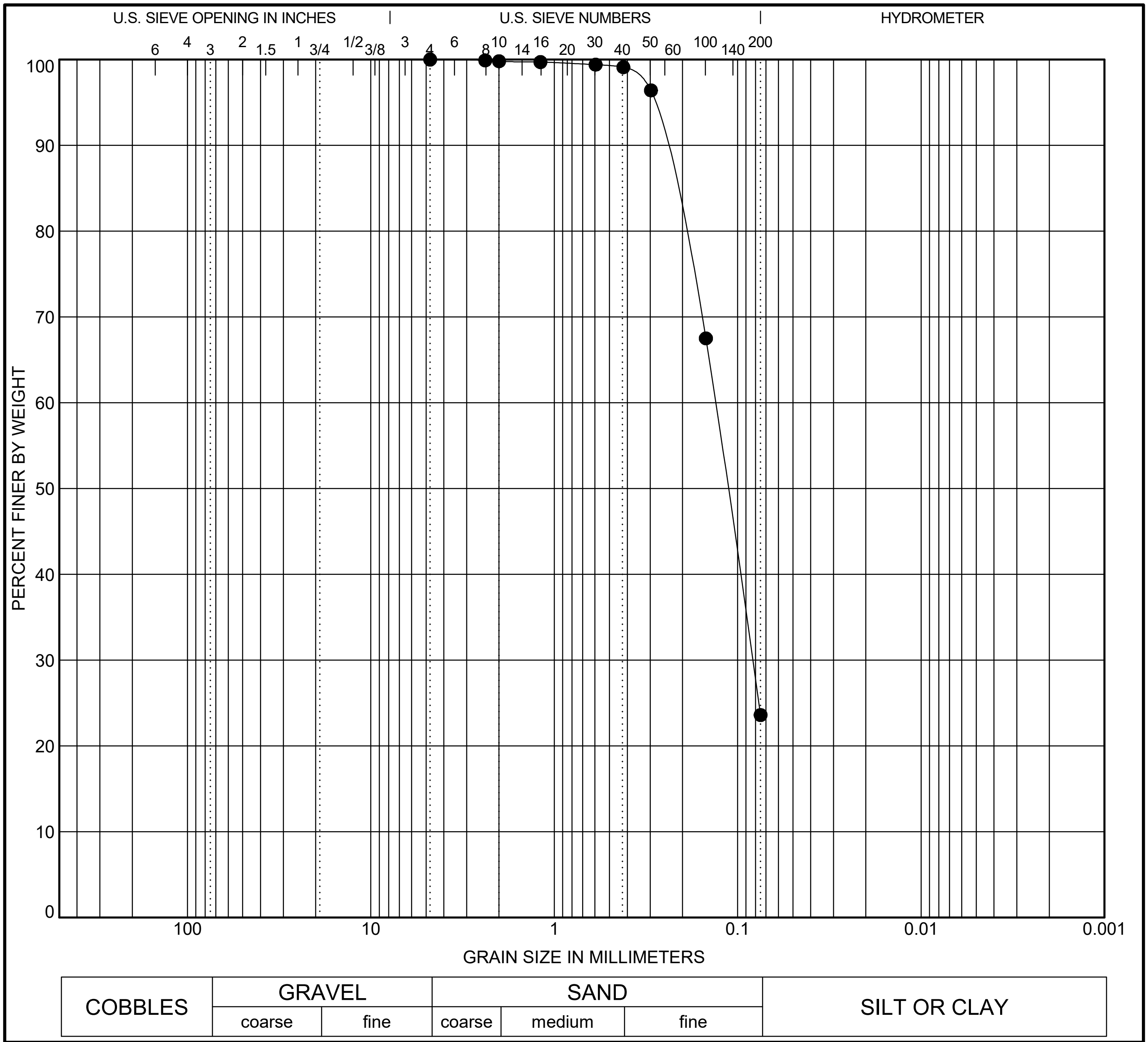
Location: Refer to site map.

Number: 114-571040-2022

Figure No. 13

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.8
No. 16	99.7
No. 30	99.4
No. 40	99.1
No. 50	96.4
No. 100	67.5
No. 200	23.6

Specimen Identification
B2021-3 - (80 - 82 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	76	24	

D100	D60	D30	D10
4.75	0.133	0.083	

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

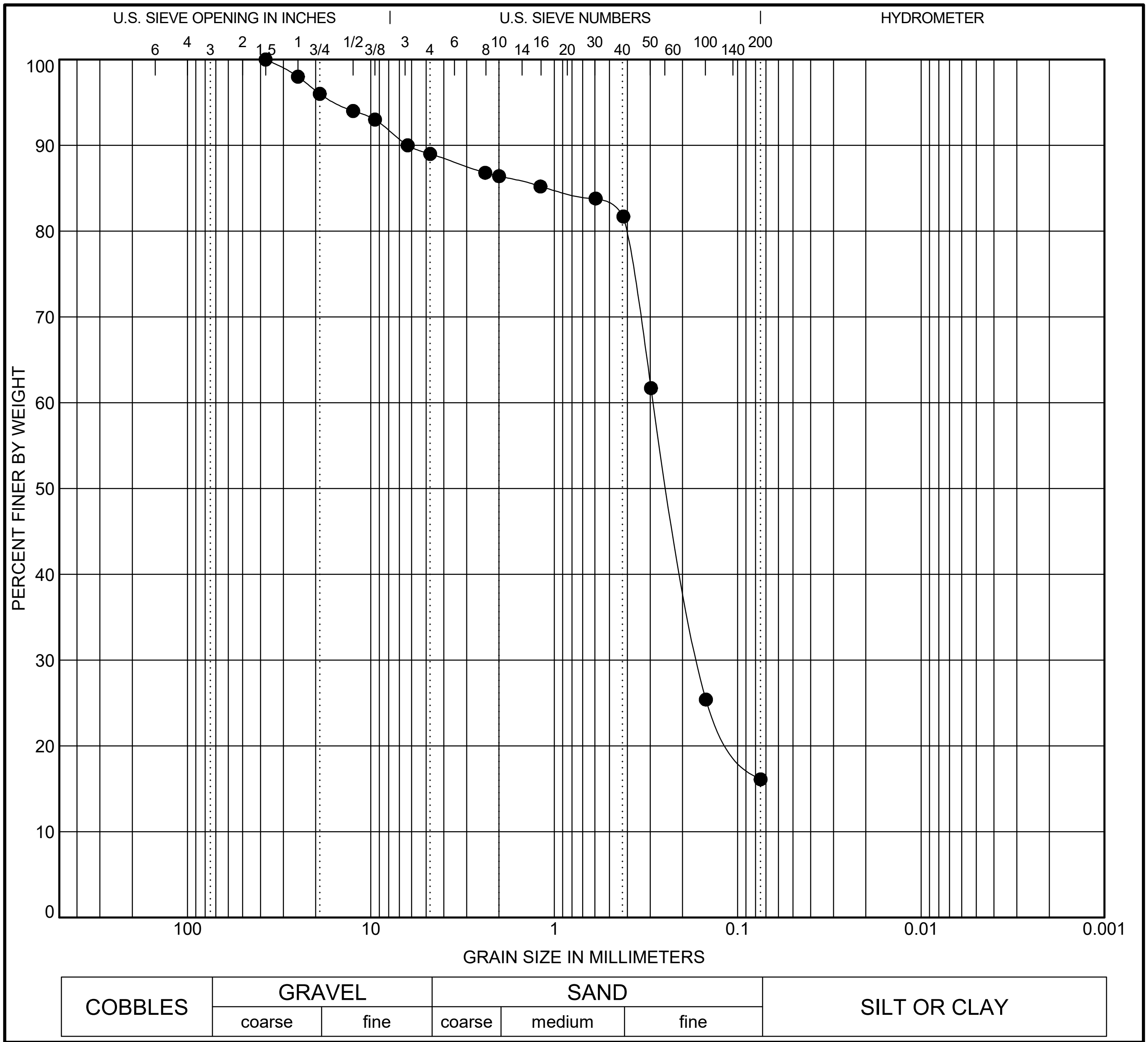
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 14



SIEVE SIZE	% PASSING
1.5 in	100
1 in	98
3/4 in	96
1/2 in	94
3/8 in	93
1/4 in	90
No. 4	89
No. 8	86.8
No. 10	86.4
No. 16	85.2
No. 30	83.8
No. 40	81.7
No. 50	61.7
No. 100	25.4
No. 200	16.1

Specimen Identification
B2021-3 - (116 - 120 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
11	73	16	

D100	D60	D30	D10
37.5	0.288	0.163	

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

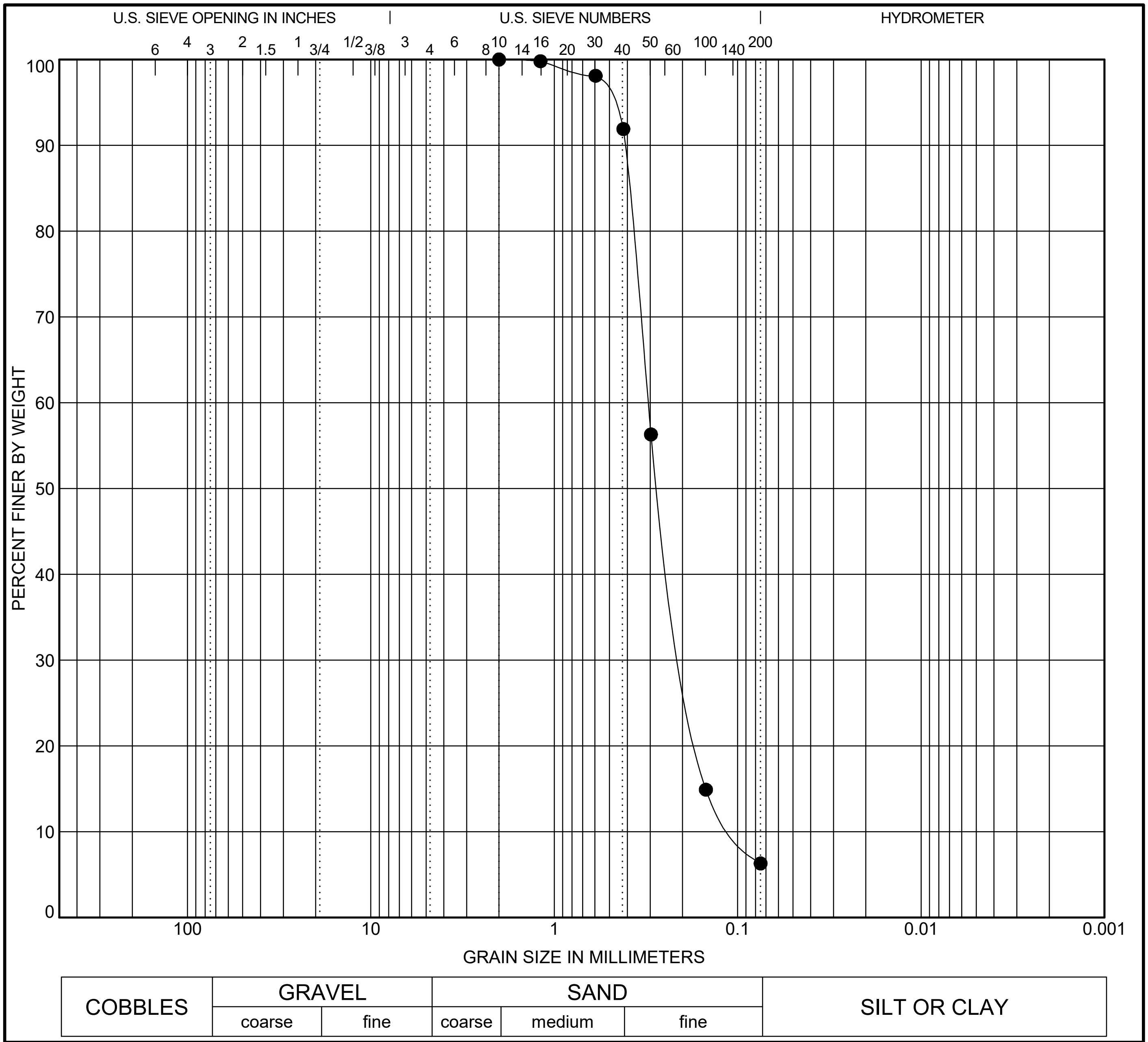
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 15

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 10	100
No. 16	99.8
No. 30	98.1
No. 40	91.9
No. 50	56.3
No. 100	14.9
No. 200	6.3

Specimen Identification
B2021-4 - (50 - 51.5 ft)

Classification
POORLY GRADED SAND with SILT(SP-SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**	**1.18**	**3.06**

% Gravel	% Sand	% Silt	% Clay
0	94	6	

D100	D60	D30	D10
2	0.308	0.192	0.101

TETRA TECH

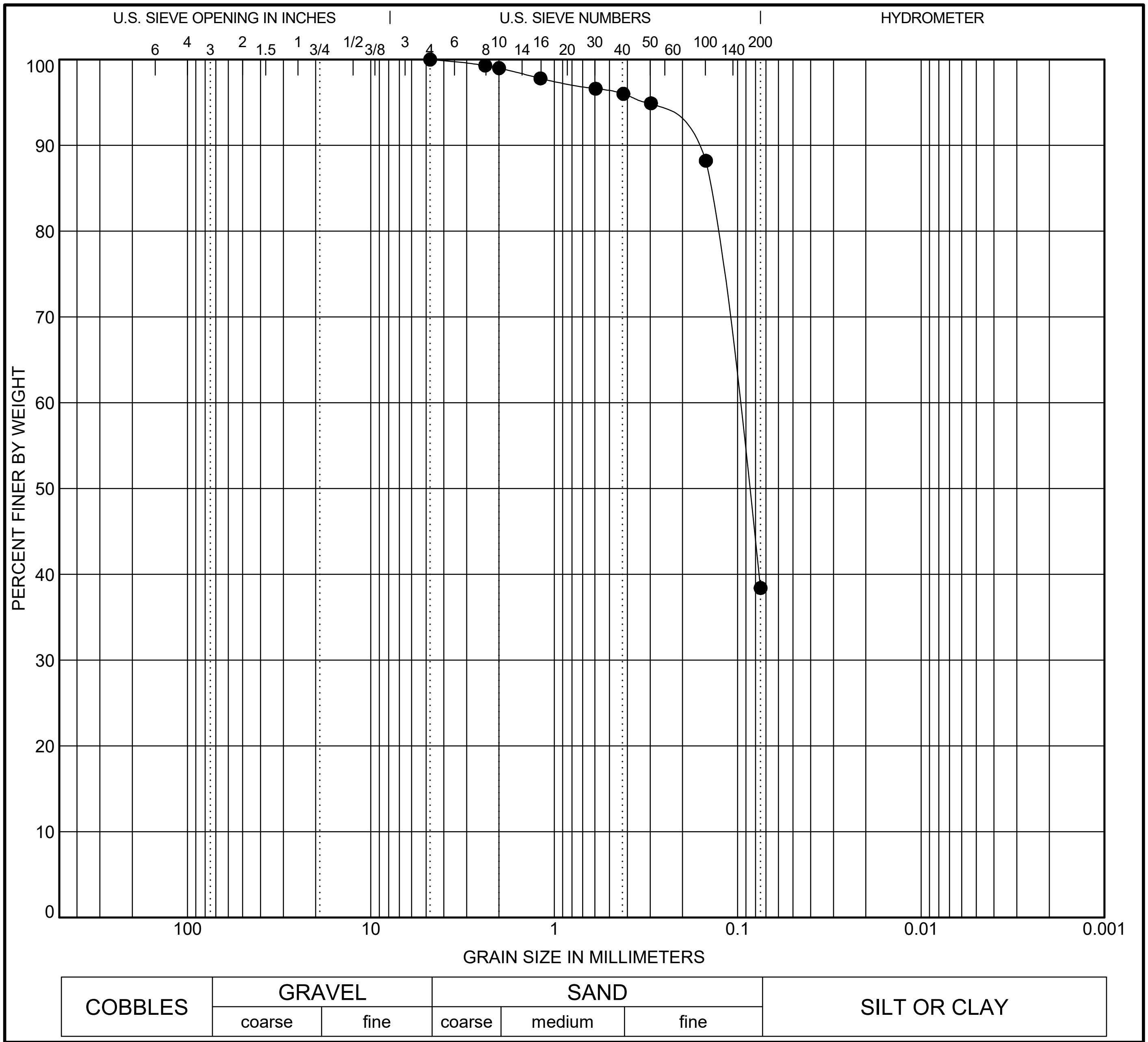
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 16



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.3
No. 10	99
No. 16	97.8
No. 30	96.6
No. 40	96
No. 50	94.9
No. 100	88.2
No. 200	38.4

Specimen Identification
B2021-4 - (90 - 91.5 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	62	38	

D100	D60	D30	D10
4.75	0.101		

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

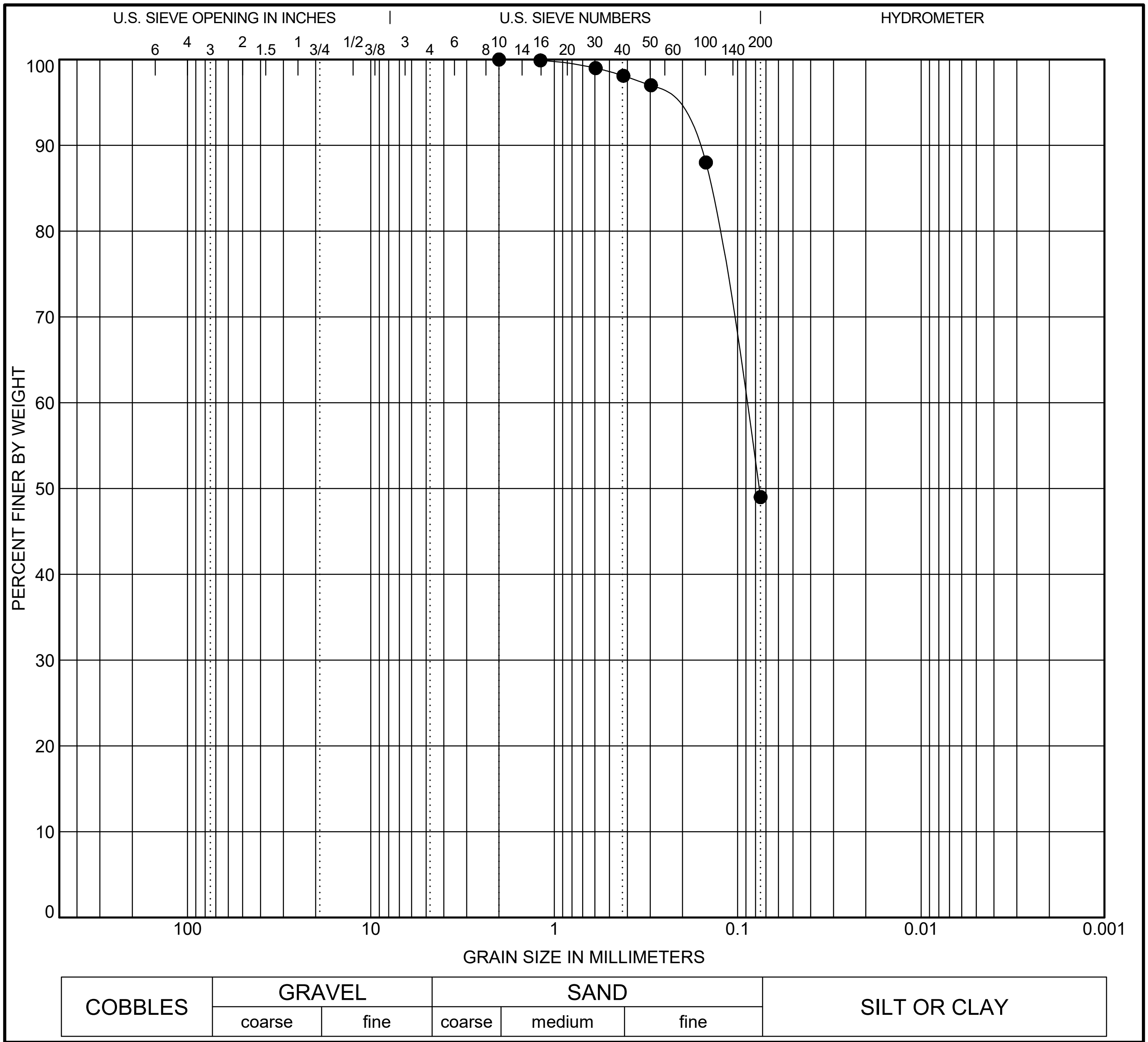
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 17

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 10	100
No. 16	99.9
No. 30	99
No. 40	98.1
No. 50	97
No. 100	88
No. 200	49

Specimen Identification

B2021-4 - (120 - 120.9 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	51	49	

D100	D60	D30	D10
2	0.091		

TETRA TECH

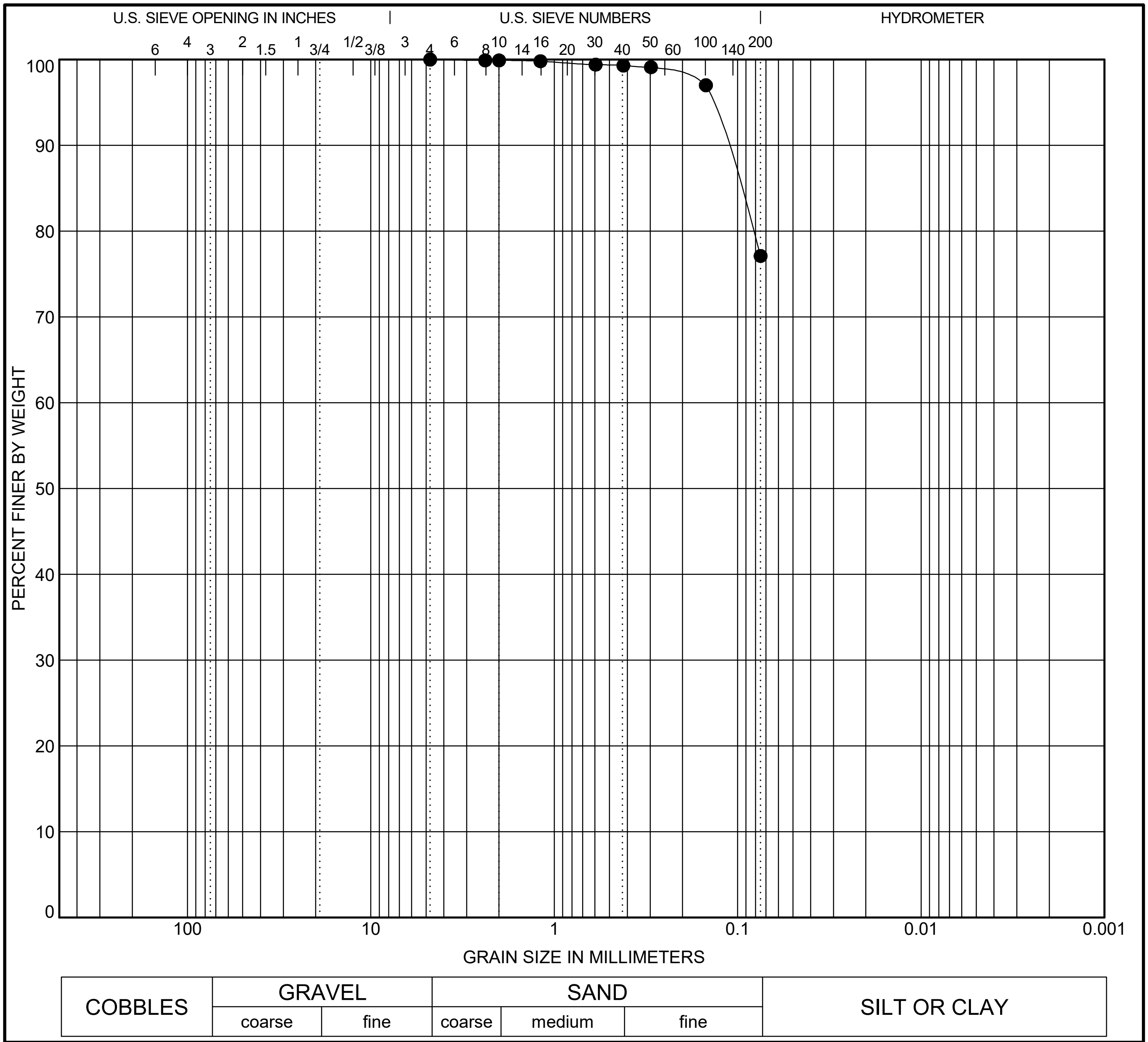
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 18



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.9
No. 16	99.8
No. 30	99.4
No. 40	99.3
No. 50	99.1
No. 100	97
No. 200	77.1

Specimen Identification
B2021-5 - (69 - 70 ft)

Classification	LL	PL	PI	Cc	Cu
SILT with SAND(ML)					
	27	**20**	**7**		

% Gravel	% Sand	% Silt	% Clay
0	23	77	

D100	D60	D30	D10
4.75			

TETRA TECH

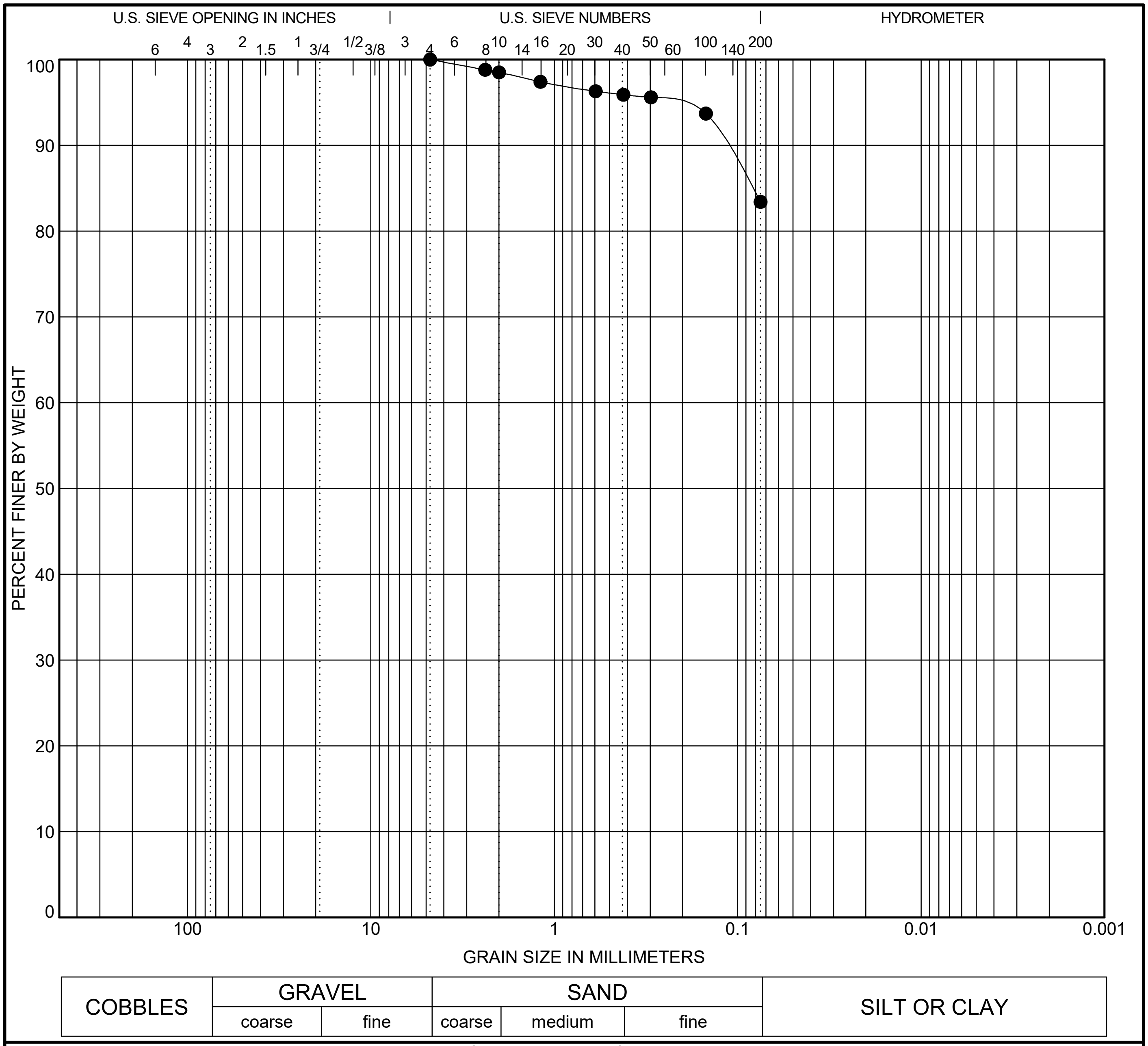
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 19



SIEVE SIZE	% PASSING
No. 4	100
No. 8	98.8
No. 10	98.5
No. 16	97.4
No. 30	96.3
No. 40	95.9
No. 50	95.6
No. 100	93.7
No. 200	83.4

Specimen Identification
B2021-5 - (80 - 81.5 ft)

Classification	LL	PL	PI	Cc	Cu
LEAN CLAY with SAND(CL)					
	35	**21**	**14**		

% Gravel	% Sand	% Silt	% Clay
0	17	83	

D100	D60	D30	D10
4.75			

BORING LOGS.GPJ ` 6-20-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

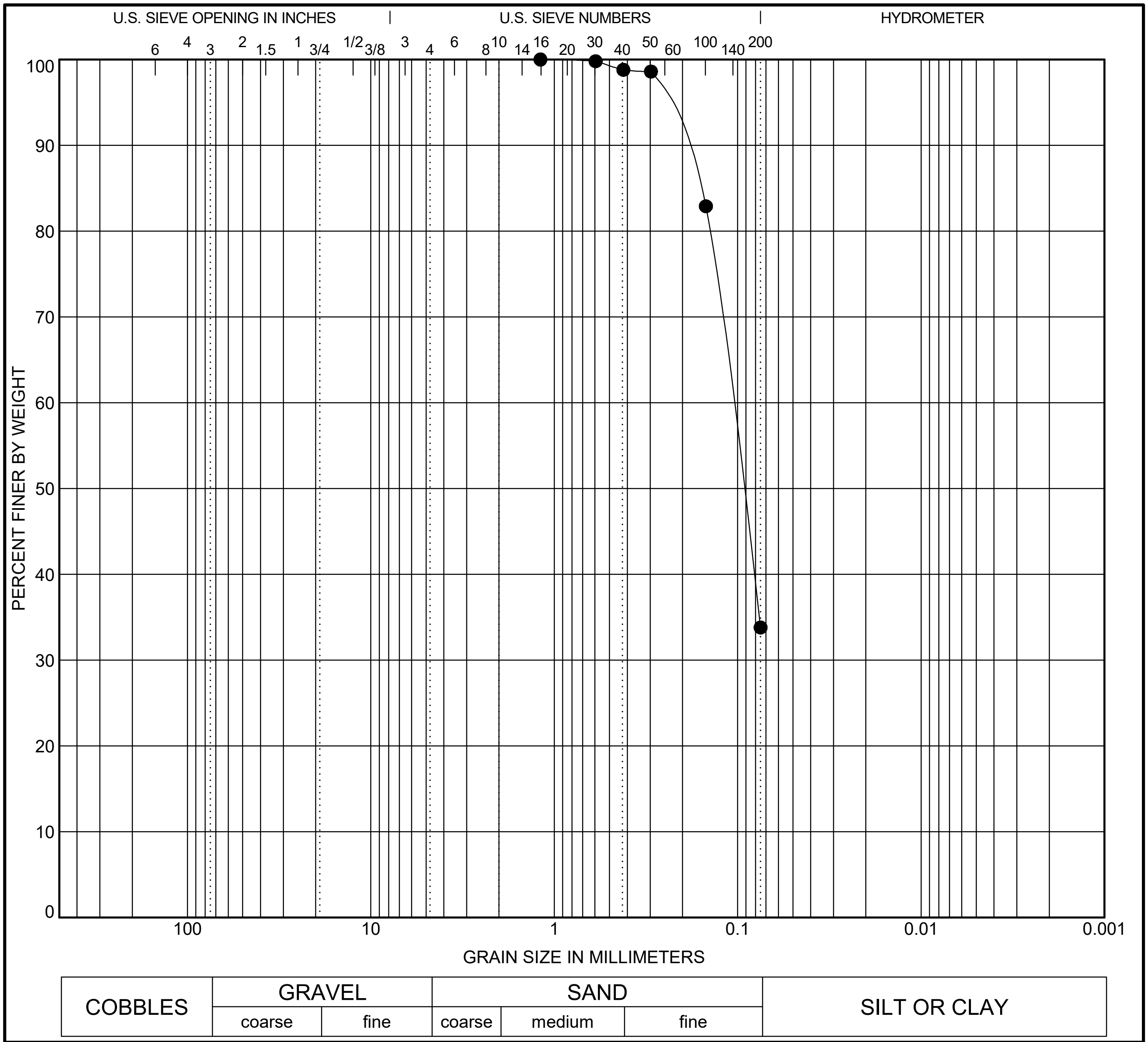
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 20

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 16	100
No. 30	99.8
No. 40	98.8
No. 50	98.6
No. 100	82.9
No. 200	33.8

Specimen Identification
B2021-5 - (90 - 91.5 ft)

Classification	LL	PL	PI	Cc	Cu
SILTY SAND(SM)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	66	34	

D100	D60	D30	D10
1.19	0.108		

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

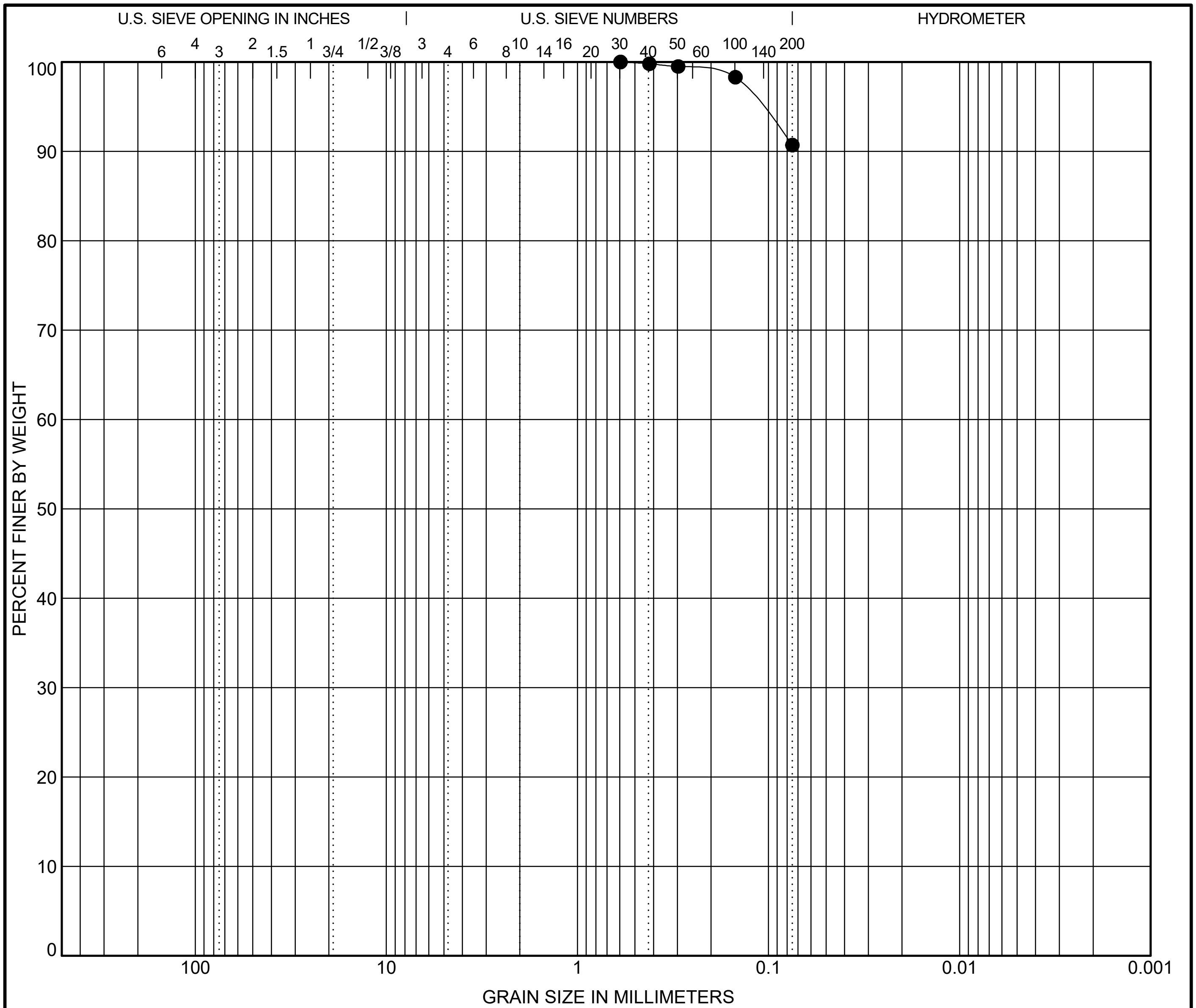
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 21

Revised 1-23-08 (MAT)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SIEVE SIZE	% PASSING
No. 30	100
No. 40	99.8
No. 50	99.5
No. 100	98.3
No. 200	90.7

Specimen Identification
B2021-6 - (79 - 81 ft)

Classification	LL	PL	PI	Cc	Cu
FAT CLAY(CH)					
	67	**19**	**48**		

% Gravel	% Sand	% Silt	% Clay
0	9	91	

D100	D60	D30	D10
0.595			

BORING LOGS.GPJ ` 6-9-22 ` ` TT_US GRAIN SIZE (SIEVE DATA)

TETRA TECH

GRAIN SIZE DISTRIBUTION

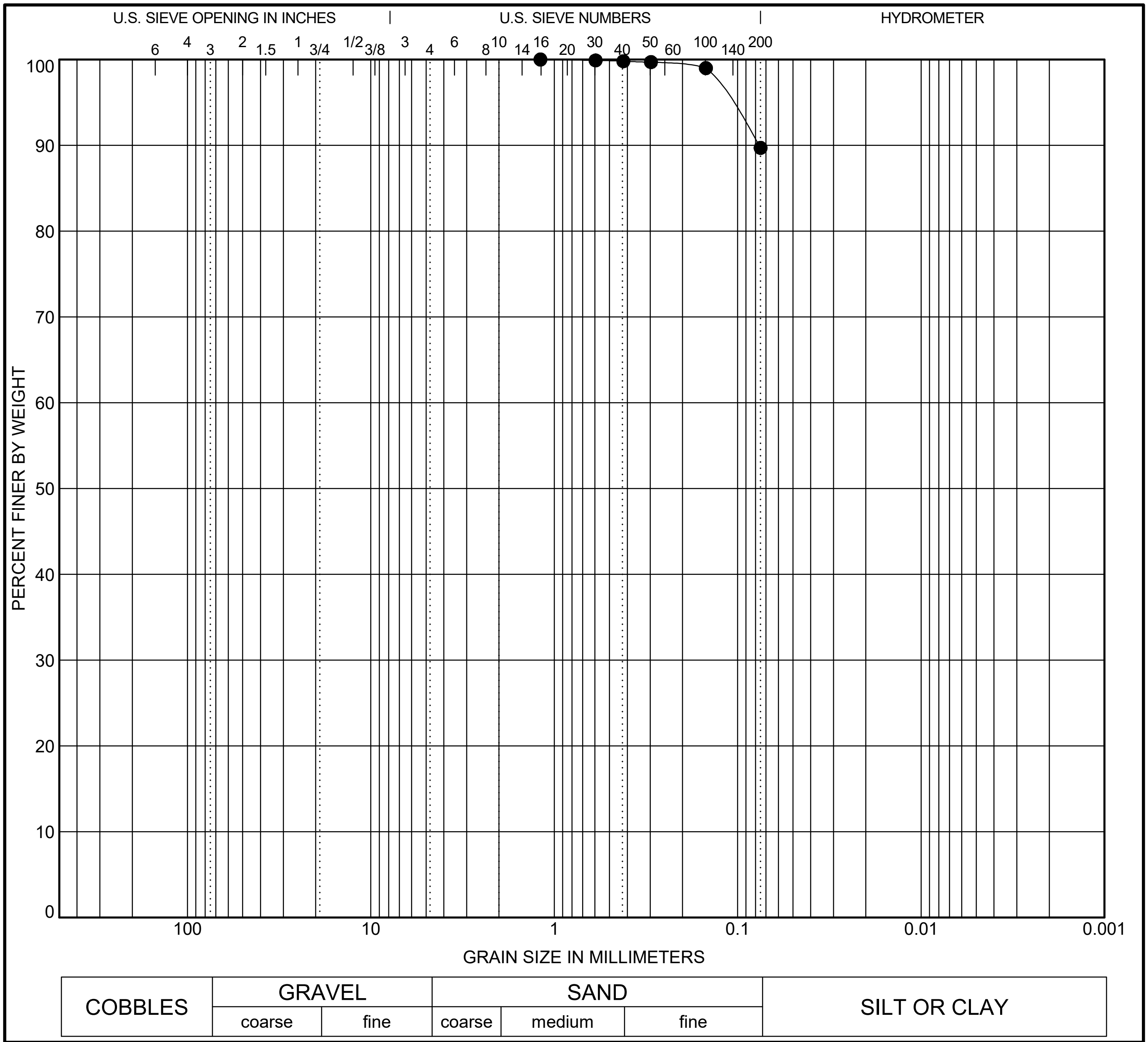
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 22

Revised 1-23-08 (MAT)



SIEVE SIZE	% PASSING
No. 16	100
No. 30	99.9
No. 40	99.8
No. 50	99.7
No. 100	99
No. 200	89.7

Specimen Identification
B2021-6 - (99 - 102 ft)

Classification	LL	PL	PI	Cc	Cu
FAT CLAY(CH)	**56**	**22**	**34**		

% Gravel	% Sand	% Silt	% Clay
0	10	90	

D100	D60	D30	D10
1.19			

GRAIN SIZE DISTRIBUTION

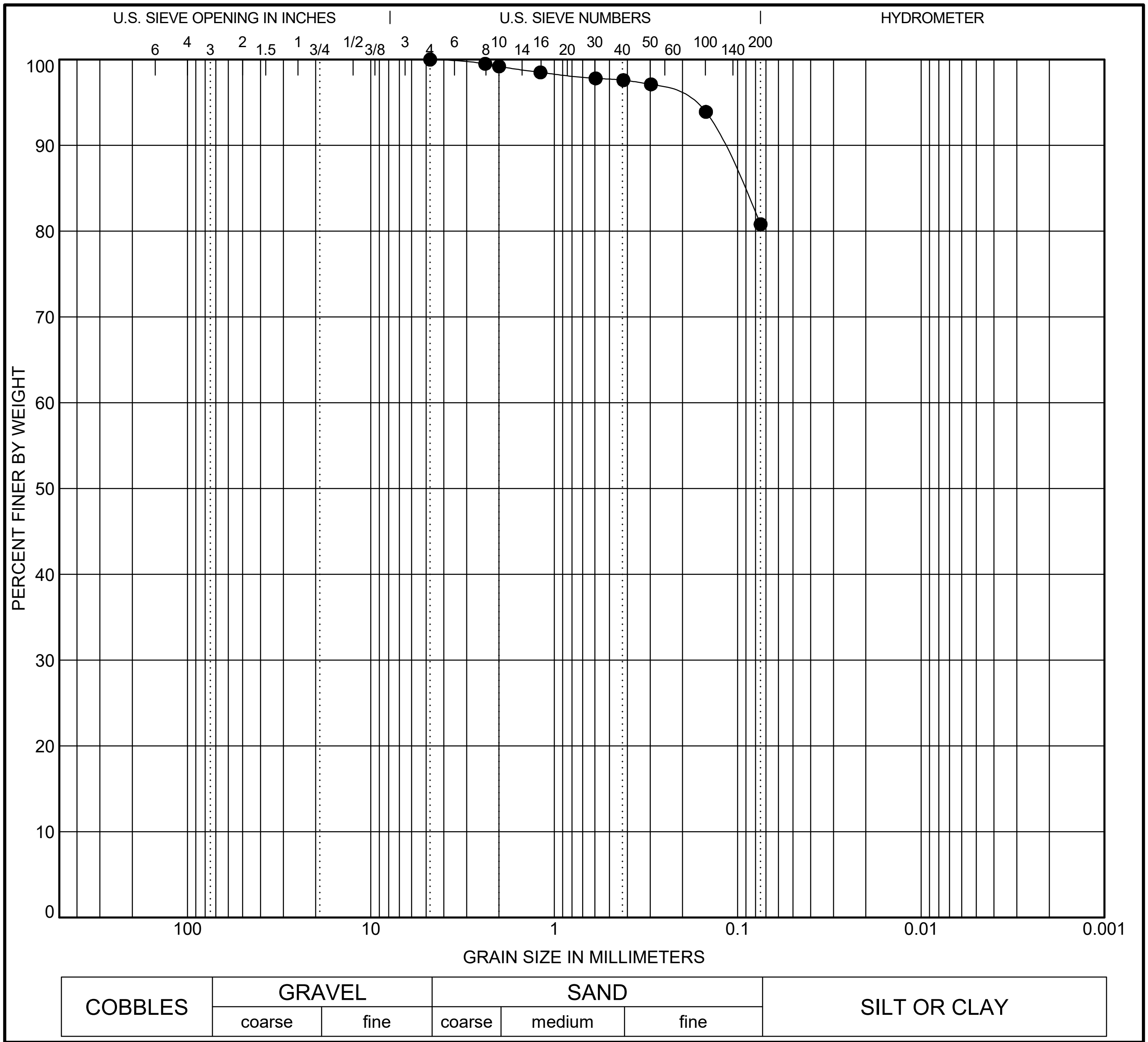
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 23



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.5
No. 10	99.2
No. 16	98.5
No. 30	97.8
No. 40	97.6
No. 50	97.1
No. 100	93.9
No. 200	80.8

Specimen Identification

B2021-6 - (106 - 107 ft)

Classification	LL	PL	PI	Cc	Cu
LEAN CLAY with SAND(CL)					
	47	**22**	**25**		

% Gravel	% Sand	% Silt	% Clay
0	19	81	

D100	D60	D30	D10
4.75			

TETRA TECH

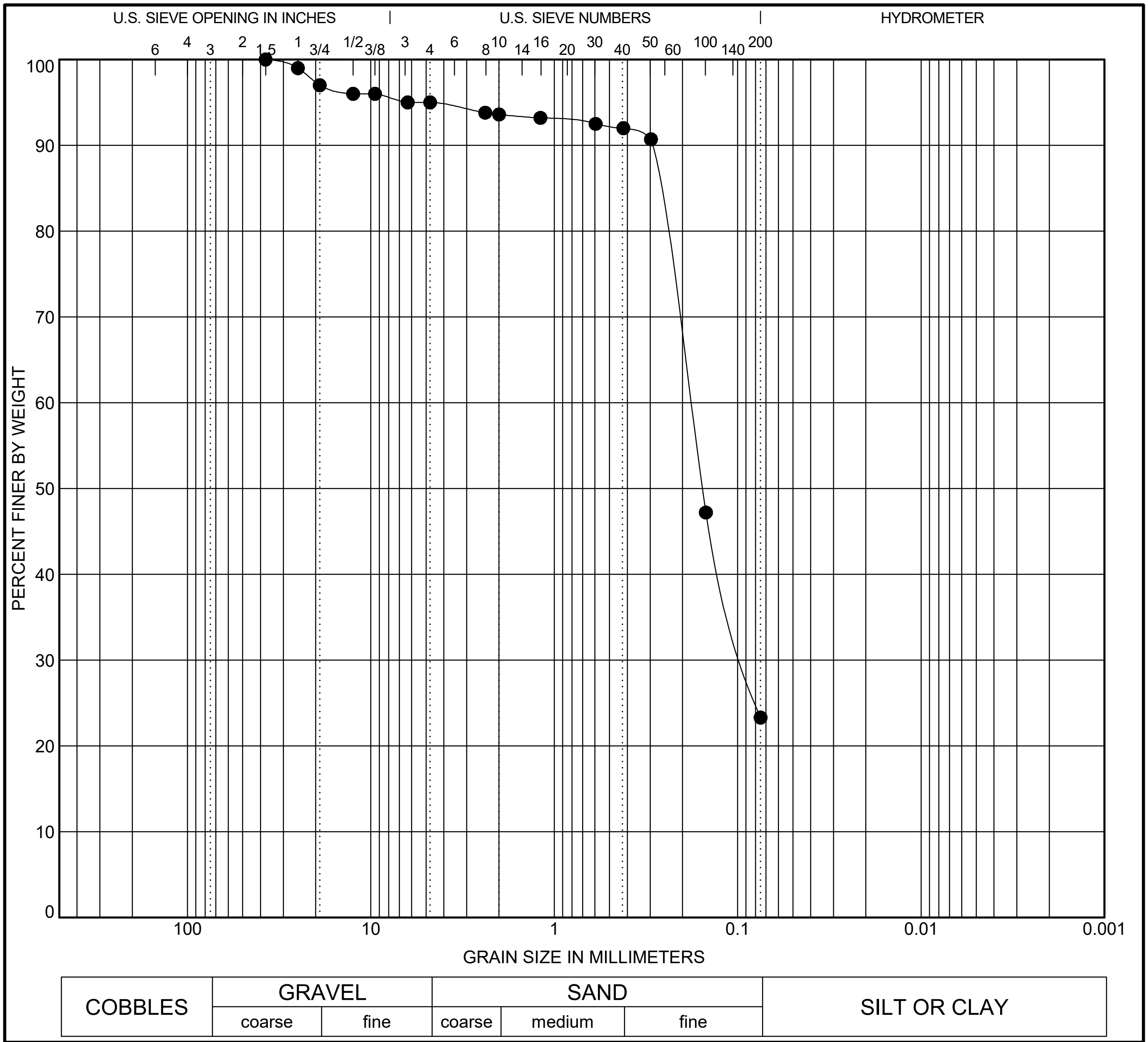
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 24



SIEVE SIZE	% PASSING
1.5 in	100
1 in	99
3/4 in	97
1/2 in	96
3/8 in	96
1/4 in	95
No. 4	95
No. 8	93.8
No. 10	93.6
No. 16	93.2
No. 30	92.5
No. 40	92
No. 50	90.7
No. 100	47.2
No. 200	23.3

Specimen Identification
B2021-7 - (39 - 41 ft)

Classification
SILTY SAND(SM)

LL	PL	PI	Cc	Cu
NV	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
5	72	23	

D100	D60	D30	D10
37.5	0.183	0.091	

TETRA TECH

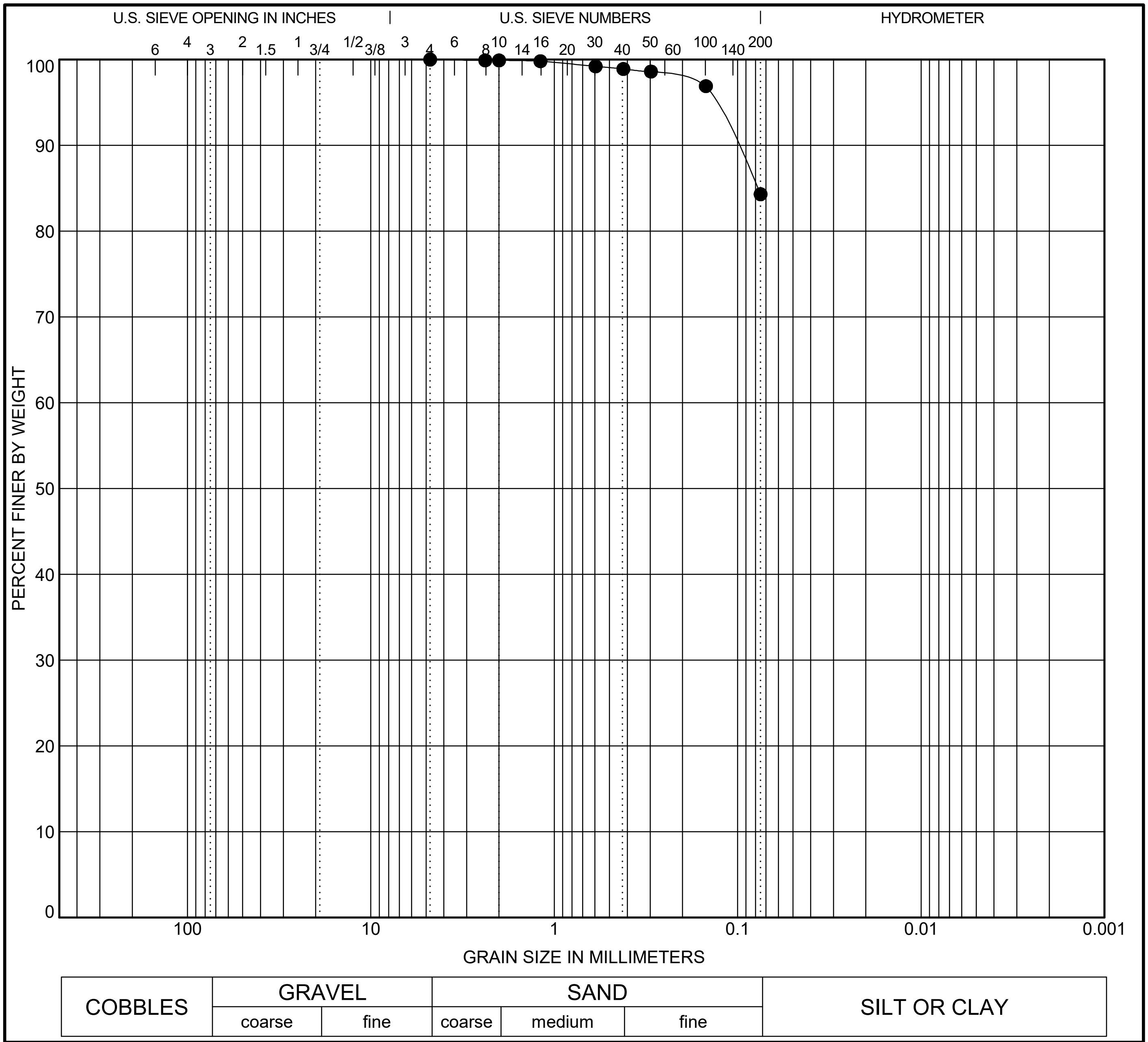
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 25



SIEVE SIZE	% PASSING
No. 4	100
No. 8	99.9
No. 10	99.9
No. 16	99.8
No. 30	99.2
No. 40	98.9
No. 50	98.6
No. 100	96.9
No. 200	84.3

Specimen Identification
B2021-7 - (59 - 60 ft)

Classification	LL	PL	PI	Cc	Cu
SILT with SAND(ML)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	16	84	

D100	D60	D30	D10
4.75			

TETRA TECH

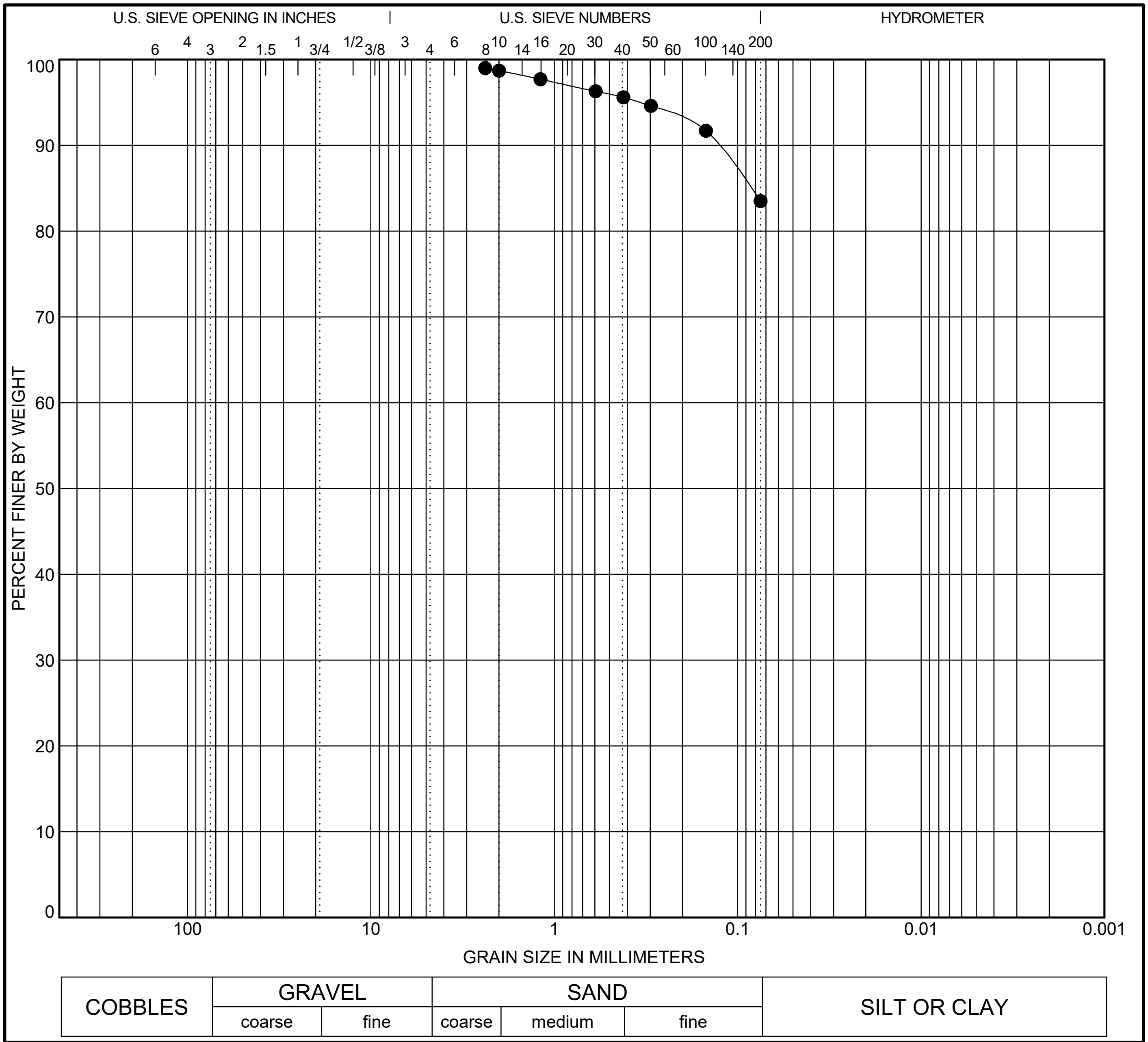
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 26



SIEVE SIZE	% PASSING
No. 8	99
No. 10	98.7
No. 16	97.7
No. 30	96.3
No. 40	95.6
No. 50	94.6
No. 100	91.7
No. 200	83.5

Specimen Identification
B2021-8 - (1 - 4 ft)

Classification	LL	PL	PI	Cc	Cu
SILT with SAND(ML)	**NV**	**NV**	**NP**		

% Gravel	% Sand	% Silt	% Clay
0	15	84	

D100	D60	D30	D10
2.38			

TETRA TECH

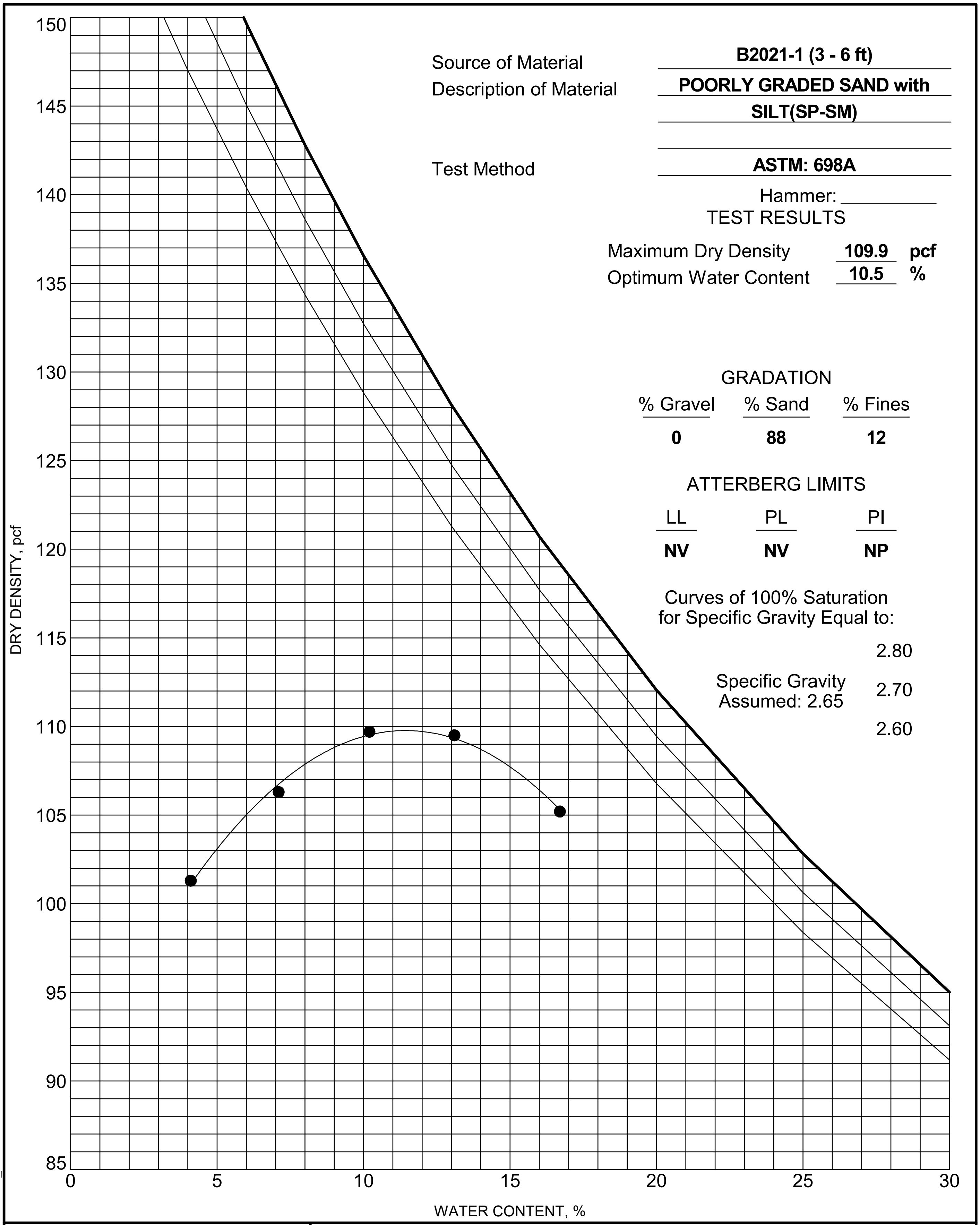
GRAIN SIZE DISTRIBUTION

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 27



Source of Material **B2021-1 (3 - 6 ft)**

Description of Material **POORLY GRADED SAND with SILT(SP-SM)**

Test Method **ASTM: 698A**

Hammer: ____________

TEST RESULTS

Maximum Dry Density	**109.9**	**pcf**
Optimum Water Content	**10.5**	**%**

GRADATION

% Gravel	% Sand	% Fines
0	**88**	**12**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

Specific Gravity
Assumed: 2.65

TETRA TECH

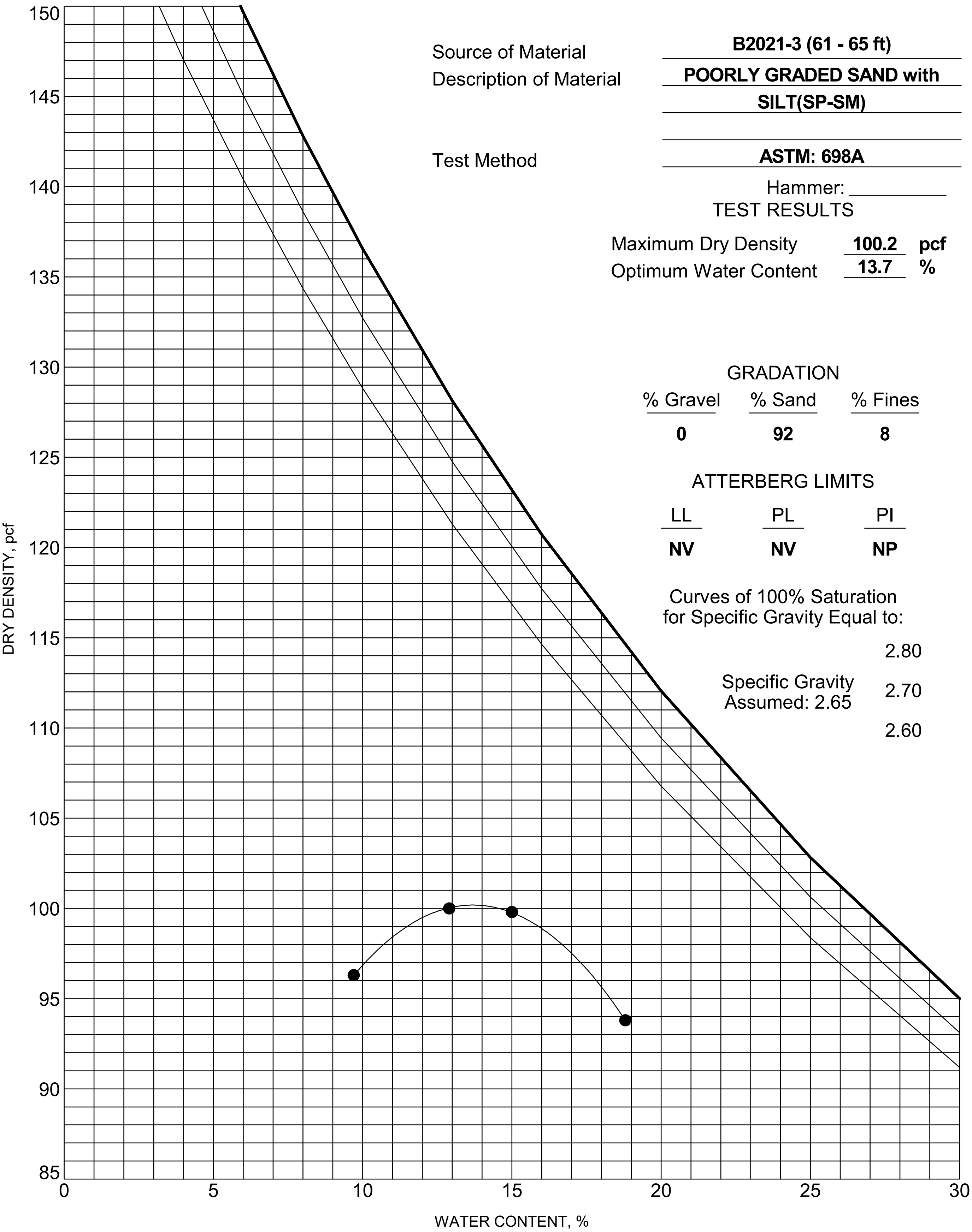
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 28



Source of Material **B2021-3 (61 - 65 ft)**

Description of Material **POORLY GRADED SAND with SILT(SP-SM)**

Test Method **ASTM: 698A**

Hammer: ____________

TEST RESULTS

Maximum Dry Density **100.2** **pcf**

Optimum Water Content **13.7** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**92**	**8**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80

Specific Gravity
Assumed: 2.65

2.70

2.60

TETRA TECH

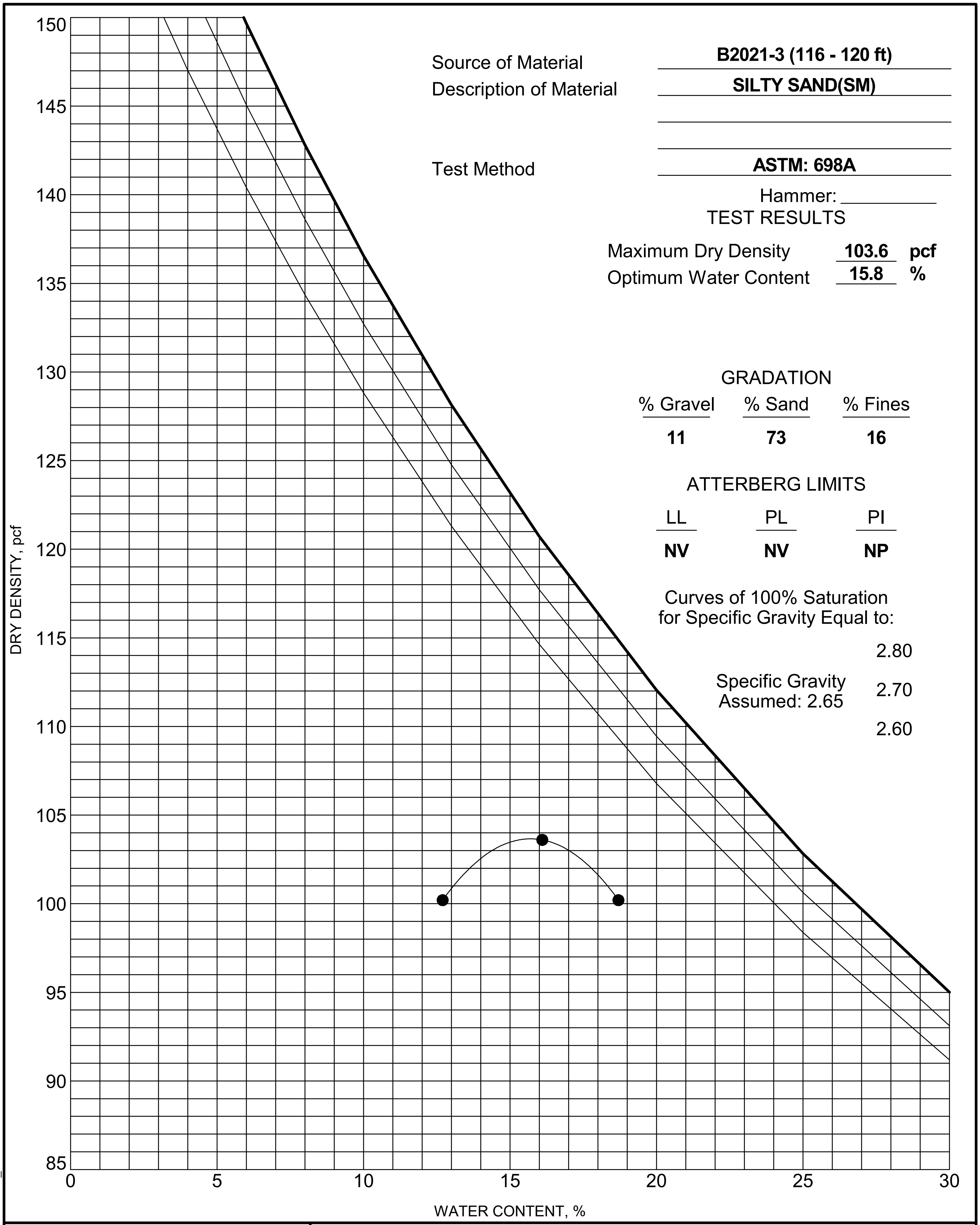
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 29



Source of Material **B2021-3 (116 - 120 ft)**

Description of Material **SILTY SAND(SM)**

Test Method **ASTM: 698A**

Hammer: ____

TEST RESULTS

Maximum Dry Density **103.6** **pcf**

Optimum Water Content **15.8** **%**

GRADATION

% Gravel	% Sand	% Fines
11	**73**	**16**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

MOISTURE-DENSITY RELATIONSHIP

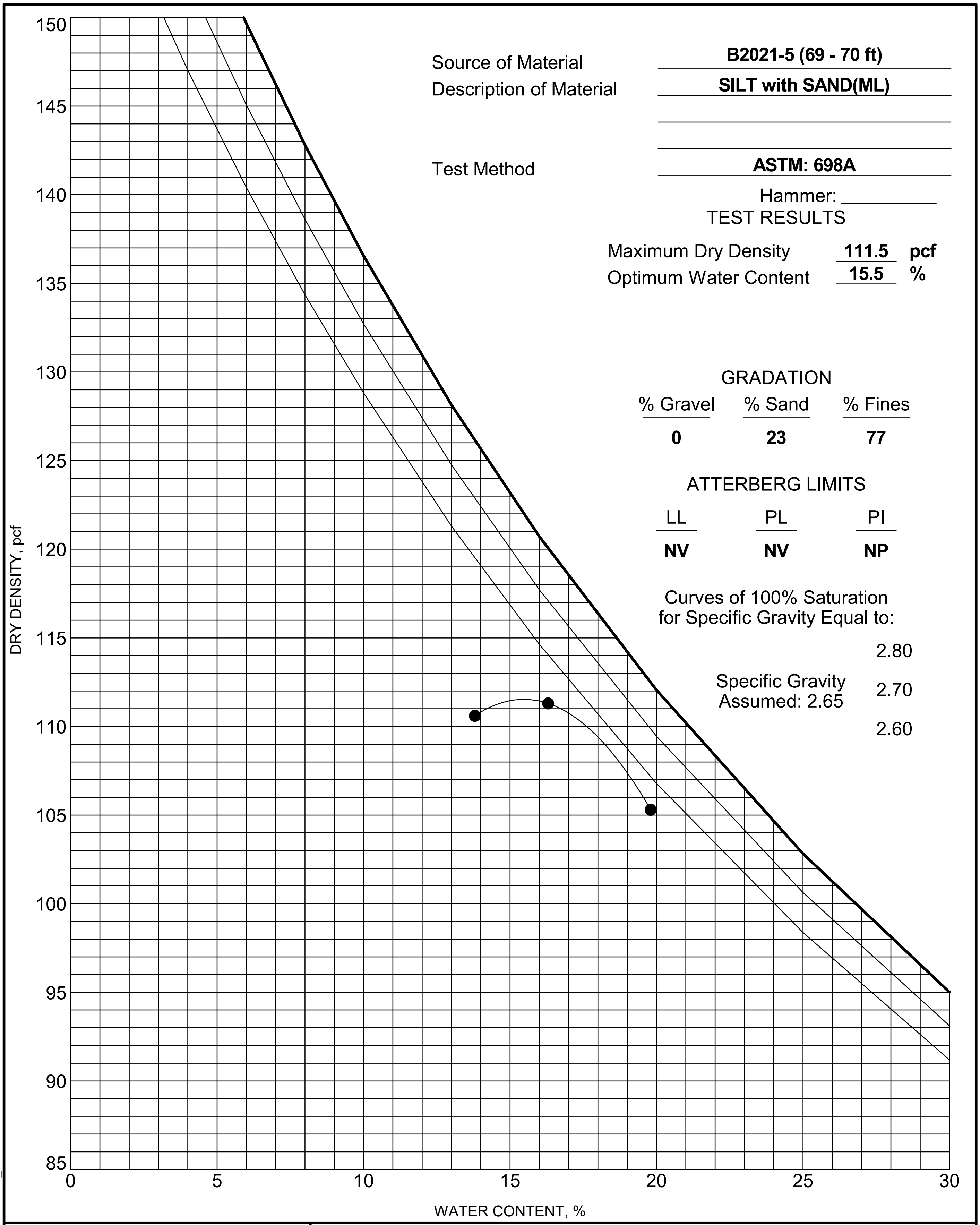
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 30



Source of Material **B2021-5 (69 - 70 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ____

TEST RESULTS

Maximum Dry Density **111.5** pcf

Optimum Water Content **15.5** %

GRADATION

% Gravel	% Sand	% Fines
0	**23**	**77**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

TETRA TECH

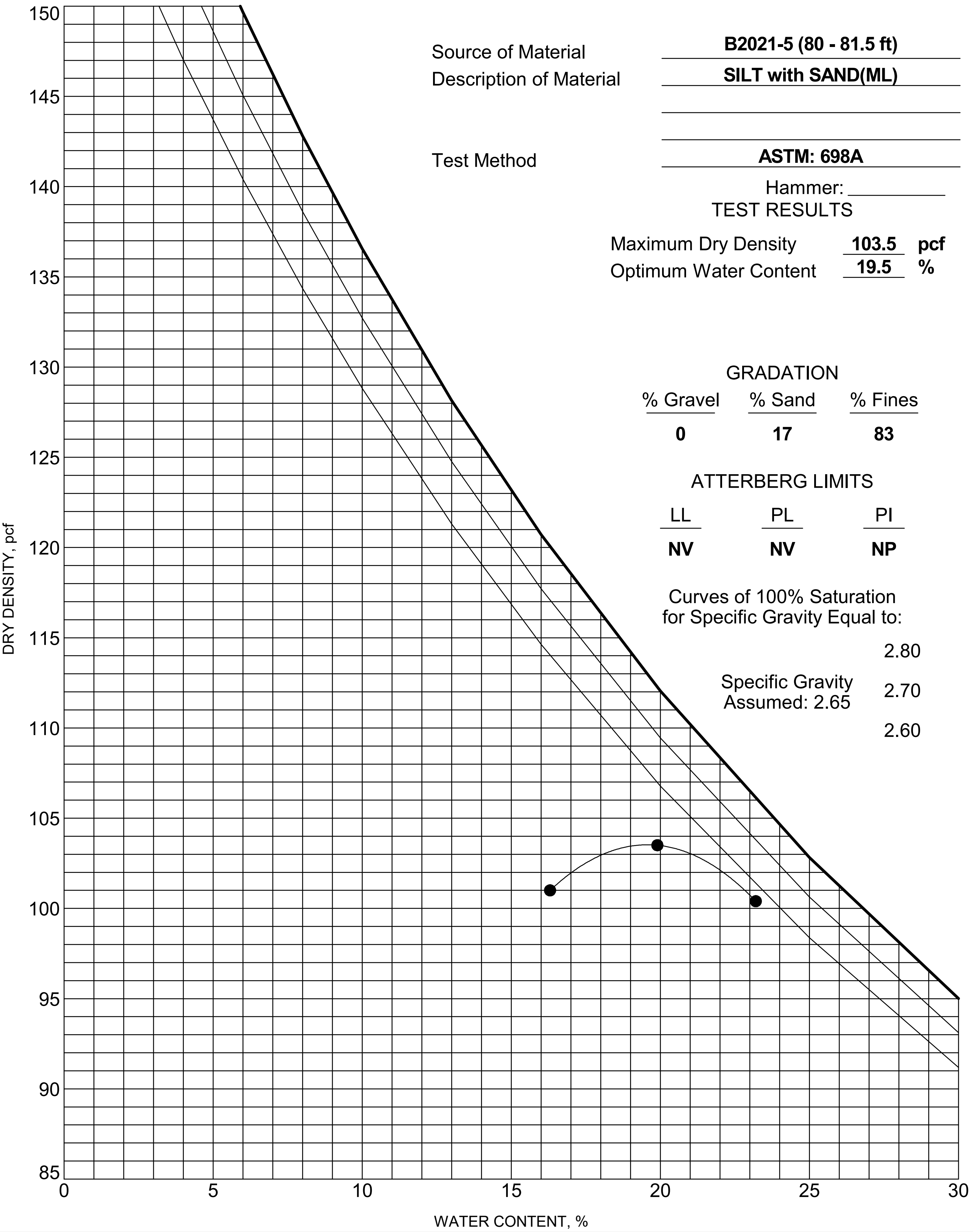
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 31



Source of Material **B2021-5 (80 - 81.5 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ___________

TEST RESULTS

Maximum Dry Density **103.5** **pcf**

Optimum Water Content **19.5** **%**

GRADATION

% Gravel	% Sand	% Fines
0	**17**	**83**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

Specific Gravity
Assumed: 2.65

TETRA TECH

MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Source of Material **B2021-6 (106 - 107 ft)**

Description of Material **LEAN CLAY with SAND(CL)**

Test Method **ASTM: 698A**

Hammer: ________

TEST RESULTS

Maximum Dry Density **100.0** **pcf**

Optimum Water Content **20.5** **%**

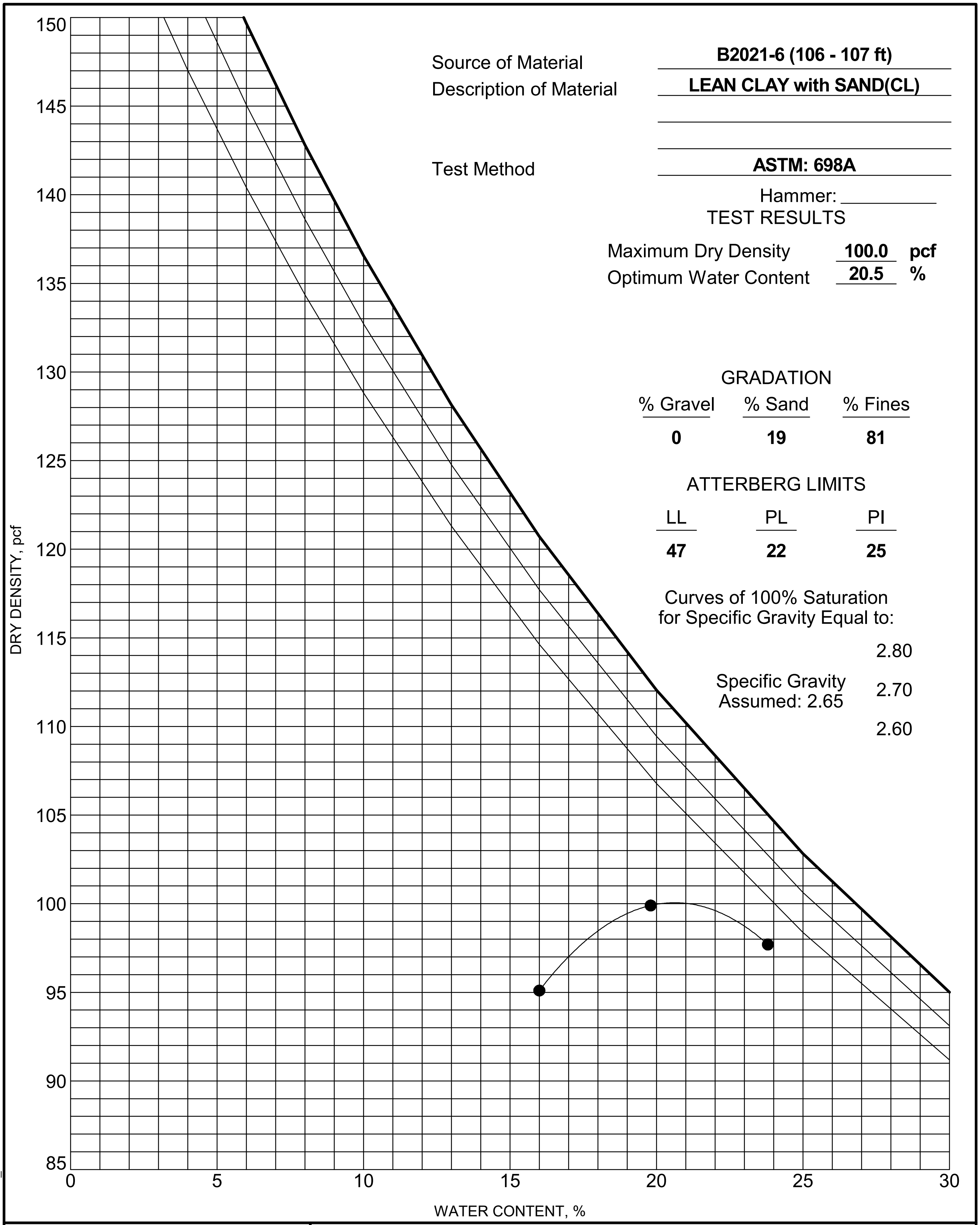
GRADATION

% Gravel	% Sand	% Fines
0	**19**	**81**

ATTERBERG LIMITS

LL	PL	PI
47	**22**	**25**

Curves of 100% Saturation
for Specific Gravity Equal to:



MOISTURE-DENSITY RELATIONSHIP

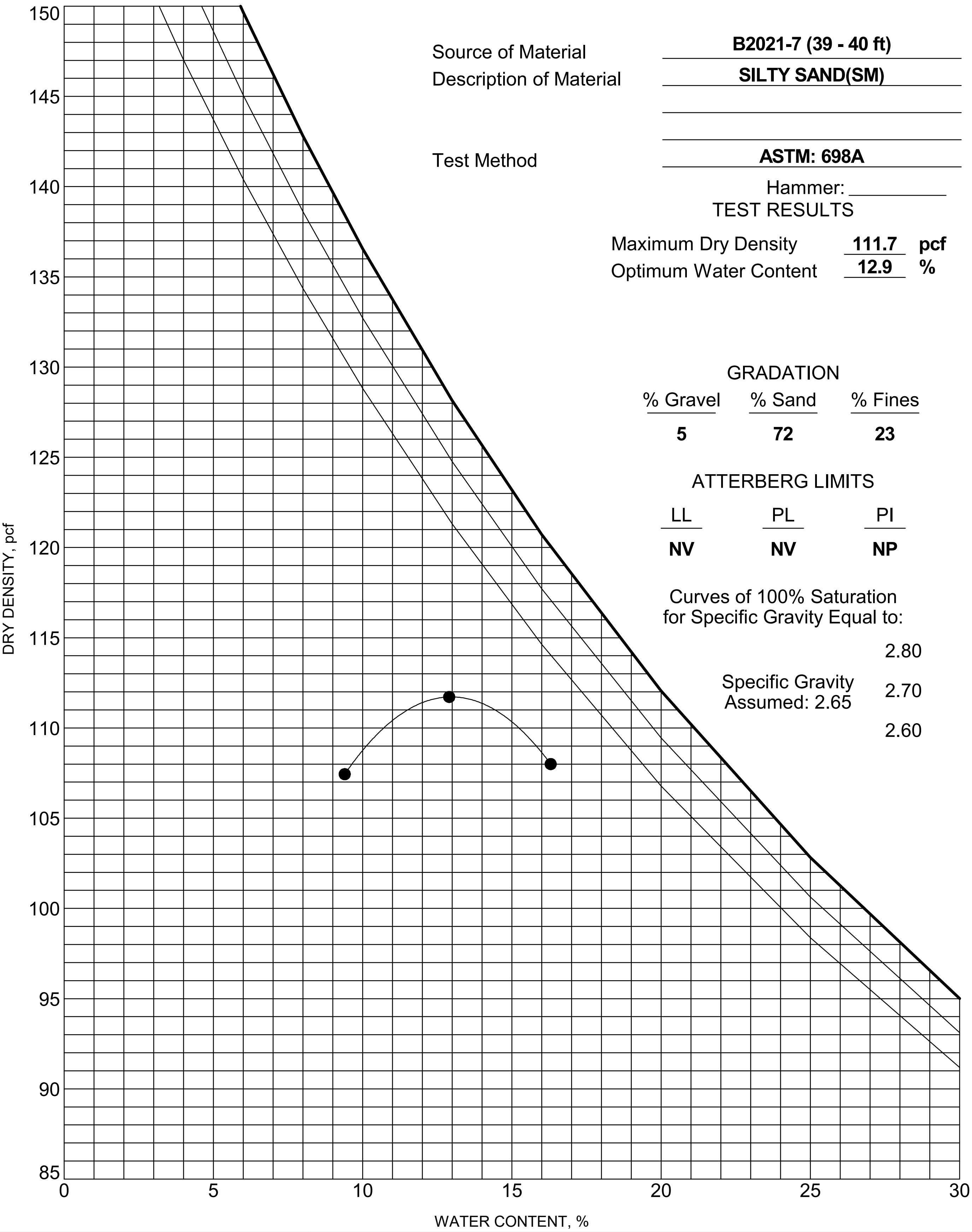
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 33



Source of Material **B2021-7 (39 - 40 ft)**

Description of Material **SILTY SAND(SM)**

Test Method **ASTM: 698A**

Hammer: ____

TEST RESULTS

Maximum Dry Density **111.7** pcf

Optimum Water Content **12.9** %

GRADATION

% Gravel	% Sand	% Fines
5	**72**	**23**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

MOISTURE-DENSITY RELATIONSHIP

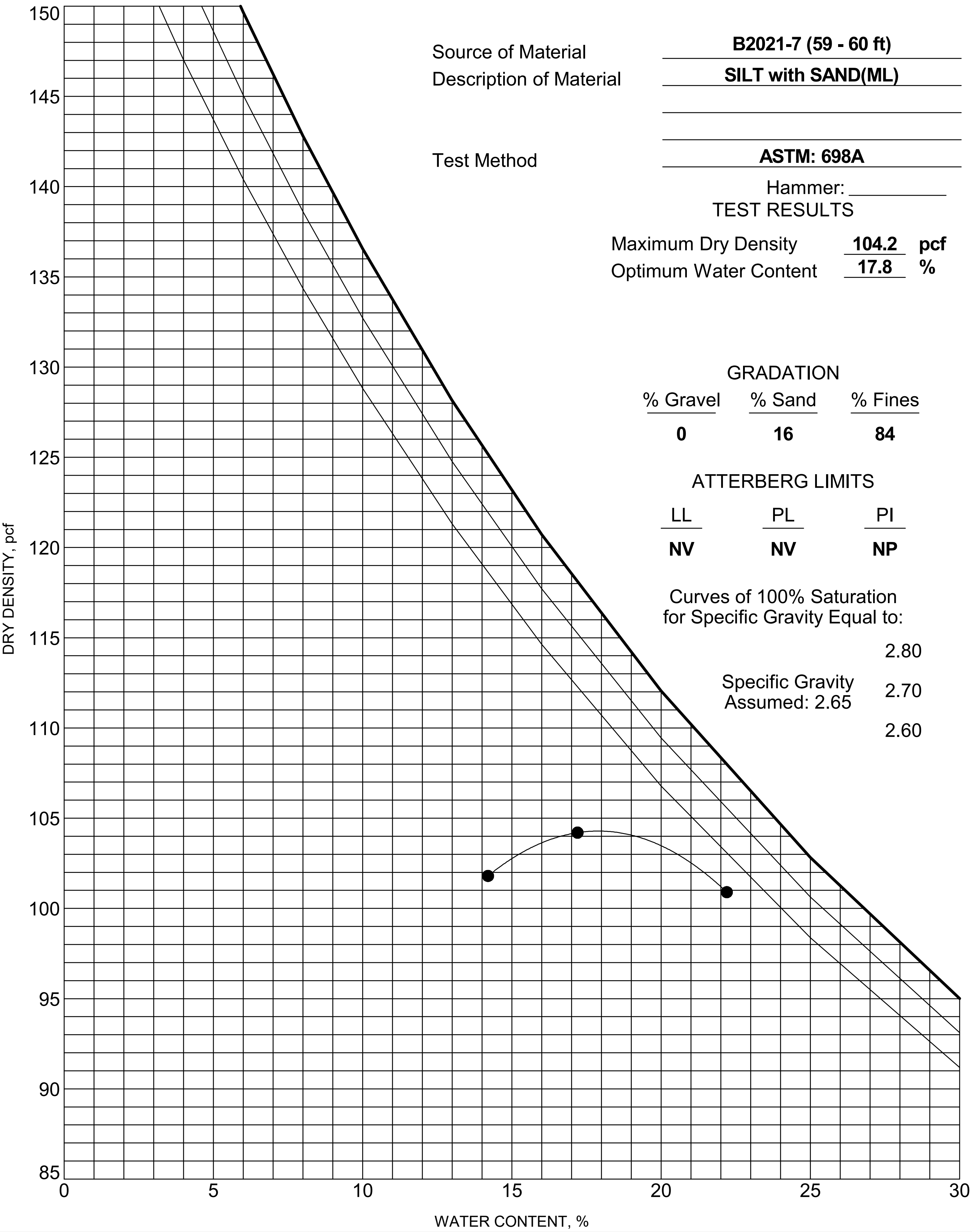
TETRA TECH

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 34



Source of Material **B2021-7 (59 - 60 ft)**

Description of Material **SILT with SAND(ML)**

Test Method **ASTM: 698A**

Hammer: ______

TEST RESULTS

Maximum Dry Density	**104.2**	**pcf**
Optimum Water Content	**17.8**	**%**

GRADATION

% Gravel	% Sand	% Fines
0	**16**	**84**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

Curves of 100% Saturation
for Specific Gravity Equal to:

Specific Gravity
Assumed: 2.65

TETRA TECH

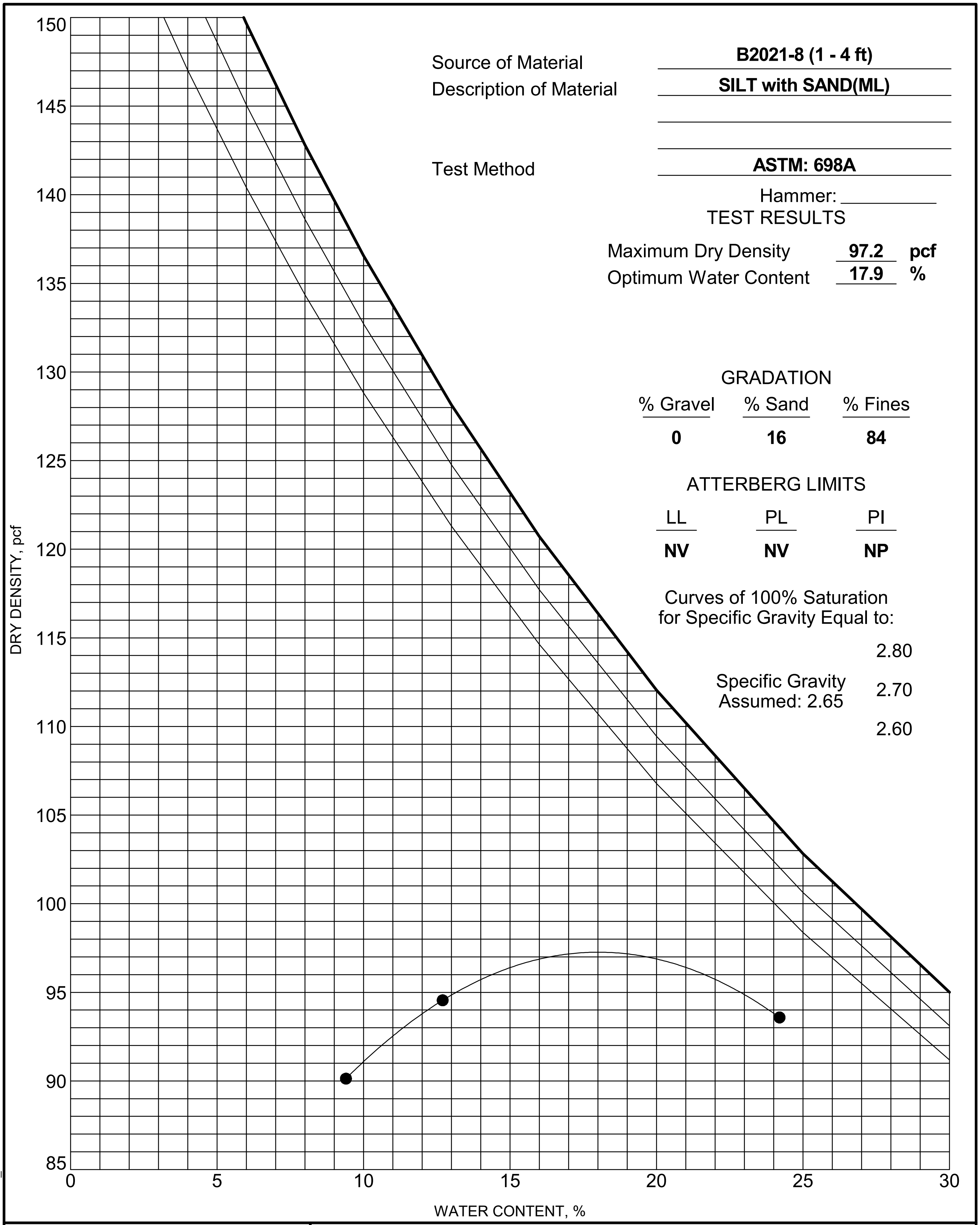
MOISTURE-DENSITY RELATIONSHIP

Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 35



Source of Material: **B2021-8 (1 - 4 ft)**

Description of Material: **SILT with SAND(ML)**

Test Method: **ASTM: 698A**

Hammer: ____________

TEST RESULTS

Maximum Dry Density **97.2** pcf

Optimum Water Content **17.9** %

GRADATION

% Gravel	% Sand	% Fines
0	**16**	**84**

ATTERBERG LIMITS

LL	PL	PI
NV	**NV**	**NP**

MOISTURE-DENSITY RELATIONSHIP

TETRA TECH

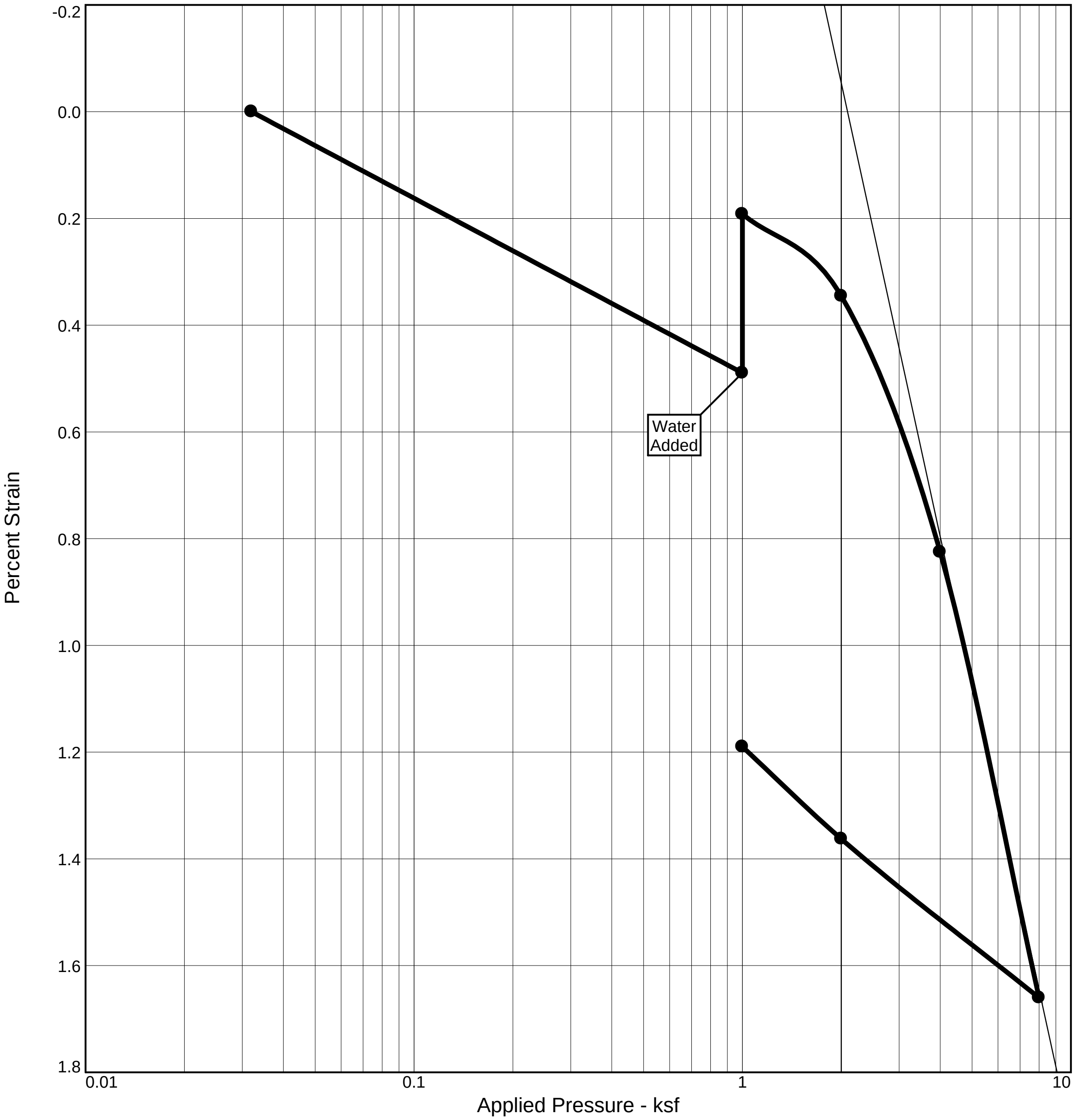
Project: Pickles Butte Sanitary Landfill - Canyon County, ID

Location: Refer to site map.

Number: 114-571040-2022

Figure No. 36

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
24.8 %	3.5 %	120.1	NV	NP	2.65		3.0	0.04	0.01	2.6	0.3	0.375

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Sand	SM	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-3 **Depth:** 25-27 ft

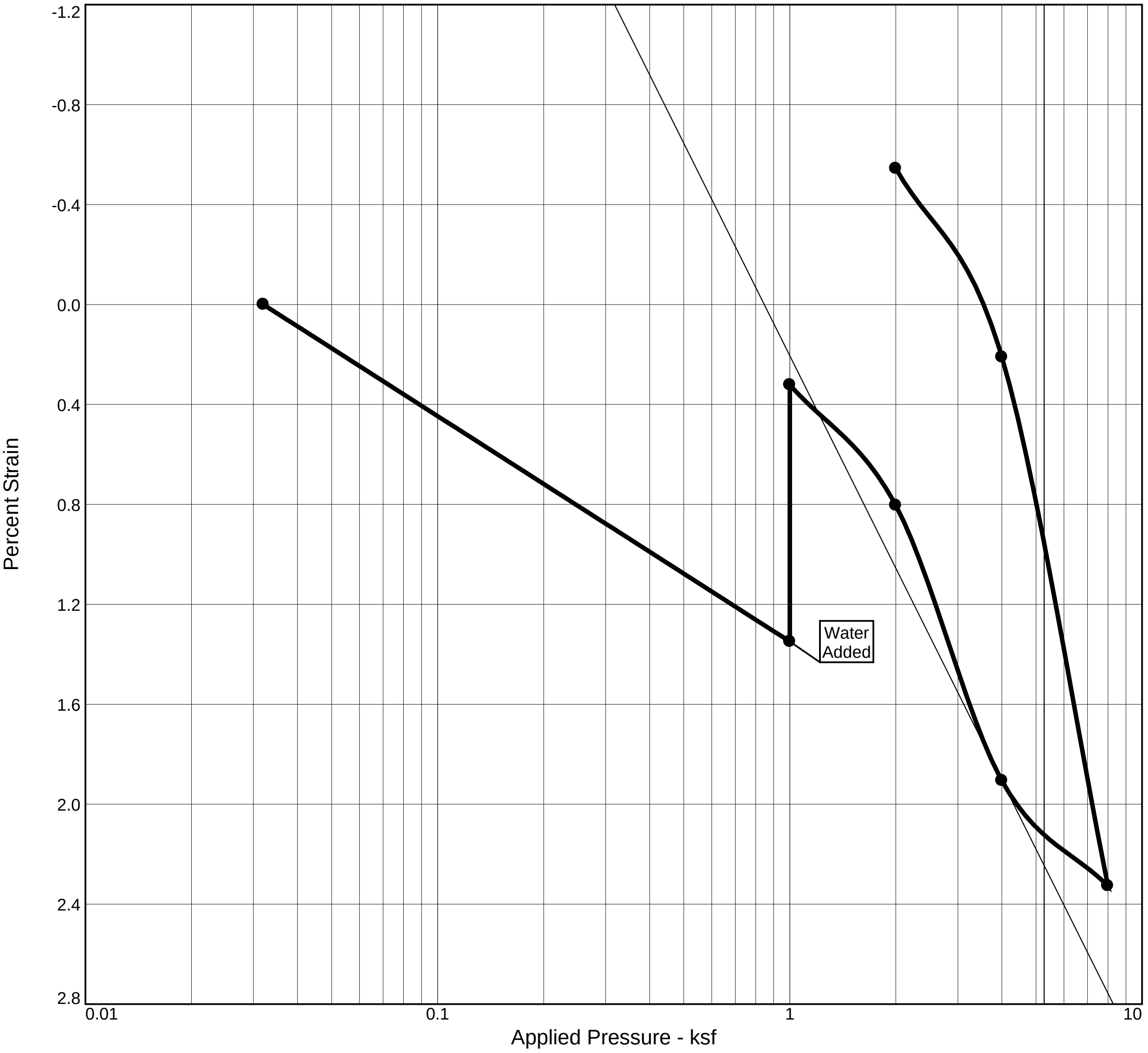
Tetra Tech

Missoula, MT

Remarks:

Figure 37

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
63.8 %	23.7 %	90.1	54	30	2.65		4.8	0.06	0.09	2.8	1.0	0.984

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Clay	CL-ML	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-5 **Depth:** 50-51.5 ft

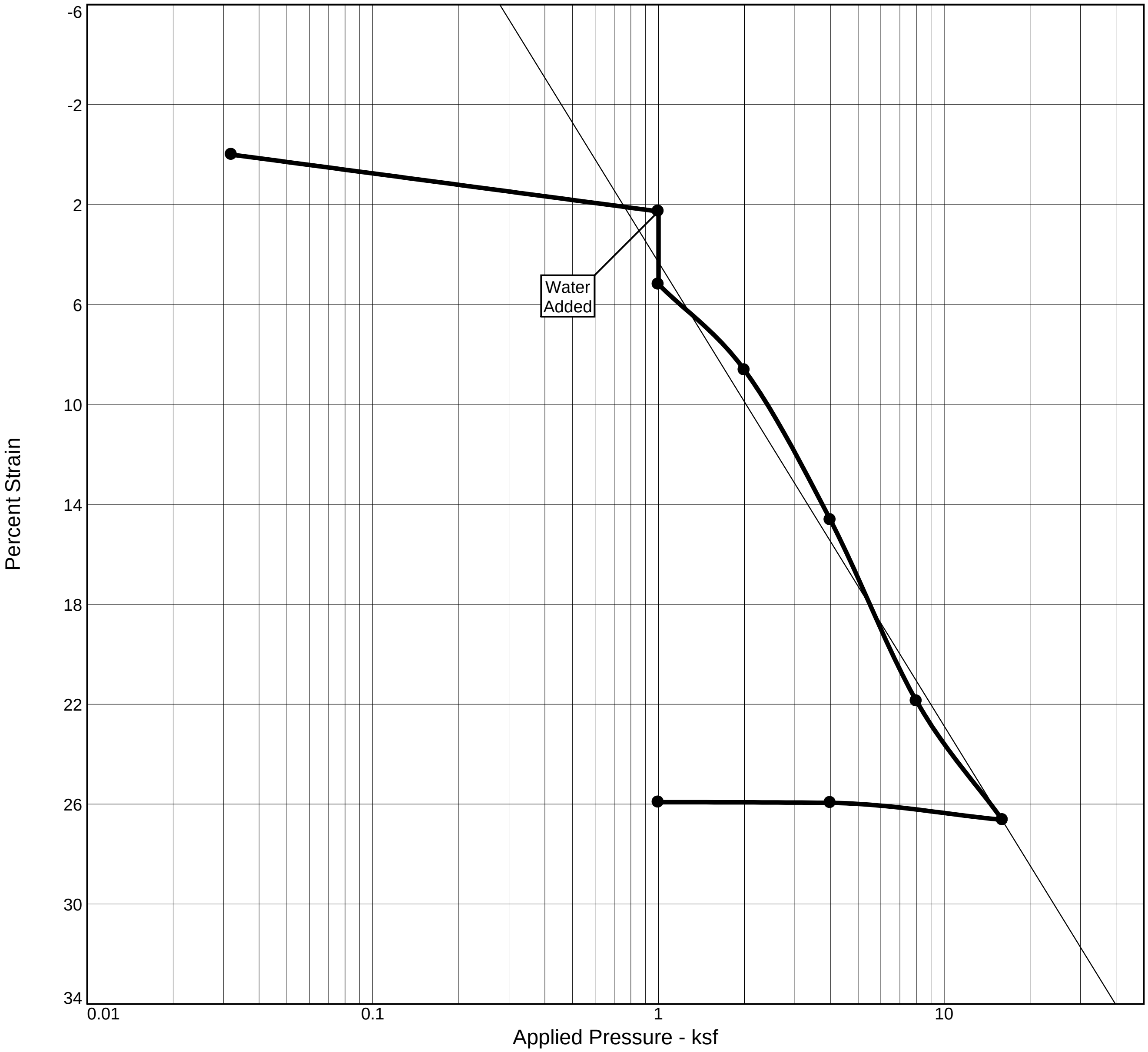
Remarks:

Tetra Tech

Missoula, MT

Figure 38

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
52.0 %	20.4 %	83.5	33	10	2.65		1.5	0.38	0.01	0	2.9	1.038

MATERIAL DESCRIPTION	USCS	AASHTO
Silty Clay	CL-ML	

Project No. 1145710402022

Project: Pickles Butte

Source of Sample: B2021-7 **Depth:** 120-121.3 ft

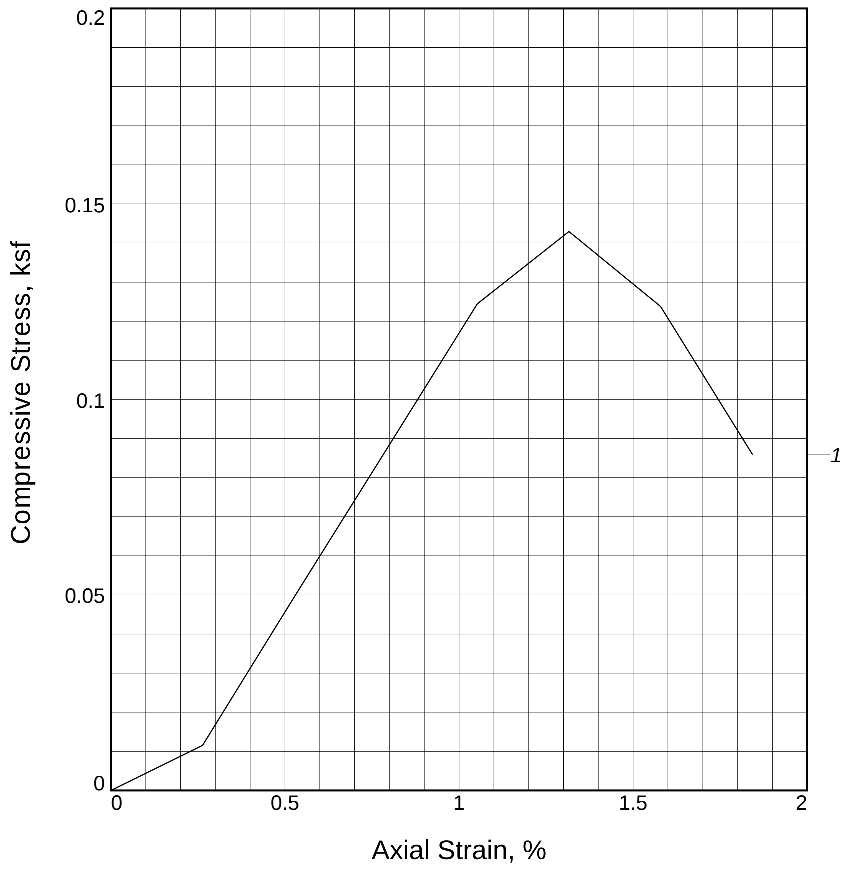
Tetra Tech

Missoula, MT

Remarks:

Figure 39

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.143			
Undrained shear strength, ksf	0.071			
Failure strain, %	1.3			
Strain rate, in./min.	0.030			
Water content, %	8.3			
Wet density, pcf	103.1			
Dry density, pcf	95.2			
Saturation, %	29.7			
Void ratio	0.7369			
Specimen diameter, in.	2.790			
Specimen height, in.	5.700			
Height/diameter ratio	2.04			

Description: bulk

LL = NV	**PL =** NV	**PI =** NV	**Assumed GS=** 2.65	**Type:** SP

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 40

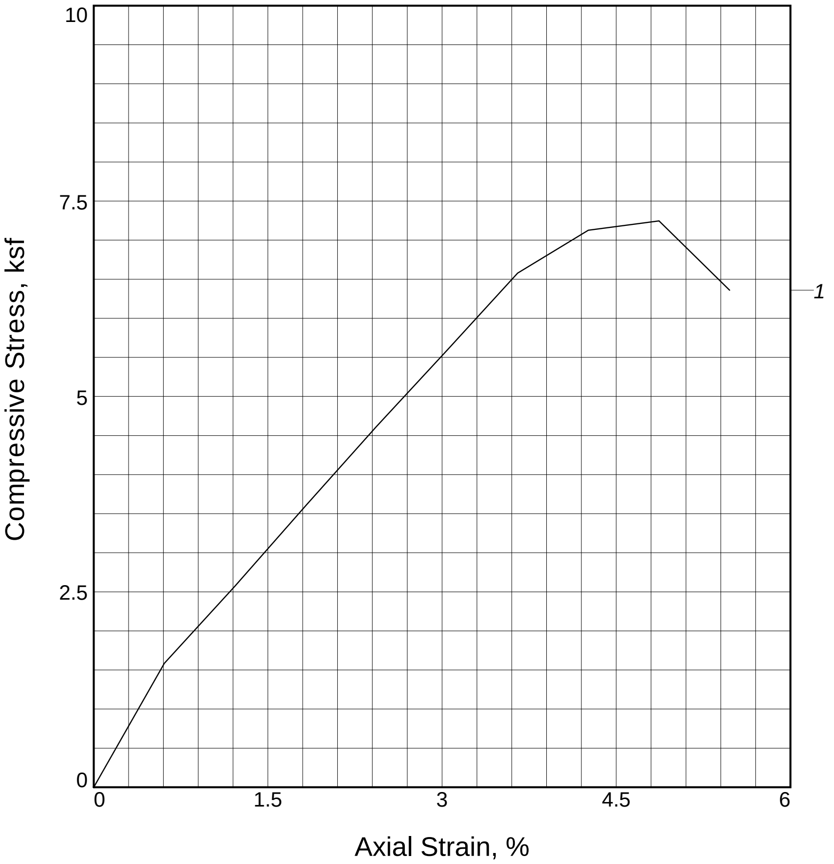
Project: Pickles Butte

Source of Sample: B2021-3

Depth: 61-65 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	7.246			
Undrained shear strength, ksf	3.623			
Failure strain, %	4.9			
Strain rate, in./min.	0.060			
Water content, %	24.0			
Wet density, pcf	119.4			
Dry density, pcf	96.3			
Saturation, %	88.5			
Void ratio	0.7184			
Specimen diameter, in.	2.450			
Specimen height, in.	4.930			
Height/diameter ratio	2.01			

Description: Special

LL = N/A **PL =** N/A **PI =** N/A **Assumed GS=** 2.65 **Type:** ML

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 41

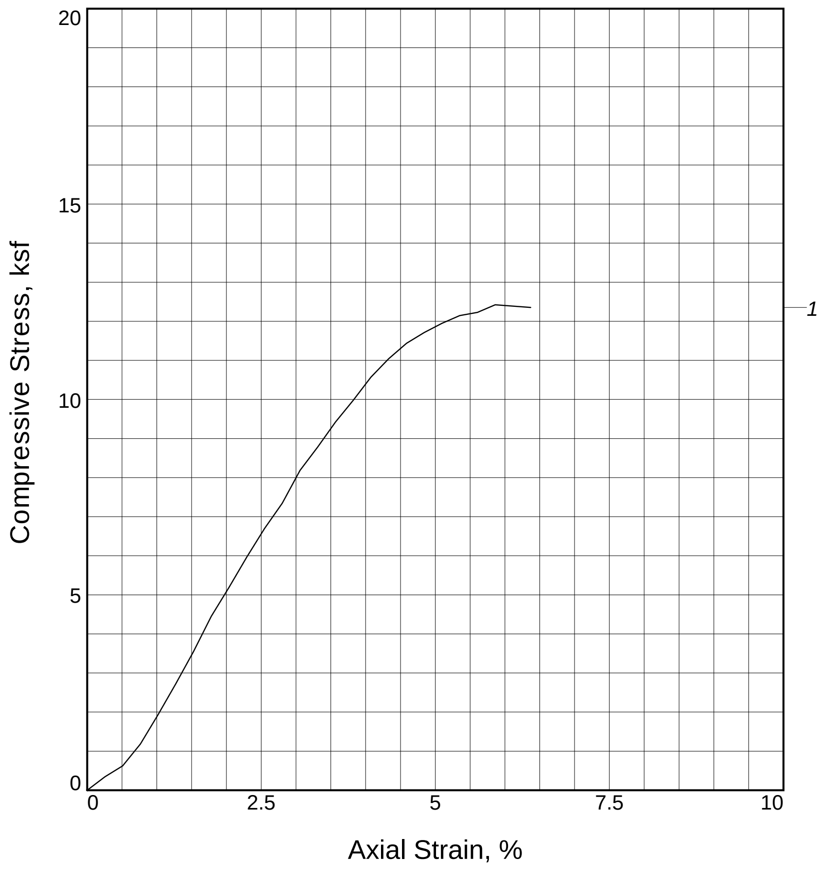
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 57-58 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	12.421			
Undrained shear strength, ksf	6.211			
Failure strain, %	5.9			
Strain rate, in./min.	0.020			
Water content, %	24.6			
Wet density, pcf	124.9			
Dry density, pcf	100.2			
Saturation, %	100.3			
Void ratio	0.6508			
Specimen diameter, in.	1.918			
Specimen height, in.	3.925			
Height/diameter ratio	2.05			

Description: Special

LL = 67	**PL =** 19	**PI =** 48	**Assumed GS=** 2.65	**Type:** CH

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 42

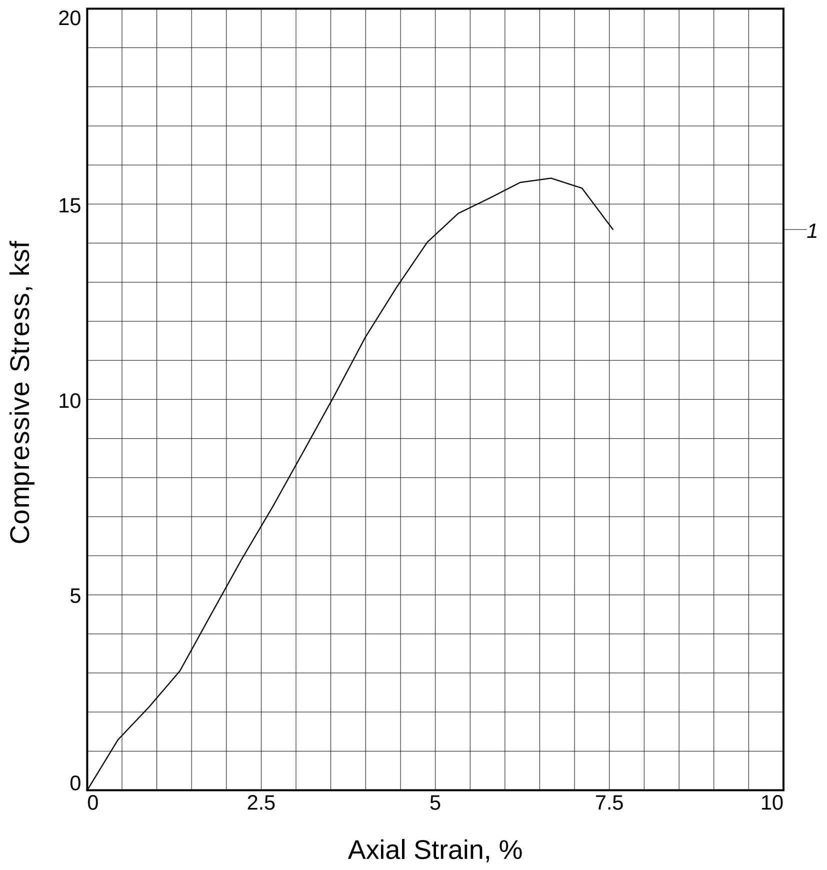
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 79-81 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	15.661			
Undrained shear strength, ksf	7.831			
Failure strain, %	6.7			
Strain rate, in./min.	0.050			
Water content, %	22.8			
Wet density, pcf	122.8			
Dry density, pcf	100.0			
Saturation, %	92.4			
Void ratio	0.6550			
Specimen diameter, in.	2.473			
Specimen height, in.	5.629			
Height/diameter ratio	2.28			

Description: Special

LL = 56	**PL =** 22	**PI =** 34	**Assumed GS=** 2.65	**Type:** CH

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 43

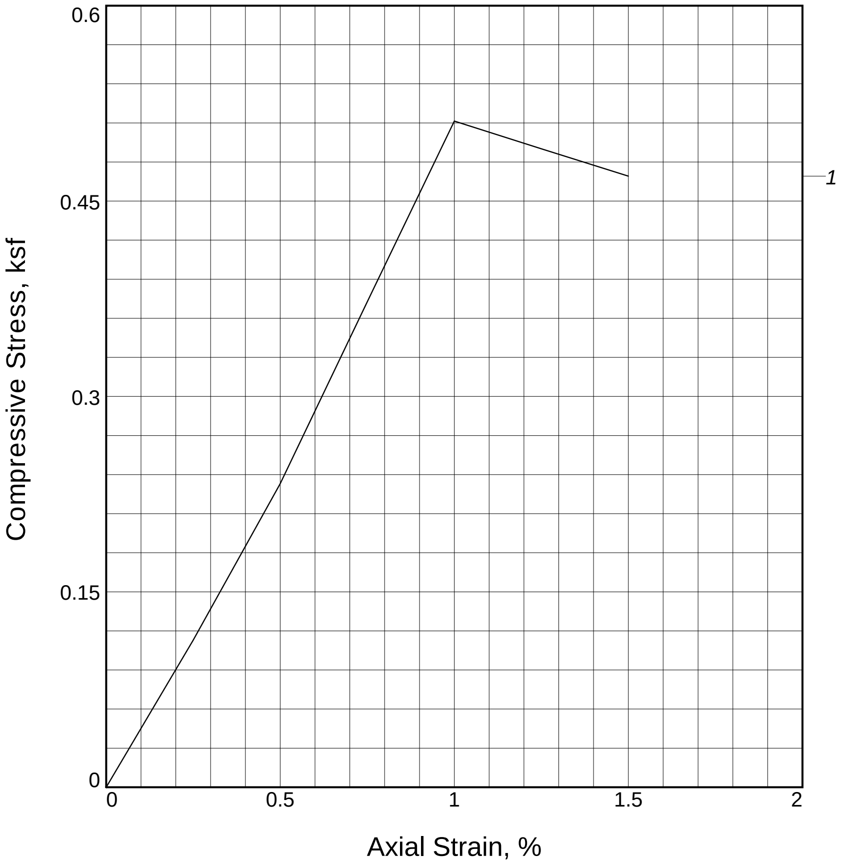
Project: Pickles Butte

Source of Sample: B2021-6

Depth: 99-102 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	0.511			
Undrained shear strength, ksf	0.256			
Failure strain, %	1.0			
Strain rate, in./min.	0.030			
Water content, %	4.5			
Wet density, pcf	109.9			
Dry density, pcf	105.2			
Saturation, %	20.8			
Void ratio	0.5722			
Specimen diameter, in.	2.710			
Specimen height, in.	6.000			
Height/diameter ratio	2.21			

Description: grab

LL = NV **PL =** NV **PI =** NV **Assumed GS=** 2.65 **Type:** SP

Project No.: 1145710402022

Date Sampled:

Remarks:

Figure 44

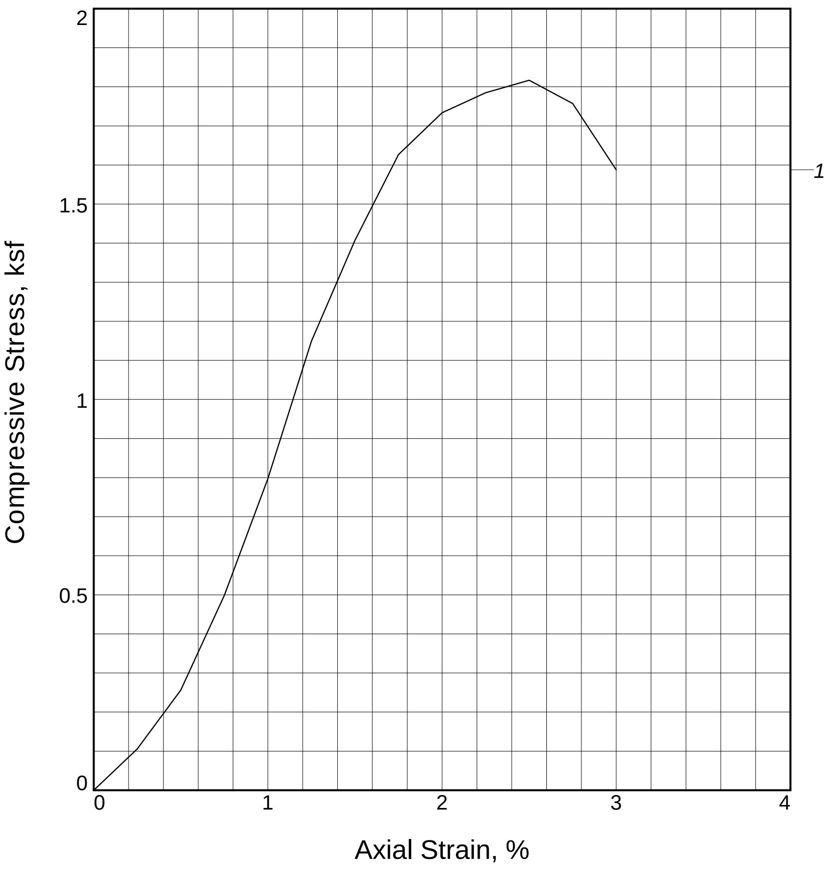
Project: Pickles Butte

Source of Sample: B2021-7

Depth: 39-40 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	1.817			
Undrained shear strength, ksf	0.908			
Failure strain, %	2.5			
Strain rate, in./min.	0.030			
Water content, %	19.9			
Wet density, pcf	112.4			
Dry density, pcf	93.8			
Saturation, %	68.9			
Void ratio	0.7646			
Specimen diameter, in.	2.800			
Specimen height, in.	6.000			
Height/diameter ratio	2.14			

Description: grab

LL = NV **PL =** NV **PI =** NV **Assumed GS=** 2.65 **Type:** ML

Project No.: 1145710402022

Date Sampled:

Remarks:

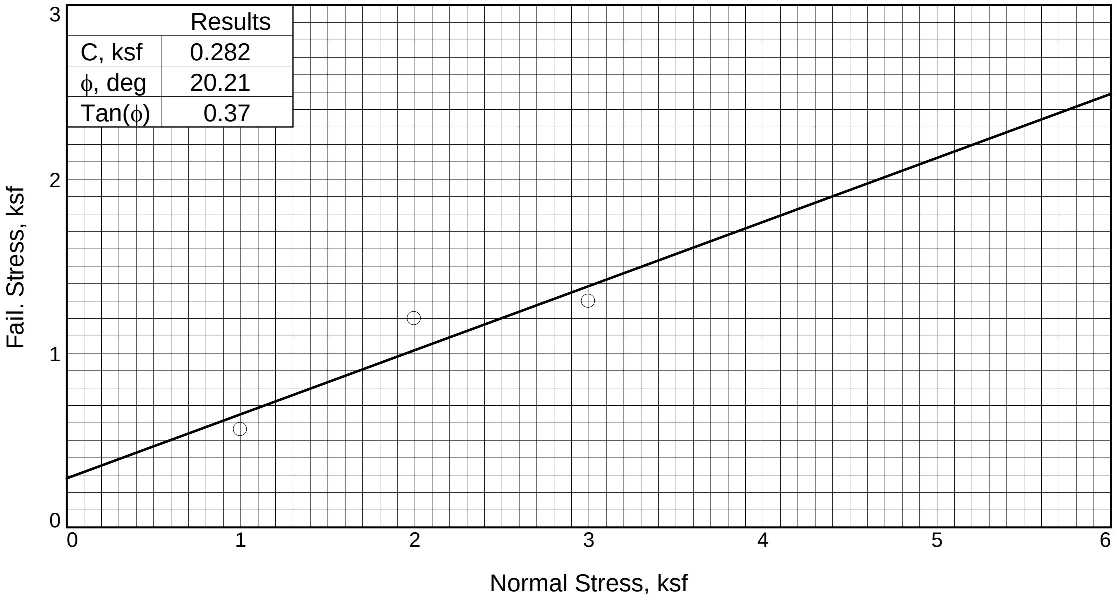
Figure 45

Project: Pickles Butte

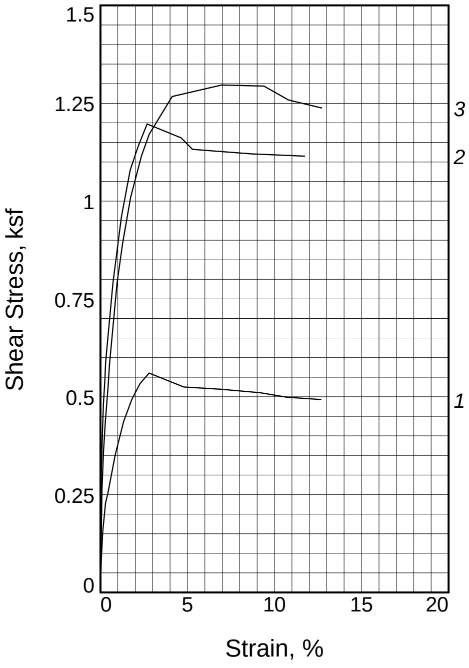
Source of Sample: B2021-7

Depth: 59-60 ft

UNCONFINED COMPRESSION TEST
Tetra Tech
Missoula, MT



	Results
C, ksf	0.282
ϕ, deg	20.21
Tan(ϕ)	0.37



Sample No.		1	2	3
Initial	Water Content, %	12.2	11.6	12.3
	Dry Density, pcf	104.5	106.4	101.5
	Saturation, %	55.7	55.5	51.6
	Void Ratio	0.5829	0.5554	0.6306
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.210	1.200	1.259
At Test	Water Content, %	16.4	17.4	18.2
	Dry Density, pcf	104.6	106.6	104.8
	Saturation, %	74.7	83.4	83.5
	Void Ratio	0.5816	0.5524	0.5787
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.209	1.198	1.219
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		0.560	1.197	1.297
Strain, %		2.8	2.7	7.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Shelby

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 46

Project: Pickles Butte

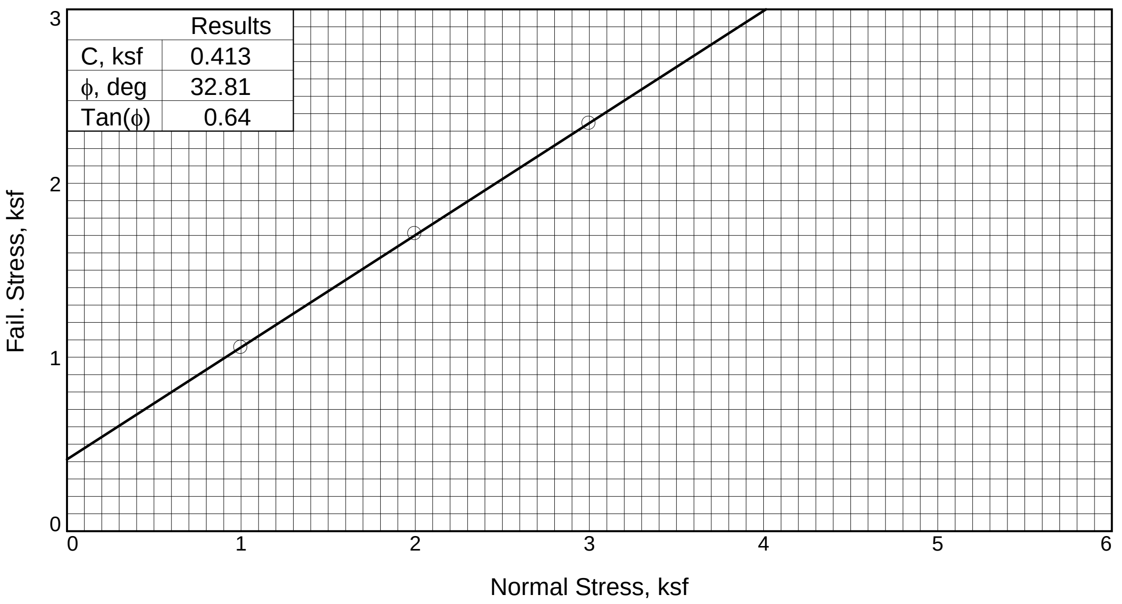
Source of Sample: B2021-3

Proj. No.: 1145710402022 **Depth:** 60-62 ft

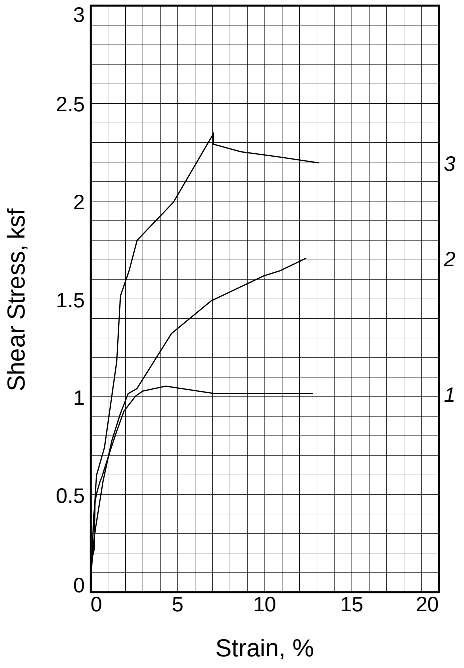
Date Sampled:

DIRECT SHEAR TEST REPORT

Tetra Tech
Missoula, MT



	Results
C, ksf	0.413
ϕ, deg	32.81
Tan(ϕ)	0.64



Sample No.		1	2	3
Initial	Water Content, %	13.7	12.8	13.0
	Dry Density, pcf	104.1	92.2	84.3
	Saturation, %	61.7	42.7	35.9
	Void Ratio	0.5892	0.7944	0.9626
	Diameter, in.	2.410	2.410	2.400
	Height, in.	0.934	1.068	1.240
At Test	Water Content, %	21.2	22.3	20.2
	Dry Density, pcf	105.2	96.7	84.8
	Saturation, %	98.1	83.1	56.4
	Void Ratio	0.5722	0.7104	0.9499
	Diameter, in.	2.410	2.410	2.400
	Height, in.	0.924	1.018	1.232
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		1.054	1.708	2.343
Strain, %		4.3	12.4	7.0
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: Shelby
Description: Silty Sand

Assumed Specific Gravity= 2.65
Remarks: Remolded

Figure 47

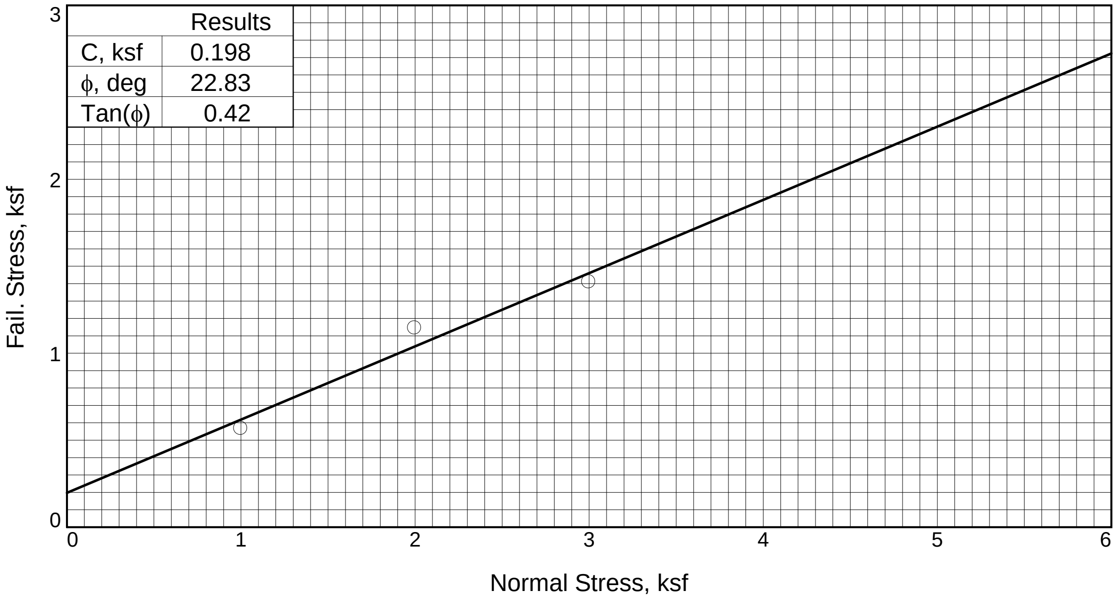
Project: Pickles Butte

Source of Sample: B2021-3

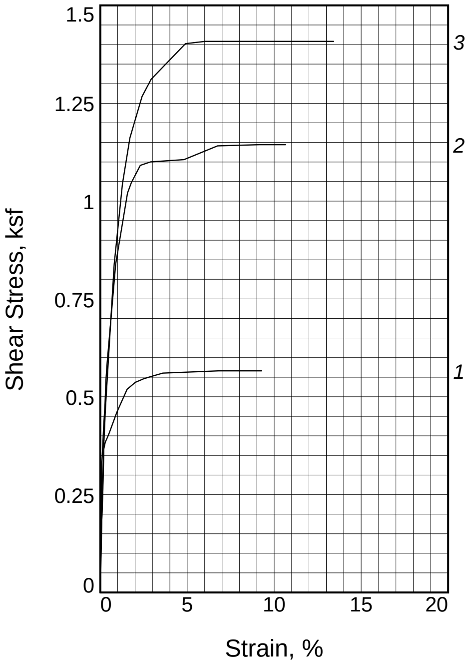
Proj. No.: 1145710402022 **Depth:** 80-82 ft

Date Sampled:

DIRECT SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.198
ϕ, deg	22.83
Tan(ϕ)	0.42



	Sample No.	1	2	3
Initial	Water Content, %	15.0	15.0	15.0
	Dry Density, pcf	97.7	89.6	96.1
	Saturation, %	57.4	47.0	55.1
	Void Ratio	0.6932	0.8458	0.7217
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.210	1.310	1.210
At Test	Water Content, %	29.0	29.5	28.0
	Dry Density, pcf	97.8	89.9	96.3
	Saturation, %	111.2	93.0	103.2
	Void Ratio	0.6910	0.8400	0.7180
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.208	1.306	1.207
	Normal Stress, ksf	1.000	2.000	3.000
	Fail. Stress, ksf	0.566	1.144	1.408
	Strain, %	6.8	9.2	6.0
	Ult. Stress, ksf			
	Strain, %			
	Strain rate, in./min.	0.001	0.001	0.001

Sample Type: MC

Description: Silty Sand

LL= NV **PI=** NP

Assumed Specific Gravity= 2.65

Remarks:

Figure 48

Project: Pickles Butte

Source of Sample: B2021-4

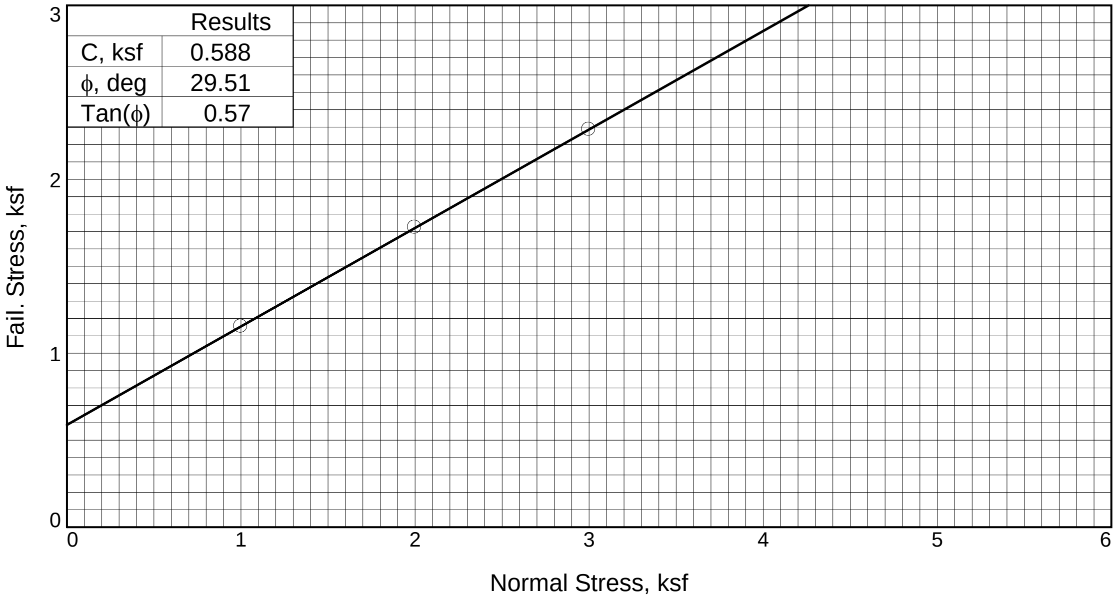
Proj. No.: 1145710402022 **Depth:** 90-91.5 ft

Date Sampled:

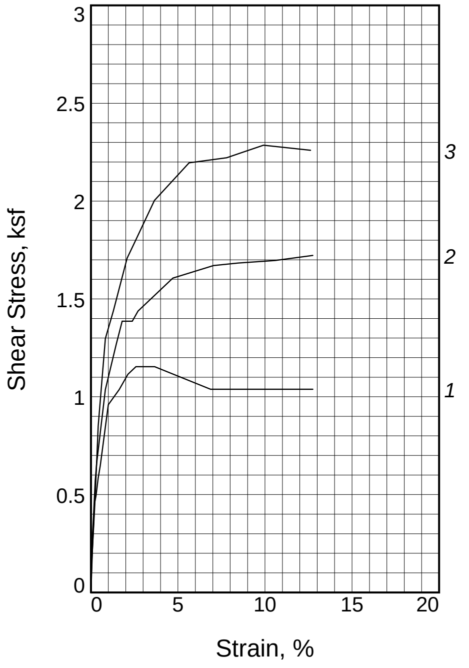
DIRECT SHEAR TEST REPORT

Tetra Tech

Missoula, MT



	Results
C, ksf	0.588
ϕ, deg	29.51
Tan(ϕ)	0.57



Sample No.		1	2	3
Initial	Water Content, %	6.9	6.2	6.2
	Dry Density, pcf	89.6	94.1	95.0
	Saturation, %	21.8	21.8	22.3
	Void Ratio	0.8457	0.7582	0.7415
	Diameter, in.	2.400	2.400	2.410
	Height, in.	1.150	1.138	1.122
At Test	Water Content, %	28.7	27.7	25.8
	Dry Density, pcf	90.0	96.2	100.9
	Saturation, %	90.8	101.9	107.0
	Void Ratio	0.8377	0.7195	0.6390
	Diameter, in.	2.400	2.400	2.410
	Height, in.	1.145	1.113	1.056
Normal Stress, ksf		1.000	2.000	3.000
Fail. Stress, ksf		1.153	1.723	2.285
Strain, %		2.6	12.8	9.9
Ult. Stress, ksf				
Strain, %				
Strain rate, in./min.		0.001	0.001	0.001

Sample Type: MC

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 49

Project: Pickles Butte

Source of Sample: B2021-4

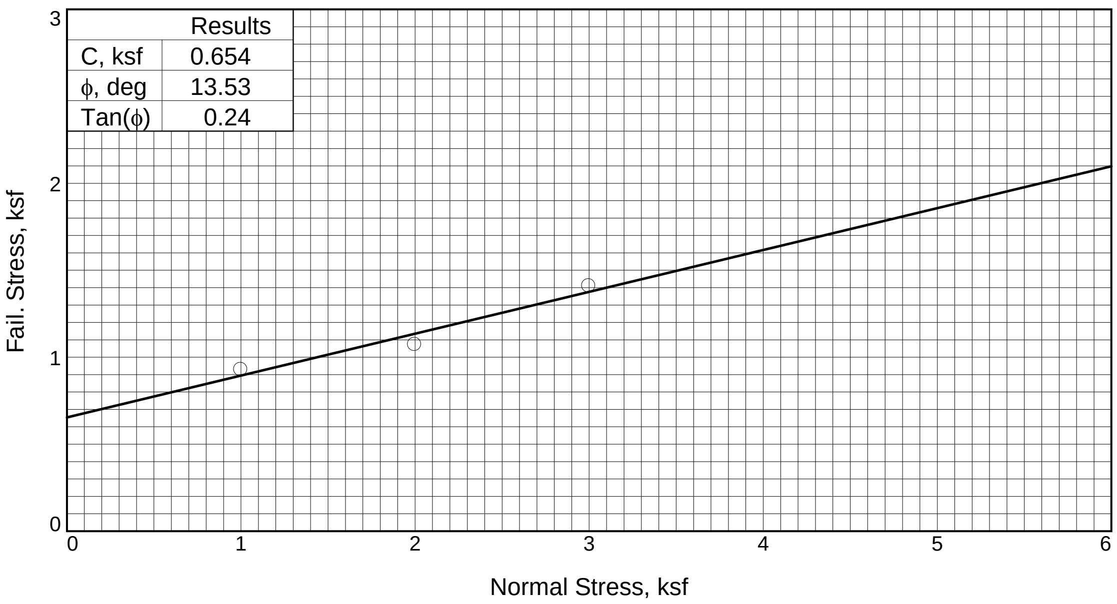
Proj. No.: 1145710402022 **Depth:** 120-120.9 ft

Date Sampled:

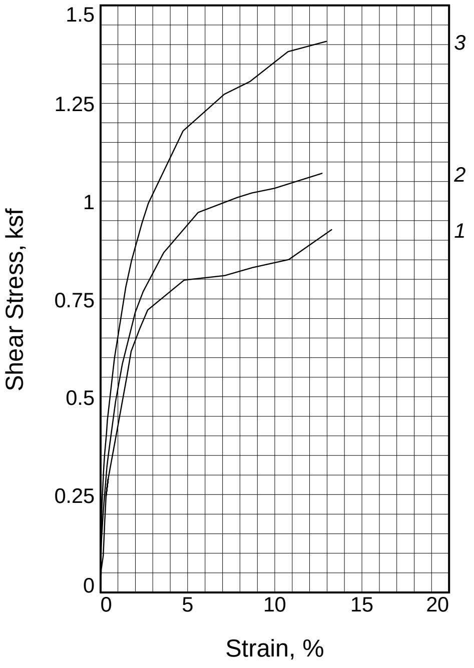
DIRECT SHEAR TEST REPORT

Tetra Tech

Missoula, MT



	Results
C, ksf	0.654
ϕ, deg	13.53
Tan(ϕ)	0.24



	Sample No.	1	2	3
Initial	Water Content, %	11.3	11.3	11.2
	Dry Density, pcf	99.2	98.3	98.8
	Saturation, %	44.6	43.7	43.8
	Void Ratio	0.6682	0.6829	0.6750
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.200	1.190	1.206
At Test	Water Content, %	27.5	25.7	27.1
	Dry Density, pcf	101.9	102.9	102.0
	Saturation, %	117.0	112.1	115.6
	Void Ratio	0.6233	0.6075	0.6217
	Diameter, in.	2.500	2.500	2.500
	Height, in.	1.168	1.137	1.168
	Normal Stress, ksf	1.000	2.000	3.000
	Fail. Stress, ksf	0.927	1.071	1.408
	Strain, %	13.3	12.7	13.0
	Ult. Stress, ksf			
	Strain, %			
	Strain rate, in./min.	0.001	0.001	0.001

Sample Type: MC

Description: Lean Clay With Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 50

Project: Pickles Butte

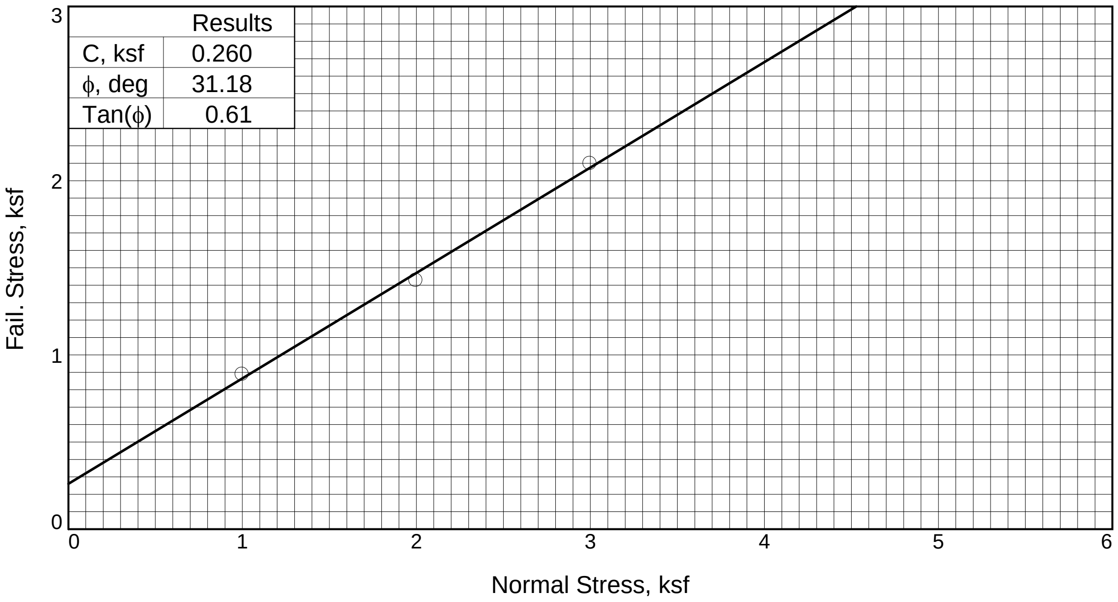
Source of Sample: B2021-5

Proj. No.: 1145710402022 **Depth:** 80.0-81.5 ft

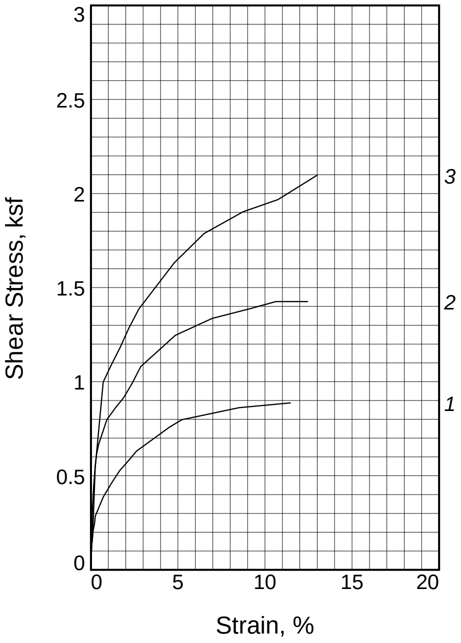
Date Sampled:

DIRECT SHEAR TEST REPORT

Tetra Tech
Missoula, MT



	Results
C, ksf	0.260
ϕ, deg	31.18
Tan(ϕ)	0.61



	Sample No.	1	2	3
Initial	Water Content, %	18.0	18.2	18.3
	Dry Density, pcf	80.6	84.6	78.3
	Saturation, %	45.3	50.4	43.7
	Void Ratio	1.0522	0.9546	1.1118
	Diameter, in.	2.410	2.410	2.400
	Height, in.	1.240	1.190	1.250
At Test	Water Content, %	25.0	24.1	24.1
	Dry Density, pcf	82.7	87.5	82.3
	Saturation, %	66.2	71.7	63.1
	Void Ratio	1.0009	0.8905	1.0104
	Diameter, in.	2.410	2.410	2.400
	Height, in.	1.209	1.151	1.190
	Normal Stress, ksf	1.000	2.000	3.000
	Fail. Stress, ksf	0.887	1.426	2.098
	Strain, %	11.5	10.6	13.0
	Ult. Stress, ksf			
	Strain, %			
	Strain rate, in./min.	0.001	0.001	0.001

Sample Type: MC

Description: Silty Sand

Assumed Specific Gravity= 2.65

Remarks: Remolded

Figure 51

Project: Pickles Butte

Source of Sample: B2021-5

Proj. No.: 1145710402022

Depth: 90-91.5 ft

Date Sampled:

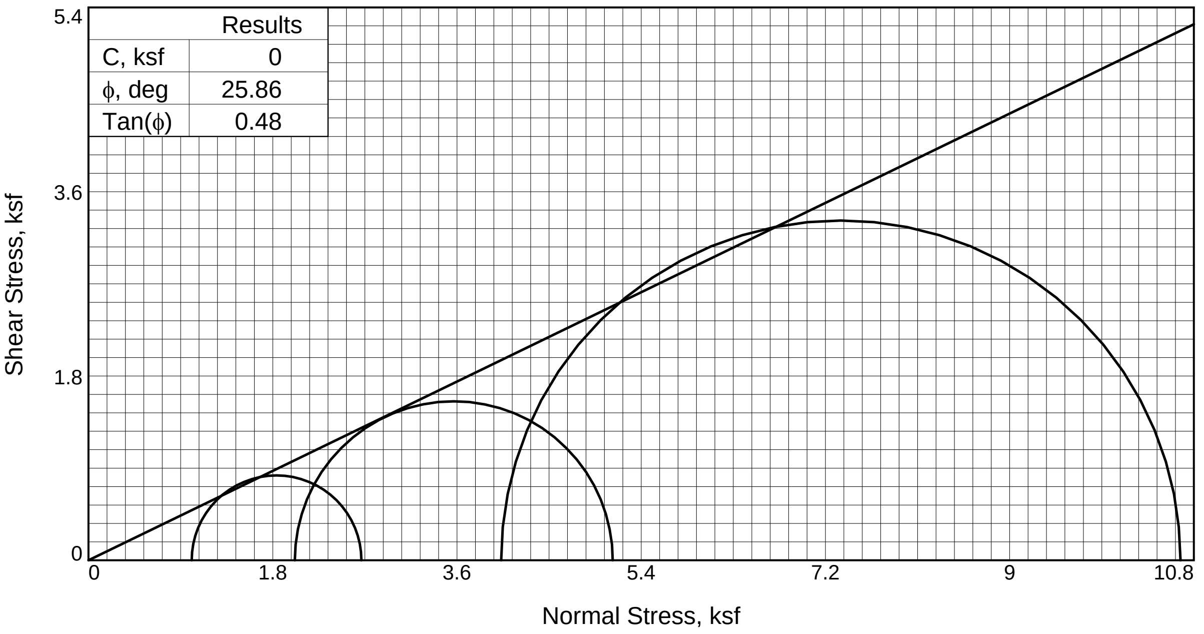
DIRECT SHEAR TEST REPORT

Tetra Tech

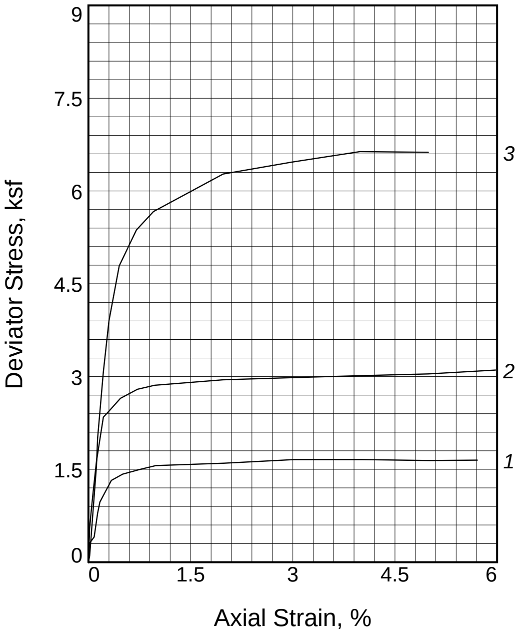
Missoula, MT

Tested By: DB

Checked By: LP



	Results
C, ksf	0
ϕ, deg	25.86
Tan(ϕ)	0.48



	Sample No.	1	2	3
Initial	Water Content, %	5.0	5.0	5.0
	Dry Density, pcf	100.9	100.9	100.9
	Saturation, %	20.7	20.7	20.7
	Void Ratio	0.6394	0.6394	0.6394
	Diameter, in.	2.803	2.803	2.803
	Height, in.	6.001	6.001	6.001
At Test	Water Content, %	22.7	21.8	20.9
	Dry Density, pcf	101.4	102.9	104.6
	Saturation, %	95.4	95.2	95.0
	Void Ratio	0.6312	0.6074	0.5820
	Diameter, in.	2.803	2.869	2.945
	Height, in.	5.972	5.616	5.247
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	85.000	85.000	85.000
	Cell Pressure, psi	92.000	99.000	113.000
	Fail. Stress, ksf	1.66	3.11	6.64
	Ult. Stress, ksf			
	σ_1 Failure, ksf	2.67	5.12	10.67
	σ_3 Failure, ksf	1.01	2.02	4.03

Type of Test:
Consolidated Undrained

Description: Silty Sand

Assumed Specific Gravity=
2.65 **Remarks:**

Figure 52

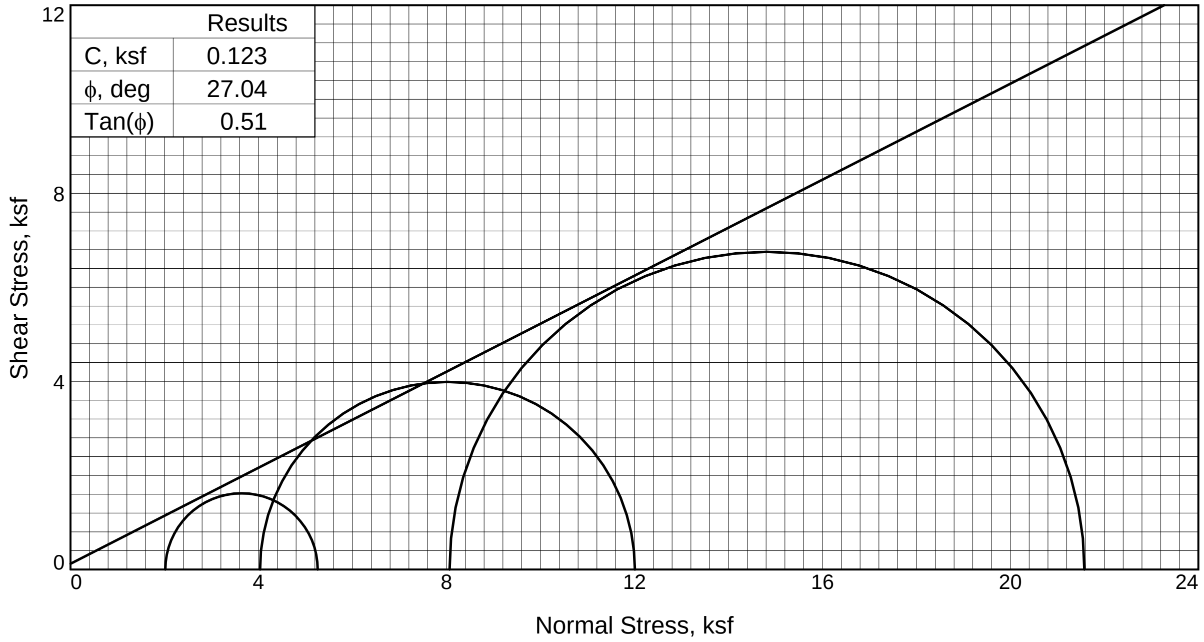
Project: Pickles Butte

Source of Sample: B2021-3

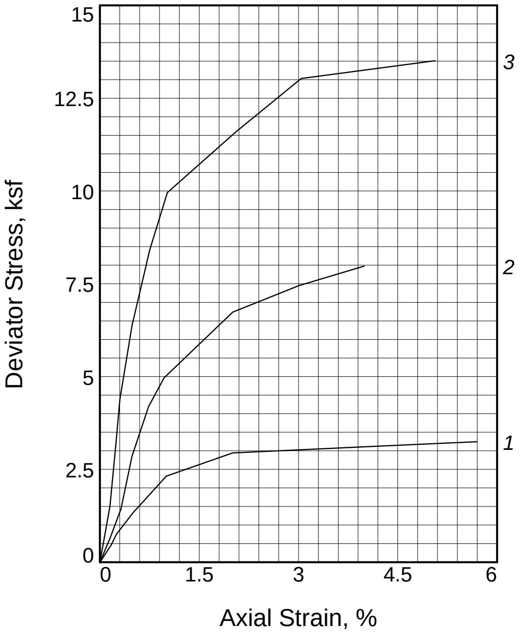
Proj. No.: 1145710402022 **Depth:** 25-27 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.123
ϕ, deg	27.04
Tan(ϕ)	0.51



	Sample No.	1	2	3
Initial	Water Content, %	5.0	5.0	5.0
	Dry Density, pcf	100.4	100.4	100.4
	Saturation, %	20.5	20.5	20.5
	Void Ratio	0.6481	0.6481	0.6481
	Diameter, in.	2.801	2.801	2.801
	Height, in.	6.001	6.001	6.001
At Test	Water Content, %	23.2	22.3	20.9
	Dry Density, pcf	100.7	102.2	104.5
	Saturation, %	95.5	95.3	95.0
	Void Ratio	0.6431	0.6195	0.5836
	Diameter, in.	2.800	2.865	2.895
	Height, in.	5.986	5.638	5.397
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	103.000	103.000	103.000
	Cell Pressure, psi	117.000	131.000	159.000
	Fail. Stress, ksf	3.24	7.98	13.51
	Ult. Stress, ksf			
	σ_1 Failure, ksf	5.26	12.01	21.57
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:
Consolidated Undrained

Description: Poorly Graded Sand with Silt

Assumed Specific Gravity= 2.65

Remarks:

Figure 53

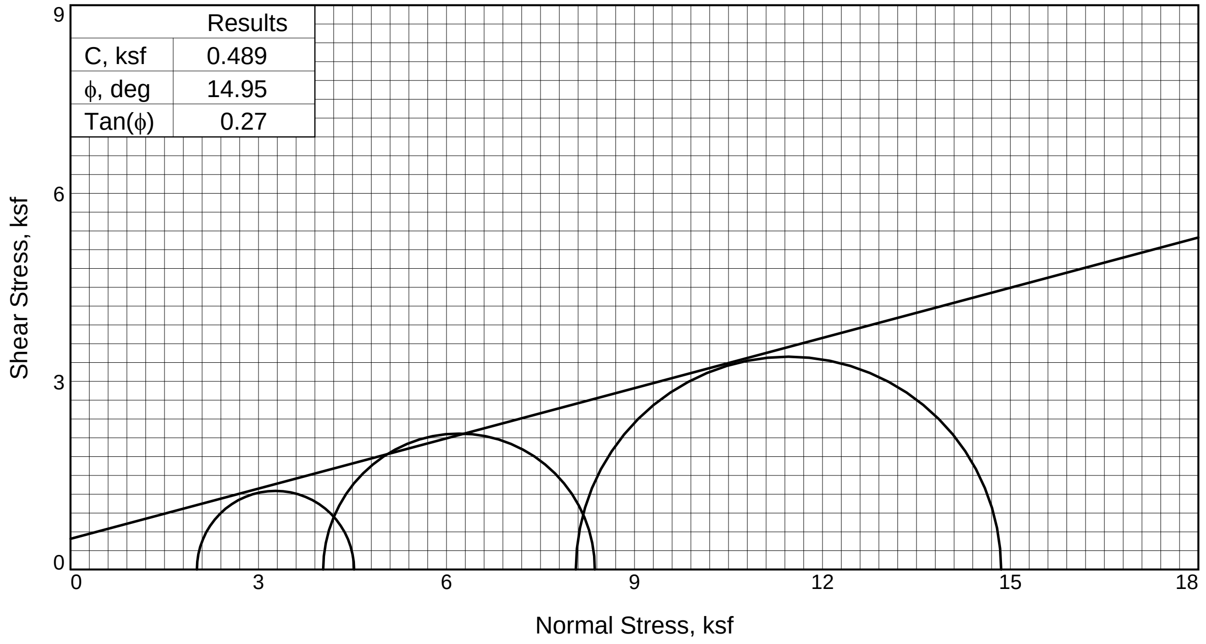
Project: Pickles Butte

Source of Sample: B2021-4

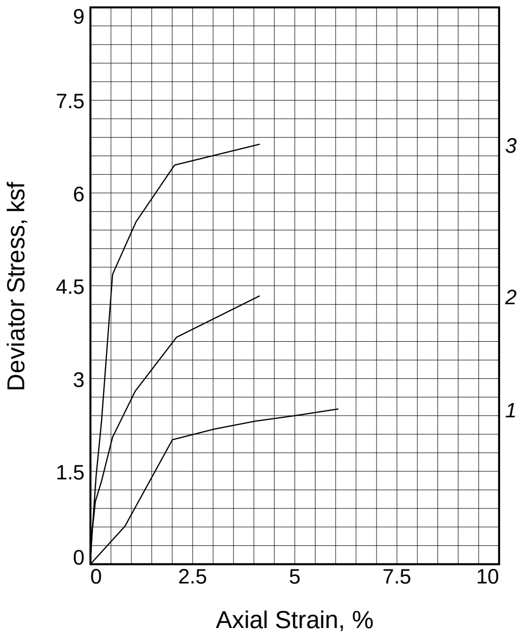
Proj. No.: 1145710402022 **Depth:** 50-51.5 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.489
ϕ, deg	14.95
Tan(ϕ)	0.27



	Sample No.	1	2	3
Initial	Water Content, %	23.0	23.0	23.0
	Dry Density, pcf	90.1	90.1	90.1
	Saturation, %	73.0	73.0	73.0
	Void Ratio	0.8354	0.8354	0.8354
	Diameter, in.	2.800	2.800	2.800
	Height, in.	6.030	6.030	6.030
At Test	Water Content, %	27.4	23.7	21.3
	Dry Density, pcf	95.2	100.9	104.9
	Saturation, %	98.4	98.2	98.0
	Void Ratio	0.7372	0.6404	0.5770
	Diameter, in.	2.747	2.776	2.793
	Height, in.	5.930	5.481	5.206
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	63.000	63.000	63.000
	Cell Pressure, psi	77.000	91.000	119.000
	Fail. Stress, ksf	2.51	4.34	6.79
	Ult. Stress, ksf			
	σ_1 Failure, ksf	4.52	8.37	14.85
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:
Consolidated Undrained

Description: Silty Clay

Assumed Specific Gravity= 2.65

Remarks:

Figure 54

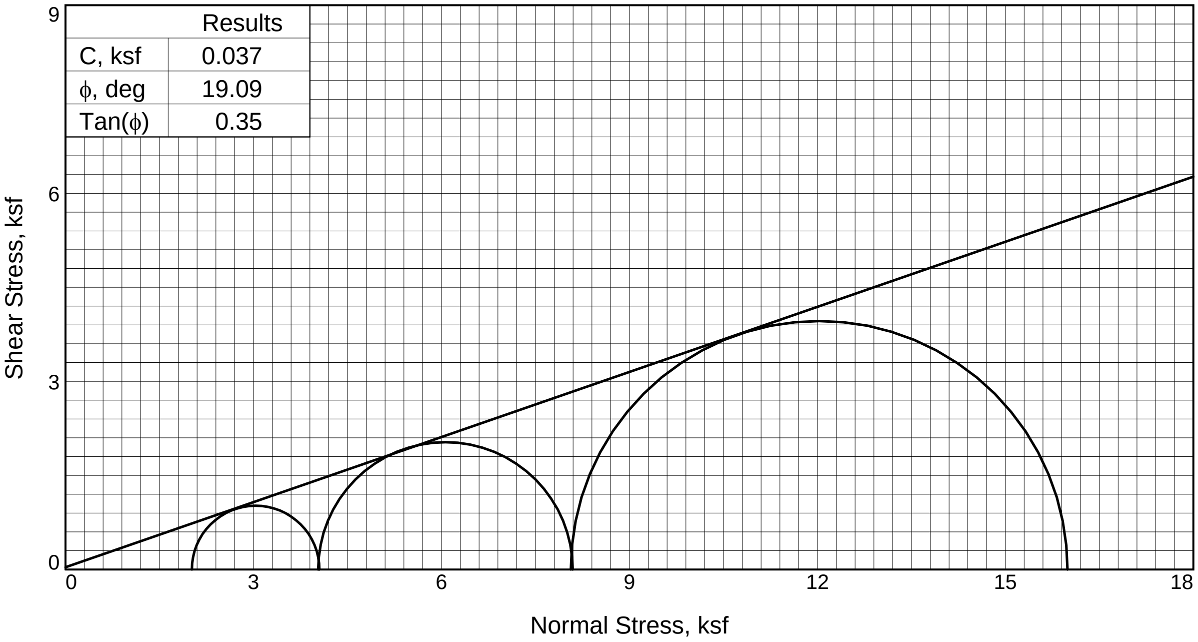
Project: Pickles Butte

Source of Sample: B2021-5

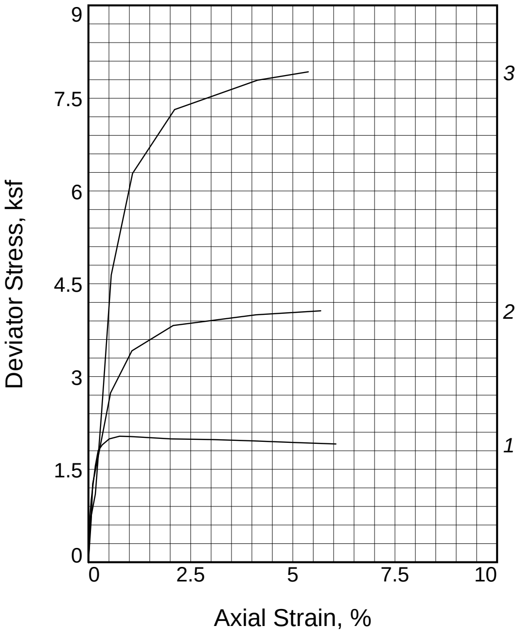
Proj. No.: 1145710402022 **Depth:** 50-51.5 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.037
ϕ, deg	19.09
Tan(ϕ)	0.35



	Sample No.	1	2	3
Initial	Water Content, %	16.2	16.2	16.2
	Dry Density, pcf	101.9	101.9	101.9
	Saturation, %	69.1	69.1	69.1
	Void Ratio	0.6231	0.6231	0.6231
	Diameter, in.	2.790	2.790	2.790
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	22.2	21.2	19.2
	Dry Density, pcf	102.4	104.1	107.8
	Saturation, %	95.7	95.5	95.0
	Void Ratio	0.6160	0.5892	0.5344
	Diameter, in.	2.800	2.873	2.924
	Height, in.	5.930	5.541	5.164
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	53.000	53.000	53.000
	Cell Pressure, psi	67.000	81.000	109.000
	Fail. Stress, ksf	2.03	4.06	7.93
	Ult. Stress, ksf			
	σ_1 Failure, ksf	4.05	8.09	15.99
	σ_3 Failure, ksf	2.02	4.03	8.06

Type of Test:
Consolidated Undrained

Description: Silt

Assumed Specific Gravity= 2.65

Remarks:

Figure 55

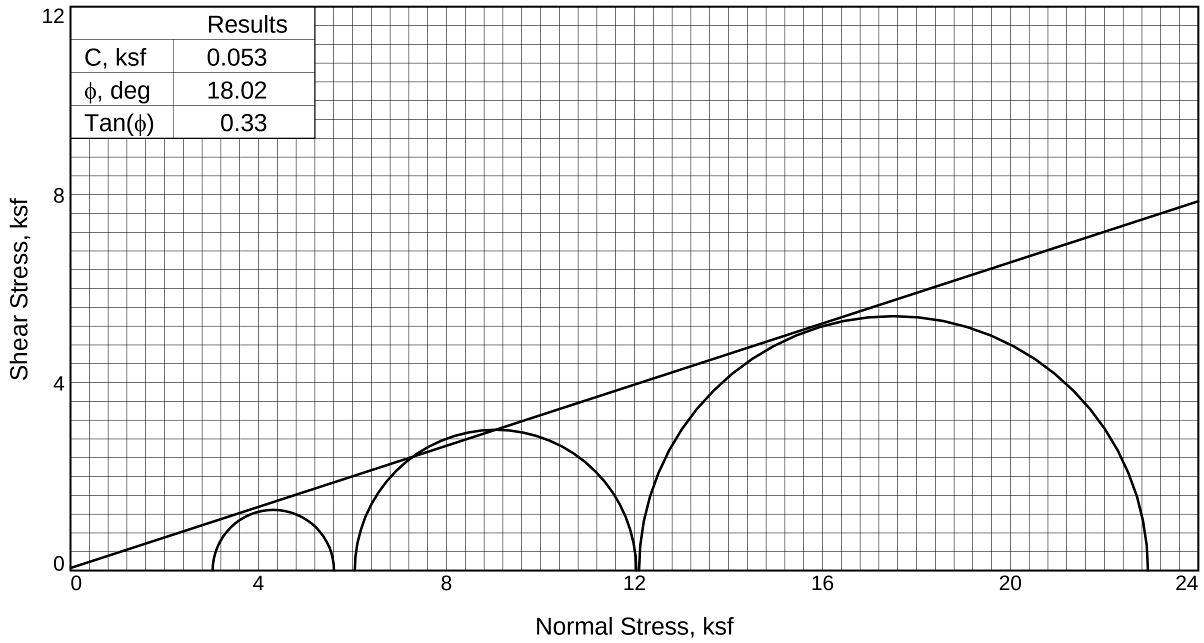
Project: Pickles Butte

Source of Sample: B2021-5

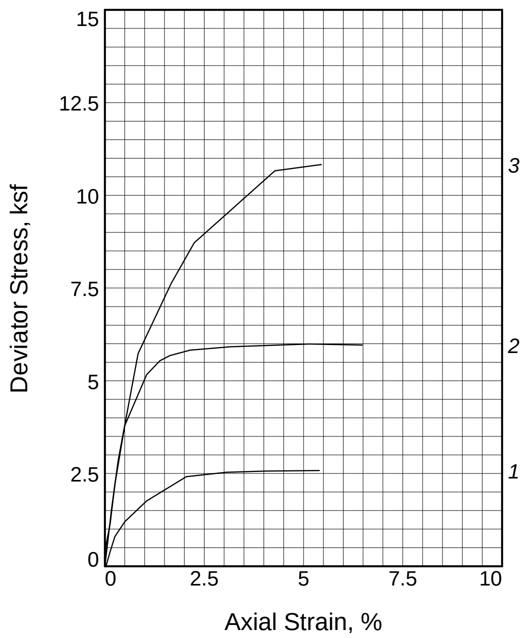
Proj. No.: 1145710402022 **Depth:** 69-70 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT



	Results
C, ksf	0.053
ϕ, deg	18.02
Tan(ϕ)	0.33



	Sample No.	1	2	3
Initial	Water Content, %	18.1	18.1	18.1
	Dry Density, pcf	85.7	85.7	85.7
	Saturation, %	51.4	51.4	51.4
	Void Ratio	0.9314	0.9314	0.9314
	Diameter, in.	2.801	2.801	2.801
	Height, in.	6.020	6.020	6.020
At Test	Water Content, %	24.5	24.5	24.5
	Dry Density, pcf	98.3	98.3	98.3
	Saturation, %	95.0	95.0	95.0
	Void Ratio	0.6826	0.6826	0.6826
	Diameter, in.	2.618	2.694	2.795
	Height, in.	6.004	5.670	5.268
	Strain rate, in./min.	0.001	0.001	0.001
	Back Pressure, psi	65.000	65.000	65.000
	Cell Pressure, psi	86.000	107.000	149.000
	Fail. Stress, ksf	2.58	5.99	10.83
	Ult. Stress, ksf			
	σ_1 Failure, ksf	5.61	12.04	22.93
	σ_3 Failure, ksf	3.02	6.05	12.10

Type of Test:
Consolidated Undrained

Description: Clay

Assumed Specific Gravity= 2.65

Remarks:

Project: Pickles Butte

Source of Sample: B2021-7

Proj. No.: 1145710402022 **Depth:** 120-121.3 ft

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Tetra Tech
Missoula, MT

Figure 56

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	0 - 1.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	2 - 3.5										9										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	-		NV	NP		99.6	83.1	11.6	110	109.9		10.5									
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	4 - 5.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	6 - 7.5										8										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	8 - 9.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	10 - 11.5										6										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	15 - 16.5										5										
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	20 - 21.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	25 - 27		NV	NP		99.9	94.7	6.2	113								0.03				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	27 - 28.5																				
B2021-1	11/15/2021	43.502927	-116.624204	2740.3976	30 - 31.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	0 - 1.5										7										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	2 - 3.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	4 - 5.5										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	6 - 7.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	8 - 9.5										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	10 - 11.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	15 - 16.5										5										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	20 - 21										3										
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	25 - 26.5																				
B2021-2	11/16/2021	43.501658	-116.713829	2739.0394	30 - 31.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	5 - 6.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	10 - 11.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	15 - 16.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	20 - 21.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	25 - 27		NV	NP		99.8	97.7	31.3					25.86	0			0.04				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	26 - 30																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022 **PROJECT NAME** Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	27 - 28.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	30 - 31.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	35 - 36.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	40 - 41.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	45 - 46.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	50 - 51.5										3										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	60 - 62		NV	NP		99.4	97.9	19.2					20.21	0.282							
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	61 - 65		NV	NP		99.6	99.1	7.7	100	100.2		13.7			0.143						
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	70 - 71.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	80 - 82		NV	NP		99.8	99.1	23.6					32.81	0.413							
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	82 - 83.5										2										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	90 - 91.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	100 - 100.2																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	101 - 107																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	110 - 110.7																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	112 - 115																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	116 - 120		NV	NP		86.4	81.7	16.1	104	103.6		15.75									
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	121 - 121.8										4										
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	135 - 138																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	139 - 142																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	140 - 141.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	147 - 151																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	150 - 151.5																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	159 - 161																				
B2021-3	11/22/2021	43.500874	-116.716768	2737.6687	160 - 161.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	5 - 6.5										6										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	9 - 10																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	10 - 11.5																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	15 - 16.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	20 - 21.5										5										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	25 - 26.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	30 - 31.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	35 - 36.5										8										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	40 - 41.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	44 - 45																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	45 - 46.5										16										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	50 - 51.5		NV	NP		100	91.9	6.3					27.04	0.123							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	51 - 52																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	60 - 61.5										2										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	69 - 70																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	70 - 71.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	79 - 80																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	80 - 81.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	89 - 90																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	90 - 91.5		NV	NP		99	96	38.4					22.83	0.198							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	98 - 99																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	99 - 100.5										22										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	109 - 110																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	110 - 111.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	119 - 120																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	120 - 120.9		NV	NP		100	98.1	49					29.51	0.588							
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	129 - 130																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	130 - 131.5																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	139 - 140																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	140 - 141.5										2										
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	149 - 150																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	150 - 150.9																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	157 - 159																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	160 - 160.9																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	169 - 170																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	170 - 170.8																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	175 - 177																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	179 - 180																				
B2021-4	12/14/2021	43.665364	-116.688388	2797.1687	189 - 190																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	5 - 6.5										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	9 - 10																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	10 - 11.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	15 - 16.5										3										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	19 - 20																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	20 - 21.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	27 - 28																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	30 - 31.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	35 - 36.5										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	39 - 40																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	40 - 41																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	45 - 46.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	49 - 50																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	50 - 51.5		54	30									14.95	0.489			0.06				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	59 - 60																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	60 - 60.6										4										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	69 - 70		NV	NP		99.9	99.3	77.1	112	111.5		15.5	19.09	0.037							
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	70 - 71.5										29										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	79 - 80																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	80 - 81.5		35	14	0.000	98.5	95.9	83.4	104	103.5	21	19.5	31.18	0.26							

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	89 - 90																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	90 - 90.8		NV	NP			98.8	33.8					13.53	0.654							
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	99 - 100										11										
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	100 - 101.3																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	109 - 110																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	110 - 110.6																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	119 - 120																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	120 - 121.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	126 - 127																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	130 - 131.4																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	139 - 140																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	140 - 140.9																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	149 - 150																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	150 - 151.4																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	159 - 160																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	160 - 160.6																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	169 - 170																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	170 - 171.5																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	174 - 175																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	179 - 180																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	189 - 190																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	199 - 200																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	204 - 205																				
B2021-5	12/19/2021	43.499133	-116.713491	2661.6331	209 - 210																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	5 - 6.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	9 - 11																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	10 - 11.5										6										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	20 - 21.5																				

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	25 - 26.5										18										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	39 - 41																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	40 - 41.5										22										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	45 - 46.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	50 - 51.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	57 - 58														7.246						
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	59 - 61																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	60 - 61.5										25										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	68 - 69																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	69 - 71																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	70 - 71.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	75 - 76																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	79 - 81		67	48			99.8	90.7													
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	80 - 81.1																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	84 - 85																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	89 - 91																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	90 - 91.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	99 - 102		56	34			99.8	89.7							15.661						
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	100 - 101.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	106 - 107		47	25		99.2	97.6	80.8	100	100		20.5									
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	110 - 111.5										21										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	120 - 121.5										22										
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	129 - 130																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	130 - 131.3																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	140 - 141.5																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	149 - 150																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	150 - 151.4																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	159 - 160																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	160 - 161.3																				
B2021-6	12/2/2021	43.495196	-116.715718	2636.7423	164 - 165																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	5 - 6.5										4										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	10 - 11.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	15 - 16.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	19 - 20																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	25 - 26.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	30 - 30.6																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	35 - 35.8																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	39 - 40		NV	NP		93.6	92	23.3	112	111.7		12.9			0.511						
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	40 - 41.4										23										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	45 - 46.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	49 - 50																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	50 - 51.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	59 - 60		NV	NP		99.9	98.9	84.3	104	104.2		17.8			1.817						
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	60 - 61.4										12										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	69 - 70																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	70 - 71.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	79 - 80																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	80 - 80.7																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	89 - 90																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	90 - 90.3																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	99 - 100																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	100 - 101.5										20										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	110 - 111.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	120 - 121.3		33	10									18.02	0.053			0.38				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	125 - 126																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	129 - 130																				

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 114-571040-2022

PROJECT NAME Pickles Butte Sanitary Landfill - Canyon County, ID

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	pH	Resistivity (ohm-cm)	Sulfate Content (%)	California Bearing Ratio
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	130 - 131.5										19										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	139 - 140																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	140 - 141.5										24										
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	149 - 150																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	150 - 151.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	160 - 161.4																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	169 - 170																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	170 - 171.5																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	179 - 180																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	189 - 190																				
B2021-7	12/7/2021	43.495280	-116.712592	2659.5036	199 - 200																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	0 - 1.5										11										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	1 - 4		NV	NP		98.7	95.6	83.5	97	97.2		17.9									
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	2 - 3.5																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	4 - 5.5										11										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	8 - 10										12										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	10 - 11.5										6										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	11 - 15																				
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	15 - 16.5										5										
B2021-8	11/15/2021	43.489880	-116.703147	2956.6206	20 - 21.5										5										

APPENDIX D: Static Slope Stability Analyses

Slope Stability Cross Sections - Figures 1D thorough 5D
Slope Stability Stability Analyses Printouts Figures 6D through 43D

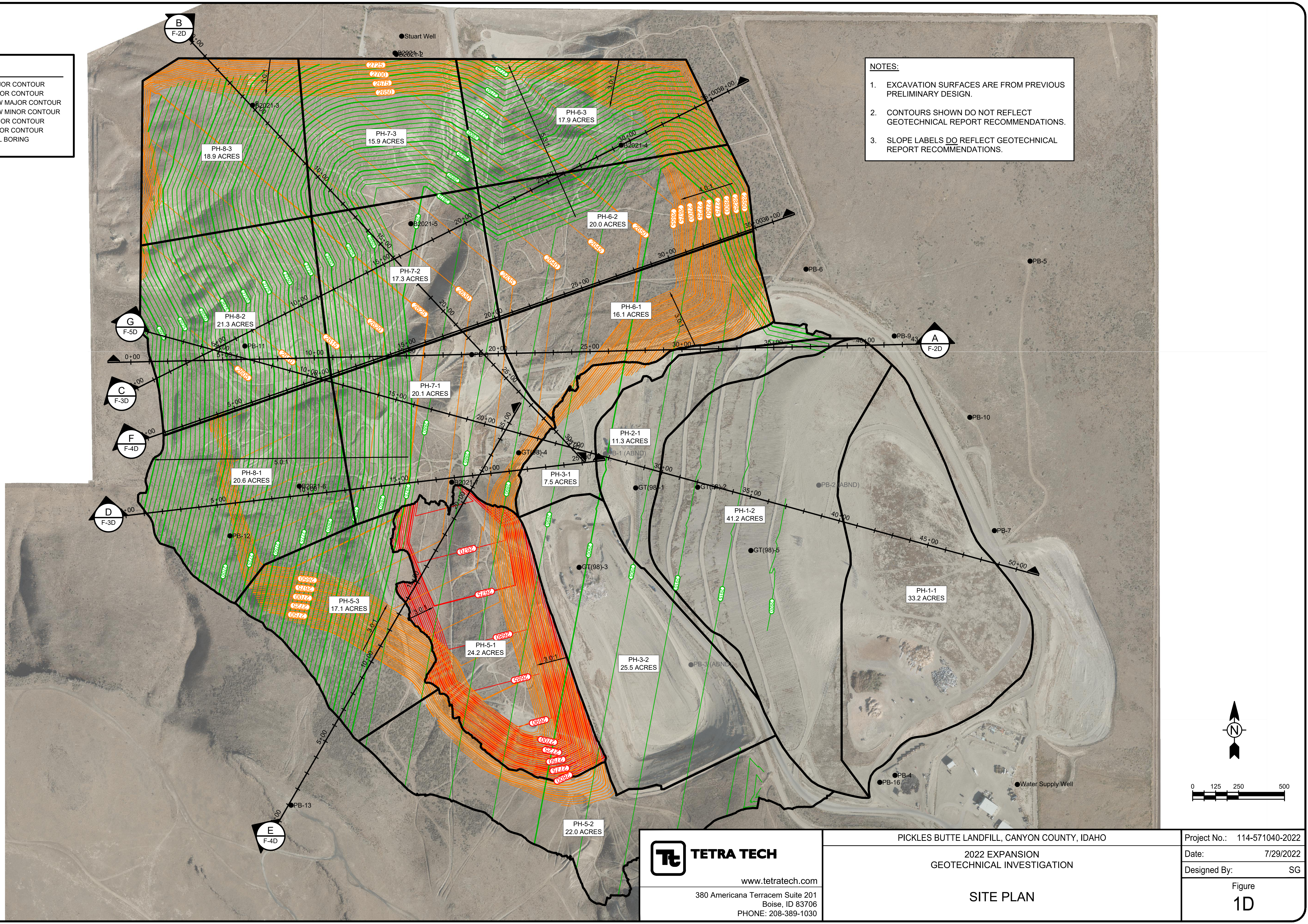
7/29/2022 12:34 PM - O:\T-Z\TT\MISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-00-GEOTECH INVESTIGATION FIGURES.DWG

LEGEND

🟧	PROPOSED CUT MAJOR CONTOUR
🟧	PROPOSED CUT MINOR CONTOUR
🟥	PROPOSED BORROW MAJOR CONTOUR
🟥	PROPOSED BORROW MINOR CONTOUR
🟩	PROPOSED FILL MAJOR CONTOUR
🟩	PROPOSED FILL MINOR CONTOUR
● B2021-#	2021 GEOTECHNICAL BORING

NOTES:

1. EXCAVATION SURFACES ARE FROM PREVIOUS PRELIMINARY DESIGN.
2. CONTOURS SHOWN DO NOT REFLECT GEOTECHNICAL REPORT RECOMMENDATIONS.
3. SLOPE LABELS DO REFLECT GEOTECHNICAL REPORT RECOMMENDATIONS.

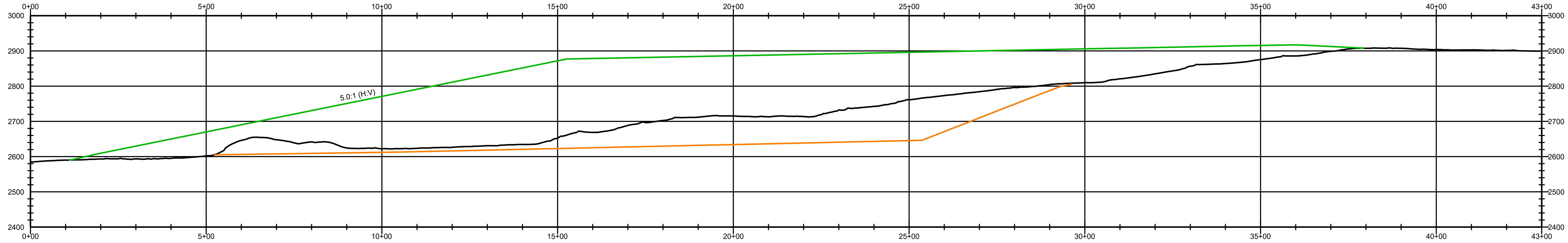


TETRA TECH www.tetratech.com 380 Americana Terracem Suite 201 Boise, ID 83706 PHONE: 208-389-1030	PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO 2022 EXPANSION GEOTECHNICAL INVESTIGATION SITE PLAN

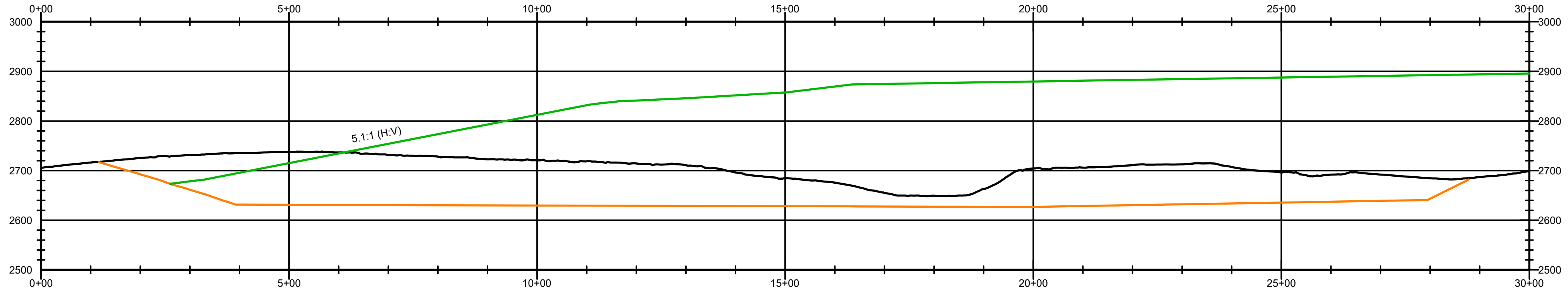
Project No.: 114-571040-2022
Date: 7/29/2022
Designed By: SG
Figure 1D

Bar Measures 1 inch

7/29/2022 12:34 PM - O:\T-Z\TTMISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-00-GEOTECH INVESTIGATION FIGURES.DWG



A
F-1D
SECTION A
SCALE: 1" = 300'



B
F-1D
SECTION B
SCALE: 1" = 300'

0 75 150 300

LEGEND
- — EXISTING GROUND
- — PROPOSED CUT
- — PROPOSED BORROW
- — PROPOSED FILL

TETRA TECH
www.tetratech.com
380 Americana Terracem Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

2022 EXPANSION
GEOTECHNICAL INVESTIGATION

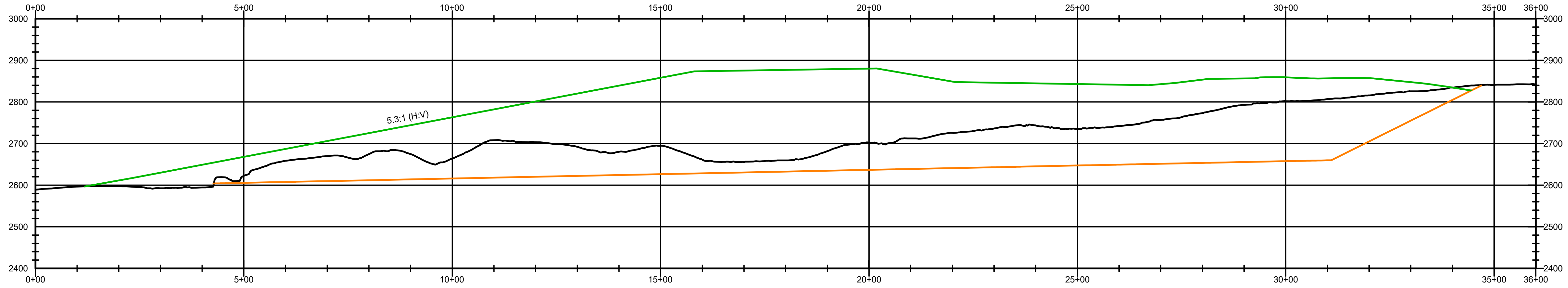
PROFILES A & B

Project No.:	114-571040-2022
Date:	7/29/2022
Designed By:	SG

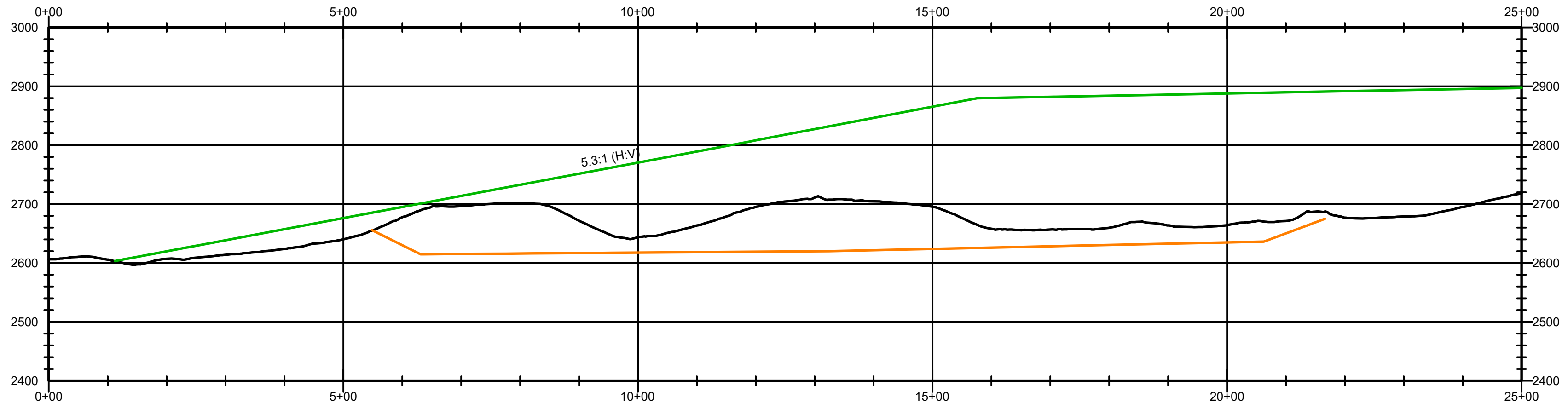
Figure
2D

Bar Measures 1 inch

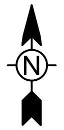
7/29/2022 12:34 PM - O:\T-Z\TT\MISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-00-GEOTECH INVESTIGATION FIGURES.DWG

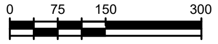


C
F-1D
SECTION C
SCALE: 1" = 300'



D
F-1D
SECTION D
SCALE: 1" = 300'





LEGEND
- EXISTING GROUND
- PROPOSED CUT
- PROPOSED BORROW
- PROPOSED FILL

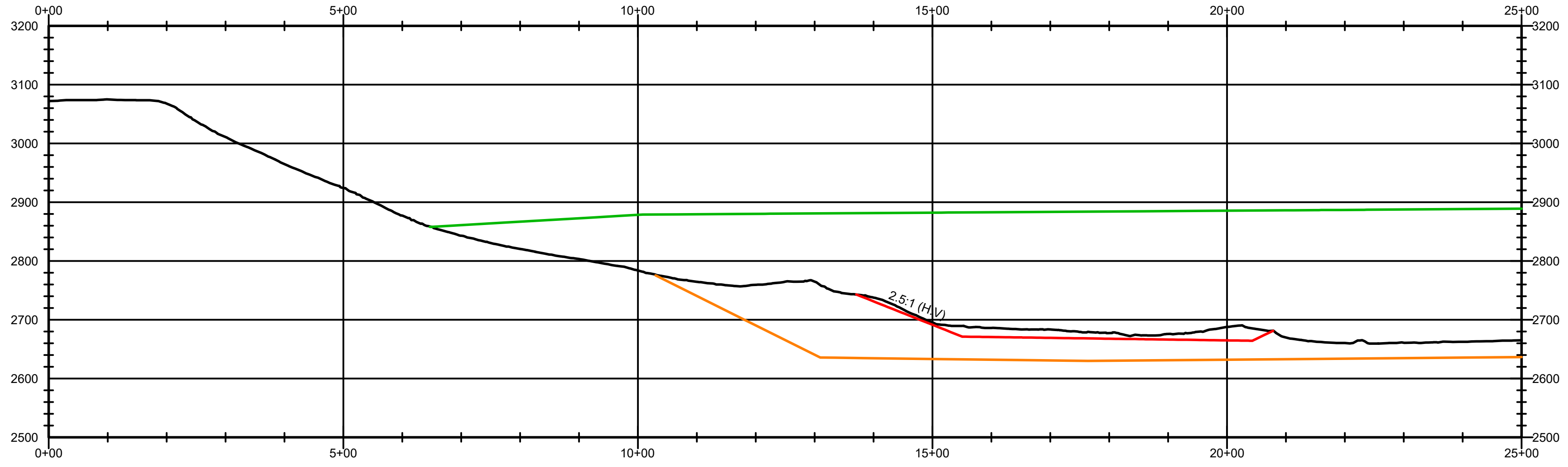
TETRA TECH
www.tetratech.com
380 Americana Terracem Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO
2022 EXPANSION
GEOTECHNICAL INVESTIGATION

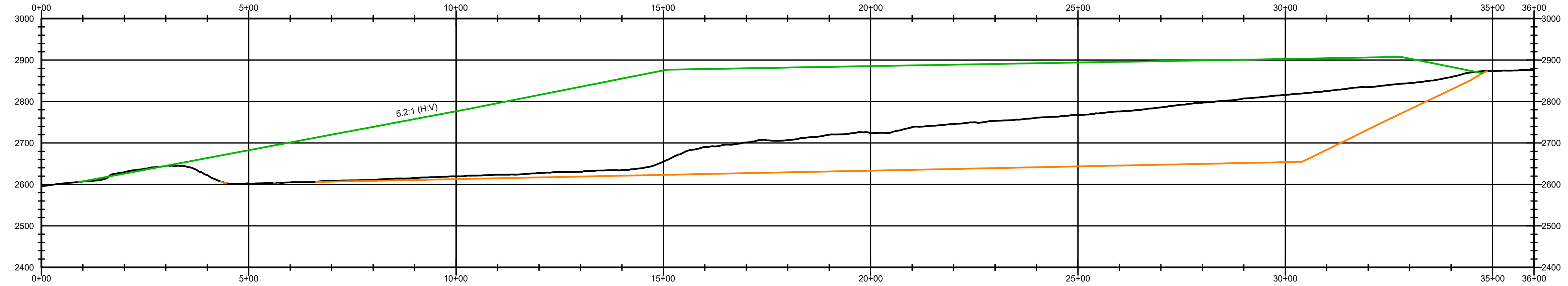
PROFILES C & D

Project No.: 114-571040-2022
Date: 7/29/2022
Designed By: SG
Figure
3D

Bar Measures 1 inch



E
F-1D
SECTION E
SCALE: 1" = 300'



F
F-1D
SECTION F
SCALE: 1" = 300'

0 75 150 300

LEGEND

▬	EXISTING GROUND
▬	PROPOSED CUT
▬	PROPOSED BORROW
▬	PROPOSED FILL

TETRA TECH
www.tetratech.com
380 Americana Terracem Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

2022 EXPANSION
GEOTECHNICAL INVESTIGATION

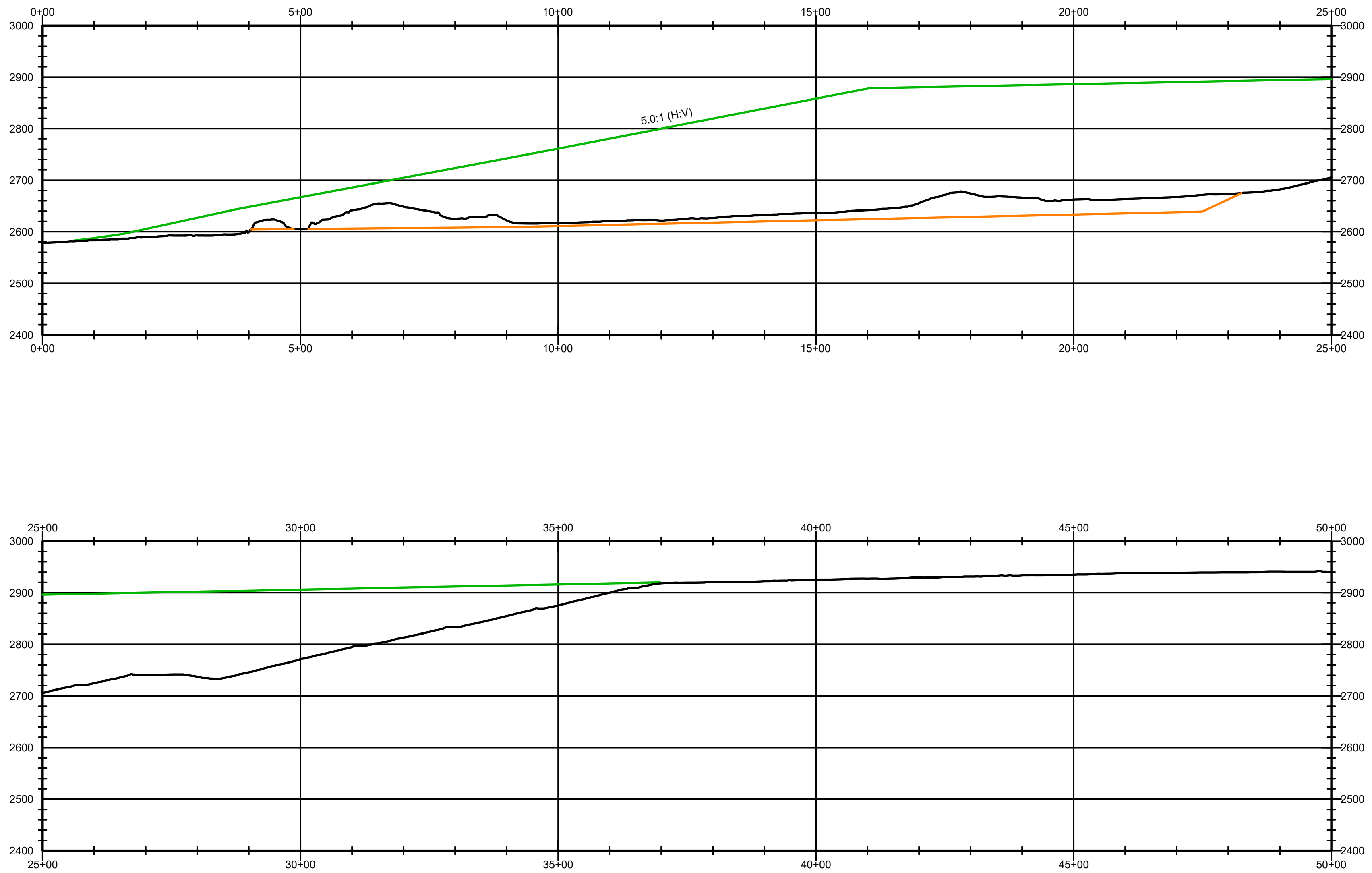
PROFILES E & F

Project No.: 114-571040-2022
Date: 7/29/2022
Designed By: SG

Figure
4D

Bar Measures 1 inch

7/29/2022 12:35 PM - O:\T-Z\TT\MISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-00-GEOTECH INVESTIGATION FIGURES.DWG



G
F-1D
SECTION G
SCALE: 1" = 300'

0 75 150 300

LEGEND
EXISTING GROUND
PROPOSED CUT
PROPOSED BORROW
PROPOSED FILL

TETRA TECH
www.tetratech.com
380 Americana Terracem Suite 201
Boise, ID 83706
PHONE: 208-389-1030

PICKLES BUTTE LANDFILL, CANYON COUNTY, IDAHO

2022 EXPANSION
GEOTECHNICAL INVESTIGATION

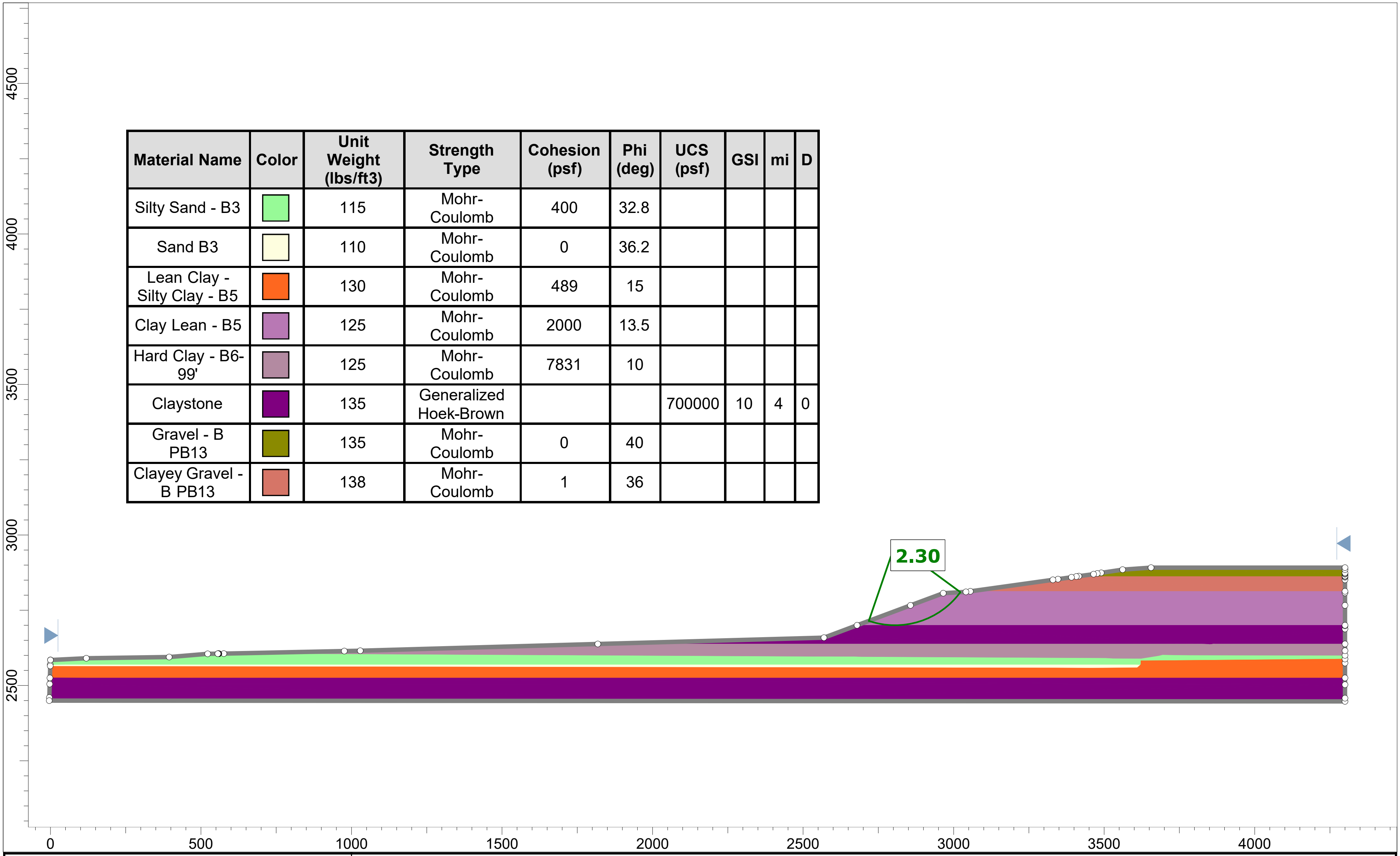
PROFILE G

Project No.: 114-571040-2022
Date: 7/29/2022
Designed By: SG

Figure
5D

Bar Measures 1 inch

7/29/2022 12:35 PM - O:\T-Z\TTMISSOULA\114-571040-PICKLES BUTTE LANDFILL\07-CAD\SHEETFILES\GEOTECH\F-00-GEOTECH INVESTIGATION FIGURES.DWG

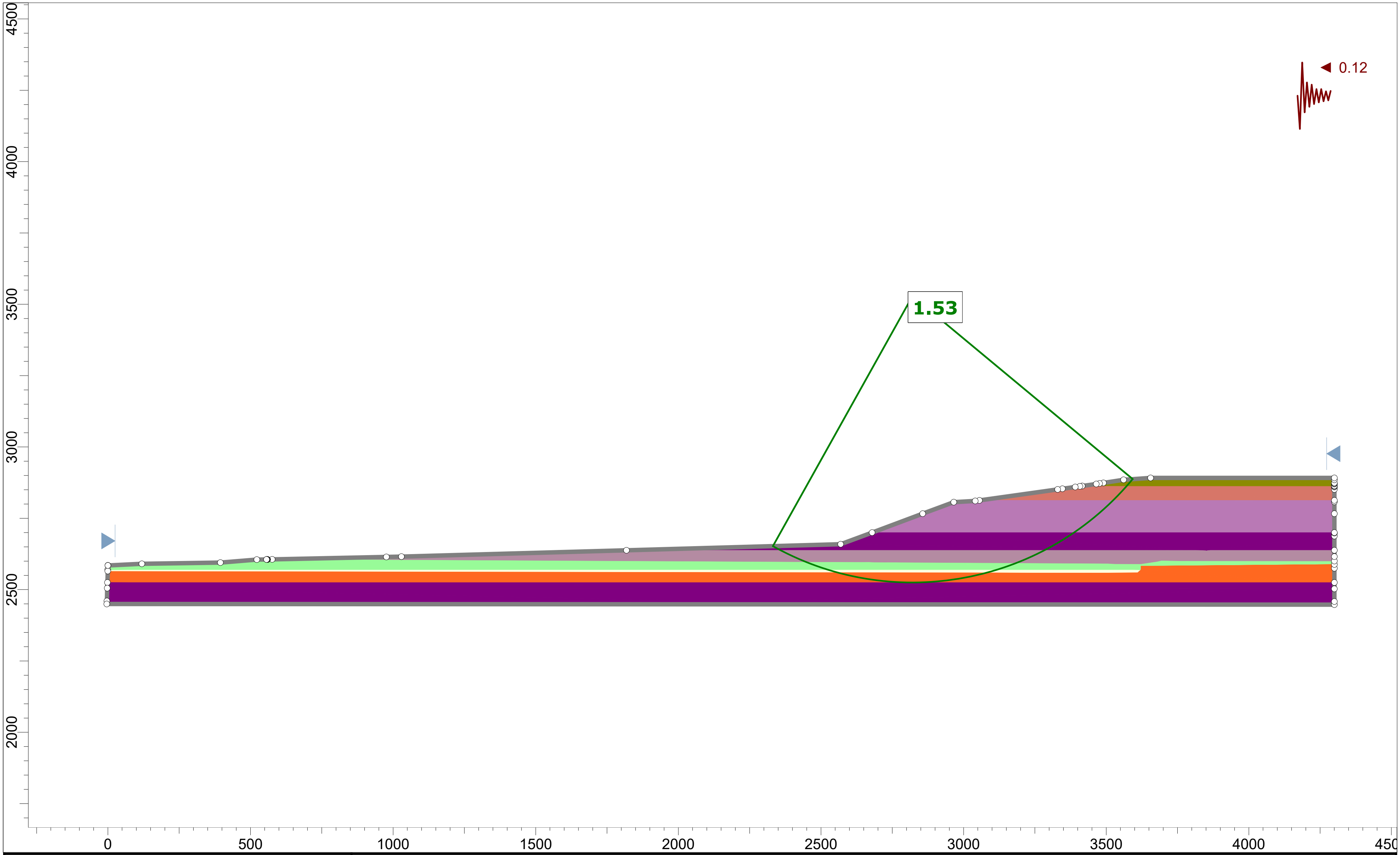


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8				
Sand B3	⬜	110	Mohr-Coulomb	0	36.2				
Lean Clay - Silty Clay - B5	🟧	130	Mohr-Coulomb	489	15				
Clay Lean - B5	🟪	125	Mohr-Coulomb	2000	13.5				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Gravel - B PB13	🟫	135	Mohr-Coulomb	0	40				
Clayey Gravel - B PB13	🟥	138	Mohr-Coulomb	1	36				

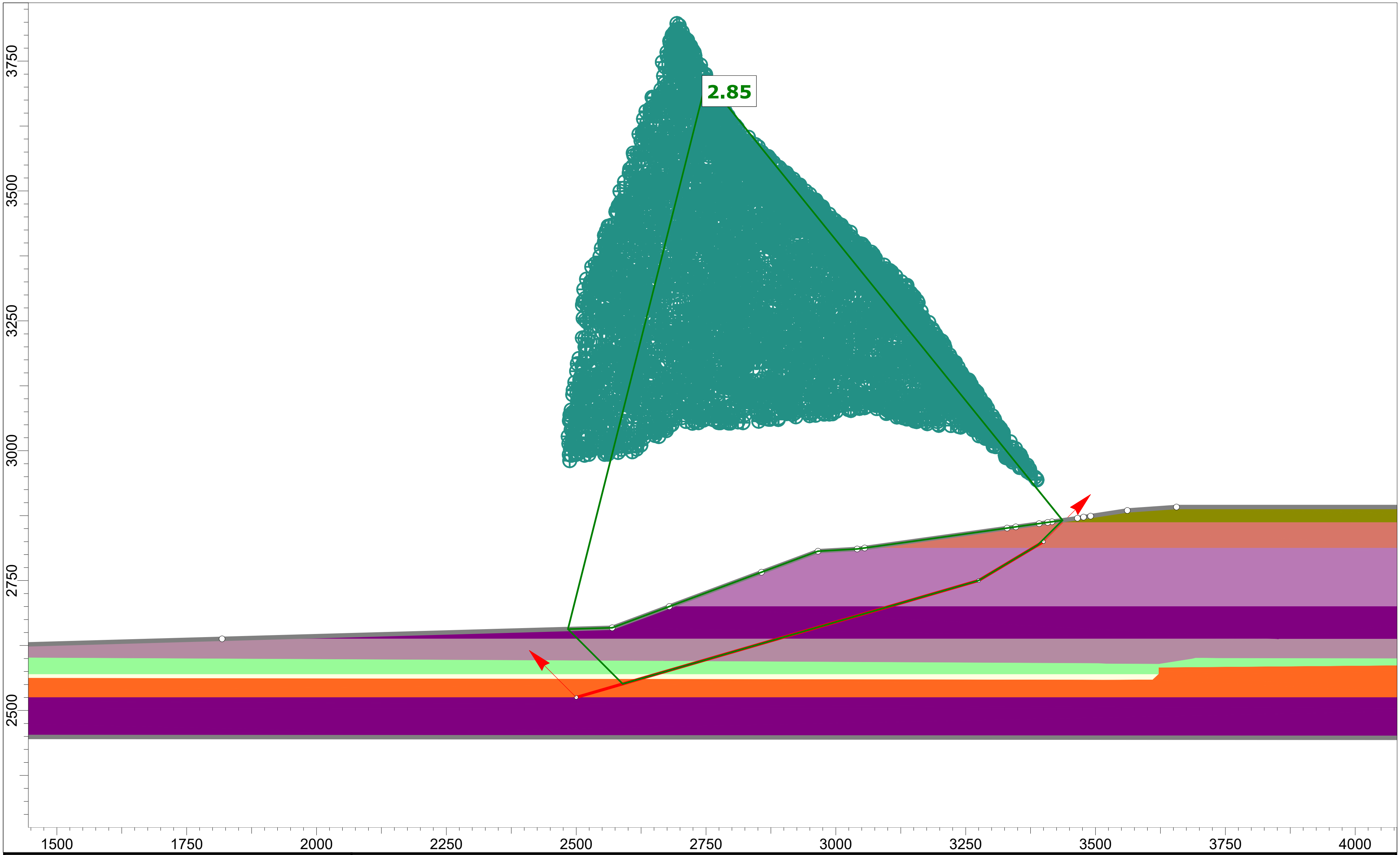
rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 6D
Group	SECTION A	*Scenario*	Proposed Excavation 3H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



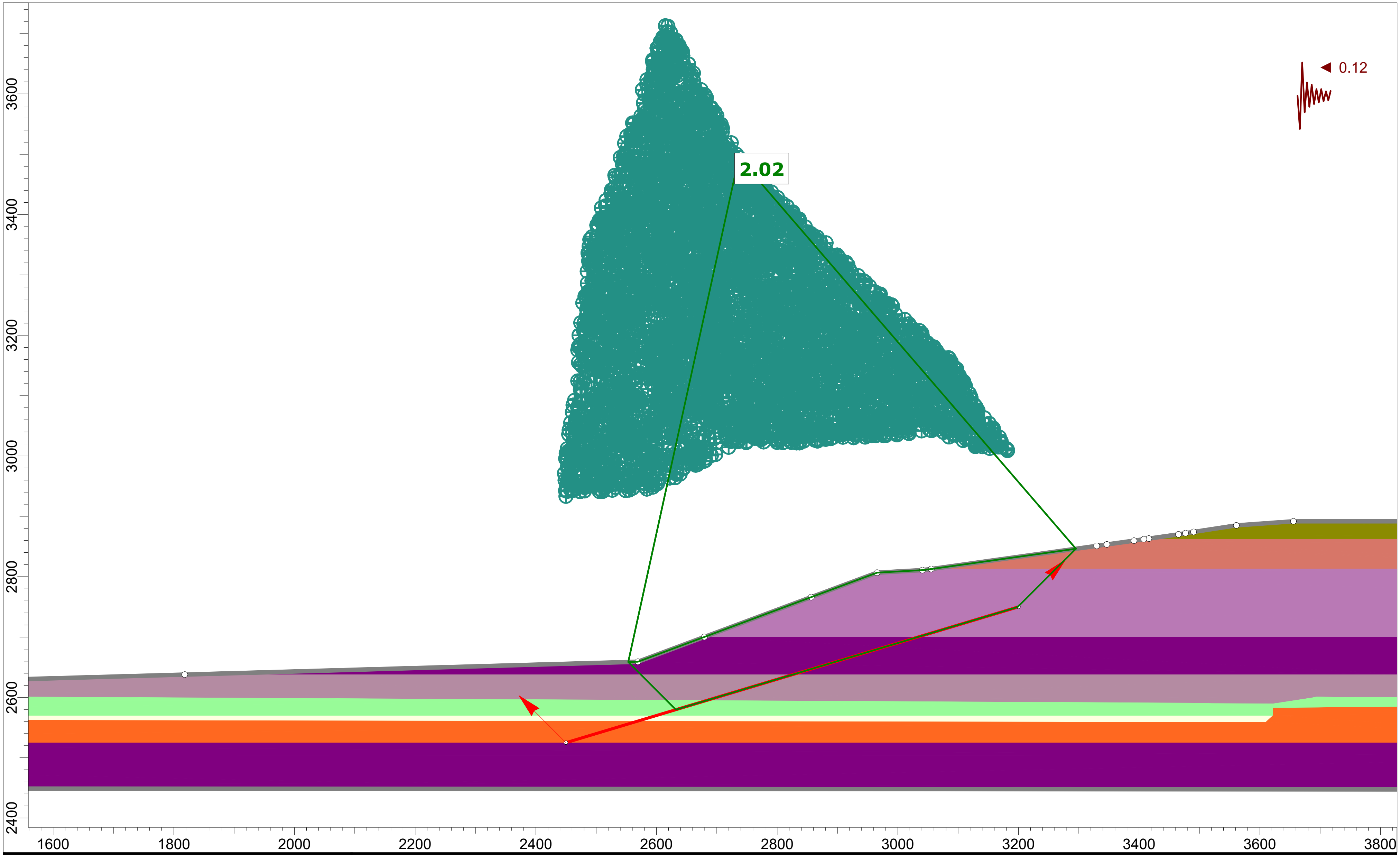
rocscience	*Project*	Pickles Butte	Figure 7D
	Group SECTION A	*Scenario* Proposed Excavation 3H:1V	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/27/2022	*File Name* Seismic Loading	



rocscience

SLIDEINTERPRET 9.023

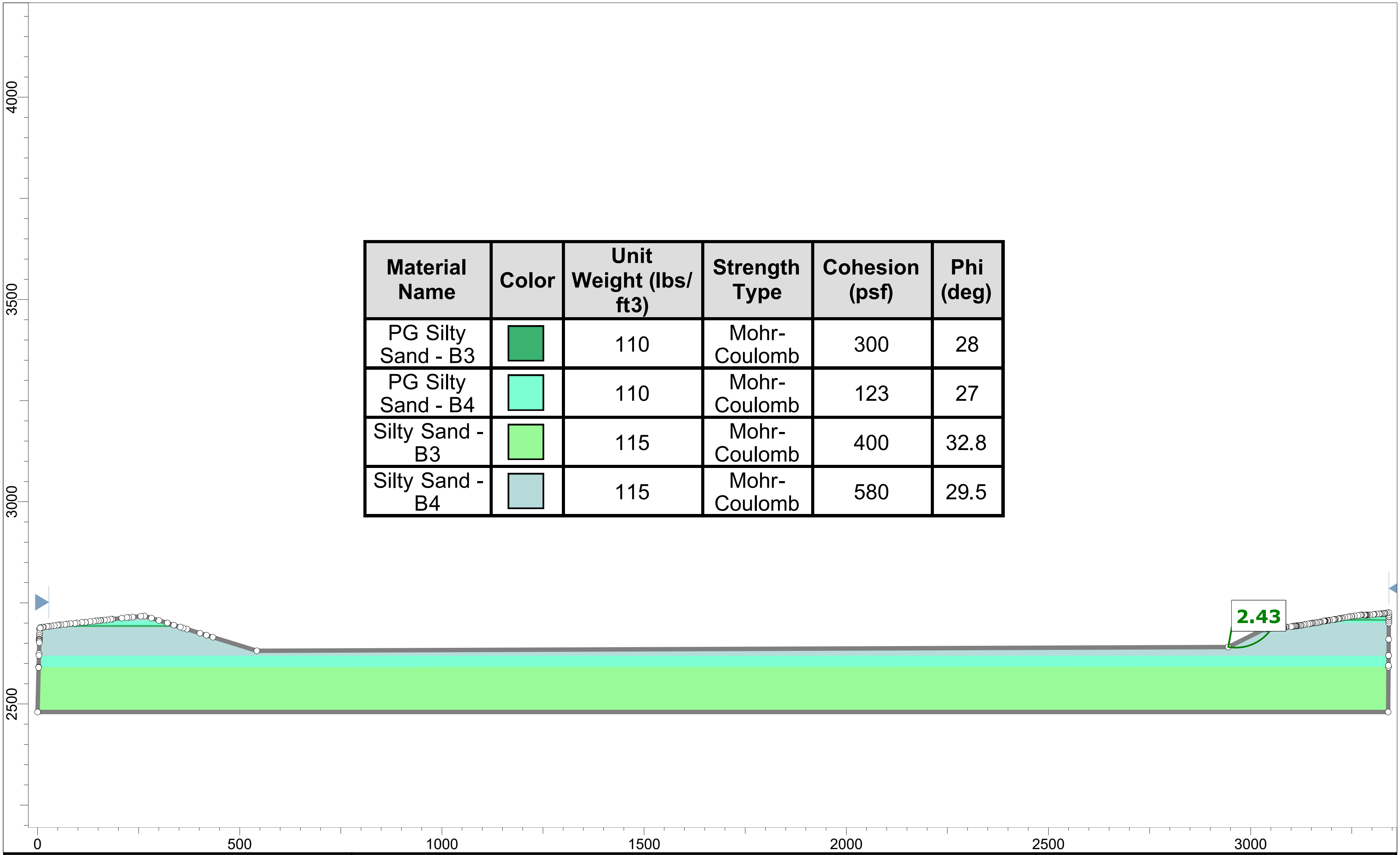
Project	Pickles Butte		Figure 8D
Group	SECTION A	*Scenario*	Proposed Excavation 3H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Static Loading - Block Failure



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 9D
Group	SECTION A	*Scenario*	Proposed Excavation 3H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading - Block

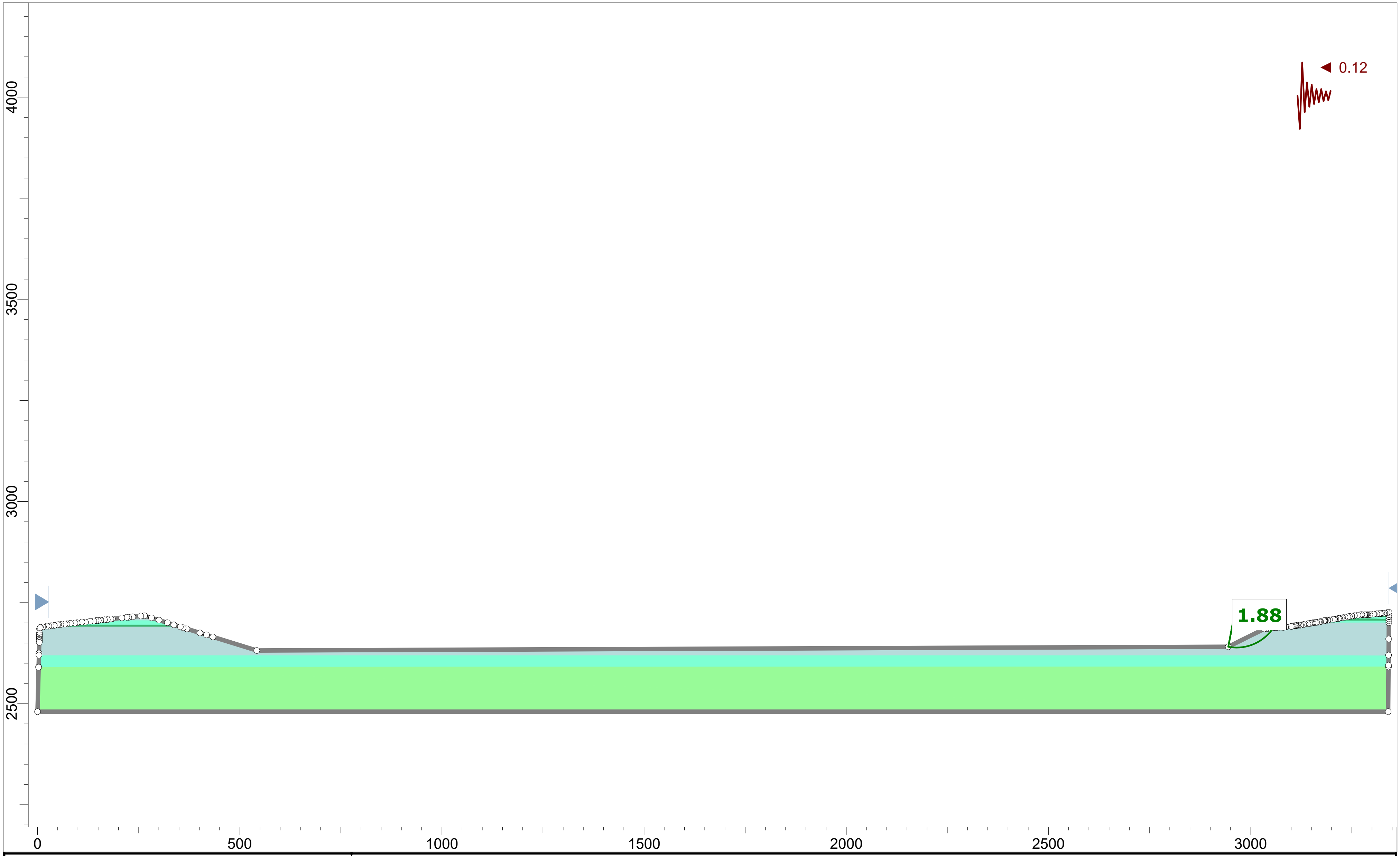


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28
PG Silty Sand - B4	🟦	110	Mohr-Coulomb	123	27
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5

rocscience

SLIDEINTERPRET 9.023

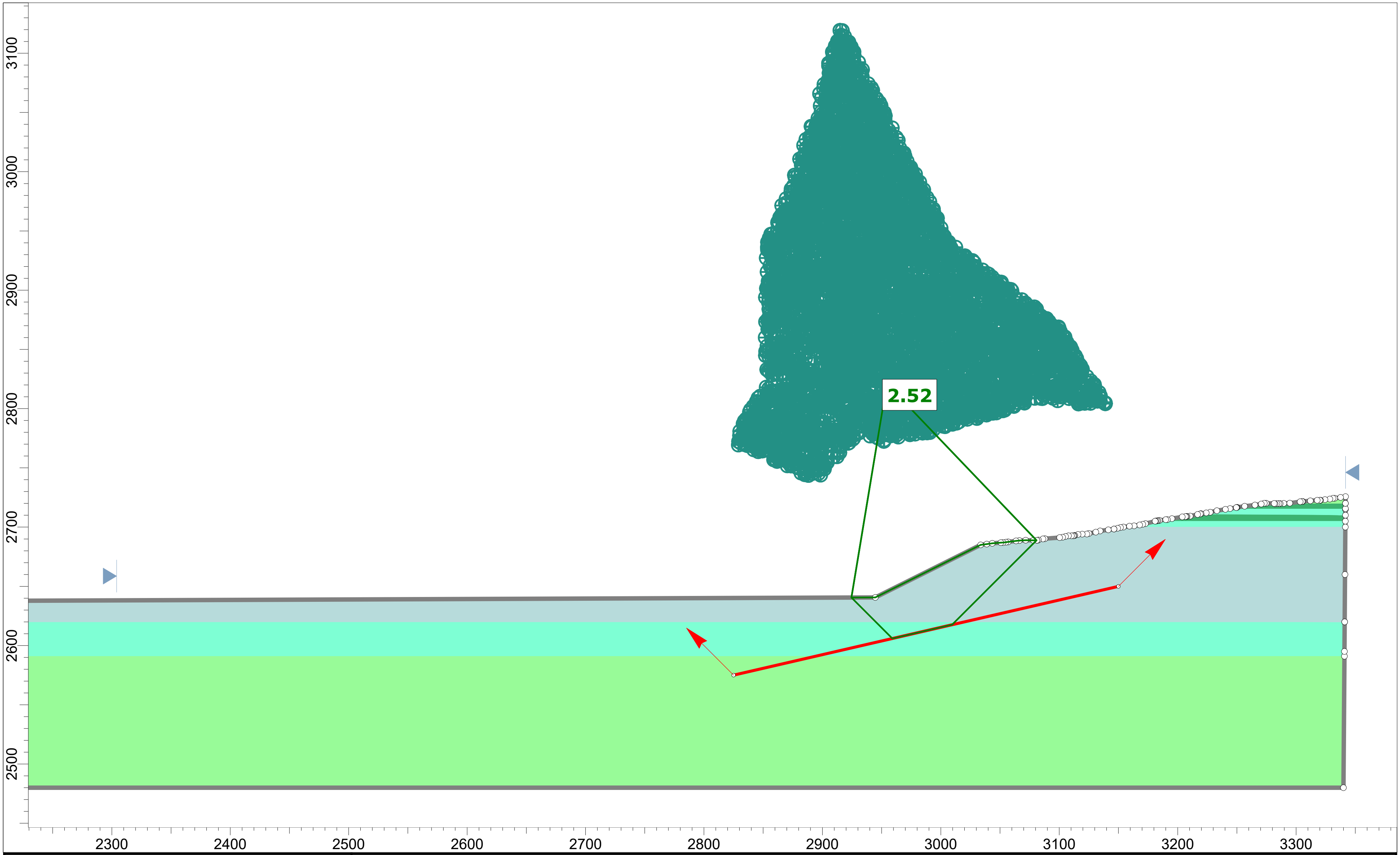
Project	Pickles Butte		Figure 10D
Group	SECTION B	*Scenario*	Proposed Excavation 2.27H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



Project	Pickles Butte		
Group	SECTION B	*Scenario*	Proposed Excavation 2.27H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Seismic Loading

Figure 11D

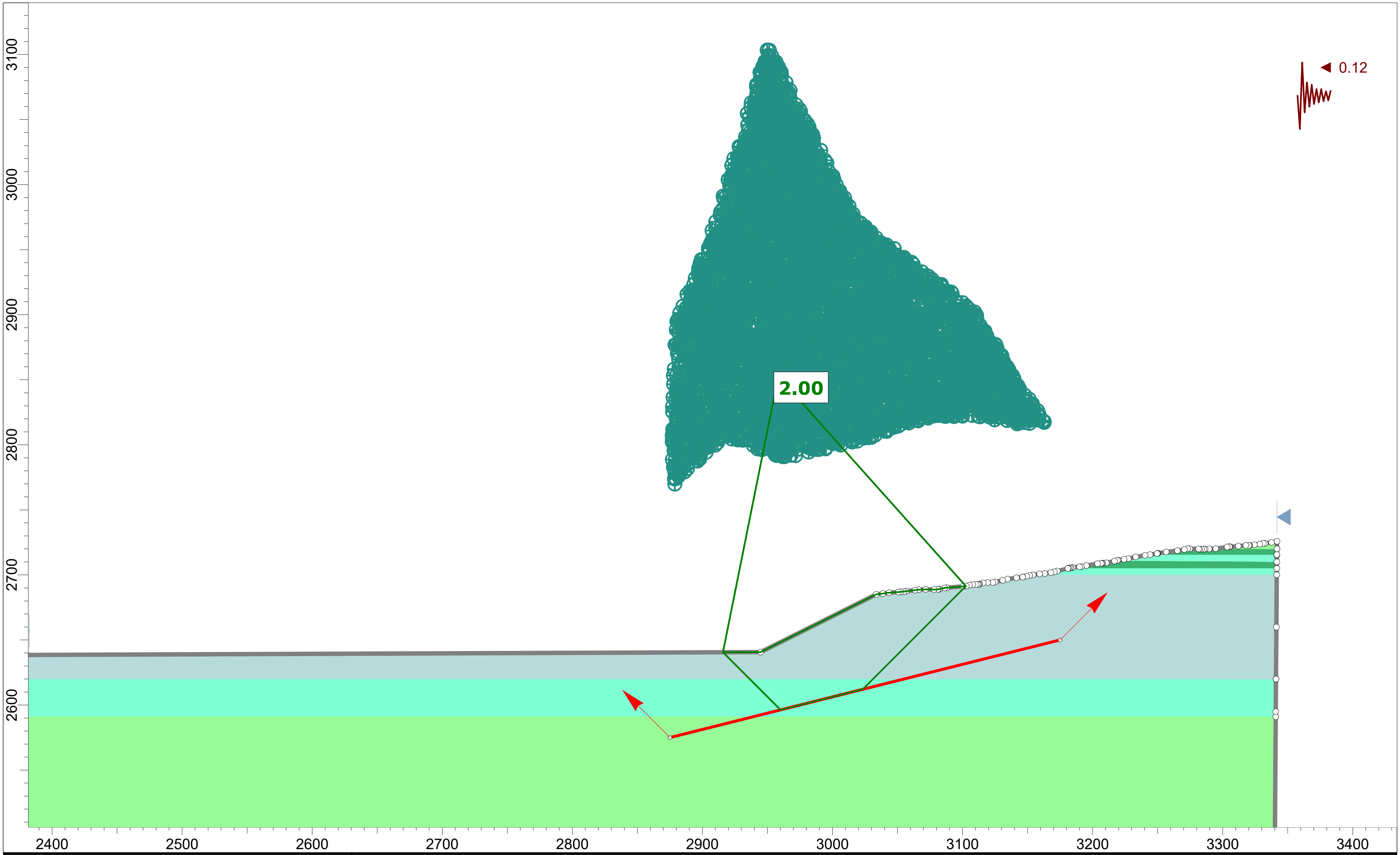
SLIDEINTERPRET 9.023



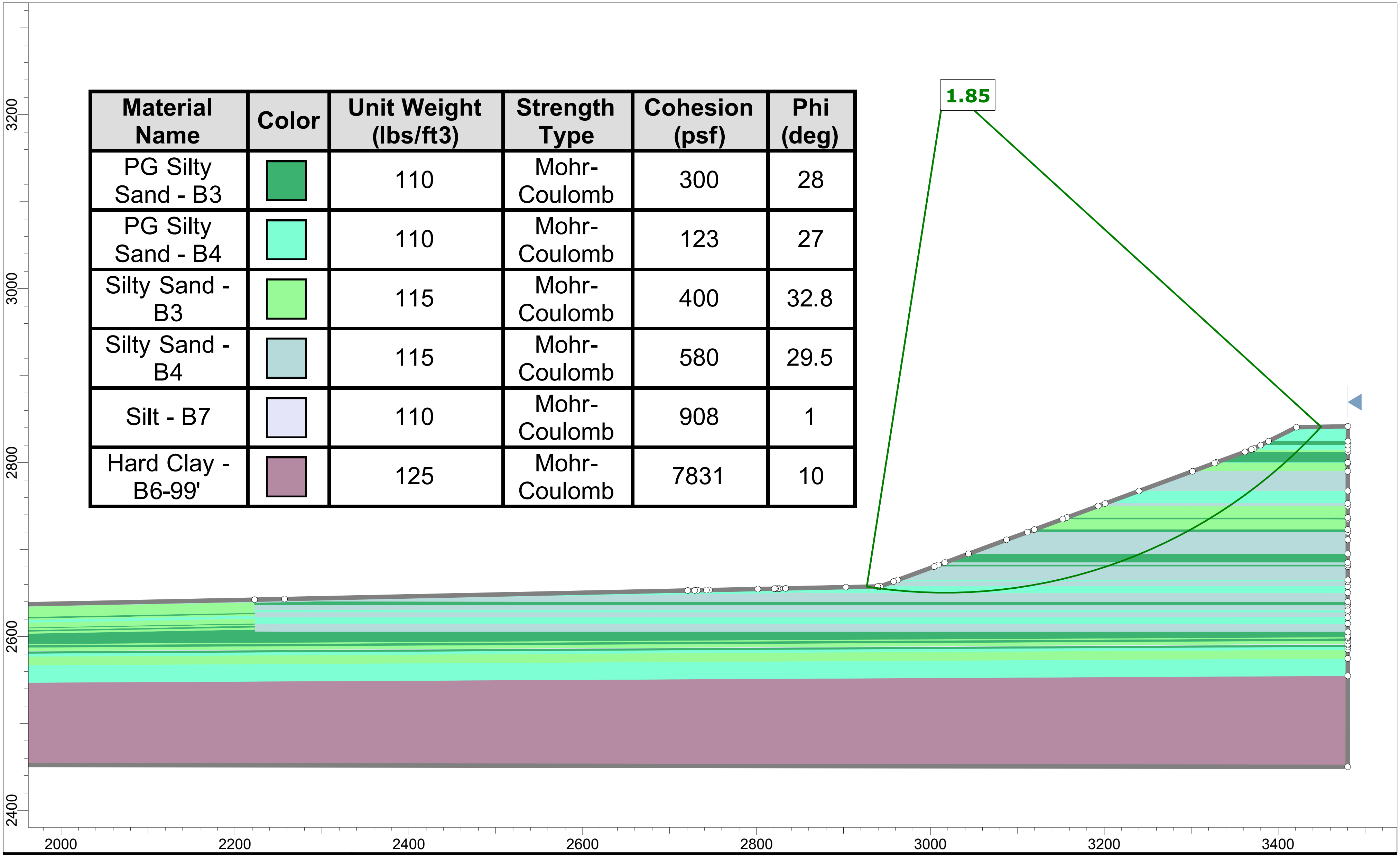
Project	Pickles Butte		Figure 12D
Group	SECTION B	Scenario	Proposed Excavation 2.27H:1V
Drawn By	SG	Company	Tetra Tech
Date	7/28/2022	File Name	Static Loading - Block Failure

rocscience

SLIDEINTERPRET 9.023



	Project	Pickles Butte	**Figure 13D**
	Group SECTION B	*Scenario* Proposed Excavation 2.27H:1V	
rocscience	*Drawn By* SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/28/2022	*File Name* Seismic Loading - Block	

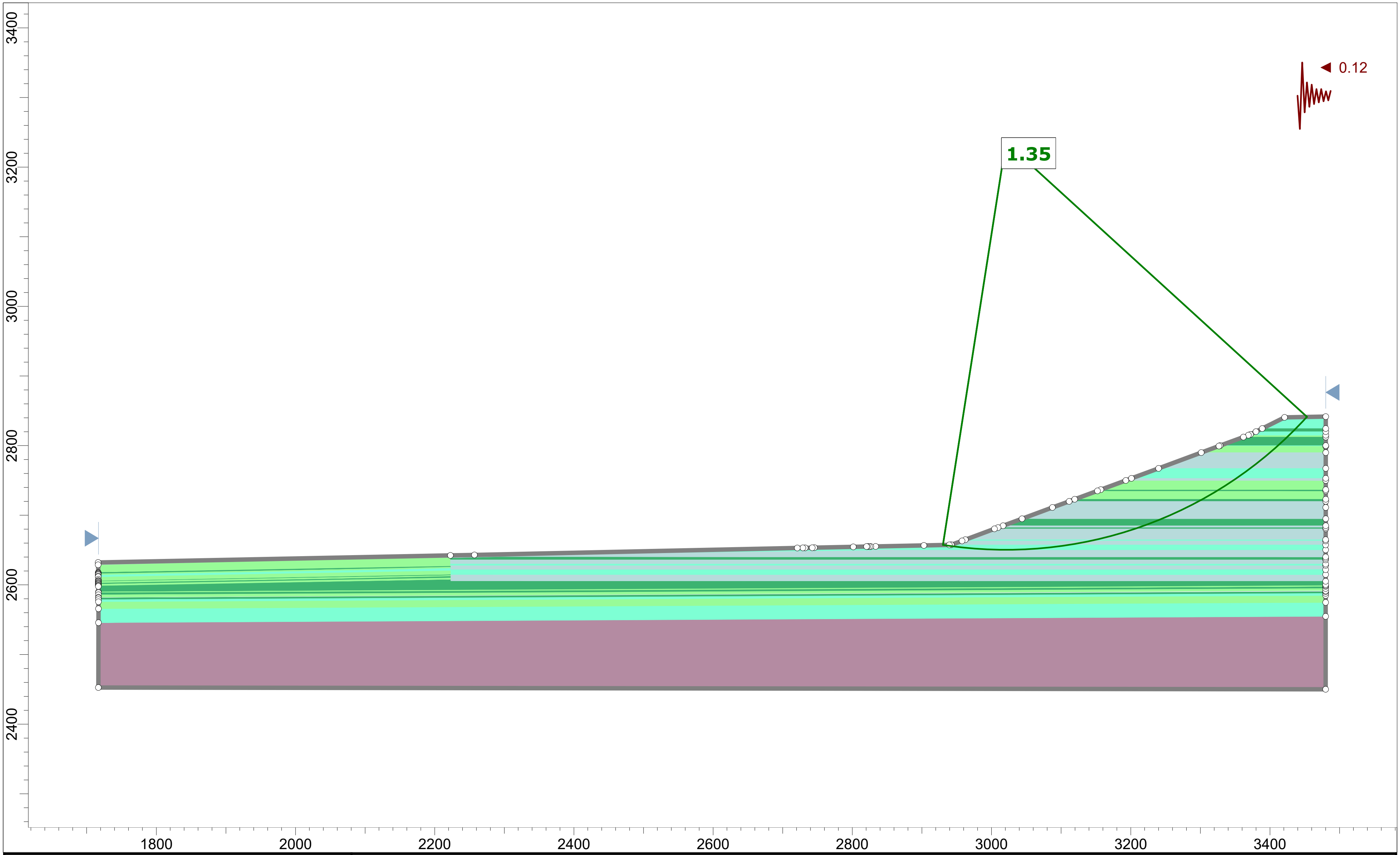


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28
PG Silty Sand - B4	🟩	110	Mohr-Coulomb	123	27
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8
Silty Sand - B4	⬜	115	Mohr-Coulomb	580	29.5
Silt - B7	⬜	110	Mohr-Coulomb	908	1
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10

rocscience

SLIDEINTERPRET 9.023

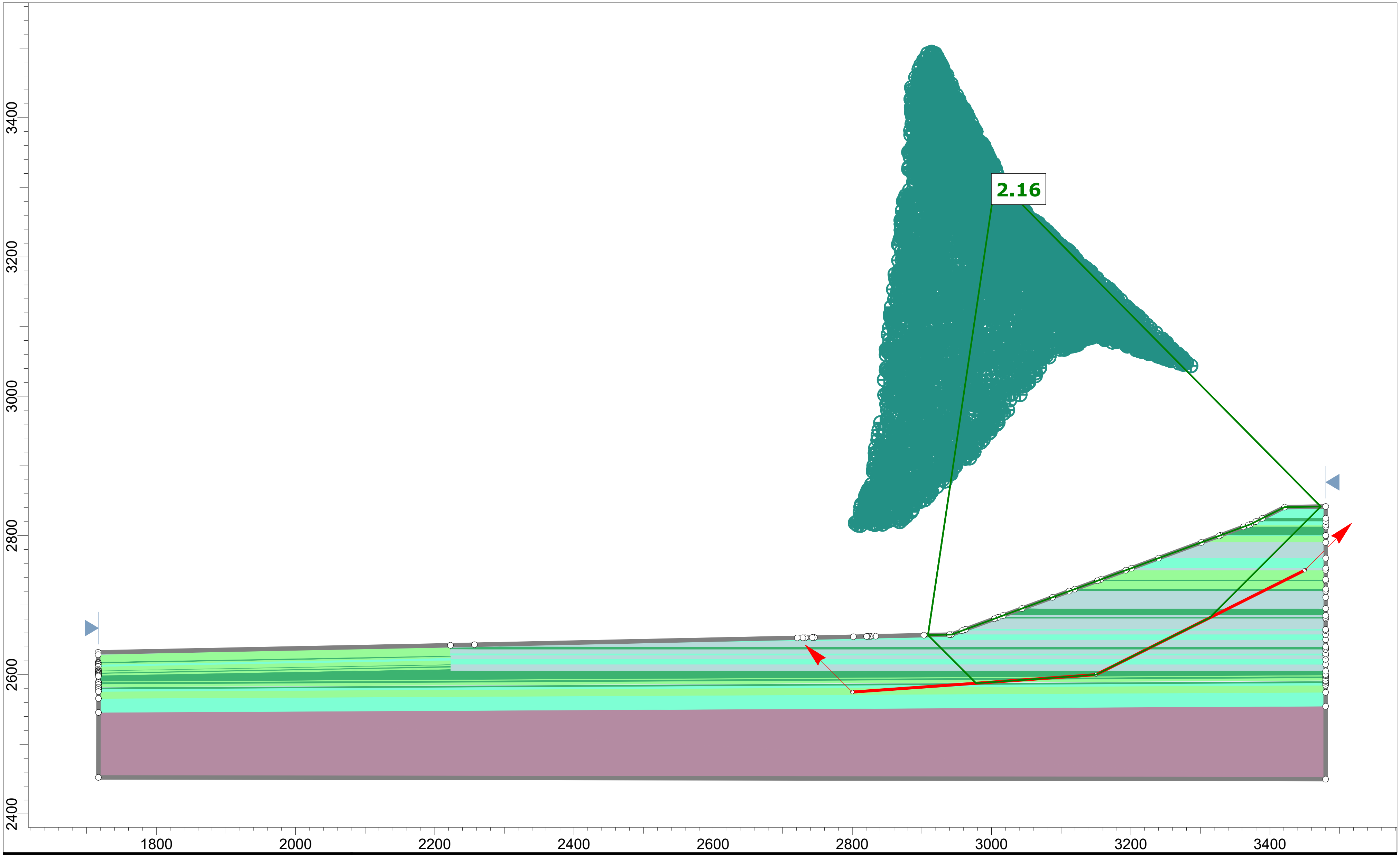
Project	Pickles Butte		Figure 14D
Group	SECTION C	*Scenario*	Proposed Excavation 2.85H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



Project	Pickles Butte		Figure 15D
Group	SECTION C	*Scenario*	Proposed Excavation 2.85H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Seismic Loading

rocscience

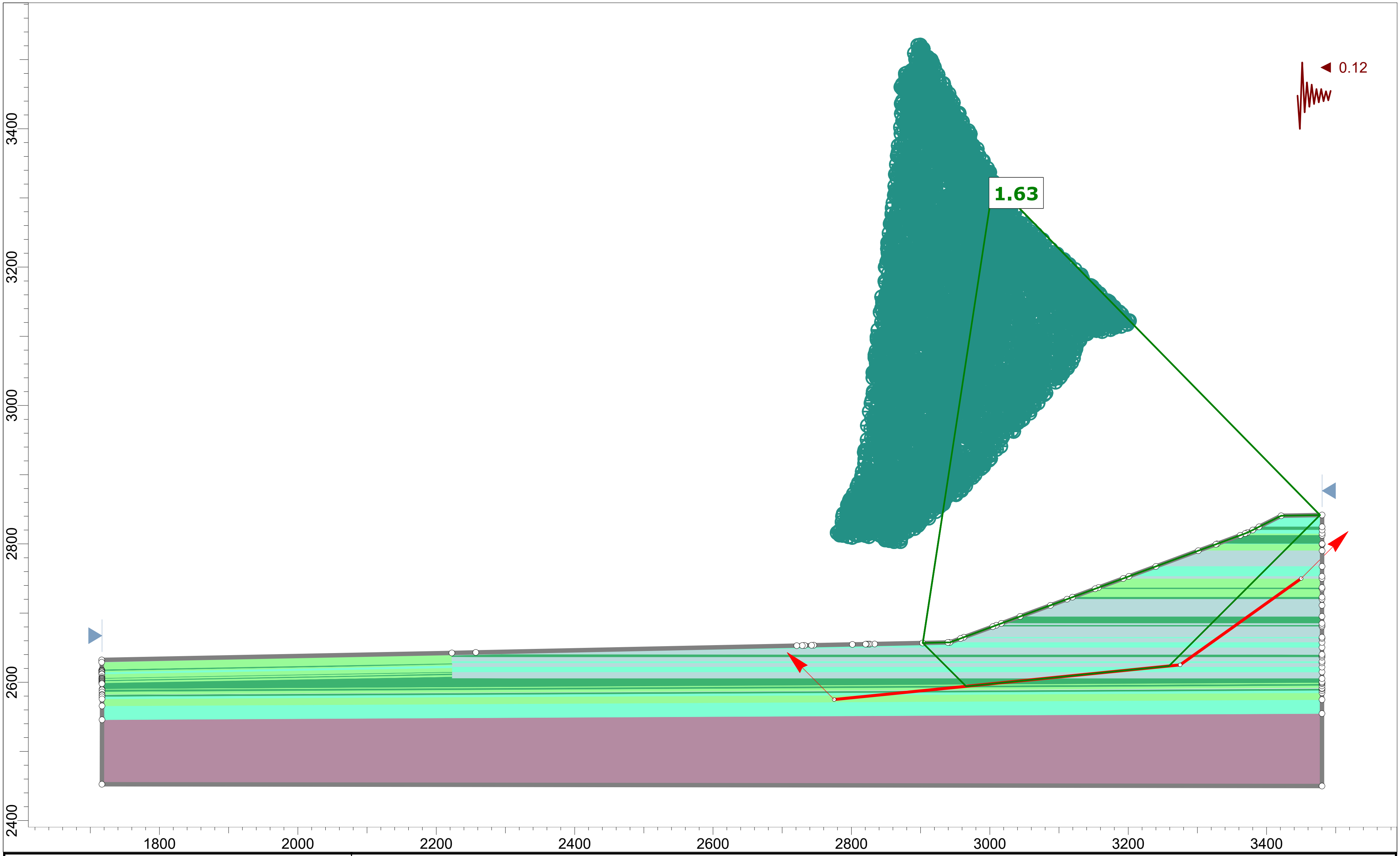
SLIDEINTERPRET 9.023



SLIDEINTERPRET 9.023

Project	Pickles Butte		
Group	SECTION C	*Scenario*	Proposed Excavation 2.85H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Static Loading - Block

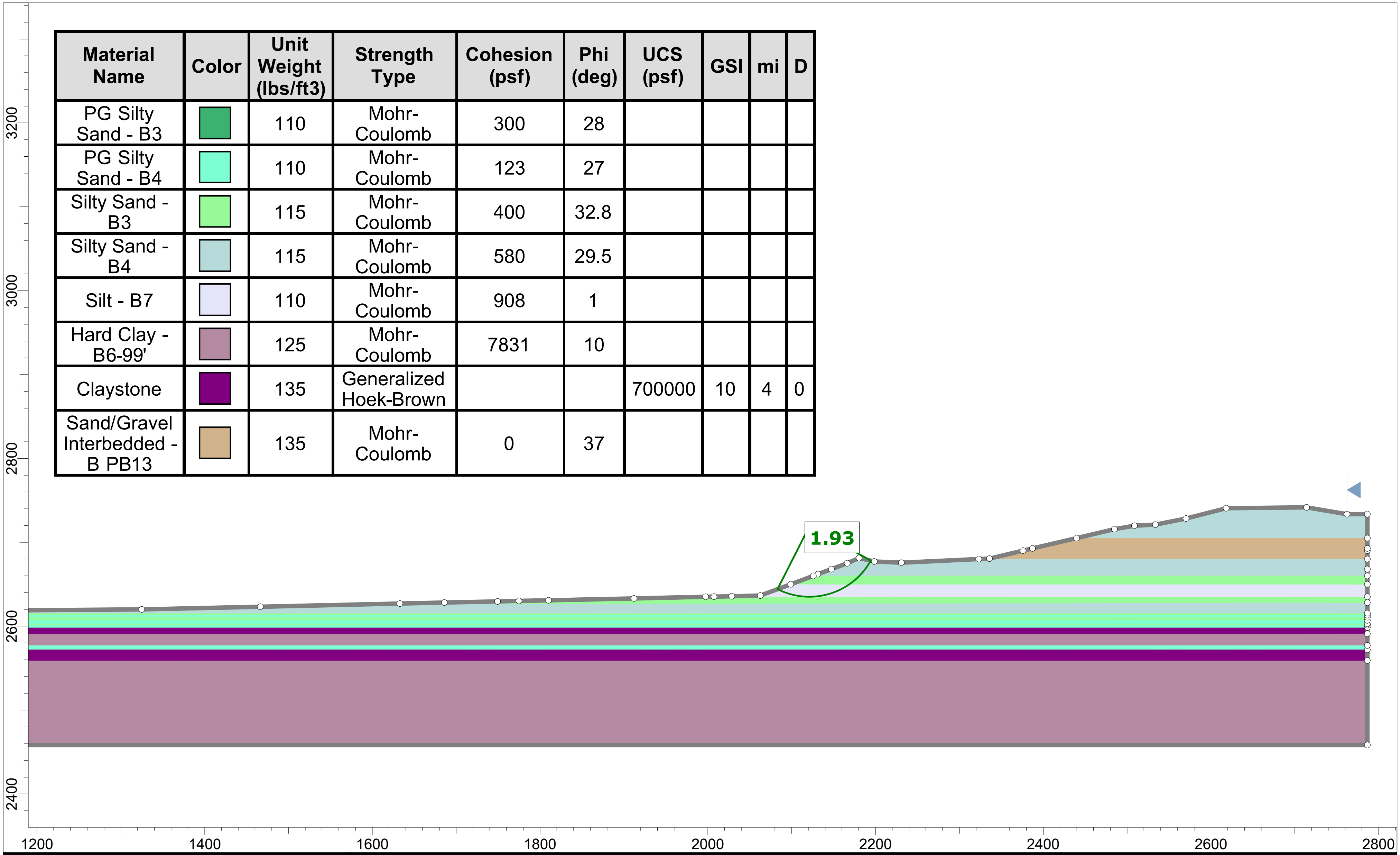
Figure 16D



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte
	Figure 17D
Group	SECTION C
Scenario	Proposed Excavation 2.85H:1V
Drawn By	SG
Company	Tetra Tech
Date	7/28/2022
File Name	Seismic Loading - Block Failure

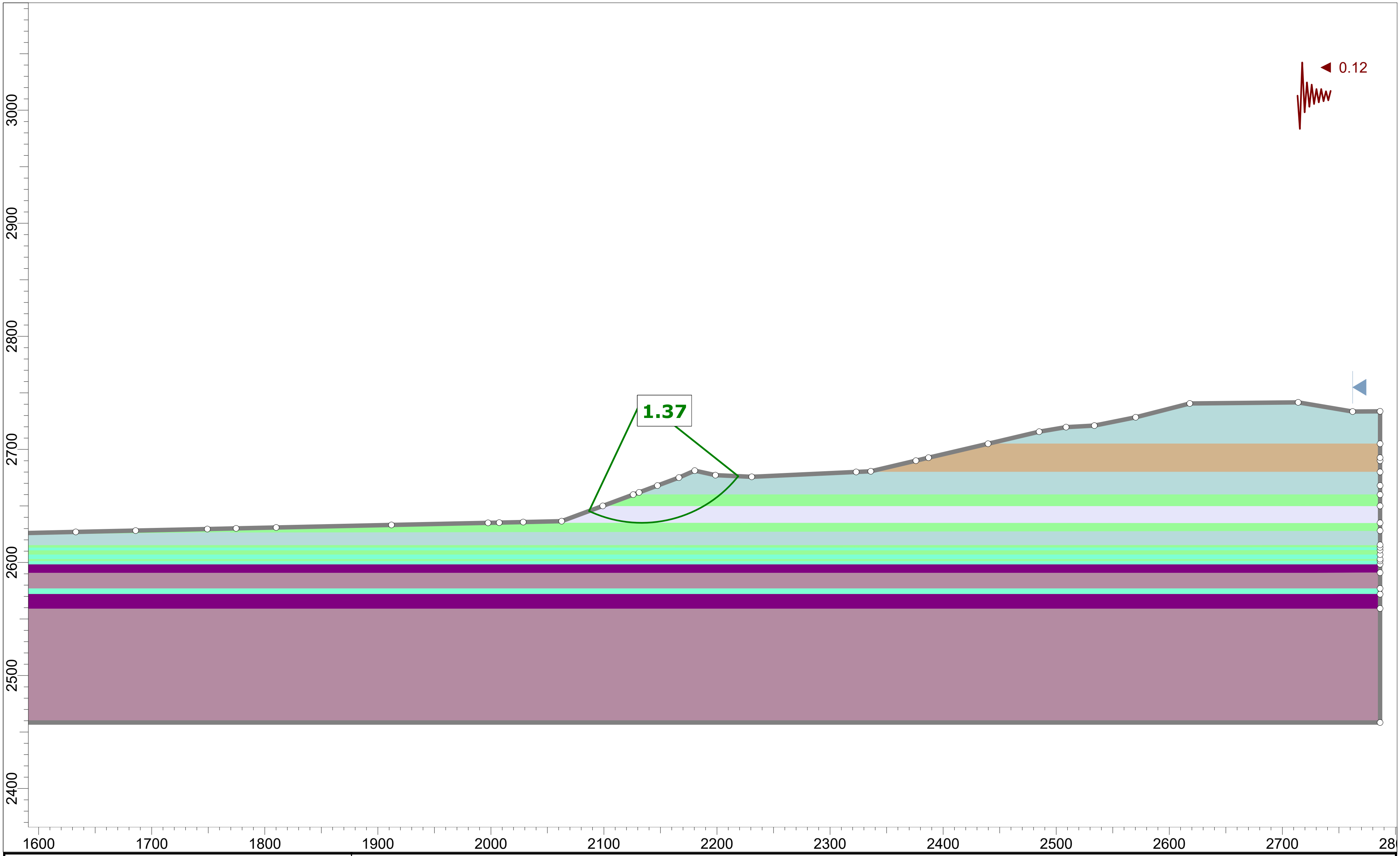


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28				
PG Silty Sand - B4	🟩	110	Mohr-Coulomb	123	27				
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Silt - B7	⬜	110	Mohr-Coulomb	908	1				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

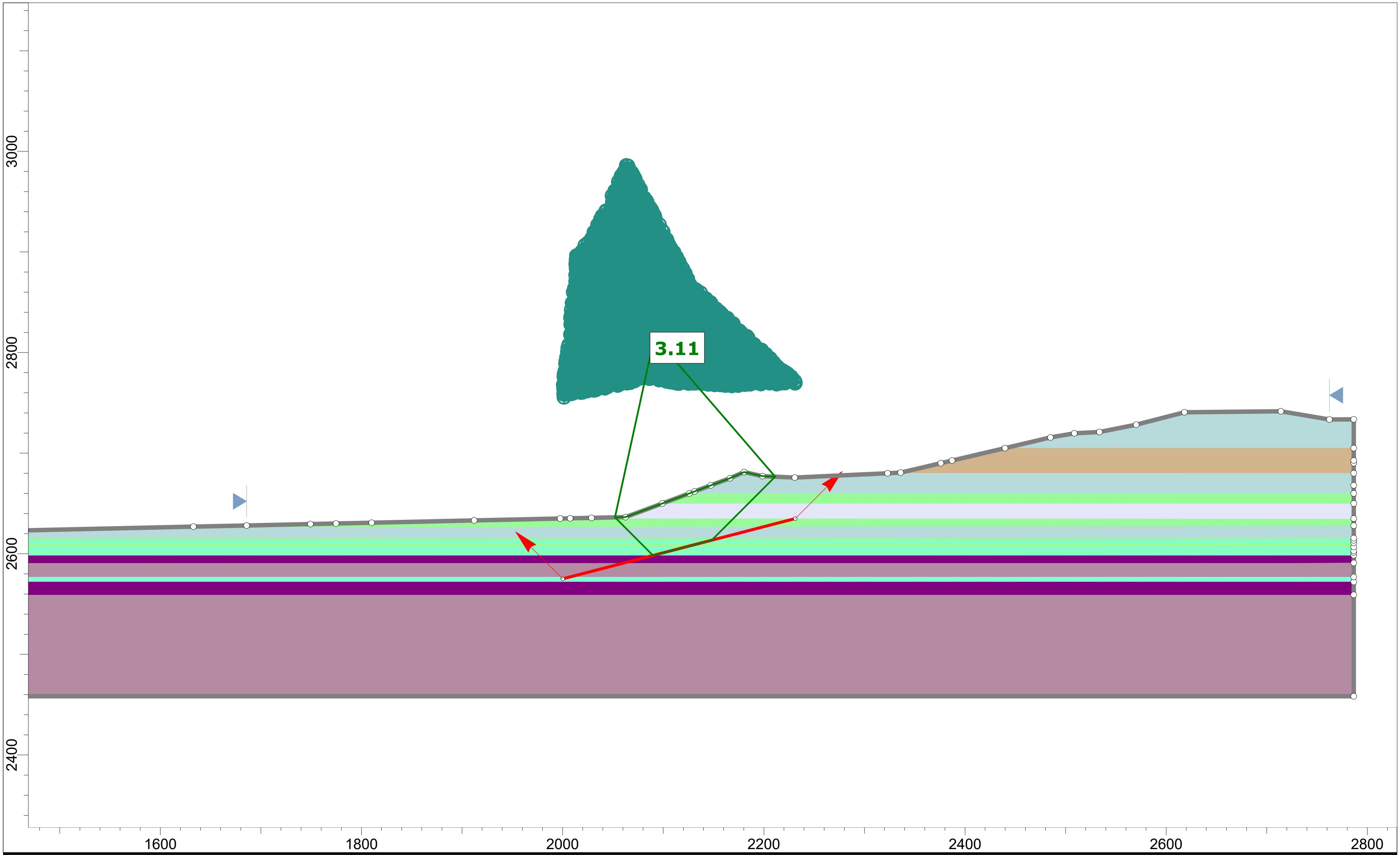
rocscience

SLIDEINTERPRET 9.023

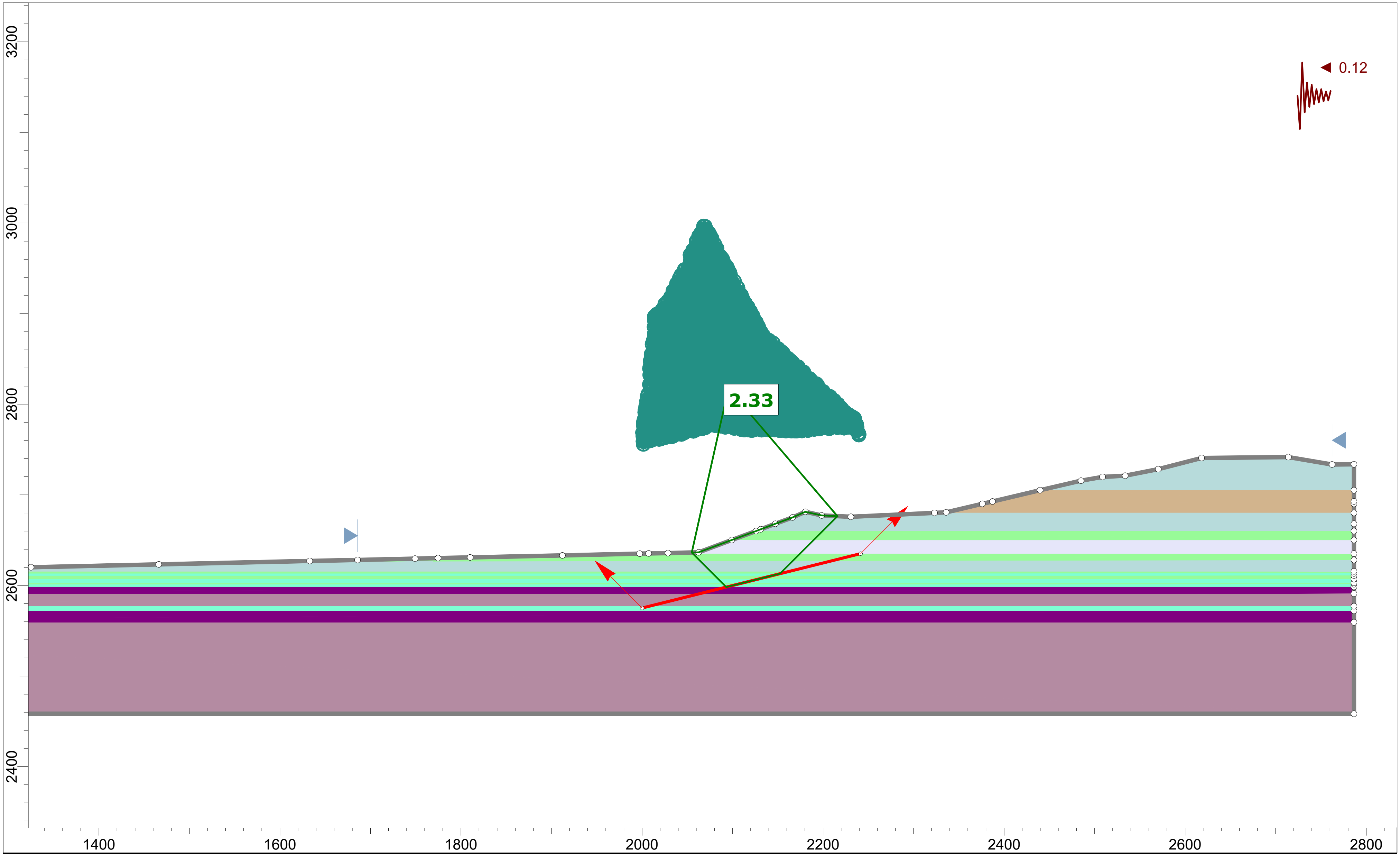
Project	Pickles Butte		Figure 18D
Group	SECTION D	*Scenario*	Proposed Excavation 2.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



rocscience	*Project*	Pickles Butte	Figure 19D
	Group SECTION D	*Scenario* Proposed Excavation 2.87H:1V	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/27/2022	*File Name* Seismic Loading	



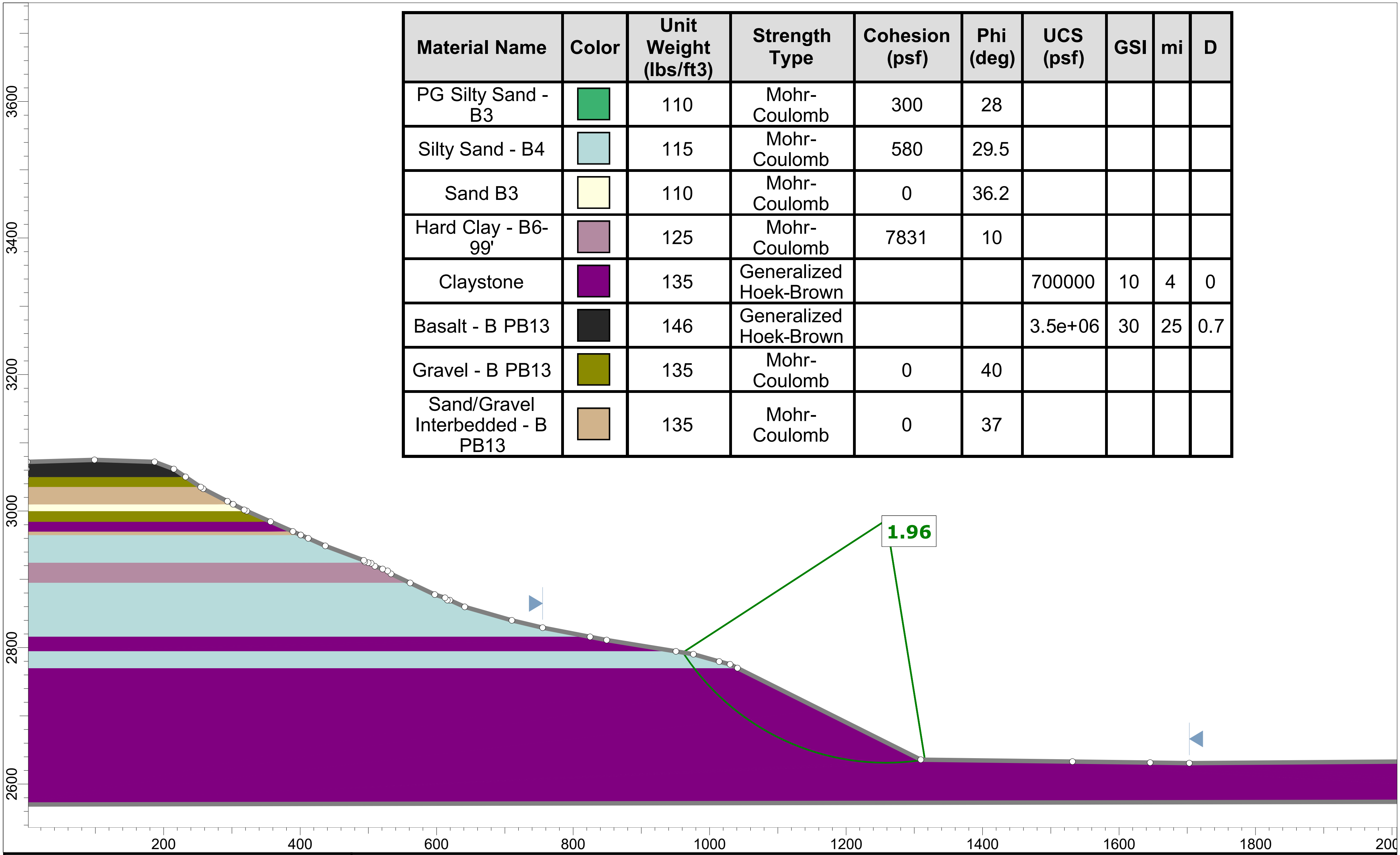
rocscience	*Project* Pickles Butte		Figure 20D
	Group SECTION D	*Scenario* Proposed Excavation 2.87H:1V	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/28/2022	*File Name* Static Loading - Block	



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 21D
Group	SECTION D	*Scenario*	Proposed Excavation 2.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading - Block Failure



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Sand B3	🟨	110	Mohr-Coulomb	0	36.2				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Basalt - B PB13	⬛	146	Generalized Hoek-Brown			3.5e+06	30	25	0.7
Gravel - B PB13	🟩	135	Mohr-Coulomb	0	40				
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

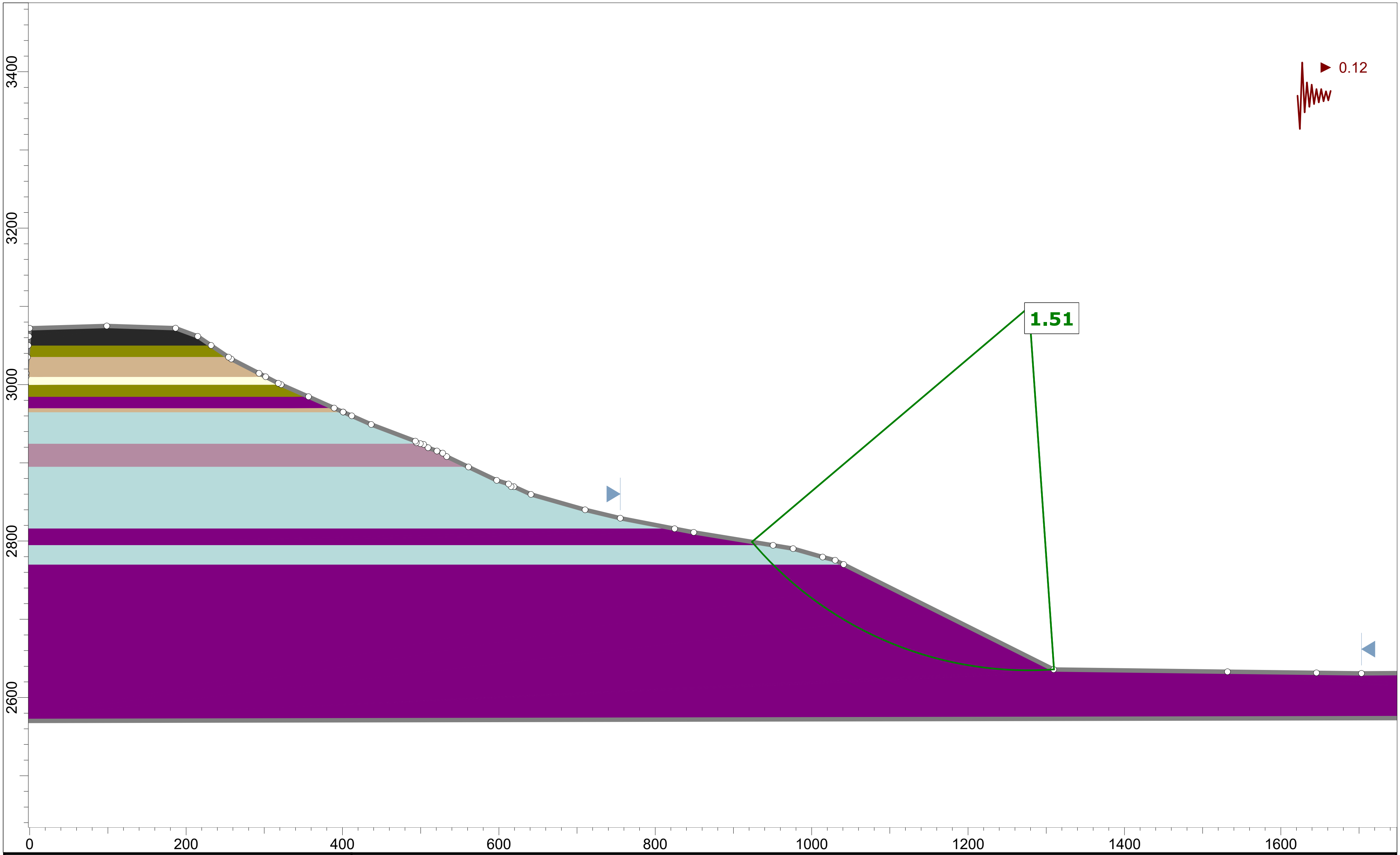
rocscience

SLIDEINTERPRET 9.023

Project
Pickles Butte

Figure 22D

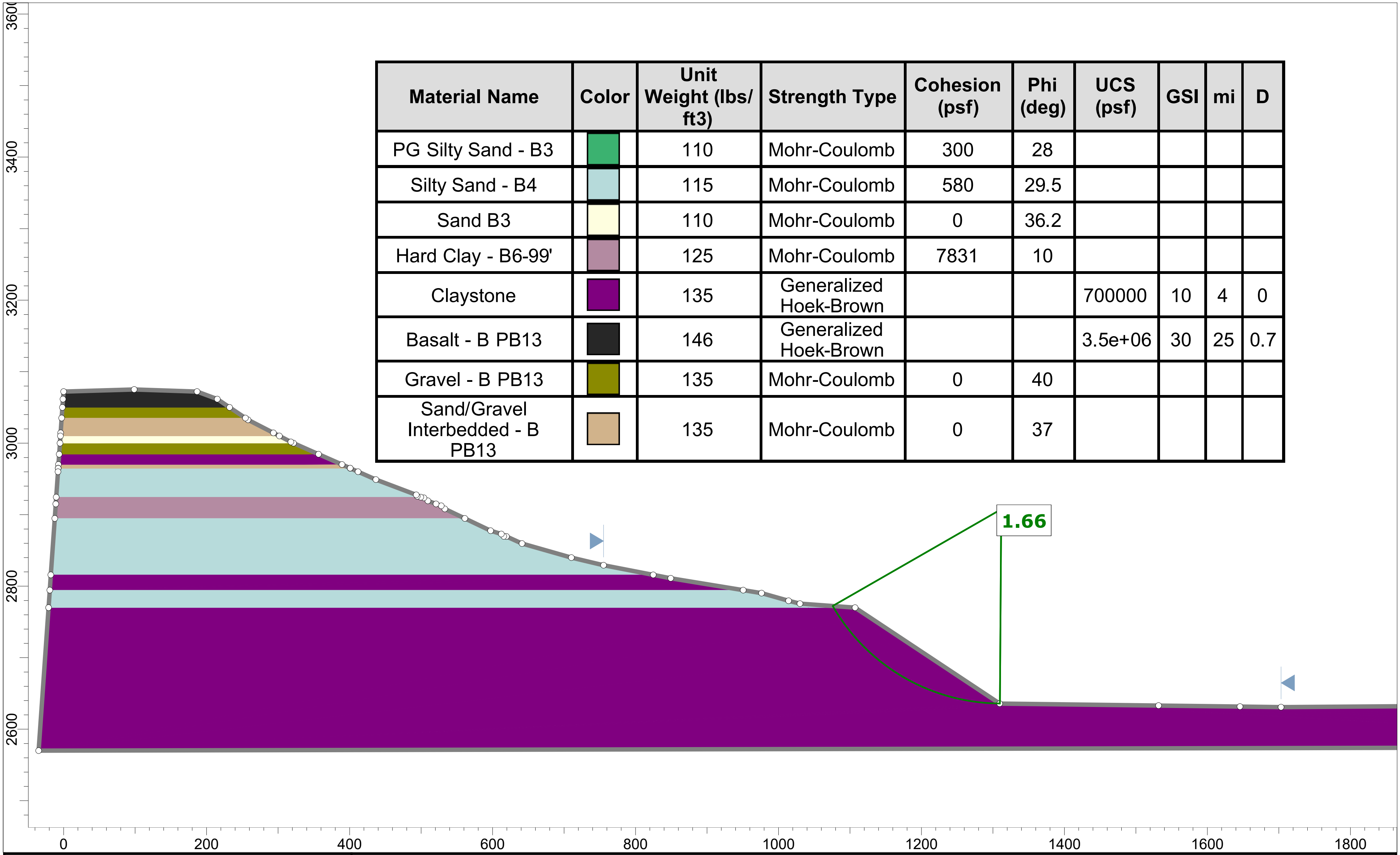
Group	SECTION E	*Scenario*	Proposed Excavation 2.27H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



rocscience

Project	Pickles Butte		Figure 23D
Group	SECTION E	*Scenario*	Proposed Excavation 2.27H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Seismic Loading

SLIDEINTERPRET 9.023

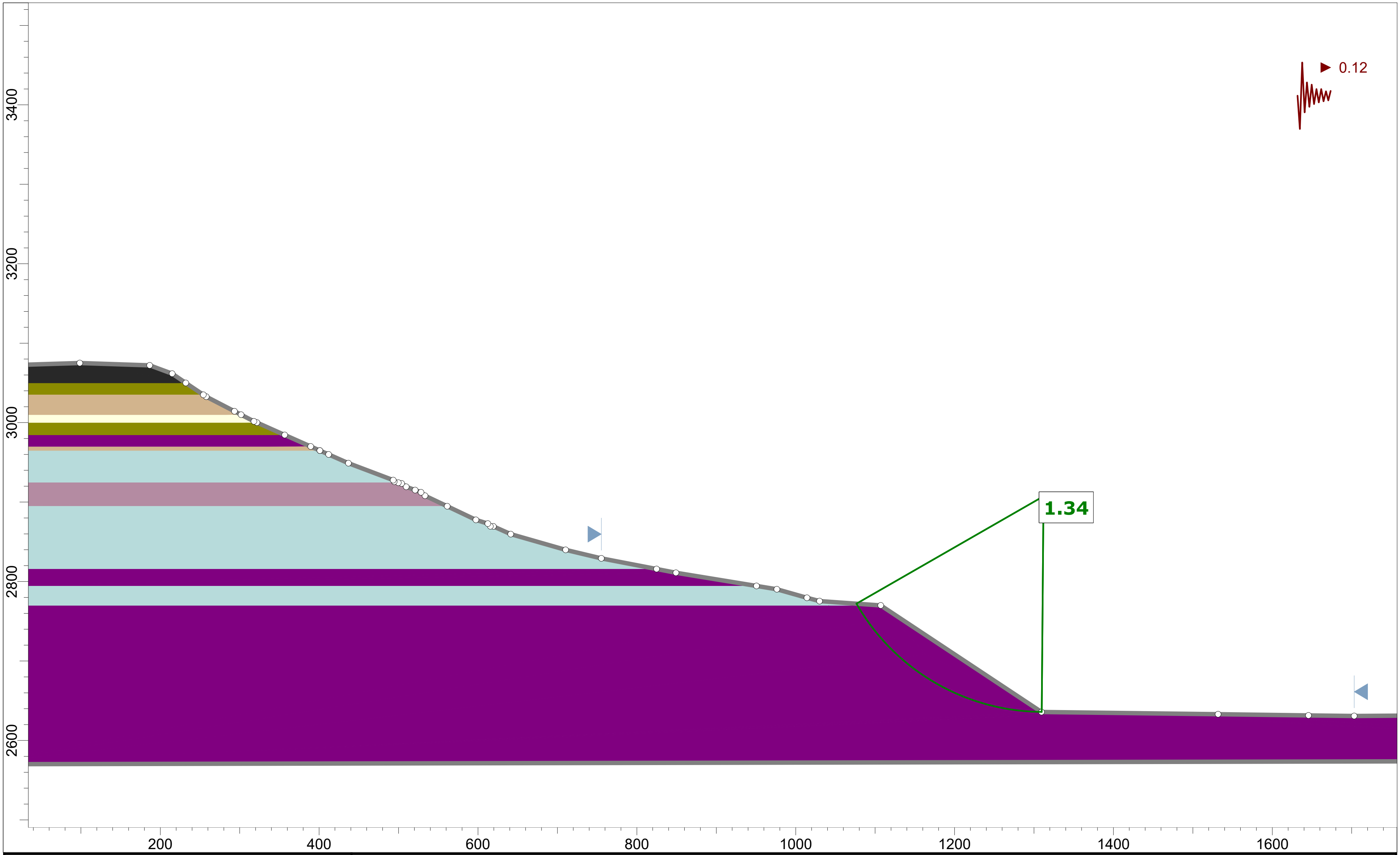


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Sand B3	⬜	110	Mohr-Coulomb	0	36.2				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Basalt - B PB13	⬛	146	Generalized Hoek-Brown			3.5e+06	30	25	0.7
Gravel - B PB13	🟨	135	Mohr-Coulomb	0	40				
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

rocscience

SLIDEINTERPRET 9.023

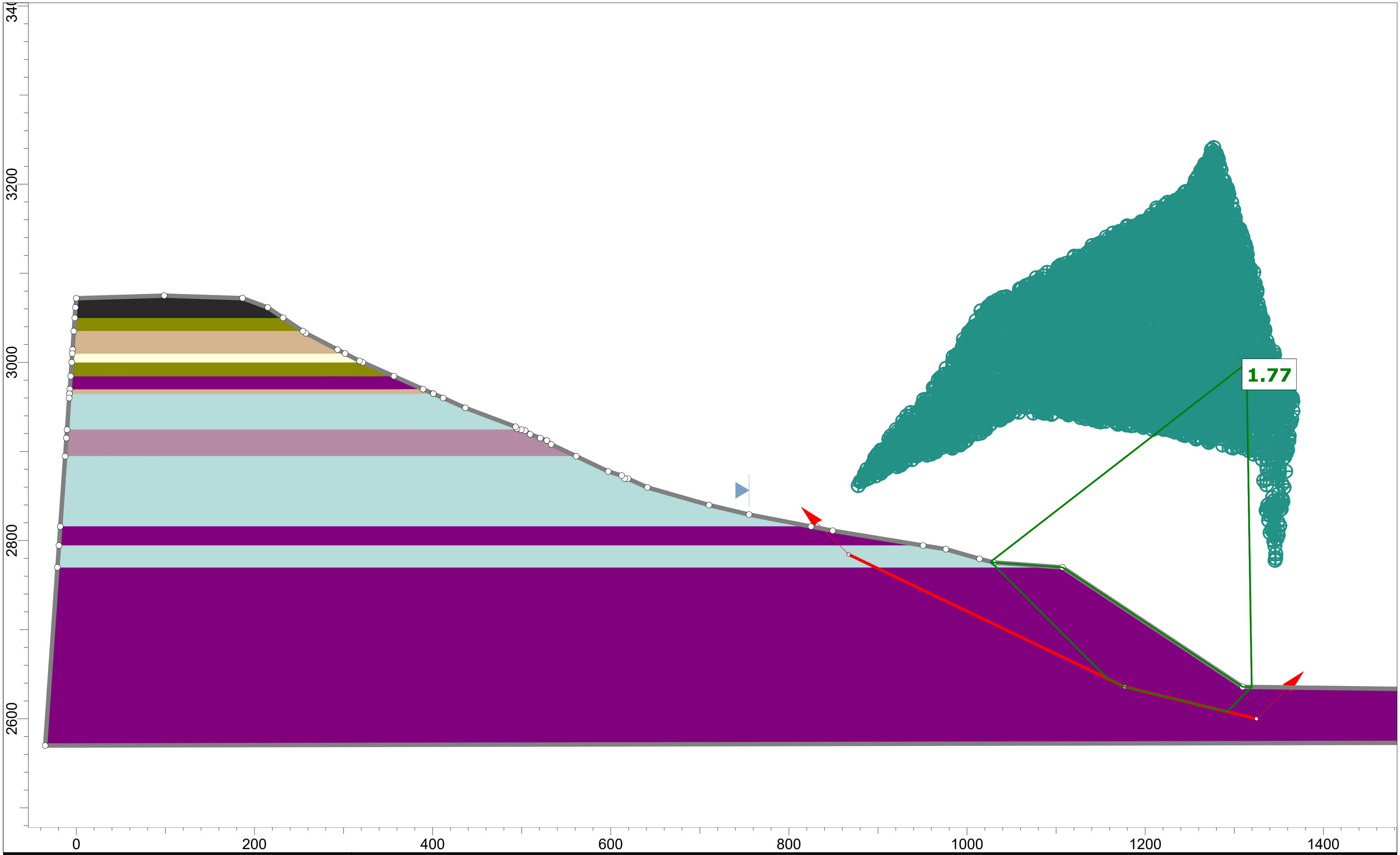
Project	Pickles Butte		Figure 24D
Group	SECTION E	*Scenario*	Proposed Excavation 1.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Static Loading



rocscience

SLIDEINTERPRET 9.023

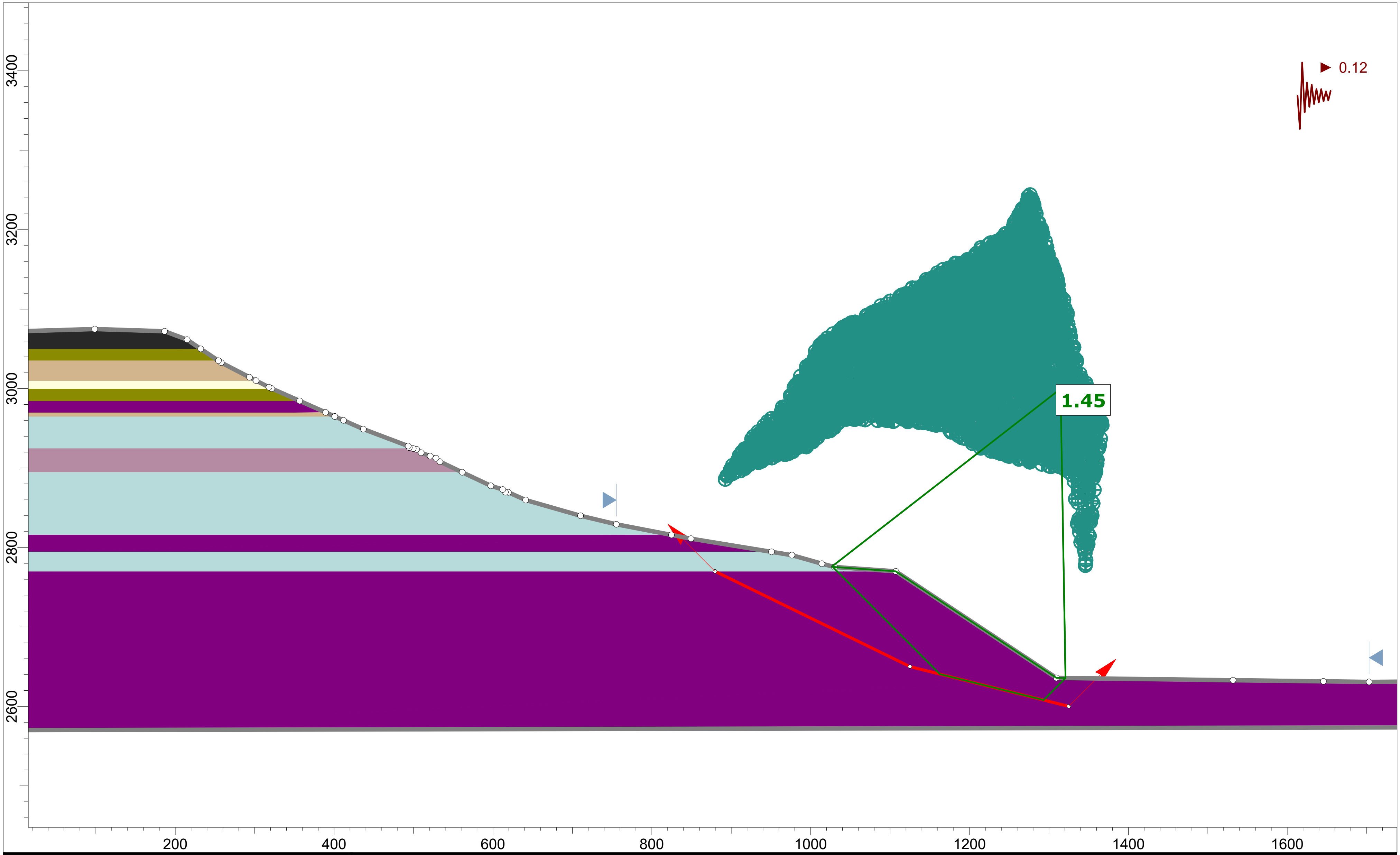
Project	Pickles Butte		Figure 25D
Group	SECTION E	*Scenario*	Proposed Excavation 1.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/27/2022	*File Name*	Seismic Loading



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 26D
Group	SECTION E	*Scenario*	Proposed Excavation1.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Static Loading - Block



rocscience

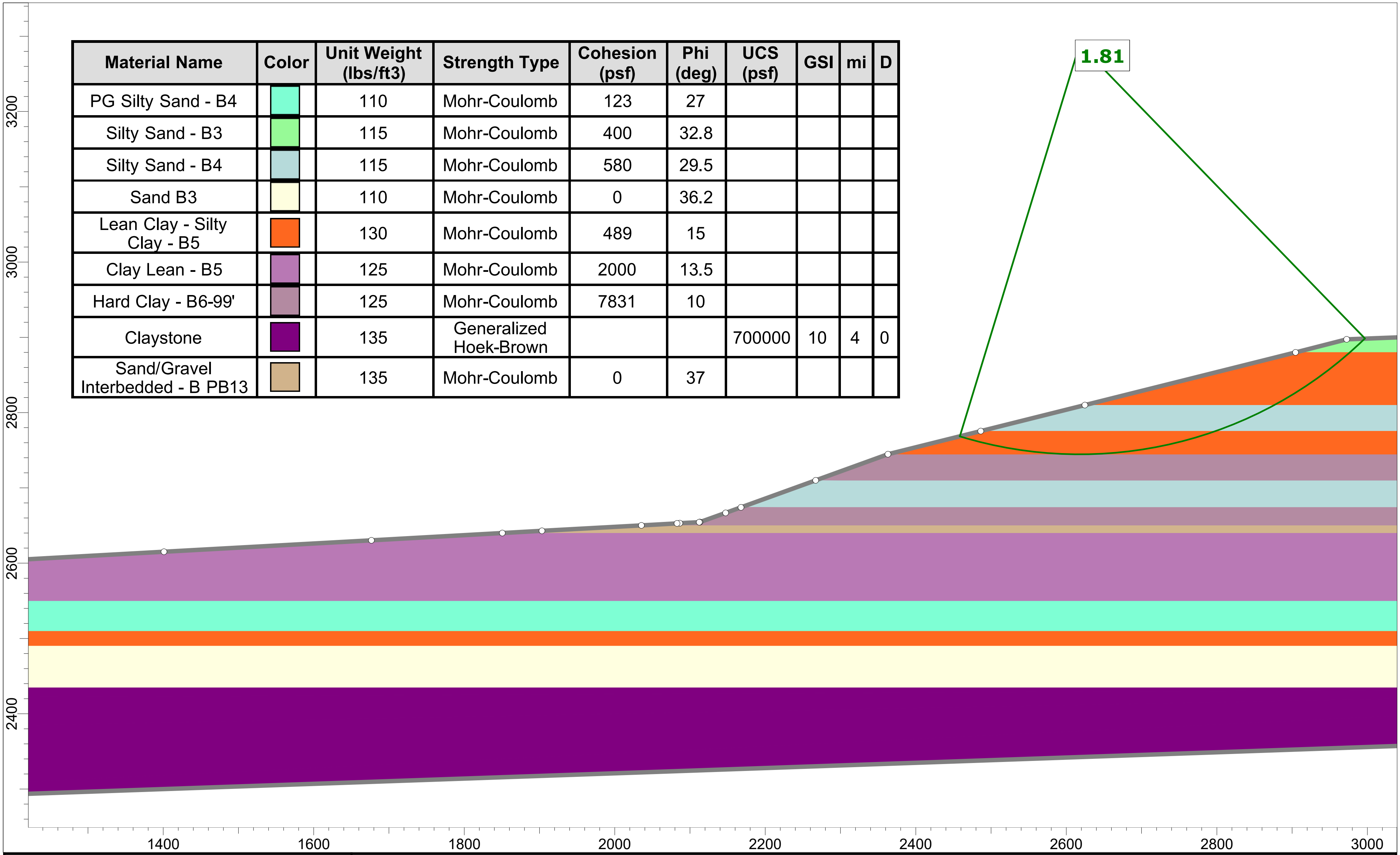
SLIDEINTERPRET 9.023

Project

Pickles Butte

Figure 27D

Group	SECTION E	*Scenario*	Proposed Excavation 1.87H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading - Block



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B4	🟩	110	Mohr-Coulomb	123	27				
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Sand B3	🟨	110	Mohr-Coulomb	0	36.2				
Lean Clay - Silty Clay - B5	🟧	130	Mohr-Coulomb	489	15				
Clay Lean - B5	🟪	125	Mohr-Coulomb	2000	13.5				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

rocscience

SLIDEINTERPRET 9.023

Project Pickles Butte

Figure 28D

Group SECTION F

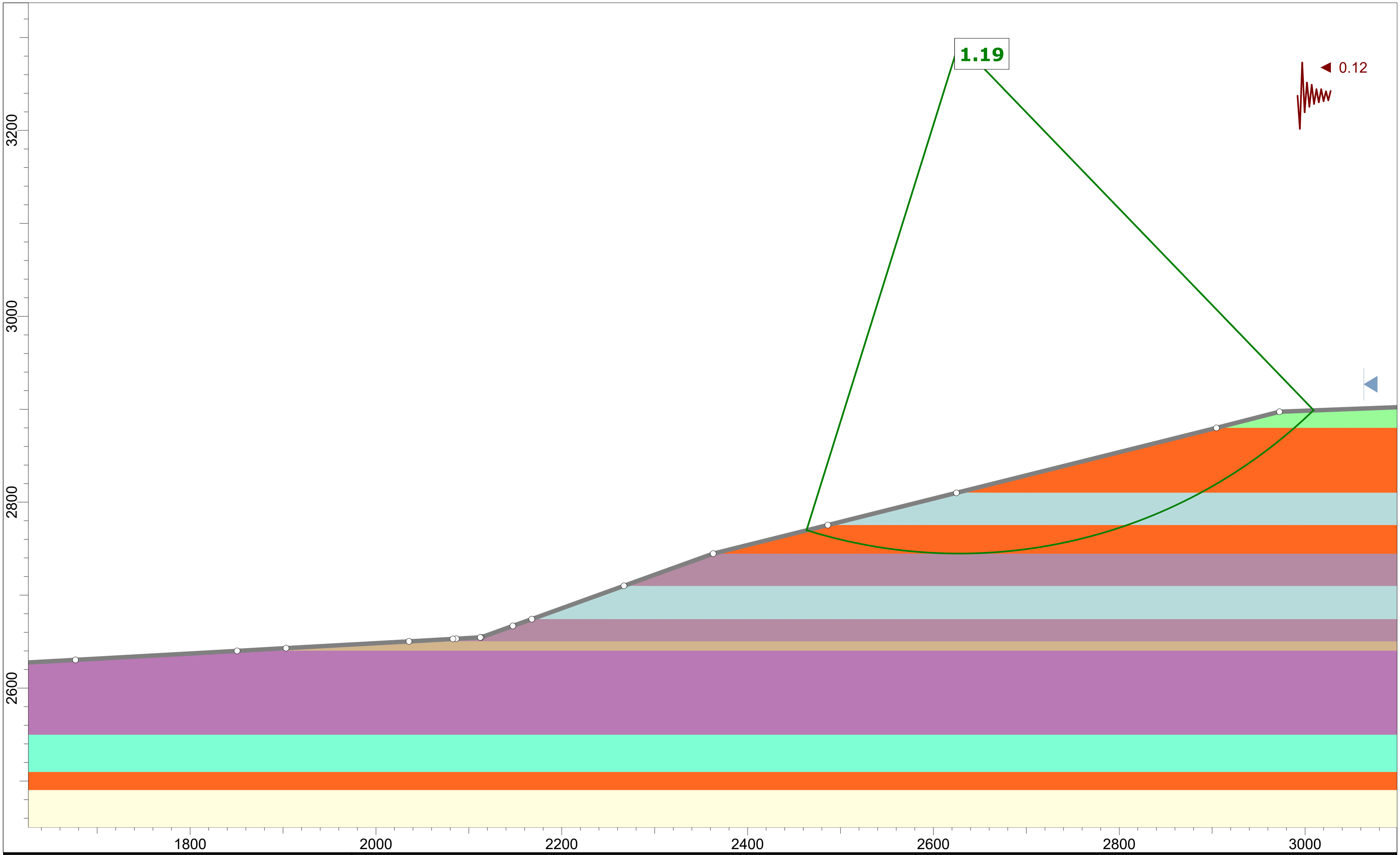
Scenario Proposed Excavation 3H:1V Lower, 4H:1V Upper

Drawn By SG

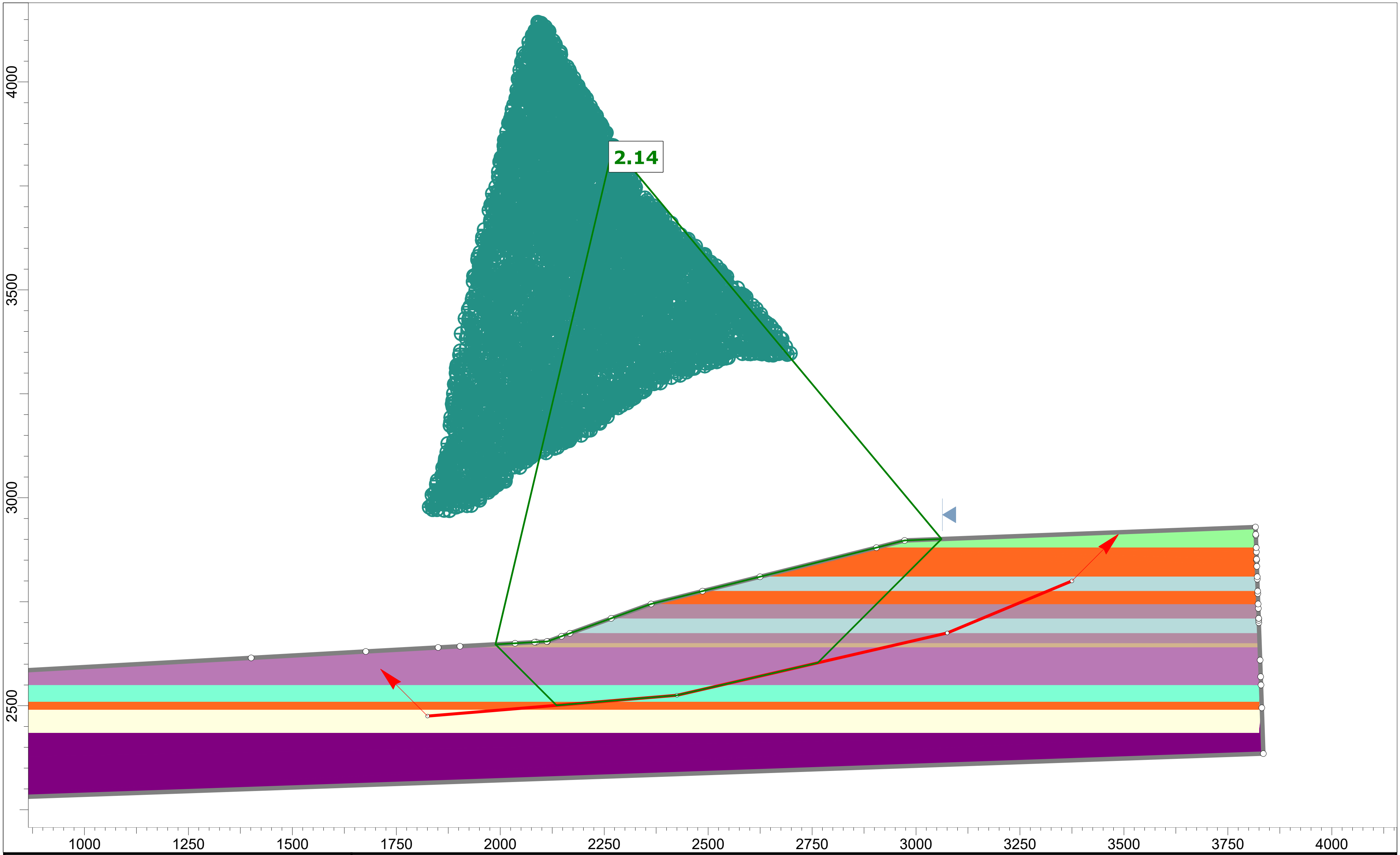
Company Tetra Tech

Date 7/28/2022

File Name Static Loading



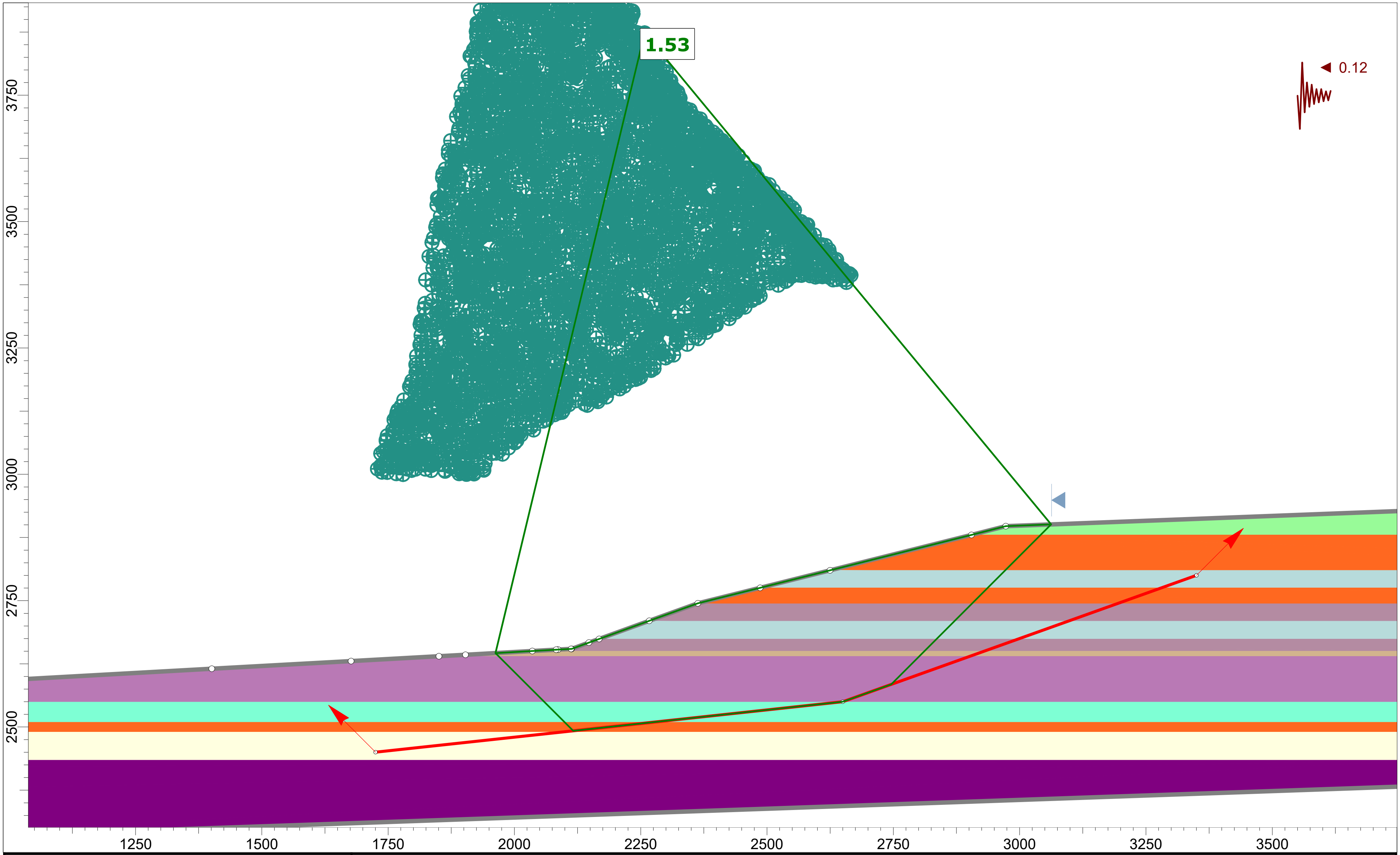
rocscience	*Project*	Pickles Butte	Figure 29D
	Group	SECTION F	*Scenario* Proposed Excavation 3H:1V Lower, 4H:1V Upper
	Drawn By	SG	*Company* Tetra Tech
SLIDEINTERPRET 9.023	*Date*	7/28/2022	*File Name* Seismic Loading



rocscience

SLIDEINTERPRET 9.023

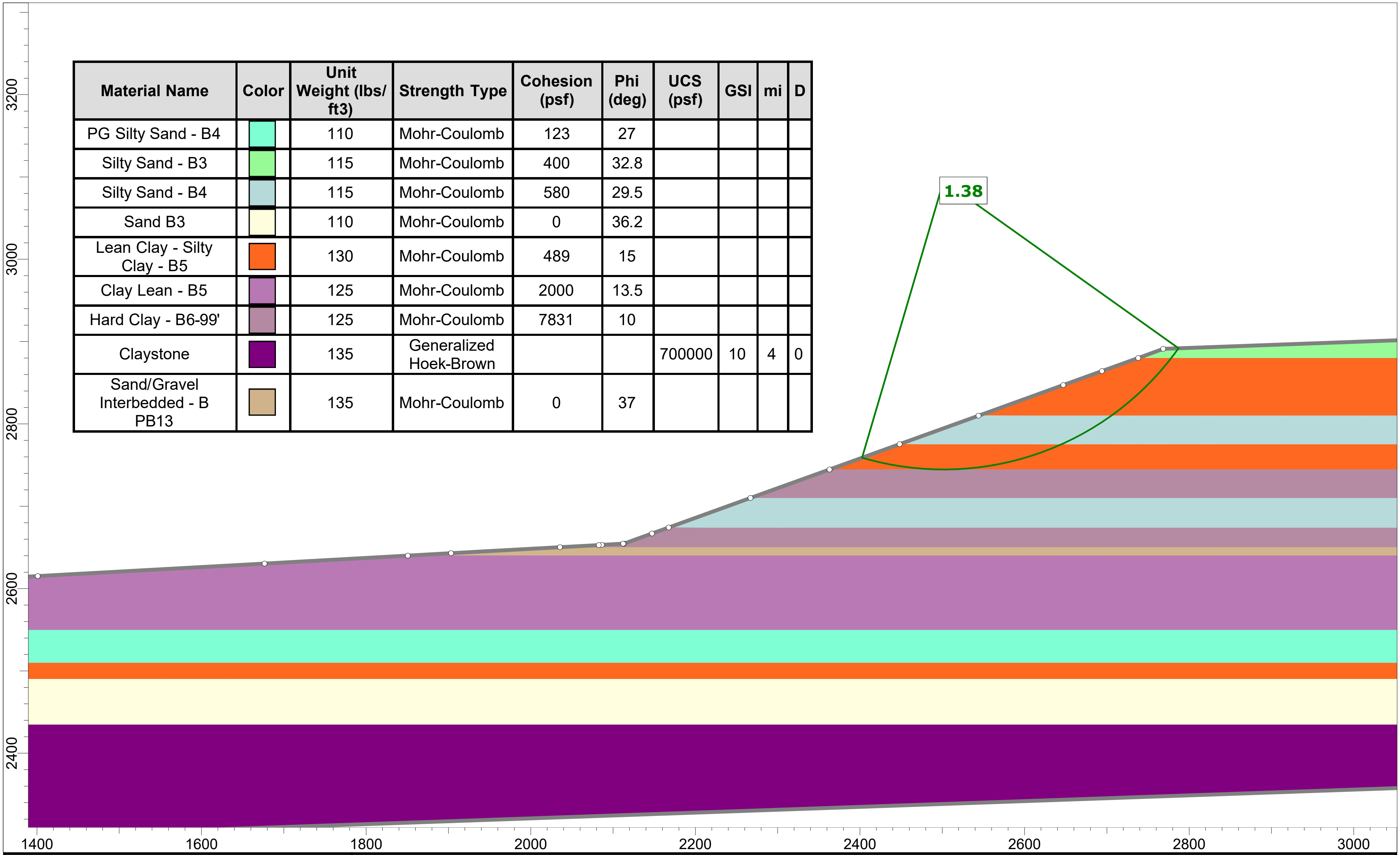
Project	Pickles Butte
	Figure 30D
Group	SECTION F
Scenario	Proposed Excavation 3H:1V Lower, 4H:1V Upper
Drawn By	SG
Company	Tetra Tech
Date	7/28/2022
File Name	Static Loading - Block Failure



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte
	Figure 31D
Group	SECTION F
Scenario	Proposed Excavation 3H:1V Lower, 4H:1V Upper
Drawn By	SG
Company	Tetra Tech
Date	7/28/2022
File Name	Static Loading - Block Failure

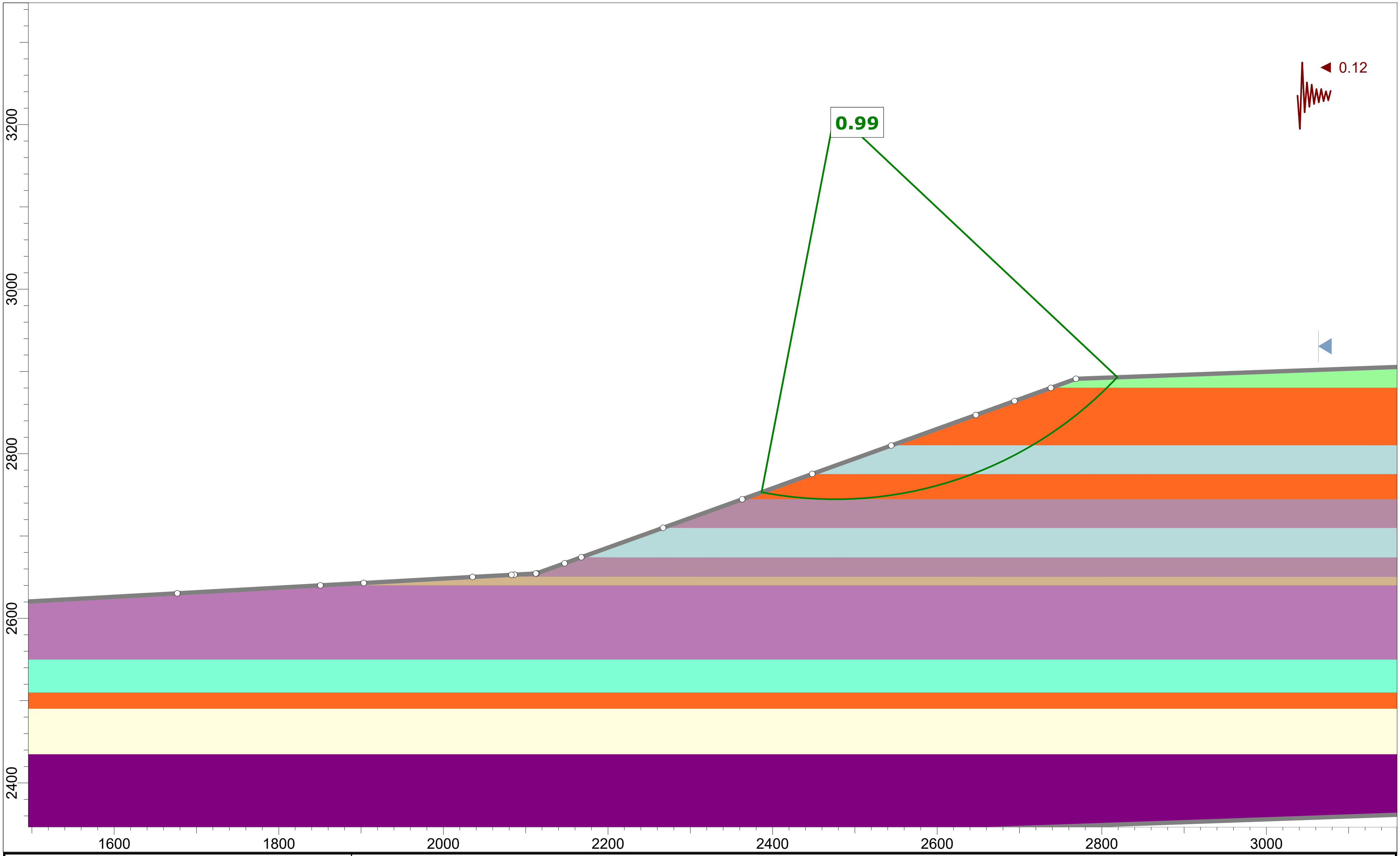


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B4	🟦	110	Mohr-Coulomb	123	27				
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Sand B3	⬜	110	Mohr-Coulomb	0	36.2				
Lean Clay - Silty Clay - B5	🟧	130	Mohr-Coulomb	489	15				
Clay Lean - B5	🟪	125	Mohr-Coulomb	2000	13.5				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

rocscience

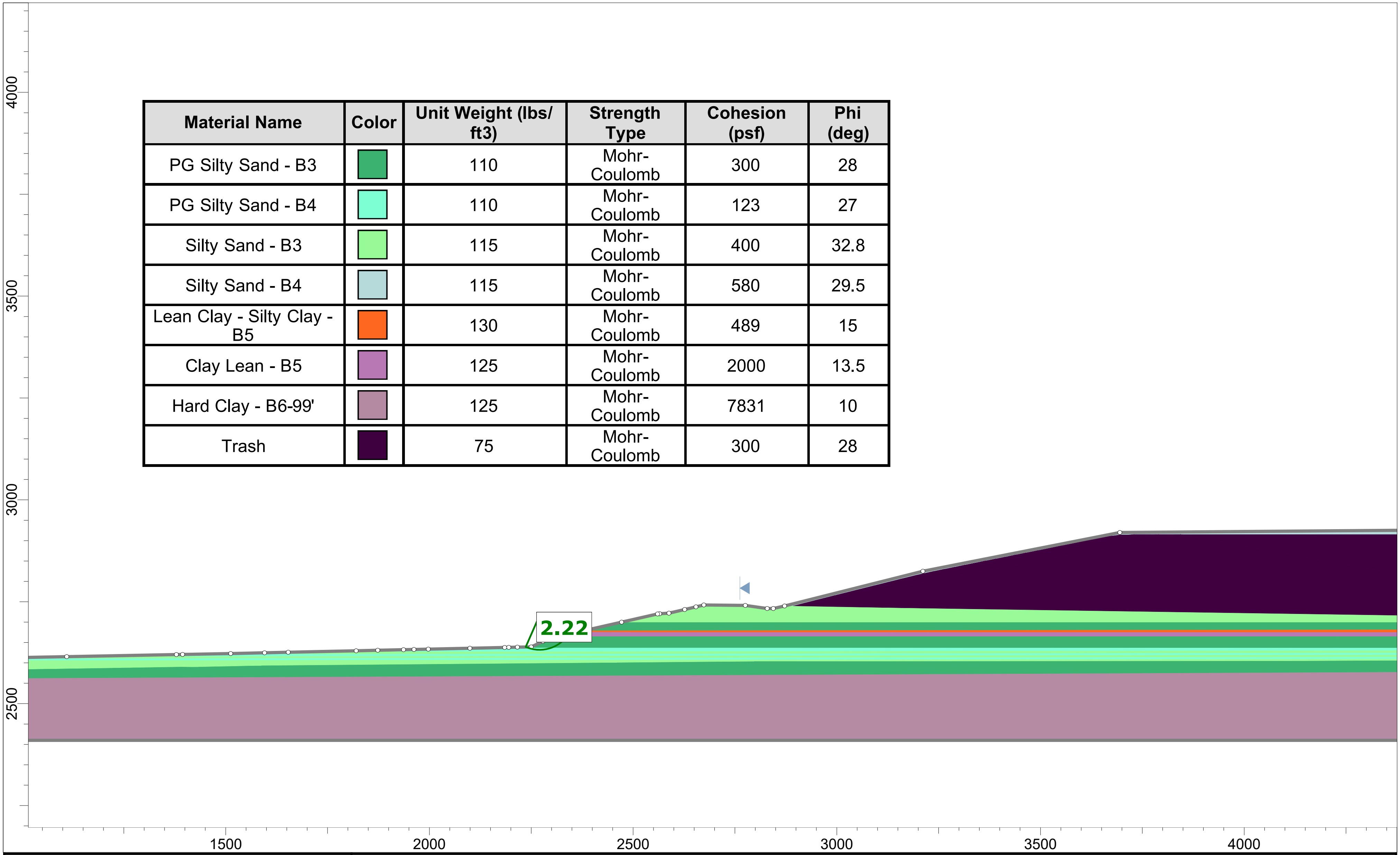
SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 32D
Group	SECTION F	*Scenario*	Proposed Excavation 3H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Static Loading



rocscience	*Project*	Pickles Butte	Figure 33D
	Group SECTION F	*Scenario* Proposed Excavation 3H:1V	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/28/2022	*File Name* Seismic Loading	

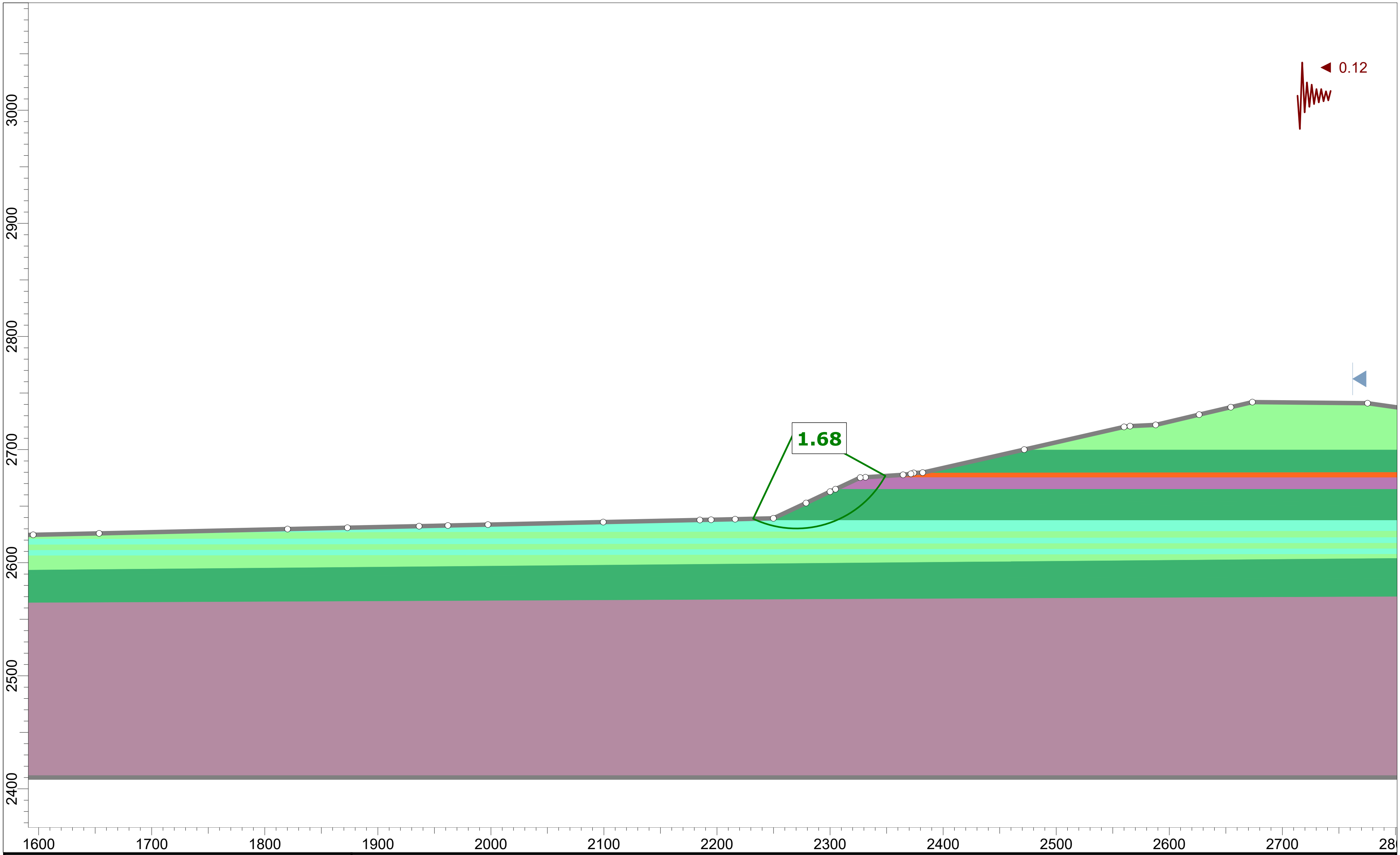
Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
PG Silty Sand - B3	🟩	110	Mohr-Coulomb	300	28
PG Silty Sand - B4	🟦	110	Mohr-Coulomb	123	27
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5
Lean Clay - Silty Clay - B5	🟧	130	Mohr-Coulomb	489	15
Clay Lean - B5	🟪	125	Mohr-Coulomb	2000	13.5
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10
Trash	🟪	75	Mohr-Coulomb	300	28



rocscience

SLIDEINTERPRET 9.023

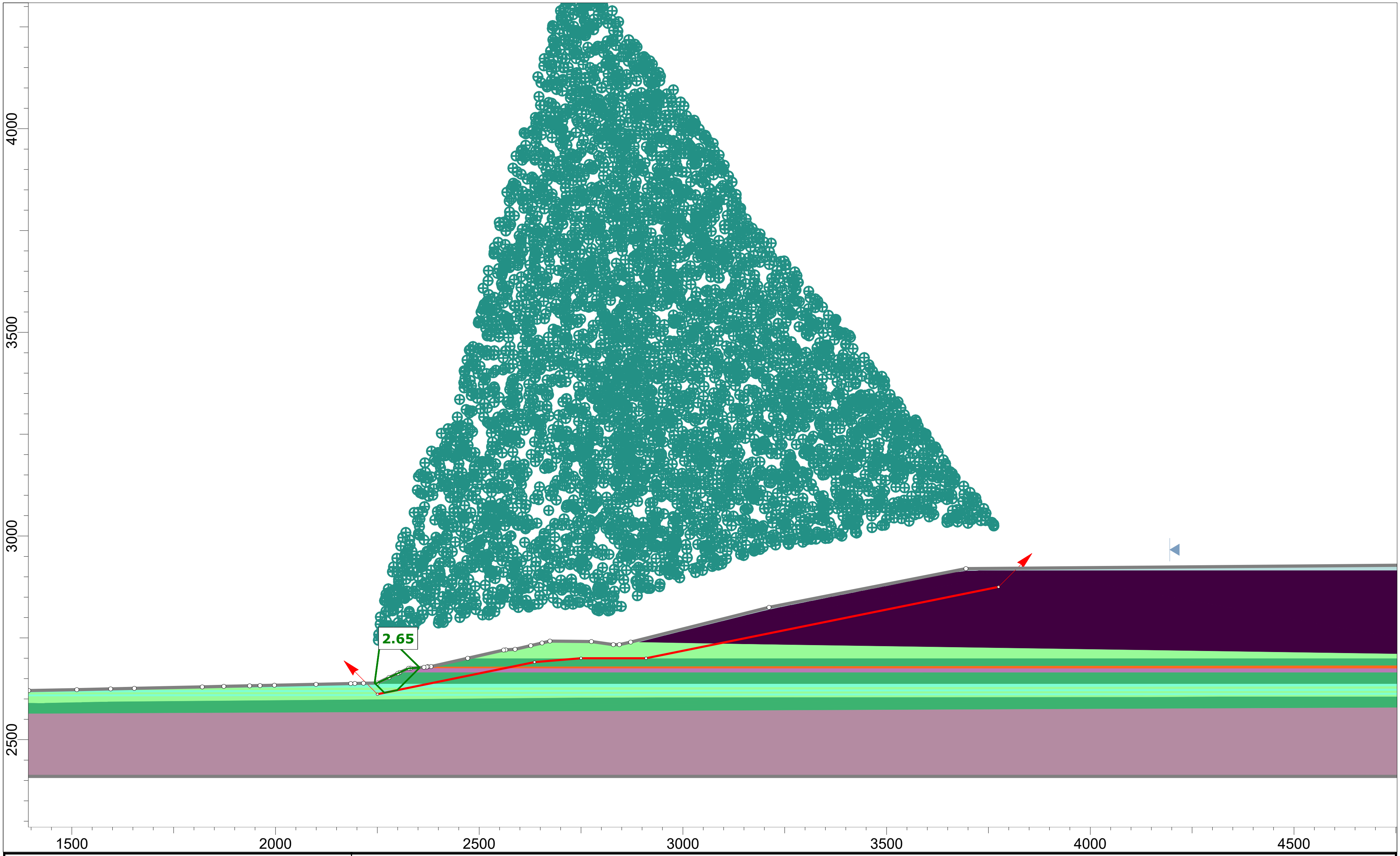
Project	Pickles Butte		Figure 34D
Group	SECTION G	*Scenario*	Proposed Excavation 2.6H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Static Loading



rocscience

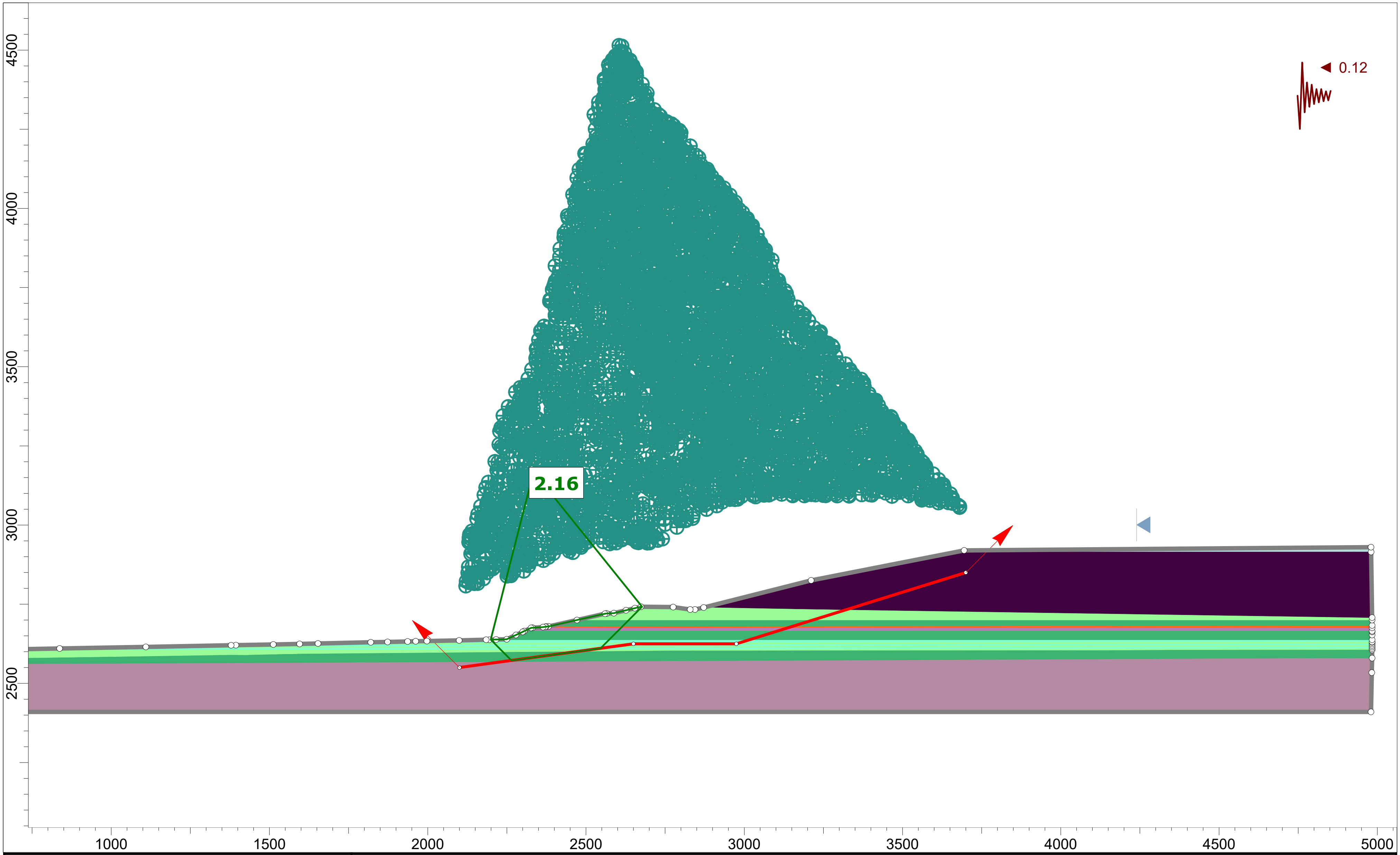
SLIDEINTERPRET 9.023

Project	Pickles Butte		**Figure 35D**
Group	SECTION G	*Scenario*	Proposed Excavation 2.6H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading



Project	Pickles Butte		Figure 36D
Group	SECTION G	Scenario	Proposed Excavation 2.6H:1V
Drawn By	SG	Company	Tetra Tech
Date	7/28/2022	File Name	Static Loading - Block

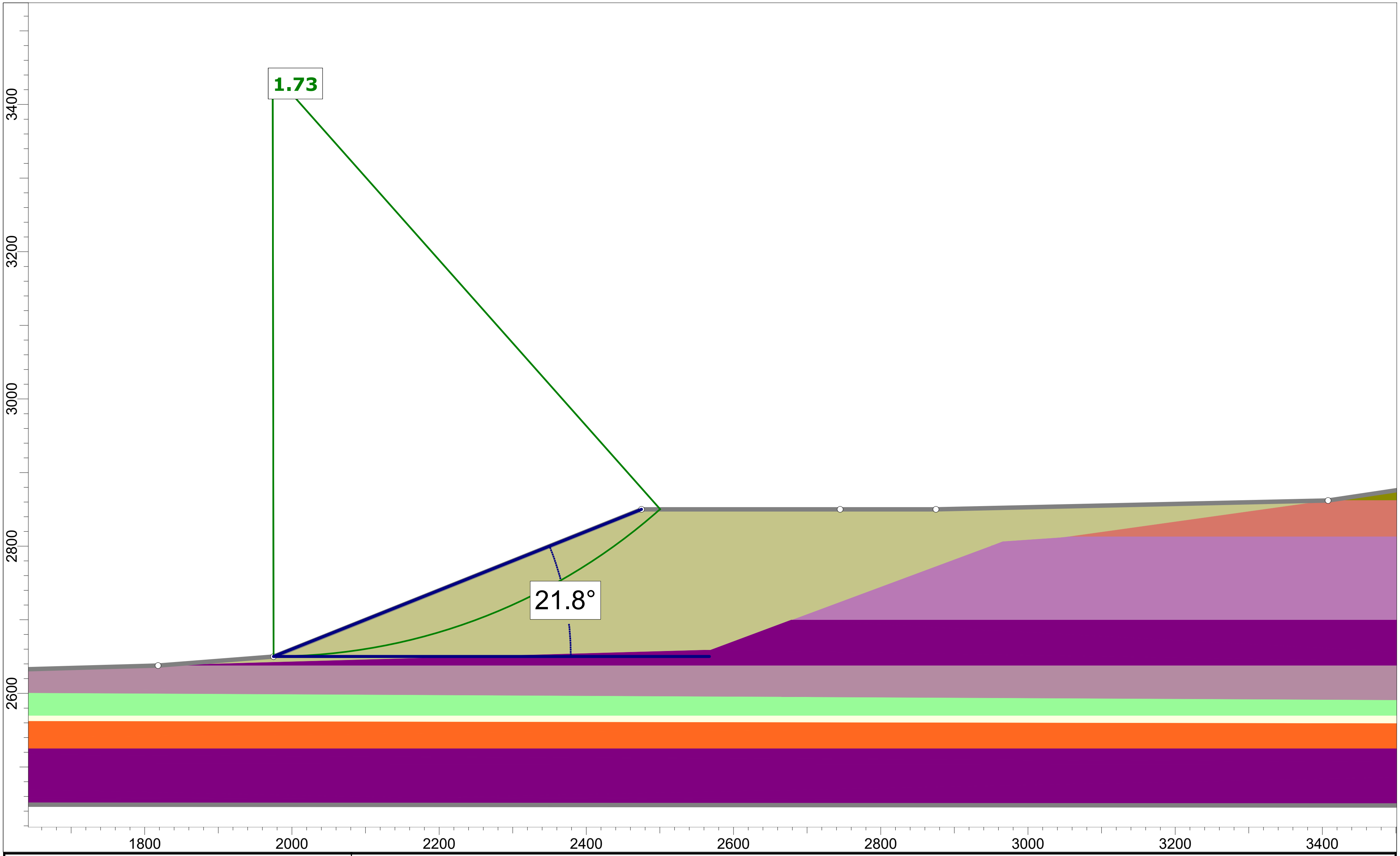
SLIDEINTERPRET 9.023



rocscience

SLIDEINTERPRET 9.023

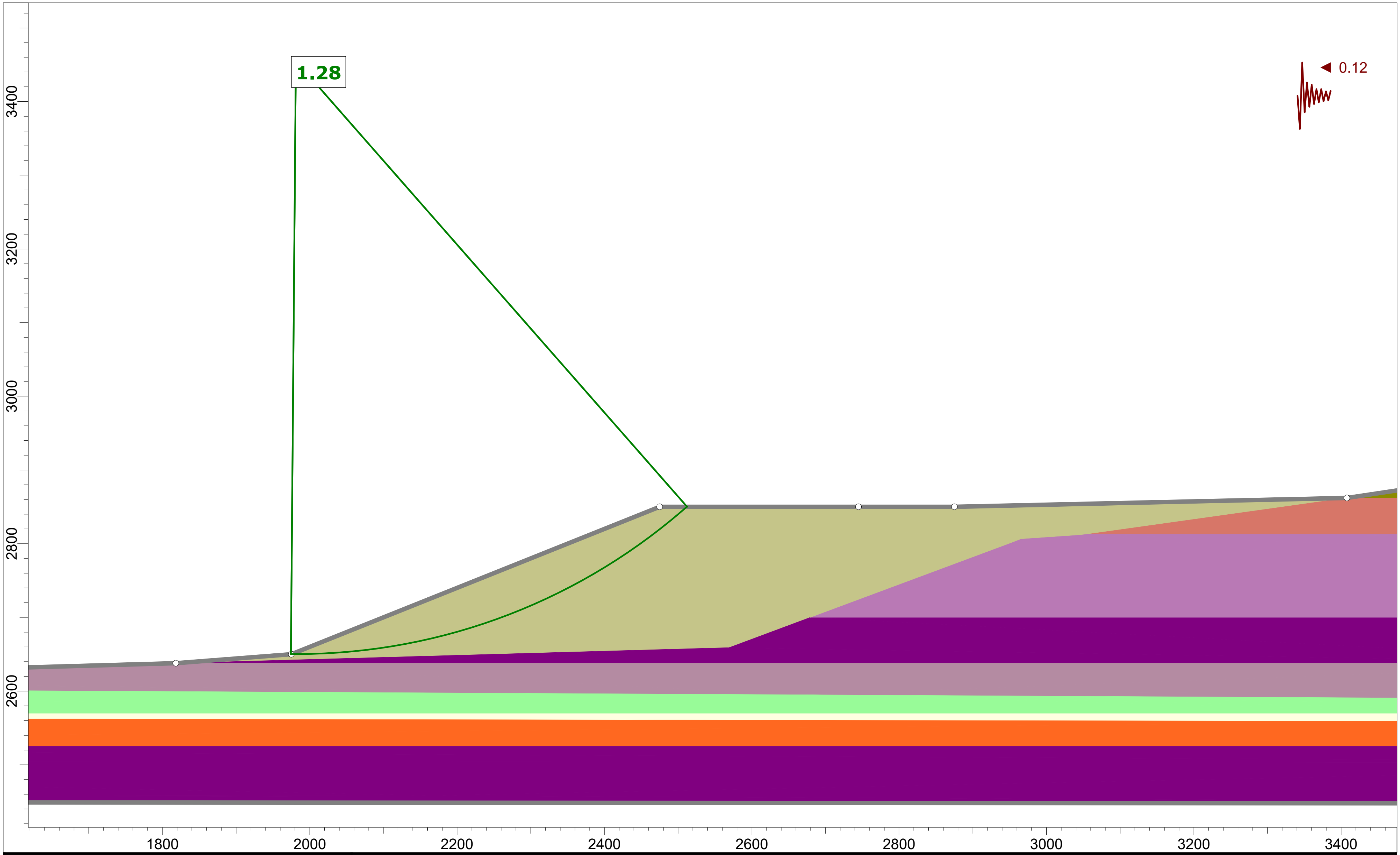
Project	Pickles Butte		Figure 37D
Group	SECTION G	*Scenario*	Proposed Excavation 2.6H:1V
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading - Block



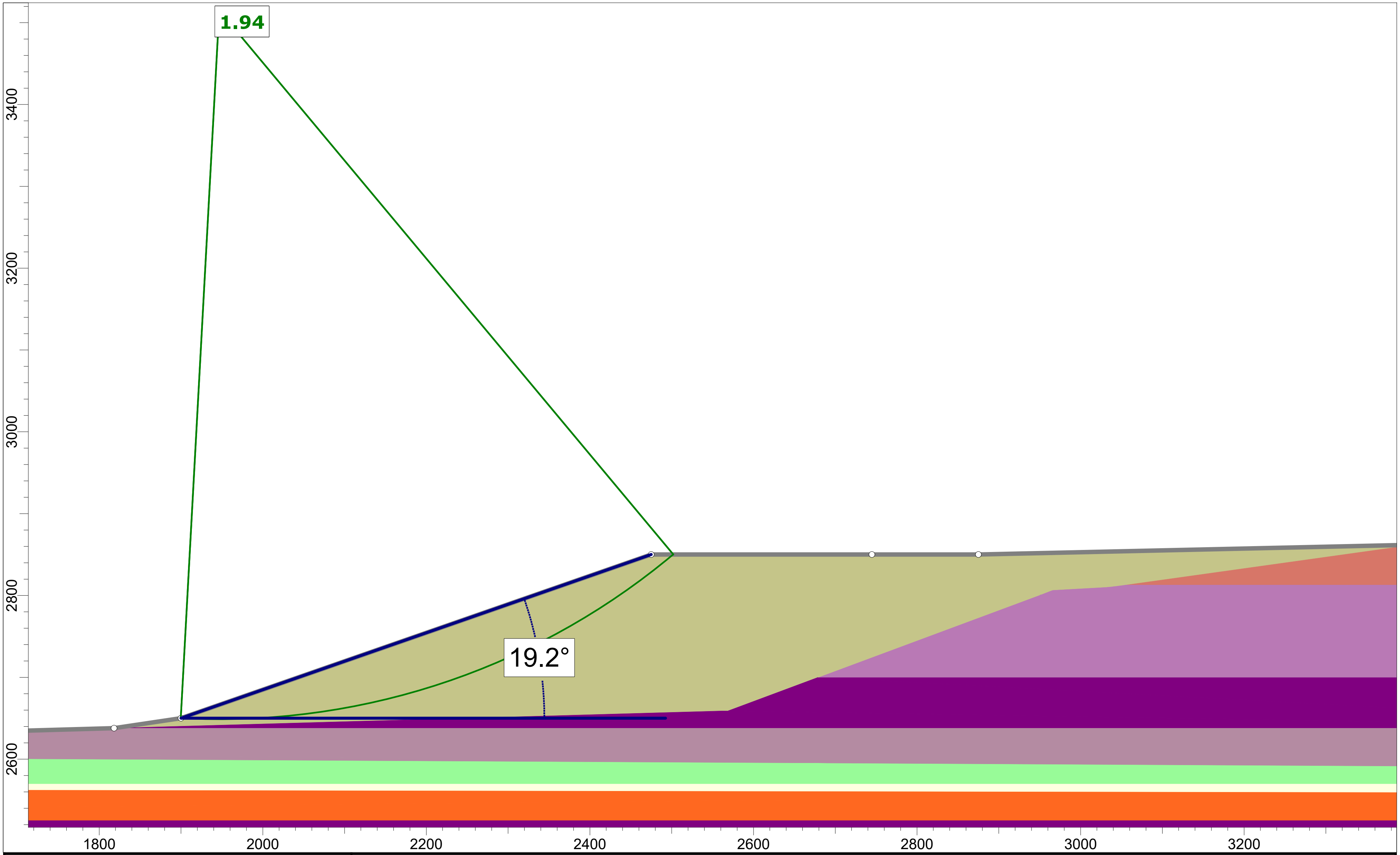
rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 38D
Group	SECTION E	*Scenario*	2.75H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	8/4/2022	*File Name*	Trash Backfill - Static



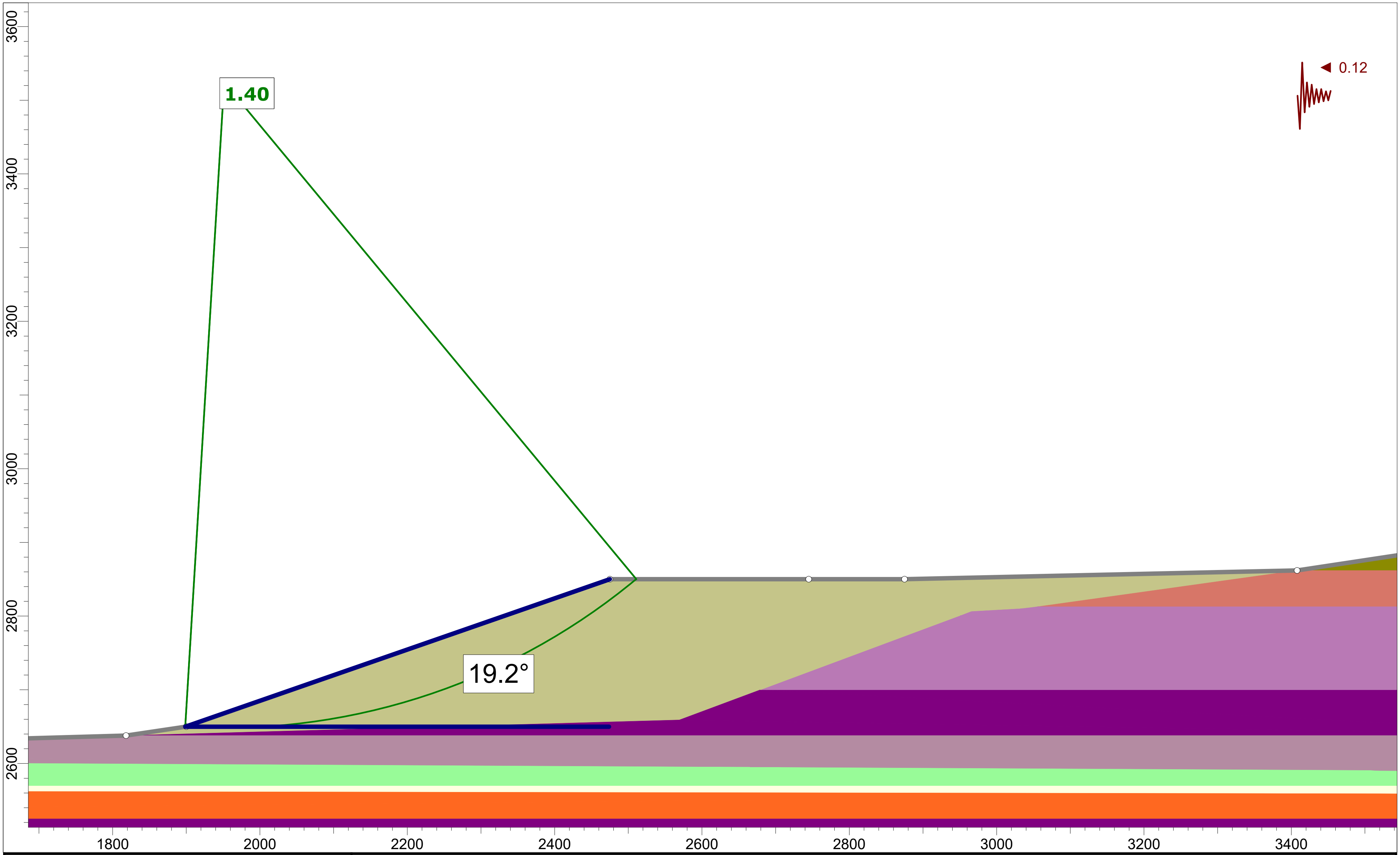
rocscience	*Project* Pickles Butte		Figure 39D
	Group SECTION E	*Scenario* 2.75H:1V Slope	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 8/4/2022	*File Name* Trash Backfill - Seismic	



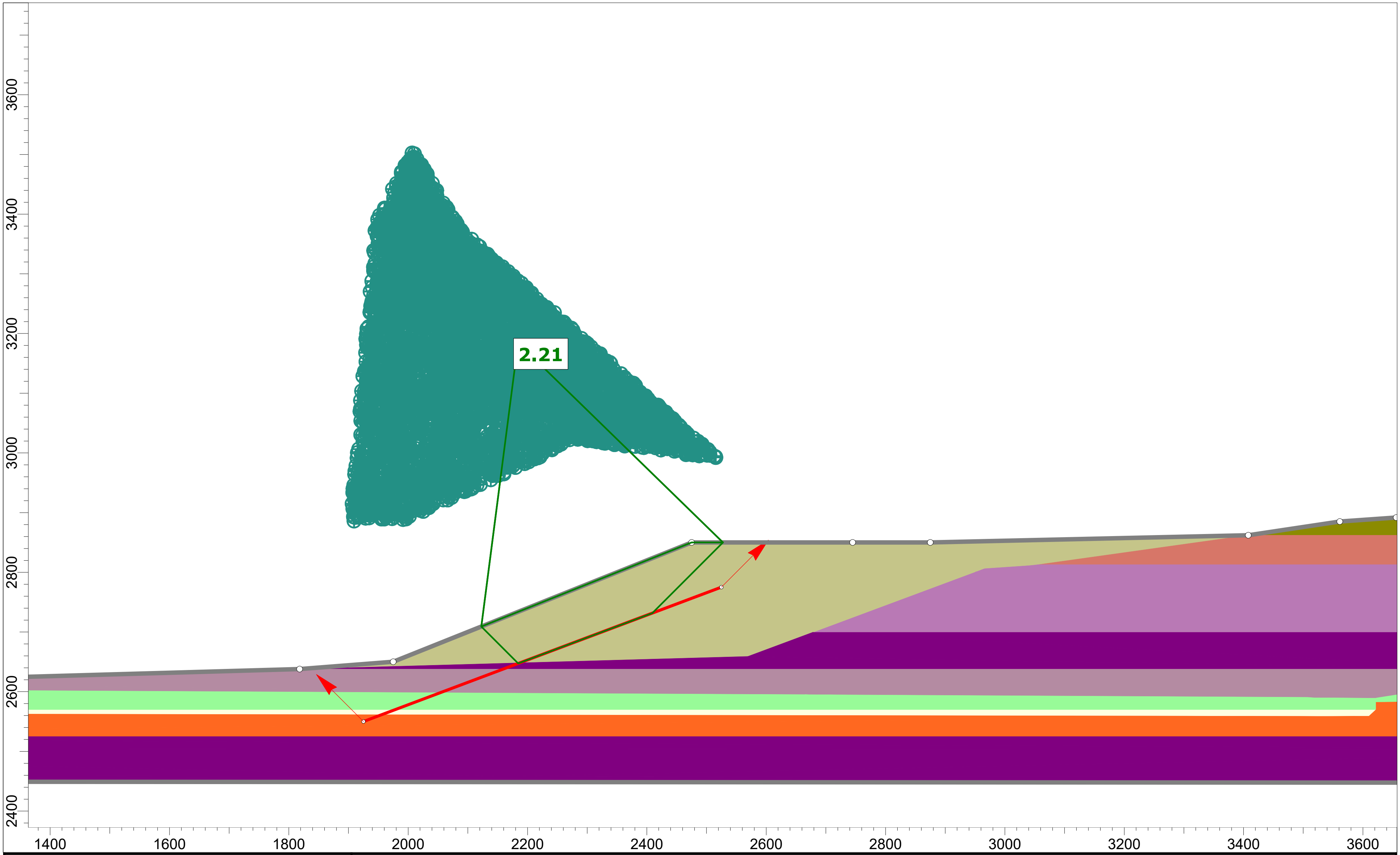
rocscience

Project	Pickles Butte		Figure 40D
Group	SECTION E	*Scenario*	3H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	8/4/2022	*File Name*	Trash Backfill

SLIDEINTERPRET 9.023



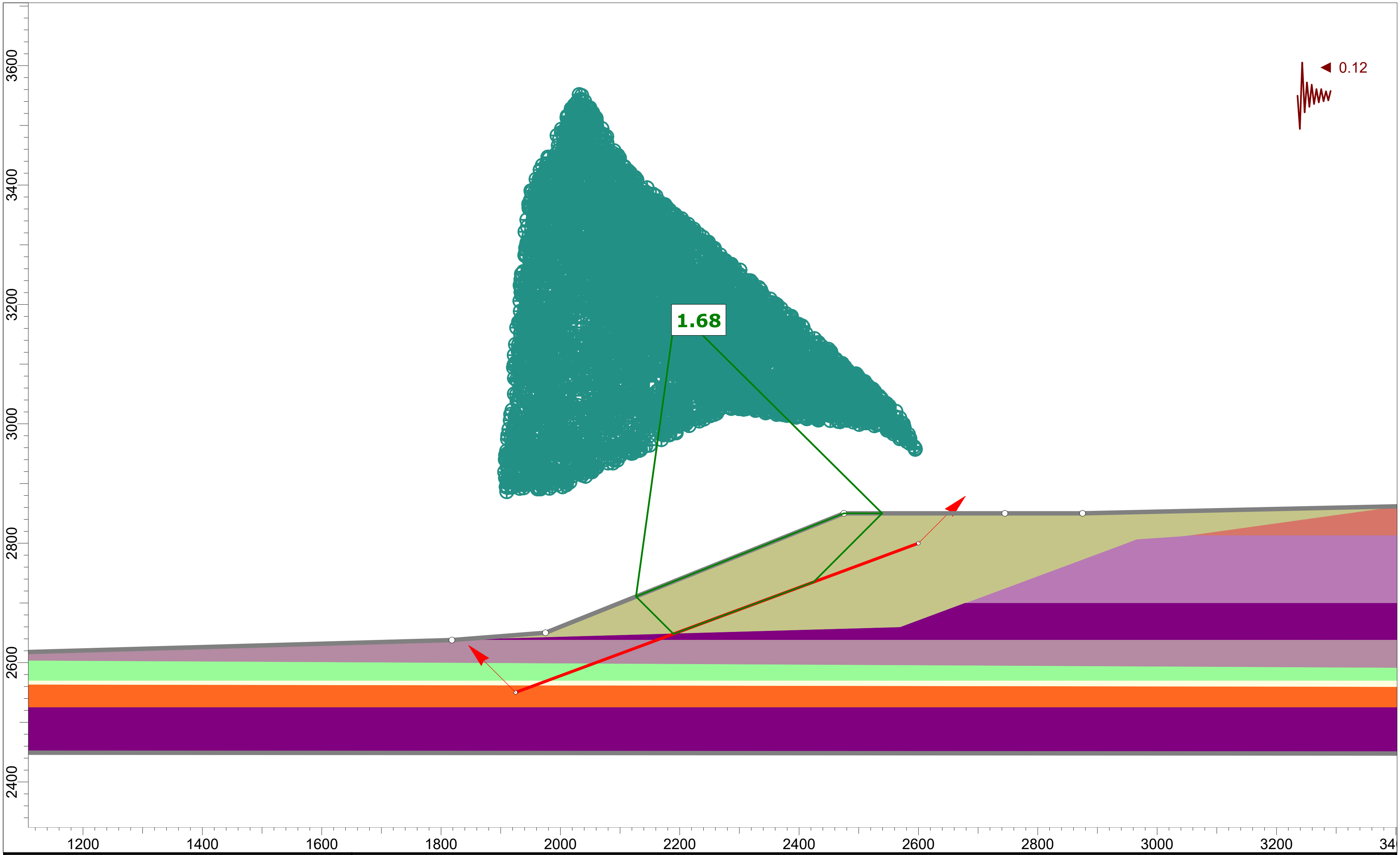
rocscience	*Project* Pickles Butte		Figure 41D
	Group SECTION E	*Scenario* 3H:1V Slope	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 8/4/2022	*File Name* Trash Backfill - Seismic	



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 42D
Group	SECTION E	*Scenario*	3H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	8/5/2022	*File Name*	Trash Backfill Block Sliding- Static

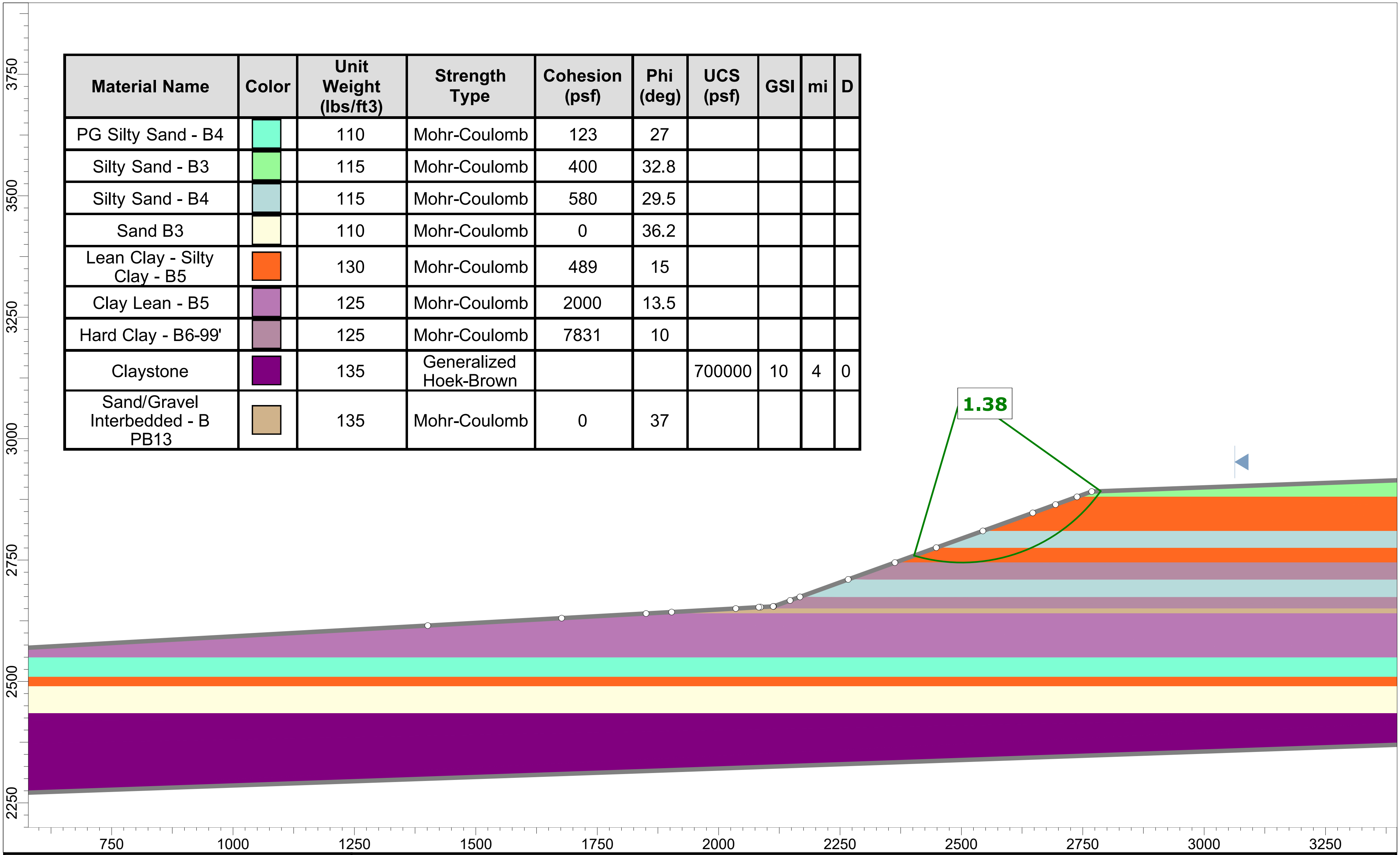


rocscience	*Project* Pickles Butte		Figure 43D
	Group SECTION E	*Scenario* 3H:1V Slope	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 8/5/2022	*File Name* Trash Backfill Block Sliding- Seismic	

APPENDIX E: Deformation Analysis Analyses

Static and Pseudo-Static Slope Stability Stability Analyses with Associated Circular and Block Failure Factor of Safety, Newmark Displacement, and Critical Acceleration for Slope 3H:1V Figures 1E through 6E

Static and Pseudo-Static Slope Stability Stability Analyses with Associated Circular and Block Failure Factor of Safety, Newmark Displacement, and Critical Acceleration for Slope 4H:1V Figures 7E through 12E

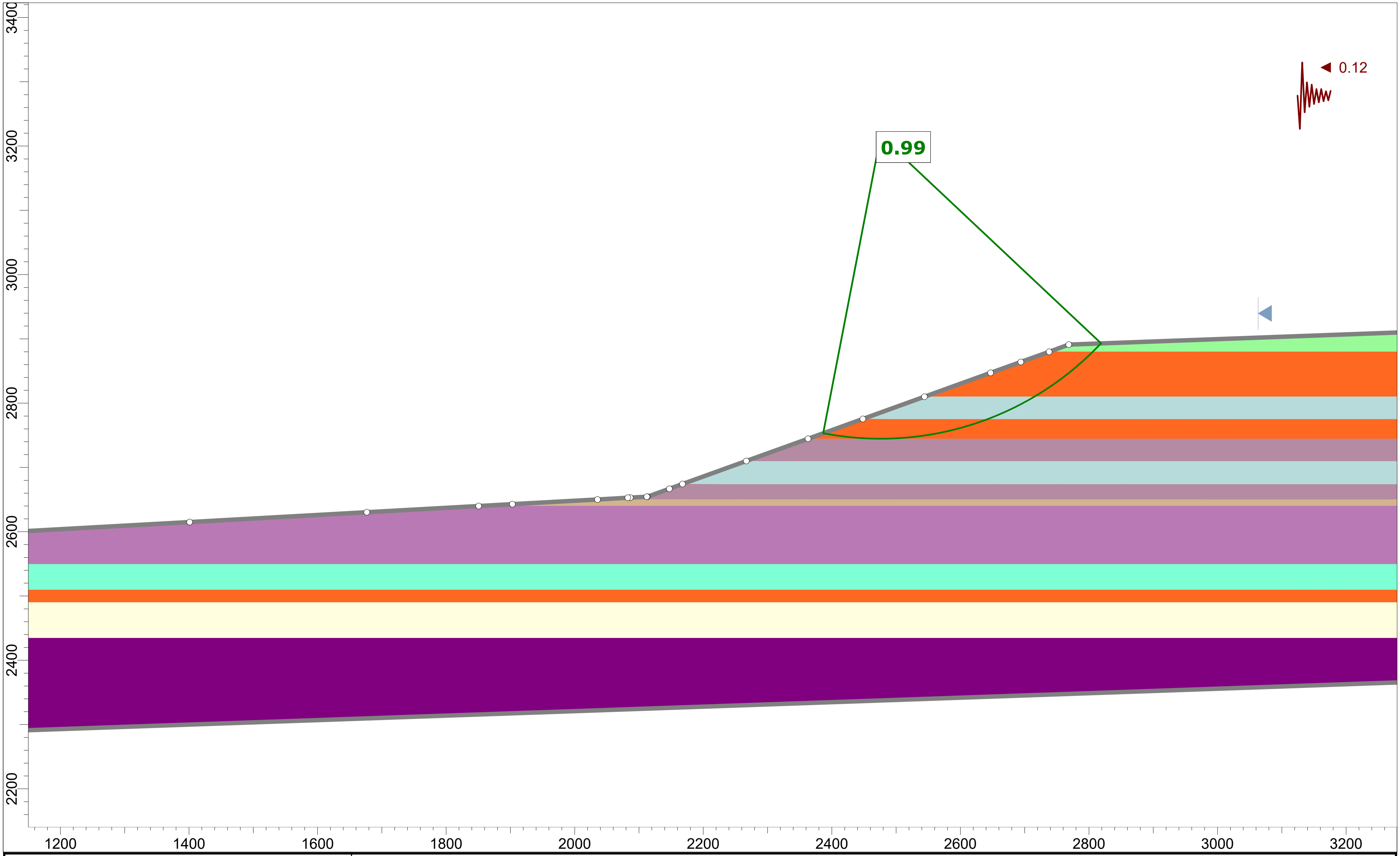


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
PG Silty Sand - B4	🟩	110	Mohr-Coulomb	123	27				
Silty Sand - B3	🟩	115	Mohr-Coulomb	400	32.8				
Silty Sand - B4	🟦	115	Mohr-Coulomb	580	29.5				
Sand B3	⬜	110	Mohr-Coulomb	0	36.2				
Lean Clay - Silty Clay - B5	🟧	130	Mohr-Coulomb	489	15				
Clay Lean - B5	🟪	125	Mohr-Coulomb	2000	13.5				
Hard Clay - B6-99'	🟪	125	Mohr-Coulomb	7831	10				
Claystone	🟪	135	Generalized Hoek-Brown			700000	10	4	0
Sand/Gravel Interbedded - B PB13	🟫	135	Mohr-Coulomb	0	37				

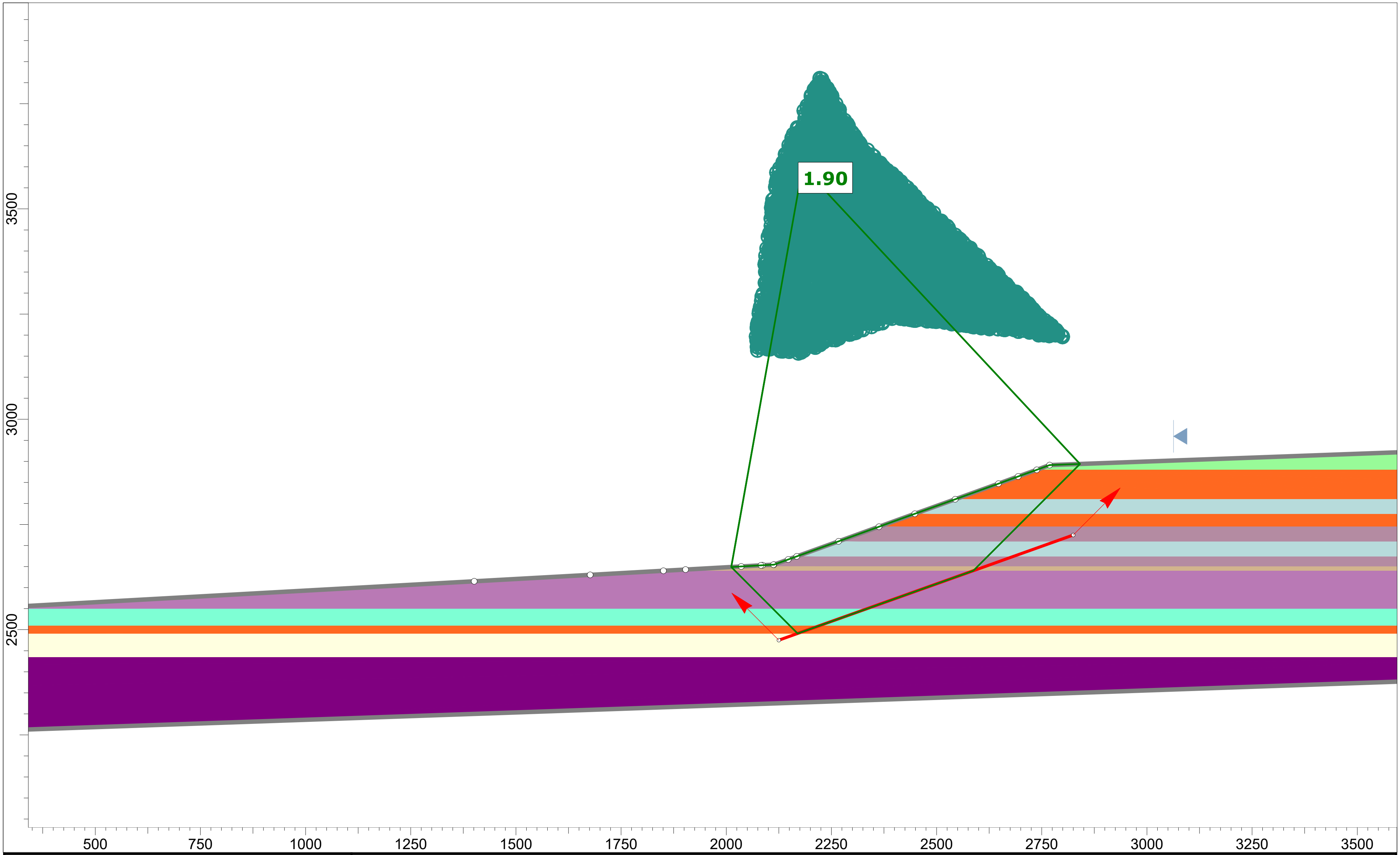
rocscience

SLIDEINTERPRET 9.023

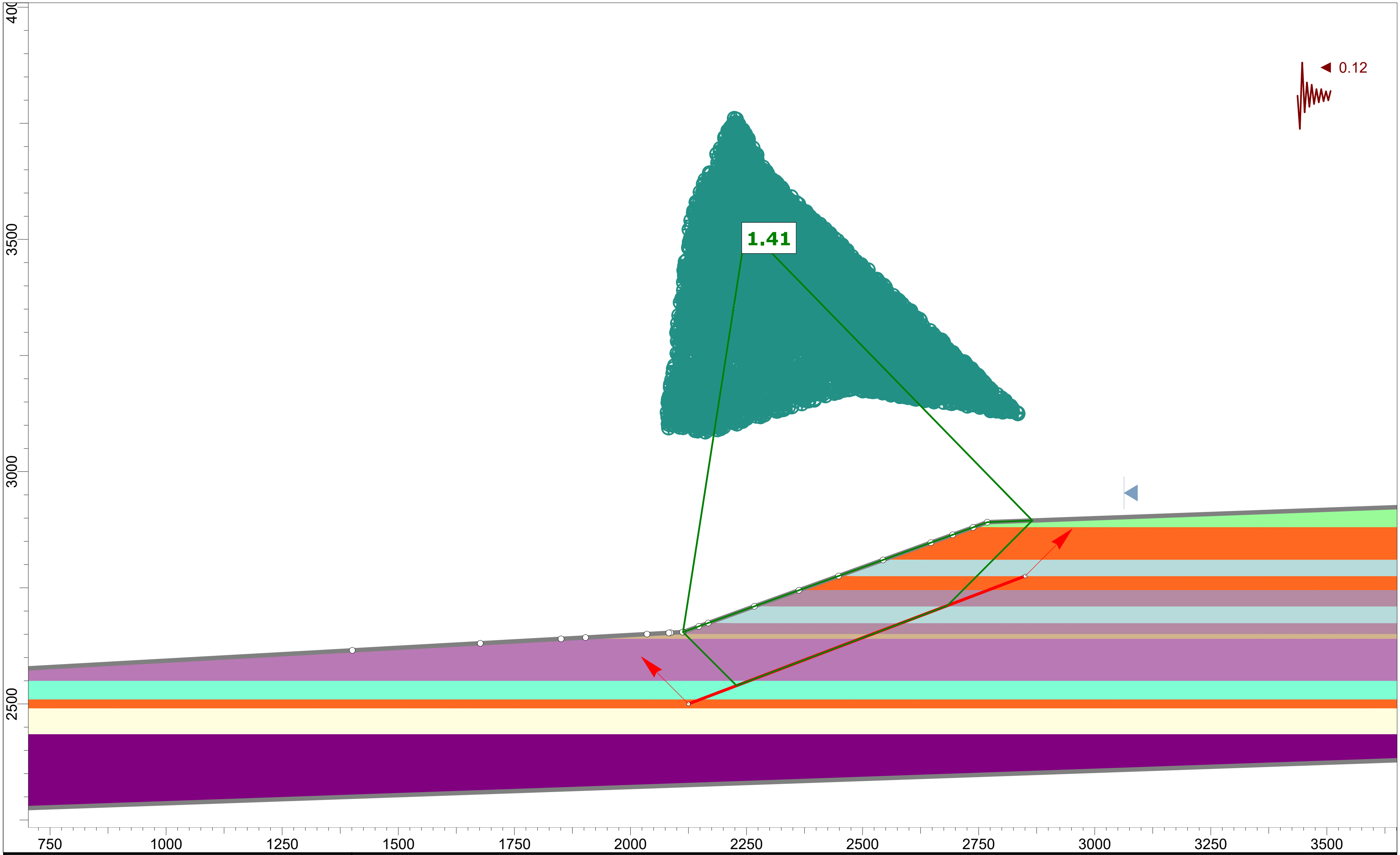
Project	Pickles Butte		Figure 1E
Group	SECTION F	*Scenario*	3H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Static Loading



rocscience	*Project* Pickles Butte		Figure 2E
	Group SECTION F	*Scenario*	3H:1V Slope
	Drawn By SG	*Company*	Tetra Tech
SLIDEINTERPRET 9.023	*Date* 7/29/2022	*File Name*	Seismic Loading



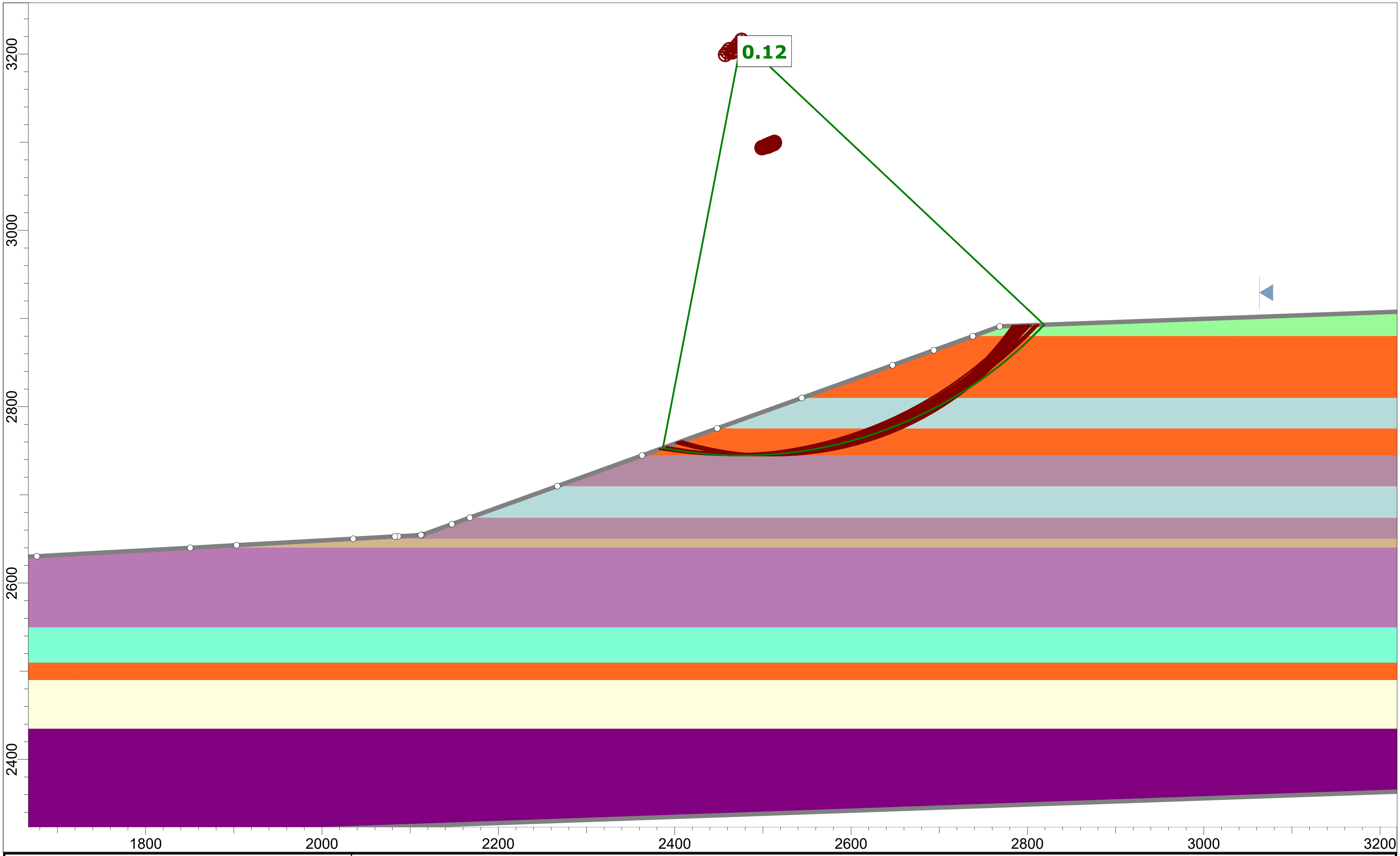
rocscience	*Project* Pickles Butte		Figure 3E
	Group SECTION F	*Scenario*	3H:1V Slope
	Drawn By SG	*Company*	Tetra Tech
SLIDEINTERPRET 9.023	*Date* 7/29/2022	*File Name*	Static Loading



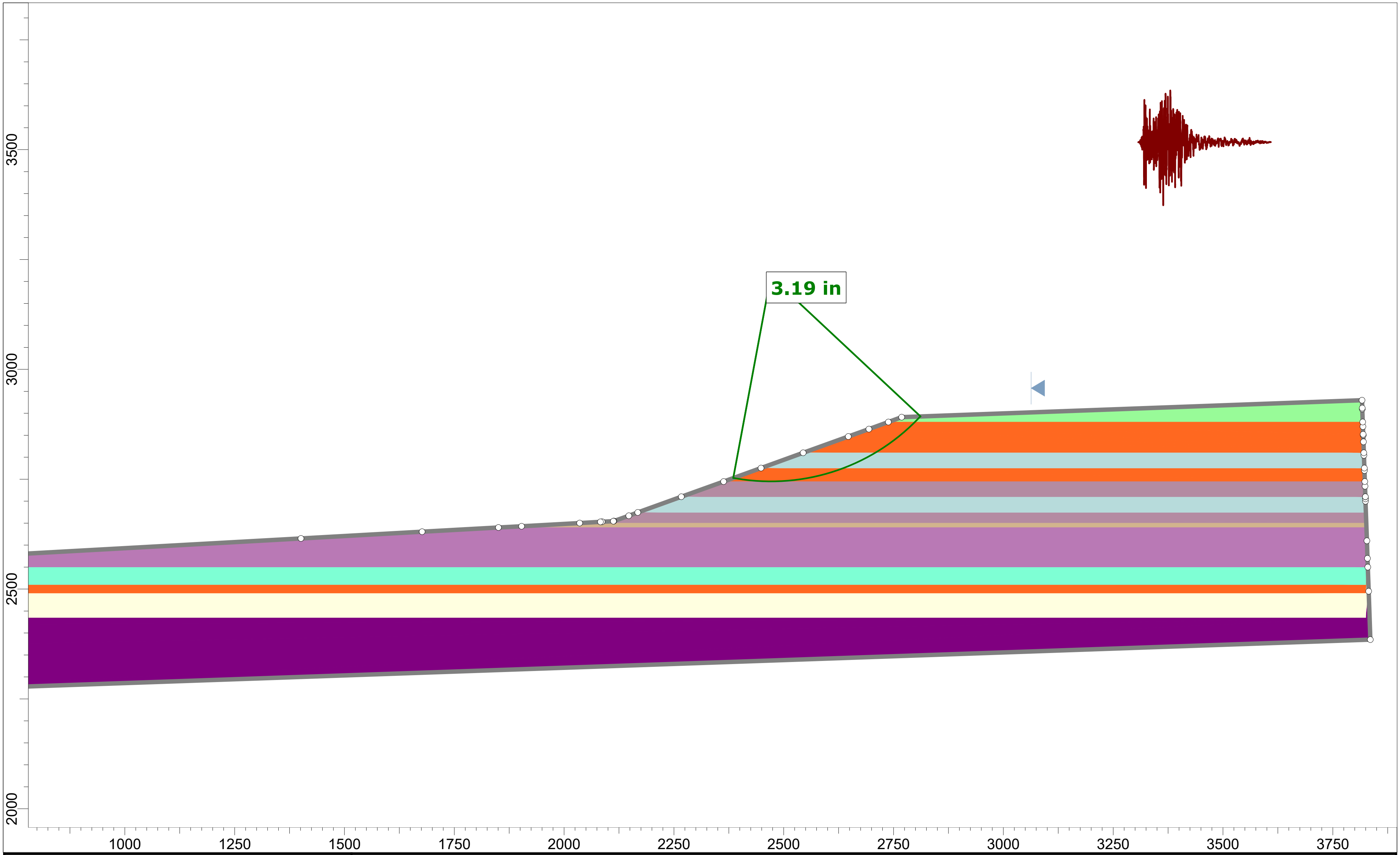
rocscience

Project	Pickles Butte		Figure 4E
Group	SECTION F	*Scenario*	3H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Seismic Loading - Block Failure

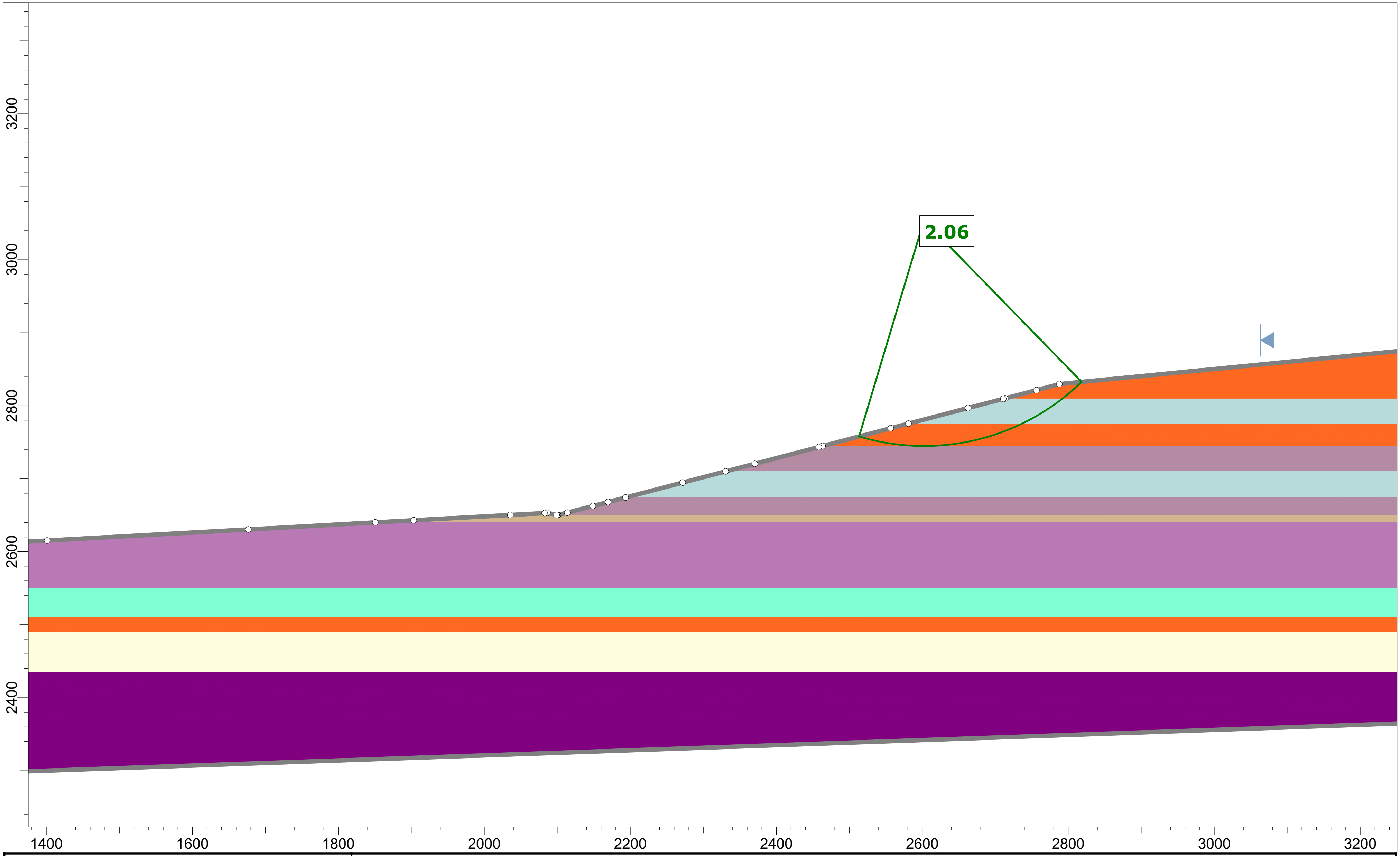
SLIDEINTERPRET 9.023



rocscience	*Project* Pickles Butte		Figure 5E
	Group SECTION F	*Scenario* 3H:1V Slope	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/29/2022	*File Name* Critical Acceleration	



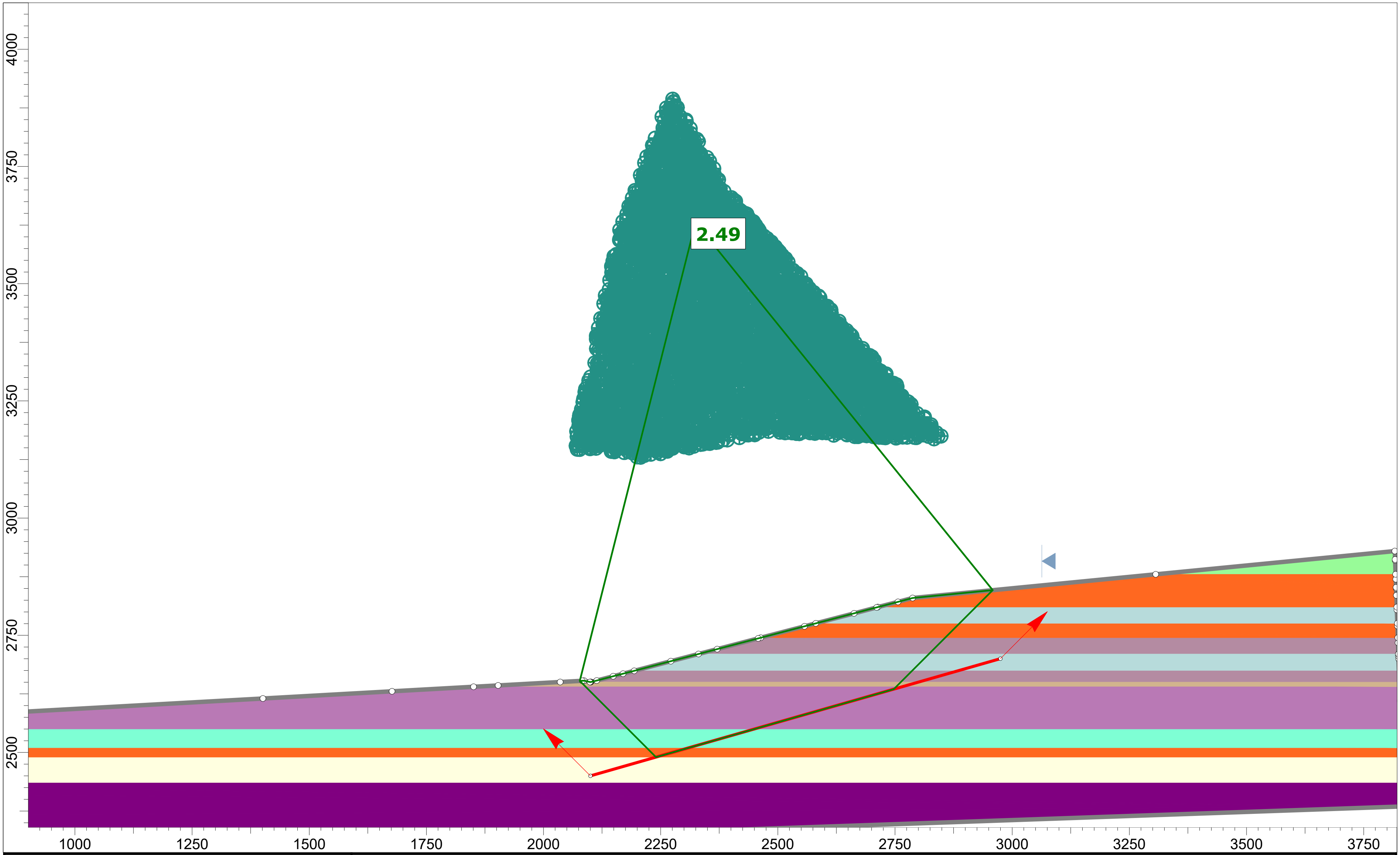
rocscience	*Project*	Pickles Butte	Figure 6E
	Group SECTION F	*Scenario* 3H:1V Slope	
	Drawn By SG	*Company* Tetra Tech	
SLIDEINTERPRET 9.023	*Date* 7/28/2022	*File Name* Seismic Loading - Newmark Displacement	



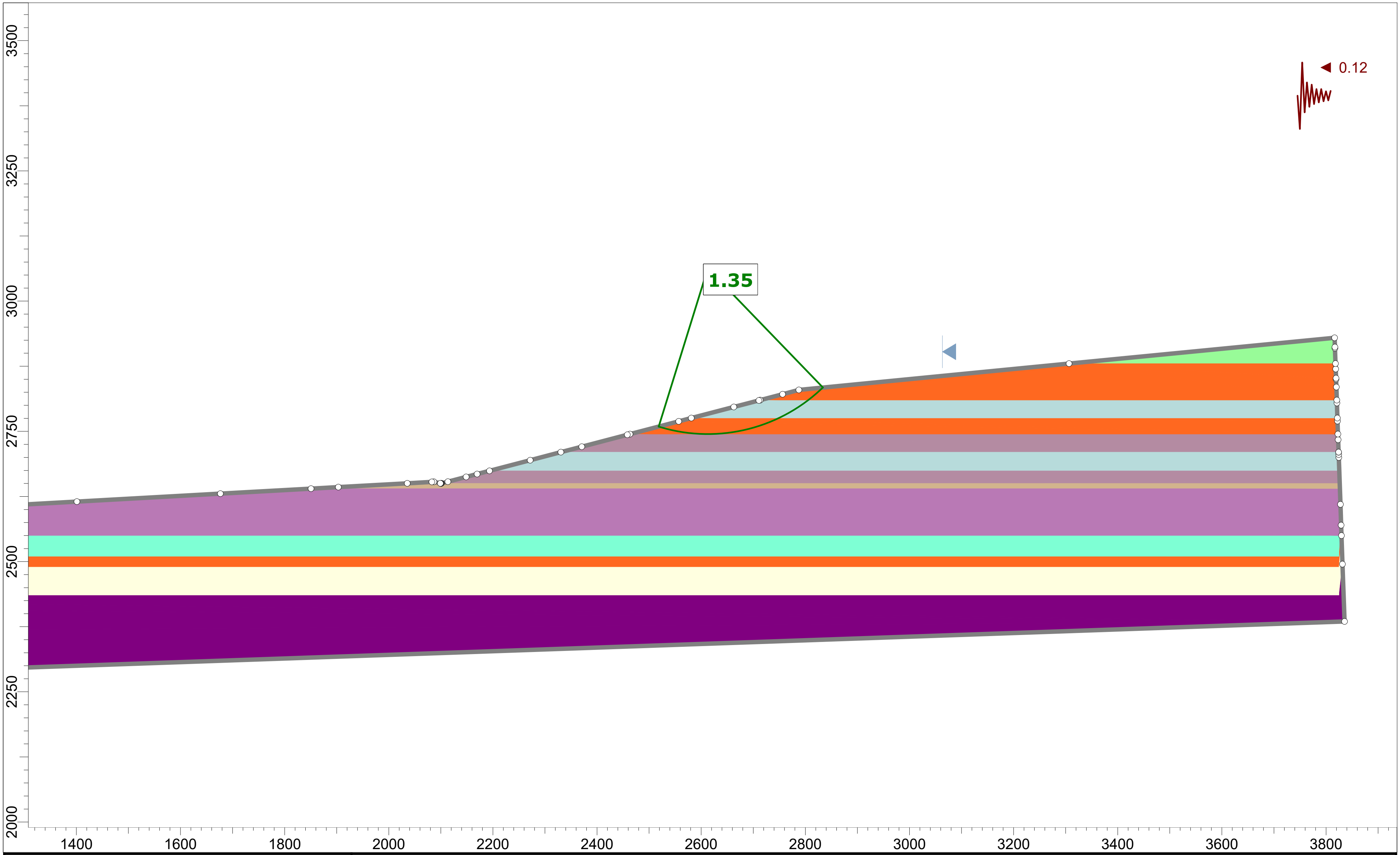
Project	Pickles Butte		Figure 7E
Group	SECTION F	*Scenario*	4H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Static Loading

rocscience

SLIDEINTERPRET 9.023



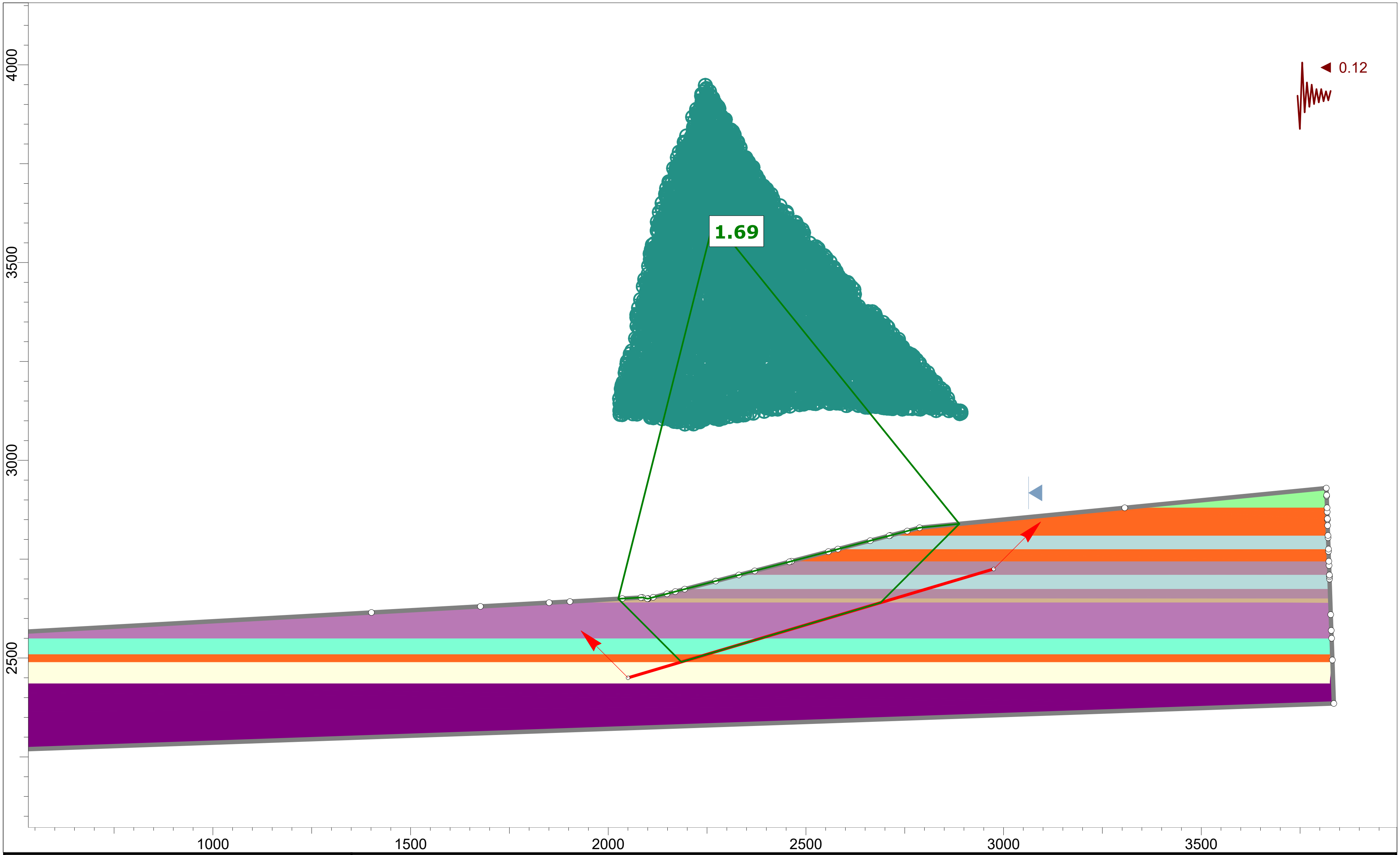
rocscience	*Project* Pickles Butte	Figure 8E
	Group SECTION F	*Scenario* 4H:1V Slope
	Drawn By SG	*Company* Tetra Tech
SLIDEINTERPRET 9.023	*Date* 7/29/2022	*File Name* Static Loading - Block Failure



rocscience

SLIDEINTERPRET 9.023

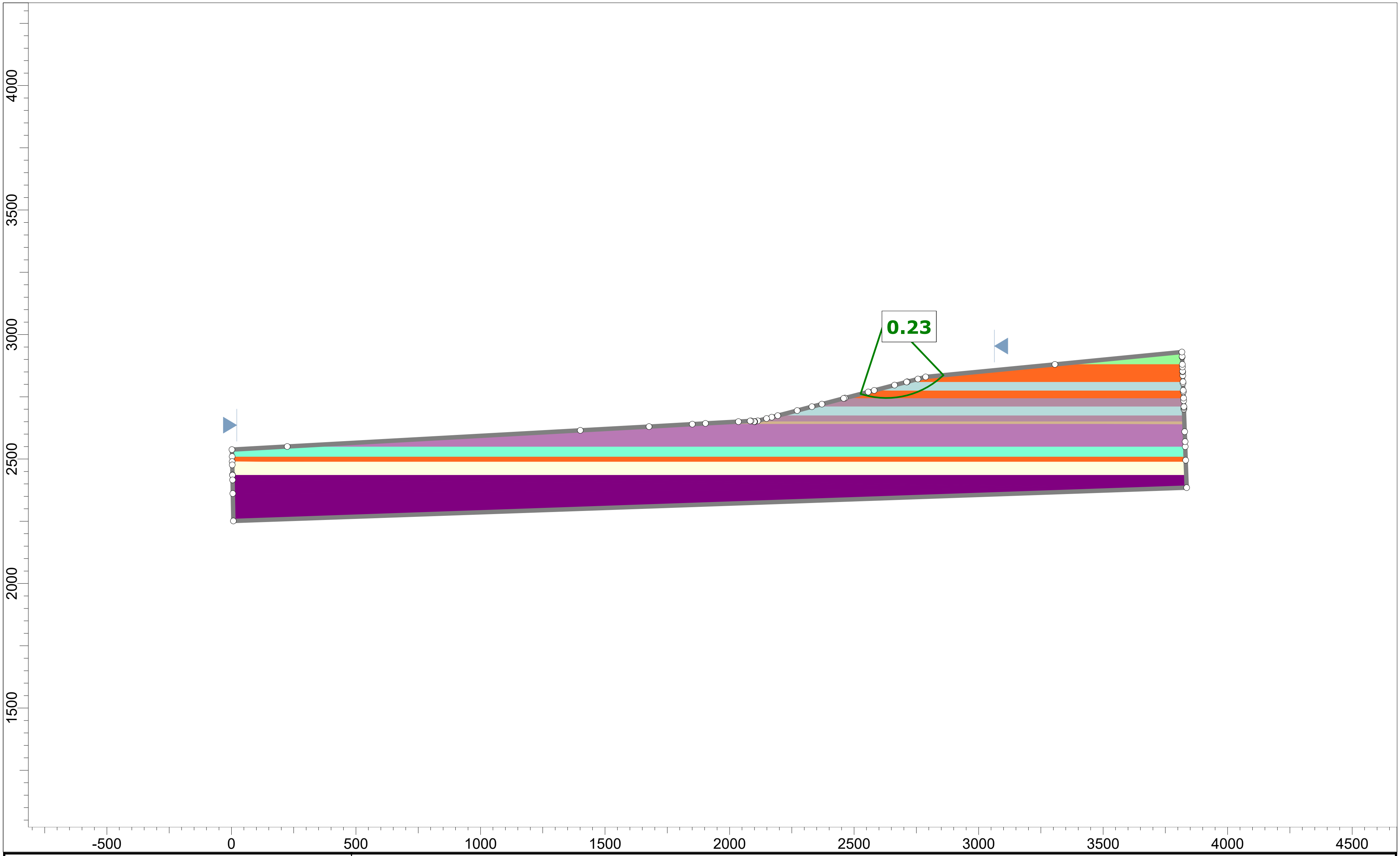
Project	Pickles Butte		Figure 9E
Group	SECTION F	*Scenario*	4H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Seismic Loading



Project	Pickles Butte		Figure 10E
Group	SECTION F	*Scenario*	4H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Seismic Loading - Block Failure

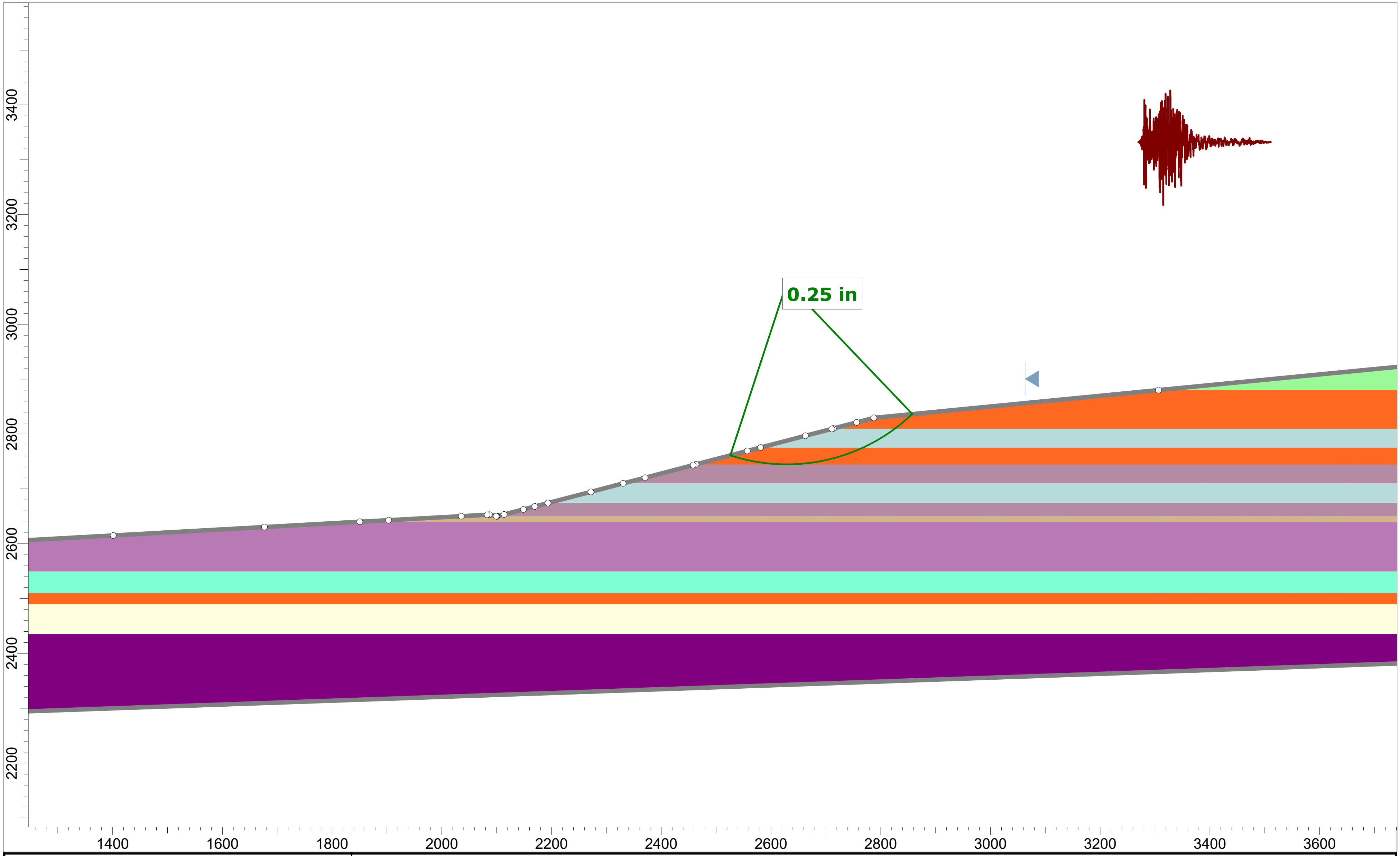
rocscience

SLIDEINTERPRET 9.023



Project	Pickles Butte		Figure 11E
Group	SECTION F	*Scenario*	4H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/29/2022	*File Name*	Critical Acceleration

SLIDEINTERPRET 9.023



rocscience

SLIDEINTERPRET 9.023

Project	Pickles Butte		Figure 12E
Group	SECTION F	*Scenario*	4H:1V Slope
Drawn By	SG	*Company*	Tetra Tech
Date	7/28/2022	*File Name*	Seismic Loading - Newmark Displacement

APPENDIX F: Previous Reporting Logs of Boring Analyses

LOGS GT-1 THROUGH GT-8 BY HOLIDAY ENGINEERING COMPANY(HOLIDAY)

LOGS PB 5 THROUGH PB12 BY HOLIDAY and DANIEL B. STEPHENS & ASSOCIATES, INC.

APPENDIX E: Borehole Logs

$*N' = N \cdot \sqrt{1/\sigma}$

Where σ = .05 T/ft² per ft depth

HOLLADAY ENGINEERING COMPANY

HOLE NUMBER GT-1 JOB NUMBER 030496

(Ø + stiffness based on table 13.2 & 13.8) PAGE 1 OF 4

(51) Soil/Samples PROJECT Dickles Butte Geotech OWNER Crook County LOCATION: CO. Crook SEC. 1/4 OF 1/4 T N R W @ 50' from toe of fill in drainage

LOGGED BY STROWD DATE START 11/4/96 DATE FINISHED 11/4/96 HOLE DEPTH 20'½ ANGLE ~90 DRILL METHOD Hollow Stem Auger SPT DIAMETER 8" Auger Splitspoon DRILL MODEL BK 81

INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	LITHOLOGY GRAPHIC	GEOPHYSICS LOG	GRAIN SIZE REL PERCENT CLY	SLT	SAND	GRAV	GRAIN ROUNDING ANG	WK	MOD	WELL	HYDRAULIC PROPERTIES EST.	MEAS.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS
																				BLOW COUNTS
		11:50	Tan Tan	fine sand																
4-5½	Inner SAMPLE			fine sand some occas. gravel pebbles ≤ 1"		I												4-5½ I	moist	2, 3 and 3 4-5½ 1" clast recovered (shoe...) 2 1st 6" 3 2nd 6" N = 12 * 3 3rd 6" (30°) N=5 N'=7 (30°)
10-11½	Inner SAMPLE (refusal?) + drive shelby tube	~200 lbs	Tan to light brn	fine sand micaceous least 6"														10-11½ I	moist	10-11½ 2, 3, 2 very weakly consolidated breaks up easily
15-16½	Inner		light brn	fine sand														15-16½ I	moist	N = 3, 3, 2 N' = 6 (29°) v. w. cons.
20-21½		12:10	lt brn	fine sand														20-21½ I	moist	N = 4, 2, 3 N' = 5 (28°) v. w. cons.
25-26½		12:21	lt brn	fine sand														I	moist	N = 3, 3, 2 N' = 5 (28°) v. w. cons
30-31½		12:25	lt brn	fine sand														I		N = 3, 4, 6 N' = 8 (32°) ditto
35-36½		12:35	lt brn	fine to med sand some coarse grain + gravel														I		N = 6, 7, 13 N' = 15 (38°) ditto
40-41½	SHELBY TUBE no sample		(...)																	push 10" up to 700 lbs (didn't penetrate ...) lost sample down hole ~~as ... up~~.
45-46½	brass rings (no) sample use SPT ...?		tan	... not med sand w/ some fine ... ... bottom is fine sand	I 45-46½												drier weakly ...			push 2½" @ 1000 lbs ... stop + ... (in sample) 12, 23, 32 = N N' = 37 (40°)

①

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 4

PROJECT Dirkles Fitto Gerlach OWNER ______ LOCATION: CO. ______ SEC. ______ 1/4 ______ OF 1/4 ______ T ______ N R ______ W

LOGGED BY STROUD DATE START 11/4/96 DATE FINISHED 11/6/96 HOLE DEPTH 201½ ANGLE -90° DRILL METHOD Hollow stem auger SPT w/ hammer DIAMETER 8" Auger DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		Blow counts N
50-51½	11/4	1:20	gry-	tan fine sand	∴				▨								med. loose		drier, weakly moist	18, 32, 41 N = 46 (42°)
	55-56½	1:40		gry-tan fine to medium sand	∴		▨	▨	▨											13, 25, 34 N = 36 minor clay (40°)
	60-61½ shut down had lunch ½ hr	1:55	tan-gry	fine to medium sand	∴		▨		▨								med loose		dry	18 30 37 N = 37 (40°)
	65-66½	2:20	tan/some orange FeOx	fine sand	∴				▨								mod loose		dry	25 42 41 N = 46 (42°)
	70-71½	2:40	tan/some orange FeOx	fine sand	∴				▨								mod loose breaks on easily		minor moisture	25 40 44 N = 45 (42°)
	75-76½	2:55	tan	fine sand	∴				▨								mod. loose		slightly moist	25 37 41 N = 40 (42°)
	80-81½	3:05	tan	fine sand to very fine sand with silt (lower)	∴ =			▨	▨								ditto		ditto	26 36 50 N = 43 (42°)
	85-86½	3:20	tan	thin very fine sand - silt laminae [illegible] silt	= =		▨	▨	▨								[illegible]		ditto	26 47 25 47 [illegible] N = 42 (42°)
	90-91½ End of [illegible] EOS	3:45	tan	fine silt sand	≈			▨	▨								[illegible]		slightly moist	13 40 50 N = 42 (42°)
95-96½	11:00	11/5	lite tan	SILT to 96' Clay @ 96'	≡		▨ ▨	▨ ▨	▨										very slightly damp	19 28 47 N = 34 (hard)

10

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 3 OF 4

PROJECT Dickles Butte Geotech OWNER Canyon LOCATION: CO.___ SEC.___ 1/4___ OF 1/4___ T___ N R___ W

LOGGED BY STROWD DATE START 11-4-96 DATE FINISHED___ HOLE DEPTH___ ANGLE: 90° DRILL METHOD Hollow Stem / SPT DIAMETER 8" Auger DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
100-101½ *	11-5 Brass Rings 1½" ID SPT	11:40	lite tan green	clay		2 Brass No Full													slightly damp	stiff N= 11 18 27 N = 20 perhaps trace clay & 3 brass rings samples
? 105-106½ 106½	NO RINGS	12:00	lt tan	1 ft clay 6" fine sand 3" clay																very stiff 12 32 34 N = 29 penetrometer unconfined 3.0 T/ft²; confined in brass ring 4.0 T/ft²
110-111½ *	BRASS RINGS	12:25	tan	Clay 8" fine sandy silt 10"		1 Brass No Full													weakly moist penetrometer in brass ring	hard 13 32 50@6" N = 35 *1 brass ring sample clay 1.5 for fine sand (T/ft²) 4.0 T/ft² for clayey silt
	115-116½ NO brass rings	12:45	light brown green clay sand lite gray	interbedded very fine silty sand with clay (beds ~6")															very weakly moist (almost dry)	11 41 50 N = 38 (40) confined ring penetrometer in clay > 4.5 Tons/ft²
	120-121½ NO RINGS	1:10	tan	silty clay															weakly moist	12 30 48 2-4 Tons/ft² N = 32 Very stiff
125-126½	first H₂O added NO RINGS	2:00		cly contact very fine silty sand to 126															add water very slightly damp	add five gallons water 20 42 50@5" N = 37 hard
	130-131½ * RINGS	2:25		clay clayey silt w/ very fine sand silty clay		4 Brass 2 [illegible] 2 No Full											Moderate Consl.		slightly to moderately damp	30(?) 32 50@5" * 4 brass rings N = 32 Very stiff
135-136½	NO Rings	3:00	grayish green	Clay w/ trace silt													wk-mod. Consl.		add water	add five gallons water 11 21 37 N = 22 penetrometer 1.75-2.75 Very stiff
140-141½	* Rings	3:45	greenish gray	clay & silty clay interbedded		[illegible]											moderately Consl.		add water moderately moist (38%?)	19 27 38 N = 25 * 4 rings (test both clay & silty clay) Very Stiff
145-146½	No Rings EOS	4:30 5:00	grn-gry	top 6" clay lower 12" silty clay													Wk-MOD		MODERATE MOISTURE ~35%	23 23 28 N = 19 Very stiff

18

& full @ 33°

HOLE NUMBER GT-1 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 4 OF 4

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC. ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W

LOGGED BY STROUD DATE START 11-4-96 DATE FINISHED 11-6-96 HOLE DEPTH 201½ ANGLE -90 DRILL METHOD Hollow Stem Auger SPT/split spoon DIAMETER ___ DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
150-151½ *	START Sample RINGS	9:115 9:45	grn-gry	clay w/ interbdd silt/fine sand	▨	1 Brass No-Full	▨	▨	▨								WK-MOD CONSOL cly WK CONSL for silt/sand		clay mod damp silt almost dry ADD ~7 gal H2O before	SILT ~ 1.5 T/ft in ring CLAY ~ 4-4.5 T/ft in Ring * ONE BRASS RING CLY + SLT
155-156½	NO RINGS	10:30	grn-gry	clay ditto	▨		▨										WK CONSL PLASTIC		pack 5 ft AUGER Run MOD. DAMP	15 22 25 pure clay GOOD CORE SAMPLE N' = 17 stiff
160-161½ *	RINGS	11:10	grn-gry	pure clay	▨	3 Brass 1 almost 2 No Full	▨										WK CONSOL PLASTIC		ADD 5 gals MOD DAMP ~ 38-42%	18 22 24 * 3 perfect samples in Rings of clay N' = 16 stiff
165-166½	NO RINGS	11:45	grn-gry	pure clay w/ 3" bd of very fine sand	▨		▨		▨								MOD-MOD STG CONSOL (EXCPT SAND)		ADD 5 gal H2O MOD DAMP ~ 40%	18 44 50 @ 5" N' = 33 Very stiff
170-171½	NO RINGS	12:30	grn-gry	pure clay w/ 1" silt bed	▨		▨										MOD CONSL		~ 40% add water Sand	17 31 33 N' = 22 Very stiff
175-176½	NO RINGS	1:45	grn-gry	clayey silt	▨		▨	▨									WK CONSOL		35% moist ADD 5 gal	13 22 32 2 T/ft² Penetrometer N = 18 stiff
180-181½ *	BRASS RINGS	2:25	grn-gry	SILTY CLAY	▨	2 Brass No Full	▨	▨									WK-MOD CONSOL		~35% ADD 5 gal	14 22 28 N = 17 * 2 BRASS RINGS · Stiff 1.5 - 2.0 T/ft² Penetr.
185-186½	NO RINGS	3:05	grn-gray	SILTY CLAY	▨		▨	▨									WK MOD CONSOLD		~ 35% ADD FIVE Gals	13 27 44 N' = 23 1.5 T/ft² Very stiff
190-191½ *	RINGS	3:40	grn-gray	SILTY CLAY	▨	1 Brass - No Full	▨	▨									WK-MOD		~ 35-38%	15 22 36 * 1 Brass RING 3.0 T/ft² would be low density with washing N' = 19 Stiff
195-196½		4:20		clayey silt	▨		▨	▨									WK		~ 30-35%	14 17 23 2.5 T/ft² N' = 13 Stiff
11/7/96	ABANDON HOLE with BENTONITE CHIPS From																			
200-201½	TO TOP	5:00		silty clay	▨	2 Brass [illegible]	▨	▨												12 17 20 / 4.5 T/ft² N' = [illegible] stiff

15

HOLE NUMBER GT-2 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 1 OF 1

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. (see map) SEC. ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W

LOGGED BY STRAND DATE START 11-7-96 DATE FINISHED 11-7-96 HOLE DEPTH 25 1/2' ANGLE -90 DRILL METHOD Hollow stem Auger DIAMETER 8" DRILL MODEL 3K-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS,VOIDS,ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	START	11-7-96		Sand cover																
	12:25			↓															slightly	
				garbage															damp	check for methane. none
																				smells 0%
5-6½		12:35																		15 8 7
2	BRASS			soil + trash																Dirt + trash
	RING																			
10-11½	NO	12:55		Soil + trash															BARELY	7,7,12 SAMP A-SOIL
	RINGS			2/3 1/3															DAMP	NO METHANE/SAMP B-Trash
																			OUTSIDE	
15-16½	RINGS	1:05		all garbage															SPLITSPOON	17 14 10
				diaper, wood															WET	5% LEL in Auger Stem quickly
				newspaper																drops to 1% LEL
				etc.																Two RINGS forged together
20-21½	NO	1:20		80% Trash															MODERATELY	8 8 14
	RINGS			20% soil															DAMP	
																				19 13 12
24-25½	BRASS	1:35		MOSTLY GRASS															DAMP	100% LEL METHANE
	RINGS	EOH																		SHUT RIG DOWN FLOOD
																				HOLLOW STEM W/ WATER
																				BACK OUT OF HOLE

HOLE NUMBER GT-3 JOB NUMBER 030496 **HOLLADAY ENGINEERING COMPANY** across road 43767 PAGE 1 OF 2

38 Sa-c PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY Strand DATE START 11/8/96 DATE FINISHED 11/8/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD SPT/AUGER DIAMETER 8"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	11-8-96	8:30																		
5-6½	NO RINGS	8:40	tan	silty very fine sand			|	|	▨								loose		slightly damp	2 3 2
10-12	SHELBY TUBE	8:50	tan	fine sand					▨								med loose		dry	200 lbs last 6"
15-16½	NO RINGS	9:00	tan	fine sand				|	▨								loose		medium damp	5 12 19 minor silt
20-21½	BRASS RINGS	9:10	lite brn	fine sand		3 - BRASS No-Fill		|	▨								mod. loose		DAMP	13 21 23
25-26½	NO RINGS	9:20	lite brn	fine-med. sand					▨								loose		VERY DAMP	13 19 28
30-31½	BRASS & PVCS	9:30	lite brn	fine-med sand		3 Brass No-Fill			▨								mod loose		very damp	14 21 33 * 3 rings
35-36½	NO RINGS	10:00	lite gry-brn	fine to med. sand					▨								loose except for Fe Ox "veins"		almost saturated	23 37 33
40-41½	BRASS RINGS	10:10	lite gry brn & orange	fine sand some med. limonite cemented clay		3-Brass No-Fill	▬		▨								small loose Fe Ox clay well consol.		very damp	16 25 37
45-46½	NO RINGS	10:20	lite gry-brn	fine sand minor Fe Ox stn					▨								wk consol.		very damp	22 30 35

3:45

15.

HOLE NUMBER GT-3 JOB NUMBER A30476

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 2

PROJECT PB Geotech OWNER Canyon Co. LOCATION: CO. Canyon SEC. 1/4 OF 1/4 T N R W

LOGGED BY STROWD DATE START 11/8/96 DATE FINISHED 11/8/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger DIAMETER 8"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
50-51½	11-8-96 * RINGS	10:25	gry tan	very fine silty sand		3 BRASS 1 - FULL 2 - NO FULL											WK-MOD CONSOL		moderately damp	18 31 37 *3 RINGS
55-56½	NO RINGS	10:40	gry-tan	very fine silty sand													WK-MOD CONSOL		MOD-STR damp	16 29 40
60-61½	RINGS	10:50	gry-tan	very fine sand/borderline silt		3-BRASS NO-FULL											WK-MOD CONSI		MOD damp	20 35 44
65-66½	NO RINGS	11:00	gry-tan grn-grey	top 3" silty fine sand bottom 10" clay													SAND WK MOD-STR CONSOL'D for clay		MOD DAMP	40 29 34
70-71½	RINGS	11:15	Gray tan grey	Top 2" clay bottom 10" fine sand		2-BRASS NO FULL											MOD CLY MOD SAND		WK to MOD DAMP/WET	18 20 37 2 RINGS - BOTH OF SAND
75-76½	NO RINGS	11:30	grn-gry	silty clay clayey silt (varves)													WK-CONSOL		WK DAMP	14 21 27 [illegible] into [illegible] of [illegible] [illegible]
80-81½	RINGS	11:45	gry-tan	interbdd fine sand-silt- silty clay		2-BRASS NO-FULL											MOD-STR		slightly damp	15 44 50 @ 5" 2 RING CLAY / silty sand
65-86½	NO RINGS hard [illegible]	12:00	tan-gry	very fine silty sand													MOD-STR		slightly damp	21 48 50 [illegible] clay [illegible] 3" bed w/ 50 [illegible]
90-91½	RINGS	12:45	tan-gry	fine silty sand ~2" clay bed		2-BRASS NO-FULL											MOD-STR		slightly damp	16 40 50
95-96½	NO RINGS	1:00	tan-gry	10" silt [illegible] [illegible] silty clay													MOD CONSOL		slightly damp	22 36 40
100-101½	2 RINGS	1:20	tan-grey	fine sand		2-BRASS [illegible]											MOD CONSOL		very slight	14 32 50 END HOLE

HOLE NUMBER GT-4 JOB NUMBER D30496

HOLLADAY ENGINEERING COMPANY

PAGE 1 OF 2

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon (large motorcycle parking lot) SEC___ 1/4___ OF 1/4___ T___ N R___ W

LOGGED BY Stroud DATE START 11-11-96 DATE FINISHED 11-11-96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger SPT DIAMETER 2"/2" DRILL MODEL BK-81

15-17'

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
		11-11-96																		
5-6½	Rings	10:00	tan	fine to med sand w/ minor clay+silt					▨								very loose but w/ [illegible] caliche		moderately damp	2 1 1 2 rings
16-11½	No Rings	10:07	tan	clayey silt w/ minor very fine sand			▨	▨									loose		mod. damp	3 2 1
15-16½	Shelby tube	10:15	?	? ?																
20-21½	No. Rings	10:25	tan	clayey fine sand			▨		▨								loose		somewhat damp	5 6 8 driven w/ brass rings but used as [illegible] (fell out [illegible] [illegible])
25-26½	No Rings	10:30	tan	silty fine sand				▨	▨								mod loose		weak dampness	6 17 23
30-31½	RINGS	10:40	gry-tan	silty fine sand		2-CRKS? NO-FULL		▨	▨								med dense		almost dry	15 27 37 2 rings
35-36½	NO RINGS	10:50	gry-tan	fine sand					▨								wk-mod consol		almost dry	12 21 32
40-40.75	Shelby tube	11:05	gry-tan	fine sand					▨										almost dry	[illegible] 8" [illegible] 8" sample left some minor silt + clay
45-46½		11:15	gry-tan	interbedded fine sand & silt [illegible]			▨		▨								wk-med consol		moist	[illegible] 4-6" [illegible] 20 27 32

HOLE NUMBER GT-4 JOB NUMBER D30496 **HOLLADAY ENGINEERING COMPANY** PAGE 2 OF 2

PROJECT Pickles Butte Gravel OWNER Canyon County LOCATION: CO. Canyon SEC___ 1/4___ OF 1/4___ T___ N R___ W

LOGGED BY Stinwood DATE START 11/11/96 DATE FINISHED 11/11/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow stem Auger DIAMETER 3½" DRILL MODEL BK-81

INTERVAL (FT)	DRILL NOTES	DATE TIME 11-11-96	COLOR	LITHOLOGY ROCK TYPE	GEOPHYSICS LOG	INDURATION & STRUCTURE FXS, VOIDS, ETC.	WATER	COMMENTS
50-51½	Brass Rings	11:25		silt w/ ~1" clay interbeds	2-Brass Almost.	MOD-STR CONSOL	mod. damp	16-30 50 minor fine sand
55-56½	NO RINGS	11:40	gry-tan sand. silt Clay tan-gry	fine sand ½" silt - 4" clay 10" gra'		WK-MOD CONSOL	wk damp	11 18 31
60-61½	RINGS	11:55	gry-tan w/ orange	fine sandy silt + w/ 1" Feldr cemented	2-BRASS No-Full	MOD CONSOL	almost dry	23 37 50 2 RINGS
65-66½	NO RINGS	12:10	gry-tan	Grade from top in bottom w/ fine sand, silt, clay		MOD CONSOL	slightly moist	19 34 45
70-71½	RINGS	12:25	tan-gry	fine sandy silt	2-BRASS No Full	MOD CONSOL	moderately moist	21 42 50
75-76½	NO RINGS WINCH [illegible]	12:40	tan-gray	fine sand + silt		MOD STR CONSOL	moderately moist	20 37 42
80-81½	NO RINGS	1:10	[illegible]	Varved clay interbdd silt [illegible]		MOD STR	slightly moist	22 32 50
85-86½	NO RINGS	1:30	gry-grn	Varved clay [illegible]		MOD ST	slightly moist	[illegible] 35 44
90-91½	BRASS RINGS	1:45	gry-grn	varved silty clay	2-BRASS Almost	MOD STR	[illegible] dry	15 40 67 2 rings
95-96½	NO RINGS	2:10	gry-grn	varved clay with ½" fine sand intbd		MOD STR	drill water added	16 32 50 don't use sample for moisture (drill water)
100-101½	Rings	2:30	Gry-Grn	[illegible]	3-Brass almost	STR-CONSOL	Somewhat moist	23 47 50 END OF HOLE

17

HOLE NUMBER GT-5 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 1 OF 2

PROJECT Pickles Butte Geotech OWNER Canyon County LOCATION: CO. Canyon Center of Landfill SEC. ____ 1/4 ____ OF 1/4 ____ T ____ N R ____ W

LOGGED BY STROUD DATE START 11/12/96 DATE FINISHED 11/14/96 HOLE DEPTH 101½ ANGLE -90 DRILL METHOD Hollow Stem Auger SPT DIAMETER 8"/2" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
0-1½	11/12/96	10:05		COVER &															MOIST	SHELBY TUBE THRU INTER
	SHELBY			TRASH												Ex LEL	0%		TO	COVER CLAY/SILT & TRASH
																check thru bolt			DRY	1½ ft @ 500 lbs
																hole in hollow stem				mashed end of tube
																& @ outside collar				
5-6½	NO	10:15		COVER &												after augering			MOIST	15 5 4
	RINGS			TRASH												Ex LEL	0%			MOST OF SAMPLE NOT
																ditto procedures				RECOVERED (SHOE BLOCKAGE)
10-11½	NO	10:30		TRASH												Ex LEL	0%		slightly	27 10 8
	RINGS																		damp	POOR RECOVERY (~3-4" SAMPL
15-16½	NO	10:40		TRASH												Ex LEL	0%		almost dry	70 @ 4 inches
	RINGS																			wood, plastic, paper
20-21½	NO	10:55		TRASH												Ex LEL	0%		almost dry	12 9 19
	RINGS																			GOOD RECOVERY ~ 20"
																				NEWSPAPER CINDER (RED)
25-26½	NO	11:10		Trash												Ex LEL	0%			50 @ 4½"
	RINGS																			SHUT DOWN WAITING ON
		ECS																		DELIVERY OF BRASS RINGS
		11-13-96																		
30-31½	BRASS	11:25		Trash												Ex LEL	0%			16 7 12 [illegible]
	RINGS																			2 brass rings
35-36½	Auger			Trash												Ex LEL	100% in			NO MORE BLOWCOUNTS
	thru																hollowstem			ex hazard
	NO SAMPLE																0 @ collar			
40-41	2½"	2:50		Trash												Ex LEL	100%			1 large brass ring
	BRASS																			
	RING																			
45	grab sample			trash												Ex LEL	100%			~ 8" sample
		2:15																		
		4:05																		
50	[illegible]	2" ring		trash												Ex LEL	100%		~	3" sample [illegible] / [illegible] in bag

HOLE NUMBER GT-5 JOB NUMBER 030496

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 2

PROJECT [illegible] Butte Geotech OWNER Cannon LOCATION: CO. [illegible] SEC. ___ 1/4 ___ OF 1/4 ___ T ___ N R ___ W

LOGGED BY [illegible] DATE START 11/12/96 DATE FINISHED 11/14/96 HOLE DEPTH 101½ ANGLE -90° DRILL METHOD Hollow Stem DIAMETER 8½" DRILL MODEL BK-81

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
		11-13-96																		
55	grab	4:30		tim ch																called 58 on bag
56 }	[illegible]		56'	in [illegible]																
58 }																				
60	1 ring +	4:55	tan-gray	Sand (med)																1 ring + 3" in bag
	grab	EOS"																		sand garbage & top
		11-14-96																		
65 →	grab +	9:30	gray	sand (med)															fairly damp	
65-65.5	2½"																sand fell			
65.5-67	splitting 9:45		+ grab														out w/o			1100 lbs [illegible] 6"
	standard 2"																retained			11 19 26 SPT
	split spoon [illegible]																in 2½ spoon			
																	LOOSE-MOD		mod. moist	
70-71½	SPT	10:20	tan-gray	silty fine sand													CONSOL.			13 34 42
75-76½	SPT	10:40	tan-gray	sand &															moderately	13 30 41
			gray-gray	clay													[illegible]		moist	sand-clay interbeds
																	mod well			
																	CONSOLID.			
																	sand mod loose			
80-81½	SPT	11:00	tan-gray	silty fine sand													as above		moist	20 35 46
85-86½	SPT	11:15	tan-gray	fine-to-med sand													MOD WELL		moist	20 37 50
																	CONSOL			
90-91½	SPT	11:35	tan-gray	[illegible]													MOD to		quite	16 12 22
				Sand													MOD CONSOL		damp	
																			(not saturated or wet)	
95-96½	SPT	11:50	tan-gray	med sand													MOD CONS		[illegible]	18 32 32
																	CONSOL		damp + cohesive	
	[illegible]																		[illegible]	
100-101½	SPT		tan-gray	fine-med sand													[illegible]		[illegible]	15 31 45

PB 1
2692 CollAR
2353 Static
2097 Water Intercept (Top)

USE TYPEWRITER OR
BALL POINT PEN

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name Canyon County
Address Caldwell, Idaho
Owner's Permit No. ______

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Other (specify type)
☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

4. METHOD DRILLED

☒ Cable ☐ Rotary ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 20 inches Total depth 658 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.325 inches	16 inches	+ 2 feet	575 feet
.250 inches	10 inches	537 feet	577 feet
.250 inches	10 inches	637 feet	658 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☒ Yes ☐ No
Perforated? ☐ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation ______ inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

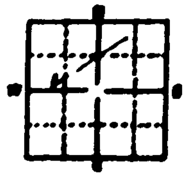
Well screen installed? ☒ Yes ☐ No
Manufacturer's name Johnson
Type Stainless Model No. ______
Diameter 10 Slot size 25 Set from 577 feet to 637 feet
Diameter __ Slot size __ Set from ______ feet to ______ feet

Gravel packed? ☒ Yes ☐ No Size of gravel No 16 Delmore
Placed from 537 feet to 658 feet

Surface seal depth 20 Material used in seal ☒ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used ☐ Slurry pit ☒ Temporary surface casing ☐ Overbore to seal depth

6. LOCATION OF WELL

Sketch map location must agree with written location. 63



Subdivision Name ______
Lot No. ______ Block No. ______

County Canyon

SW ¼ NW ¼ Sec. 21, T. [illegible] N, R. 3 W

7. WATER LEVEL

Static water level 735 feet below land surface
Flowing? ☐ Yes ☐ No G.P.M. flow
Temperature ____ F. Quality ______
Artesian closed in pressure ______ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☒ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
5 gpm	121	3

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
20	0	3	Top Soil		
11	3	45	Sand 20% Clay		
11	48	152	Sandy Clay		
11	152	205	Yellow Clay		
10	205	251	Gray Clay Sticky		
20	251	277	Blue Shale		
20	277	327	Blue Clay 10% Sand		
20	327	520	Blue Clay (Shale)		
18	520	595	Grey Shale		
16	595	640	Shale, Sandy	✓	
16	640	658	Blue Clay		

Department of Water Resources
Western Regional Office

10.

Work started 10/4/77 finished 2/16/78

11. DRILLERS CERTIFICATION

Firm Name Witt Drilling Firm No. 55
Address Caldwell, Ida Date 2/16/78
Signed by (Firm Official) Kenneth Witt
and
Operator Claude Dufae

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

HOLE NUMBER PB-2-CC JOB NUMBER I1120491

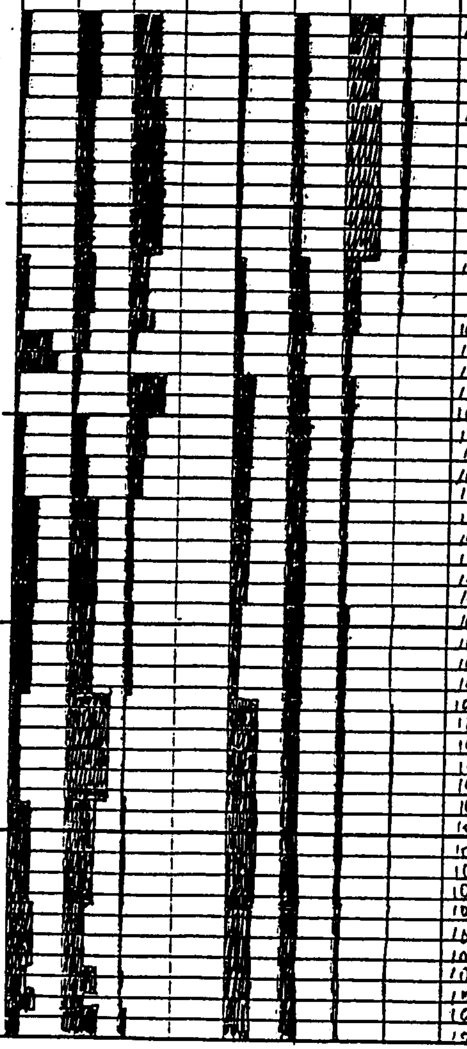
HOLLADAY ENGINEERING COMPANY

COLLAR ELV. ~ 2830' (2770 HC)

PAGE 1 OF 2

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY STROWD DATE START 4-15-92 DATE FINISHED 5- -92 HOLE DEPTH 557' ANGLE 90° DRILL METHOD CORE LEXAN DIAMETER 2.4" DRILL MODEL Longyear 44



REC	INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	HYDRAULIC PROPERTIES EST.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS
	0 - 1	4-15-92	2:00							no core recovery/loose sand
	2				silty sand	10^{-4}	unconsolid.		none	sample collected in contain-
[illegible]	3			lt gy br	"	"	"	R	"	at collar, prob. rd fill
	4			"	"	"	"	O	"	no core rec. Rd fill sand
[illegible]	5	liner collapsed	2:50	"	"	"	"	A	"	
0%	6			"	"	10^{-3}	"	D	"	"
	7			"	"	"	"	F	damp	"
	8			"	"	"	"	I	dry	"
	9			"	"	"	"	L	"	"
	10			"	"	"	"	L	"	"
				"	"	"	"		"	"
			3:30	"	"	"	"		"	"
				gy wht	silty sand w/ cly	10^{-4}	minor		"	Poor West to call office about collapsing, lin
10%		hole caving		"	"	"	1-2 mm voids		"	tiny drilling holes in Lexan
	15	at 15'	5:20	"	"	"	circular voids		damp ~ 6%	12.5-15 finished first core rec.
				"	"	10^{-3}	mod consolid		"	wk bedding
45%				"	clay w/ minor sd	10^{-7}	wk consolid		"	
		EOS	6:00	"	"	10^{-7}	"	massive	"	
8%		4-16-92	7:00	lt yel gry	sand	10^{-3}	unconsolid	S	dry	coarse immature sandstone
	20	hole [illegible]	7:30	"	med sandstone	10^{-3}	minor wk cons		dry	bimodal grain size distrib.
0%		casing 13'	9:15	lt gy tn	fine silty sand	10^{-5}	cutting? P		dry	no rec. sample coll. @ collar
		cuttings	9:45	"	silty fine sd + cly	10^{-5}	un - wk consol		"	Talked drillers called Ray SLC
		"		"	"	10^{-6}	wk Consol.		"	sampling bias favors coarser
		"	11:30	"	"	10^{-5}	"		"	w/ collector catching cuttings
	25	"		"	silt w/ cly	10^{-5}	"		"	"
		"		"	clayey silt	10^{-6}	"		"	"
		"		"	"	10^{-6}	"	MASSIVE	"	"
		"		"	"	10^{-6}	"		"	"
		"	1:00	"	"	10^{-6}	"		"	"
	30	"		"	"	10^{-5}	"		"	"
		"		"	"	10^{-5}	"		dry	"
		"		"	"	10^{-5}	"		"	"
33.5		EOS@4:3	1:45	"	"	10^{-6}	"		"	1:50-3:00 REAMING STUFF to set casing
		4-17-92	8:00	olive tan gr	clayey silt	10^{-6}	wk consolid		inject clear mud + water	hole bottom 33.5'
		using		"	"	10^{-4}	wk-mod consl.		"	(polymer) CORE BOXES TOO SHORT
90%		H2O		"	"	10^{-4}	"		"	FOR LEXAN TUBES
				"	"	10^{-4}	"		"	
		drilling		"	"	10^{-4}	"		"	
38.5		fast	8:30	"	"	10^{-5}	"		"	
				olive gy gr	"	10^{-5}	"		"	
100%		drilling		"	clayey silt	10^{-5}	"		inject H2O	
		fast		"	"	10^{-5}	"		+ polymer	
				"	"	10^{-5}	"		"	
43.6		water run	9:05	"	"	10^{-5}	"		"	
				"	"	10^{-6}	"		"	
				"	"	10^{-6}	"		"	
85%				"	"	10^{-5}	"		"	
				"	"	10^{-5}	"		"	
48.6			10:00	"	"	10^{-4}	"		"	
90%				"	"	10^{-5}	"		"	

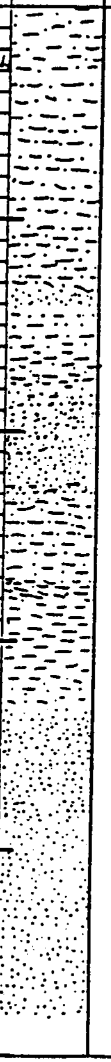
HOLLADAY ENGINEERING COMPANY

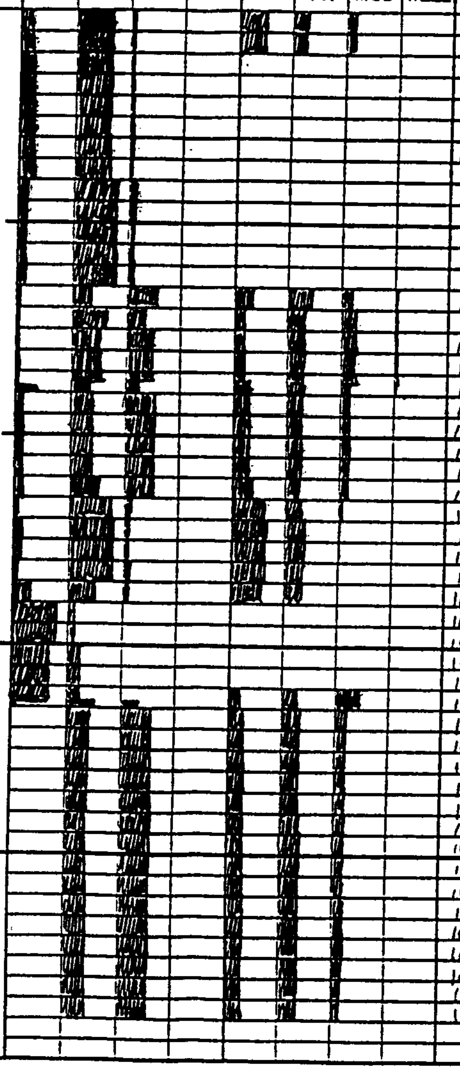
HOLE NUMBER PB-2 JOB NUMBER T1120491

PAGE 2 OF 2

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Strond DATE START 4-15-92 DATE FINISHED 4-20-92 HOLE DEPTH ____ ANGLE 90° DRILL METHOD core DIAMETER 2.4" DRILL MODEL Longyear 44





INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	GEOPHYSICS LOG	HYDRAULIC PROPERTIES EST.	HYDRAULIC PROPERTIES MEAS.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS
90%	fast	4-17	gry-grn	silty clay + sd		10-4		wkly consl.	massive	inject H2O	+ polymer
	drilling		"	"		10-4		"			(Fluidrill clear mud)
53'		10:50	"	siltstone w/ cl		10-5		mod. consol.			
			olive grn	"		10-5		"			
65%			"	"		10-5		"			
			"	"		10-5		"			
			"	"		10-5		"			
58'		11:10	"			10-5		"			
			"	siltstone		10-4		"			
			"			10-4		"			
85%			gry grn			10-4		"			
			"			10-4		"		inject H2O	
63'	lost circ	11:30	"			10-4		"			
			"	fine sand		10-3		wk consol.			Sand in hole bottom, losing circ.
80%			"	coarse silt		10-4		"			cross beds
			gry-tan	silty sand		10-4		"			x bedding
			"	silt w/ clay		10-4					wk bdd
68'	Water run	12:15	"	sandy clay		10-5		mod. consol.			
	4-18	EOS 2:00 8:30am	"	fine sand + silt		10-4		wk bdd		Quit for day	EOS @ 2:00 high winds + dust storm
		~~8:30~~	"	fine sand		10-4		"		inject H2O	
53%			"			10-4		massive		+ polymer	
			"			10-4		"			
73'		8:25	"			10-4		"			
			"	silt		10-4		NK consol	Massive		
100%			"	silt w/ minor cly		10-5		"			
			"			10-5		"			
			"			10-5		"			
78'		9:05	"	clayey silt		10-6		mod. consol.			
			"	silty clay		10-7		"			
			"	"		10-7		"			coarse? clay grs near fine silt
55%			"	"		10-7		"		inject H2O	
			"	"		10-7		CROSS-BEDD		+ polymer	CROSS:
83'		9:30	"	fine sand + silt		10-6		"		water run	air blowby @ casing
	stuck in hole	4-19 8:00am	"	NO CORE SAMPLE		10-3		loose fine	?	drilling dry	Hole squeezed; re-reaming 15' got
0%			"	fine " (fine		10-3		"		"	stuck in hole after 3 ft in
	Sand fill	10:00	"	sand) " sand		10-3		"		"	backs off hole bottom
	hole bottom		"	"		10-3		"	?	"	fills w/ sand/air into formation
88'	losing circ	11:00	"	NO SAMPLE		10-3		"		"	sample from sand blowing up casing
			"	NO CORE SAMP		10-3		"		"	" " "
	Trip		"	"		10-3		"		"	" " "
0%	chg bit		gry-tan	"		10-3		"	?	"	" " "
			"	"		10-3		"		"	" " "
93'		2:30	"	"		10-3		"		"	" " "
	Try Air		tan-olive	silty fine sand		10-4		wk consol	?	Air Quik +	2 inches of core recovery
3%	Quick +		"	"		10-4		"		Clear Mud.	lost cast down hole
	Clear Mud		"	"		10-4		"	?	H2O inject	trip out 4:30
			"	"		10-4		"		"	
		3:10	"	"		10-4		"		"	
ABORT HOLE OFFSET 60' WEST	Trip in	7:30 4/20/92									
										Lose Circ. Trip out + get stuck @ 56' ABORT HOLE	

HOLE NUMBER DB-2A JOB NUMBER T1102491

HOLLADAY ENGINEERING COMPANY

PAGE 3 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Stroud DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 557' ANGLE -90° DRILL METHOD Rotary/Core DIAMETER DRILL MODEL Longyear 44

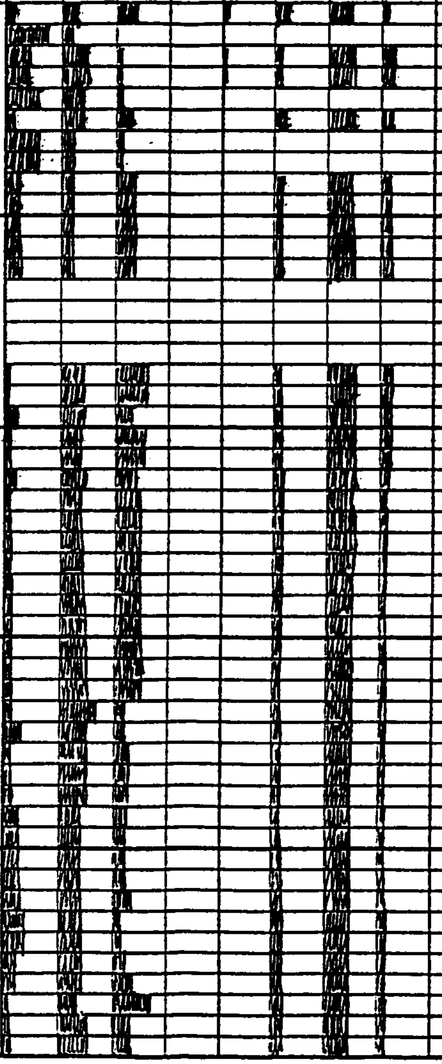
INTERVAL (FT) REC	INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	HYDRAULIC PROPERTIES EST.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS
			4-22		no samp					MUD ROTARY w/ BENTONITE
					"					
	103'		9:20		silt					cuttings indicate silt but kaolinite
					no samp					+ sand from uphole contamination
										does not allow further
										classification
10%	113'	START SET CASING	10:00	gry-tan	silt					REAMING TO SET CASING - ON BOTTOM
	114	Punch	2:30	g "	"	10^{-6}			inject H_2O	BLOWS HYDRAULIC HOSE - DOWN
		BORE		"	Fine sand w/	-4			clear mud	CASING set to 113' TRY PUNCH
		H_2O +		"	silt	-4	minor			BORE CORE
25%		clear mud		"	"	-4	bdd			
				"	"	-4				
		remove		"	silt w/ fine	-4				core bedding / significant
	120	spring	3:30	"	sand	-4	minor bdd			grain size changes
		core lost			NO					
0%		down			SAMP					
	123	hole	3:45		"					
		insert			fine sand	-4		massive	too much	poor recovery from
30%		spring			clayey sd	-4			inject H_2O?	too much water? Upper
			4:15	lt gry tan	clayey silt + sd	-5				sample very wet - lower
	127			"	"	-5				sample almost dry (damp).
50%				"	clay, minor silt	-7			less H_2O	clay zone
	129		4:45	"	silty fine sand	-4			inj-hole dec.	
	130		5:00	"	Fine sandy silt	-4	massive			CORE BARREL SEPARATED UNSCREWED
80%	131	4-23-92	8:30	"	silt minor cly	-5			inj H_2O +	lost down hole. Size /129-131
				"	silt	-5			clear mud	retrieved 6:00 pm
	133		9:10	"	fine sand w/ silt	-4				minor cly w/ silty sand
					no sample					
20%					"					
					"					
		retaining			"					retaining spring in backwards. 10% recovery
	138	spring backwards	10:00	lt gry.	silt w/ minor cly	-5				ask Ross to use less H_2O inject
	139		10:05	lt grey-grn	almost pure cly	-7	plastic cly			
				lt tan w/	clayey silt	-5				
					no sample					
					"					Ross says sample is packing +
10%					"					blocking off core barrel
					"					
	145		11:20		"					
50%	146		12:00		silty fine sand	-4	massive			minor Clay
37%					"	-4				try low rotation - fair recovery
	148		12:45		"	-4				try no rotation - no recovery
		trip out				-4				trip out, try core drilling w/
						-4				

HOLE NUMBER PB-2 JOB NUMBER T1120491 **HOLLADAY ENGINEERING COMPANY** PAGE 4 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Strowd DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 557' ANGLE -90° DRILL METHOD Core DIAMETER 2.410 DRILL MODEL Longyear-44

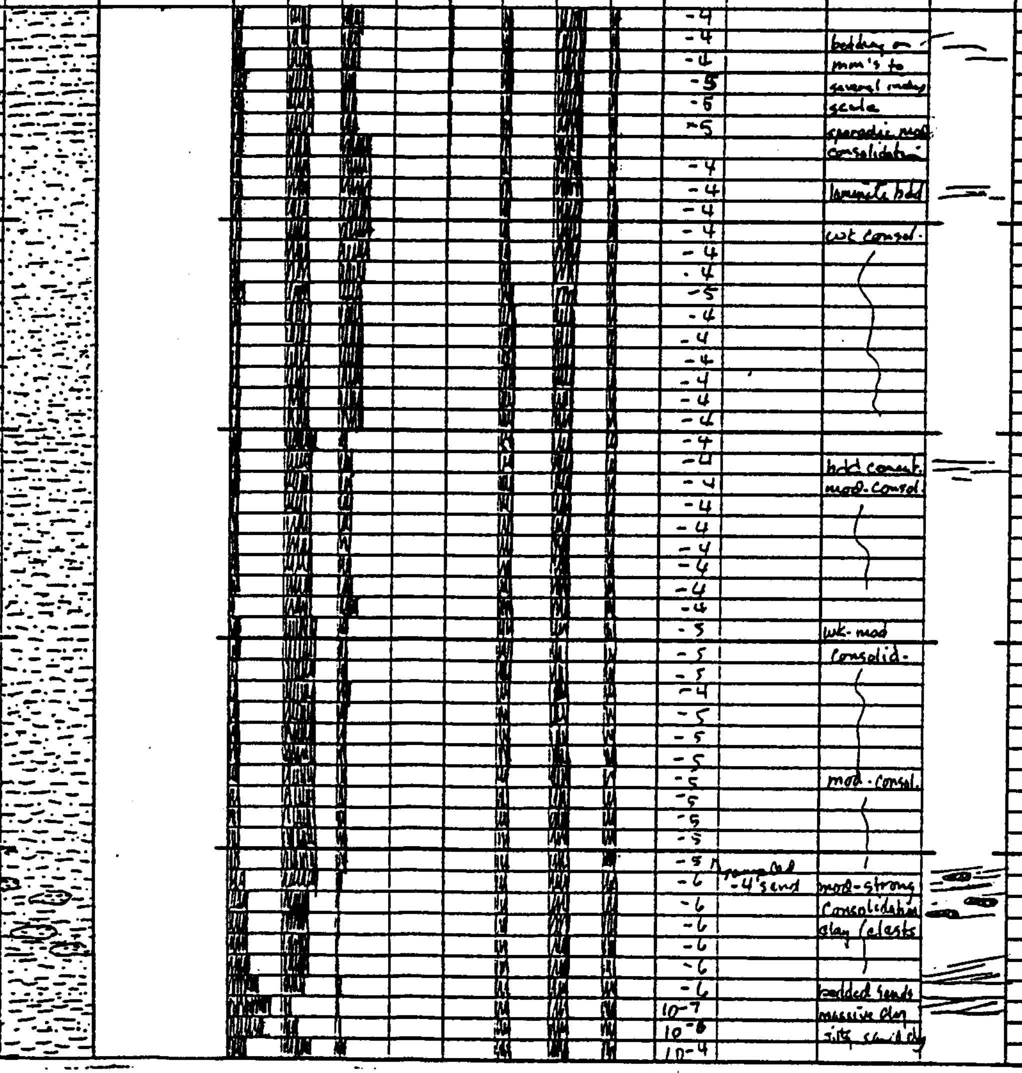
INTERVAL (FT)			DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
Rec		DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
60%		4-23		gry-gn-tan	fine silty sand											10^{-4}				inject H_2O	
					clay											10^{-6}		mod consl.			
	153	Trip out	2:15		clayey silt											10^{-4}					50% rec. - trip out for lexan tube bit
					"											10^{-4}					
				lt gry tan	silty clay											-5					
81%				"	silty sand											-4					
				gr-gn-tn	silty clay											-5		wk laminated			silty clays mod. consolidated
	156		3:45	lt gry tan	"											-5		bdd in clys			sands wk to unconsolidated
				"	clayey fine sand											-4		wk consol.			
				"	"											-4					
53%				"	"											-4					
				"	"											-4					
	163	EOS	11:30	"	"											-4					
		4-28-92	7:00 am		no samp.															inject H_2O	trip back in hole, load of H_2O
0%		no rec.			"																
					"																
	167	no recov.	8:15		"																
		using		lt gry tan	silty fine sand											-4		sporadic consol			occas. HEMATITE STN + CEMENT
100%		bentonite		"	"											-4		minor x-bd			w/ lumpy consolidated zones
		[illegible]		"	clayey silt											-5		wk-uncons			mostly wk to unconsolidated
				"	silty fine sand											-4		"			
	172		9:00	"	"											-4		"			
				"	"											-5		"			some visible clay/binding sand
93%				"	"											-4					
				"	"											-4					
				"	"											-4					
	177		9:45	"	silty fine sand											-4					
				"	"											-4					
				"	"											-4					
56%				"	"											-4					
				"	"											-4					
				"	"											-4					
				"	"											-4					
	184		10:30	lt gry tan	sandy silt											-4		mod str consl			
77%				"	silty clay											-6		wk consl.			
				"	silty fine sand											-4					
				"	"											-4					bedding structures
	188		11:15	"	"											-4		mod consl.			"
				lt gry tan	sandy silt w/ clay											-5					more clay less sand
				"	"											-5					
93%				"	"											-5		"			
				"	"											-5					
	193		11:45	"	silty sand											-4		wk consol		inject H_2O	consolidation limited to
				lt gry tan	clayey silt											-5					zones inches to a foot thk
				"	"											-5					
100%				"	silty fine sand											-4					
				"	"											-4					
	198		12:30	"	fine sand											-3					
				"	sandy silt											-4					
				"	"											-4					



HOLE NUMBER PB-2 JOB NUMBER T1120491 **HOLLADAY ENGINEERING COMPANY** PAGE 5 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Strowd DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 557' ANGLE -90 DRILL METHOD CORE DIAMETER 2.4"/4" OD DRILL MODEL Longyear 44



INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	LITHOLOGY ROCK TYPE	HYDRAULIC PROPERTIES EST.	MEAS.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	WATER	COMMENTS
	mud + H2O		lt gry tan	sandy silt	-4			inject H2O	minor clay fraction
82 %			"	"	-4		bedding on	w/ bentonite	low water mix. high rotation
			"	"	-4		mm's to		low bentonite
204		1:00	"	"	-5		several m.		increasing clay component
			"	fine sandy silt	-5		scale		
96 %			"		~5		sporadic mod		
			orange	silty sand			consolidation		orange hematite stain
			lt gry tan		-4				
209		1:30	"	silty sand	-4		laminate bdd		fine bedding on splitting core open
			"	"	-4				can't see fine structures in Lexan
50 %			"	"	-4		wk consol.		degree of rounding rarely
			"	"	-4				seems to change
	low rec.		"	"	.4				
214	didn't [illegible]	2:00	"	silt & fine sand	-5				POSSIBLY LOST [illegible] DOWNGRA
			"	"	-4				
86 %			"	"	-4				
			"	"	-4				
			"	"	-4				tell driller will blow hole
			"	"	-4				clear of water at EOS to test
220		2:45	"	"	-4				for methane
			"	clayey siltstone	-4				
			"	fine sandy silt	-4		bdd consol.		bdd planes cemented
			"	w/ minor cly	-4		mod. consol.		sedimentary features
			"	"	-4				masked from Lexan
			"	"	-4				tubes.
			"	"	-4				
			"	"	-4				
			"	"	-4				
229		3:45	lt tan gy	"	-4				
			"	clayey silt w/	-5		wk-mod		
			"	fine sand	-5		consolid.		
72 %			"	"	-5				
			"	"	-4				
			"	"	-5				
			"	"	-5				
236	EOS	4:30	"	"	-5				blow H2O from hole methane chk
	4-29-92	8:00	lt tan gy	"	-5		mod. consol.		mod. induration - holds together
100 %	using		"	"	-5				but can be easily broken by
	H2O + mud		" w/ org	"	-5				hand
			"	clayey silt w/	-5				~3 mm round blebs of orange
241		8:45	"	fine sand	-5	sampled			hematite stain
			lt tan gy	siltstone w/ cly	-6	-4's sand	mod-strong		
100 %			"	Claystone w/	-6		Consolidation		POSSIBLE MONITORING HORZ
			"	siltstone	-6		clay clasts		HEMATITE rimmed clasts of clay
			"	oxidized	-6				within fine silt/clay matrix
246		9:40	"		-6				10-5 w/ 10-7 clay beds
	drill w/o		"	clay bed 4"+1"	-6		bedded sands		drill without Lexan liner for
60 %	Lexan		"	clay 13" THK	10-7		massive clay		better logging.
	liner		"	clay + fine sand	10-6		silty sand/cly		
			"	mixed sd slt cly	10-4				

HOLE NUMBER PB#2 JOB NUMBER T1120491

HOLLADAY ENGINEERING COMPANY

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SE OF 1/4 NW 2

LOGGED BY [illegible] DATE START 4-20-92 DATE FINISHED 5-75 HOLE DEPTH 557' ANGLE -90 DRILL METHOD Core DIAMETER 2.4"/4 OD DRILL MODEL [illegible] 44

INTERVAL (FT)	DRILL NOTES	DATE TIME	COLOR	ROCK TYPE	HYDRAULIC PROPERTIES EST.	MEAS.	INDURATION & STRUCTURE FXS, VOIDS, ETC.	GRAPHIC	WATER	COMMENTS
			lt gry tan	silty sand	10^{-4}		very wk consol.		inject H_2O	poor recovery - sand washing
252	stop drill blow hole	10:30	"	" "	10^{-3}		unconsolid.		blow dry hole	out of barrel w/o liner
253 INVERTED		2:50	lt gry yellow	clay + silty sand	10^{-7}		cly str consol.		NO GRD H_2O	ATTEMPT GRD-WATER MEAS. + AIR CORE
	Drill wet		lt. gry tan	silty fine sand	10^{-4}		unconsolid		after 3½ hrs.	START DRILL AGAIN @ 2:00 –
63%			"	" "	10^{-4}		"		AIR CORE	LOSING AIR CIRC. PLUG BEHIND BIT
			"	silty clay	10^{-7}		mod str cons		INJECT H_2O +	CLEAR MUD + NO LINER
			"	silty clay/silty sd	10^{-7}		"			Thin 1" sand bed in clay
		4:45	"	" "	10^{-7}		mod. consolid			2" + 3" sand beds in clay
259	EDS	4:45	"	"	10^{-7}		mod str cons			
	4-30-92	8:00	"	silty sand	10^{-4}		mod cons.			
	DRILL		"	"	10^{-4}		"			ORIENTATION NEW HELPER 7:00-8:00
	WET		"	sandy silt	10^{-5}		mod str.			could define bedding ∠ 30°
50%	w/o		yel-gry gn	"	10^{-5}		"			
	LINER		"	"	10^{-5}		"			sub horiz. bdd.
	penetration		"	"	10^{-5}		"			parting on bdd planes
	slowing		"	"	10^{-5}		"			on well consolid. material
	down		grn gry tn	silty sandstone	10^{-6}		"			
268		9:30	-	silty sand	10^{-4}		wk consol.			
			"	clayey siltstone	10^{-5}		mod. consol.			
				" " w/ sand	10^{-5}		"			
85%			"	clayey siltstone	-5		hard str cons			
			"	"	-5		"			hematite str on bd plane
273		10:00	grn-gry tn	"	-5		"			
	slower		"	silty claystone	-6		mod consl.			
73%	drilling		"	"	-6		"			
	more		"	"	-6		"			
	indurated		"	"	-6		"			
			"	"	-7		"			
279		11:15	"	clayey siltstone	-4		"			
			"	silty claystone	-6		consolidated			material is "tight" and dense
86%			"	"	-6		"			and has become more consistently
			"	"	-6		bdd ~ ∠10°			consolidated since about 250'
			"	"	-6		"			Decide to case to this zone
284		12:40	"	"	-6		"			and try air core again.
	5-1-92			no sample						
	Tricone			"						Tricone Ream Hole 113'-
	to set			"						298 - set casing to 259'
	casing			"	-6		horiz. bdd.	massive		
288				"	-6				damp from	
	5-2-92		grn-tan	clayey siltstone	-6				previous	Establish circ. blow water
	AIR CORE		"	"	-6				injected	dry hole 7:00 - 9:00
28%	"		"	"	-6				H_2O ??	minor fossil wood stems ?
	"		"	"	-6					parting planes on bedding
294	blow dry	10:15	-	clayey siltstone	-6					minor "hematite" spots"
	more		"	silty claystone	-7		gritty,		AIR BLOW	GOOD SAMPLE DRILL WITHOUT
50%	clay		"	"	-7		massive,	massive	DRY MOST	FOR HYDRAULIC AIR CIRCULATION
297	collecting	4:30	"	"	-7		dense		OF DAY	CONDUCTIVITY
100 298	off	8:30	"	"	-7		damp		FORMATION H_2O	9:00: air well probe - damp clay bottom
100% 299	Drill no air	10:00	"	"	-7				damp clay ?	
	casing [illegible]	12:45	"	"coarse" clay	-7		INJECT H_2O		INJECT H_2O	due to plugging up bit air

HOLE NUMBER PB-2 JOB NUMBER T1120491 **HOLLADAY ENGINEERING COMPANY** PAGE 7 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T. 2 N R 3 W

LOGGED BY Strowd DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 557' ANGLE -90 DRILL METHOD CORE DIAMETER 2.4"/4" DRILL MODEL Longyear 44

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
			gry-grn-tan	"coarse" clayst											10^{-7}		some fine		inject H_2O	clay size fraction but not
100 %			"	" "											-7		bdd subhorz			a plastic or putty type.
			"	"											-7		mod. str.			a "coarse" powdery damp
304		12:05	"	clayey minor											-7		consolidation			clay w/ minor silt fraction
	Try blocks		"	silt component											-6			massive		perhaps slit siltyer than prev.
	water off		"	"											-6					run.
84 %	inside core		"	"											-6					
	tube-		"	"											-6					SAWED INTO TO CHECK SITUATION
	marginally		"	"											-6					
310	successful	1:20	"	"											-6		bdd struct.			CRUSHED LINER BLOCKING OFF
	USING		gry grn tan	silty claystone											-6					Occassional bands, blebs,
	H_2O		"	"											-6					and erratic zones of hematite
84 %	without		"	"											-6					stain are present in all of
	clear		"	"											-6			massive		the clays. Minor fossil
	mud or		"	"											-6					plant debris, possible
316	AIR	2:00	"	"											-6					gastropods + small mammal bones
	Quick		"	silty claystone											-6		bdd			present
			"	"											-6					
100 %			"	"											-6					
			"	"											-6					
321		2:40	"	"											-6		mod strong			
			gry grn tan	silty claystone											-6		induration	massive		same powdery damp clay
			"	"											-6					
100 %			"	"											-6					
			"	"											-6					
326		3:15	"	"											-6					
			gy grn tan	silty claystone											-6					
85 %			"	"											-6					
			"	"											-6					
			"	"											-6					
			"	"											-6					
332		4:00	"	"											-6					blow hole dry
100 %	DRILL DRY	5-4/8:10	"	"											-6				NO WATER	DRILL DRY W/O AIR (200% rec)
334	230% rec.	8:10	"	"											-6				INJ. SAMPLE	SAMPLE DAMP BUT NOT SATURATED
	DRILL WET		gy grn tan	silty claystone											-6		Str indur.		INJECT H_2O	SAME MATERIAL MASSIVE Clys.
			"	"											-6					BUT BECOMING HARDER
74%			"	"											-6					
			"	"											-6					
			"	"											-6					
340		8:45	"	"											-6		bdd Horz			
			"	silty claystone											-6					
			"	"											-6					
92%			"	"											-6					
			"	"											-6					
345		9:30	"	"											-6		bdd			
			"	silty claystone											-6		strong			
84 %			"	"											-6		induration			occassional hematite orange
			"	"											-6					stains
			"	"											-6					
350			"	"											-6					

HOLE NUMBER PB-2 JOB NUMBER T1120491

HOLLADAY ENGINEERING COMPANY

PAGE 8 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY STROWD DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 5-57 ANGLE -90° DRILL METHOD CORE DIAMETER 2.4"/4" DRILL MODEL Longyear 44

INTERVAL (FT)			DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
		DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	351	INJECT	10:30	gy-gn-tn	silty claystone											10^{-6}				inject H_2O	ABIT COARSER THAN PREVIOUS
		H_2O w/	COLOR		"											-6		Mod str ind			hematite stain blebs but
		NO	CHANGE	darker	"											-6		parting on		moist-damp	becoming darker
83%		ADDITIVES	↪	gy-grn	"											-6		bedding		claystone	iron mineral in reduced
				gry-grn	"											-6					form as metallic gray blebs
				"	"											-6		mod indurated			no hematite / possible
	357		12:10	"	"											-6		carbonaceous			REDOX around 357 1/2'
				gry-brn	"											-6		PLANT TRASH			TRANSITIONAL OXIDATION
				"	"											-6		OCCASS.			NO MATERIAL CHANGE OTHER
83%				"	"											-6		bdd - HORZ		INJECTING H_2O	THAN OXID.
				"	"											-6				NO APPARENT	PARTIAL REDUCTION HERE
	>		COLOR CHANGE	blue-gry	"											-6				CHANGE IN	REDUCED HERE
	363		12:45	"	"											-6		STRONG INDUR		NATIVE	ON DRYING CLAYSTONE BECOMES
		DRILLING		"	silty claystone											-6				MOISTURE	POWDERY BUT MOD. HARD
		SLOWER		"	"											-6				CONTENT ~	BECOMES LIGHT GRAY ON DRYING
71%		HARDER		"	"											-6		HORIZ BDD		10-12%	CARBON PLANT TRASH
				"	"											-6					COMMON SINCE REDUCED
				"	"											-6					
				"	"											-6			[illegible]		GOT STUCK 10 MINUTES BREAKING
	370	stuck	1:45	"	"											-6				INJECTING H_2O	BDD JOINT ABOVE HOLE BOTTOM.
				MED. GRY	silty claystone											-6		Fine bdd			APPEARS SLIGHTLY MORE SILTY
				"	"											-6		HORZ.		DAMP CLY	
83%		BLOCKING		"	"											-6				10-12%	MUSCOVITE MORE ABUNDANT
		OFF @		"	"											-6		MOD STR.			
		6 FT UP		"	"											-6		CONSOLIDATION	MASSIVE		HOMOGENEOUS SILTY CLAY
	376	5 FT LINERS	2:20	"	"											-6					HAS NOT VARIED MUCH
				MED. GRY	silty claystone											-6					PHYSICALLY SINCE ~ 270'
				WET	"											-6					
87%				LIGHT GRY	"											-6					
				DRY	"											-6				INJECTING H_2O	
				"	"											-6					SAMPLE HARD SUFFICIENTLY
	382		2:50	MED GRY	"											-6		plant shear		MOIST CLY	TO CRACK IN LINER EVEN
		Ross says		"	silty claystone											-6				10-12%	WHEN FLUID FILLED
		more fines		"	"											-6		bdd HORZ			
63%		are being		"	"											-6					
		carried		"	"											-6		MOD STR			
		away w/		"	"											-6		CONSOLD.			
		H_2O in		"	"											-6					
		thingy		"	"											-6		CARBO BDD PLANES			[illegible] CARBO BDD
	390	material	3:30	"	"											-6		plant trash		INJECT H_2O	
				MED. GRY	silty claystone											-6		INJECT H_2O			THIS RUN DOESN'T HAVE
100%				"	"											-6					MUCH INJECTED H_2O IN
				"	"											-6		HORZ BDD			SAMPLE LINER - GOOD TEST SAM
				"	"											-6					
	395	EOS	4:10	"	"											-6		BLOW DRY HOLE			BLOW DRY FOR 1 HR 4:15-5:15
		5-5-92	7:30	"	claystone											-7					LESS SILTY
100%	397	DRILL DRY	8:15	"												-7		10-12% H_2O	MASSIVE	NO H_2O INJ.	sticky cly/moisture 10-14%?
				"												-7		strong consold		" " "	almost pure "modeling clay"
				"												-7					
				"												-7					

HOLE NUMBER PB-2 JOB NUMBER T1120491

HOLLADAY ENGINEERING COMPANY

PAGE 9 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Stroud DATE START 4-20-92 DATE FINISHED 5-15 HOLE DEPTH 557' ANGLE -90 DRILL METHOD Core DIAMETER 2.4" DRILL MODEL Longyear 44

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
100%	INJECTING		MED. GRAY	claystone											10^{-7}		strong		inject H_2O	sticky cly vry minor silt
	H_2O +		"	"											-7		consolidation	massive	est. 10-18%	
403	AIR QUIK	9:00 am	"	"											-7				formation	moist + sticky
			"	"											-7		massive w/		H_2O	MEDIUM GRAY BECOMES
			"	"											-7		bits of			VERY LIGHT CEMENT GRAY
100%			"	"											-7		bdd struc.			ON DRYING OUT
			"	"											-7					
408		9:30	"	"											-7				10-14%	~2% silt 98% cly
			MED GRY	CLAYSTONE											-7		STR. CONSOL.		natural H_2O	NOT AS CARBONACEOUS
			"	"											-7					
80%			"	"											-7					
			"	"											-7					
			"	"											-7					
414		10:00	"	"											-7					
	WATER	1:00	MED GRAY	claystone											-7					
	TRUCK		"	"											-7		STR CONSOL.			
83%	DOWN		"	"											-7					
	WIRE		"	"											-7					
	LINE PROBLEM		"	"											-7					
420		1:30	"	"											-7				DAMP CLY	
	[illegible]	1:40	MED GRY	CLAYSTONE											-7				INJECTING	QUAD DEFECTIVE ON CORE
	INT. H_2O		"	"											-7				WATER	TUBE HAS TO TRIP 3:20-4:00
58%			"	"											-7					REPLACED UNIT - SHOE AT
			"	"											-7					BIT WASN'T IN ALL THE WAY
			"	"											-7					
426	Trip out	3:30	"	"											-7					
		4:45	MED GRY	CLAYSTONE											-7		STRONG			
			"	"											-7		CONSOLIDATED			
71%			"	"											-7					
			"	"											-7					
			"	"											-7					
			"	"											-7					
433	EOS	5:30	"	"											-7		SUB HORIZ bdd.			3½ HRS DOWN 6½ DRILL
	5-6-92	7:00	MED GRY	CLAYSTONE											-7		STRONG		INJECT H_2O	BROUGHT IN LARGER COMPRESSOR
			"	"											-7		CONSOLID.			220 psi ; DRILL STEM WAS
			"	"											-7					STUCK IN HOLE AT
71%			"	"											-7				10-14% natural	BEGINNING OF SHIFT.
			"	"											-7				moisture in	MATERIAL FRACTURES
			"	"											-7				sample	WITH AND ACROSS BEDDING
440		8:45	"	"											-7					
			MED GRY	CLAYSTONE											-7		HORIZ. BDD		INJ. H_2O	
			"	"											-7		STR. CONS.			
			"	"											-7					
70%			"	"											-7					
			"	"											-7					
			"	"											-7					
447	"	9:15	"	"											-7					
			"	"											-7					
70 %			"	"											-7					
			"	"											-7					

HOLE NUMBER PB-2 JOB NUMBER T1120491

HOLLADAY ENGINEERING COMPANY

PAGE 10 OF 12

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY Strond DATE START 4-20-93 DATE FINISHED 5-15-93 HOLE DEPTH 557' ANGLE -90° DRILL METHOD CORE DIAMETER 2.4" DRILL MODEL Longyear 44

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK.	MOD	WELL	EST.	MEAS.		GRAPHIC		
	DRILLING		MED. GRY	CLAYSTONE											10^{-7}		MOD STR.	MASSIVE	INJECT	MATERIAL BASICALLY
	WET		"	"											-7		CONSOLID.		H₂O	UNCHANGED SINCE 395'
			"	"											-7					OR EVEN 362'
454		9:45	"	"											-7				NATIVE	
			MED. GRY	CLAYSTONE											-7				MOISTURE	
			"	"											-7				~10-12%	
			"	"											-7					
100			"	"											-7					
			"	"											-7					
460		10:00	"	"											-7					
			MED GRY	CLAYSTONE											-7		MOD STRONG		INJECT H₂O	
			VERY	"											-7		CONSOLID			
			UNIFORM	"											-7					
712			GRAY	"											-7					
			COLOR	"											-7					
			"	"											-7					
467		11:30	"	"											-7					
			"	CLAYSTONE											-7					
			"	"											-7					
.83%			"	"											-7					
			"	"											-7				INJECT H₂O	
			"	"											-7					
473		12:15	"	"											-7					
			MED. GRY	CLAYSTONE											-7		MOD STR.			
832			"	"											-7		CONSOLID.			
			"	"											-7					
			"	"											-7					
			"	"											-7					
479		12:45	"	"											-7					
			MED GRAY	CLAYSTONE											-7					CARBONACEOUS WOOD FRAGS
			"	"											-7					LINER CRUSHED BY COMPRESSION
			"	"											-7				NATIVE MOIST	
93%			"	"											-7				~12-14%	
			"	"											-7					
485		1:30	"	"											-7					GOT STUCK IN HOLE 15 MIN.
		2:00	MED. GRY	CLAYSTONE											-7		MOD STRONG		USING H₂O	
			"	"											-7		CONSOLID.		+ CLEAR MUD	
832			"	"											-7				(POLYMER)	
	CASING		"	"											-7					
	SEAL		"	"											-7					CASING WORKING LOOSE
491	FAILING	2:45	"	"											-7					
			MED GRY	CLAYSTONE											-7					
			"	"											-7					
			"	"											-7					
			"	"											-7				RETURN	
496	NOW DRY	3:45	"	"											-7				WATER IN	4:00 blow hole - return air
497	5-7-97	10:15	MED GRY	CLAYSTONE				DRILL DRY THIS ONE FOOT SAMPLE							-7				HOLE BOTTOM	coming from outside casing
	5-15-97	10:00		NO SAMPLE				NO SAMP - PACKER BLOCKED CORE TUBE											IN MORNING	RESEAL CASING + DRY TILL 5:30
0%																				SET MORE CASING FROM 290 TO
																				293

PAGE 11 OF 12

HOLLADAY ENGINEERING COMPANY

HOLE NUMBER PB2 JOB NUMBER T1120491

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W

LOGGED BY STROWD DATE START 4/20/92 DATE FINISHED 5-15 HOLE DEPTH 557 ANGLE -90° DRILL METHOD CORE DIAMETER 2.4"/4" DRILL MODEL Longyear 44

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	NO SAMPLE PACKER BLOCKED OFF						CORE TUBE													
02																				
505															10-7		MOD STR.	MASSIVE	INJECT H2O	SOME RUBBER PACKER
63%			* MED GY	CLAYSTONE											-7		CONSOLID.		CLEAR MUD	DEBRIS MIXED W/ SAMPLE
507	10:45	DRILLING	"	"											-7					
			"												-7		Gr. bdd	=	NATIVE MOISTURE	INSIDE CORE WETTING
100 %			"												-7				FRONT ~	15% - 20%
			"												-7		MOD STR		15-20%	
			"												-7		CONS.			* MED GRAY COLOR
512		11:30	MED GY.												-7			MASSIVE		IS VERY LIGHT TAN-GRY
			"	CLAYSTONE											-7					UPON DRYING. THIS COLO
			"	"											-7					CHARACTERISTIC APPLIES
100%			"	"											-7					TO ALL GRY CLAYSTONE
			"	"											-7		Gr. laminated	=		ENCOUNTERED THUS FAR.
517		12:00	"	"											-7		bdd	—		
	LOST		MED GRY	CLAYSTONE											-7					
70%	RECOVERED		"	"											-7					RUBBER PACKER DEBRIS IN SAMP.
	SAMPLE		"	"											-7		Gr. bdd.	=		
	RETRIEVED		"	"											-7					
	NEXT RUN		"	"											-7					
			"	"											-7					
524	1:00	1:00	"	"											-7				20-25%	CUT HOLES IN LINER &
			MED GRY	CLAYSTONE											-7				NATIVE	RELEASED INJ. H2O &
83%			"	"											-7				H2O	RETAPPED
			"	"											-7					
			"	"											-7					
			"	"											-7					
530		1:15	"	"											-7				20-25	GOOD SAMPLE FOR
	DRILLED		MED GRY	CLAYSTONE											-7				NATIVE	UNDISTURBED SAMPLE
	W/O		"	"											-7				MOISTURE	NO PACKED IN INJECT
5 hrs 44%	LINER		"	"											-7					H2O (DRILLED W/O
			"	"											-7					LEXAN LINER)
			"	"											-7					
536		2:00	"	"											-7					
	WITH		MED GRY	CLAYSTONE											-7					
	LINER		"	"											-7					
100%			"	"											-7					
540		2:30	"	"											-7					CLAYSTONE PERHAPS BECOMING
			MED GRY	CLAYSTONE											-7					SLIGHTLY COARSER GRAINED
100%			"	"											-7					
			"	"											-7					
		3	"	"											-7					
545		3:00	"	"											-7					
			MED GY	CLAYSTONE											-7					
															-7					
83%															-7					
															-7					
															-7					

HOLE NUMBER 7B2 JOB NUMBER T1120491

HOLLADAY ENGINEERING COMPANY

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SE OF 1/4 NW T 2 N R 3 W PAGE 12 OF 12

LOGGED BY Stroud DATE START 4-20-92 DATE FINISHED 5-15-92 HOLE DEPTH 557' ANGLE -90° DRILL METHOD CORE DIAMETER 2.4"/4" DRILL MODEL LONGYEAR 44

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE EXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
551		3:30	MED GRY	CLAYSTONE			▨								10^{-7}		MOD STR.		INJECT H_2O	DRAINED INJECTED
83%			"	"			▨								-7		CONSOL.		+ CLEAR MUD	WATER FROM LINER
			"	"			▨								-7					
			"	"			▨								-7					
			"	"			▨								-7					
			"	"			▨								-7				NATIVE H_2O	
557	BLOW DRY	4:00	"	"			▨								-7				20-25%	ATTEMPT BLOW HOLE DRY EO
	EOH	5/16/92																	48' water in	COMPRESSOR WON'T START
																			hole @ 7:00am	Formation water?

HOLE NUMBER PB-4 JOB NUMBER T2120491 **HOLLADAY ENGINEERING COMPANY** ELEV. ~ 2930 PAGE 1 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Smowo DATE START 9-29-92 DATE FINISHED 10-21-92 HOLE DEPTH 640 ANGLE -90° DRILL METHOD Air Rotary R.C. DIAMETER 12¼" DRILL MODEL Schramm T685-DA

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	Reverse Circ. Air Rotary	9-29-92																		
5	5¼" will Ream to 12¼" mud	4:20	lt gy-tan	Road fill w/ fine sand + Gravel	⁘		▮	▮	▮	▮	▮	▮	▮	▮	$\sim 10^{-4}$		wk consolidation		~8%	GRAVEL FRACTION WELL ROUNDED MAY BE FORMATION GRAVEL IN PART OR GRAVEL FROM PAD CONSTRUCTION
10	Rotary	4:24	lt bn-tan	fine sand/GRV	⁘		▮	▮	▮	▮	▮	▮	▮	▮	$10^{-2/+3}$		wk		~10%	GRAVEL CLASTS UP TO +2" AND PERHAPS LARGER
15		4:26	lt bn-tn	fine sand minor gravel	⁘			▮	▮	▮		▮	▮	▮	$10^{-2/-3}$		wk-mod		~12%	slightly damp
20		4:30	lt bn-tn	fine sand minor GRV.	⁘			▮	▮	▮		▮	▮	▮	$10^{-2/-3}$		wk-mod		~12%	slightly damp
25		4:34	lt bn-tan	fine sand some silt	≡			▮	▮			▮	▮	▮	10^{-3}		wk		~10%	drier
30		4:36	tan	clayey silt w/ fine-med sand	≡		▮	▮	▮			▮	▮	▮	10^{-4}		wk-mod		~10%	dry
35	EOS	4:40 9-30-92	tan	~~clayey silt~~ sandy clay	≡		▮	▮	▮			▮	▮	▮	10^{-6}		mod.		~15%	slightly damp
40		7:30	tan	clayey fine sand	≡		▮	▮	▮			▮	▮	▮	10^{-5}		mod.		~12%	
45		7:45	tan	clayey fine sand w/ minor gravel	≡		▮	▮	▮	▮		▮	▮	▮	10-5		mod		~15%	very poorly sorted material
50		7:55		clayey silt + clay	≡		▮	▮	▮	▮					10^{-5}		mod		~12%	ditto

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 2 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY STROUD DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90° DRILL METHOD Air Rotary R.C DIAMETER ______ DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS. VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	R.C. Air Rotary 5¼"	9-30-92																		
55	↓	8:15	tan	silty clay			▮	▮							10^{-6}		mod.		~25%	clay is partially "balling up"
60		8:30	tan	silty clay w/ minor sand			▮	▮	▮		▮		▮	▮	10^{-5}		mod.		~20%	somewhat "damp" feeling
65		8:45	gy-tan	fine sandy silt			▮	▮	▮	▮	▮		▮	▮	10^{-4}		wk-mod.		~15%	almost "dry + dusty" trace gravel
70		9:00	gy-tan	fine sandy silt			▮	▮	▮	▮	▮		▮	▮	10^{-5}		wk-mod		~15%	minor gravel
75		9:02	gy-tan	silty fine sand			▮	▮	▮		▮		▮	▮	10^{-4}		wk-mod		~15%	"flowing sand" almost "dry"
80		9:05	tan	fine sandy silt			▮	▮	▮		▮		▮	▮	10^{-5}		wk-mod		~15%	
85		9:08	tan	clayey fine sand silt			▮	▮	▮		▮		▮	▮	10^{-5}		wk-mod		~15%	
90		9:10	gy-tan	fine sandy grvl			▮	▮	▮	▮	▮		▮	▮	10^{-4}		wk-mod		~12%	
95		9:12	lt brn-tan	silty fine sand			▮	▮	▮		▮		▮		10^{-5}		wk-mod		~12%	
100		9:15	lt brn-tan	gravelly silty fine sand			▮	▮	▮	▮	▮		▮	▮	10^{-4}		wk		~15%	almost damp feeling

HOLE NUMBER PB-4 JOB NUMBER I2120491

HOLLADAY ENGINEERING COMPANY

PAGE 3 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Stroud DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90 DRILL METHOD ______ DIAMETER ______ DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS.VOIDS,ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
R.C. AIR ROTARY	D.C. AIR ROTARY 5¼" ↓	9-30-92																		
105		9:18	lt bn-tan	silty fine sand	⋯		▮	▮	▮			▮	▮	▮	10-5		wk-mod		~12-15%	
110		9:20	lt bn-tan	silty fine sand	⋯		▮	▮	▮			▮	▮	▮	10-3		wk		~10%	DRY, almost no cly fraction
115		9:25	lt bn-tan	silty fine sand	⋯		▮	▮	▮			▮	▮	▮	10-4		wk-mod		~12%	some clay again
120		9:30	lt gy tan	silty fine sand	⋯		▮	▮	▮			▮	▮	▮	10-3		wk		~12%	less clay
125		9:32	lt gy tan	clayey silt w/ minor gravel	⋯		▮	▮	▮	▮		▮	▮	▮	10-5		wk mod		~12%	
130	START USING AUX. COMPRESSOR MINOR TORQUING UP.	9:35	lt gy tan	clayey silt w/ minor gravel	⋯		▮	▮	▮	▮		▮	▮	▮	10-5		wk mod		~12%	almost dry
135		9:40	lt gy tan	silty fine sand	⋯		▮	▮	▮			▮	▮	▮	10-4		wk		~10%	Dry
140		9:45	lt gy-tan	silty fine sand minor gravel	⋯		▮	▮	▮	▮		▮	▮	▮	10-4		wk		~12%	
145		9:51	lt gy tan	silty fine sand	⋯			▮	▮			▮	▮	▮	10-3/-4		wk		~15%	almost damp / cleaner sand less clay
150		9:58		silt. fine sand	⋯		▮	▮	▮	▮		▮	▮	▮	10-4		wk-mod		~12%	

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 4 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T. 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90 DRILL METHOD DIAMETER DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS. VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR																			
	ROTARY																			
	R.C.																			
	5¼"																			
155		10:00	lt brn-tan	sandy silt w/ minor gravel	⁙		▮	▮	▮	▮		▮	▮	▮	10^{-5}		wk-mod		12-15%	
160		10:10	tan-brn	silty fine sand w/ gravel	⁙		▮	▮	▮	▮		▮	▮	▮	10^{-4}		wk-MOD		~12-15%	
165		10:20	tan-brn	silty fine sand	⁙			▮	▮			▮	▮	▮	10^{-3}		wk		~12%	ALMOST DRY
170	some torquing up on drill stem	10:30	lt-brn tan	silty fine sand	⁙			▮	▮			▮	▮	▮	10^{-3}		wk		~12%	still "flowing" sand
175		10:40	brn-tan	fine sandy GRAVEL	⁙			▮	▮	▮		▮	▮	▮	10^{-3}		wk-MOD		~12-15%	LIMONITE RIND ON MANY CLASTS CLASTS HAVE BEEN WELL ROUNDED
180		10:45	brn-tan	fine sandy gravel	⁙			▮	▮	▮		▮	▮	▮	10^{-3}		wk-MOD		~12%	
185		10:50	tn-brn	fine sand	⁙			▮	▮	▮		▮	▮	▮	10^{-3}		wk		~12%	fairly well sorted sand w/ possible few gravel clasts
190		10:55	tn-brn	fine sand	⁙			▮	▮			▮	▮	▮	10^{-3}		wk		~12%	clean sand
195		11:00	tn-brn	fine sand	⁙			▮	▮			▮	▮	▮	10^{-3}		wk		~10%	DRY
200		11:05	tn brn	silty fine sand	⁙			▮	▮			▮	▮	▮	$10^{-3}/10^{-4}$		wk		~12%	finer sand more silt

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 5 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Steward DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90 DRILL METHOD ______ DIAMETER ______ DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS.VOIDS.ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	R.C.	9-30-92																		
	AIR																			
	ROTARY																			
	5 1/4"																			
205	↓	11:15	tan brn	silty fine sand				▮	▮		▮		▮	▮	10^{-4}		wk-mod		~12%	ALMOST DRY; "HINT" OF MOISTURE
210		11:25	tan-brn	fine to coarse sand				▮	▮		▮		▮	▮	10^{-3}		wk		~12%	LESS SILT
215		11:30	tan brn	silty sand				▮	▮		▮		▮	▮	10^{-4}		wk		~12%	MORE SILT AS BEFORE
220		11:40	tan-brn	silty fine sand			▮	▮	▮		▮		▮	▮	10^{-5}		wk-mod		~12%	MORE CLAY
	s																			
	Drilling																			
225	slowing	11:55	lt brn	fine-coarse				▮	▮	▮	▮		▮	▮	10^{-3}		wk-mod		~10-12%	NO CLAY
	down			sand w/																
				some GRAVEL																
230	Torquing	12:10	br-tan	silty sand w/			▮	▮	▮	▮	▮		▮	▮	10^{-4}		MOD		AIR QUIK inject ~~Polymer~~	RODS STICKING - silt binding
	up			gravel															~~"foam"~~	+ caving on RODS
																			~12%	
235		12:30	brn tan	silty fine sand				▮	▮		▮		▮	▮	10^{-4}		WK-MOD		~12%	
240		12:50	tan-brn	silty fine sand				▮	▮		▮		▮	▮	10^{-4}		wk-mod		~12%	
245		1:00	tan-brn	~~silty fine sand~~			▮	▮	▮		▮		▮	▮	$10^{-4}/10^{-5}$		wk-mod		~12%	GETTING FINER
				fine sandy silt																
				fine sandy silt																

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 6 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90° DRILL METHOD DIAMETER DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	R.C.	9-30-92																		
	AIR																			
	ROTARY																			
	5¼"																			
255	↓	1:45	brn-tan	silty fine sand			▨	▨	▨			▨	▨	▨	10^{-4}		MOD		~12-15%	TRACE CLAY
	↓																CONSOLIDATED			
	Then																			
	ream to																			
	12¼"																			
260	+	2:00	brn-tan	fine sandy silt			▨	▨	▨			▨	▨	▨	10^{-5}		MOD		~12%	VIRTUALLY DRY + DUSTY
	set																			
	casing																			
	from																			
	0 to																			
265	270	2:05	brn-tan	fine sandy silt				▨	▨	▨		▨	▨	▨	10^{-5}		WK-MOD		~12%	
				minor gravel																
CASING																				
270	decreas-	2:10	lt brn	claystone			▨	▨							$10^{-6}/10^{-7}$		MOD-STR		INJECT	INSITU MOISTURE WAS
BOTTOM @ 272	Polymer																		POLYMER	"DRY" SAMPLE WETTED
	INJECTION																			TRACE SAND, MINOR SILT
	SAND-SILT																			
	CAVING																			
275	TORQUING	2:15	lt brn	CLAYSTONE			▨	▨							10^{-7}		MOD-STR		?	WETTED SAMPLE BUT
	UP ON																			CLAY DUST BEFOR INJECTION
	RODS																			
280		2:20	tan	CLAYSTONE			▨	▨							10^{-7}		MOD-STR.		<20%	DUST @ DISCHARGE (DRY)
																				MUCH OF SILT FRACTION BEING
																				COLLECTED @ SAMPLE DISCHARGE
																				AS DUST CLAY BLOWING AWAY
285		2:25	tan	CLAYSTONE			▨	▨							10^{-7}		MOD-STR		~25%	WETTED BY INJECTION
																				SLIGHTLY
290		2:30	tan	CLAYSTONE			▨	▨							10^{-7}		MOD-STR		<20%	
295		2:35	tan	CLAYSTONE			▨	▨							10^{-7}		MOD-STR		<20%	TRIPS OUT. CAN'T GO FURTHER
																				R.C. AIR; WILL REAM 12¼"
																				MUD ROTARY 0-300 FT.
																				END OF SHIFT @ 5:00
																				↓ ↓
300	TRIPS	2:40	tan	CLAYSTONE											10^{-7}		MOD-STR		<20%	

HOLE NUMBER PB-4 JOB NUMBER I1124091

HOLLADAY ENGINEERING COMPANY

PAGE 7 OF 13

PROJECT Pickles Butte OWNER Canyon Co LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY STROWD DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90° DRILL METHOD AIR ROTARY DIAMETER 8" DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	8" AIR	10-13-92																	NO H_2O	REAMED 0-279'
	ROTARY																		INJECT	CHECK FOR WATER - SOME
																				POSSIBLE RETURN WATER
																			↓	BLOW HOLE WAIT 2 HRS - NO H.
305		7:40	LT-TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD		wetted from	water in hole SAMPLE 3c
																	CONSOLID.			IS NOT REPRESENTATIVE - HOLE
																				REQUIRES CLEANING
	AIR		LT-TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD	LOOSE	~35%	
	CORE		"	"			▨	▨							-6		"	LOW DENSITY	" ?	
310			"	"			▨	▨							-6		"	CLAY	" ?	POOR SAMPLE CORE
	↓	2:30	"	"			▨	▨							-6		"	BUT NO OPEN	" ?	309-311, < 1 ft RECOVERED
	AIR		LT TAN	SILTY CLAY			▨	▨							-6		"	VOIDS	>35%	
	CORE		"	"			▨	▨							-6		"		>35%	CORE ATTEMPT AGAIN
	AGAIN	5:	"	"			▨	▨							-6		"		>35%	GOOD RECOVERY (311-315
315	↓	5:30	"	"			▨	▨							-6		"		>35%	SAMPLE VERY DAMP - RELEASE
	AIR	10-14-92																		FILM OF MOISTURE ON CORE
	ROTARY																			312-313 Pulled for lab test.
	4"																			
320		7:15	LT TAN	SILTY CLAY			▨	▨							$10^{-5}/10^{-6}$		WK MOD		>35%	SLIGHTLY DRIER FROM HOT
																				COMPRESSOR AIR ROTARY
	↓																			
325		7:25	LT TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD		>35%	
330		7:50	LT TAN	CLAYEY SILT			▨	▨							10^{-5}		WK		~35%	
335		8:05	LT TAN	CLAYEY SILT			▨	▨							10^{-5}		WK		~32%	
340		8:15	LT TAN	CLAYEY SILT			▨	▨							10^{-5}		WK		~35%	
345		8:30	LT TAN	CLAYEY SILT			▨	▨							10^{-5}		WK		>35%	QUITE DAMP
350		8:45	LT TAN	CLAYEY SILT			▨	▨							$10^{-5}/-6$		WK		>35%	

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 8 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 646 ANGLE -90 DRILL METHOD DIAMETER DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR	10-14-92																	No H_2O INJECTION	
	ROTARY																			
	8"																		↓	
355	↓	3:50	LT TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD		~35%	
																	CONSOLIDATION			
360	↓	9:00	LT TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD		~35%	
ONLY 10% RECOVERY	AIR CORE																			LOST CORE BARREL DOWN HOLE 11:45 – 2:00
365	↓	3:49	LT TAN	CLAYEY SILT			▨	▨							10^{-5}		WK		~35%	
	AIR ROTARY																			
370		3:50	LT TAN	SILTY CLAY			▨	▨							10^{-6}		WK-MOD		~35%	MORE CLAY
375		3:55	LT TAN	SILTY CLAY			▨	▨							10^{-6}		MOD		~35%	
380		4:00	LT TAN	SILTY CLAY			▨	▨							10^{-6}		MOD		~35%	
385		4:05	LT TAN	SILTY CLAY			▨	▨							10^{-6}		MOD		~35%	
390		4:10	LT TAN	CLAYSTONE			▨								10^{-7}		MOD		>35%	
395		4:15	LT TAN	CLAYSTONE			▨								10^{-7}		MOD		~35%	
400	↓ EOS	4:20	LT TAN	CLAYSTONE			▨								10^{-7}		MOD		≥35%	QUITE DAMP

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 9 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90 DRILL METHOD AIR ROTARY DIAMETER 8" DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS,VOIDS,ETC.		EST. WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR	10-15-92	LT GRN-	CLAY											10^{-7}		WK-MOD		+35%	CHECK FOR WATER - PROBE GOES
	CORE	7:45	BRN	"											-7		CONSOLIDATION		+35%	DOWN TO 388' (TD @ 400) NEUTR
			"	"											-7		"		+35%	LEXAN LINER COMPRESSED SPLIT
			LIGHT	"											-7		"		+35%	TUBE IN CORE BARREL MAKING
405	↓	10:20	GRN-BRN	"											-7		"		+35%	EXTRACTION OF SPLIT TUBE DIFFICU
	AIR																		CORE	SAMPLE QUITE DAMP, SOME
	ROTARY																			LAMINATED THIN BEDDING
	DRILLING																			NO H_2O INJECTION IN HOLE
	DRY		LT																	404 - 405 pulled for lab tests
410		12:05	GRN-BRN	CLAY											-7		MOD. CONSL		+35%	FORMS CLAY BALLS @ DRILL
																				DISCHARGE VERY DAMP
																				feeling
415		12:10	LT GRN-BRN	CLAY											-7		MOD CONSL.		+35%	trace silt
420		12:25	GRN-BRN	CLAY											-7		MOD CONSL.		+35%	↑
																				OXIDIZED
																				REDUCED
425		12:40	BRN-GRY	CLAY											-7		MOD CONSL.		+35%	↓
430		12:55	BRN-GRY	CLAY											-7		MOD. CONSL		+35%	TRACE SILT
435		1:05	-GRY	CLAY											-7		MOD CONSL		+35%	
440	EOS	1:20	-GRY	CLAY											-7		MOD CONSL.		+35%	DRILLER LEAVES
	Trip in	10-20-92	GRY-GRN-	sand silt													WK-CONSOL	BROKEN	Groundwater	check after sitting 4-days-none
60%	for AIR	OXIDIZED	BRN	w/ clay	?												WK		VERY	(GOT TO WITHIN 3FT OF HOLE
	CORE	"	"	"													WK	AND	DAMP but	BOTTOM) HOLE BLOWN CLEAN out
	poor	"	"	"													WK	LOOSE	NOT "WET"	CORE SAMPLE 400-405
445	sample	9:30	"	"											-5 ?? silt?				+35%	appears to be hole shaft
																				CORE BIT BURNED + FAILED
																				HAVE TO ORDER ANOTHER
																				Pull 444-449 for lab tests
450		12:00		fine sl. clayey silt											-6		WK		+35%	PARTIALLY OXIDIZED

HOLE NUMBER PB-4 JOB NUMBER T2120491 **HOLLADAY ENGINEERING COMPANY** PAGE 10 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC. 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90 DRILL METHOD AIR ROTARY DIAMETER 8" DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	HIGH	10-20-92																		
	PENETRATION																			
	RATE																			
	IN THIS																			
455	MATERIAL	12:00	GRY-BRN	fine sandy silt			▮	▮	▮		▮		▮	▮	-5		WK		+35%	VERY DAMP PARTIALLY OXIDIZED
460		12:15	GRY-BRN	clayey silt			▮	▮	▮		▮		▮	▮	-6		WK		+35%	BECOMING LESS OXIDIZED
465		12:25	GRN-BRN	clayey silt			▮	▮	▮				▮	▮	-6		WK		~35%	MORE OXIDIZED
470		12:30	DARK BRN	CLAYEY SILT			▮	▮	▮						-5/-6		WK		~35%	
475		12:34	BRN-GRY	CLAYEY SILT			▮	▮	▮						-5/-6		WK		~35%	
480		12:38	BRN-GRY	CLAYEY SILT			▮	▮	▮						-6		WK		+35%	VERY DAMP
485		12:40	BRN GRY	CLAYEY SILT			▮	▮							-5/-6		WK		~35%	
490		12:45	BRN GRY	CLAYEY SILT			▮	▮							-6		WK		~35%	STILL PARTIALLY OXIDIZED
495		12:50	MED GRY	SILTY CLAY			▮	▮							-6/-7		WK-MOD		+35%	QUITE DAMP - MORE CLAY
																				Trip out @ 500' - Check for water - none
500		12:55	MED GRY	SILTY CLAY			▮	▮							-7		WK-MOD		+35%	DAMP CLAY INCREASING

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 11 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Stroud DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90° DRILL METHOD ______ DIAMETER ______ DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR	10-20-92																	N.	Clean hole by Trip in + blow
	CORE																			water check 9:00 - 10:00
	NO																			none (10-21-92)
	RECOVERY	10-21-92																		10-20-92 AIR CORE HAD
505	AIR	10:35	DARK GRAY	CLAY			▮	▮							10^{-7}		WK-MOD		NO Water	NO RECOVERY DUE TO LOOSE
	ROTARY																CONSOLIDATION		1" morning	FORMATION - AIR BLOWING MATERIAL
																			+35% (500-505)	OUT OF SPLIT TUBE. Rotary cutting
																				500-505 VERY DAMP
				SILTY																
510		10:40	DARK GRY	CLAY			▮	▮							-7		WK-MOD		+35%	MORE SILT - STILL "BALLING"
515		10:45	MED GRY	SILTY CLAY			▮	▮							-6		WK - LOOSE		~35%	NO LONGER IN BALLS @ DISCHA
520		10:47	MED GRY	CLAYEY SILT			▮	▮							-5/-6		WK		~35%	
525		10:50	GRAY	SILTY CLAY			▮	▮							-6/-7		WK		~35%	Trace sand
530		10:52	GRAY	CLAY			▮								-7		WK		+35%	
535		10:55	GRAY	SILTY CLAY			▮	▮							-7		WK CONSOL		+35%	
540		10:59	GRAY	SILTY CLAY			▮	▮							-7		WK-MOD		+35%	QUITE DAMP
545		11:01	GRAY	SILTY CLAY			▮	▮							-7		WK to MOD		+35%	
550	✓	11:05	GRAY	SILTY CLAY			▮	▮							-7		[illegible]		+35%	

HOLE NUMBER PB-4 JOB NUMBER T2120491

HOLLADAY ENGINEERING COMPANY

PAGE 12 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY Strowd DATE START 9-29-92 DATE FINISHED 10-21 HOLE DEPTH 640 ANGLE -90° DRILL METHOD DIAMETER DRILL MODEL Schramm

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL. PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR ROTARY 8"	10-21-92																		
555		11:10	GRAY	CLAYSTONE	- - -		▨								10-7		WK-MOD		~35%	
560		11:14	GRAY	CLAYSTONE	- - -		▨								-7		WK-MOD		+35%	
565		11:16	GRAY	CLAYSTONE	- - -		▨								-7		WK-MOD		+35%	VERY DAMP
570		11:20	GRAY	CLAYSTONE	- - -		▨								-7		WK-MOD		+35%	VERY DAMP ; TRACE SILT
575		11:24	GRAY	CLAYSTONE	- - -		▨								-7		WK-MOD		+35%	VERY DAMP · ZONE 565-575 or 580 possible screen zone. ALTHOUGH NO APPRECIABLE YIELD EVIDENCE IN HOLE DURING DRILLING.
580		11:28	GRAY	CLAYSTONE	- - -		▨								-7		WK-MOD		+35%	
585		11:30	GRAY	CLAYSTONE	- - -		▨								-7		MOD CONSOLID		+35%	A BIT HARDER MATERIAL
590		11:35	GRAY	CLAYSTONE	- - -		▨								-7		MOD		+35%	
595		11:40	GRAY	CLAYSTONE	- - -		▨								-7		MOD		+35%	
600	✓	11:45	GRAY	CLAYSTONE	- - -		▨								-7		[illegible]		+35%	[illegible]

HOLE NUMBER PD-4 JOB NUMBER JI120491

HOLLADAY ENGINEERING COMPANY

PAGE 13 OF 13

PROJECT Pickles Butte OWNER Canyon Co. LOCATION: CO. Canyon SEC 21 1/4 SW OF 1/4 SE T 2 N R 3 W

LOGGED BY STROWD DATE START 9-29-92 DATE FINISHED 10-21-92 HOLE DEPTH 640 ANGLE -90° DRILL METHOD Air Rotary DIAMETER 8" DRILL MODEL Schramm T685

INTERVAL (FT)		DATE TIME	COLOR	LITHOLOGY		GEOPHYSICS LOG	GRAIN SIZE REL PERCENT				GRAIN ROUNDING				HYDRAULIC PROPERTIES		INDURATION & STRUCTURE FXS, VOIDS, ETC.		WATER	COMMENTS
	DRILL NOTES			ROCK TYPE	GRAPHIC		CLY	SLT	SAND	GRAV	ANG	WK	MOD	WELL	EST.	MEAS.		GRAPHIC		
	AIR ROTARY 8"	10-21-92																		
605		11:50	GRAY	CLAYSTONE	≡		▨								10-7		MOD CONSOLIDATED		+35%	VERY DAMP
610		11:55	GRAY	CLAYSTONE	≡		▨								-7		MOD		+35%	VERY DAMP
615		12:00	GRAY	CLAYSTONE	≡		▨								-7		MOD		+35%	
																				DRILLER FEELS POSSIBLE WATER BEARING ZONE
620		12:08	GRAY	CLAYSTONE	≡		▨								-7		MOD		+35%	
625		12:15	GRAY	CLAYSTONE	≡		▨								-7		MOD		+ 35%	ABIT MORE SILT - DRILLER FEE MAKING MINOR WATER 610-630 POSSIBLE SCREEN ZONE
630		12:20	GRAY	CLAYSTONE	≡		▨								-7		MOD		~35%	ABIT DRIER FEELING
635		12:25	GRAY	CLAYSTONE	≡		▨								-7		MOD		~30-35%	DISTINCTLY LESS MOISTURE PARTIALLY OXIDIZED CLAY CLASTS
640	TD	12:30	GRAY	CLAYSTONE	≡		▨								-7		MOD		~30-35%	Water check - water in the PARTIALLY OXIDIZED CLAY CLAST

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL

Address 115 Albany, Caldwell, ID 83605

Drilling Permit No. 63-93-W-0554-~~001~~004

Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other ______

Thickness	Diameter	From	To
.25 inches	4 inches	+ 2.5 feet	512.5 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ______ inches by ______ inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☐ No
Manufacturer Houston Type Pre-pack
Top Packer or Headpipe
Bottom of Tailpipe

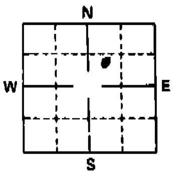
Diameter 4 Slot size .020 Set from 512.5 feet to 522.5 feet
Diameter ______ Slot size ______ Set from ______ feet to ______ feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10/20
Placed from 496 feet to 535 feet

Surface seal depth 400-496 Material used in seal: ☐ Cement grout ☒ Bentonite ☐ Puddling clay ☐ ______
Sealing procedure used: ☒ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with locking cap and protective cover

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Landfill

Lot No. ______ Block No. ______

County Canyon

Address of Well Site Perch Road, Pickles Butte
(give at least name of road)

SW ¼ NE ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 514 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ______
Artesian closed-in pressure ______ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 77 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ______

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

70568

Bore	Depth		Material	Water	
Diam.	From	To		Yes	No
12¾	0	40	tan fine sandy silt		
"	40	48	brown sandy gravel		
"	48	140	tan silty clay		
"	140	185	gray silty fine sand		
"	185	225	gray fine to med sand		
"	225	240	light gray clayey silt		
"	240	250	light gray silty fine sand		
"	250	275	tan clay		
"	275	320	fine to med sand		
"	320		mixed gray fine sand and		
"		400	tan clayey silts		
"	400	435	gray fine sand		
12¾	435	455	no sample		
10"	455	485	tan gray silty claystone		
10"	485	560	gray brown silty fine sand	x	
5¼"	560	620	clayey silt and fine sand	x	
5¼"	620	660	blue gray claystone		

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

FEB 09 1994

10.

Work started 7-7-93 finished 11-23-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503

Address Box 25608 Salt Lake, Ut Date 11-23-93

Signed by Drilling Supervisor

and

(Operator) ______
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL
Address 6284 Perch Road, Caldwell
Drilling Permit No. 63-93-W-0554-001
Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.25 inches	4 inches	+ 2.5 feet	487.5 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ______ inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☐ Yes ☐ No
Manufacturer Houston Type Stainless Steel
Top Packer or Headpipe
Bottom of Tailpipe

Diameter 4 Slot size .020 Set from 487.5 feet to 497.5 feet
Diameter ______ Slot size ______ Set from ______ feet to ______ feet
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel
Placed from 478 feet to 515 feet

Surface seal depth 478 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐
Sealing procedure used: ☐ Slurry pit
☒ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with locking cap and protective cover.

6. LOCATION OF WELL

Sketch map location **must** agree with written location.

N
W E
S

Subdivision Name Pickles Butte Landfill
Lot No. ______ Block No.
County Canyon
Address of Well Site 6284 Perch Road
(give at least name of road)
SE ¼ NW ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 491 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed-in pressure ______ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 75 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG

70567

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12 3/4	0	17	silty sand		
"	17	18	sandy gravel		
"	18	60	tan silty clay		
"	60	95	med sand		
"	95	125	tan calyey silt		
"	125	160	tan clay		
12 3/4	160	195	fine sand		
7 7/8	195	220	silty clay		
"	220	360	fine and med sand		
"	360	380	tan clayey silt		
"	380	435	fine sand		
"	435	510	435-490 tan, 490-510 gray silt x		
"	510	620	gray silty clay		
"	620	690	gray clay stone		
7 7/8	690	700	gray silty clay		

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

MICROFILMED
09 1994

10.

Work started 7-31-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address ______ Date 11-23-93
Signed by Drilling Supervisor Gary K Hill
and
(Operator) ______
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

1. WELL OWNER

Name PICKLES BUTTE SANITARY LANDFILL

Address 6284 Perch Road, Caldwell

Drilling Permit No. 63-93-w-0554-~~001~~ 003

Water Right Permit No. ____

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase ☐ Modification
☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other ____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary
☐ Cable ☐ Mud ☐ Other ____ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other ____

Thickness		Diameter			From		To	
.25	inches	4	inches	+	2.2	feet	535	feet
	inches		inches			feet		feet
	inches		inches			feet		feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch ☐ Gun
Size of perforation? ____ inches by ____ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No
Manufacturer Houston Type Wire Wrap
Top Packer or Headpipe ____
Bottom of Tailpipe ____

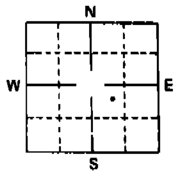
Diameter 4" Slot size .02 Set from 535 feet to 555 feet
Diameter ____ Slot size ____ Set from ____ feet to ____ feet
Gravel packed? ☒ Yes ☐ No ☐ Size of gravel 10/20
Placed from 525 feet to 566 feet

Surface seal depth 520 Material used in seal: ☒ Cement grout
☐ Bentonite ☐ Puddling clay ☐ ____
Sealing procedure used: ☐ Slurry pit
☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☒ Threaded ☐ Welded
☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with protective cover and lock

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles ~~Butte~~ Landfill
Lot No. ____ Block No. ____
County Canyon
Address of Well Site 6284 Perch Road
(give at least name of road)
NW ¼ SE ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 539' feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow ____
Artesian closed-in pressure ____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 77 °F. Quality Poor
Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ____

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG 70565

Bore	Depth		Material	Water	
Diam.	From	To		Yes	No
12¾	0	25	tan clayey sand		
"	25	35	sandy gravel		
"	35	55	fine sand		
"	55	65	tan clayey silt		
"	65	130	fine and med sand		
"	130	185	tan clay		
"	185	210	clayey fine sand		
"	210	250	silty clay		
"	250	260	fine sand		
"	260	280	clayey silt		
"	280	370	fine sand		
"	370	390	clayey silt		
12¾	390	455	fine sand		
10"	455	515	silt		
"	515	525	tan clayey silt		
"	525	540	gray clayey silt	x	
10"	540	570	gray clay	x	
5¼"	570	600	gray silty clay		
5¼"	600	630	blue gray clay		

RECEIVED
NOV 30 1993
WATER RESOU
WESTERN REG

RECEIVED
NOV 26 1993
Department of Water Resources

10.

Work started 10-01-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503
Address ____ Date 11-23-93
Signed by Drilling Supervisor Hill
and
(Operator) ____
(If different than the Drilling Supervisor)

FILED FEB 09 1994

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
4/92

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name CANYON COUNTY (PICKLES BUTTE LANDFILL)

Address 115 Albany, Caldwell, ID 83605

Drilling Permit No. 63-93-W-0554-~~001~~ 002

Water Right Permit No.

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement

☐ Well diameter increase ☐ Modification

☐ Abandoned (describe abandonment or modification procedures such as liners, screen, materials, plug depths, etc. in lithologic log, section 9.)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☒ Monitor

☐ Industrial ☐ Stock ☐ Waste Disposal or Injection

☐ Other ______ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Auger ☒ Reverse rotary

☐ Cable ☐ Mud ☐ Other ______ (backhoe, hydraulic, etc.)

5. WELL CONSTRUCTION

Casing schedule: ☐ Steel ☐ Concrete ☒ Other Stainless

Thickness	Diameter	From	To
.25 inches	4 inches	+ 2.5 feet	377 feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No

Was a packer or seal used? ☐ Yes ☒ No

Perforated? ☐ Yes ☒ No

How perforated? ☒ Factory ☐ Knife ☐ Torch ☐ Gun

Size of perforation? .020 inches by ______ inches

Number		From		To	
	perforations		feet		feet
	perforations		feet		feet
	perforations		feet		feet

Well screen installed? ☒ Yes ☐ No

Manufacturer Houston Type Stainless Steel

Top Packer or Headpipe

Bottom of Tailpipe 10' S.S. Sump

Diameter 4" Slot size .020 Set from 377 feet to 407 feet

Diameter ____ Slot size ____ Set from ____ feet to ____ feet

Gravel packed? ☐ Yes ☐ No ☐ Size of gravel ______

Placed from 299 feet to 424 feet

Surface seal depth 294 Material used in seal: ☒ Cement grout ☒ Bentonite ☐ Puddling clay ☐ ______

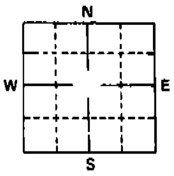
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☐ Overbore to seal depth

Method of joining casing: ☒ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata

Describe access port Top of casing with protective cover and locking cap.

6. LOCATION OF WELL

Sketch map location **must** agree with written location.



Subdivision Name Pickles Butte Sanitary Landfill

Lot No. ______ Block No. ______

County Canyon

Address of Well Site Perch Road, Pickle Butte
(give at least name of road)

SW ¼ NW ¼ Sec. 21, T. 2 N ☒ or S ☐, R. 3 E ☐ or W ☒

7. WATER LEVEL

Static water level 393' feet below land surface.

Flowing? ☐ Yes ☒ No G.P.M. flow ______

Artesian closed-in pressure ______ p.s.i.

Controlled by: ☐ Valve ☐ Cap ☐ Plug

Temperature 74 °F. Quality Poor

Describe artesian or temperature zones below.

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Air ☐ Other ______

Discharge G.P.M.	Pumping Level	Hours Pumped

70566

9. LITHOLOGIC LOG

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
12¼	0	10	tan silty sand		x
"	10	25	tan clayey silt		x
"	25	35	fine sand		x
"	35	50	tan clayey silt		x
"	50	70	tan clay		x
"	70	100	silty fine sand		x
"	100	105	clay		x
"	105	115	fine sand		x
"	115	120	tan clay		x
"	120	125	fine sand		x
"	125	145	tan silty clay		x
"	145	150	sand with cobbles		x
"	150	240	tan silty clay		x
"	240	365	gray clay		x
12¼	365	424	gray clay	x	

RECEIVED
NOV 30 1993
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 26 1993
Department of Water Resources

10.

Work started 10-26-93 finished 11-20-93

11. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Boyles Brothers Firm No. 503

Address ______ Date 11-23-93

FEB 09 1994

Signed by Drilling Supervisor Daryk Hill

and

(Operator) ______
(If different than the Drilling Supervisor)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

63855

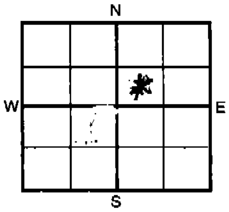
1 of 2

Use Typewriter
or
Ball Point Pen

1. DRILLING PERMIT NO. 63-95-W-0564-001
Other IDWR No.

2. OWNER: County of Canyon
Name HOLLADAY ENGINEERING
Address 1431 BUS ALT HWY 95
City PAYETTE State ID Zip 83661

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.



Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, SW 1/4 NE 1/4 ____ 1/4
10 acres 40 acres 160 acres
Gov't Lot ____ County Canyon
Address of Well Site Pickle Butte Dump
PB #9 City
(Give at least name of road + Distance to Road or Landmark)
Lt. ____ Blk. ____ Sub. Name

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
BENTONITE	0	381	12000#	Pour

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y ☐ N ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
4"	+3	508		SEAMLESS	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe 5'

9. PERFORATIONS/SCREENS
☐ Perforations Method
☒ Screens Screen Type HUSTON

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
508	543	.020		4"	SS	☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
513.17 ft. TOC below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
		RECEIVED	
		NOV 27 1995	

Water Temp. ____ Bottom hole temp.
Department of Water Resources
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
12	1	10	TOP SOIL & DUST		
	10	17	GRAVEL IN HARD PAN		
	17	28	LARGER GRAVEL & HARD PAN		
	28	30	CLAY & SMALL GRAVEL		
	30	32	MORE GRAVEL LOOSER		
	32	40	CLAY - TIGHT IN SMALL GRAVEL		
10	40	90	CLAY - TIGHT IN SMALL GRAVEL		
	90	95	COARSE SAND IN CLAY		
	95	112	SANDY CLAY		
	112	120	CLAY		
	120	135	CLAY W/ COARSE SAND		
	135	180	HARD CLAY		
	180	182	SUPER HARD CLAY		
	182	205	CLAY		
	205	210	COARSE SAND & CLAY		
	210	263	VERY HARD CLAY THRU REG		
	263	265	VERY HARD CLAY		
	265	305	SOFT CLAY / SANDY CLAY		
	305	315	SAND		
	315	375	CLAY		
	375	400	VERY HARD CLAY (CLAY ROCK)		
	400	405	SOFT SANDY CLAY / CLAY		
	405	430	REG CLAY		
	430	435	SOFT CLAY OR SANDY CLAY		
	435	445	CLAY REG TYPE		
	445	455	HARD CLAY W/ DARK PEA GRAVEL/COARSE	SAND	
	455	465	SAME " " " " "	"	
	465	470	SOFT CLAY LIKE SANDY CLAY		
	470	475	CLAY		
	475	480	CLAYSTONE & SANDSTONE LIKE	PCS	
8	480	487	" " " " "	"	
	487	510	GRAY BLUE CLAY		
			CONTINUED		

Completed Depth 544 (Measurable)
MAR 07 1996
Date: Started ____ Completed ____

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON PUMP & DRILLING Firm No. 0457

Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

C

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

63656

Use Typewriter
or
Ball Point Pen

PG 2082

1. DRILLING PERMIT NO. 63-95-W-0564-001
Other IDWR No.

2. OWNER:
Name
Address
City State Zip

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N W E S

Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, ___ 1/4 (10 acres) SW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ___ County Canyon

Address of Well Site
City
(Give at least name of road + Distance to Road or Landmark)

Lt. Blk. Sub. Name

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y ☐ N ☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
___ ft. below ground Artesian pressure ___ lb.
Depth flow encountered ___ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. Bottom hole temp.
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	510	511	FRAC GRAY & BLUE CLAY		
	511	518	REG. " / " "		
	519	528	FRAC CLAY		
	528	528.6	VERY HARD CLAY BLUE/GRAY		
	528.6	530	REG.		
	530	531	FRAC / HARD DRILLING CLAY Pos		
	531	544	REG CLAY BLUE/GRAY		

RECEIVED
NOV 20 1995
WATER RESOURCES
WESTERN REGION

RECEIVED
NOV 27 1995
Department of Water Resources

MAR 07 1996

Completed Depth 544 (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON Pump Drilling Firm No. 0457

Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
7/94

C

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

RECEIVED
NOV 2 0 1995
WATER RESOURCES
WESTERN REGION

63657

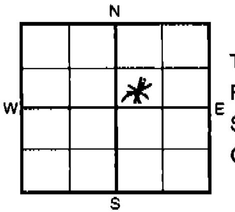
Use Typewriter
or
Ball Point Pen

Pg 1 of 2

1. DRILLING PERMIT NO. 63-95-W-0565-001
Other IDWR No.

2. OWNER: County of Canyon
Name HOLLADAY ENGINEERING CO
Address 1431 BUS. ALT HWY 95
City PAYETTE State ID Zip 83661

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.



Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21 , SW 1/4 NE 1/4 ____ 1/4
10 acres 40 acres 160 acres
Gov't Lot ____ County Canyon
Address of Well Site 15500 Missouri, PickleButte LANDFILL City
(Give at least name of road + Distance to Road or Landmark)
Lt. ____ Blk. ____ Sub. Name PB10

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	
BENTONITE		20	12,000	POUR

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y☐ N☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
10	0	140	.25	STEEL	☒	☐	☐	☐
8	+2	500	.25	STEEL	☒	☐	☐	☐
4	+2	504		STAINLESS	☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☒ Screens Screen Type HOUSTON

MAR 0 7 1996

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
504	534	.020		4"	STAINLESS	☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
____ ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

RECEIVED
NOV 2 7 1995
Department of Water Resources

Water Temp. ____ Bottom hole temp.
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
12	1	5	TOP SOIL		
12	5	10	CLAY w/SMALL GRAVEL		
?	10	20	GRAVEL & SAND		
10	20	31	GRAVEL & SAND		
	31	45	CLAY w/SOME SMALL GRAVEL		
	45	55	" " " COARSE SAND		
	55	73	COARSE SAND w/SOME CLAY (SLOW DRILLING)		
	73	100	CLAY		
	100	105	SAND		
	105	115	SAND (COARSE) W/CLAY SOFT & HARD		
	115	120	COARSE SAND / SMALL GRAVEL W/ CLAY		
	120	125	SAND W/GRAVEL-SMALL & Clay		
	125	130	SAND W/LITTLE CLAY		
	130	135	SAND & MORE CLAY		
	135	136	VERY HARD CLAY		
	136	205	REG CLAY		
8	205	210	SANDY CLAY		
	210	215	SANDY CLAY W/HARD PCS CLAY		
	215	220	SANDY CLAY - VERY HARD DRILLING		
	220	275	SANDY CLAY - MORE CLAY		
	275	300	SANDY CLAY W/HARD PCS OF CLAY taking form		
	300	305	SAND		
	305	339	CLAY		
	339	341	VERY HARD CLAY		
	341	430	CLAY		
	430	455	VERY HARD CLAY (DRILLING SLOWER)		
	455	457	"SUPER" VERY HARD CLAY		
	457	465	REG. CLAY		
	465	470	CLAY W/SMALL GRAVEL		
	470	515	CLAY W/IRON SPOTS)		
	515	518	TURNING GRY		
	518	525	BROWN CLAY		
	525	540	SAND COARSE W/CLAY		

Completed Depth CONTINUED (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ADAMSON PUMP & DRILLING Firm No. 0457
Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES

C

Form 238-7
7/94

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter
or
Ball Point Pen

63658 C PG 2 of 2

1. DRILLING PERMIT NO. 63-95-W-0565-001
Other IDWR No.

2. OWNER:
Name HOLLADAY ENGINEERING CO
Address
City PB #10 State Zip

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

Twp. 2 North ☒ or South ☐
Rge. 3 East ☐ or West ☒
Sec. 21, ____ 1/4 (10 acres) SW 1/4 (40 acres) NE 1/4 (160 acres)
Gov't Lot ____ County Canyon
Address of Well Site ____ City ____
(Give at least name of road + Distance to Road or Landmark)
Lt. ____ Blk. ____ Sub. Name ____

4. PROPOSED USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☐ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☐ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT	METHOD
Material	From	To	Sacks or Pounds	

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s)
Was drive shoe seal tested? Y☐ N☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

MAR 07 1996

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
____ ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	540	560	TURNING BLUE CLAY W/ COARSE SAND		
			CAVED IN TO 544		

RECEIVED
NOV 27 1995
Department of Water Resources

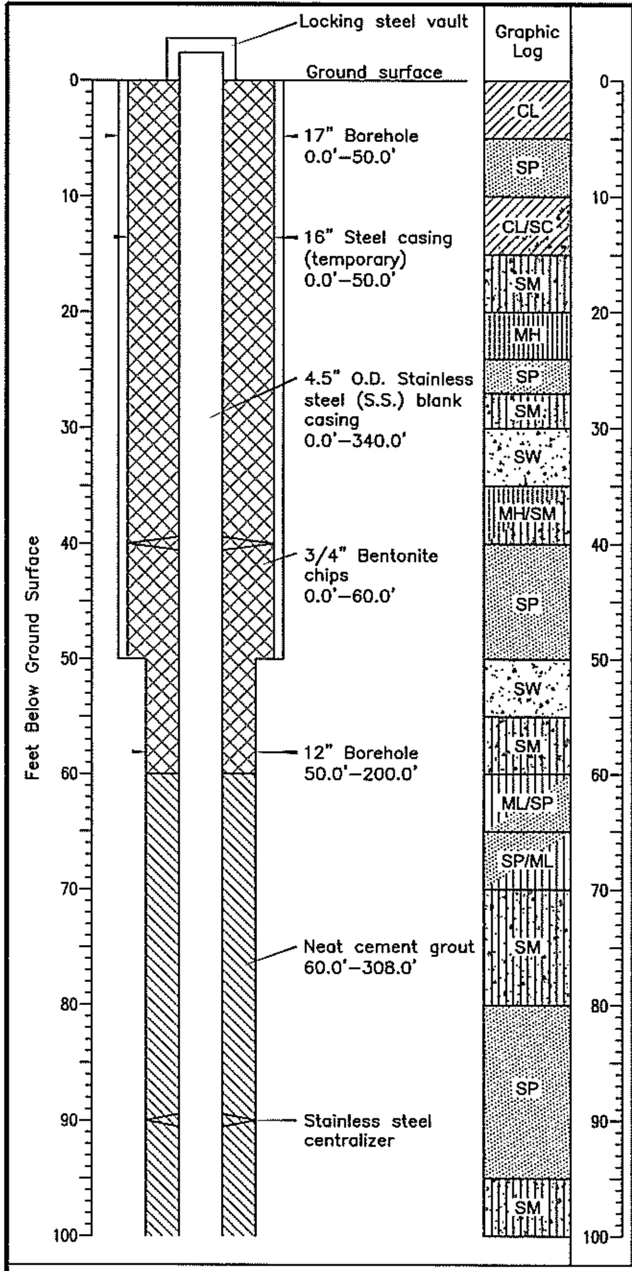
RECEIVED
NOV 20 1995
WATER RESOURCES WESTERN REGION

Completed Depth 544 (Measurable)
Date: Started 8-25-95 Completed 9-29-95

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name ____ Firm No. ____
Firm Official Dave Adamson Date 11-17-95
and
Supervisor or Operator Dave Adamson Date 11-17-95
(Sign once if Firm Official & Operator)

FORWARD WHITE COPY TO WATER RESOURCES



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
40%/40%	0–5	CL	Silty clay, light brownish gray (2.5Y 6/2).
70%/90%	5–10	SP	Sand, light gray (10YR 7/2), medium gravel, well sorted.
25%/25%	10–15	CL–SC	Sandy clay/clayey sand, light brownish gray (2.5Y 6/2).
40%/50%	15–20	SM	Silty sand, light yellowish brown (7.5Y 7/3), fine–grained, well sorted.
90%/90%	20–24	MH	Clayey silt, grayish brown (2.5YR 5/2), low plasticity, hard.
90%/90%	24–25	SP	Sand, dark yellowish brown (10YR 4/4), medium–grained, well sorted, well cemented, hard.
70%/90%	25–27	SP	Same as above.
70%/90%	27–30	SM	Silty sand, light olive brown (2.5Y 5/4), fine– to medium–grained, moderately sorted, soft.
50%/50%	30–35	SW	Sand, light brownish gray (2.5Y 6/2), thinly laminated, fine– to medium–grained, moderately sorted, moderately cemented.
75%/75%	35–40	MH–SM	Clayey silt and silty fine sand, light gray (5Y 7/1), laminated, some orange banding, moderately indurated.
70%/70%	40–45	SP	Sand, dry color light gray (10YR 7/2), medium–grained, moderately to well sorted, moderately to well indurated.
75%/75%	45–50	SP	Same as above.
30%/30%	50–55	SW	Sand, light gray (2.5YR 7/1) to light brownish gray (2.5YR 6/2), prominent orange banding, medium–grained, moderately sorted, soft.
20%/20%	55–60	SM	Silty sand, light olive brown (2.5Y 5/4) to grayish brown (2.5YR 5/2), fine–grained, weakly indurated.
40%/40%	60–65	ML–SP	Silty very fine sand, gray (2.5Y 6/1), massive, grading downward to sand, olive yellow (2.5Y 6/6), medium–grained, well sorted, hard.
45%/45%	65–70	SP–ML	Sand, as above, grading downward to silt and silty fine sand, slightly moist.
60%/60%	70–75	SM	Silty sand, light brownish gray (2.5Y 6/2), fine–grained, slightly moist.
20%/20%	75–80	SM	Similar to above, finer–grained, dry.
65%/65%	80–85	SP	Sand, light brownish gray (2.5Y 6/2), fine–grained, well sorted, moderately indurated, slightly moist.
55%/55%	85–90	SP	Same as above, dry.
20%/20%	90–95	SP	Sand, light brownish gray (7.5YR 6/2), fine– to medium–grained, moderately sorted.
85%/85%	95–100	SM	Sand, light gray (2.5Y 6/1), silty fine–grained, softer than above, slightly moist.

Geologist: J. Raucci
Driller: HAZ–Tech
Date completed: 6–30–11

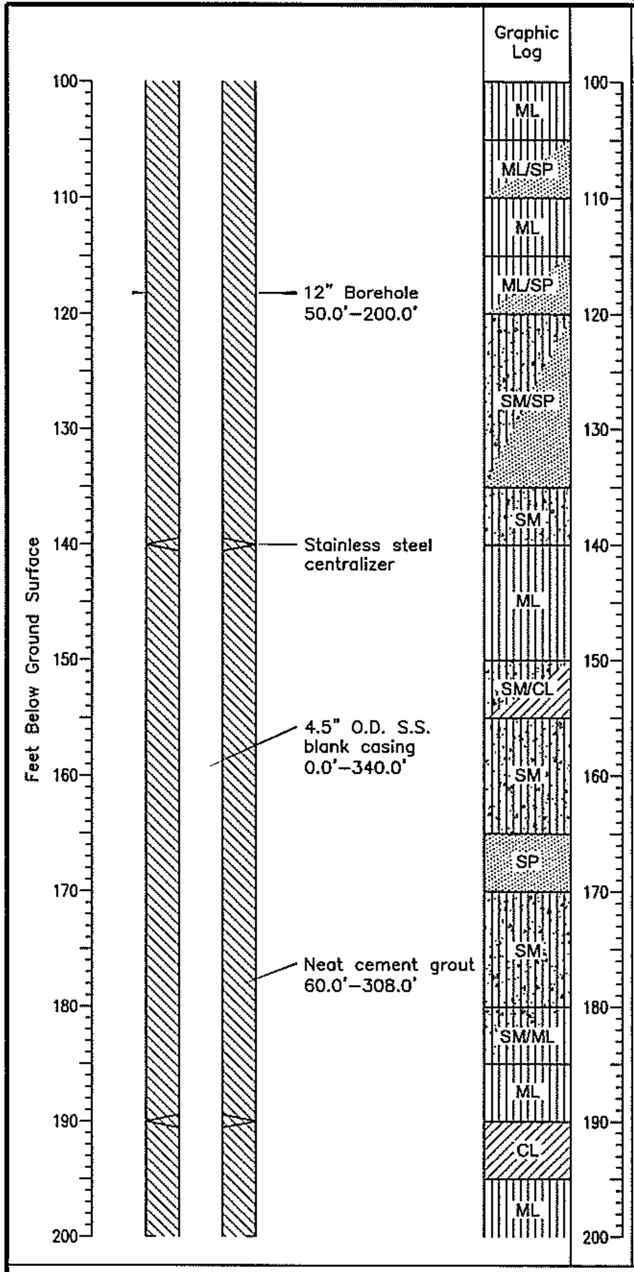
Drilling method: Core, air rotary
Bit diameters: 19" (0'–50'), 12" (50'–200'), 9 7/8" (200'–420')
Sampling device: HQ core, air rotary cuttings (400'–420')
Steel suface casing: 16" steel (0'–50')

Northing: 668731.199
Easting: 243735.206
Elevation: 2654.1 (TOC)

Note: TOC = top of casing

PICKLES BUTTE
Well Log: PB-11

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



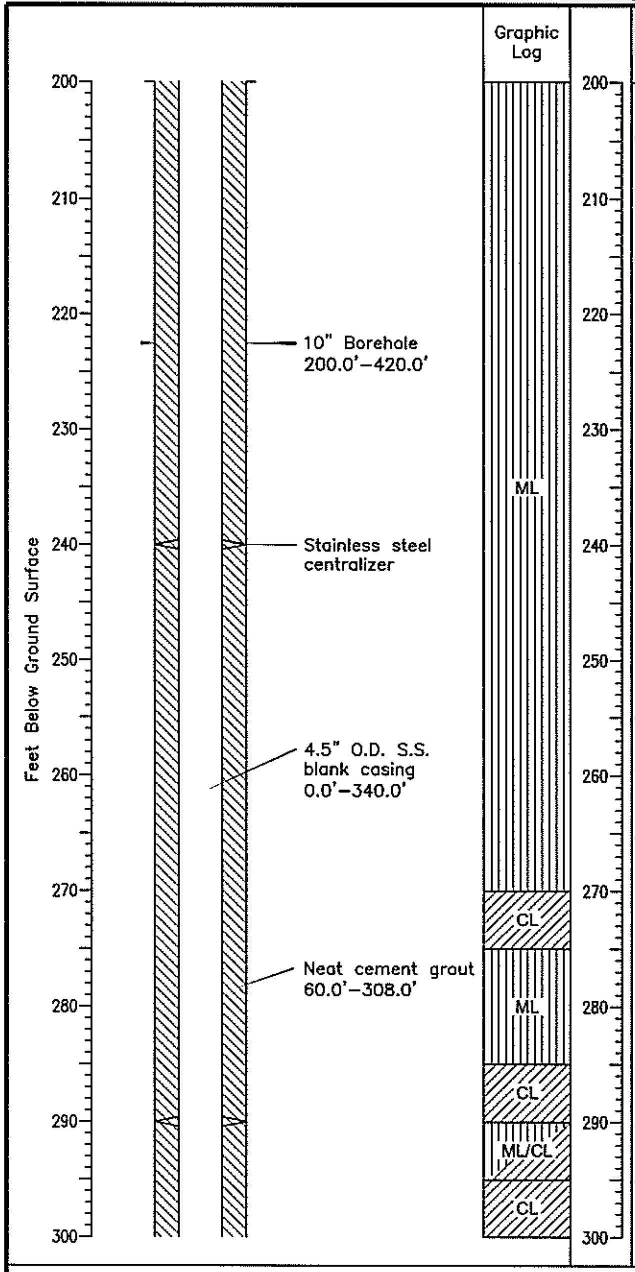
Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
20%/20%	100–105	ML	Sandy silt, pale yellow (2.5Y 8/2), moderately indurated, dry.
20%/20%	105–110	ML–SP	Same as above, interbedded with dark gray (2Y 3/1), medium–grained sandstone, very hard, CaCO3 cement.
20%/20%	110–115	ML	Sandy silt and silt, light olive gray (5Y 6/2), weakly indurated, slightly moist.
20%/20%	115–120	ML–SP	Same as above, interbedded with dark gray medium–grained sandstone.
50%/50%	120–125	SM–SP	Sandy silt, light olive gray, similar to above, slightly moist, with white fine–grained, well sorted sandstone, cross bedded, some yellow with orange banding, dry, hard.
20%/20%	125–130	SM–SP	Same as above, interbedded with sandstone, dark gray (2Y 3/1), medium–grained.
60%/60%	130–135	SM–SP	Sandy silt, pale yellow (2.5Y 7/3), with white fine–grained sand with yellow color banding, dry.
30%/30%	135–140	SM	Silty sand, light gray (5Y 7/2), fine–grained, moist, reddish yellow color banding.
0%/30%	140–145	ML	Sandy silt, light gray (2.5Y 7/2), fine–grained, slightly moist with small (less than 1 inch) reddish yellow clay lenses.
55%/55%	145–150	ML	Siltstone, light gray (2.5Y 7/2), hard, dry.
100%/100%	150–155	SM–CL	Interbedded, silty sand/sandy silt, light brownish gray (7.5Y 6/2) with clay, dark greenish gray (5GY 4/1), thin bands of reddish clay, fine–grained.
20%/20%	155–160	SM	Silty sand, light yellowish brown (2.5Y 6/4), laminated and color banded, cross bedded, fine–grained, weakly cemented, slightly moist.
50%/50%	160–165	SM	Silty sand, light brownish gray (2.5YR 6/2), otherwise as above, very fine–grained, borderline sandy silt.
100%/100%	165–168	SP	Similar to above, but dominantly fine sand.
100%/100%	168–170	SP	Sandstone, light olive brown (2.5Y 5/4), color banded, cross bedded, fine, soft, slightly moist.
50%/50%	170–175	SM	Silty sandstone, grayish brown (7.5Y 5/2), massive to laminated, color banding (yellow), trough cross bedded, fine–grained, organic material (?).
30%/50%	175–180	SM	Silty sandstone, light olive brown (7.5Y 5/3), fine–grained, similar to above, slightly moist.
100%/100%	180–185	SM–ML	Sandy silt and silty sand, gray (5Y 5/1) to grayish brown (2.5Y5/2), moderately indurated, slightly moist.
85%/85%	185–190	ML	Siltstone, gray (5Y 5/1), moderately to strongly cemented, massive, slightly moist to dry.
0%/0%	190–195	CL	Little recovery, clay, appears to be dark gray (5Y 4/1).
65%/75%	195–200	ML	Siltstone, sandy silt and clayey silt intervals, gray (5Y 5/1), reddish brown color banding, moderately indurated, very slightly moist.

Geologist: J. Raucci
Driller: HAZ–Tech
Date completed: 6–30–11

Drilling method: Core, air rotary
Bit diameters: 19" (0'–50'), 12" (50'–200'), 9 7/8" (200'–420')
Sampling device: HQ core, air rotary cuttings (400'–420')
Steel suface casing: 16" steel (0'–50')

PICKLES BUTTE
Well Log: PB-11

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

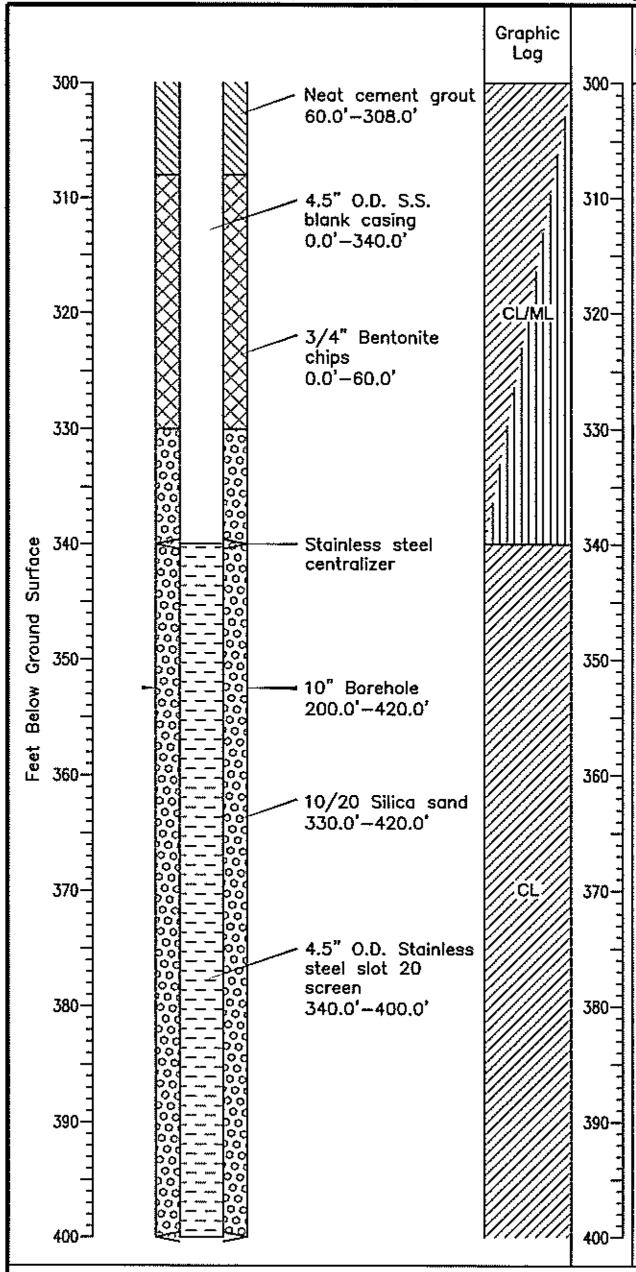


Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
60%/85%	200–205	ML	Siltstone, gray (5Y 5/1), same as above.
90%/100%	205–210	ML	Same as above.
100%/100%	210–215	ML	Same as above.
85%/100%	215–220	ML	Same as above.
100%/100%	220–225	ML	Siltstone, dark gray (5Y 4/1), finely laminated, moderately indurated, slightly moist.
100%/100%	225–230	ML	Same as above.
75%/85%	230–235	ML	Same as above.
90%/90%	235–240	ML	Same as above, lighter color (5Y 5/1).
25%/75%	240–245	ML	Same as above, highly fractured.
90%/90%	245–250	ML	Same as above.
40%/100%	250–255	ML	Same as above, many fractures.
60%/100%	255–260	ML	Same as above.
70%/100%	260–265	ML	Same as above.
80%/100%	265–270	ML	Same as above.
85%/85%	270–275	CL	Similar to above, finer–grained (claystone, some silt).
100%/100%	275–280	ML	Similar to above, silty, locally cross bedded.
100%/100%	280–285	ML	Siltstone, same as above.
50%/100%	285–290	CL	Silty claystone, similar to above.
50%/100%	290–295	ML/CL	Siltstone and claystone, same as above, fractured.
60%/100%	295–300	CL	Predominantly silty claystone, two prominent, steeply inclined fractures.

Geologist: J. Raucci
Driller: HAZ–Tech
Date completed: 6–30–11

Drilling method: Core, air rotary
Bit diameters: 19" (0'–50'), 12" (50'–200'), 9 7/8" (200'–420')
Sampling device: HQ core, air rotary cuttings (400'–420')
Steel suface casing: 16" steel (0'–50')

PICKLES BUTTE
Well Log: PB-11



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
100%/100%	300–305	CL/ML	Clay, silty claystone and siltstone, color as above (5YR 4/1–5/1), siltstones are laminated, locally cross bedded, claystone is massive to finely laminated, slightly moist, moderately indurated, brittle to slightly plastic.
100%/100%	305–310	CL–ML	Same as above.
40%/75%	310–315	CL–ML	Same as above.
80%/100%	315–325	CL–ML	Same as above.
100%/100%	325–330	CL–ML	Same as above.
100%/100%	330–335	CL–ML	Same as above.
100%/100%	335–340	CL–ML	Becoming more dominantly claystone and silty claystone.
100%/100%	340–345	CL	Same as above.
90%/90%	345–350	CL	Same as above.
75%/90%	350–355	CL	Claystone, silty claystone and siltstone, gray (5Y 5/1), interbedded, predominantly claystone and silty claystone, slightly moist, slight to moderate plasticity.
100%/100%	355–360	CL	Same as above.
90%/90%	360–365	CL	Same as above.
85%/85%	365–370	CL	Same as above.
95%/95%	370–375	CL	Same as above.
75%/90%	375–380	CL	Same as above.
100%/100%	380–385	CL	Same as above.
80%/80%	385–390	CL	Same as above.
55%/100%	390–395	CL	Same as above.
90%/90%	395–420	CL	Same as above.

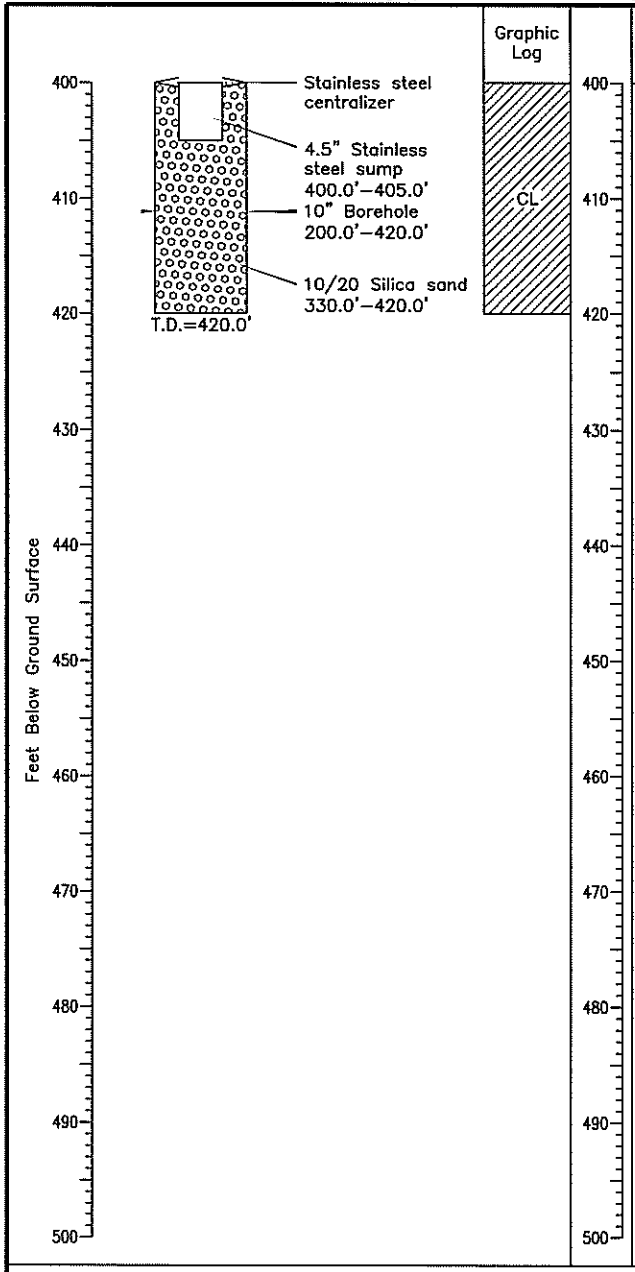
Geologist: J. Raucci
Driller: HAZ–Tech
Date completed: 6–30–11

Drilling method: Core, air rotary
Bit diameters: 19" (0'–50'), 12" (50'–200'), 9 7/8" (200'–420')
Sampling device: HQ core, air rotary cuttings (400'–420')
Steel suface casing: 16" steel (0'–50')

PICKLES BUTTE
Well Log: PB-11

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-11 (5of5)



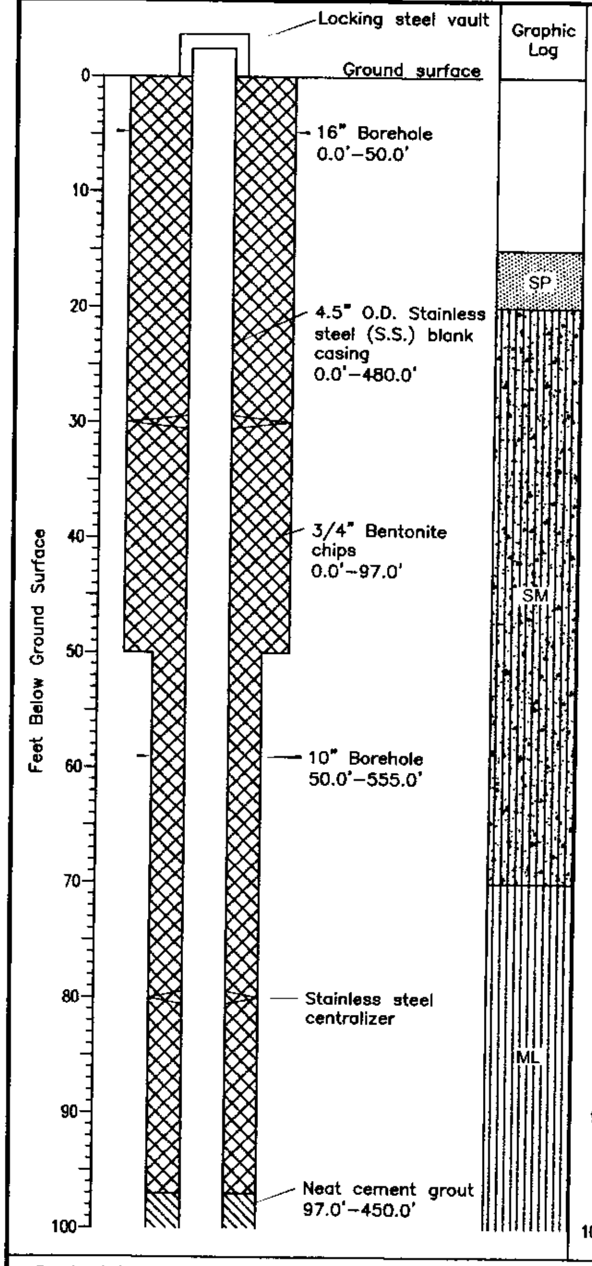
Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		CL	Same as above, rotary cuttings.

Geologist: J. Raucci
Driller: HAZ–Tech
Date completed: 6–30–11

Drilling method: Core, air rotary
Bit diameters: 19" (0'–50'), 12" (50'–200'), 9 7/8" (200'–420')
Sampling device: HQ core, air rotary cuttings (400'–420')
Steel suface casing: 16" steel (0'–50')

PICKLES BUTTE
Well Log: PB-11

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Depth	Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
0	0%/0%	0–15		No recovery.
10	0%/20%	15–20	SP	Sand, olive brown (2.5Y 4/3), coarse–grained, no plasticity.
20	35%/60%	20–25	SM	Silty sand, olive brown (2.5Y 4/4), fine–grained, no plasticity.
	35%/60%	25–30	SM	Same as above.
30	25%/55%	30–35	SM	Same as above.
	25%/55%	35–40	SM	Same as above.
40	100%/100%	40–45	SM	Silty sand, olive brown (2.5Y 4/3), fine–grained.
	100%/100%	45–50	SM	Clayey silty sand, light olive brown (2.5Y 5/4), very low plasticity.
50	25%/90%	50–60	SM	Silty sand grading into sand, light yellowish brown (2.5Y 6/3), fine– to medium–grained, no plasticity, hard, clayey silty sand, light olive brown (2.5Y 5/3), fine–grained, hard no plasticity.
60	100%/100%	60–70	SM	Clayey silty sand, light olive brown (2.5Y 5/3), hard no plasticity.
70	95%/95%	70–80	ML	Sandy silt, light yellowish brown (2.5Y 6/3), no plasticity.
80	100%/100%	80–90	ML	Clayey sandy silt, grayish brown (2.5YR 5/2).
90	100%/100%	90–100	ML	Same as above.
100				

Geologist: M. Nauck
Driller: HAZ–Tech
Date completed: 7–15–11

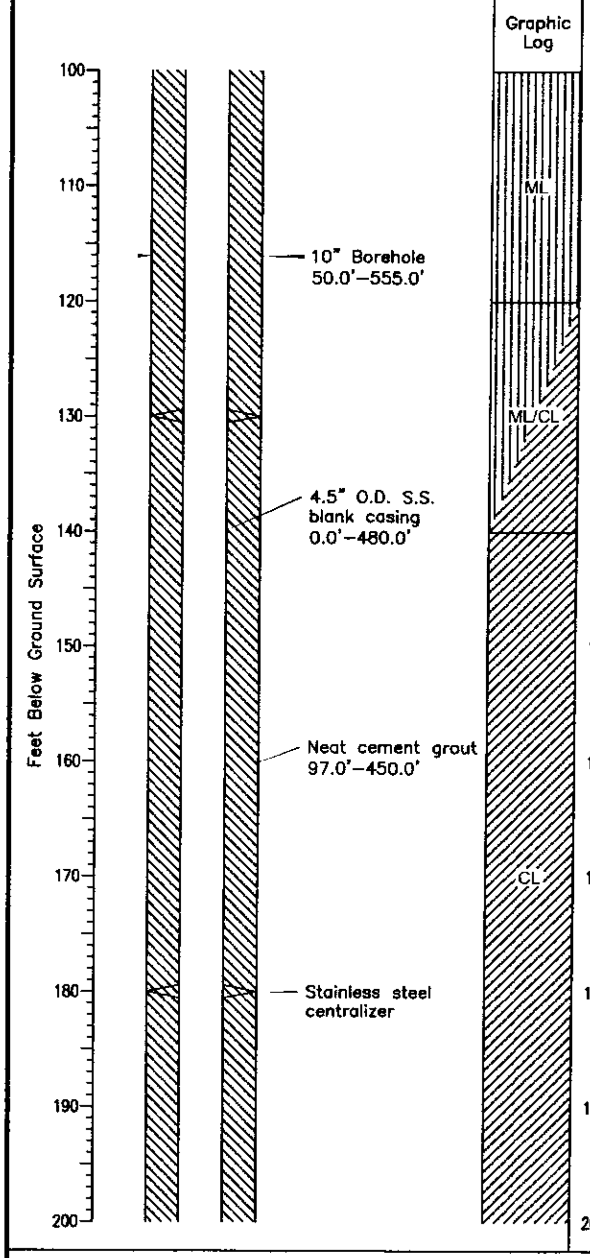
Drilling method: Core, air rotary
Bit diameters: 16" (0'–50'), 9 7/8" (50'–555')
Sampling device: HQ core (0'–350'), air rotary cuttings (350'–555')
Steel suface casing: None

Northing: 667697.966
Easting: 243653.665
Elevation: 2657.2 (TOC)

Note: TOC = top of casing

PICKLES BUTTE
Well Log: PB-12

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



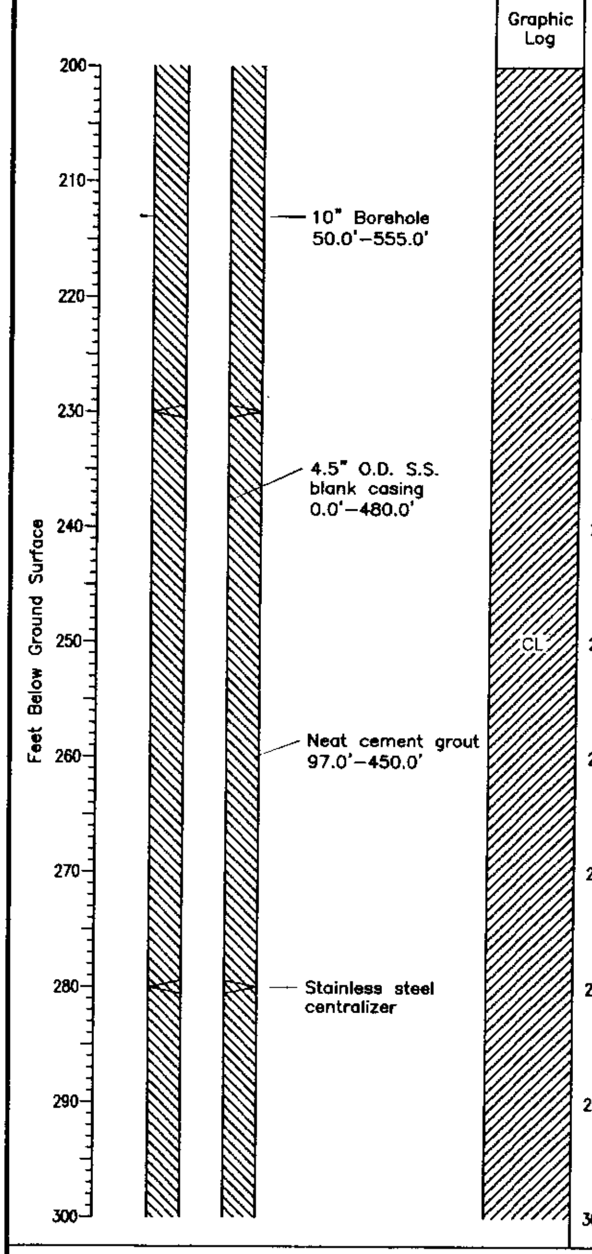
	Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
100	35%/48%	100–110	ML	Clayey silt with abrupt transition to clay, light olive brown (2.5Y 5/4), clay has iron and manganese stain.
110	100%/100%	110–120	ML	Same as above with interbedded silty sand.
120	100%/100%	120–130	ML–CL	Silty claystone, gray (5Y 5/4), no plasticity, hard.
130	100%/100%	130–140	ML–CL	Same as above.
140	40%/65%	140–150	CL	Similar to above; claystone, gray (5Y 5/1), no plasticity, hard to brittle.
150	100%/100%	150–160	CL	Same as above.
160	100%/39%	160–170	CL	Same as above.
170	100%/100%	170–180	CL	Same as above.
180	5%/18%	180–190	CL	Same as above with multiple fractures.
190	90%/100%	190–200	CL	Same as above.
200				

Geologist: M. Nauck
Driller: HAZ–Tech
Date completed: 7–15–11

Drilling method: Core, air rotary
Bit diameters: 16" (0'–50'), 9 7/8" (50'–555')
Sampling device: HQ core (0'–350'), air rotary cuttings (350'–555')
Steel suface casing: None

PICKLES BUTTE
Well Log: PB-12

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



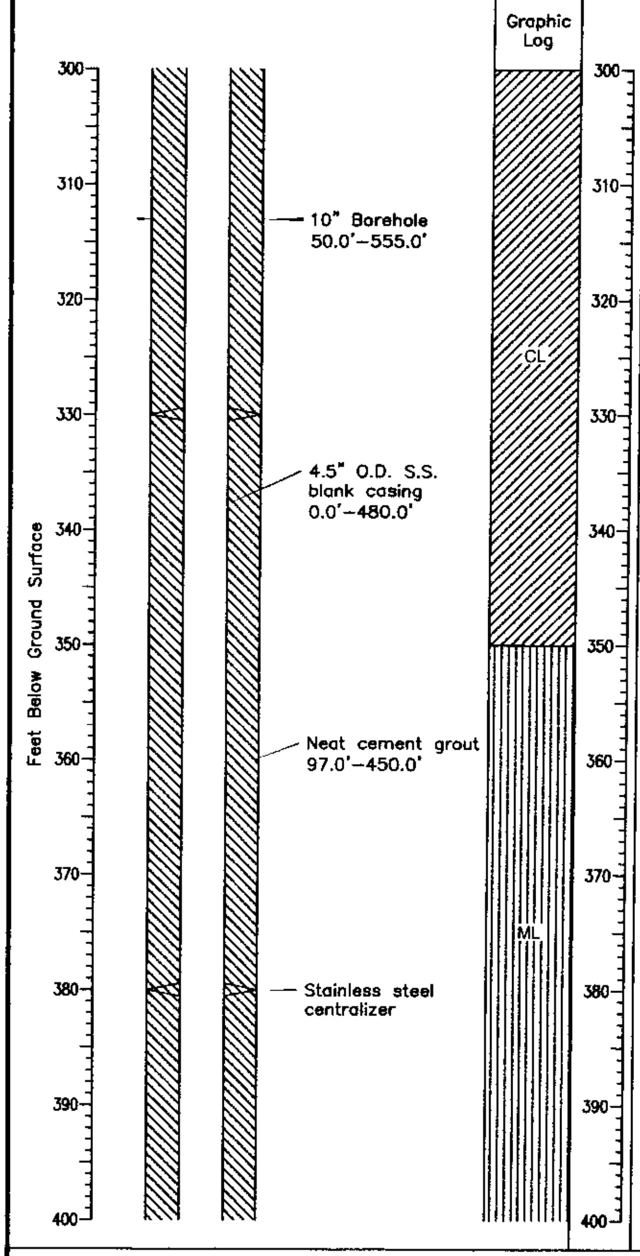
	Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
200	100%/100%	200–210	CL	Same as above.
210	85%/89%	210–220	CL	Same as above.
220	100%/100%	220–230	CL	Same as above.
230	85%/95%	230–240	CL	Same as above, massive, non–fractured.
240	75%/75%	240–250	CL	Claystone, gray (5Y 5/1), no plasticity, hard, brittle, slightly moist.
250	90%/90%	250–260	CL	Same as above.
260	100%/100%	260–270	CL	Same as above.
270	100%/100%	270–280	CL	Same as above.
280	100%/35%	280–290	CL	Same as above.
290	100%/100%	290–300	CL	Same as above.
300				

Geologist: M. Nauck
Driller: HAZ–Tech
Date completed: 7–15–11

Drilling method: Core, air rotary
Bit diameters: 16" (0'–50'), 9 7/8" (50'–555')
Sampling device: HQ core (0'–350'), air rotary cuttings (350'–555')
Steel suface casing: None

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

PICKLES BUTTE
Well Log: PB-12



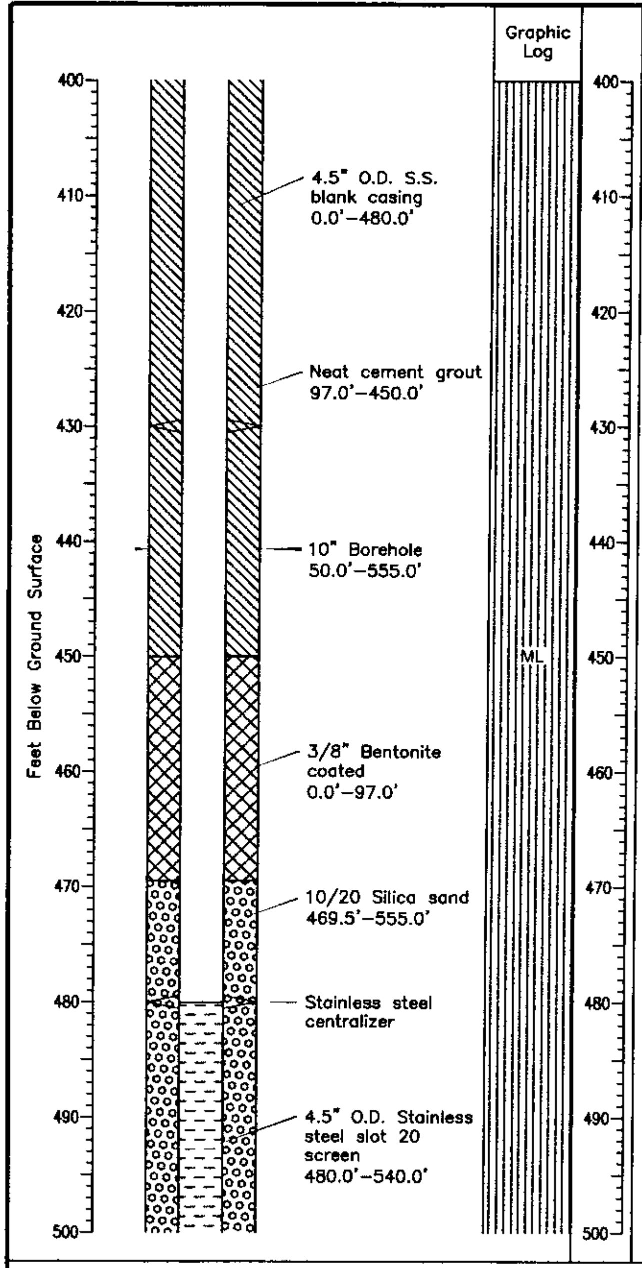
Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
100%/100%	300–310	CL	Same as above.
100%/100%	310–320	CL	Same as above.
100%/100%	320–330	CL	Same as above.
100%/100%	330–340	CL	Same as above.
100%/100%	340–350	CL	Same as above.
NA	350–555	ML	Cuttings not sampled at discrete intervals from 350 feet to 555 feet. Visual inspection indicated predominantly gray silt with varying amounts of clay and sand.

Geologist: M. Nauck
Driller: HAZ–Tech
Date completed: 7–15–11

Drilling method: Core, air rotary
Bit diameters: 16" (0'–50'), 9 7/8" (50'–555')
Sampling device: HQ core (0'–350'), air rotary cuttings (350'–555')
Steel suface casing: None

PICKLES BUTTE
Well Log: PB-12

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



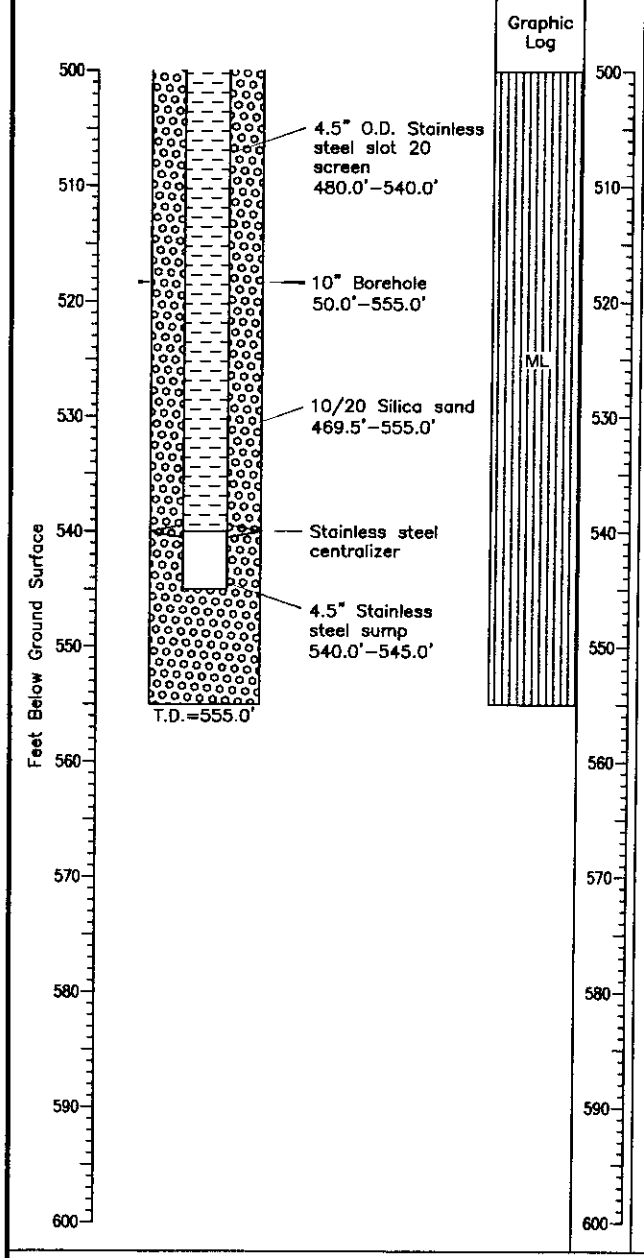
Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA		ML	Cuttings not sampled at discrete intervals from 350 feet to 555 feet. Visual inspection indicated predominantly gray silt with varying amounts of clay and sand.

Geologist: M. Nauck
Driller: HAZ–Tech
Date completed: 7–15–11

Drilling method: Core, air rotary
Bit diameters: 16" (0'–50'), 9 7/8" (50'–555')
Sampling device: HQ core (0'–350'), air rotary cuttings (350'–555')
Steel suface casing: None

PICKLES BUTTE
Well Log: PB-12

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA		ML	Cuttings not sampled at discrete intervals from 350 feet to 555 feet. Visual inspection indicated predominantly gray silt with varying amounts of clay and sand.

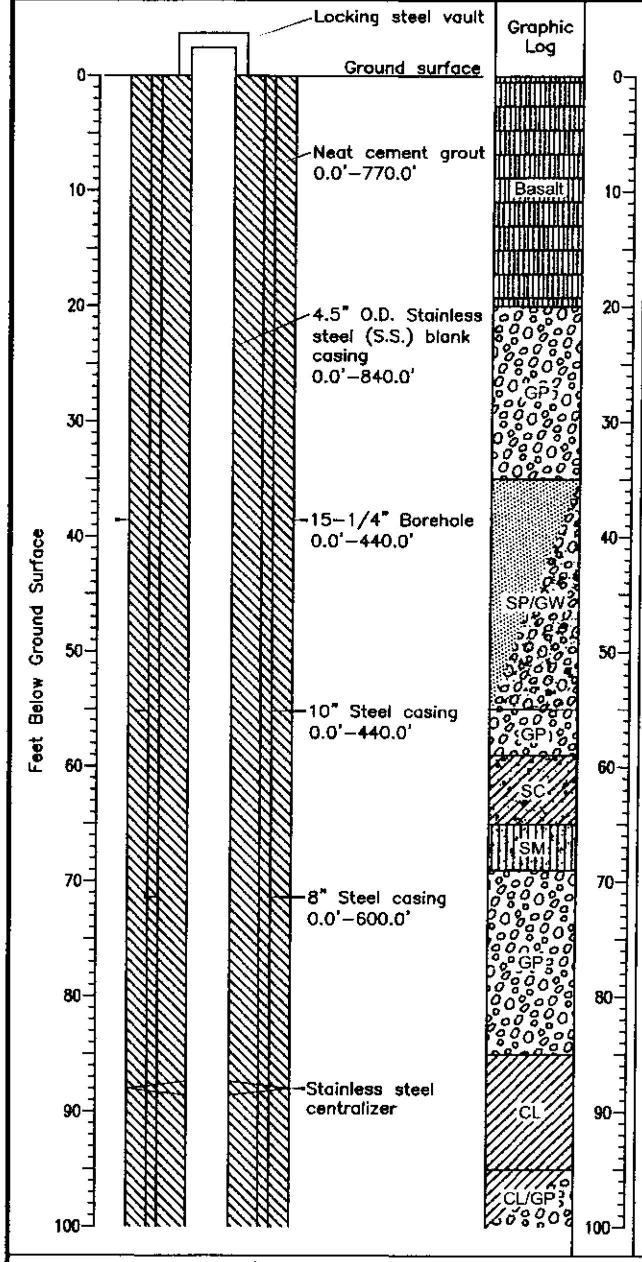
Geologist: M. Nauck
Driller: HAZ-Tech
Date completed: 7-15-11

Drilling method: Core, air rotary
Bit diameters: 16" (0'-50'), 9 7/8" (50'-555')
Sampling device: HQ core (0'-350'), air rotary cuttings (350'-555')
Steel suface casing: None

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154

PICKLES BUTTE
Well Log: PB-12

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-13 (1of10)



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
90%/95%	0–5		Vesicular basalt, gray (2.5Y 5/1), several fractures near top of core, slightly glassy texture.
100%/100%	5–10		Same as above.
80%/95%	10–15		Same as above with vertical and horizontal fractures.
25%/70%	15–20		Vesicular basalt, gray (2.5Y 5/1), highly fractured.
0%/2%	20–25	GP	Gravel, unconsolidated, well rounded, loose, 1 to 2.5 inches diameter.
0%/10%	25–35	GP	Same as above, 0.25 to 3.0 inches diameter.
0%/0%	35–45	SP/GW	No core recovery. Rotary cuttings indicate predominantly medium– to coarse–grained sand and interbedded gravel.
0%/0%	45–55	SP/GW	No core recovery, same as above.
8%/15%	55–65	GP SC	Gravel, 0.5 to 3.0 inches diameter with abrupt change to clayey silty fine sand, light olive brown (2.5Y 5/3), very fine–grained, well graded, well rounded, moderate plasticity, soft.
0%/23%	65–75	SM	65 to 69 feet silty fine sand, light olive brown (2.5Y 5/3). 69 to 75 feet coarse sandy gravel, polychromic, well rounded, 0.25 to 2.0 inches diameter, loose.
0%/10%	75–85	GP	Greater than 2 inches diameter, loose.
85%/95%	85–95	CL	Claystone to silty claystone, pale olive (5Y 6/3), none to medium plasticity, hard to stiff, dry, transition to very well consolidated to well consolidated.
55%/55%	95–105	CL/GP	Silty claystone, light yellowish brown (2.5Y), medium plasticity, medium density, slightly moist, some ferric like staining. Gravel lenses noted at 95 to 100 feet in rotary cuttings.

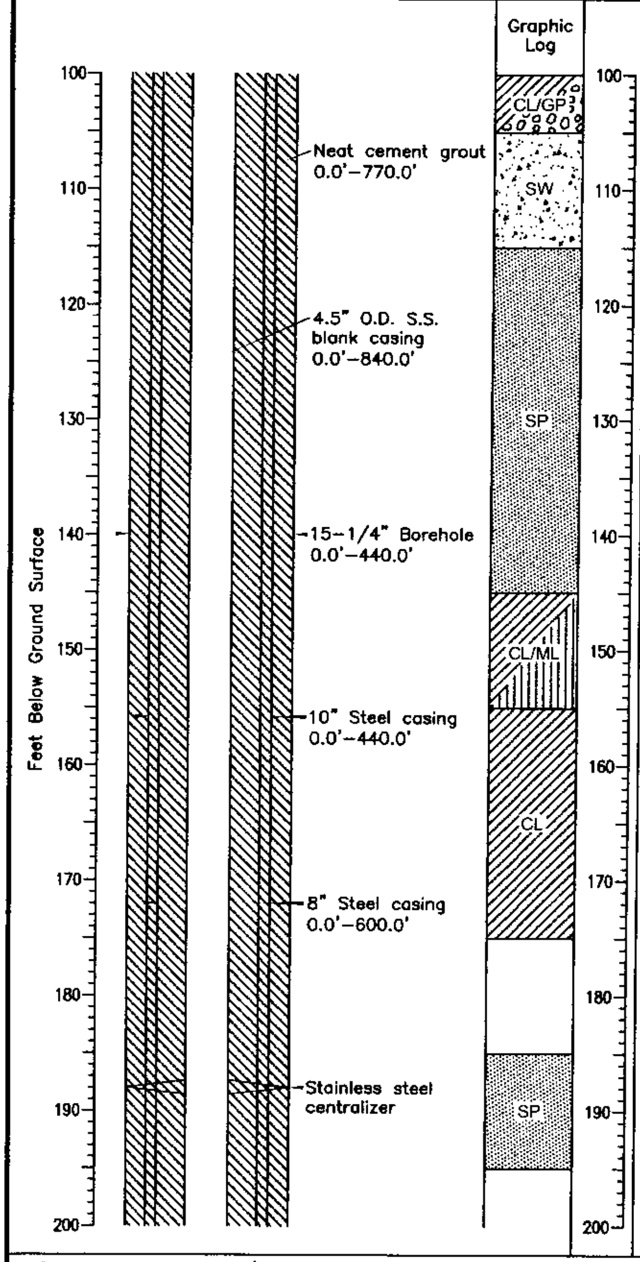
Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech
Date completed: 12–15–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Northing: 666231.696
Easting: 243986.781
Elevation: 3073.9 (TOC)
Notes: HAZ–Tech core drilling 0'–666'; Adamson Pump and Drill air rotary drilling 666'–920'
TOC = top of casing

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
0%/12%	105–115	SW	Sand, grayish brown (2.5Y 5/2), medium– to fine-grained, subrounded, poorly sorted, no plasticity, soft, wet (drilling fluid).
0%/0%	115–125	SP	No core recovery. Rotary cuttings predominantly loose, medium-grained sand with few fines.
0%/0%	125–135	SP	No core recovery, same as above.
0%/0%	135–145	SP	No core recovery, same as above.
12%/25%	145–155	CL–ML	Silty claystone to claystone, light brownish gray (2.5Y 6/2), stiff/brittle, dry.
15%/22%	155–165	CL	Claystone, light brownish gray (2.5Y 6/2), stiff, dry.
15%/20%	165–175	CL	Same as above.
0%/0%	175–180		No recovery.
0%/18%	185–195	SP	Fine to medium sand, olive gray (5Y 5/2), poorly graded, loose, wet.
0%/0%	195–205		No recovery.

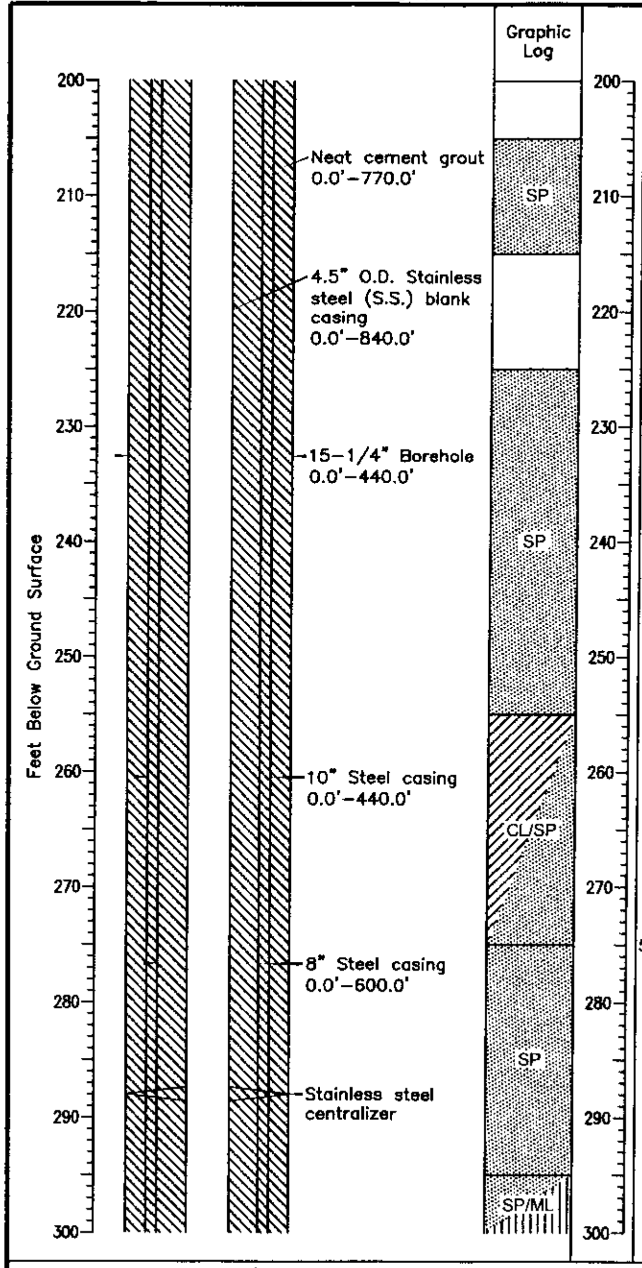
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech
Date completed: 12-15-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ-Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
0%/20%	205–215	SP	Sand, olive brown (2YR 4/3), medium–grained, well sorted, loose, wet.
0%/0%	215–225		No recovery.
0%/15%	225–235	SP	Same as above.
0%/15%	235–245	SP	Same as above.
0%/35%	245–255	SP	Sand, same as above, color (2.5Y 4/2), then 3 inches of claystone, light yellowish brown (2.5Y 6/2), slight plasticity, slightly moist.
35%/90%	255–265	CL–SP	Interbedded brown sand, same as above, with light yellowish brown claystone, some oxidation color banding.
30%/80%	265–275	CL–SP	Same as above, predominantly sand with sandy claystone interbeds.
50%/100%	275–285	SP	Sand, light yellowish brown (2.5Y 6/3), fine–grained, well sorted, micaceous, claystone interbeds, moderately compact, slightly moist.
45%/95%	285–295	SP	Sand, grayish brown (7.5Y 5/3) medium–grained, well sorted with uncommon silty and clayey interbeds, 1 to 2 centimeters thick, loose to weakly cemented, moist, prominent oxidation color banding.
40%/90%	295–305	SP–ML	Similar to above, grayish brown sand interbedded with lighter colored silty fine sand and sandy clay, loose to weakly cemented.

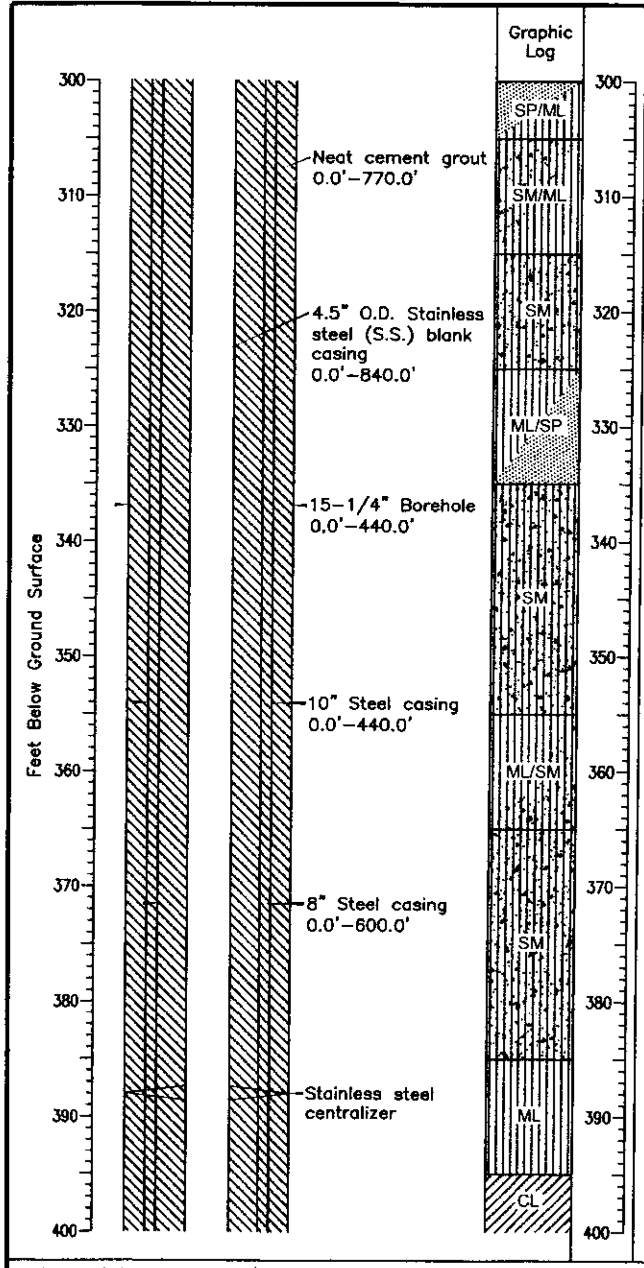
Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech
Date completed: 12–15–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ–Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
50%/85%	305–315	SM–ML	Sandy silt and silty sand, light yellowish brown (2.5Y 6/3–6/4), fine-grained, weakly cemented, brittle, moist, interbedded with olive brown sand, similar to above.
70%/100%	315–325	SM	Similar to above, but also several thin layers (5 to 10 centimeters) very hard fine sandstone, pale yellow (5Y 8/2), prominent oxidation color sanding, hard rock is dry.
50%/100%	325–335	ML–SP	Sandy siltstone, pale yellow (2.5Y 7/4), hard, dry, interbedded with light olive brown loose sand, similar to above.
0%/90%	335–345	SM	Silty sandstone and sandy siltstone, light yellow brown (2.5Y 6/4), generally weakly cemented with loose and very hard layers, oxidation staining especially in very hard layers.
60%/90%	345–355	SM	Same as above, color mottled with olive yellow (2.5Y 6/6), massive to finely laminated, dry to slightly moist.
40%/90%	355–365	ML–SM	Siltstone, sandy siltstone and very fine sandstone, pale yellow (2.5Y 7/4) to light olive brown (2.5Y 6/3), weakly to moderately cemented, laminated, local oxidation staining, dry to slightly moist.
50%/90%	365–375	SM	Interbedded silty fine sandstone, and siltstone, same as above, with olive brown, fine– to medium-grained sandstone, weakly cemented, slightly moist.
40%/75%	375–380	SM	Sandstone, light olive brown, fine-grained, similar to above, finely laminated, cross-bedded, claystone 384 to 385 feet, slightly moist.
25%/75%	385–395	ML	Similar to above, sandy siltstone and very fine-grained silty sandstone, local oxidation staining, highly fractured, slightly moist.
0%/15%	395–405	CL	Sandy claystone and siltstone, color same as above.

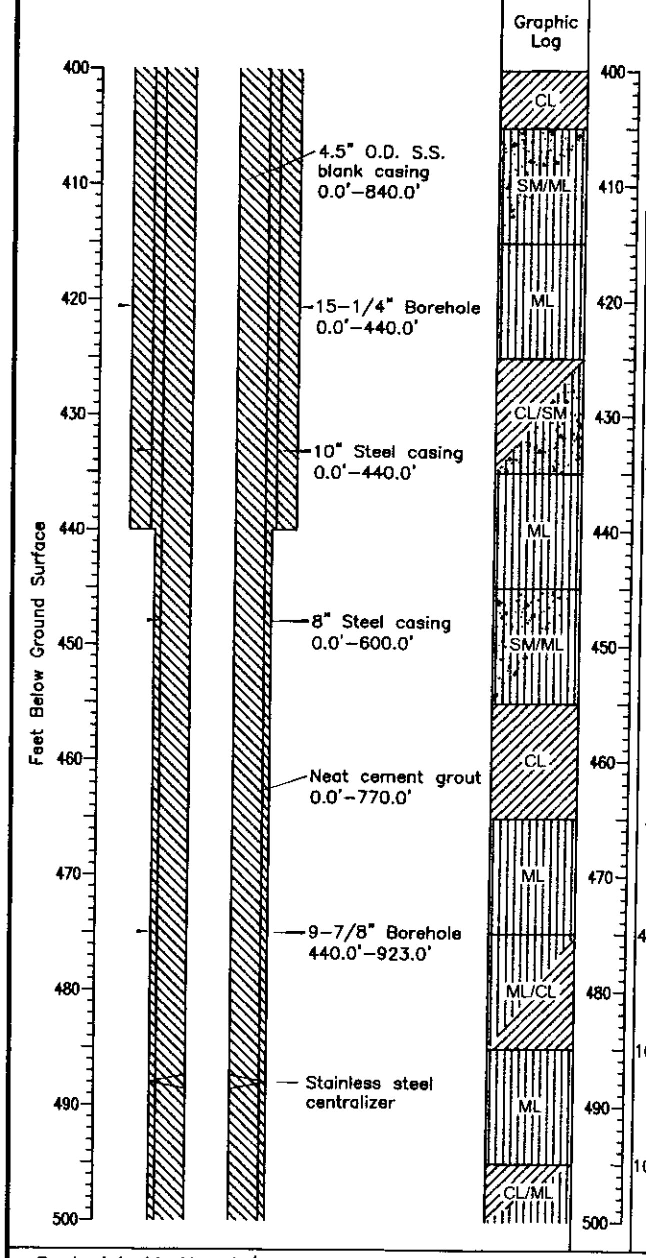
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech
Date completed: 12-15-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ-Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
20%/70%	405–415	SM–ML	Sandy siltstone and sandstone, light olive brown, finely laminated, cross-bedded, very fine-grained local oxidation staining, slightly moist.
0%/15%	415–425	ML	Silty claystone and siltstone, light yellowish brown to pale olive.
60%/80%	425–435	CL–SM	Similar to above, light olive brown fine-grained sediments, some organic material, slightly moist, laminated, weakly to moderately cemented.
75%/85%	435–445	ML	Same as above, dominantly sandy silt, clayey fine sand, color same as above.
15%/50%	445–455	SM–ML	Same as above, a bit more sand.
20%/50%	455–465	CL	Silty claystone, olive gray (5Y 5/2), massive, micaceous, brittle, very slightly moist.
30%/90%	465–475	ML	Similar to above, siltier (clayey siltstone), sub-vertical fractures 460 to 465 feet.
40%/100%	475–485	ML–CL	Same as above, color pale olive (5Y 6/3).
100%/100%	485–495	ML	Same as above, clayey siltstone, pale olive, some oxidation staining, few fractures.
100%/100%	495–505	CL–ML	Siltstone and claystone with minor very fine sandstone, light olive gray (5Y 6/2), micaceous, dry to slightly moist, indurated, oxidation staining along bedding.

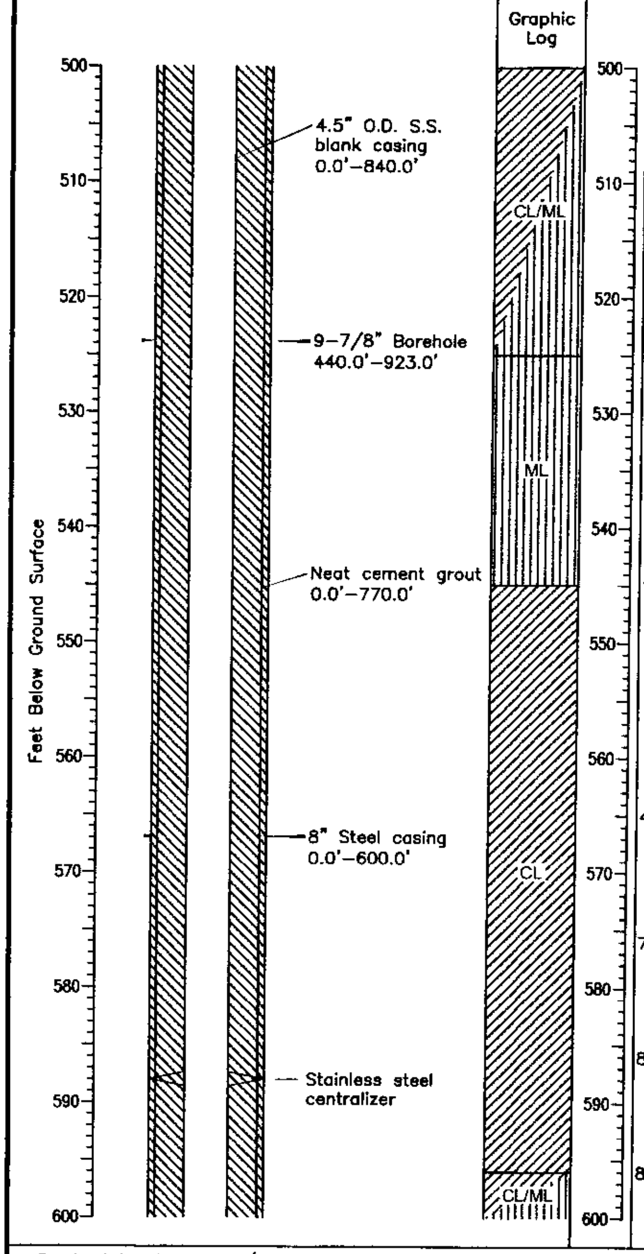
Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech
Date completed: 12–15–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ–Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

PICKLES BUTTE
Well Log: PB-13



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
80%/100%	505-515	CL-ML	Same as above, silty clay and clayey silt, abundant organic material and oxidation staining.
0%/100%	515-525	CL-ML	Same as above.
80%/100%	525-535	ML	Similar to above, less muddy, siltstone and silty very fine sandstone with claystone, olive (5Y 5/3), sandy layers are laminated, cross-bedded.
0%/100%	535-545	ML	Predominantly fine-grained silt, sandstone and clayey siltstone.
100%/100%	545-555	CL	Silty claystone, pale olive to olive gray, weakly cemented to 553 feet, then clayey siltstone, gray (5Y 5/1), dense, finely laminated, slightly moist. Contact with "blue clay" unit at 552.5 feet.
not recorded	555-565	CL	Silty claystone with minor sand, gray (5Y 5/1), massive to laminated, fine-grained, weakly to moderately cemented, dense, very slightly moist.
40%/100%	565-576	CL	Silty claystone, dark greenish gray (Gley1 4/1), hard, brittle, numerous fractures.
70%/100%	576-586	CL	Same as above.
85%/100%	586-596	CL	Silty claystone, dark greenish gray (Gley1 4/1), slight plasticity, brittle, slightly moist, micaceous.
80%/100%	596-606	CL-ML	Same as above, a bit siltier, greenish gray (Gley1 5/1), interbedded with hard micaceous siltstone.

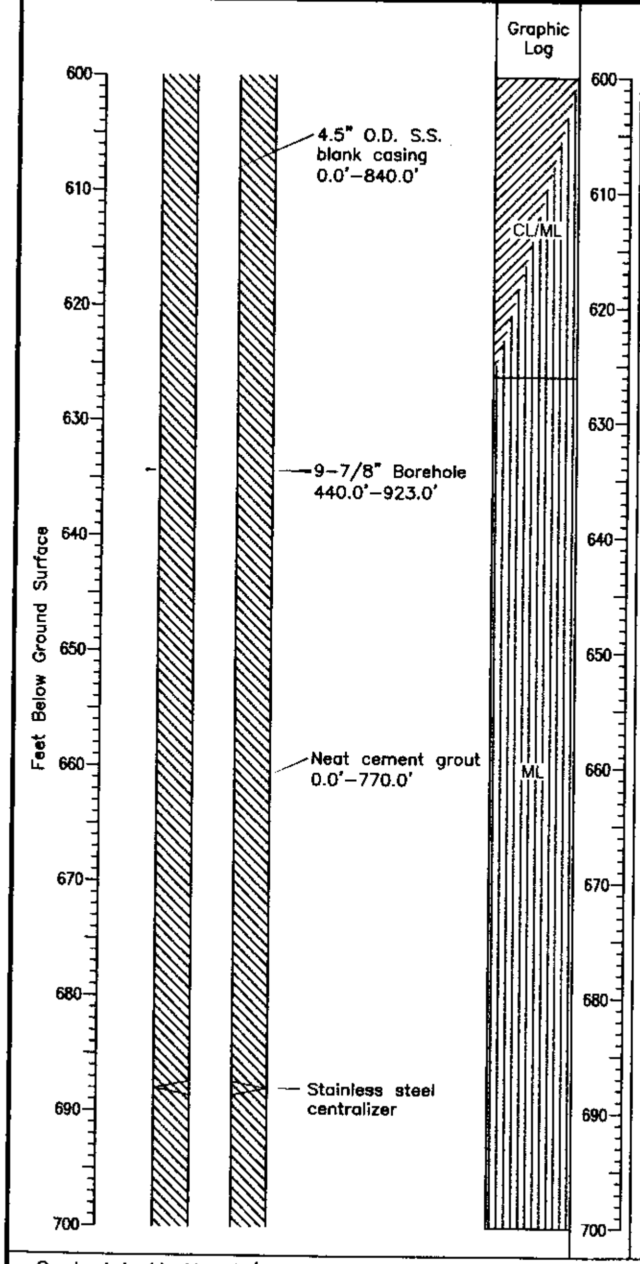
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech
Date completed: 12-15-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'-440'), 9 7/8" (440'-923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'-600'), 10" (0'-440')

Note: HAZ-Tech core drilling 0'-666';
Adamson Pump and Drill air rotary drilling
666'-920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
100%/100%	606–616	CL–ML	Same as above. Large steeply dipping fracture at 5 feet.
100%/100%	616–626	CL–ML	Siltstone and interbedded claystone, greenish gray (Gley1 5/10Y–5/N), micaceous, harder than above, (claystone is soft).
100%/100%	626–636	ML	Same as above, predominantly siltstone.
100%/100%	636–646	ML	Siltstone with minor sand and mud, dark greenish gray (Gley1 4/1–10/Y), laminated, fine–grained, hard, slightly moist.
80%/90%	646–656	ML	Same as above.
40%/40%	656–666	ML	Same as above.
	666–923	ML	Cuttings not sampled at discrete intervals from 666 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech
Date completed: 12–15–11

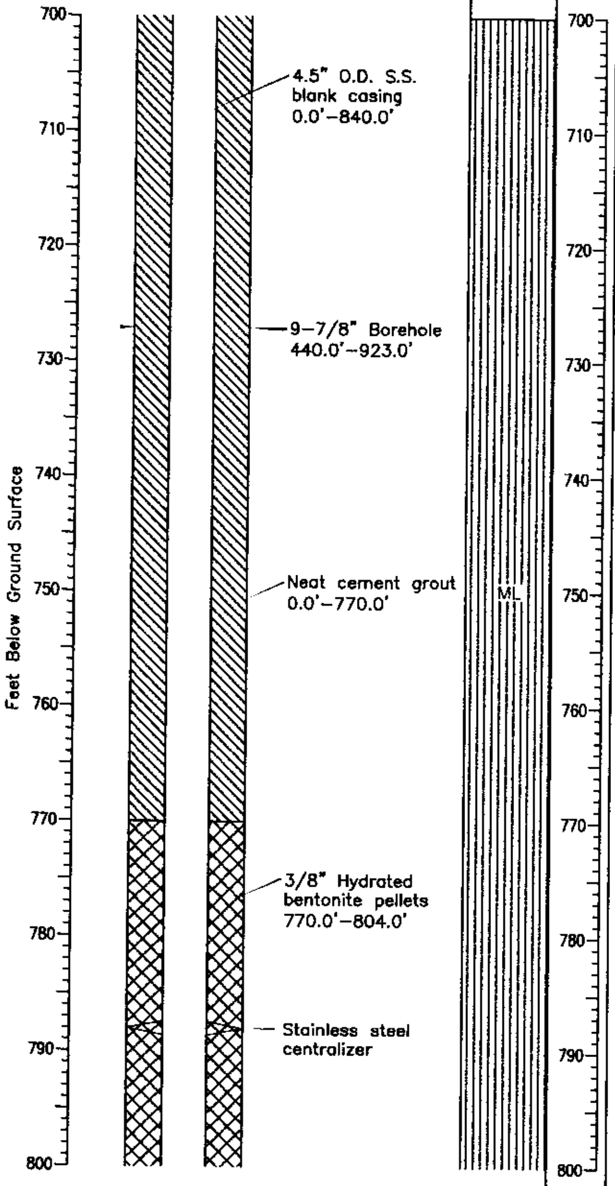
Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ–Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-13 (8of10)



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		ML	Cuttings not sampled at discrete intervals from 666 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

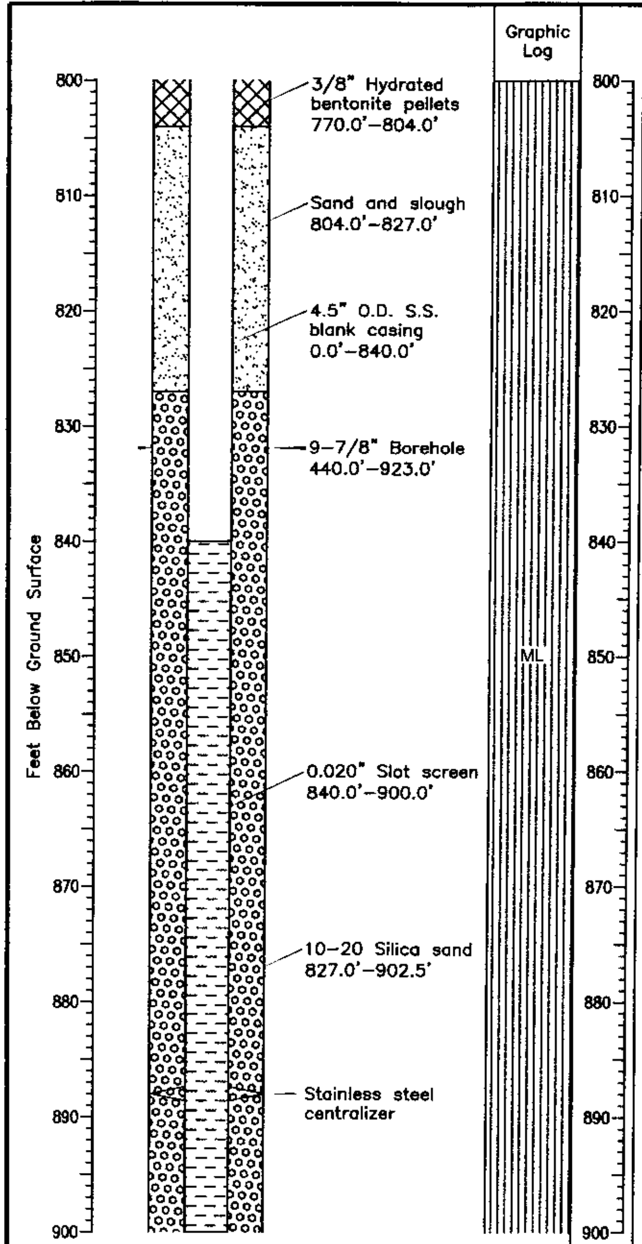
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech
Date completed: 12-15-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'-440'), 9 7/8" (440'-923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'-600'), 10" (0'-440')

Note: HAZ-Tech core drilling 0'-666';
Adamson Pump and Drill air rotary drilling
666'-920'

PICKLES BUTTE
Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
8-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		ML	Cuttings not sampled at discrete intervals from 666 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech
Date completed: 12–15–11

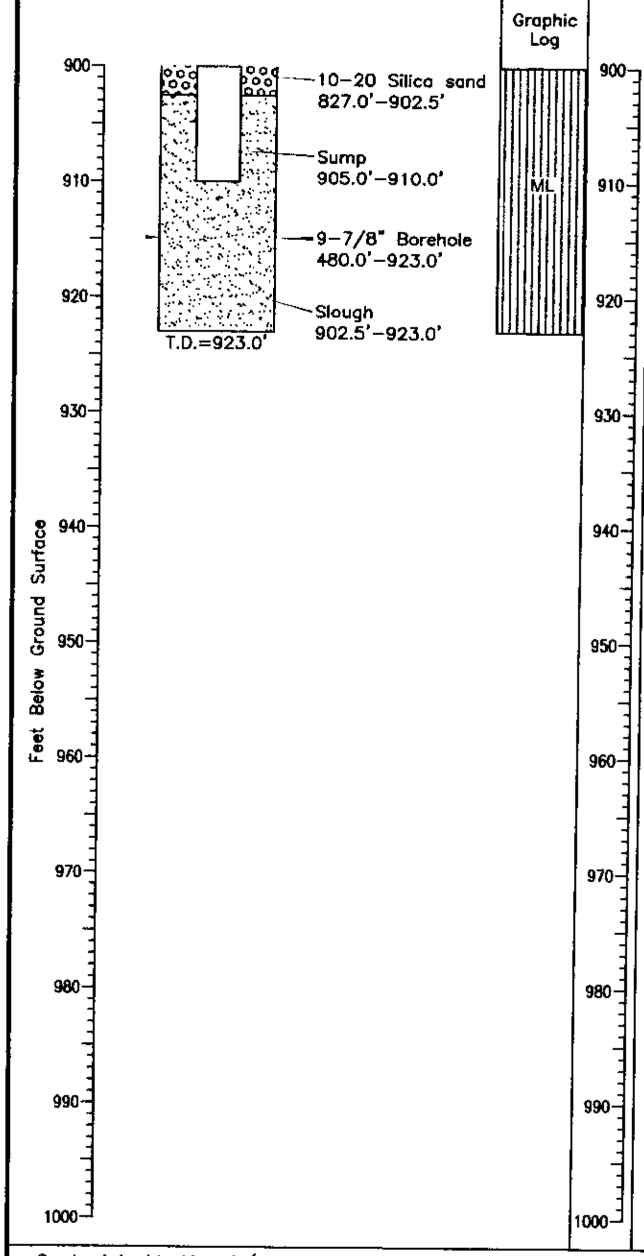
Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'–440'), 9 7/8" (440'–923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'–600'), 10" (0'–440')

Note: HAZ–Tech core drilling 0'–666';
Adamson Pump and Drill air rotary drilling
666'–920'

PICKLES BUTTE

Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
8–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		ML	Cuttings not sampled at discrete intervals from 666 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech
Date completed: 12-15-11

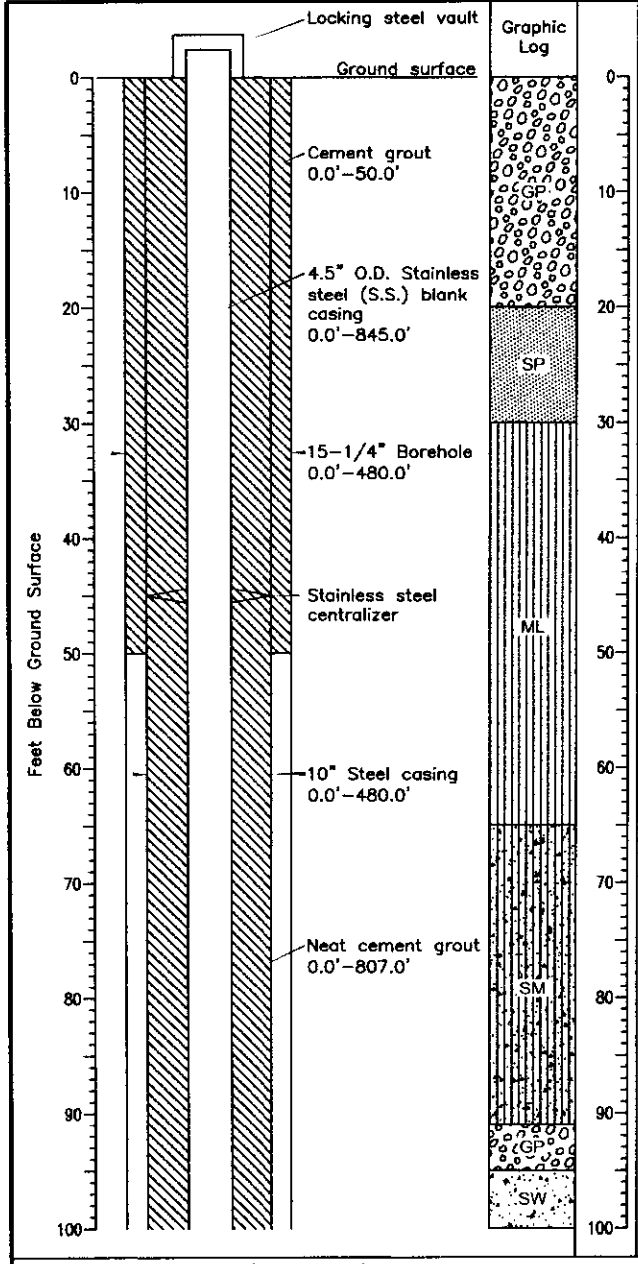
Drilling method: Core, mud rotary, air rotary
Bit diameters: 15 1/4" (0'-440'), 9 7/8" (440'-923')
Sampling device: HQ core, air rotary cuttings
Steel suface casing: 8" (0'-600'), 10" (0'-440')

Note: HAZ-Tech core drilling 0'-666';
Adamson Pump and Drill air rotary drilling
666'-920'

PICKLES BUTTE

Well Log: PB-13

Daniel B. Stephens & Associates, Inc.
8-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample interval (feet bgs)	USCS Symbol	Comments and Lithology
0%/0%	0–10	GP	No core recovery. 0 to 30 feet description based on rotary cuttings unconsolidated gravel, meterolithic clasts up to 3 inches, rounded, coarse-grained, poorly sorted, sand matrix.
	10–20	GP	Same as above.
	20–30	SP	Sand, medium- to coarse-grained, moderately well sorted, loose.
80%/80%	30–35	ML	Silstone, light brownish gray (2.5Y 6/2), weakly cemented.
85%/85%	35–40	ML	Siltstone-sandy siltstone, light brownish gray (2.5Y 6/2), weakly cemented.
85%/85%	40–45	ML	Siltstone-clayey siltstone, pale yellow (2.5Y 7/3), weakly cemented.
45%/75%	45–50	ML	Sandy silstone, light yellowish brown (2.5Y 6/3), very weakly cemented, highly fractured, oxidation staining.
60%/75%	50–55	ML	Same as above.
25%/40%	55–60	ML	Same as above, fine-grained.
50%/95%	60–65	ML	Same as above, fine-grained, highly fractured.
35%/35%	65–75	SM	Silty sandstone, light yellowish brown (2.5Y 5/4), laminated, fine- to medium-grained, weakly cemented.
25%/30%	75–85	SM	Same as above, light olive brown (2.5Y 5/4).
19%/19%	85–91	SM	Same as above with coarse-grained sand in drilling fluid matrix.
	91–95	GP	Rotary cuttings indicate gravel layer at 91 to 95 feet.
60%/99%	95–100	SW	Sand, pale yellow (2.5Y 8/3), coarse-grained, subrounded, loose, wet.
60%/99%	100–105	SM	Silty sandstone, pale yellow (2.5Y 8/3), fine-grained, weakly cemented.

Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

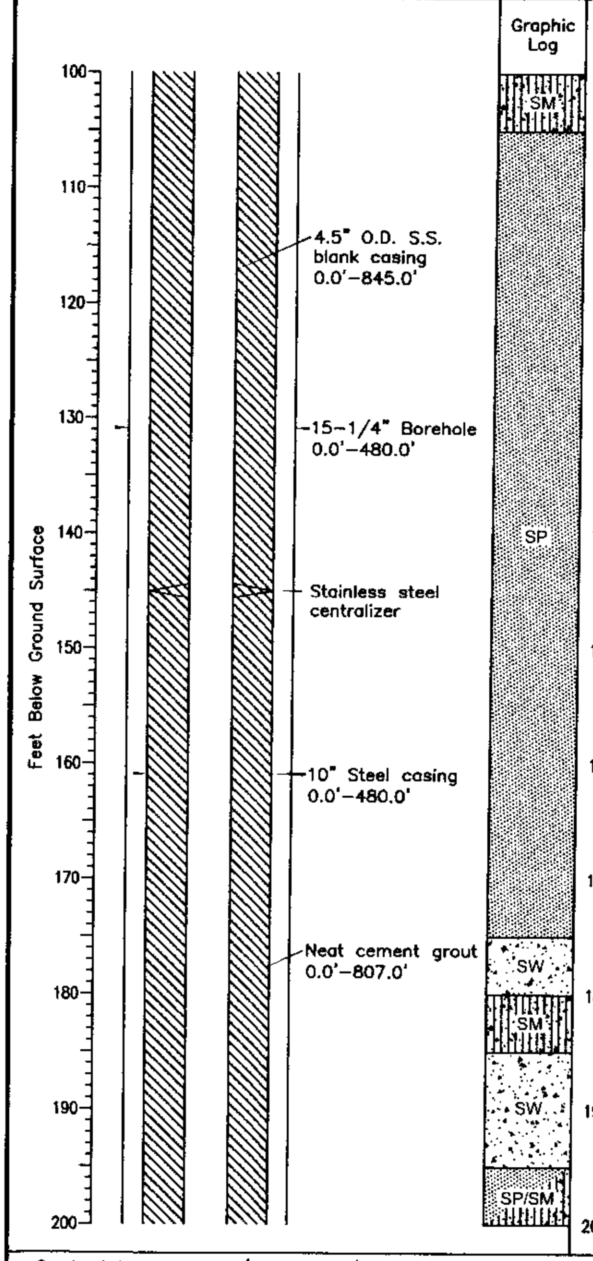
Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"
Note: TOC = top of casing

Northing: 665549.182
Easting: 244947.947
Elevation: 3080.9 (TOC)

Note: HAZ-Tech core drilling 0'-385', 520'-750' (NQ core 600'-750'); Adamson Pump and Drill mud rotary drilling 385'-520', air rotary drilling 750'-923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
0%/0%	105–115	SP	No core recovery 105 feet to 175 feet, rotary cuttings indicate dominantly medium sand, moderately well sorted, unconsolidated.
0%/0%	115–125	SP	Same as above.
0%/0%	125–175	SP	Same as above to 175 feet (rotary cuttings).
0%/50%	175–180	SW	Sand, dark yellowish brown (10YR 4/4), coarse-grained, non-plastic, loose, wet.
0%/50%	180–185	SM	Silty sand, light yellowish brown (2.5Y 6/4), fine-grained, low plasticity, loose, wet.
30%/40%	185–195	SW	Sandstone, dark grayish brown (2.5Y 5/2), coarse-grained, subrounded, weakly cemented, vertical fractures.
35%/35%	195–205	SP–SM	Sandstone grading to silty sandstone, olive brown (2.5Y 4/3), coarse- to fine-grained, weakly cemented.

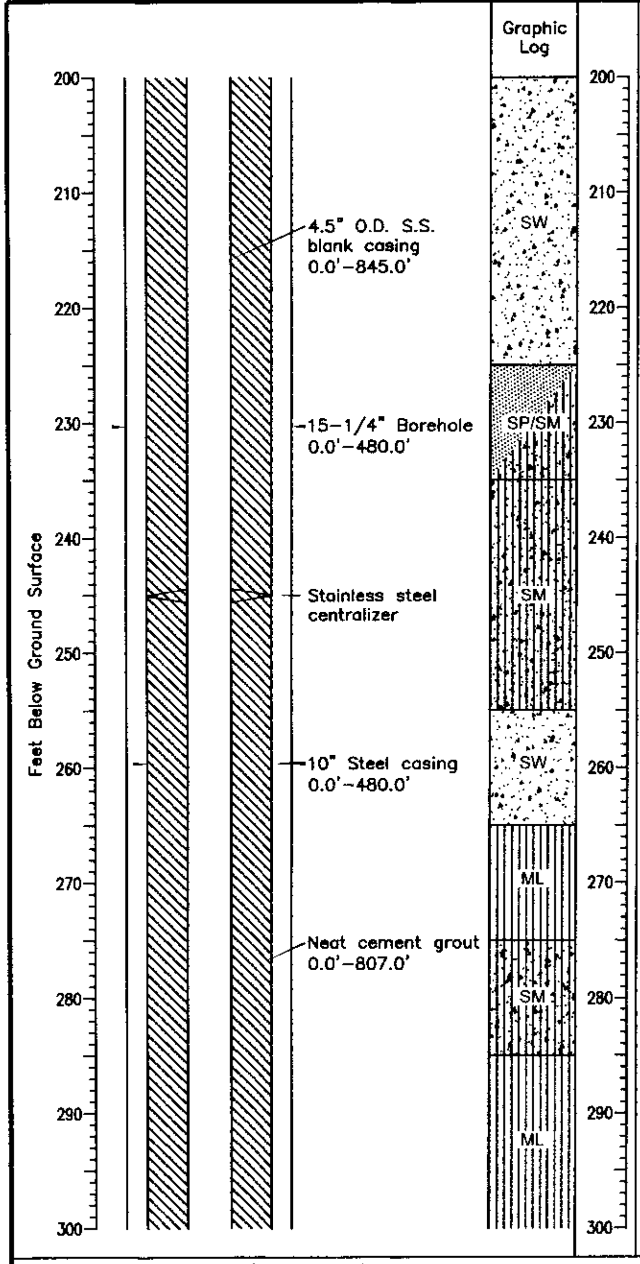
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ-Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
0%/48%	205–215	SW	Sand, dark yellowish brown (10YR 4/4), coarse-grained, non-plastic, loose, wet.
0%/48%	215–225	SW	Same as above.
0%/48%	225–235	SP–SM	Loose sand graiding to silty sandstone, light yellowish brown (2.5Y 6/3), fine-grained, weakly cemented.
0%/48%	235–245	SM	Silty sandstone, light yellowish brown (2.5Y 6/3), fine– to medium-grained, weakly cemented, fractured.
0%/48%	245–255	SM	Same as above with iron staining.
0%/48%	255–265	SW	Sandstone, light olive brown (2.5Y 5/3), laminated, coarse-grained, very weakly cemented, iron staining.
0%/48%	265–275	ML	Sandy clayey silt, light yellowish brown (2.5Y 6/3), low plasticity, soft, damp.
0%/48%	275–285	SM	Silty sandstone, light yellowish brown (2.5Y 6/3), iron stained banding, fine-grained, weakly cemented.
0%/48%	285–295	ML	Sandy siltstone, light yellowish brown (2.5Y 6/3), fine-grained, weakly cemented, fractured.
0%/48%	295–305	ML	Same as above, light olive brown (2.5Y 5/3).

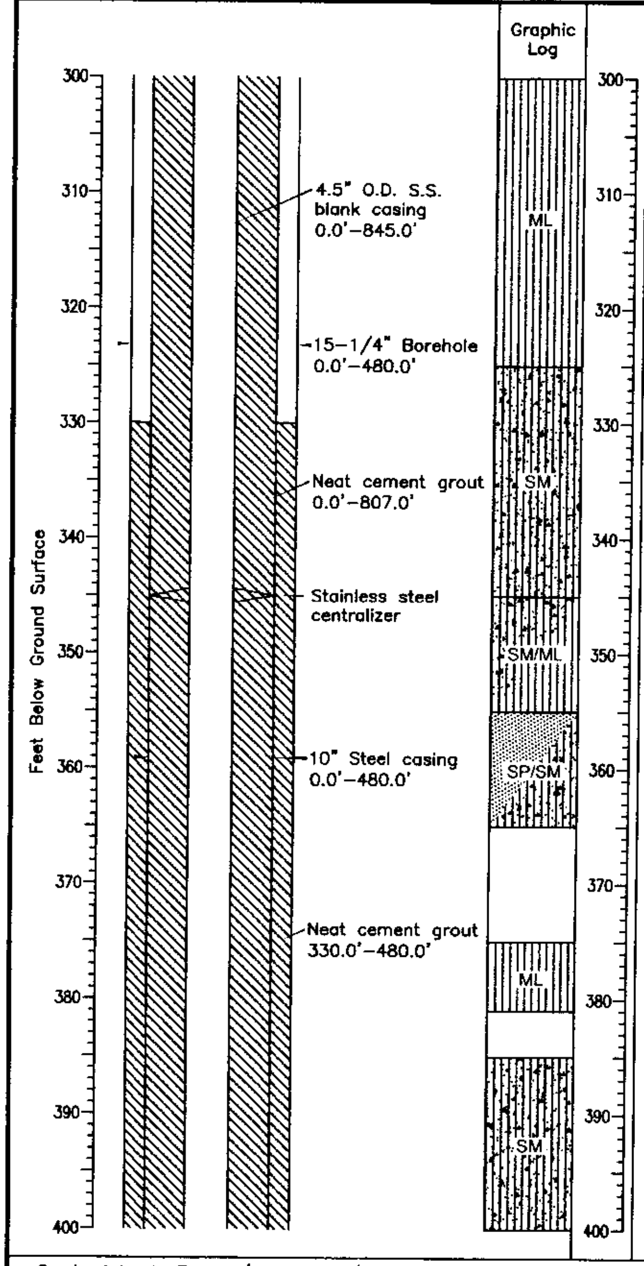
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–11–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15–1/4" and 9–7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ–Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
100%/100%	305–315	ML	Same as above.
100%/100%	315–325	ML	Same as above, light olive brown (2.5Y 6/2).
100%/100%	325–335	SM	Silty sandstone, light olive brown (2.5Y 5/3), fine-grained, moderatedly cemented.
100%/100%	335–345	SM	Silty sandstone, pale yellow (2.5Y 7/3), fine-grained, weakly cemented dry.
85%/95%	345–355	SM–ML	Same as above grading into siltstone, light yellowish brown (2.5Y 6/3), weakly cemented.
45%/88%	355–365	SP–SM	Same as above, with loose medium-grained sand.
0%/0%	365–375		No recovery.
95%/95%	375–381	ML	Siltstone, plae yellow (2.5Y 7/3), weakly cemented, dry.
0%/0%	381–385		No recovery.
NA	385–395	SM	Clayey silty sand, light yellowish brown (2.5Y 6/3), fine- to medium-grained, moderately sorted, moderate plasticity, soft (cuttings from mud rotary).
NA	395–405	SM	As above, more sand than fines (cuttings from mud rotary).

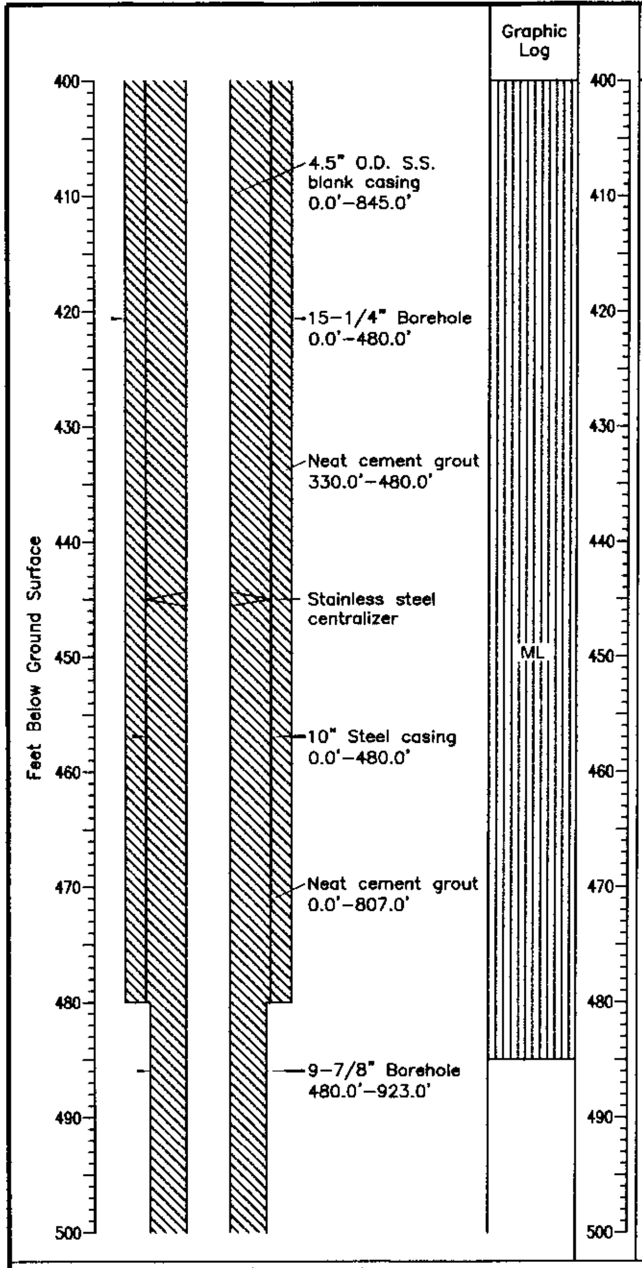
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–11–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15–1/4" and 9–7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ–Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

PICKLES BUTTE
Well Log: PB-14



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA	405-415	ML	Same as above, clayey silt with sand, more fines than sand (cuttings from mud rotary).
NA	415-425	ML	Same as above (cuttings from mud rotary).
NA	425-435	ML	Same as above (cuttings from mud rotary).
NA	435-445	ML	Same as above, few cutting returns (cuttings from mud rotary).
NA	445-455	ML	Same as above (cuttings from mud rotary).
NA	455-465	ML	Same as above (cuttings from mud rotary).
NA	465-475	ML	Same as above (cuttings from mud rotary).
NA	475-485	ML	Same as above (cuttings from mud rotary).
NA	485-520		No cuttings return.

Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

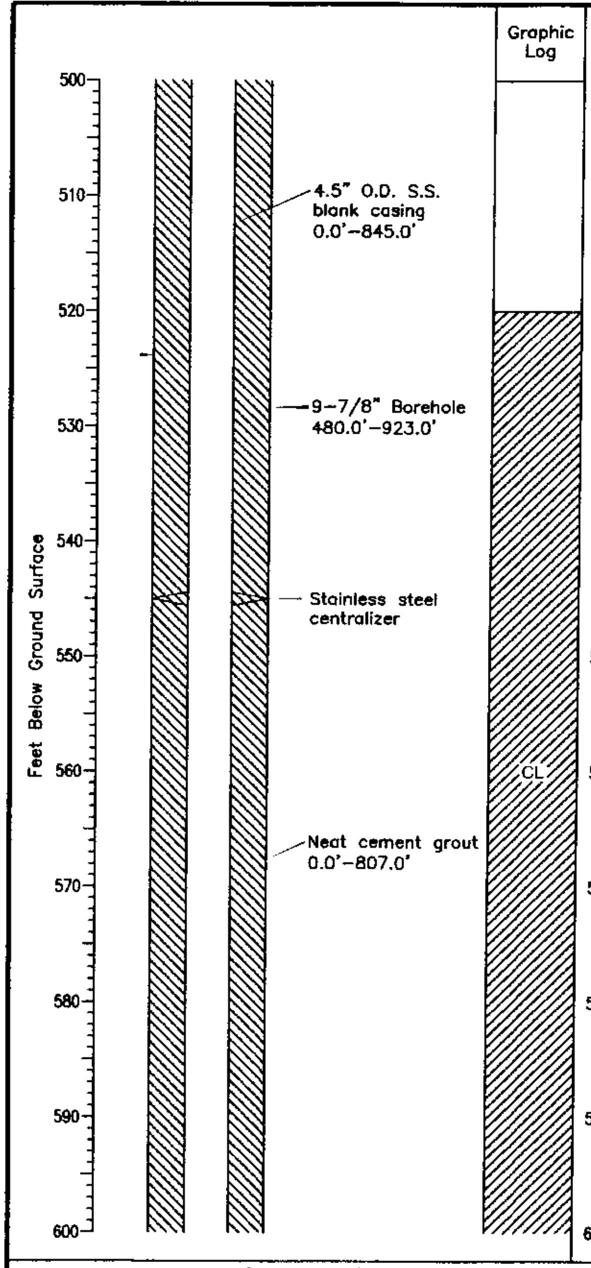
Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ-Tech core drilling 0'-385', 520'-750' (NQ core 600'-750'); Adamson Pump and Drill mud rotary drilling 385'-520', air rotary drilling 750'-923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-14 (6of10)



	Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
500				
	NA			No cuttings return.
510				
520	70%/77%	520–525	CL	Silty claystone, olive gray (5Y 3/2), weakly cemented.
	96%/96%	525–530	CL	Same as above.
530	90%/90%	530–540	CL	Silty sandy claystone, dark olive gray (5Y 3/2), fine-grained, weakly cemented, moist.
540	90%/95%	540–550	CL	Same as above, with dark gray mottling, moderately cemented, few fractures.
550	95%/95%	550–560	CL	Same as above.
560	95%/95%	560–570	CL	Same as above.
570	70%/95%	570–580	CL	Sandy silty claystone, light yellowish brown (7.5Y 6/3), very fine-grained, weakly cemented, slight to moderate plastice when wet.
580	82%/82%	580–590	CL	Same as above, some fractures.
590	70%/90%	590–595	CL	Sandy silty claystone, dark greenish brown (2.5Y 4/2), very fine-grained, weakly cemented, dry to damp.
	0%/37%	595–605	CL	Sandy silty claystone, greenish gray (Gley1 5/1), very fine-grained, slight plasticity, moderately cemented, brittle, dry.
600				

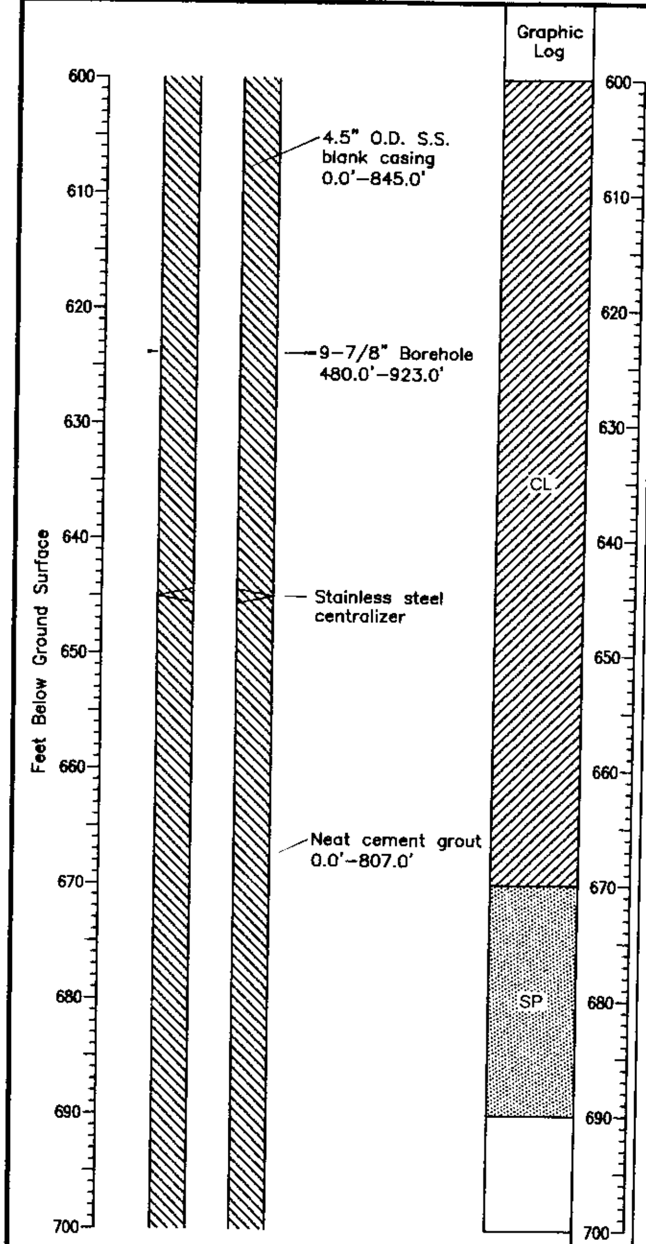
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ-Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154

PICKLES BUTTE
Well Log: PB-14



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
10%/81%	605–615	CL	Sandy silty claystone, dark greenish gray (Gley1 4/1), fine-grained, slight to moderate plasticity when wet, dry (608–615 feet no recovery).
65%/84%	615–625	CL	Same as above.
40%/64%	625–635	CL	Claystone, dark greenish gray (Gley1 4/1), plastic when wet, hard, brittle, dry-damp, massive.
0%/84%	635–640	CL	Same as above.
0%/20%	640–650	CL	Same as above.
30%/44%	650–660	CL	Same as above.
10%/34%	660–670	CL	Same as above.
0%/38%	670–690	SP	Sandstone, dark greenish gray (Gley1 4/1), fine-grained, well sorted, round to subround, non-plastic, hard, dry-damp.
0%/0%	690–700		No recovery.

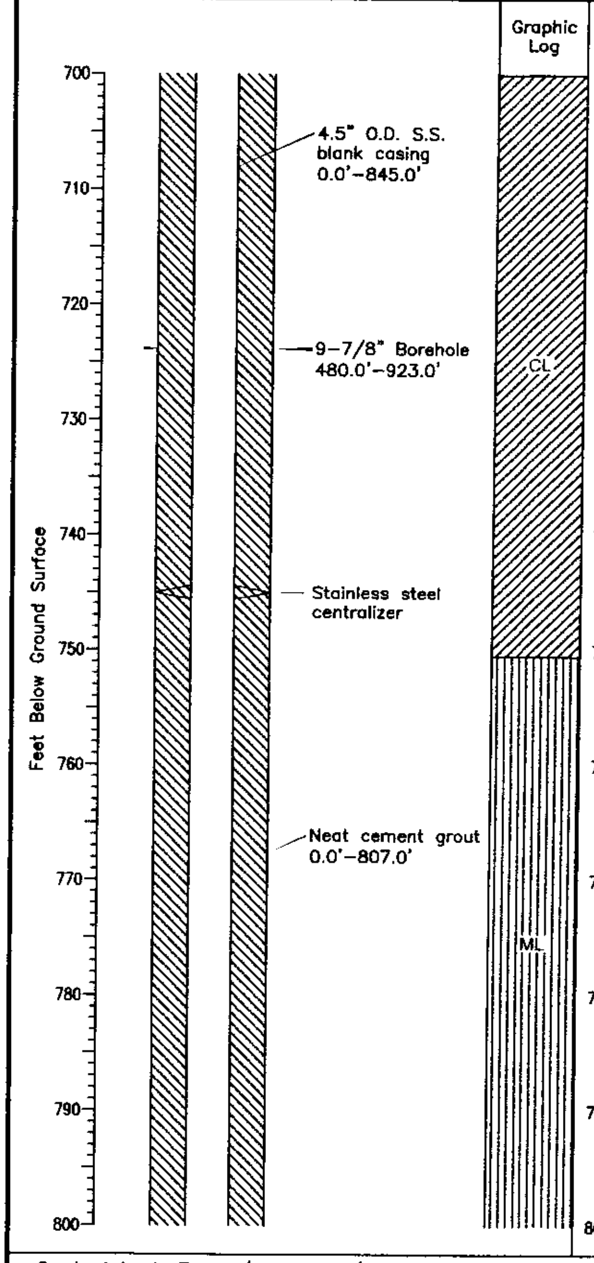
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ-Tech core drilling 0'-385', 520'-750' (NQ core 600'-750'); Adamson Pump and Drill mud rotary drilling 385'-520', air rotary drilling 750'-923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
15%/58%	700-710	CL	Claystone, dark greenish gray (Gley1 4/1), plastic when wet, hard, brittle, damp.
0%/63%	710-720	CL	Same as above, most likely borehole slough.
20%/55%	720-730	CL	Claystone, dark greenish gray (Gley1 4/1), plastic when wet, hard, brittle, dry-damp, massive, with few fractures.
90%/96%	730-740	CL	Same as above, without fractures.
70%/100%	740-750.5	CL	Same as above.
NA	750.5-923	ML	Cuttings not sampled at discrete intervals from 750.5 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

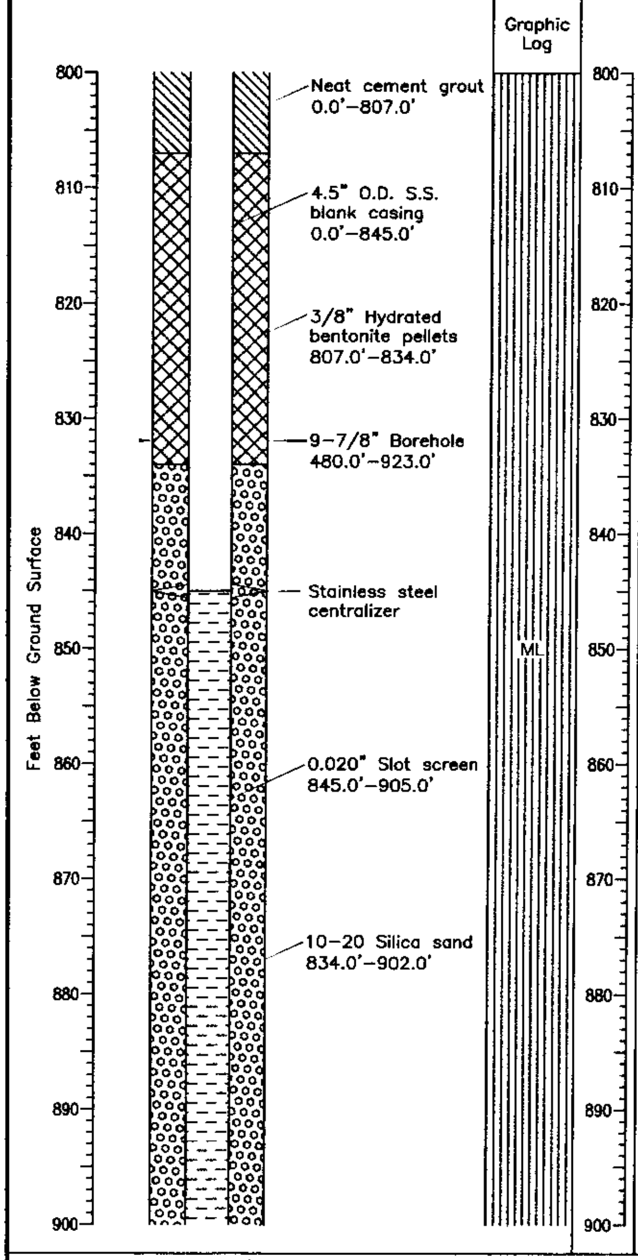
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-11-11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15-1/4" and 9-7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ-Tech core drilling 0'-385', 520'-750' (NQ core 600'-750'); Adamson Pump and Drill mud rotary drilling 385'-520', air rotary drilling 750'-923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA		ML	Cuttings not sampled at discrete intervals from 750.5 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–11–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15–1/4" and 9–7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

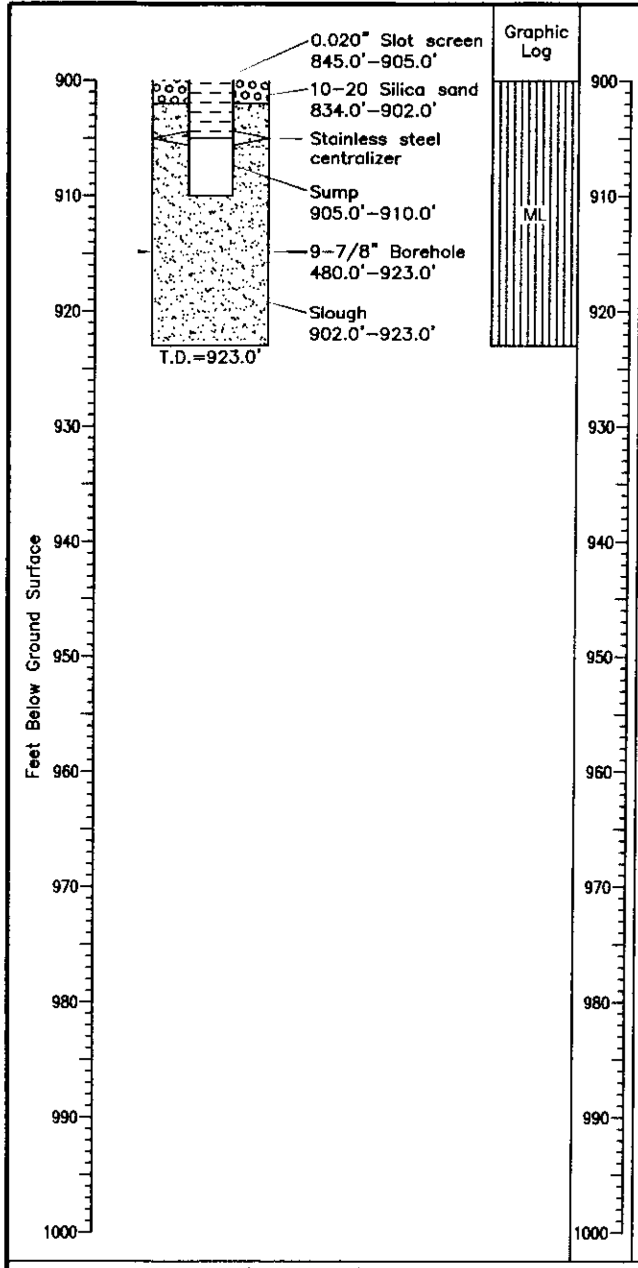
Note: HAZ–Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

PICKLES BUTTE

Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6–05–2012

JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA		ML	Cuttings not sampled at discrete intervals from 750.5 feet to 923 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

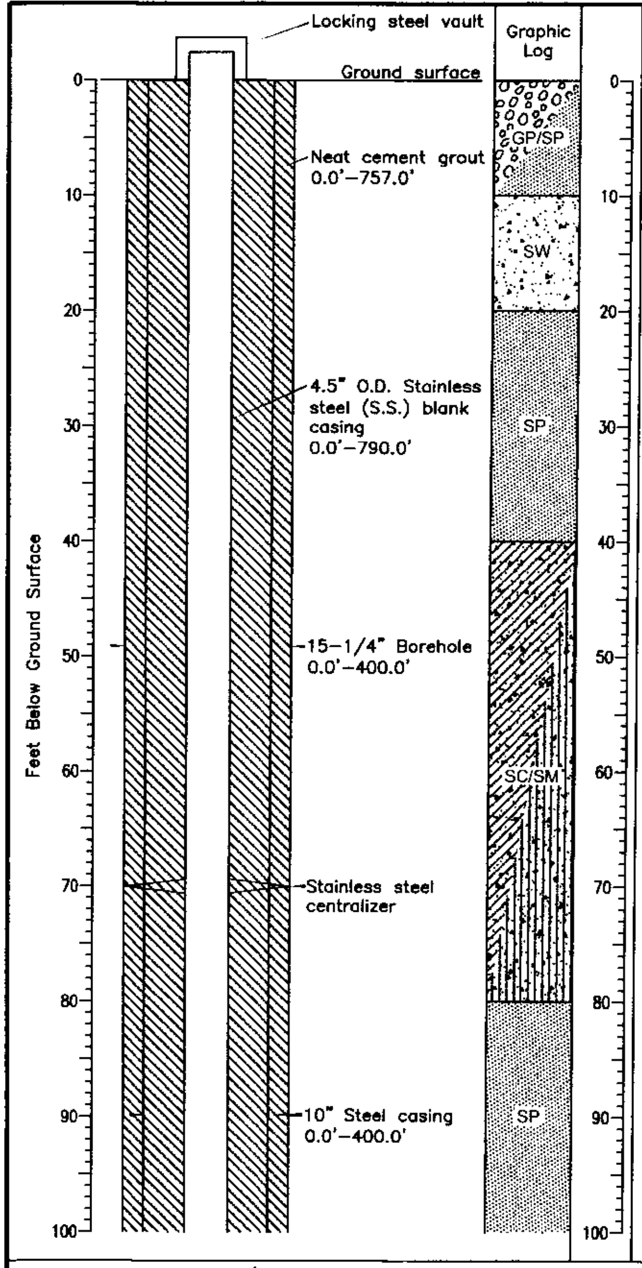
Geologist: J. Fisher/M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–11–11

Drilling method: Core, mud rotary, air rotary
Bit diameters: 15–1/4" and 9–7/8"
Sampling device: HQ core, NQ core, rotary cuttings
Steel suface casing: 10"

Note: HAZ–Tech core drilling 0'–385', 520'–750' (NQ core 600'–750'); Adamson Pump and Drill mud rotary drilling 385'–520', air rotary drilling 750'–923'

PICKLES BUTTE
Well Log: PB-14

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA	0–10	GP–SP	Gravelly sand, olive gray (5Y 5/2), fine– to medium–grained, subrounded, well sorted, non–plastic, loose, moist.
NA	10–20	SW	Sand, light gray (5Y 7/2), fine– to coarse–grained, well sorted, subrounded, non–plastic, loose, dry.
NA	20–30	SP	Same as above.
NA	30–40	SP	Same as above.
NA	40–50	SC–SM	Clayey silty sand, pale yellow (5Y 7/3), fine–grained, subrounded, low plastic, soft, slightly moist.
NA	50–60	SC–SM	Same as above.
NA	60–70	SC–SM	Same as above.
NA	70–80	SC–SM	Clayey silty sand, light olive brown (2.5Y 5/3), fine– to coarse–grained, rounded to subrounded, low plastic, soft, moist.
NA	80–90	SP	Sand, pale yellow (2.5Y 7/4), fine–grained, non–plastic, loose, moist.
NA	90–100	SP	Same as above.

Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–26–11

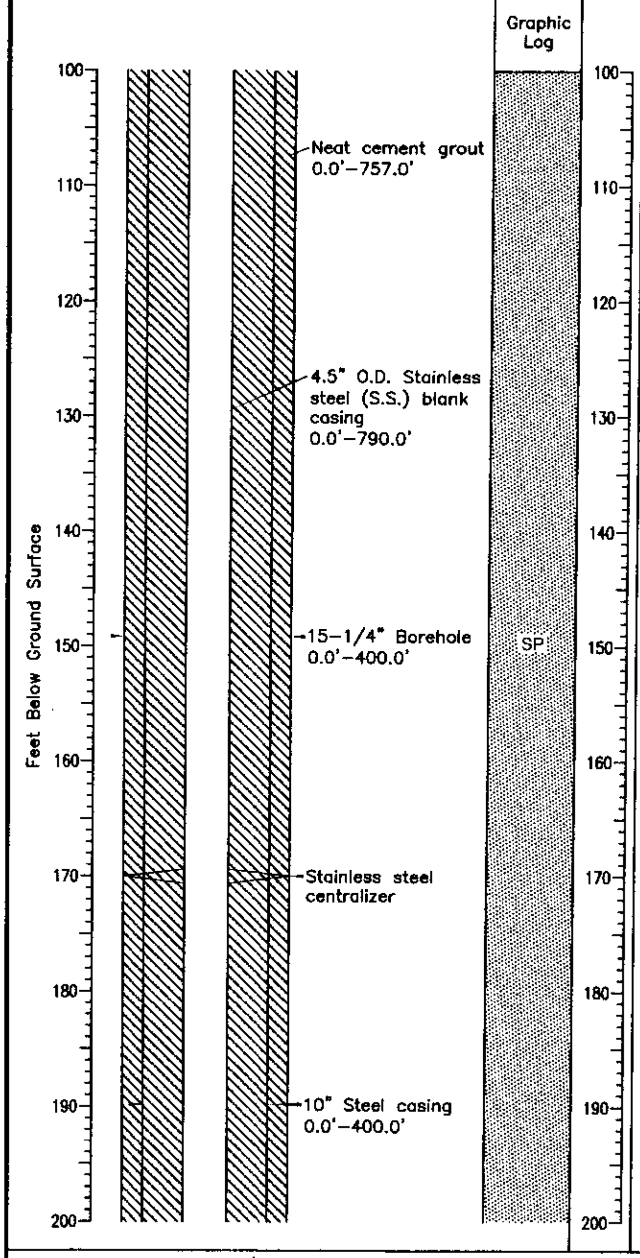
Drilling method: Core, mud rotary
Bit diameters: 15–1/4", 12" and 9–7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"
Note: TOC = top of casing

Northing: 665617.168
Easting: 246058.254
Elevation: 3023.3 (TOC)

Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ–Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA	100–110	SP	Sand, light yellowish brown (2.5Y 6/3), fine-grained, poorly sorted, subrounded, non-plastic, loose, moist
NA	110–120	SP	Sand, light olive brown (2.5Y 5/3), fine- to medium-grained, subrounded, poorly sorted, non-plastic, loose, moist
NA	120–130	SP	Same as above.
NA	130–140	SP	Same as above.
NA	140–150	SP	Same as above.
NA	150–160	SP	Same as above.
NA	160–170	SP	Same as above.
NA	170–180	SP	Same as above.
NA	180–190	SP	Same as above with iron staining.
NA	190–200	SP	Sand, pale yellow (2.5Y 8/4), fine- to coarse-grained, poorly sorted, subangular to subrounded, non-plastic, loose, dry.

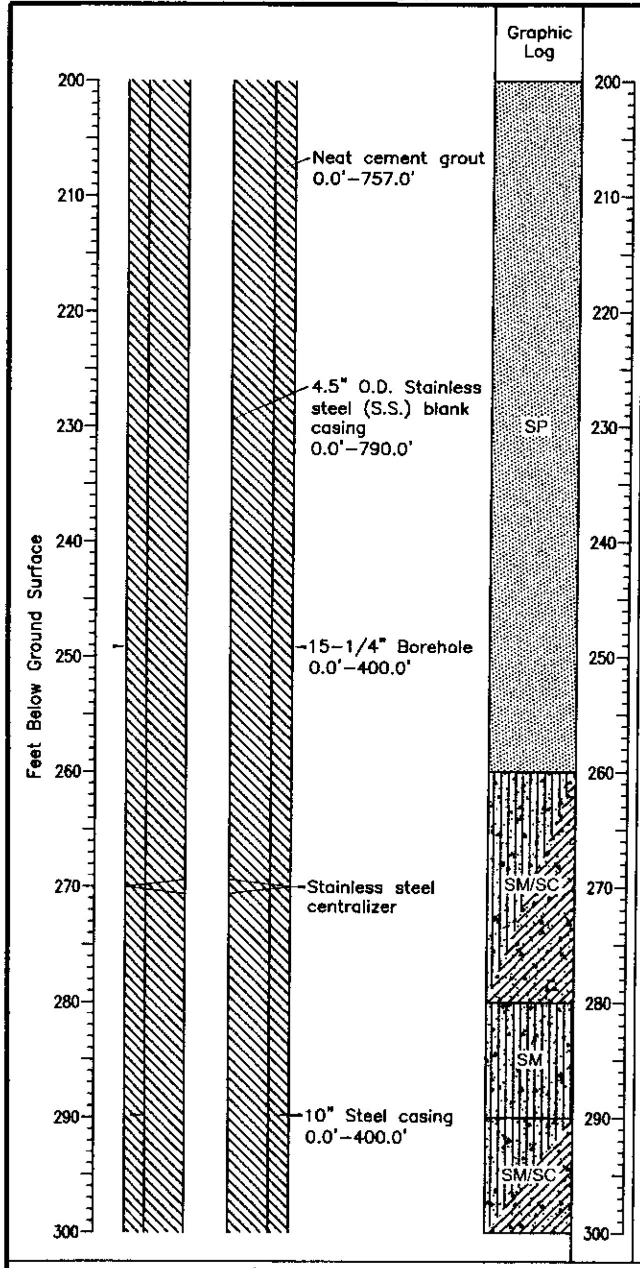
Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–26–11

Drilling method: Core, mud rotary
Bit diameters: 15–1/4", 12" and 9–7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ–Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA	200–210	SP	Same as above, medium–coarse grained.
NA	210–220	SP	Same as above.
NA	220–230	SP	Same as above.
NA	230–240	SP	Same as above with iron staining.
NA	240–250	SP	Same as above.
NA	250–260	SP	Sand, pale yellow (2.5Y 8/3), fine–grained, well sorted, subrounded, non–plastic, loose, dry.
NA	260–270	SM–SC	Silty clayey sand, pale yellow (5Y 7/3), fine–grained, subrounded, low plastic, soft, moist
NA	270–280	SM–SC	Same as above.
NA	280–290	SM	Silty sand, pale olive (5Y 6/3), fine–grained, subrounded, non–plastic, loose, slightly moist
NA	290–300	SM–SC	Clayey silty sand, olive (5Y 5/3), fine–grained, subrounded, very low plastic, soft, slightly moist

Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–26–11

Drilling method: Core, mud rotary
Bit diameters: 15–1/4", 12" and 9–7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

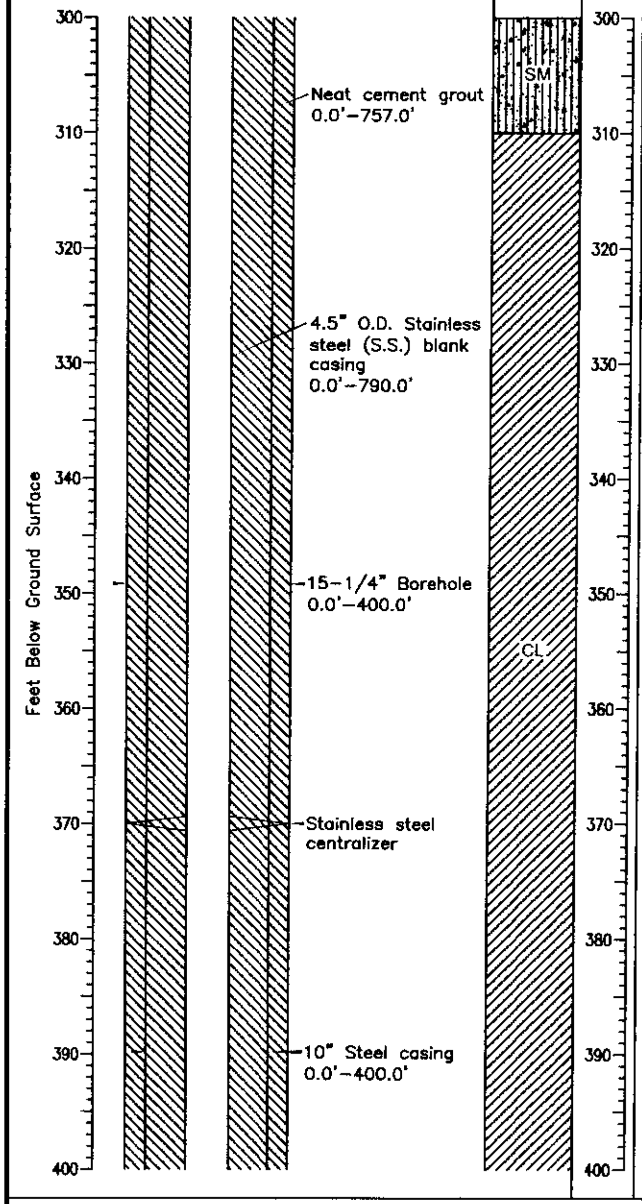
Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ–Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE

Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6–05–2012

JN ES09.0154



Depth	Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
300	NA	300–310	SM	Silty sand, pale yellow (5Y 8/2), fine-grained, subrounded, non-plastic, loose, dry.
310	NA	310–320	CL	Sandy silty clay, light yellowish brown (2.5Y 6/4), fine-grained, subrounded, medium plastic, soft, moist.
320	NA	320–330	CL	Same as above.
330	NA	330–340	CL	Same as above.
340	NA	340–350	CL	Same as above.
350	NA	350–360	CL	Silty clay, pale olive (5Y 6/3), very fine-grained, highly plastic, soft, wet.
360		360–370		
370	NA	370–380	CL	Same as above.
380	NA	380–390	CL	Same as above.
390	NA	390–400	CL	Same as above.
400				

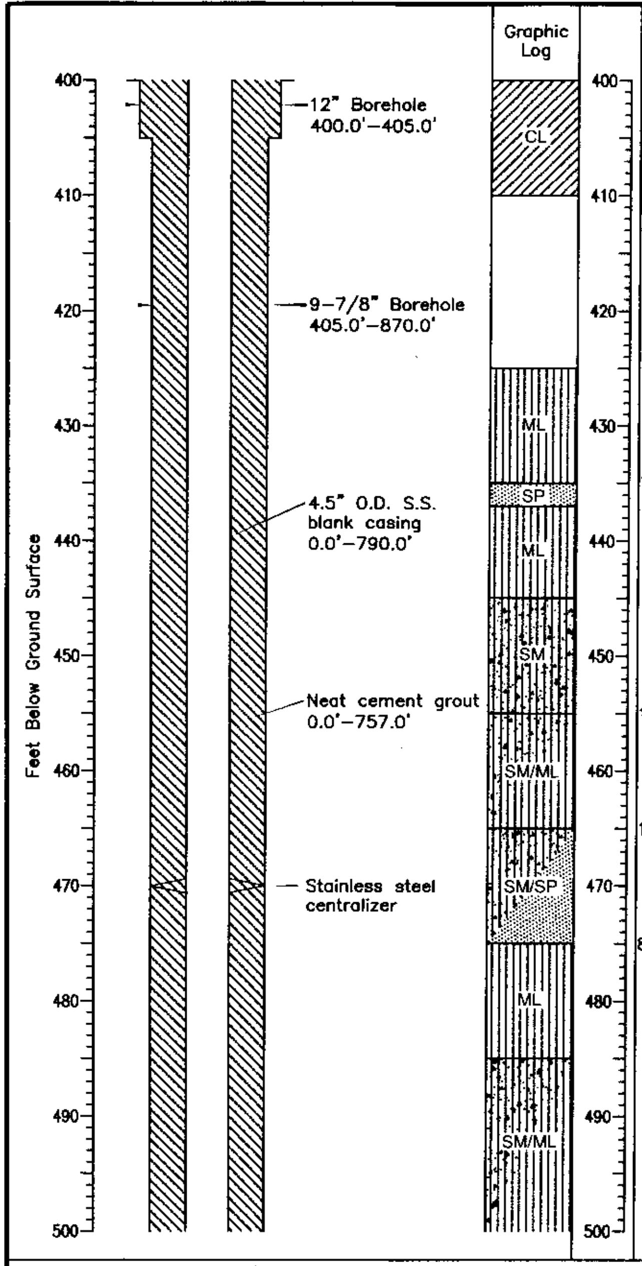
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-26-11

Drilling method: Core, mud rotary
Bit diameters: 15-1/4", 12" and 9-7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ-Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
NA	400–410	CL	Same as above.
NA	410–425		No recovery.
30%/65%	425–435	ML	Siltstone, pale yellow (5Y 7/3) to light yellowish brown (2.5Y 6/3), moderately soft, significant clay fraction.
75%/100%	435–445	SP ML	Sand, light yellowish brown (2.5Y 6/4), medium-grained, well sorted, loose (from 435 to 437 feet) then siltstone as above to 445 feet.
50%/75%	445–455	SM	Silty clayey sand, pale olive (5Y 6/3), fine-grained, appreciable clay with alternately clayey soft and hard layers, with organic material and orange oxidation. No recovery from 452.5 to 455 feet.
100%/100%	455–465	SM–ML	Silty sand and sandy silt, pale olive (5Y 6/3), laminated, fine-grained, alternating soft and hard layers, brittle to plastic, slightly moist, with abundant organic material.
100%/100%	465–475	SM–SP	Same as above interbedded with sand, olive gray (5Y 5/2), fine- to medium-grained, moderately well sorted, loose, soft.
85%/100%	475–485	ML	Sandy siltstone, pale olive (5Y 6/3), laminated, weakly to moderately cemented, micaceous with some clay.
60%/80%	485–495	SM–ML	Similar to above silty sand and sandy silt, color mottled pale olive (5Y 6/3) to light olive gray (5Y 6/2), massive to laminated, weakly cemented, interbedded clay and clayey layers.
60%/75%	495–505	SM–ML	Same as above, less sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–26–11

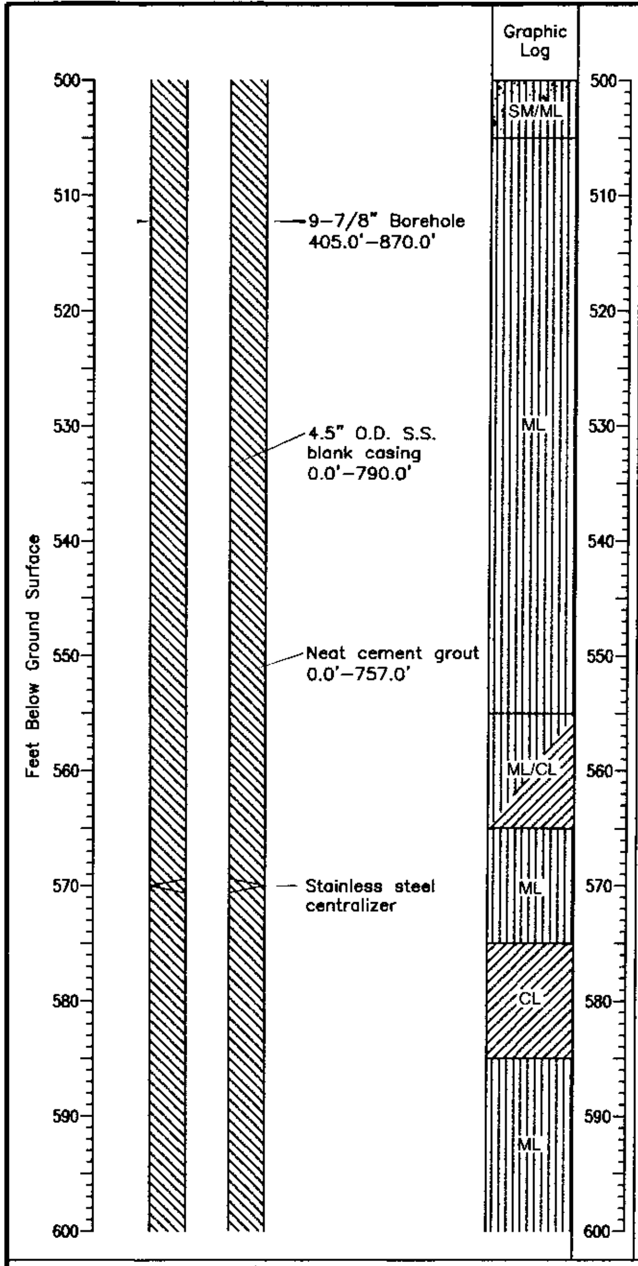
Drilling method: Core, mud rotary
Bit diameters: 15–1/4", 12" and 9–7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ–Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-15 (6of9)



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
90%/100%	505–515	ML	Same as above, predominantly silt.
80%/90%	515–525	ML	Same as above.
85%/100%	525–535	ML	Same as above, predominantly silt with minor sand and clay, massive to laminated, locally crossbedded, slightly moist.
50%/65%	535–545	ML	Same as above.
100%/100%	545–555	ML	Similar to above, clayey siltstone, light yellowish brown (2.5Y 6/2–6/3).
100%/100%	555–565	ML–CL	Same as above at 555 feet silty clay, brownish gray (2.5Y 5/2), at 565 feet weakly to moderately cemented.
100%/100%	565–575	ML	Clayey silt, olive (5Y 4/3), soft, slightly plastic to 568.5 feet, silstone, dark greenish gray (Gley1 10Y 4/1), siltstone with sand and clay, sandy at top, well cemented, contact w/ "blue clay" unit at 568.5 feet.
20%/30%	575–585	CL	Sandy clay, dark gray (Gley1 4/N), well cemented, slightly plastic when wet, micaceous, dry.
100%/100%	585–595	ML	Silstone with clay and minor sand, mottled dark gray (Gley1 4/N), well cemented, micaceous.
90%/95%	595–605	ML	Sandy silstone with clay, dark gray (Gley1 4/N), massive to laminated, micaceous.

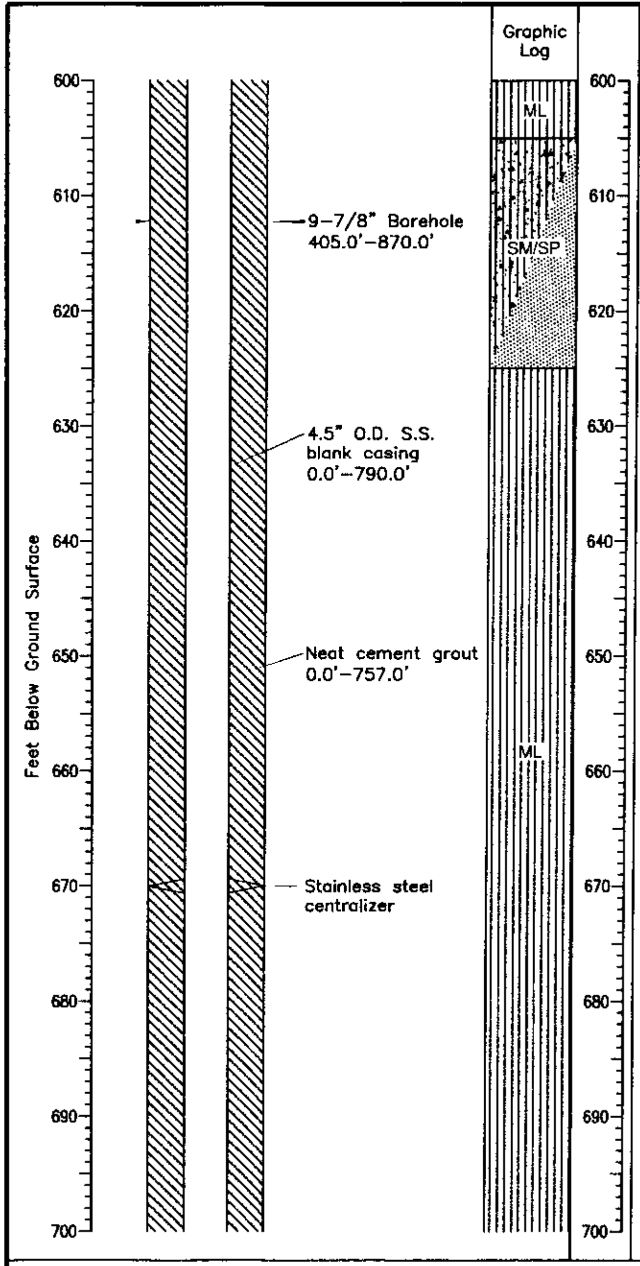
Geologist: M. Nauck/J. Raucci
Driller: HAZ–Tech; Adamson Pump and Drill
Date completed: 10–26–11

Drilling method: Core, mud rotary
Bit diameters: 15–1/4", 12" and 9–7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'–425'; HAZ–Tech core drilling 425'–625'; air rotary drilling 625'–870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6–05–2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
80%/90%	605-625	SM-SP	Sand and silty sand, mottled gray and light gray, laminated, fine- to medium-grained, moderately sorted, loose to well cemented, slightly moist to moist; interbedded w/ thin (1 to 2 cm) clay lenses.
	625-870	ML	Cuttings not sampled at discrete intervals from 625 feet to 870 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-26-11

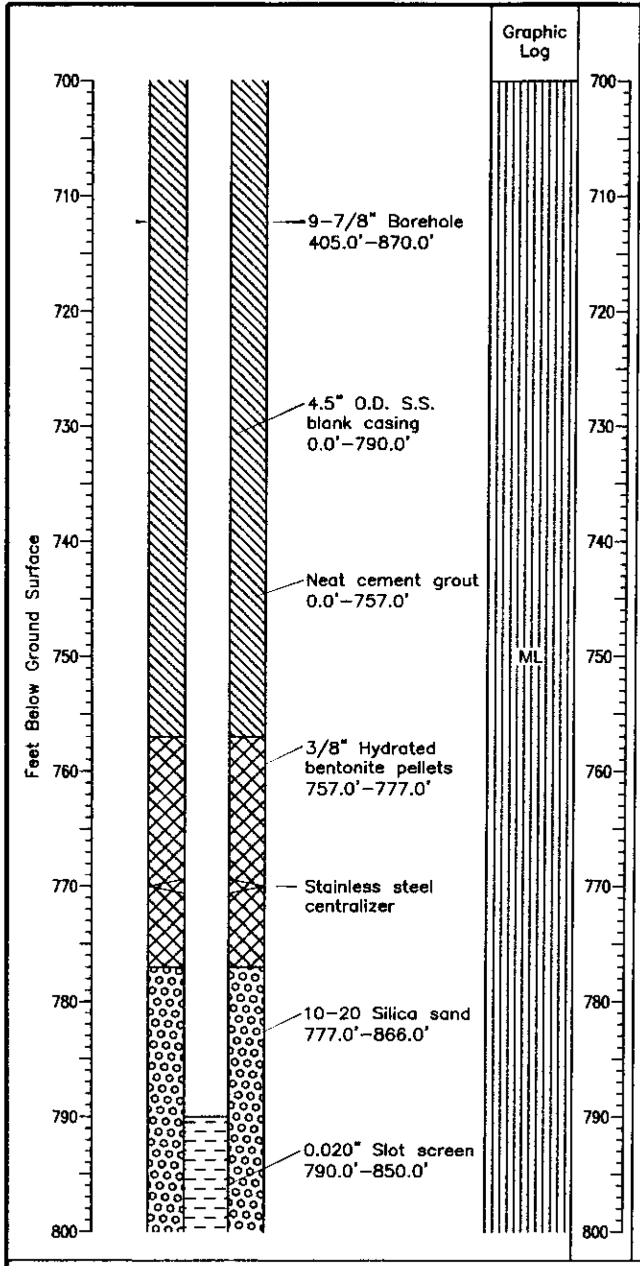
Drilling method: Core, mud rotary
Bit diameters: 15-1/4", 12" and 9-7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'-425'; HAZ-Tech core drilling 425'-625'; air rotary drilling 625'-870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154

S:\Projects\ES09.0154_Pickles\VR_Drawings\ES09_0154_07B_borelogs.dwg PB-15 (8of9)



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		ML	Cuttings not sampled at discrete intervals from 625 feet to 870 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

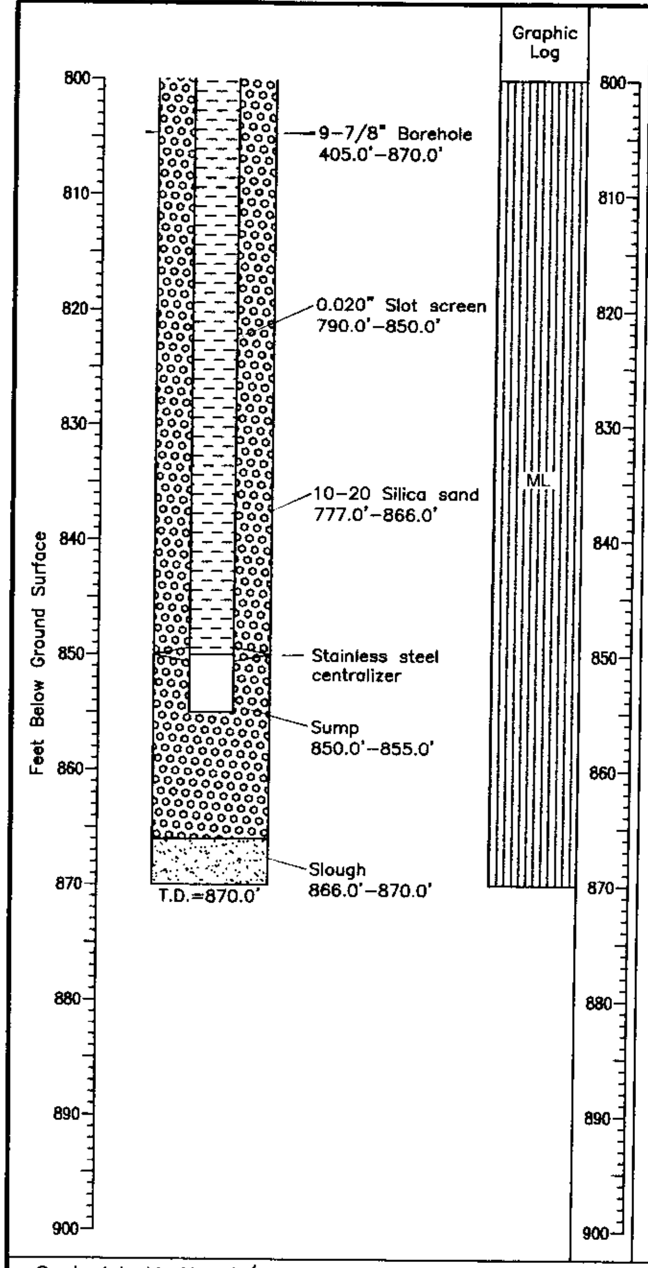
Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-26-11

Drilling method: Core, mud rotary
Bit diameters: 15-1/4", 12" and 9-7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'-425'; HAZ-Tech core drilling 425'-625'; air rotary drilling 625'-870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
8-05-2012
JN ES09.0154



Rock Quality Designation Recovery	Sample Interval (feet bgs)	USCS Symbol	Comments and Lithology
		ML	Cuttings not sampled at discrete intervals from 625 feet to 870 feet. Air rotary drilling method only enabled amalgamated bulk sample collection. Visual inspection indicated predominantly gray silt with lesser amounts of clay and sand.

Geologist: M. Nauck/J. Raucci
Driller: HAZ-Tech; Adamson Pump and Drill
Date completed: 10-26-11

Drilling method: Core, mud rotary
Bit diameters: 15-1/4", 12" and 9-7/8"
Sampling device: HQ core, rotary cuttings
Steel suface casing: 10"

Note: Adamson Pump and Drill mud rotary drilling 0'-425'; HAZ-Tech core drilling 425'-625'; air rotary drilling 625'-870'

PICKLES BUTTE
Well Log: PB-15

Daniel B. Stephens & Associates, Inc.
6-05-2012
JN ES09.0154

APPENDIX G: SEISMIC INVESTIGATION REPORT

Pickles Butte Sanitary Landfill 3D Seismic Survey Report

Nampa, Idaho

Project No. 114-571040-2022
February 21, 2022

PRESENTED TO

Mr. David Loper
Canyon County Solid Waste Director
15500 Missouri Avenue
Nampa, ID 83686

PRESENTED BY

Tetra Tech
350 Indiana Street, Suite 500
Golden, CO 80401
(303) 217-5700
tetratech.com

Prepared by:

Lincoln Steele February 21, 2022
Project Geophysicist

Reviewed by:

Dan O'Connell PhD February 21, 2022
Principal Geophysicist

DISCLAIMER

The subsurface conditions and recommendations presented in this document are based on conditions encountered at the specific geophysical survey locations at the time they were conducted. Due to the complexity and variability of natural earth and rock formations and materials, significant variations may occur between and around these locations or with time. Because these data represent a very small statistical sampling of subsurface conditions, it is possible that conditions may be encountered that are substantially different from those indicated. In these instances, modification and adjustment to the recommendations presented may be warranted.

TABLE OF CONTENTS

FIGURES

1. INTRODUCTION

Acronyms	
Ft	Feet
ka	Kiloannum (thousand years)
mm	millimeters
PBSL	Pickles Butte Sanitary Landfill
QC	Quality Control
USGS	United States Geologic Survey
WSRP	Western Snake River Plain

1.1 Background

The Pickles Butte Sanitary Landfill (PBSL) is an operational landfill site in southwestern Canyon County Idaho (**Figure 1**). The county is in the process of expanding the footprint of the landfill, primarily to the northwest of the current landfill site. The site is located within the Western Snake River Plain (WSRP) fault system and a portion of an undifferentiated Quaternary aged northeast-dipping WSRP normal fault is mapped within the project boundaries, extending northwest through the proposed expansion area (**Figure 1**). The mapped fault is labeled as a normal fault with an approximate slip rate of less than 0.2 mm/year. Proposed excavations within the fault areas are expected to extend up to 150 ft below ground surface, potentially intercepting this fault.

1.2 Purpose

This report presents results from an active-source 3D seismic survey conducted at the PBSL site in Nampa Idaho. Tetra Tech was contacted to support and provide technical insight for the ongoing expansion program at the PBSL site. Tetra Tech developed a technical approach and an expedited timeline for a seismic survey to help delineate a mapped fault at the site. The seismic survey was designed to image and delineate a suspected fault in support of the proposed expansion program at the PBSL (**Figure 1**). Seismic imaging over the suspected fault area was attained by using 3D seismic velocity tomography and reflection processing. Seismic reflection is a reliable method for imaging the faults when present and can help to orient the faults and subsurface structure as well. The 3D seismic tomography provides the information needed to accurately convert seismic reflection data in time to depth and elevation. The information gained from this survey was used to direct the final proposed boring of the larger geotechnical investigation at the site.

1.3 Geologic Background of the Western Snake River Plane Fault System

The fault segments from the Western Snake River Plain (WSRP) fault system were extracted from Personius (2003). The WRSP faults closest to the project are shown as red lines in **Figure 1**, herein referred to as USGS WSRP faults. From Personius (2003), “The Western Snake River Plain fault system consists of numerous northwest-striking, northeast- and southwest-dipping normal faults that offset older (Plio-Pleistocene) fluvial deposits (Glenns Ferry Formation, Tuana Gravels, Tenmile Gravel) associated with the Snake River, and isolated volcanic and sedimentary rocks of the Snake River Group, in southwestern Idaho. Some faults form asymmetric linear ridges as much as 30-m-high of Plio-Pleistocene deposits and some early Quaternary deposits and surfaces are tilted or downwarped, but most have subdued expressions on the floor of the Snake River Plain. No detailed studies on the age of faulted deposits have been published, but most fault traces are confined to older Quaternary deposits on the western Snake River Plain, so the faults are herein assigned a Quaternary age until further detailed studies are conducted.” Measured fault dips are 55-88° NE from the subset of exposed USGS WSRP fault segments mapped by Wood and Anderson (1981).

The USGS WSRP faults are subdued and do not show evidence of activity within the past ~100 ka (Wood and Anderson, 1981). From Personius (2003), “Most faults in this zone have subdued expressions on the floor of the

Snake River Plain, and some are mapped in the subsurface and have little surface expression. Faults form asymmetric linear ridges as much as 30 m high of Plio-Pleistocene deposits, and some early Quaternary deposits and surfaces are tilted or down-warped (Wood and Anderson, 1981; Othberg and Stanford, 1992 ; Ostenaa, October 2, 1985). Faults in the Western Snake River Plain fault system offset older (Plio-Pleistocene) fluvial deposits (Glenns Ferry Formation, Tuana Gravels, Tenmile Gravel) associated with the Snake River, and isolated volcanic and sedimentary rocks of the Snake River Group (Wood and Anderson, 1981; Gilbert and others, 1983; Othberg and Stanford, 1992; Othberg, 1994). Othberg (1994) noted that fault movements are older than the sediments underlying the Whitney Terrace; Wood and Anderson (1981) used soil development to infer an age of more than 100 ka for these deposits." A caution is that inferred ages based on soil development are very uncertain. Inferred soil ages can be in error by a factor of five (meaning an inferred age based on soil development of 100ka could really be as little as 20ka or as long as 500 ka). Consequently, it is prudent to map WSRP fault system structure that is mapped to extend within the project site (Personius, 2003).

In the project area the USGS WSRP fault segments approach the site from the northwest as a northeast dipping normal fault, making a right step to the south to another USGS NE-dipping WSRP fault segment, and then stepping southwest to a second SW dipping USGS WSRP fault segment (**Figure 2**). Consequently, within or close to the project site USGS WSRP fault deformation is expected to splay to accommodate the right step in the USGS WSRP fault system across the project site (**Figure 1**). Further there is another USGS WSRP fault segment mapped northeast of the project site (**Figure 2**) so the USGS NW-striking NE-dipping WSRP fault segment that approaches the project site from the northwest would be expected to also possibly split or step left (northeast) at some position close to or within the project site. If the USGS NW-striking NE-dipping WSRP fault segment (red line in **Figure 2)** is splaying out then in addition to fault structure complexity like splays, steps, and horsetails, this fault segment might become locally steep or even change dip direction along strike, structures typical near the ends of normal faults, and may partition slip between normal slip and strike slip deformation (Mandl, 1988; pgs. 24-44).

2. SEISMIC IMAGING

2.1 Seismic Data Acquisition

In December 2021 Vantage Geo LLC. with support from and under the direction of Tetra Tech deployed a 3D array of single component, wireless seismic nodes over an approximate 9-acre area at the PBSL site. The primary objective was to intercept the suspected fault trace with the geophone array and provide meaningful imagery of the fault (**Figure 3**). Seismic stations were positioned within the seismic array using a proprietary in-house method developed to produce surveys with high fold data while also minimizing source points and total number of receiver stations. A total of 285 GTI© single channel wireless nodes were deployed over the surveys area and installed into the ground surface. The installation of the GTI nodes below grade provides excellent geophone-ground coupling while also reducing acoustic noise thereby increasing seismic signal relative to noise. To further reduce noise at the site Tetra Tech timed the survey to coincide with a non-operational day at the landfill along with posting signage to temporarily restrict access to the site. Both measures helped to improve the signal against noise in the data, which was critical for imaging a weak fault trace in low-contrast unconsolidated geologic conditions (**Figure 4**).

Once installed, the GTI nodes run self-diagnostic routines to ensure high data quality and proper installation. The nodes also record GPS positions, instrument tolerances, and assigned station numbers for efficient data processing. Tetra Tech chose to utilize an IVI© Envirovibe2 (EV2) as the active source vehicle for the survey. The EV2 provides excellent signal and can provide custom sweep lengths and frequencies which help to overcome site and geologic conditions that may interfere with data quality. Based on the geologic conditions at the PBSL site, Tetra Tech chose a linear sweep table with a limited frequency range of 5-75Hz. The relatively low sweep frequencies allow energy to better penetrate the slow materials at the site, mainly the loose unconsolidated overburden and weathered bedrock profile. Pre-plot source positions were provided to the EV2 operator via a heads-up display in the cab of the EV2. The EV2 operator recorded 440 individual shot locations within and around the survey area (**Figure 5**). A portion of the proposed shot locations were inaccessible for the EV2 primarily due to steep terrain along the western half of the of the site. To ensure safe operation of the EV2 most of the western source points were confined to road tracks and relatively flat areas (**Figure 5**). The 440 EV2 shot points and 285 receiver stations provided 124,224 receiver traces for data processing.

Data were acquired over the course of two days following the installation and QC of the GTI nodes. The nodes were then picked up from the survey area and data were harvested from using the EV2 shot records as the data harvest template. The nodes record data continuously for up to 21 days and EV2 source files are used to re-create individual shot records from each node for processing. No data QC or health and safety issues were noted during the field work at PBSL.

2.2 Seismic Data Processing

To provide rapid data turnaround, Tetra Tech utilized the services of Agile Seismic LLC to provide 3D seismic velocity tomography and reflection processing. Seismic data were assigned geometry based on the measured survey parameters and imported into a GeoTomo® database to QC the raw shot gathers and the project geometry. A processing grid was established with a 3-meter nominal spacing between stations to calculate fold from the survey and assign inline numbering and crossline numbering. First arrival times were straightforward to pick and with the GeoTomo® 3D traveltime P-wave velocity tomography software to estimate 3D P-wave velocities. The 3D P-wave velocity model provided refraction statics and the information required to convert seismic reflection two-way time images to depth and elevation. 3D P-wave are critical for seismic reflection migration processing since it is not possible to derive shallow (near-surface) velocities from reflection analyses and provide an initial 3D velocity model for seismic reflection processing. Seismic reflection velocity analyses updated the 3D velocity model to calculate residual statics and create the initial stack to produce 3D reflection-two-way-time volume. Several iterations of velocity analyses and denoising were used to improve imaging of stratigraphic horizons before final time migration were completed. Post Stack Time Migration (PoSTM) was selected to produce the final reflection results based on testing by Agile. The PoSTM data were produced using true amplitude processing to improve imaging of structural truncations produced by faulting. All seismic processing is performed using NAD83 UTM Zone 11 positions in meters and elevations in meters to ensure a processing is accurate; state plane coordinates use a foot (U.S. survey foot) which has a different length than the standard international foot used for vertical coordinates. Details of seismic processing steps are provided in **Appendix A**.

Overall, the data acquired at PBSL was relatively clean data with little environmental noise but strong surface waves (**Figure 4**). Denoising was used to attenuate the surface waves and provide clean data with good first breaks picks for the 3D P-wave travel time velocity tomography. Initial interpretations using early processing of the seismic data and final PoSTM interpretations was used to select a boring location to intercept faulting at similar depths.

2.3 Seismic Data and Interpretations

The seismic reflection data are relatively low frequency in spite of the 5-75 Hz vibroseis sweep (**Appendix B**). The combination of a deep water table, thick surficial dry sediments, and weathered rock strongly attenuate high frequency reflections. However, the broadband low-frequency data provide good signal-to-noise and good resolution of first order fault structure as discussed below.

Two tip splay fault structures are identified and mapped in 3D using seismic inlines (SSW-NNE cross sections) spanning the range of inline 1033 (northwest extent of good continuous 3D imaging) to inline 1053 (southeast extent of good continuous 3D imaging). Uninterpreted seismic reflection two-way-time cross sections are presented first in **Figures 6A-8A** paired with the same data with fault picks in **Figures 6B-8B**. The positions of inlines 1033, 1040, and 1053 in **Figures 6-8** are provided in **Figure 5**. The signed energy reflection attribute is used in **Figures 6-8** because it provides the sharpest delineation of fault structure (**Figures 6B-8B**). The central horst between the two faults (**Figure 9**) is likely less deformed, resulting in high amplitudes within the horst relative to the hanging wall (downthrown) sides of the two faults to the south and north (**Figures 6B-8B**). Conventional true amplitude color wiggle travel reflection cross sections with fault picks are provided from inline 1033 to inline 1053 in **Appendix B** for reference.

Both mapped 3D fault segments correspond to tip splay faults since they have substantially different strikes than the N34°W strike of northwest NE-dipping WSRP fault segment postulated to run through the project site (**Figure 5**). This is best illustrated in 3D perspective (**Figure 9**) with comparison to observed normal-faulting termination structures in **Figure 10**. Perrin et al (2016) provide field scale examples near the termini of normal faulting tip splay faults that develop and extend beyond main normal fault traces (**Figure 10**). We interpreted the southwest dipping fault (medium green fault in **Figure 9**) that strikes N47°W is a tip splay fault since it changes strike 15° and changes dip direction to the southwest whereas the USGS NW-striking WSRP fault is mapped as dipping northeast. The second, north-northeast dipping tip splay fault (blue fault in **Figure 9**) strikes N69°W which cuts off the main USGS NW-striking WSRP fault further west than the SW-dipping tip splay fault (**Figure 11**).

Preliminary borehole data are used from Boring B2021-5, abbreviated as borehole B5 in this report. Borehole B5 provided preliminary geotechnical and geologic data at depth within the extent of the 3D seismic volume (**Figure 9**). The 3D mapping of the two tip splay faults in **Figures 6-9 and 11** demonstrates that main USGS NW-striking WSRP fault deformation terminates northwest of borehole B5 and splinters into a series of tip splay faults within the project site. These tip splay faults are typical of normal-fault termination structures observed for normal faults (**Figure 10**). Thus, the mostly likely scenario is that primary USGS NW-striking WSRP normal-faulting deformation is unlikely to occur within the project site. Since the USGS WSRP normal faults are not observed to display ~100 ka deposits, the likelihood of primary WSRP normal fault deformation occurring within the project site likely has a very small probability. It is possible that main USGS NW-striking WSRP normal fault deformation transfers to a southwest-dipping right-stepping splay fault segment west of the project site (cyan fault in **Figure 11**). This would produce uplift between the main USGS NW-striking WSRP normal fault and the right-step to the SW-dipping fault segment producing a topographic fault-parallel horst ridge (outlined in yellow in **Figure 11**). It is clear from the 3D fault mapping that primary USGS NW-striking WSRP faulting is decreasing west of the project site as faulting splinters to splay faults (**Figure 11**), typical of the terminus regions of normal faults (**Figure 10**). Where main USGS NW-striking WSRP faulting ends is constrained to be no further southeast than the west extent of the NE-dipping tip splay fault (blue fault in **Figure 11**).

The shallow limit of faulting of the tip splay faults within the project site is not directly constrained by the 3D fault mapping in **Figure 9** because fault structure does not produce consistently discernable seismic signatures above the water table. However, combining the seismic 3D tip splay fault mapping with observations from borehole B5 provides a constraint on the potential shallower manifestations of tip splay fault deformation along the SW-dipping tip splay fault. Three possible cases to considers for the upward progression of the tip splay faults from the mapped position in the 3D seismic volume are:

1. Fault deformation continues upward at a SW dip of 71° through borehole B5 as a narrow fault plane
2. Fault deformation becomes complex in the 66-86-foot depth interval of clay (shale) between sands (sandstones) in borehole B5 due to flexure and complex faulting within the clay (shale) interval like deformation in this case from Mandl (1988) (see **Figure 12**).
3. Fault deformation does not extend above the elevation of the water table and does not intercept borehole B5, but instead produces flexure in strata located above the water table.

Case 2 seems most likely since it explains the observed broken pieces of consolidated clay observed in borehole B5 and general lack of deformation in the overlying and deeper sands, e.g. the WSRP southwest-dipping tip splay fault intersects borehole B5 near the base of the silty clay at a depth of 81 feet in **Figure 9** producing complex deformation and low blow counts within the 66-86-foot deep clay interval in a pattern similar to the shale interval in **Figure 12**. Based on age constraints on WSRP faulting, deformation observed within the 66-86-foot depth interval in borehole B5 may be older than ~100 ka (Personius, 2003).

It may seem unrealistic to consider that a right-stepping splay normal fault could develop with a southwest dip on the southwest side of the main USGS NW-striking NE-dipping WSRP normal fault, but this has been observed at other sites. For instance, Marchal et al. (2003) provide marine seismic reflection data with exactly this style of normal faulting with a southwest-dipping spay fault developing on the southwest side of a northeast-dipping primary normal fault (**Figure 13**). The important point is that primary normal-faulting deformation from the main NW WSRP fault is clearly decreasing toward its terminus no further southeast than the west side of the northeast-dipping (blue) tip splay fault in **Figure 11**, although primary faulting may already be decreasing prior to entering the far western side of the project site with fault slip partitioning to the southwest dipping right stepping splay fault further west (cyan fault in **Figure 11**).

The 3D seismic fault mapping clearly shows there is no single continuous NW-SE northeast-dipping normal fault extending through the entire 3D seismic volume extent (**Figure 11**). There may be additional unmapped limited extent (lengths < 200 feet) fault splays or relay faults within or outside of the 3D seismic volume extent shown in **Figure 11**. Distributed small stepover and relay faults commonly occur between large fault stepovers, like the less than one-mile right step from the northwest USGS NE-dipping WSRP fault (red fault in **Figure 1**) to the southwest USGS NE-dipping WSRP fault (purple fault in **Figure 1**) (Marchal et al., 2003; Perrin et al., 2016). The primary conclusion of these investigations is that any primary normal faulting deformation on the USGS northwest-striking NE-dipping WSRP normal fault (red line in **Figure 2**) will be confined to the northwest 800 feet of the fault's extension within the project site boundary. Any slip on the USGS northwest-striking NE-dipping WSRP normal fault will be decreasing toward the project site since this investigation shows that the primary fault terminates before reaching the area near borehole B5 in the project site (**Figure 11**).

3. CONCLUSIONS AND RECOMMENDATIONS

Seismic reflection results from the Pickle Butte 3D survey revise the location and structure of the USGS mapped NW-striking NE-dipping WSRP normal fault across the project site (**Figure 11**). The new 3D imaging of fault structure (**Figure 9**) demonstrates that faulting along the USGS NW-striking NE-dipping WSRP normal fault is tapering to zero west of borehole B5 and that residual fault deformation is distributed amongst a network of tip splay faults across the project site (**Figure 11**). Thus, primary normal fault slip is unlikely east of the west edges of the tip splay faults mapped in **Figures 9 and 11**. Instead, any fault slip associated with earthquakes along the USGS mapped NW-striking NE-dipping WSRP normal fault will likely partition into attenuated fault slip among the splay faults within the project site. There may be additional limited extent (strike lengths < 200 feet) fault splays and relay fault within or outside of the 3D seismic volume extent shown in **Figure 11**. Distributed small stepover and relay faults commonly occur between large fault stepovers, like the less than one-mile right step from the northwest NE-dipping WSRP fault (red fault in **Figure 1**) to the southwest NE-dipping WSRP fault (purple fault in **Figure 1**) (Marchal et al., 2003; Perrin et al., 2016).

Typically, in highly weathered rock or in poorly consolidated sediments, fault slip transitions to distributed deformation or bedding flexure prior to reaching the ground surface. Tip splay faulting may decrease with decreasing depth above the water table (**Figure 9**) and transition to flexure or distributed deformation (**Figure 12**). This is the most likely scenario for the PBSL project site. The projected intersection of the SW-dipping tip splay fault at a depth of 81 feet in borehole B5 (**Figure 9**) near the base of a zone of distributed broken clay deformation, suggests the fault has produced distributed deformation in the 66-86-foot depth interval of borehole B5. Since the age of this depth interval in borehole B5 is probably much greater than the ~100 ka overlying unfaulted geologic strata used by Personius (2003) to constrain the most recent age of active faulting along the WSRP normal faults, this possible fault deformation observed in borehole B5 in the 66-86-foot depth interval is likely older than 100 ka.

The USGS NW-striking NE-dipping WSRP normal fault that is mapped as extending into the project site from the northwest does not appear to displace ~100ka age sedimentary units (Personius, 2003). From a probabilistic perspective there seems to be little possibility of significant shallow (< 200 feet) faulting within the project site southeast of the west edges of the mapped tip splay faults in **Figure 11** (negligible nonzero fault slip for annual exceedance probabilities greater than 0.01%). To best characterize the potential movement and absolute location of faulting would require geologic mapping during excavation of the future landfill cell. This area of the proposed landfill expansion would be constructed in >50 years in the future. When the area is excavated for cover material in the future before waste is placed in this area it is recommended that geologic mapping of the fault is conducted, with particular attention to identifying narrow fault zones with evidence of recent activity and areas of potential distributed deformation. Careful sampling can yield materials suitable to date the most recent age of fault activity to determine if any detected fault activity is recent (unlikely) or > 100 ka in age (most likely).

4. REFERENCES

Breckenridge, R.M., Lewis, R.S., Adema, G.W., and Weisz, D.W., 2003, Miocene and younger faults in Idaho: Idaho Geological Survey Map 8, 1 sheet, scale 1:1,000,000.

Dahlen, F.A., Hung, S.-H. & Nolet, G., 2000, Frechet kernels for finite-frequency traveltimes—I. Theory, Geophys. J. Int., 141, 157–174.

Gilbert, J.D., Piety, L., and LaForge, R., 1983, Seismotectonic study for Black Canyon Dam, Boise project, Idaho: U.S. Bureau of Reclamation Seismotectonic Report 83-7, 73 p., 8 pl.

Mandl, G., 1988, Mechanics of Tectonic Faulting, Models and Basic Concepts, Elsevier, Amsterdam, 407 pp.

Marchal, D., M. Guiraud, and T. Rives, 2003, Geometric and morphologic evolution of normal fault planes and traces from 2D to 4D data, Journal of Structural Geology, 25, 135-158.

Ostenaa, D., 1985, Memorandum to Chief, Division of Dam and Waterway Design, U.S. Bureau of Reclamation, Seismotectonic considerations for Modification Decision Analysis-Deer Flat Dams-Boise Project, Idaho, dated October 2, 1985, p. 10.

Othberg, K.L., 1994, Geology and geomorphology of the Boise Valley and adjoining areas, western Snake River Plain, Idaho: Idaho Geological Survey Bulletin 29, 54 p.

Othberg, K.L., and Stanford, L.R., 1992, Geologic map of the Boise Valley and adjoining areas, western Snake River Plain, Idaho: Idaho Geological Survey Geologic Map Series, scale 1:100,000.

Perrin, C., I. Manighetti, and Y. Gaudemer, 2016, Off-fault tip splay networks: A genetic and generic property of faults indicative of their long-term propagation, Comptes Rendus Geoscience, 348, 52-60.

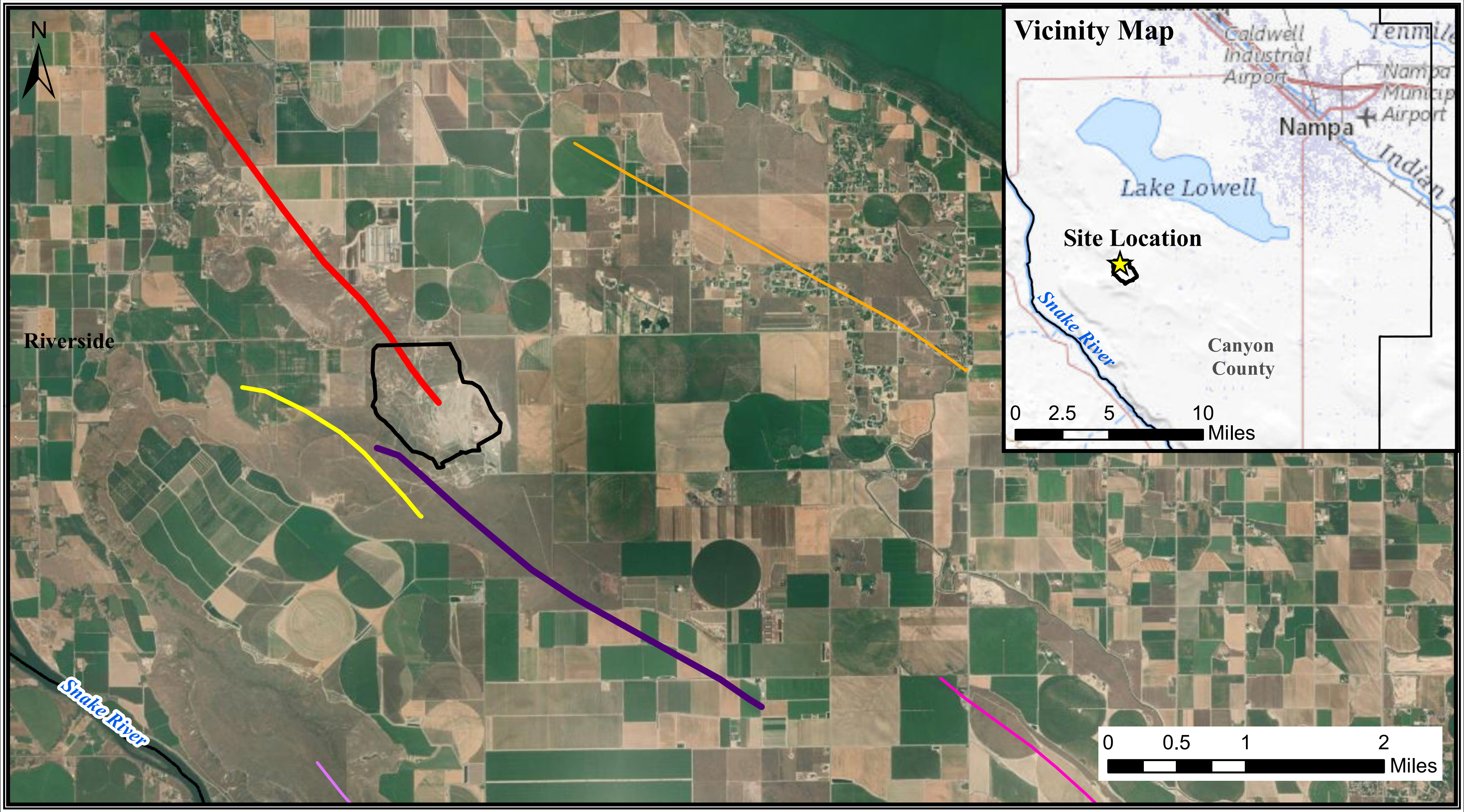
Personius, S.F., compiler, 2003, Fault number 635, Western Snake River Plain fault system, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults.

Savage, C.N., 1958, Geology and mineral resources of Ada and Canyon Counties: Idaho Bureau of Mines and Geology County Report No. 3, 94 p., 2 pls., scale 1:125,000.

Wood, S.H., and Anderson, J.E., 1981, Chapter 2-Geology, in Mitchell, J.C., ed., Geological, hydrological, geochemical and geophysical investigations of the Nampa-Caldwell and adjacent areas, southwestern Idaho: Idaho Department of Water Resources Water Information Bulletin No. 30, Geothermal Investigations in Idaho, Part 11, p. 9-31.

FIGURES

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure1_3D_Survey_Area.mxd February 2022



Legend

▭ Approx. Project Area Boundary

Western Snake River Plain Fault System

- ━ Primary Site NW Segment
- ━ SW Site NE Dipping Segment
- ━ SW Site SW Dipping Segment
- ━ Upper NE Segment
- ━ Lower SW Segment
- ━ Lower SE Segment

Note: US Geological Survey and Idaho Geological Survey, Quanternary fault and fold database for the United States, accessed Feb. 14, 2022, at: https://www.usgs.gov/programs/earthquake-hazards/faults

TITLE:

Faults Mapped Near the Project Area

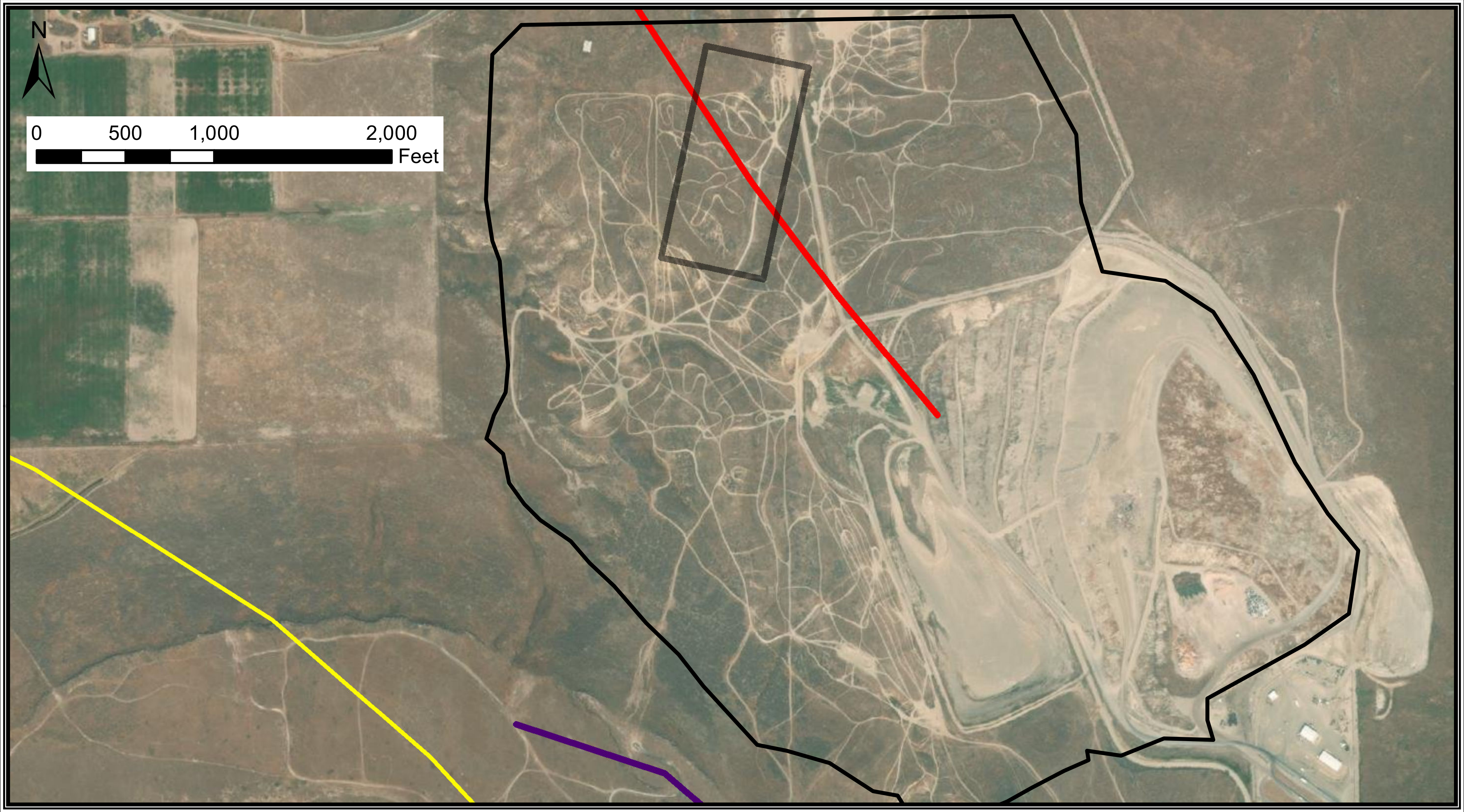
LOCATION:

Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	1
PROJECT#	114-571040-2022	
DATE	2/14/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure2_3D_SeismicSurvey.mxd February 2022



Legend

▭ Approx. Project Area Boundary ▭ 3D Seismic Volume Geographic Extent

Western Snake River Plain Fault System

- 🟥 Primary Site NW Segment
- 🟪 SW Site NE Dipping Segment
- 🟨 SW Site SW Dipping Segment

Note: US Geological Survey and Idaho Geological Survey, Quanternary fault and fold database for the United States, accessed Feb. 14, 2022, at: https://www.usgs.gov/programs/earthquake-hazards/faults

TITLE:
PBSL 3D Seismic Survey

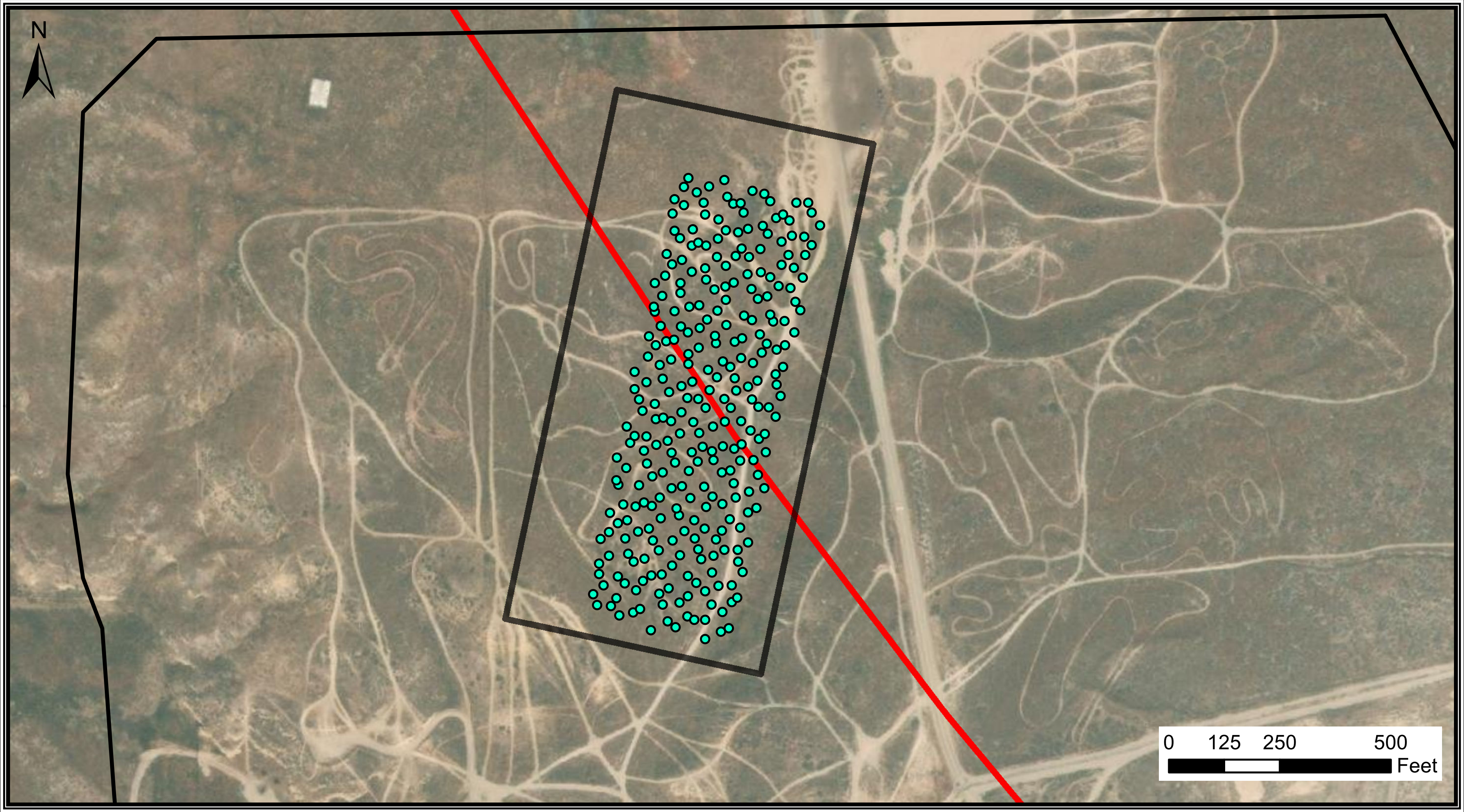
LOCATION:
Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO
DRAFTED	CEC
PROJECT#	114-571040-2022
DATE	2/14/2022

FIGURE
2

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure3_SeismicNodePositions.mxd February 2022



Legend

☐ Approx. Project Area Boundary

☐ 3D Seismic Volume Geographic Extent

● Seismic Node

Western Snake River Plain Fault System

— Primary Site NW Segment

Note: US Geological Survey and Idaho Geological Survey, Quanternary fault and fold database for the United States, accessed Feb. 14, 2022, at: https://www.usgs.gov/programs/earthquake-hazards/faults

TITLE:

PBSL 3D Survey Area and Seismic Node Positions

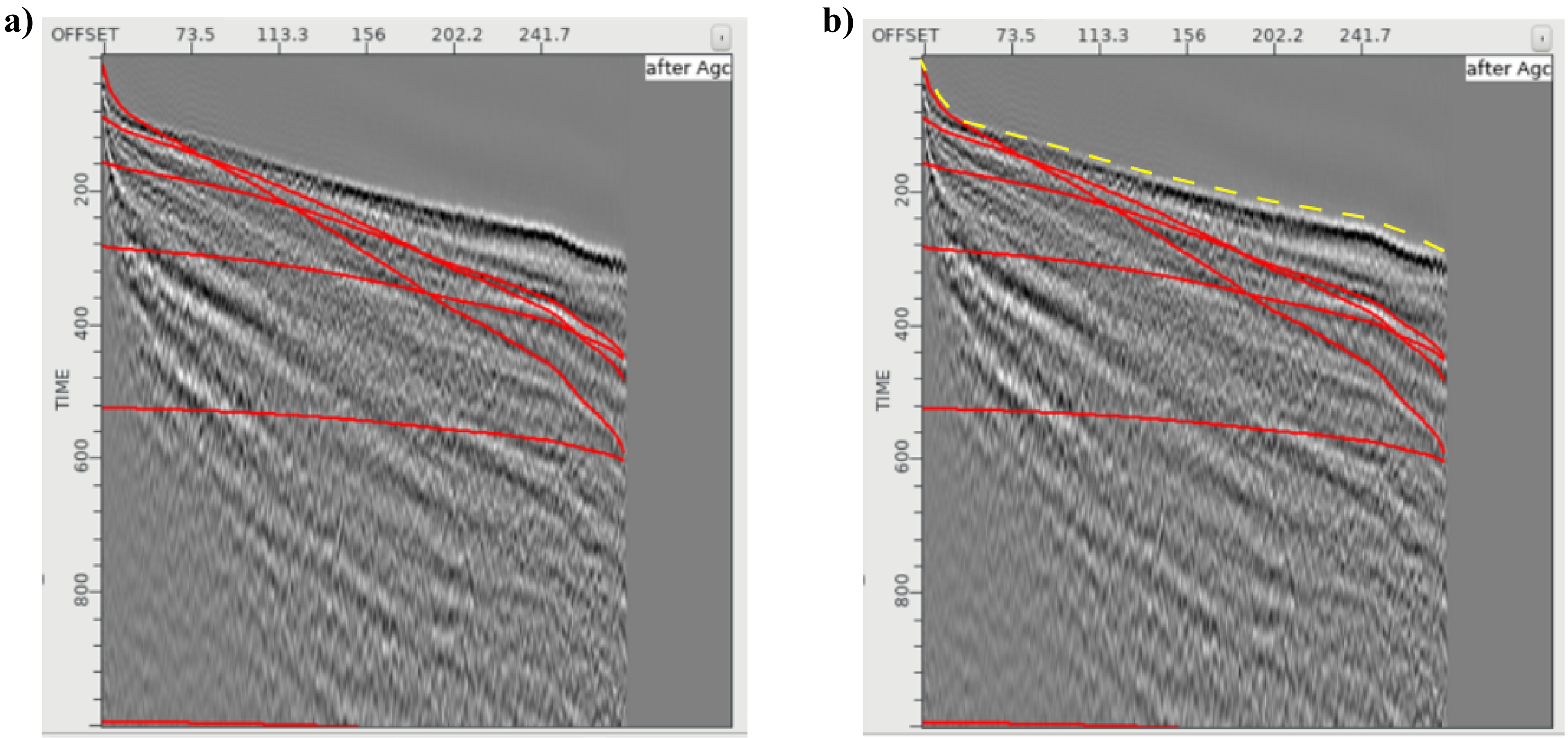
LOCATION:

Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	3
PROJECT#	114-571040-2022	
DATE	2/14/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure4_Field_Data_Example.mxd February 2022



TITLE:

PBSL 3D Seismic Field Data Example

LOCATION:

Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	**4**
PROJECT#	114-571040-2022	
DATE	2/15/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure5_Seismic_Source_and_Profile.mxd February 2022

Legend

☐ Approx. Project Area Boundary

☐ 3D Seismic Volume Geographic Extent

☆ Seismic Source Points

- - - Inline Positions

Western Snake River Plain Fault System

━ Primary Site NW Segment

Note: US Geological Survey and Idaho Geological Survey, Quanternary fault and fold database for the United States, accessed Feb. 14, 2022, at: https://www.usgs.gov/programs/earthquake-hazards/faults

TITLE:

PBSL 3D Seismic Source and Inline Profile Positions

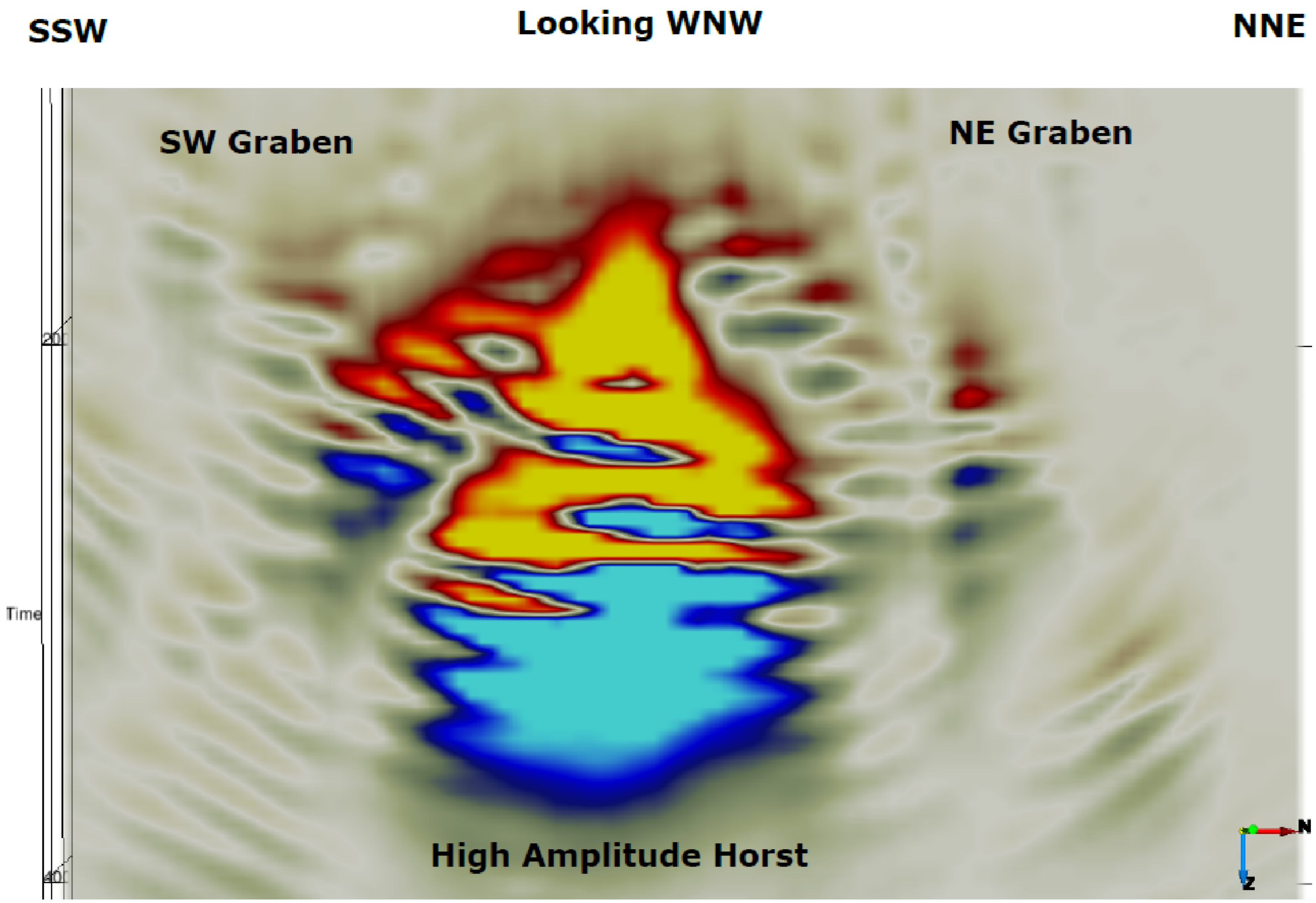
LOCATION:

Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	5
PROJECT#	114-571040-2022	
DATE	2/15/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure6a.mxd February 2022



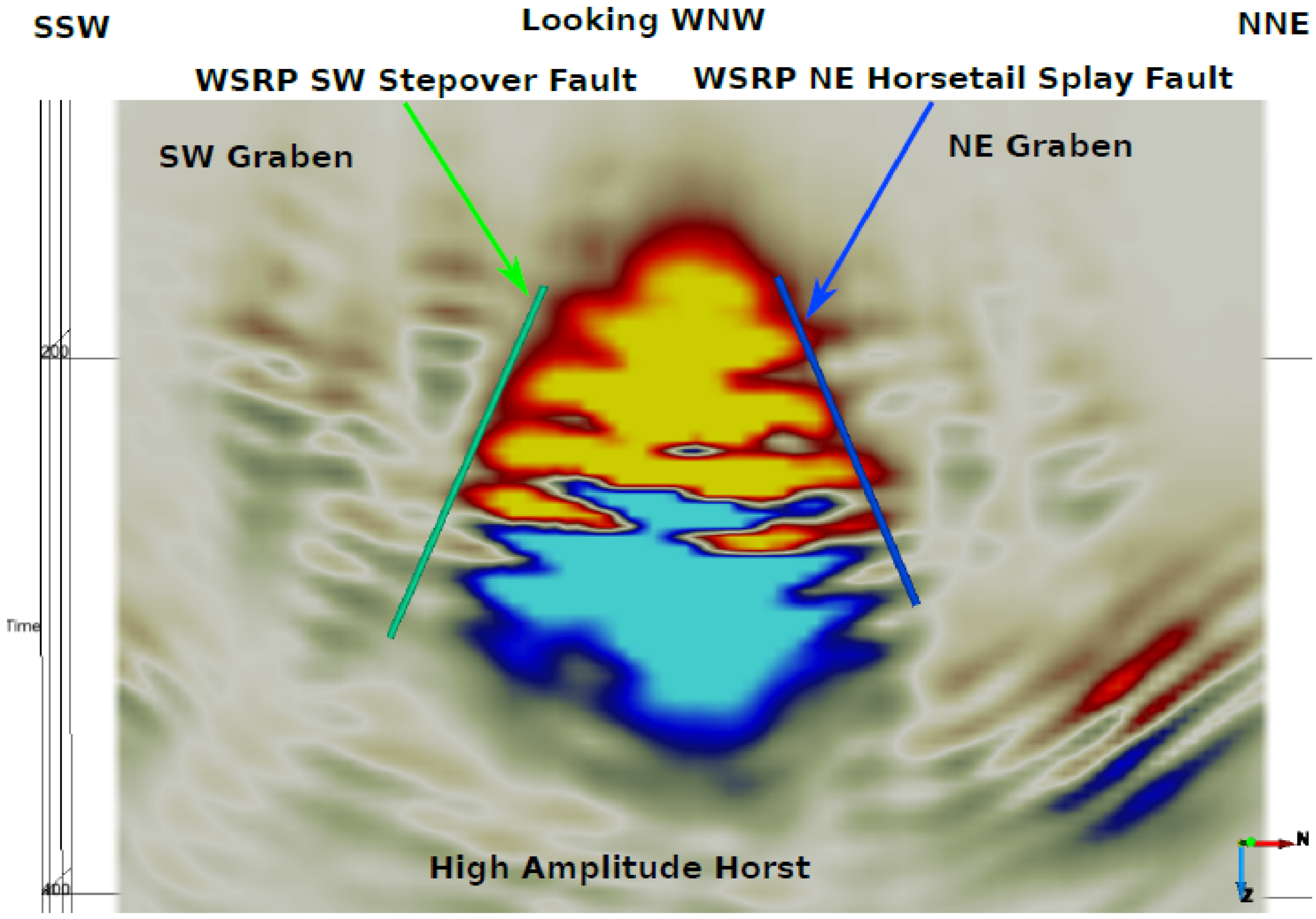
West Mapping (Inline 1033)

TITLE:
Seismic Reflection Two-Way-Time
Cross-Section Along Western Inline 1033

LOCATION:
Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	6a
PROJECT#	114-571040-2022	
DATE	2/16/2022	



East Mapping (Inline 1053)

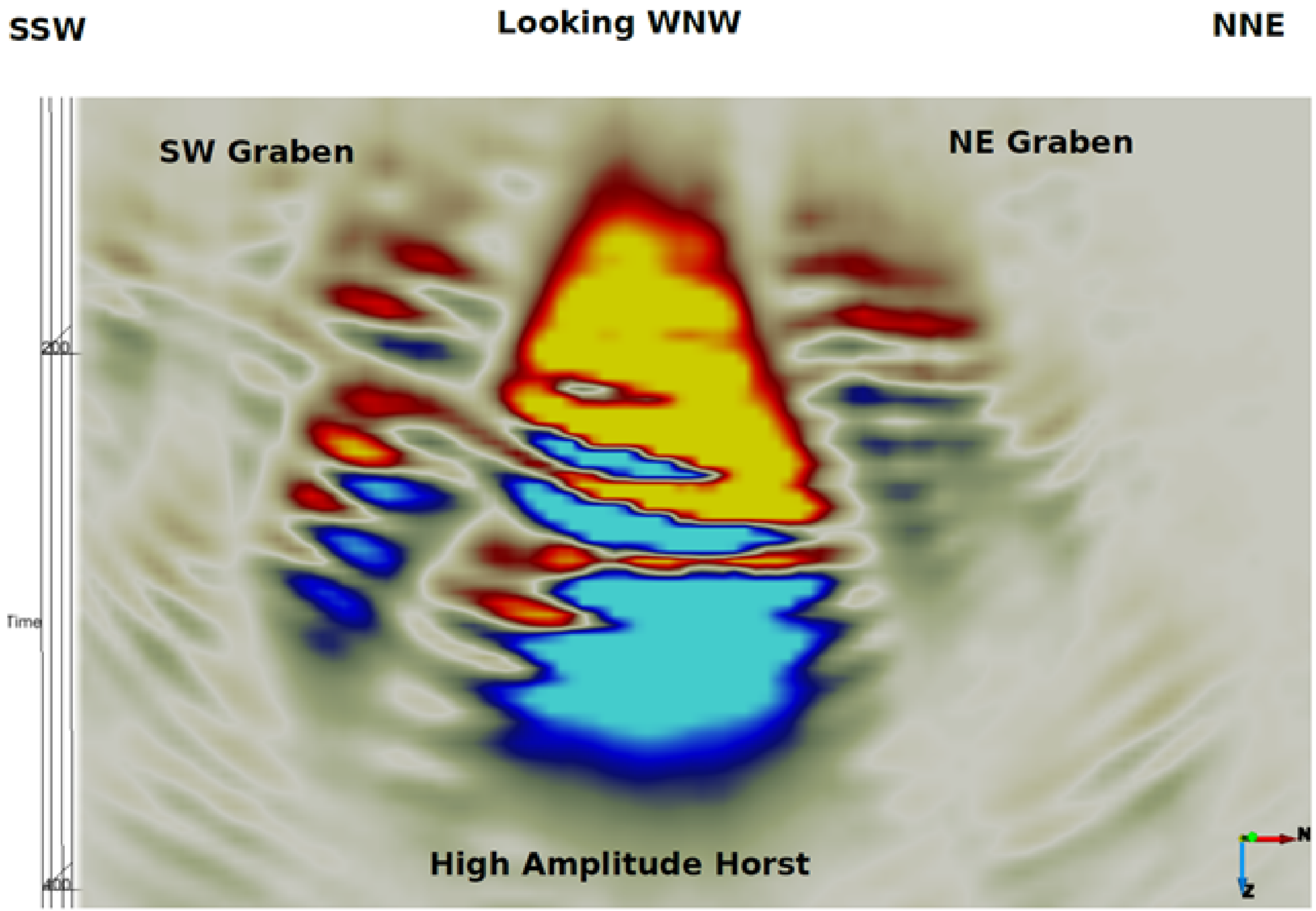
TITLE: **Interpreted Seismic Reflection Two-Way-Time Cross-Section Along Western Inline 1033**

LOCATION: Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	**6b**
PROJECT#	114-571040-2022	
DATE	2/16/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure6b.mxd February 2022



Middle Mapping (Inline 1040)

TITLE:
Seismic Reflection Two-Way-Time
Cross-Section Along Middle Inline 1040

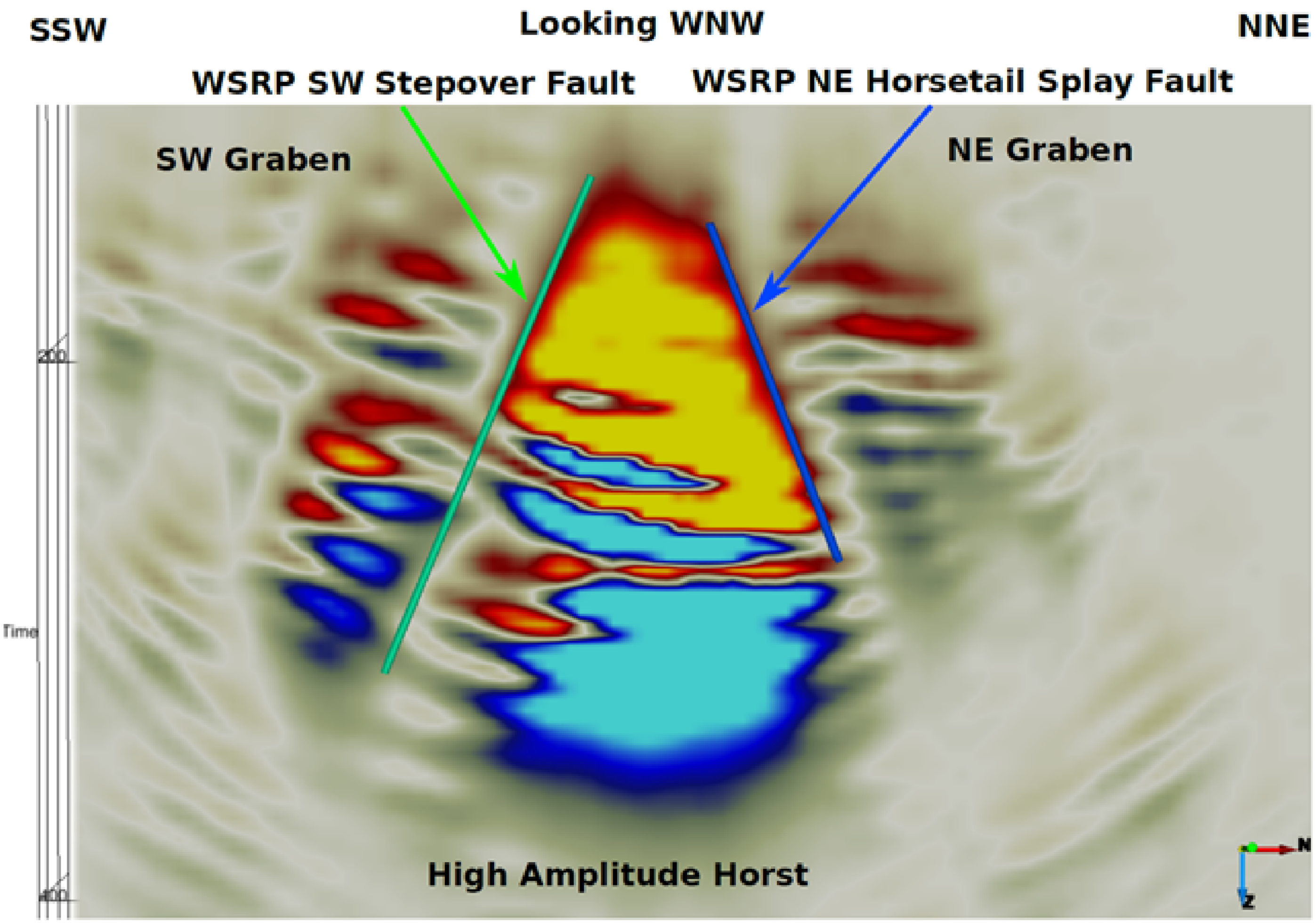
LOCATION:
Nampa, Idaho

TETRA TECH

APPROVED LS, DRHO
DRAFTED CEC
PROJECT# 114-571040-2022
DATE 2/16/2022

FIGURE
7a

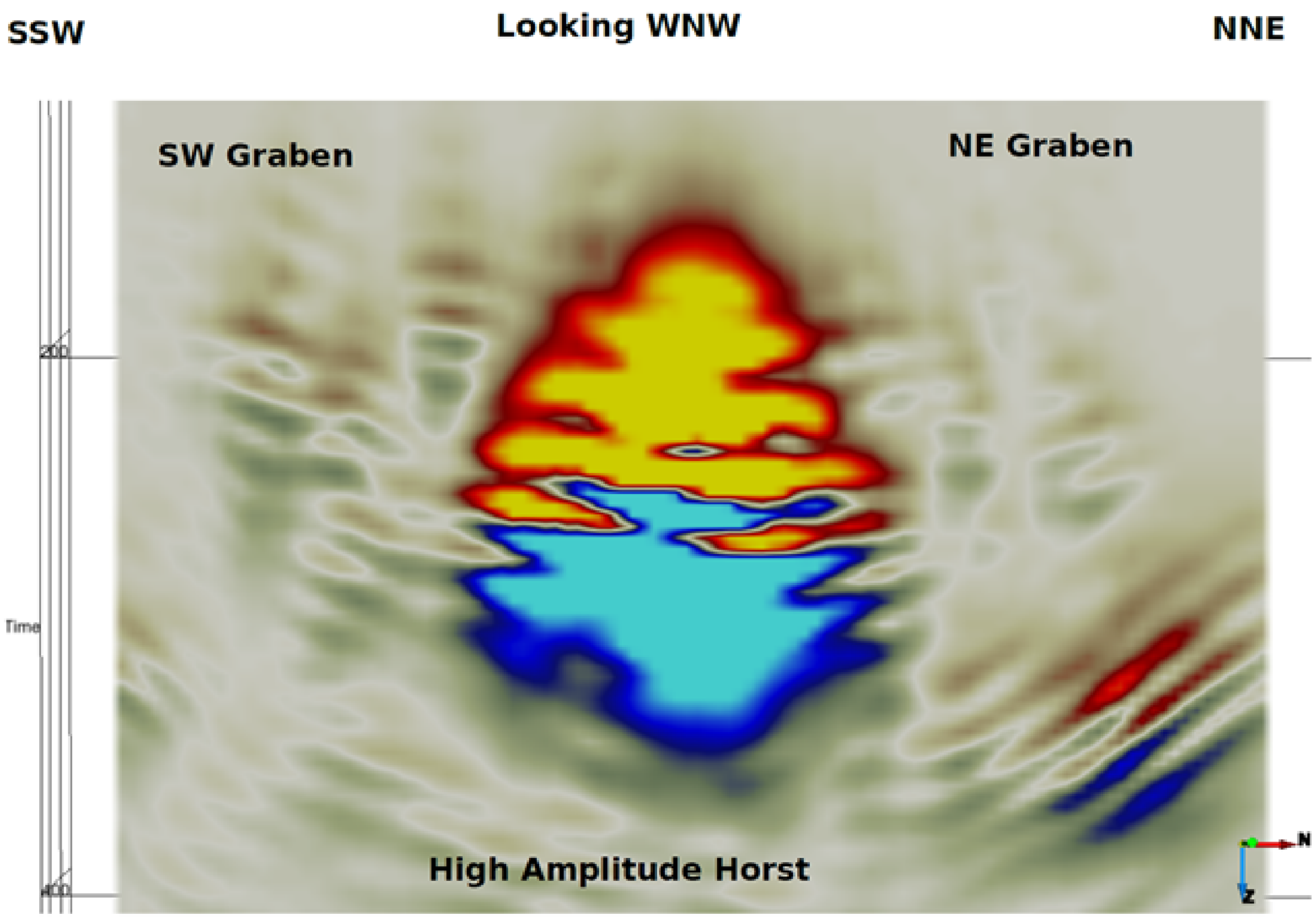
C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure7a.mxd February 2022



Middle Mapping (Inline 1040)

TITLE:	Interpreted Seismic Reflection Two-Way-Time Cross-Section Along Middle Inline 1040		
LOCATION:	Nampa, Idaho		
TETRA TECH	APPROVED	LS, DRHO	FIGURE 7b
	DRAFTED	CEC	
	PROJECT#	114-571040-2022	
	DATE	2/16/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure7b.mxd February 2022



East Mapping (Inline 1053)

TITLE: **Seismic Reflection Two-Way-Time Cross-Section Along Eastern Inline 1053**

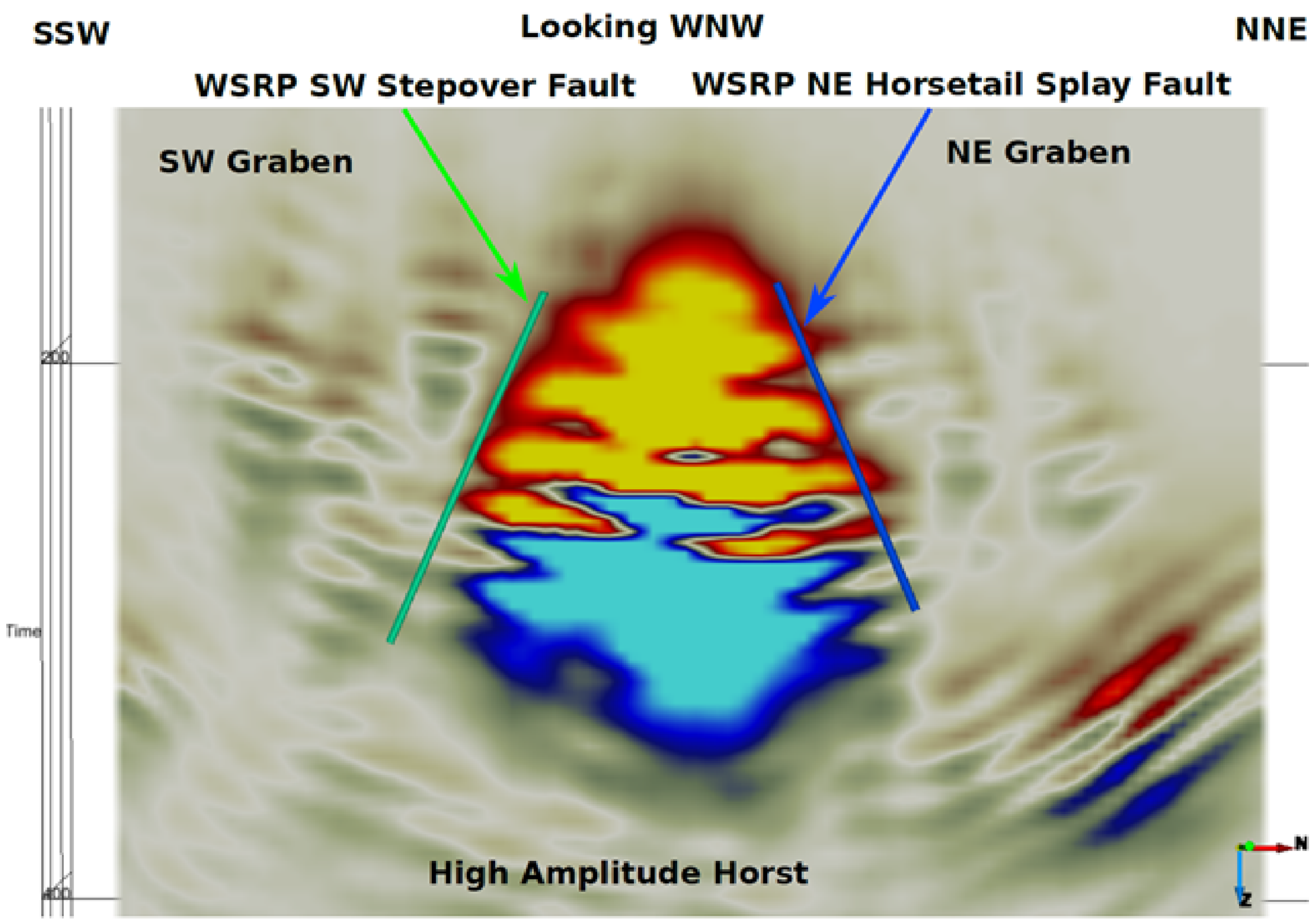
LOCATION: Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO
DRAFTED	CEC
PROJECT#	114-571040-2022
DATE	2/16/2022

FIGURE **8a**

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure8a.mxd February 2022



East Mapping (Inline 1053)

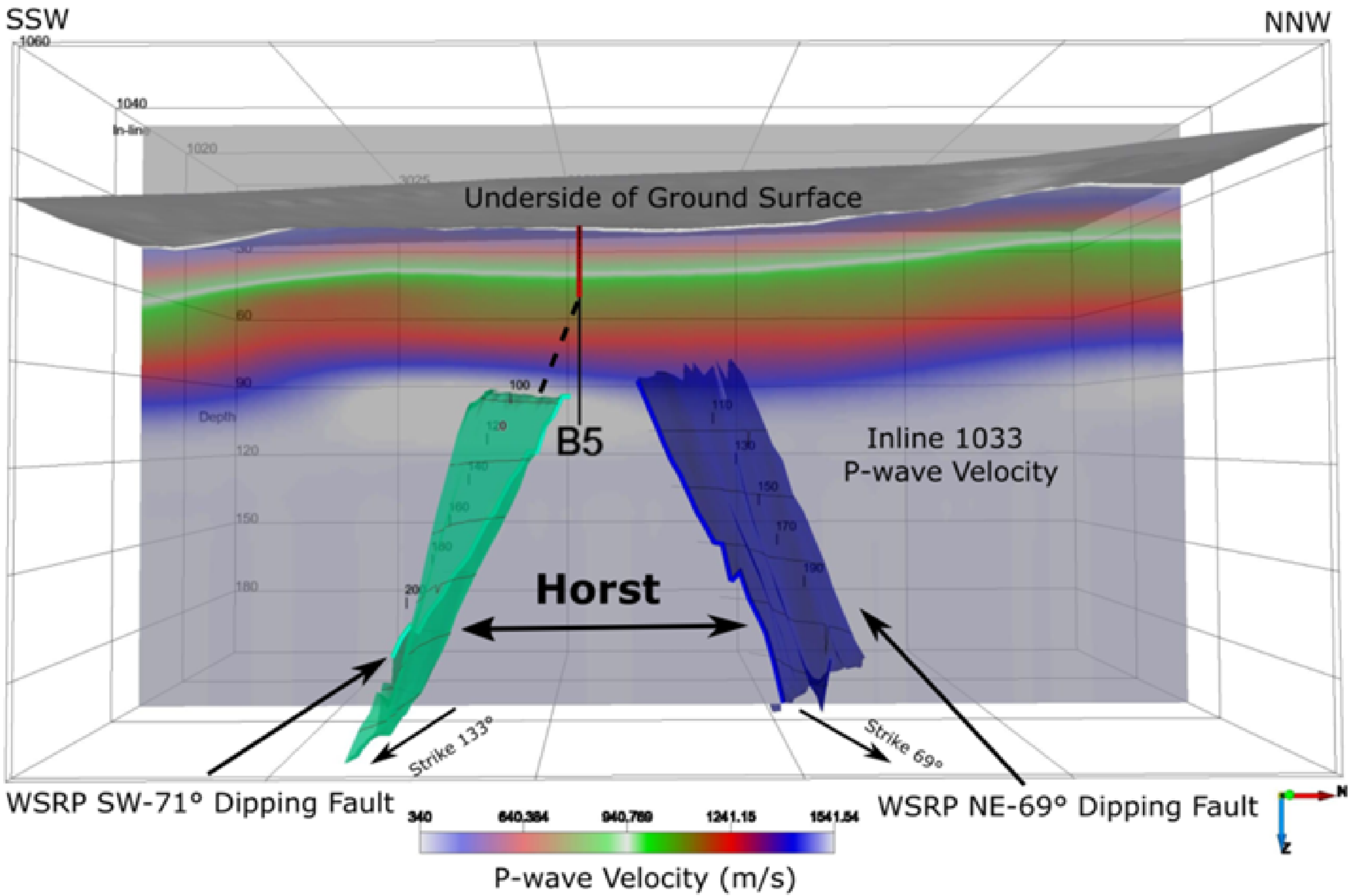
TITLE:
Interpreted Seismic Reflection Two-Way-Time Cross-Section Along Eastern Inline 1053

LOCATION:
Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE 8b
DRAFTED	CEC	
PROJECT#	114-571040-2022	
DATE	2/16/2022	

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure8b.mxd February 2022



TITLE: **3D Perspective of Mapped Western Snake River Plain Fault Surfaces**

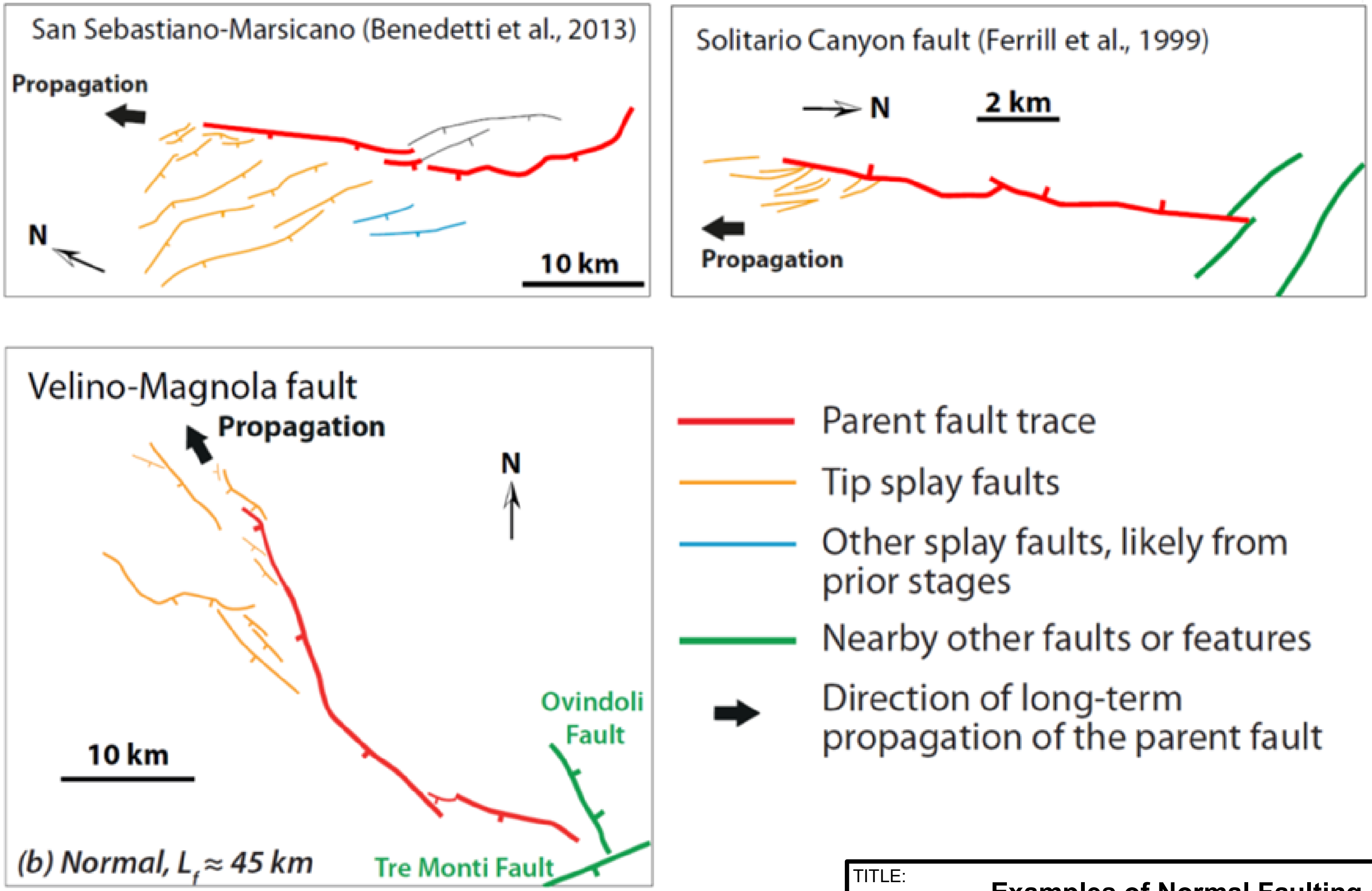
LOCATION: Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO
DRAFTED	CEC
PROJECT#	114-571040-2022
DATE	2/21/2022

FIGURE 9

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure9_new.mxd February 2022



Note: Illustration from Perrin et al., 2016

TITLE:
Examples of Normal Faulting and Splay Faulting Distributions

LOCATION:
Nampa, Idaho

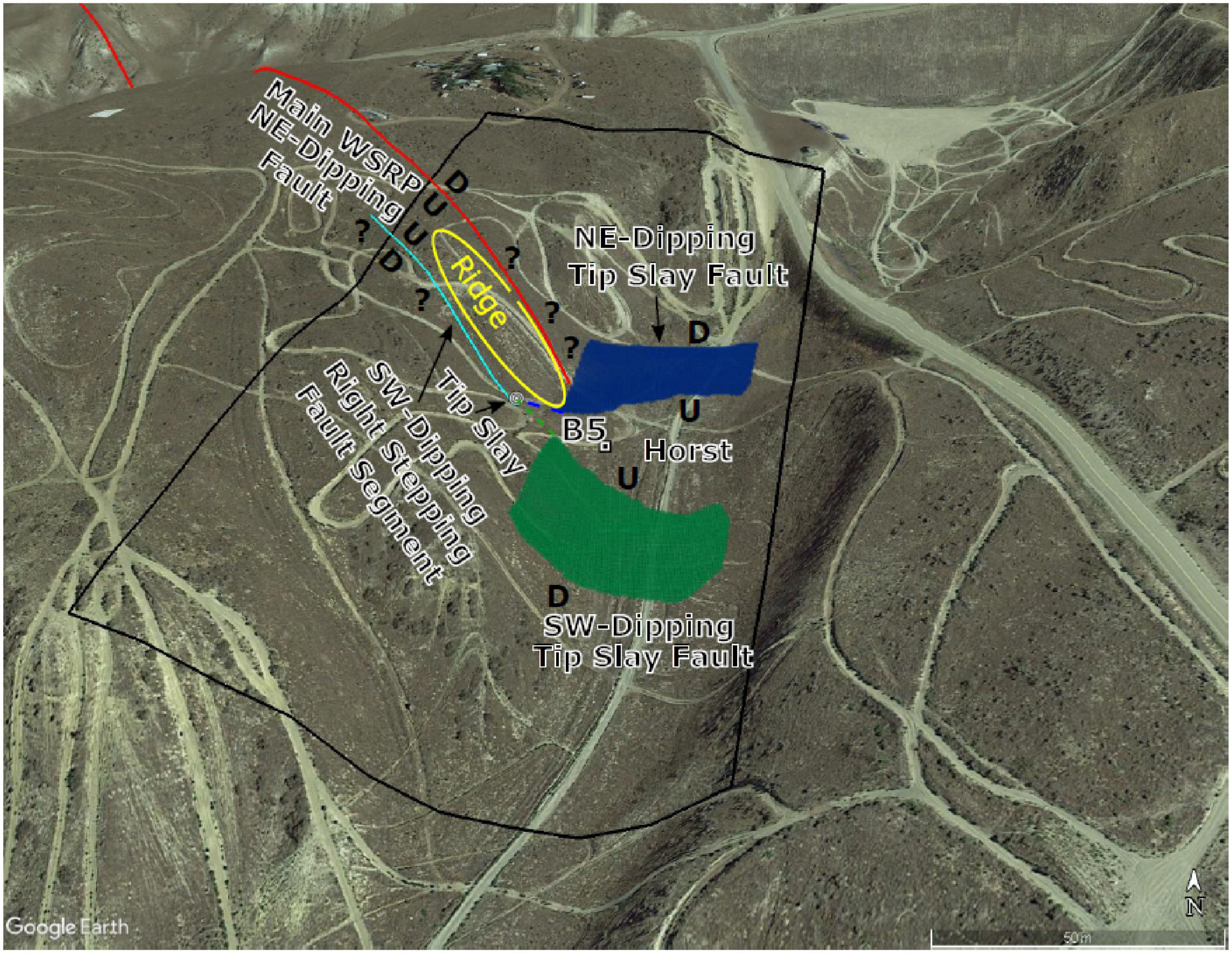
TETRA TECH

APPROVED	LS, DRHO
DRAFTED	CEC
PROJECT#	114-571040-2022
DATE	2/16/2022

FIGURE
10

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure10.mxd February 2022

C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure11.mxd February 2022

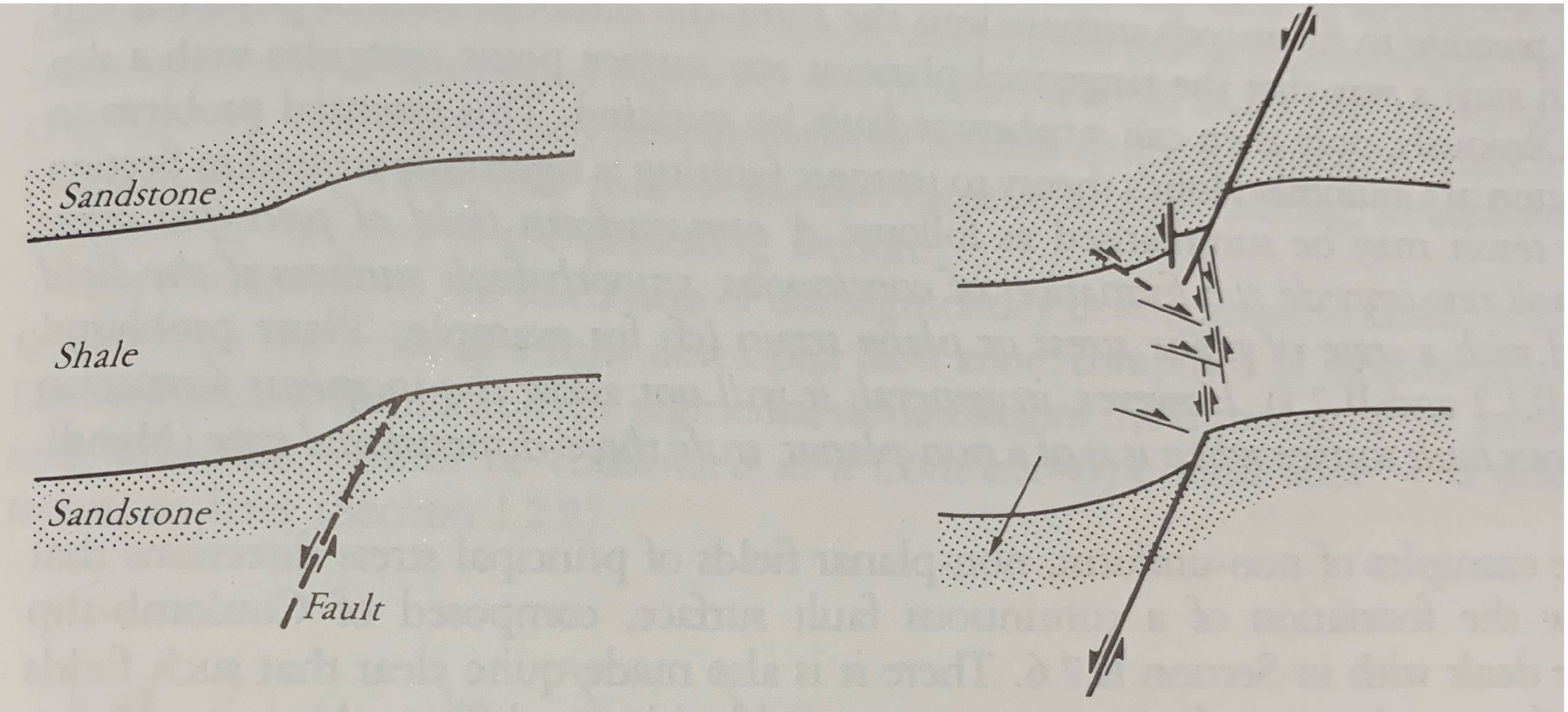


TETRA TECH

3D Map Perspective (3x Vertical Exaggeration)

Nampa, Idaho

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	11
PROJECT#	114-571040-2022	
DATE	2/18/2022	



A Continuous flexuring of shale bed in response to faulting of substratum.

B Upward progressing fault experiences lateral offset in dip direction.

Note: Illustration from Mandl, 1988 (pg. 45)

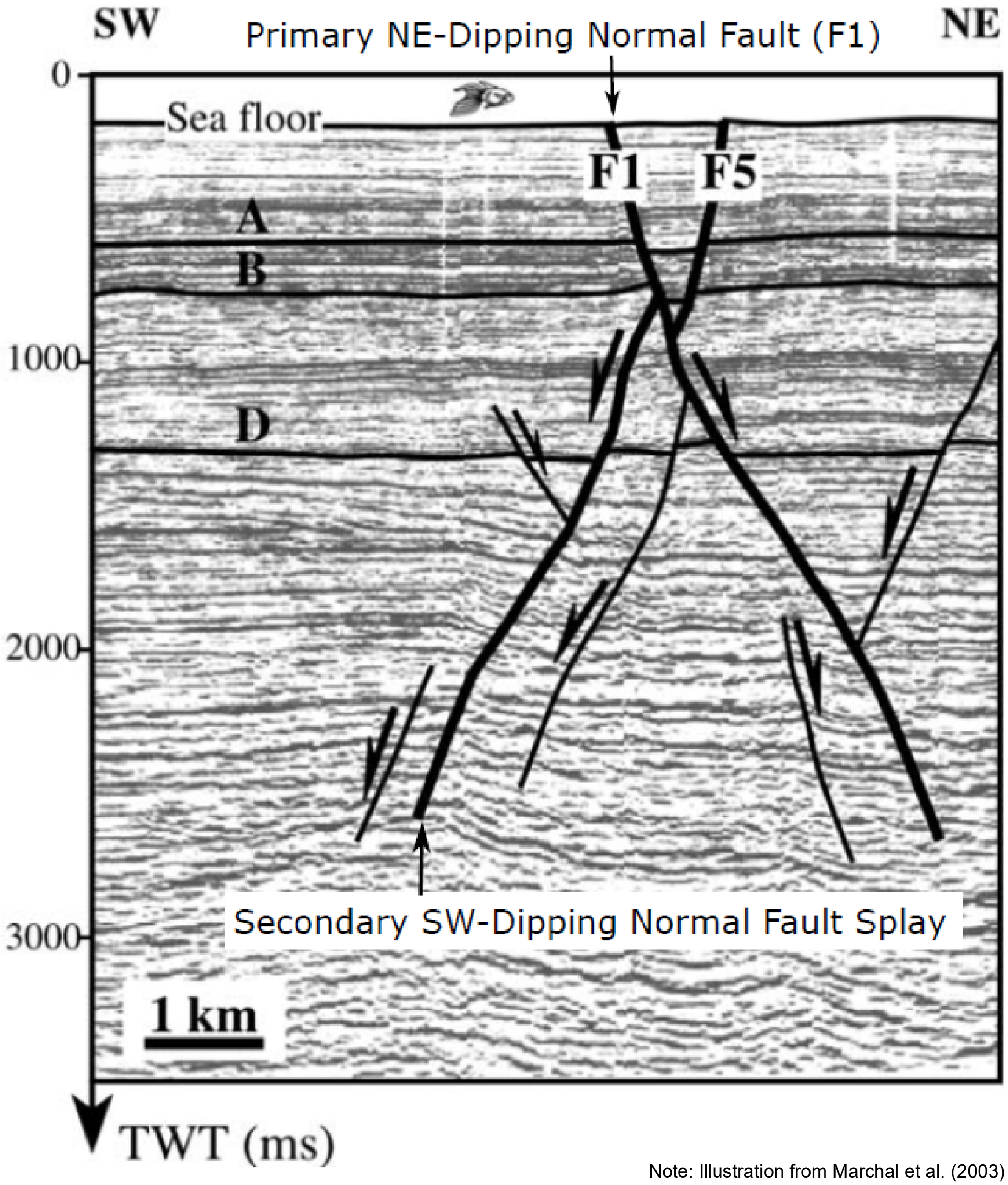
C:\Users\christina.coulter\OneDrive - Tetra Tech, Inc\Documents\Pickles Butte Boise Seismic\Pickles_Butte_Figure12.mxd February 2022

TITLE:
Example of Flexure
Leading to Fault Offsetting

LOCATION:
Nampa, Idaho

TETRA TECH

APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	12
PROJECT#	114-571040-2022	
DATE	2/16/2022	



Note: Illustration from Marchal et al. (2003)

Field Example		
APPROVED	LS, DRHO	FIGURE
DRAFTED	CEC	13
PROJECT#	114-571040-2022	
DATE	2/21/2022	

Appendix A

Seismic Processing
Agile Seismic LLC

Pickles Butte 3D Seismic Survey Report
Pickles Butte, Idaho
Project No. 114-571040-2022

Pickles Butte

Seismic Processing

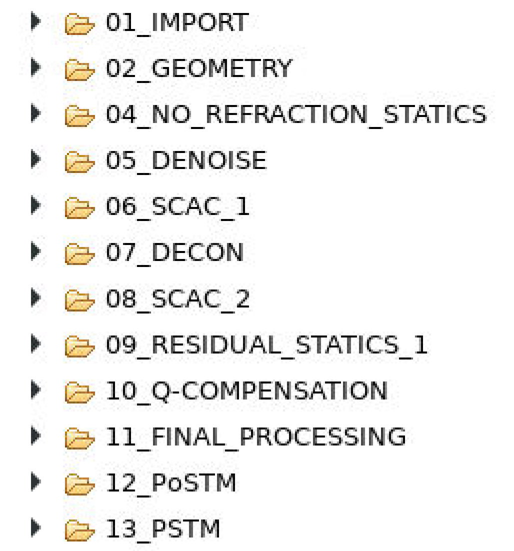
Final Report

January 16th 2022

Agile Seismic LLC

Processing Steps

- Pickles Butte seismic processing are shown below:

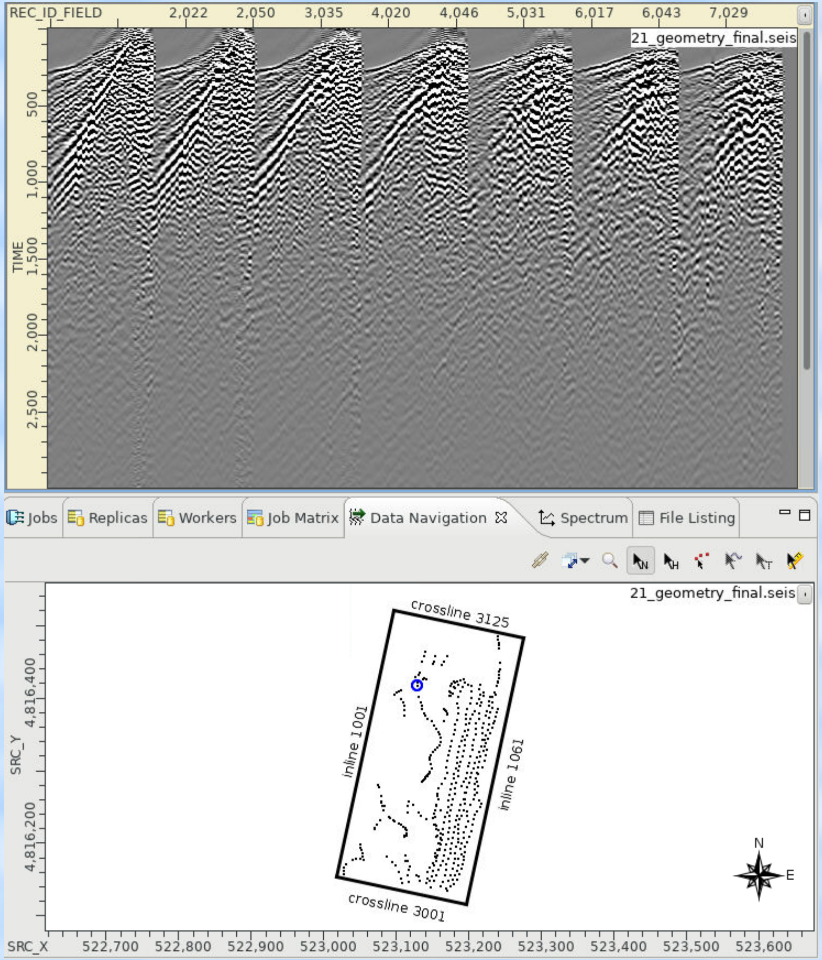


01_IMPORT
02_GEOMETRY
04_NO_REFRACTION_STATICS
05_DENOISE
06_SCAC_1
07_DECON
08_SCAC_2
09_RESIDUAL_STATICS_1
10_Q-COMPENSATION
11_FINAL_PROCESSING
12_PoSTM
13_PSTM

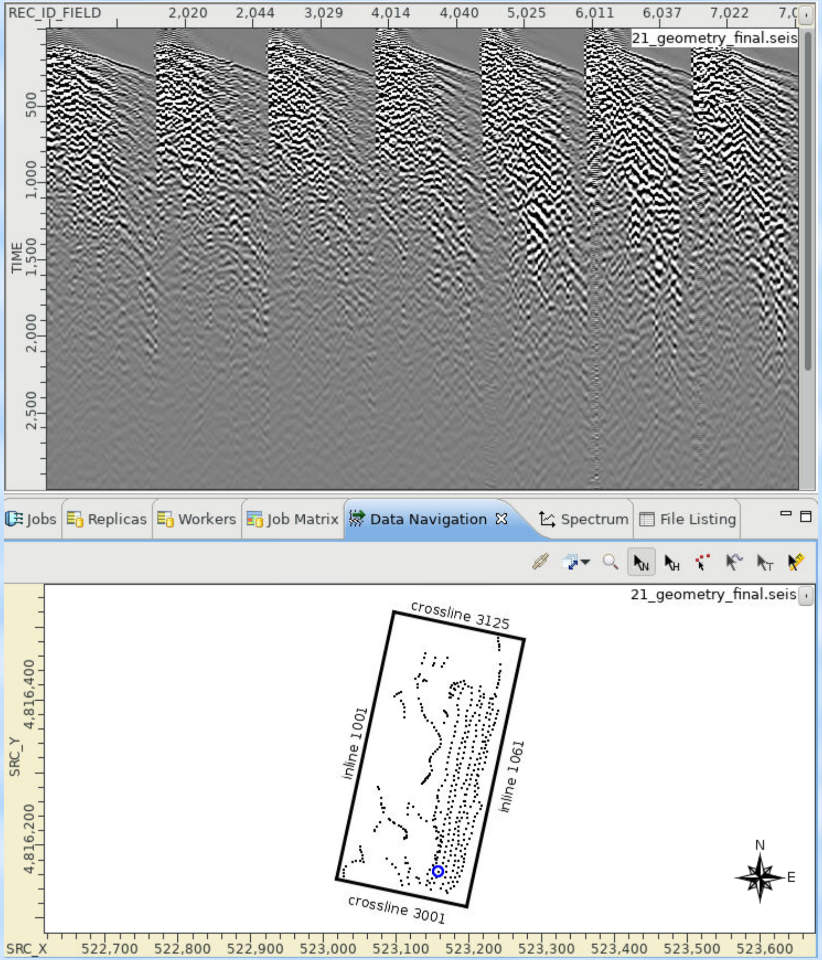
Data Import

- Seismic source was vibroseis
- Receivers were GTI nodes
- Pilot sweep frequency range is 5-75 hz.
- Seismic data was acquired at 2 ms and resampled to 4 ms.
- Total number of shots is 440
- Total number of receivers is 285
- Total number of traces is 125224
- All data had coordinates and elevations for sources and receivers in the headers.
- Vibroseis data was mostly clean with strong ground-roll and occasional noise from water pumps.

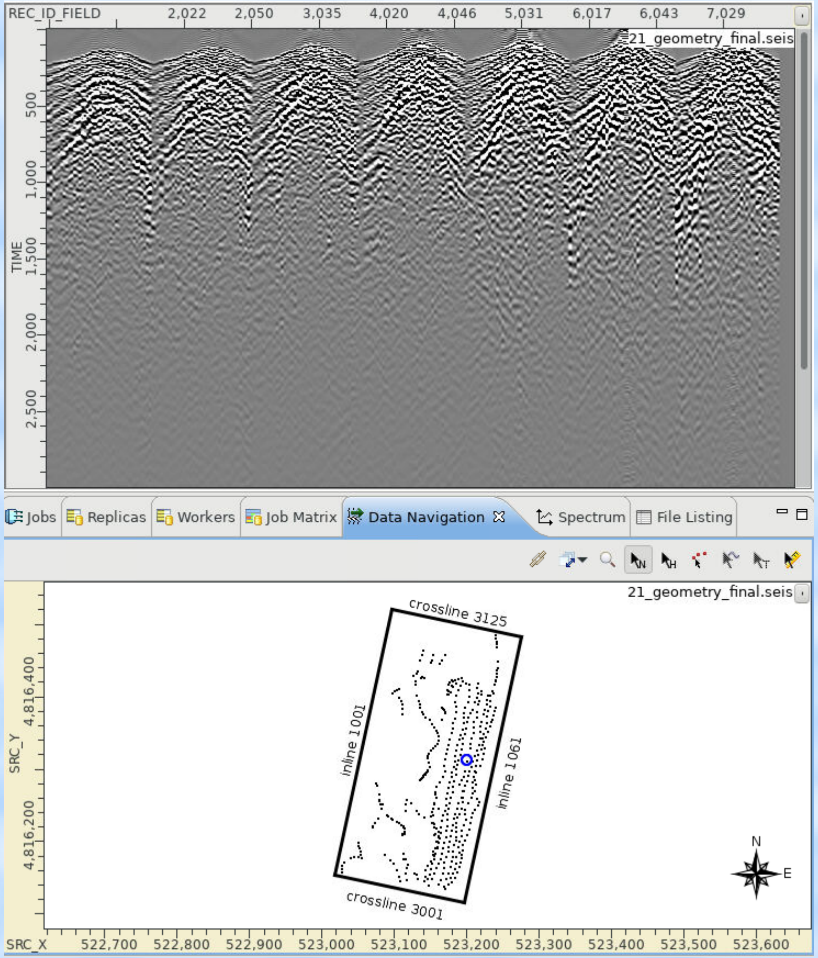
Raw Data: Shot Gathers – Example #1



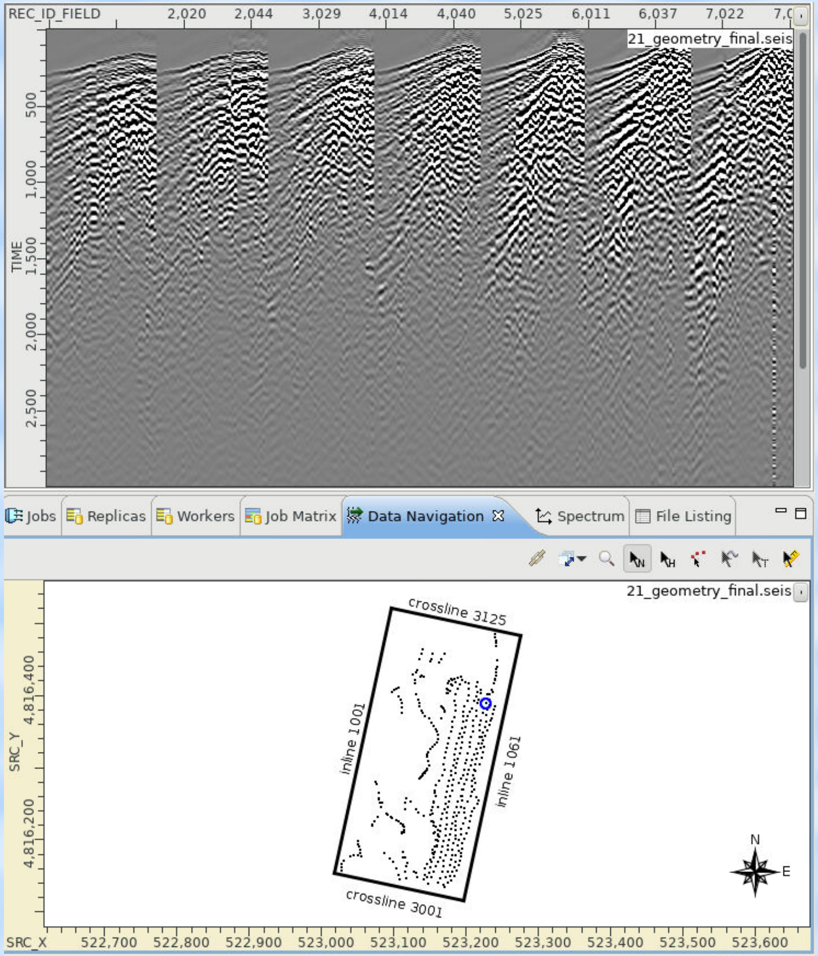
Raw Data: Shot Gathers – Example #2



Raw Data: Shot Gathers – Example #3



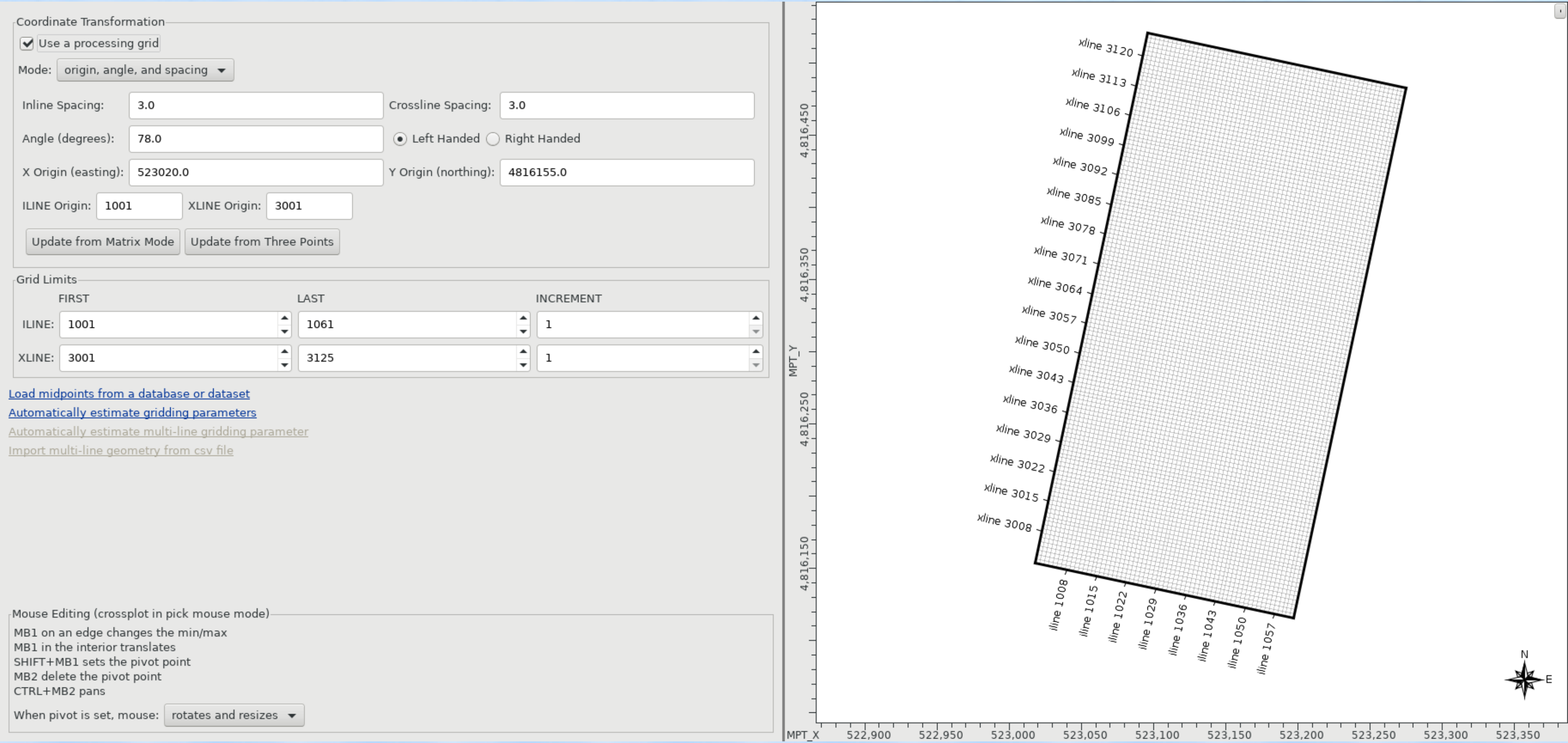
Raw Data: Shot Gathers – Example #4



Geometry

- Seismic data already had source and receiver coordinates and elevations in the headers.
- Processing grid was created with the following parameters:
    - Inline range 1001-1061
    - Crossline range 3001-3125
    - Inline and crossline spacing was set to 3 m
    - Fixed datum 850 m and replacement velocity 1500 m/sec
- Geometry was built using coordinates and elevations in the headers.
- Geometry brute stack was shown for select inlines only since good fold was very narrow in xline direction.
- Following processing was done for Geometry brute stack:
    - Sparse velocity analysis
    - AGC
    - Spiking Decon
    - Stack
    - FXYDecon 5-75 Hz
    - Low Cut Filter 12-20-- Hz

Processing Grid



Coordinate Transformation

☑ Use a processing grid

Mode: origin, angle, and spacing

Inline Spacing: 3.0

Crossline Spacing: 3.0

Angle (degrees): 78.0

● Left Handed ○ Right Handed

X Origin (easting): 523020.0

Y Origin (northing): 4816155.0

ILINE Origin: 1001

XLINE Origin: 3001

Update from Matrix Mode

Update from Three Points

Grid Limits

	FIRST	LAST	INCREMENT
ILINE:	1001	1061	1
XLINE:	3001	3125	1

Load midpoints from a database or dataset

Automatically estimate gridding parameters

Automatically estimate multi-line gridding parameter

Import multi-line geometry from csv file

Mouse Editing (crossplot in pick mouse mode)

MB1 on an edge changes the min/max

MB1 in the interior translates

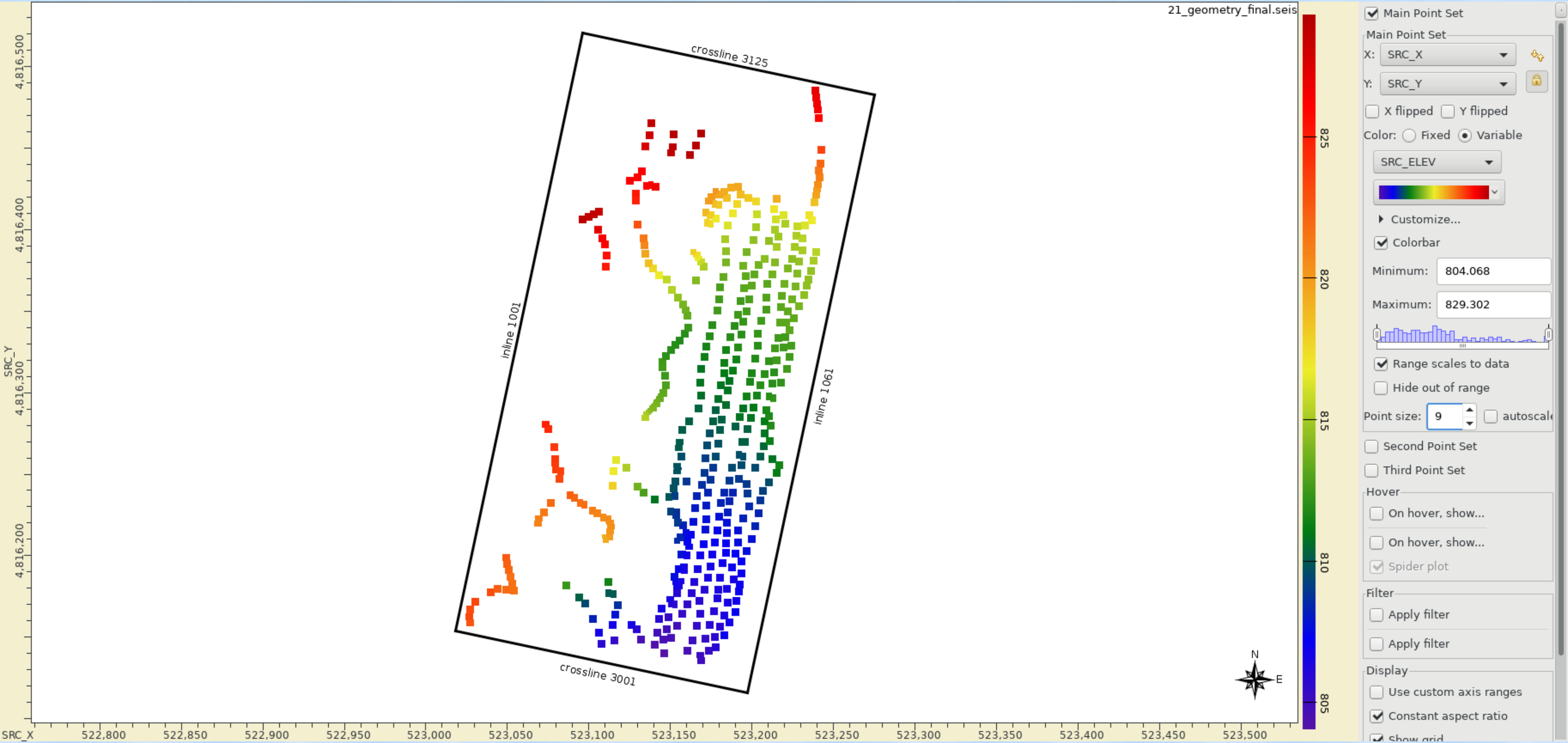
SHIFT+MB1 sets the pivot point

MB2 delete the pivot point

CTRL+MB2 pans

When pivot is set, mouse: rotates and resizes

Geometry: Sources



☑ Main Point Set

Main Point Set

X: SRC_X

Y: SRC_Y

☐ X flipped ☐ Y flipped

Color: ○ Fixed ● Variable

SRC_ELEV

Customize...

☑ Colorbar

Minimum: 804.068

Maximum: 829.302

☑ Range scales to data

☐ Hide out of range

Point size: 9 ☐ autoscale

☐ Second Point Set

☐ Third Point Set

Hover

☐ On hover, show...

☐ On hover, show...

☑ Spider plot

Filter

☐ Apply filter

☐ Apply filter

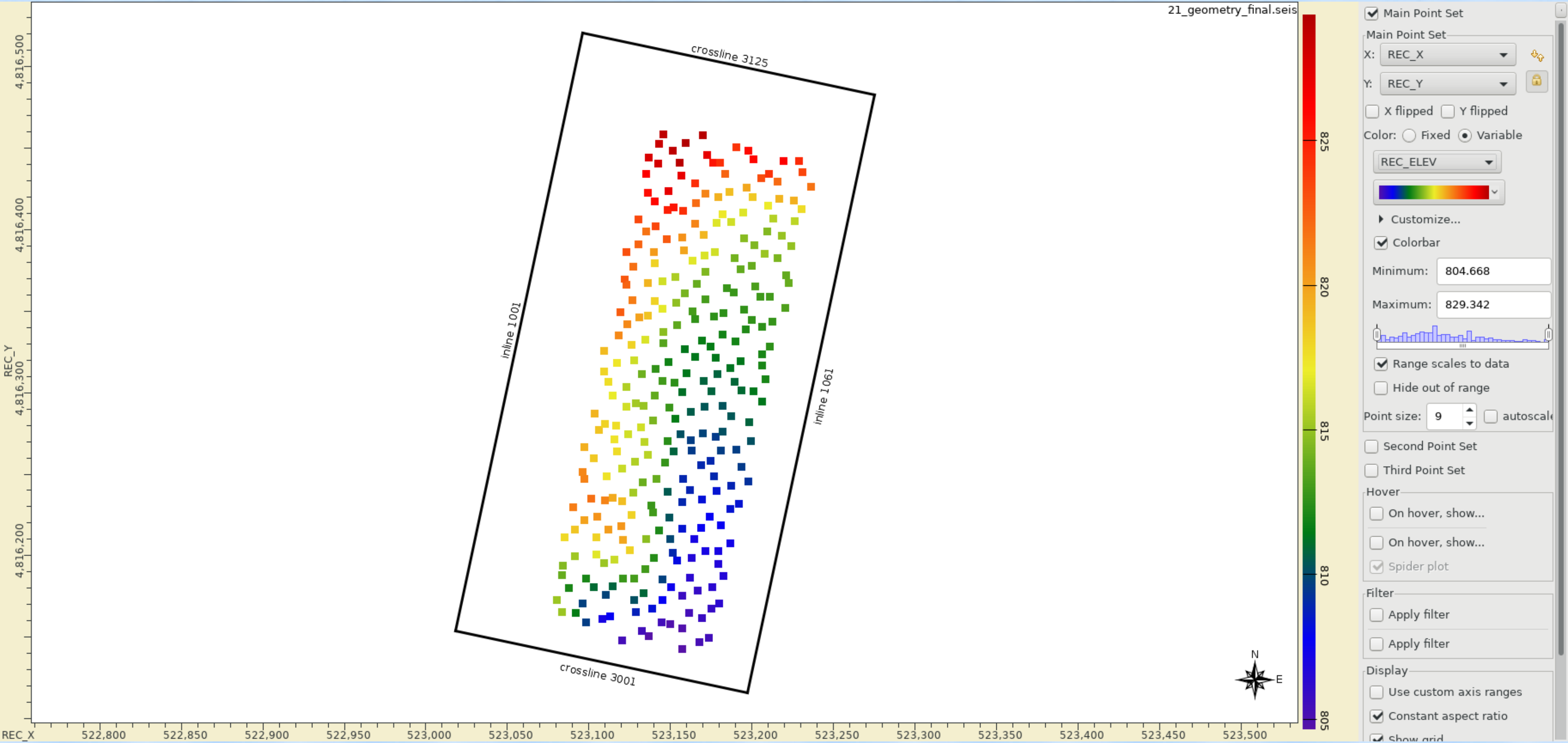
Display

☐ Use custom axis ranges

☑ Constant aspect ratio

☑ Show grid

Geometry: Receivers



☑ Main Point Set

Main Point Set

X: REC_X

Y: REC_Y

☐ X flipped ☐ Y flipped

Color: ○ Fixed ● Variable

REC_ELEV

Customize...

☑ Colorbar

Minimum: 804.668

Maximum: 829.342

☑ Range scales to data

☐ Hide out of range

Point size: 9 ☐ autoscal

☐ Second Point Set

☐ Third Point Set

Hover

☐ On hover, show...

☐ On hover, show...

☑ Spider plot

Filter

☐ Apply filter

☐ Apply filter

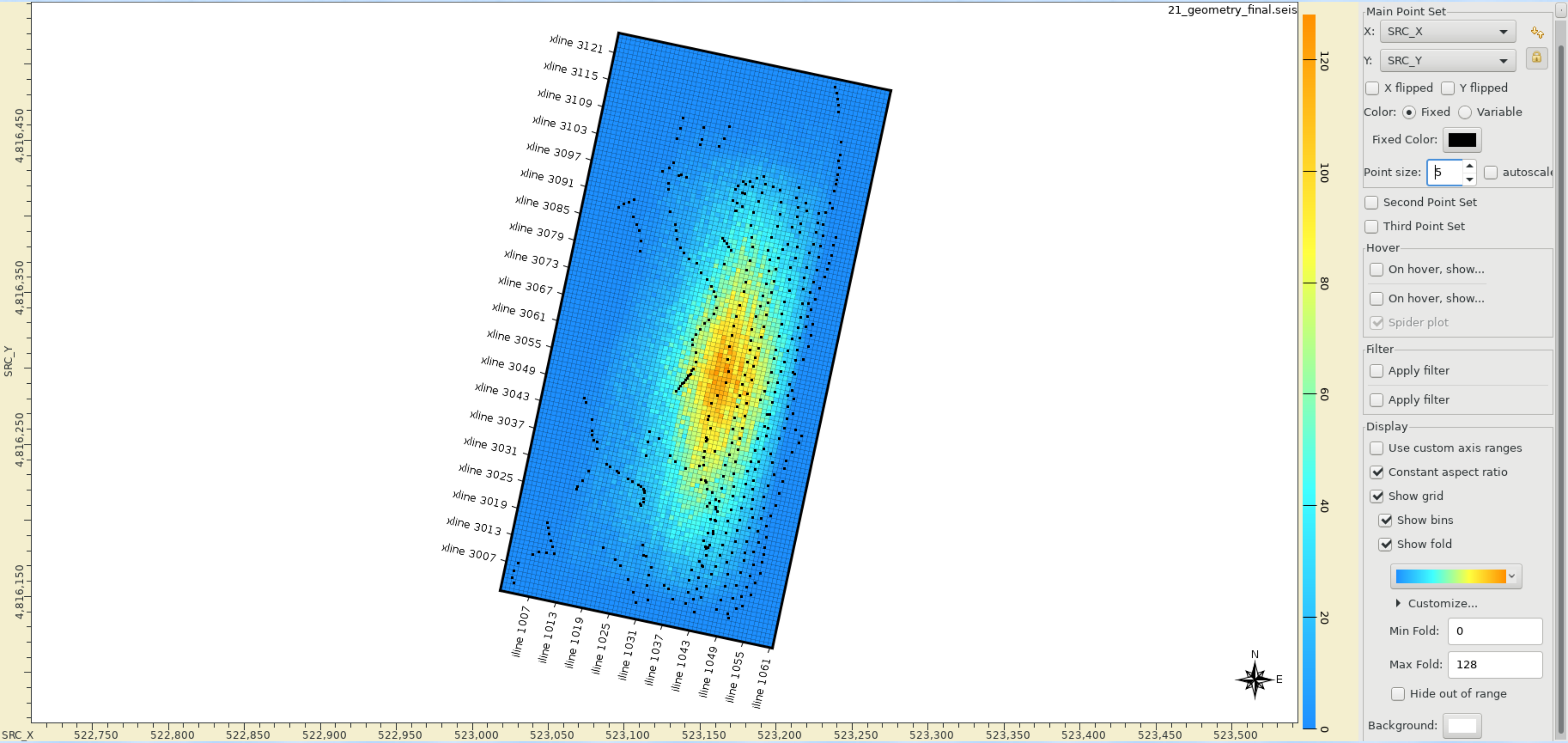
Display

☐ Use custom axis ranges

☑ Constant aspect ratio

☑ Show grid

Geometry: Fold



Main Point Set

X: SRC_X

Y: SRC_Y

☐ X flipped ☐ Y flipped

Color: ● Fixed ○ Variable

Fixed Color: ■

Point size: 5 ☐ autoscale

☐ Second Point Set

☐ Third Point Set

Hover

☐ On hover, show...

☐ On hover, show...

☑ Spider plot

Filter

☐ Apply filter

☐ Apply filter

Display

☐ Use custom axis ranges

☑ Constant aspect ratio

☑ Show grid

☑ Show bins

☑ Show fold

Customize...

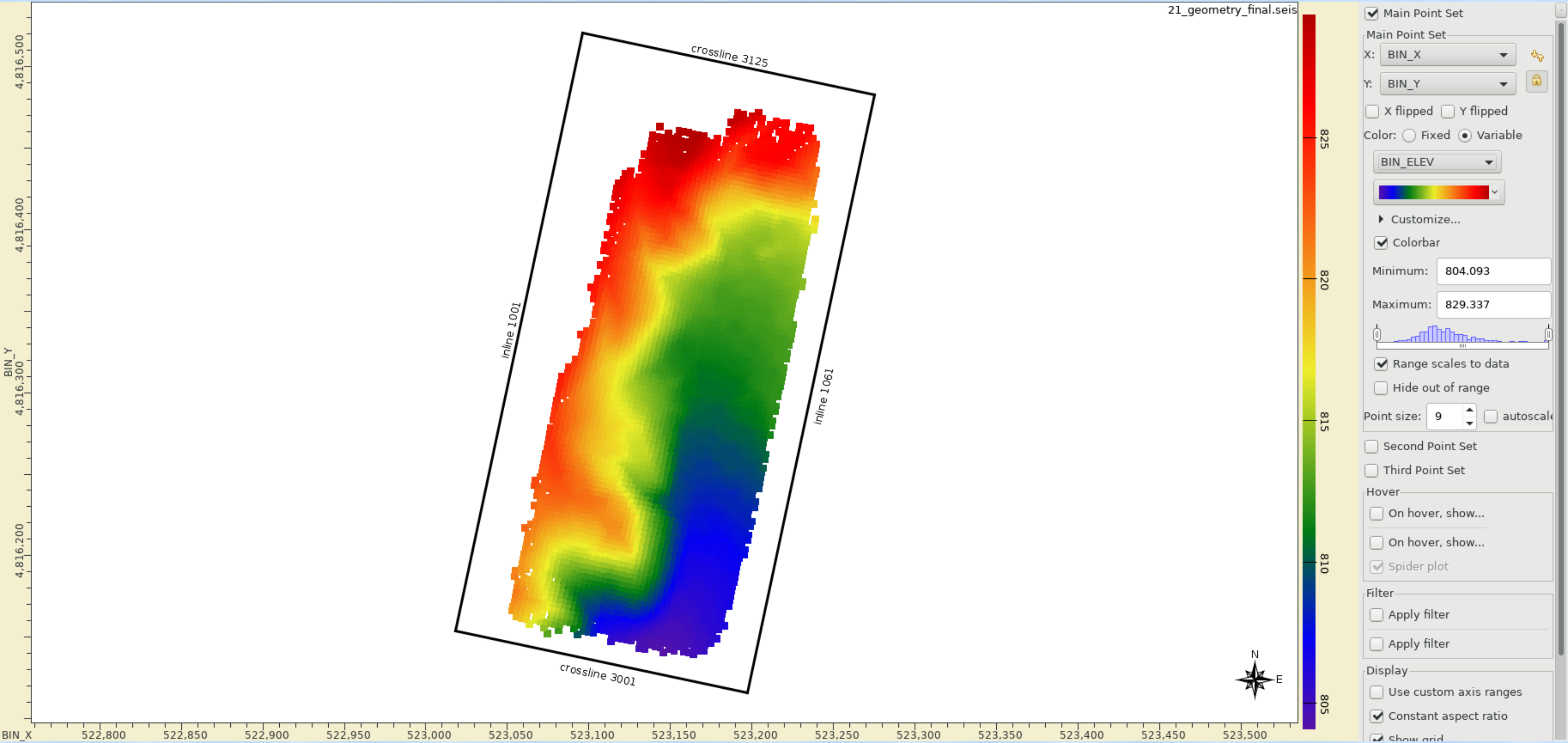
Min Fold: 0

Max Fold: 128

☐ Hide out of range

Background:

Geometry: Surface Elevation



☑ Main Point Set

Main Point Set

X: BIN_X

Y: BIN_Y

☐ X flipped ☐ Y flipped

Color: ○ Fixed ● Variable

BIN_ELEV

Customize...

☑ Colorbar

Minimum: 804.093

Maximum: 829.337

☑ Range scales to data

☐ Hide out of range

Point size: 9 ☐ autoscale

☐ Second Point Set

☐ Third Point Set

Hover

☐ On hover, show...

☐ On hover, show...

☑ Spider plot

Filter

☐ Apply filter

☐ Apply filter

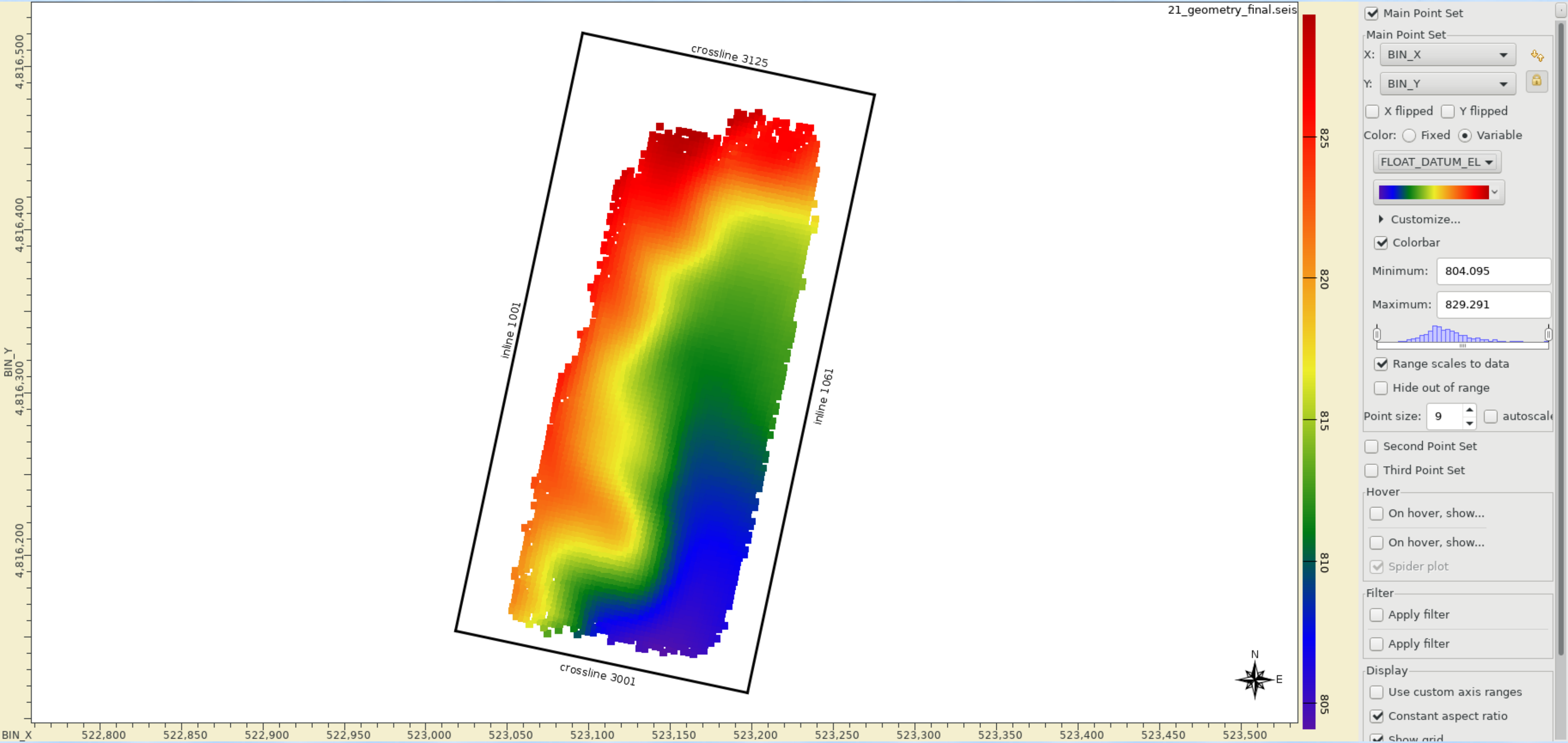
Display

☐ Use custom axis ranges

☑ Constant ratio

☑ Show grid

Geometry: Floating Datum Elevation



☑ Main Point Set

Main Point Set

X: BIN_X

Y: BIN_Y

☐ X flipped ☐ Y flipped

Color: ○ Fixed ● Variable

FLOAT_DATUM_EL

Customize...

☑ Colorbar

Minimum: 804.095

Maximum: 829.291

☑ Range scales to data

☐ Hide out of range

Point size: 9 ☐ autoscale

☐ Second Point Set

☐ Third Point Set

Hover

☐ On hover, show...

☐ On hover, show...

☑ Spider plot

Filter

☐ Apply filter

☐ Apply filter

Display

☐ Use custom axis ranges

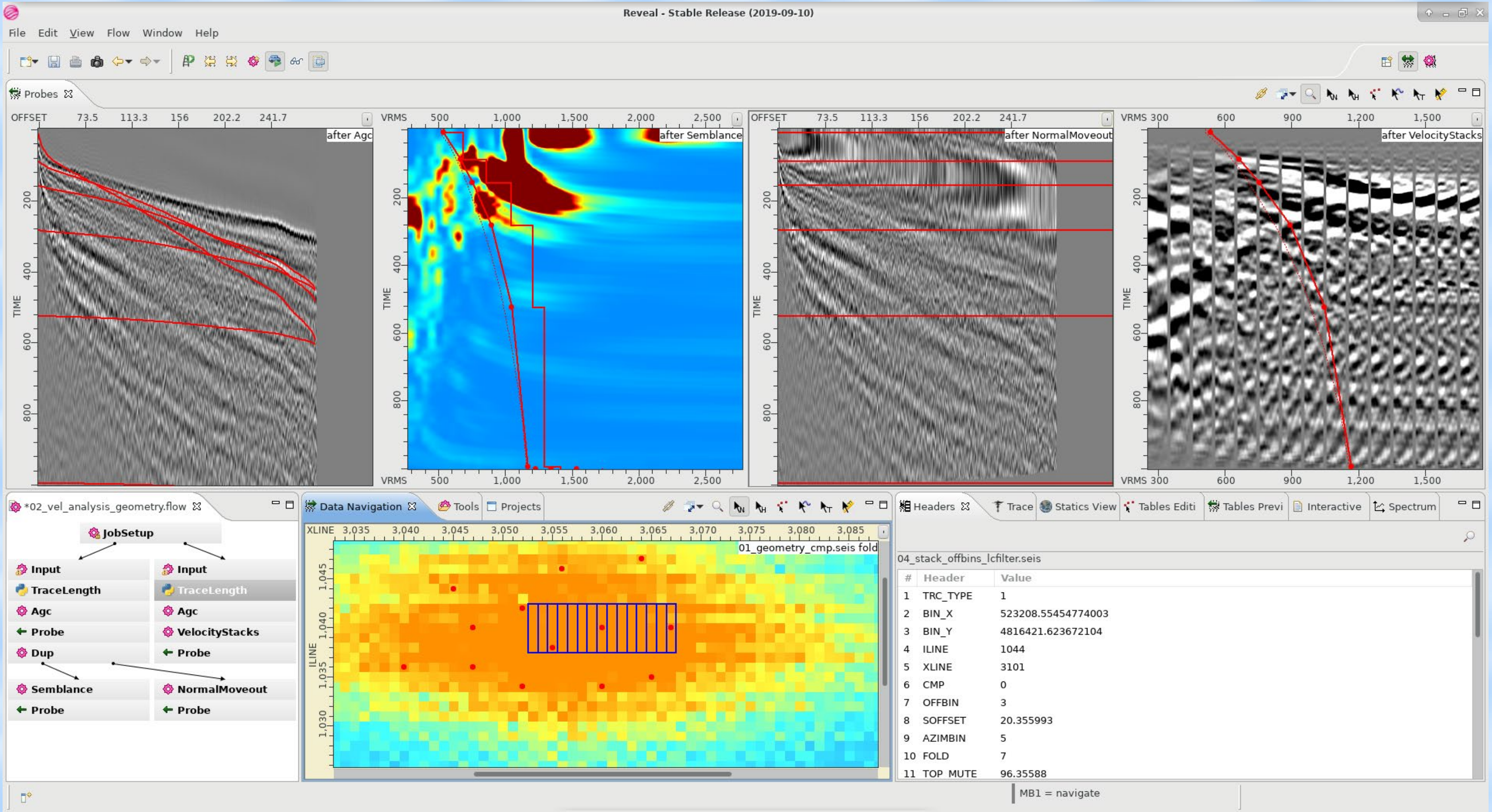
☑ Constant aspect ratio

☑ Show grid

Geometry: Brute Stack

Velocity Analysis

Geometry: Velocity Analysis



04_stack_offbins_lcfilter.seis

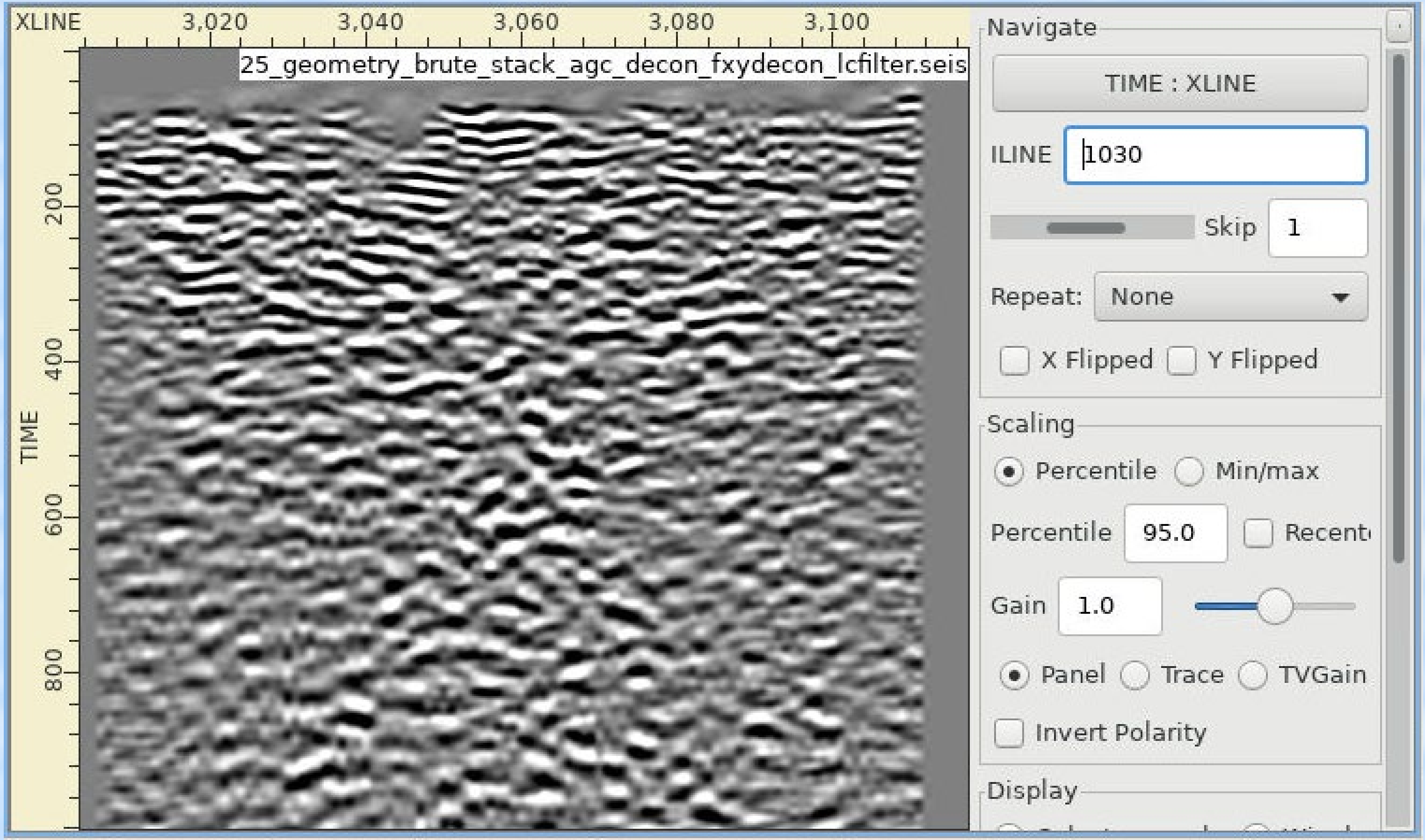
#	Header	Value
1	TRC_TYPE	1
2	BIN_X	523208.55454774003
3	BIN_Y	4816421.623672104
4	ILINE	1044
5	XLINE	3101
6	CMP	0
7	OFFBIN	3
8	SOFFSET	20.355993
9	AZIMBIN	5
10	FOLD	7
11	TOP_MUTE	96.35588

MB1 = navigate

Geometry: Brute Stack

Inlines

Geometry: Brute Stack - IL 1030



25_geometry_brute_stack_agc_decon_fxydecon_lcfilter.seis

Navigate

ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

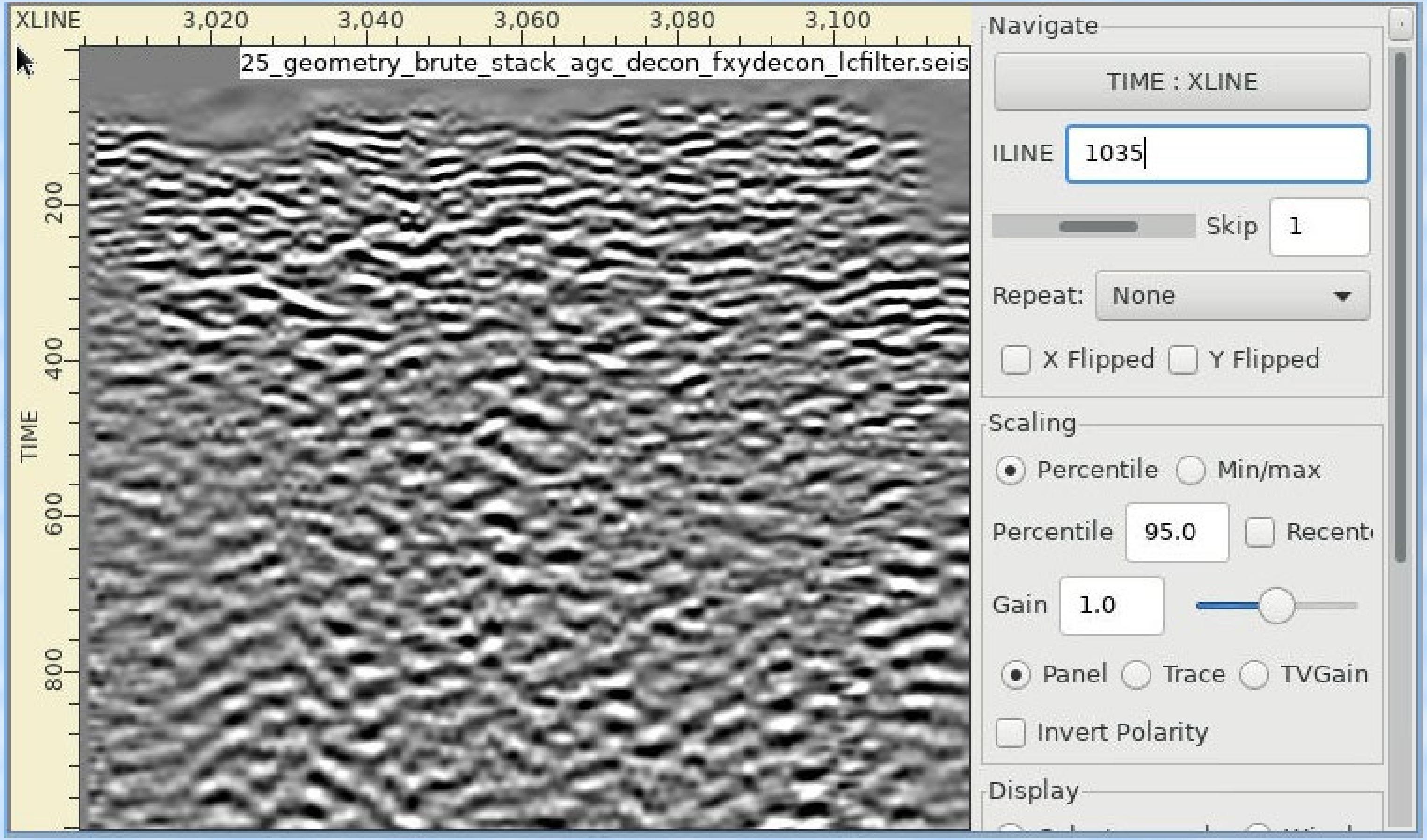
Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

Display

Geometry: Brute Stack - IL 1035



25_geometry_brute_stack_agc_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

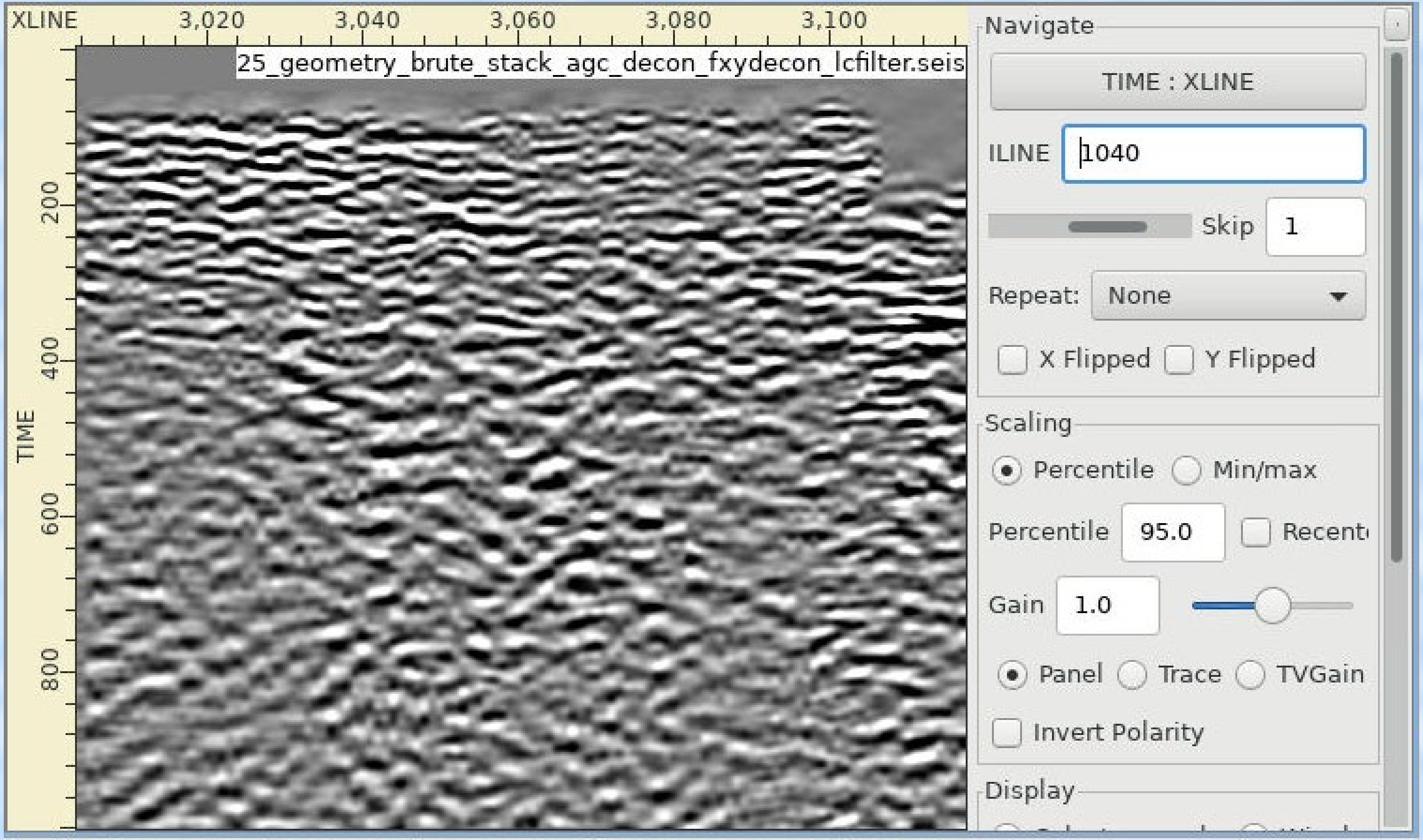
Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

Display

Geometry: Brute Stack - IL 1040



Navigate

TIME : XLINE

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

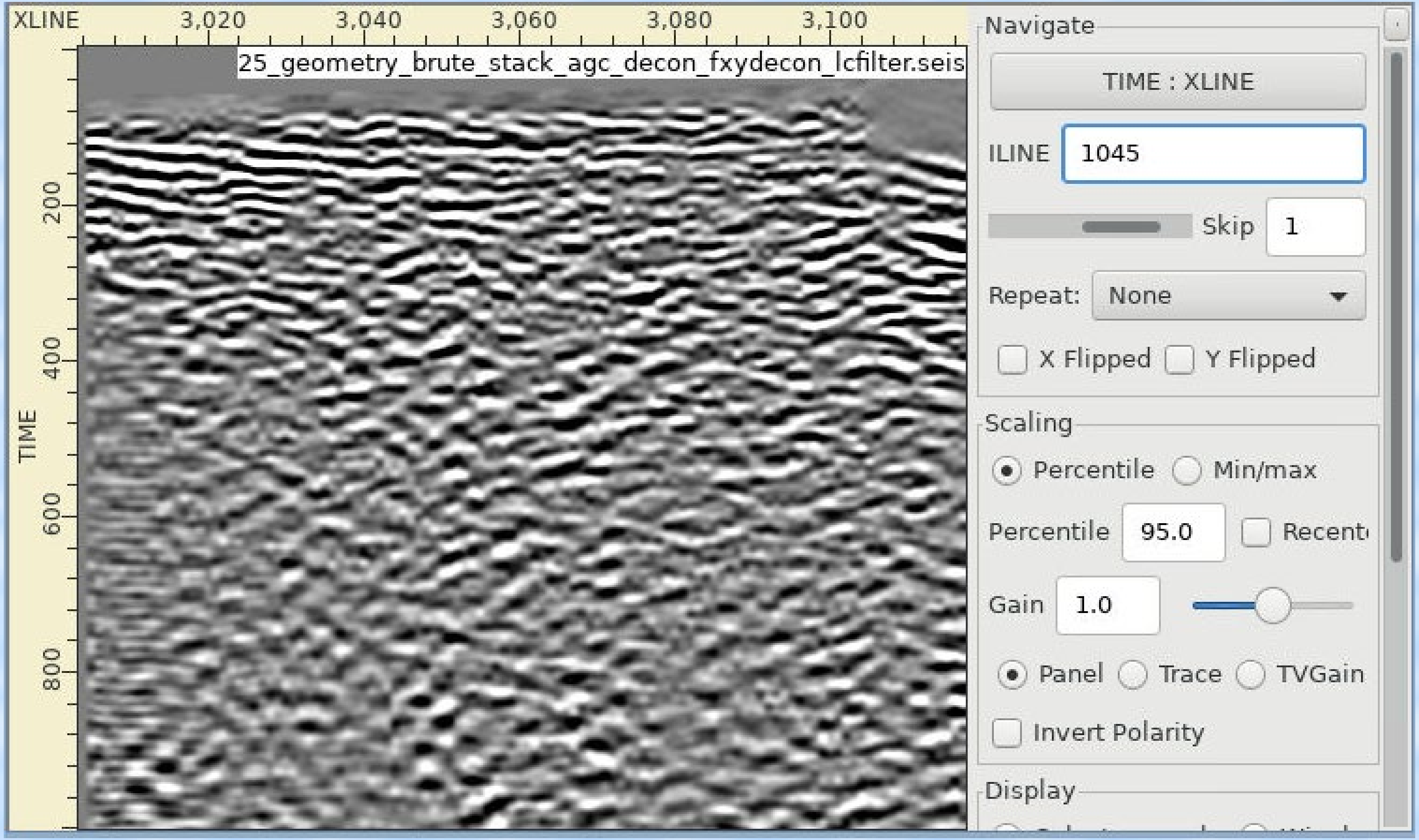
Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

Display

Geometry: Brute Stack - IL 1040



25_geometry_brute_stack_agc_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

Display

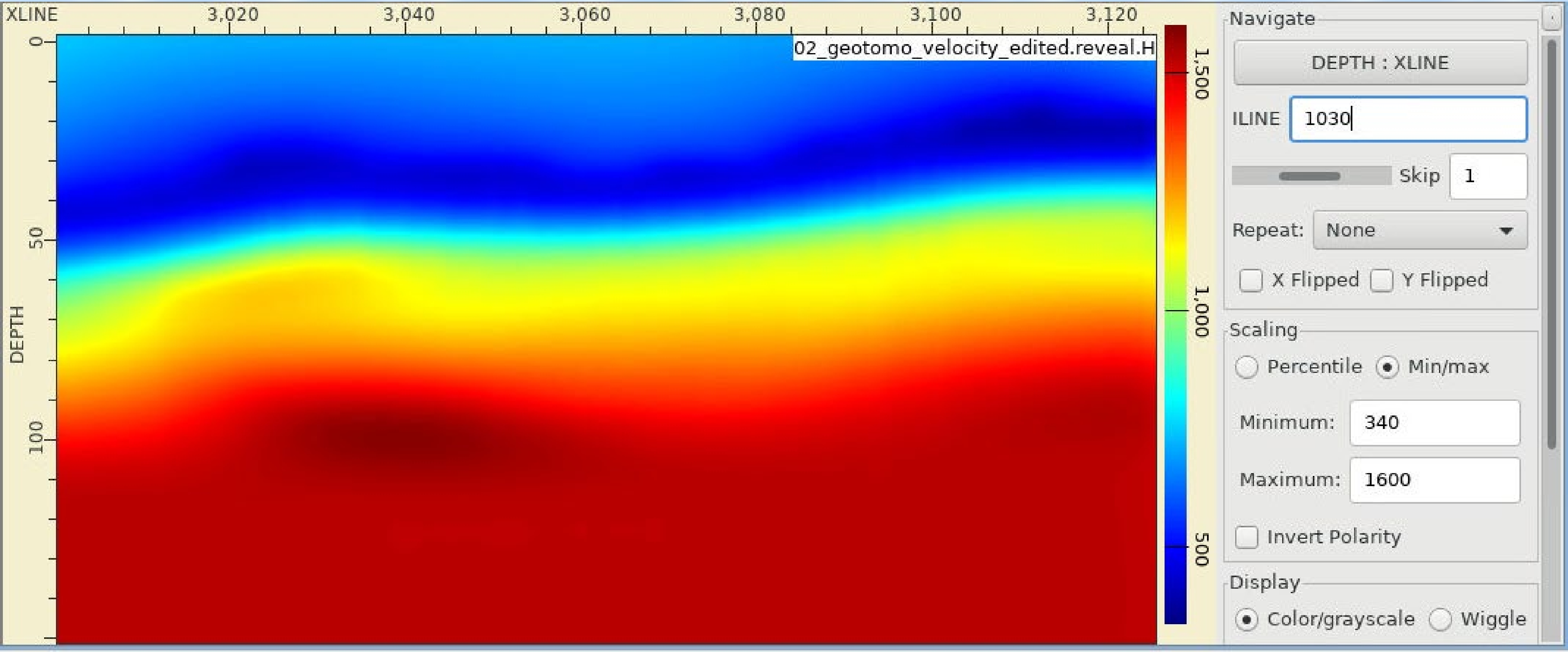
Refraction Tomography

- Refraction Tomography was used to produce near surface velocity as well as refraction statics.
- Refraction statics were not used and instead statics were handled in residual Statics processing.
- Refraction tomography velocity was used in all stacks and for migration since it is not possible to derive very shallow velocity from reflection data.

Refraction Tomography: Velocity

Inlines

Refraction Tomography: Velocity - IL 1030



Navigate

ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

○ Percentile ● Min/max

Minimum: 340

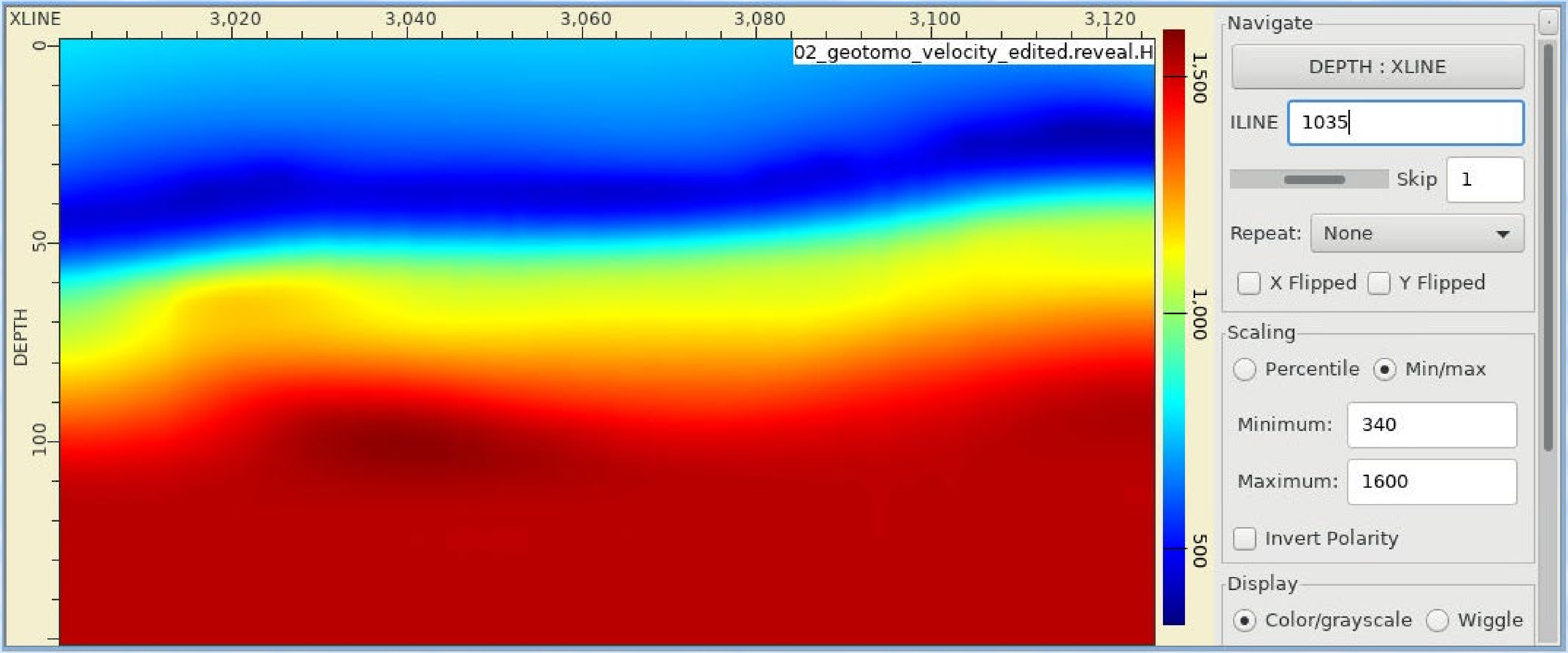
Maximum: 1600

☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

Refraction Tomography: Velocity - IL 1035



ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

○ Percentile ● Min/max

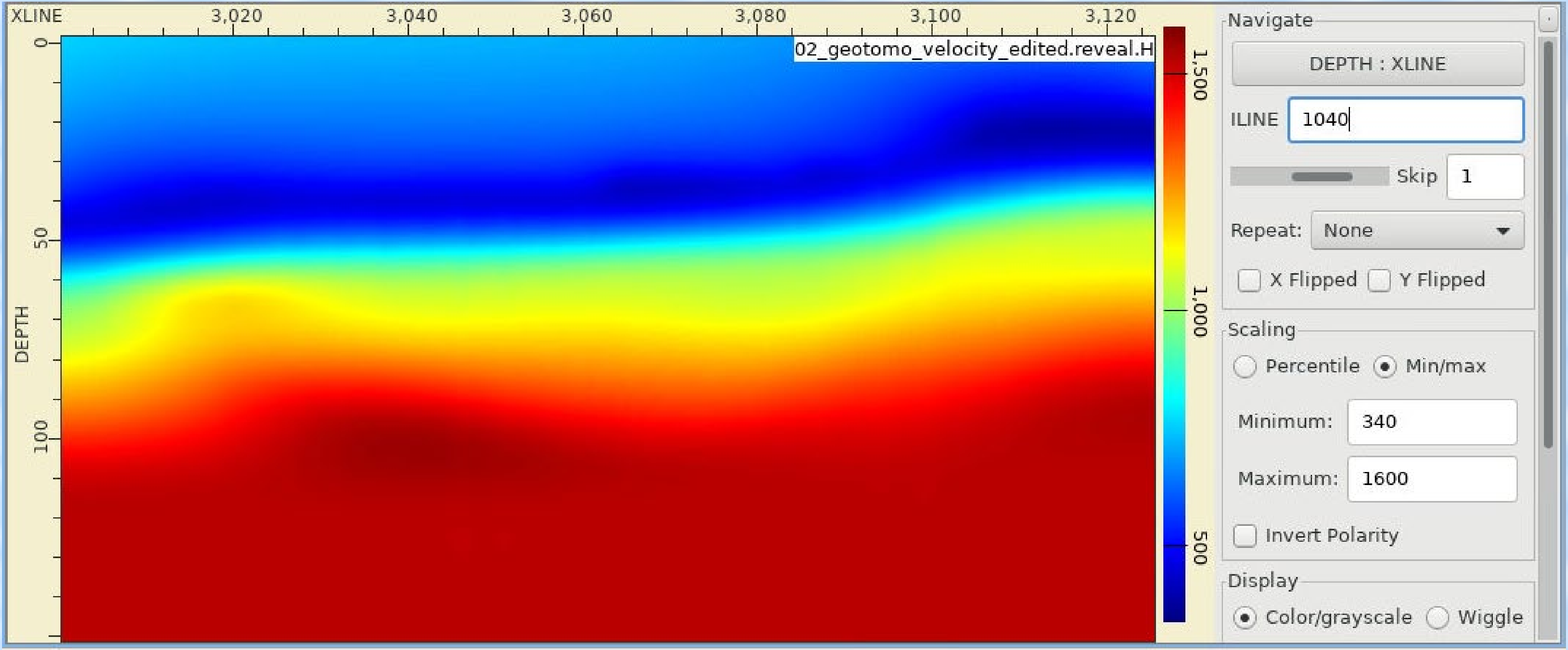
Minimum: 340

Maximum: 1600

☐ Invert Polarity

● Color/grayscale ○ Wiggle

Refraction Tomography: Velocity - IL 1040



Navigate

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

○ Percentile ● Min/max

Minimum: 340

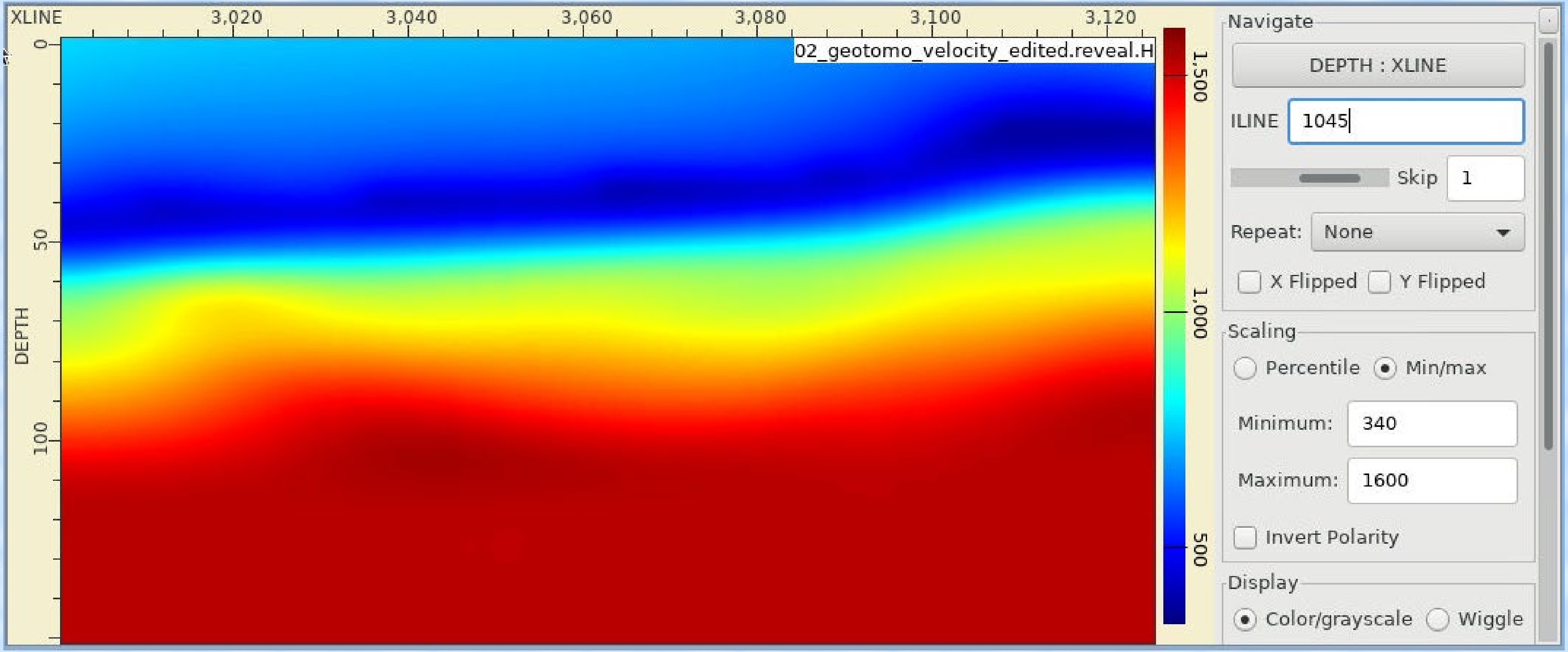
Maximum: 1600

☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

Refraction Tomography: Velocity - IL 1045



Navigate

ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

○ Percentile ● Min/max

Minimum: 340

Maximum: 1600

☐ Invert Polarity

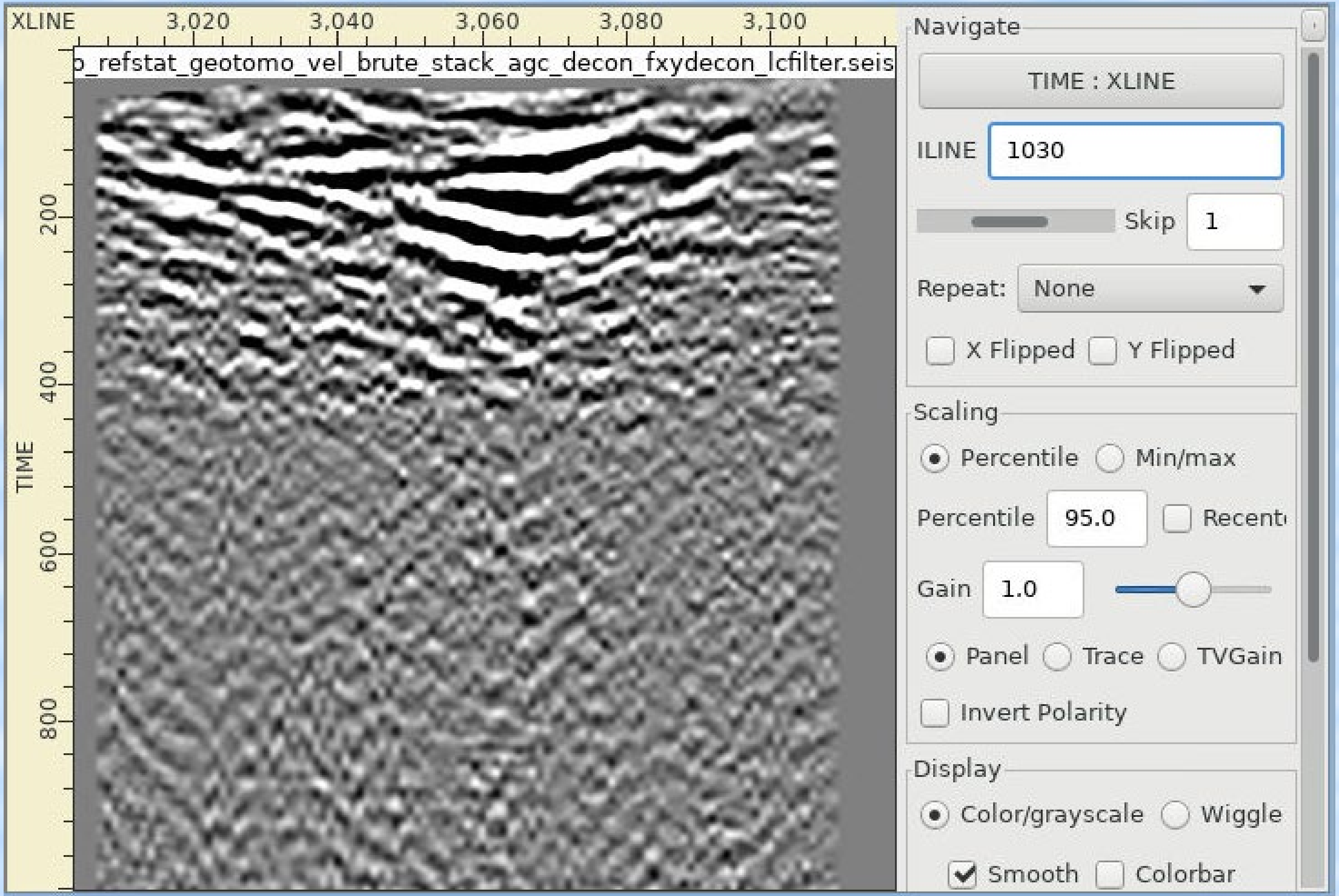
Display

● Color/grayscale ○ Wiggle

Refraction Tomography: Stack

Inlines

Refraction Tomography: Stack - IL 1030



p_refstat_geotomo_vel_brute_stack_agc_decon_fxydecon_lcfilter.seis

ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

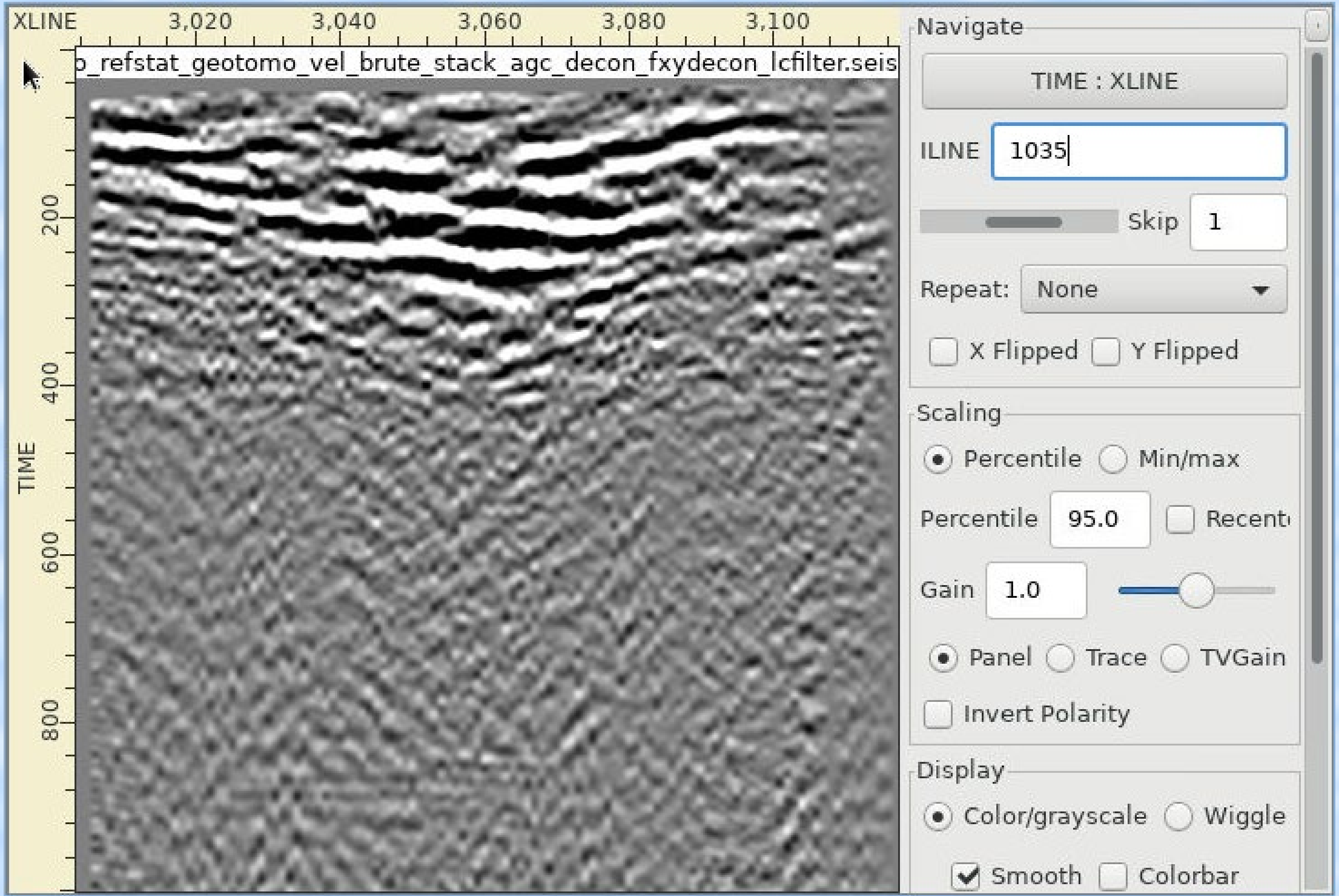
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Refraction Tomography: Stack - IL 1035



_refstat_geotomo_vel_brute_stack_agc_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

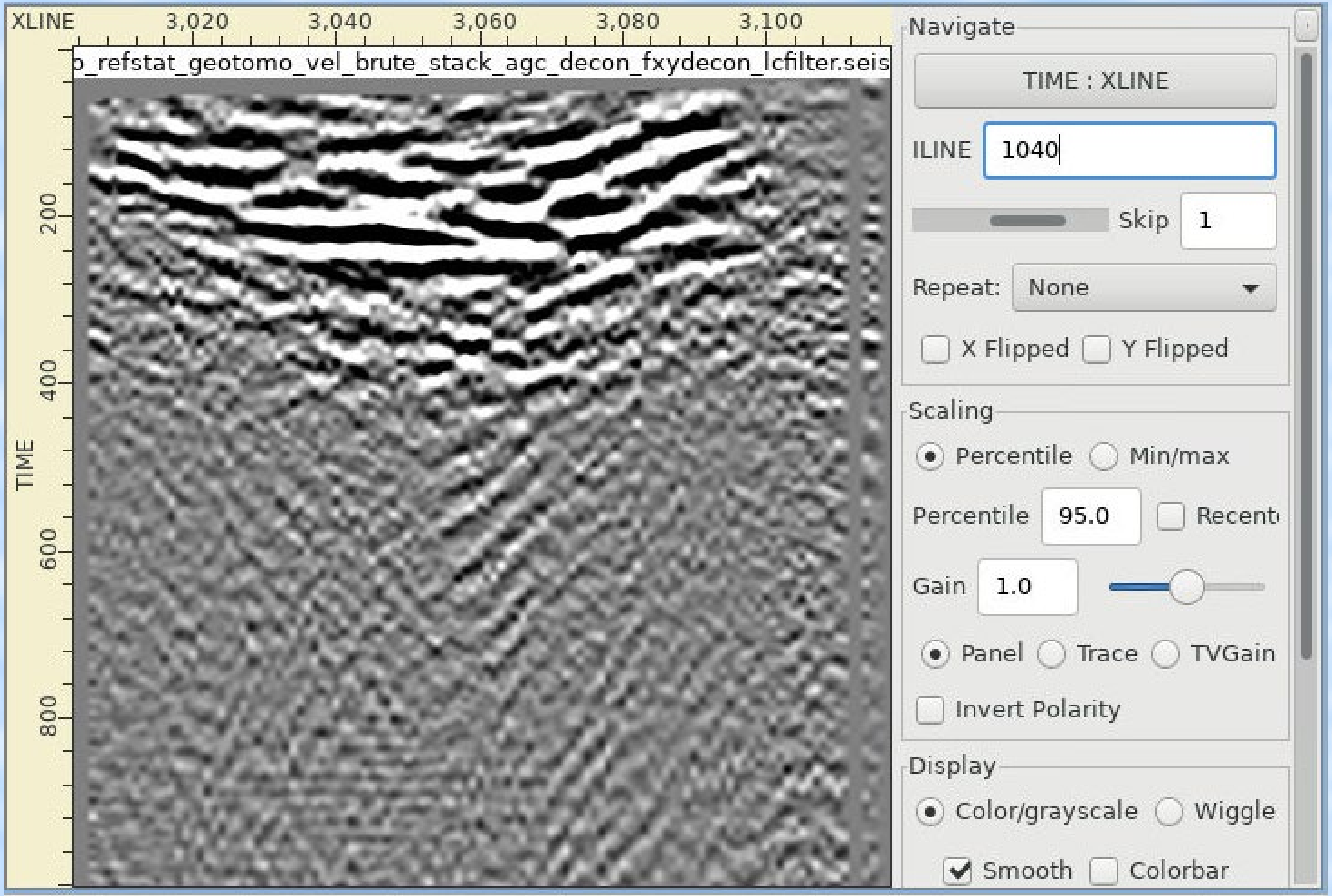
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Refraction Tomography: Stack - IL 1040



_refstat_geotomo_vel_brute_stack_agc_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

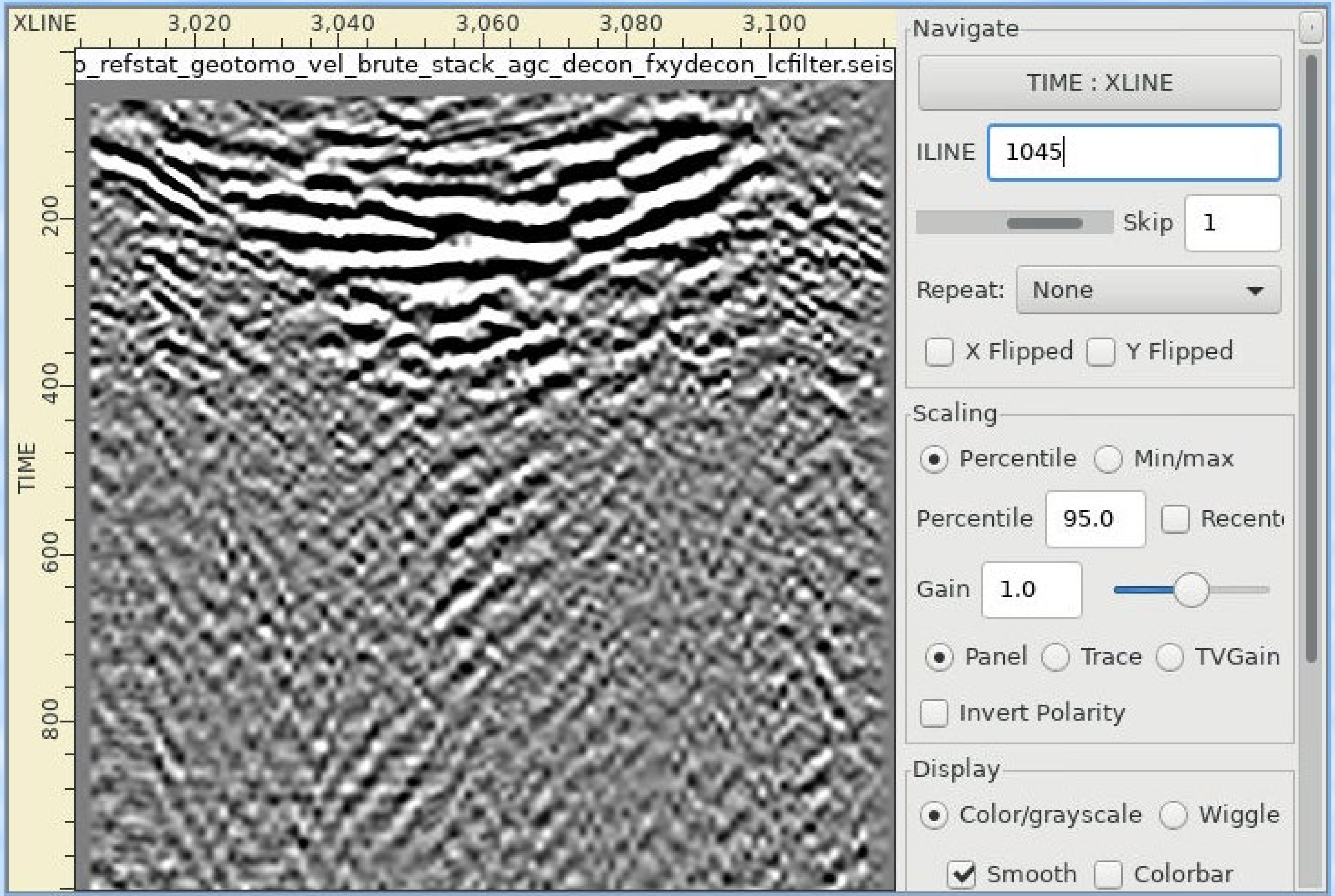
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Refraction Tomography: Stack - IL 1040



ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

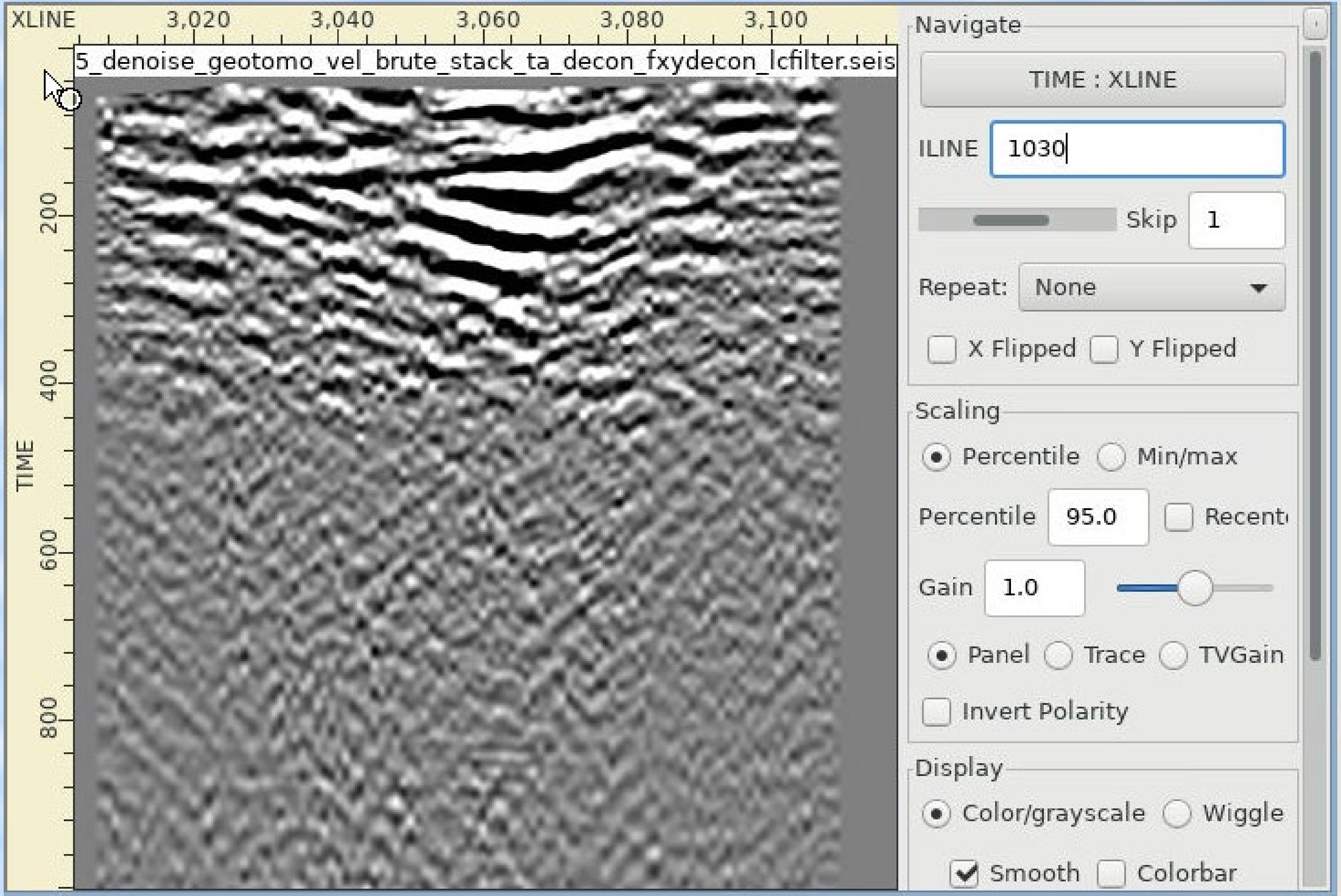
Denoise

- This data is clean as far as burst/environmental noise is concerned.
- Surface waves are strong.
- Main goal of denoising was to attenuate surface noise.

Denoise: Stack

Inlines

Denoise: Stack - IL 1030



5_denoise_geotomo_vel_brute_stack_ta_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

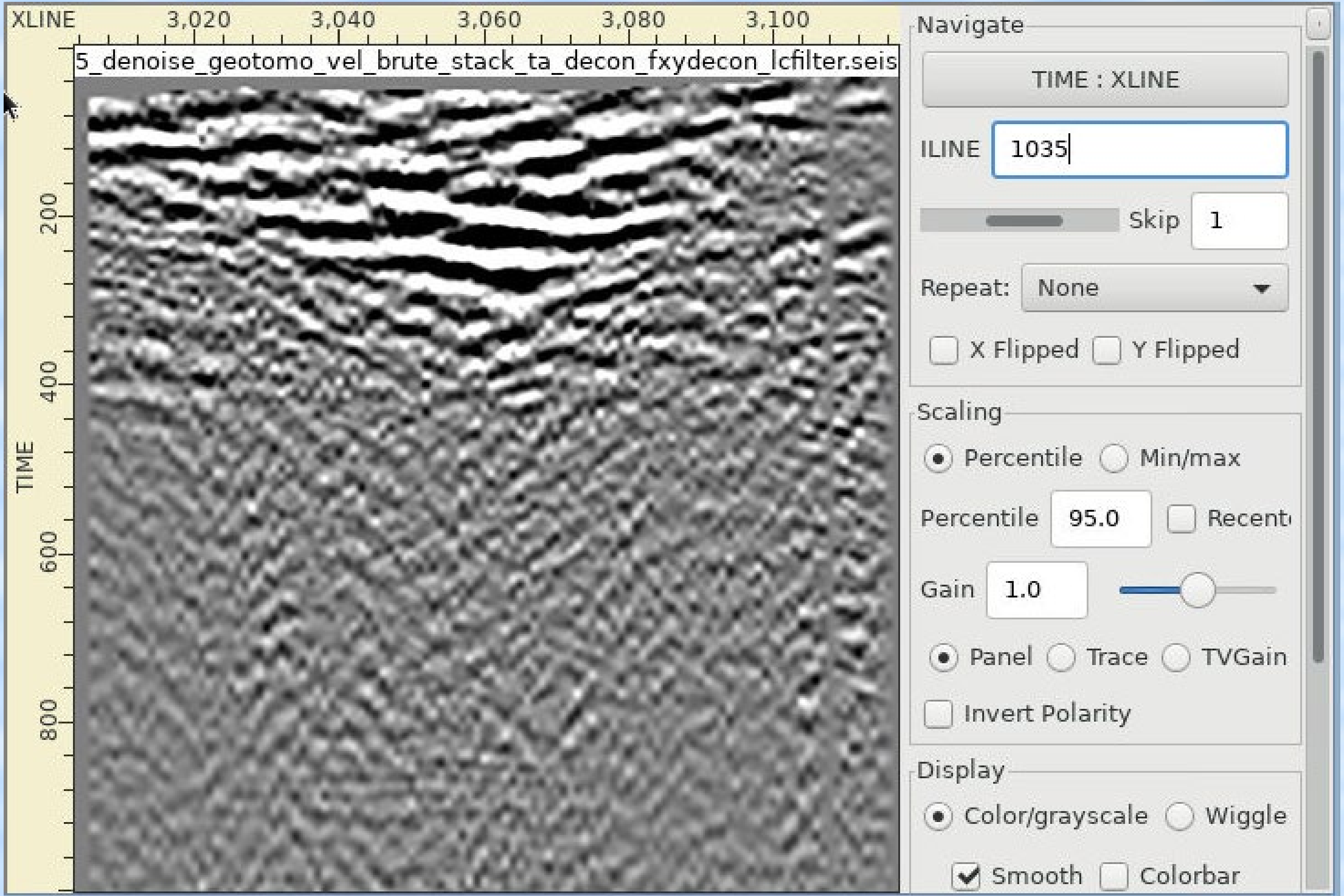
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Denoise: Stack - IL 1035



ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

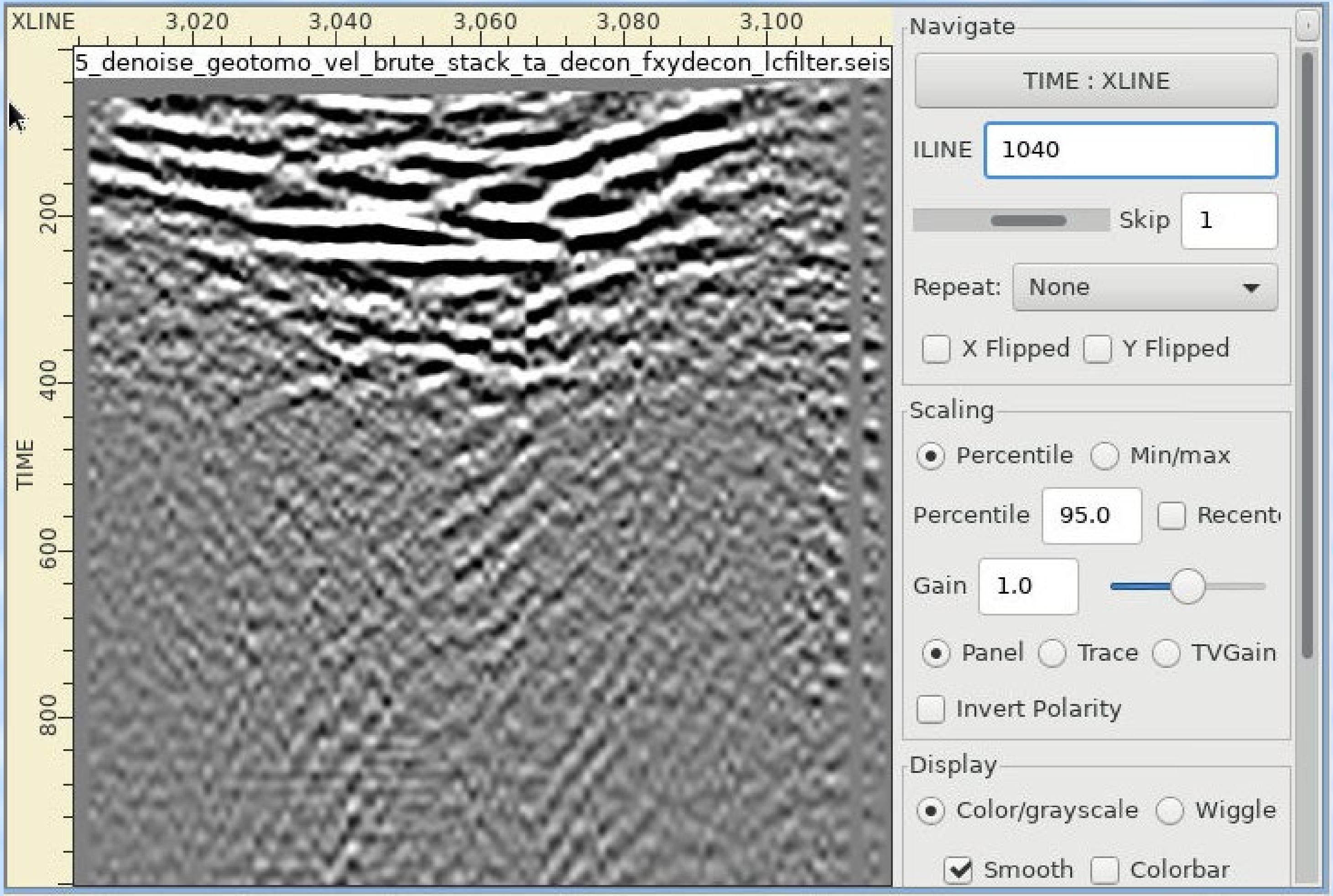
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Denoise: Stack - IL 1040



5_denoise_geotomo_vel_brute_stack_ta_decon_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

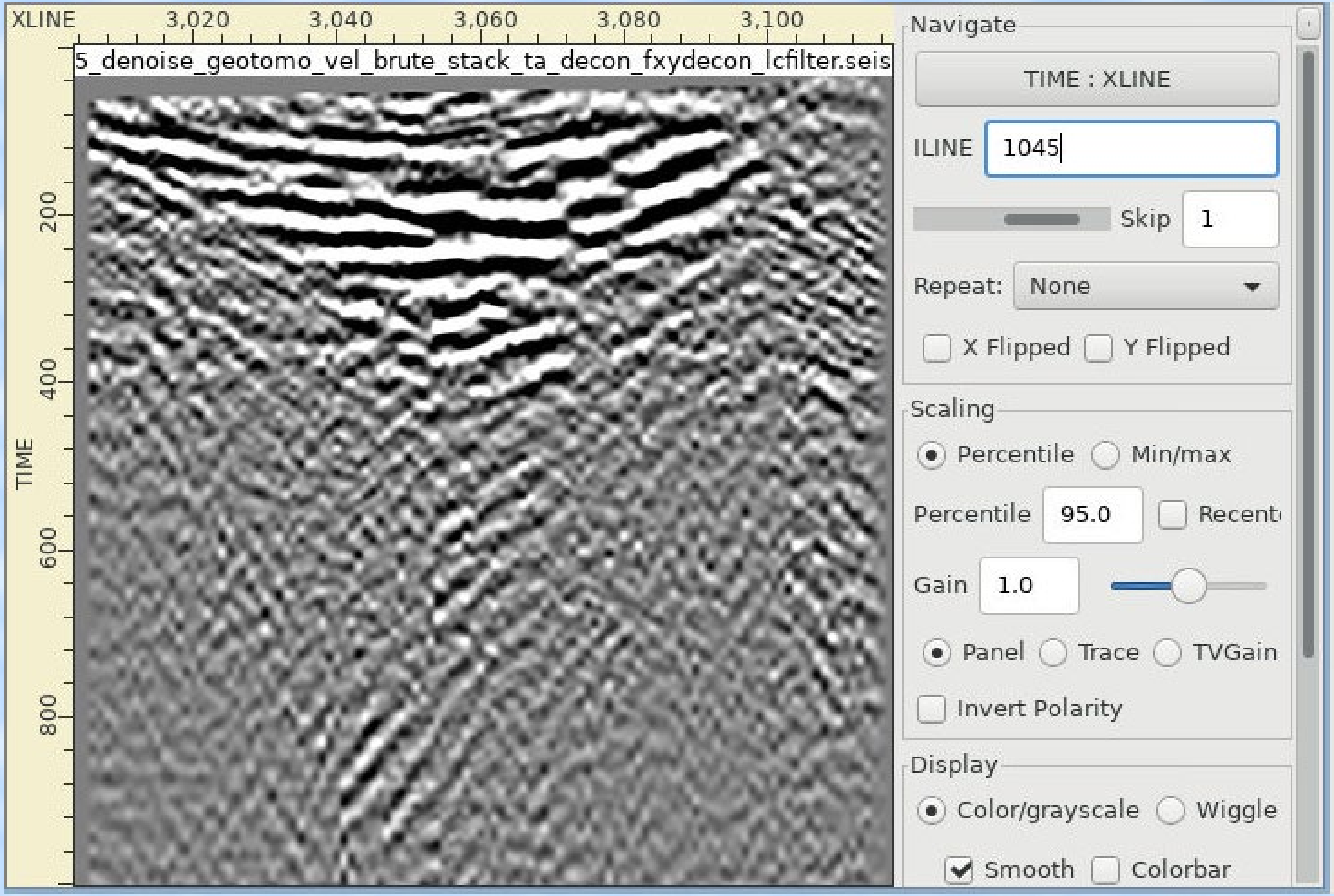
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Denoise: Stack - IL 1045



Navigate

TIME : XLINE

ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

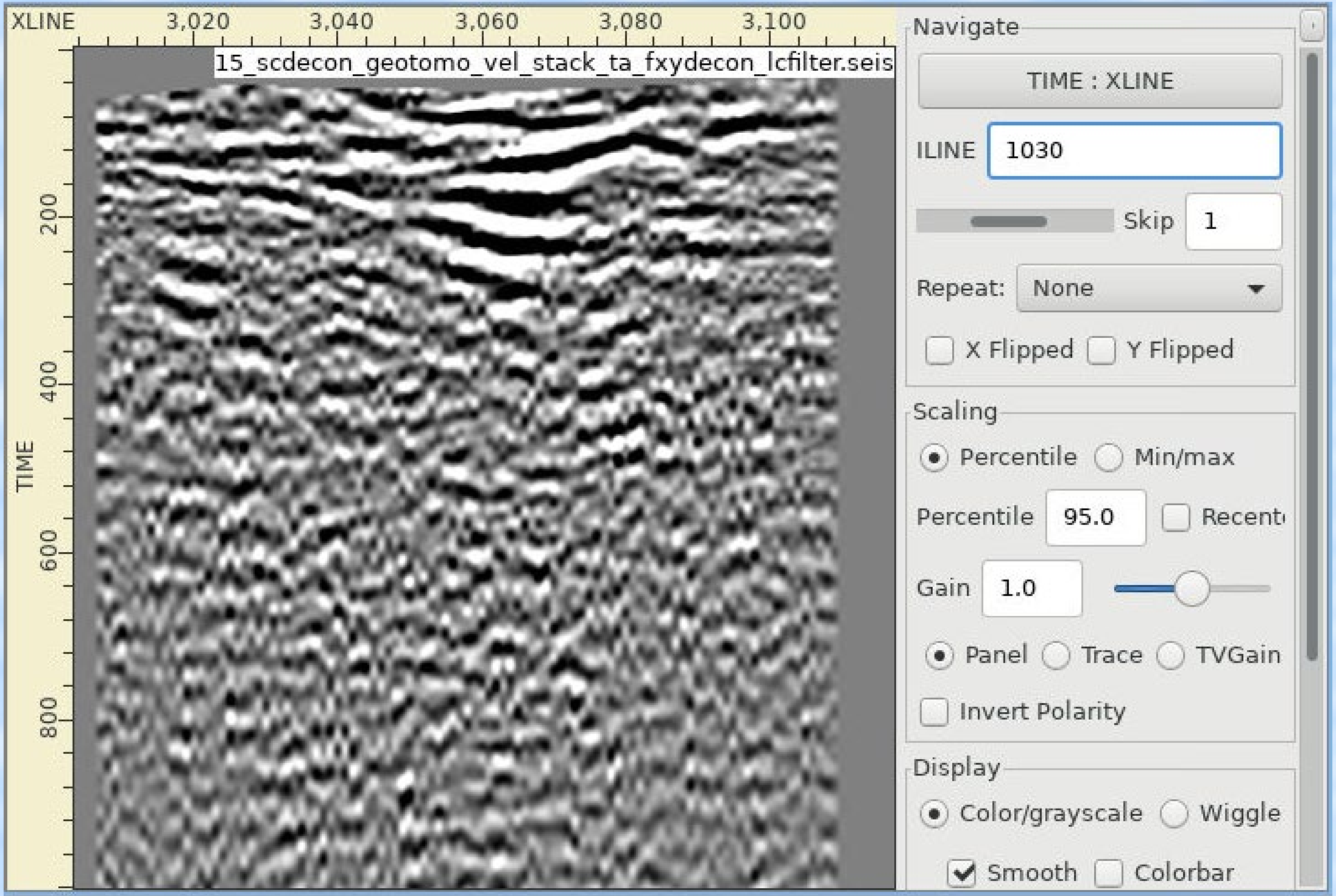
Surface Consistent (SC) Deconvolution

- Surface Consistent (SC) Deconvolution was used to compress the seismic wavelet and broaden frequency band of the data.
- SC Decon parameters used were:
- Gap: 0 ms (Spiking Decon)
- Operator Length: 180 ms

Surface Consistent (SC) Deconvolution: Stack

Inlines

SC Decon: Stack - IL 1030



ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

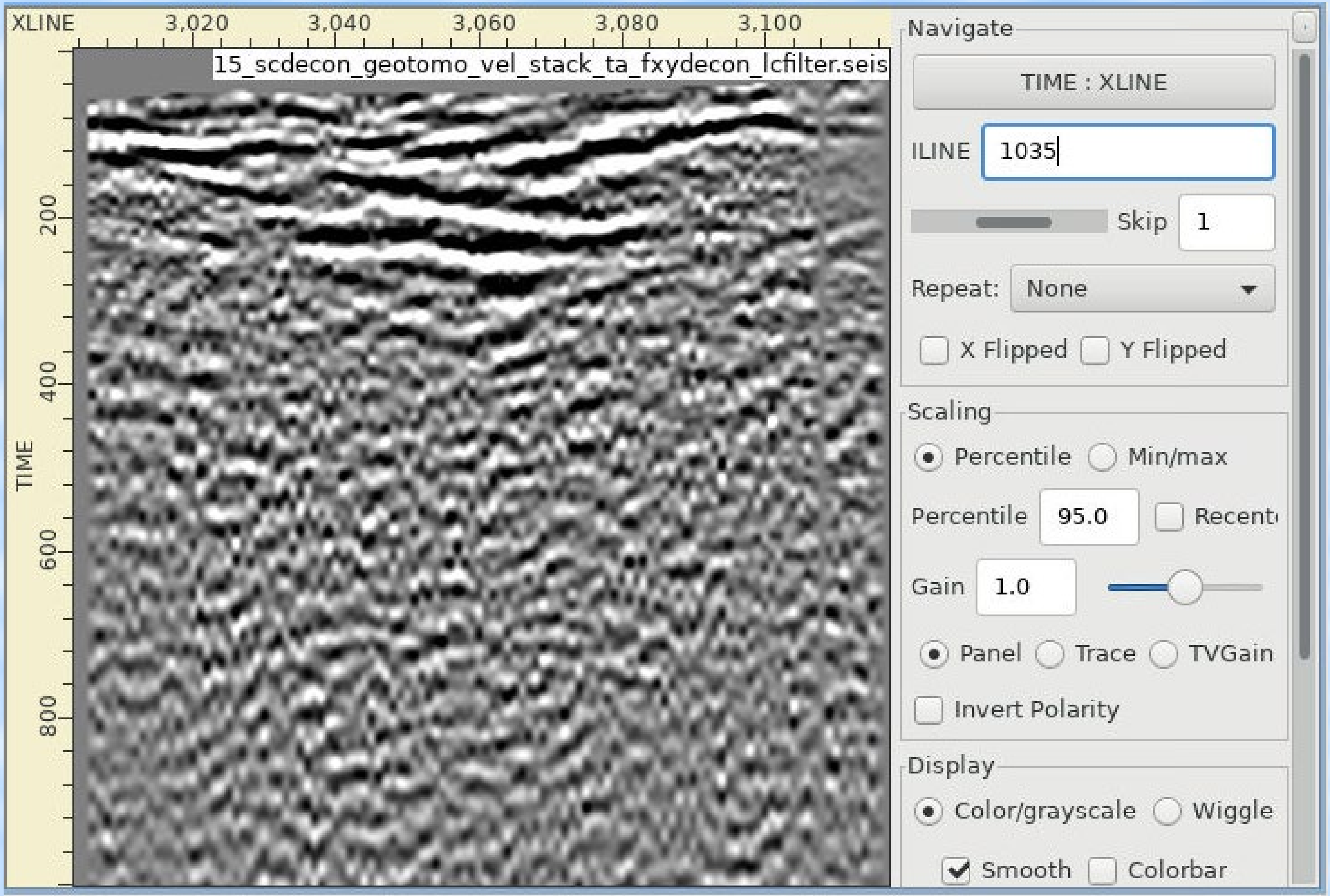
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

SC Decon: Stack - IL 1035



15_scdecon_geotomo_vel_stack_ta_fxydecon_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

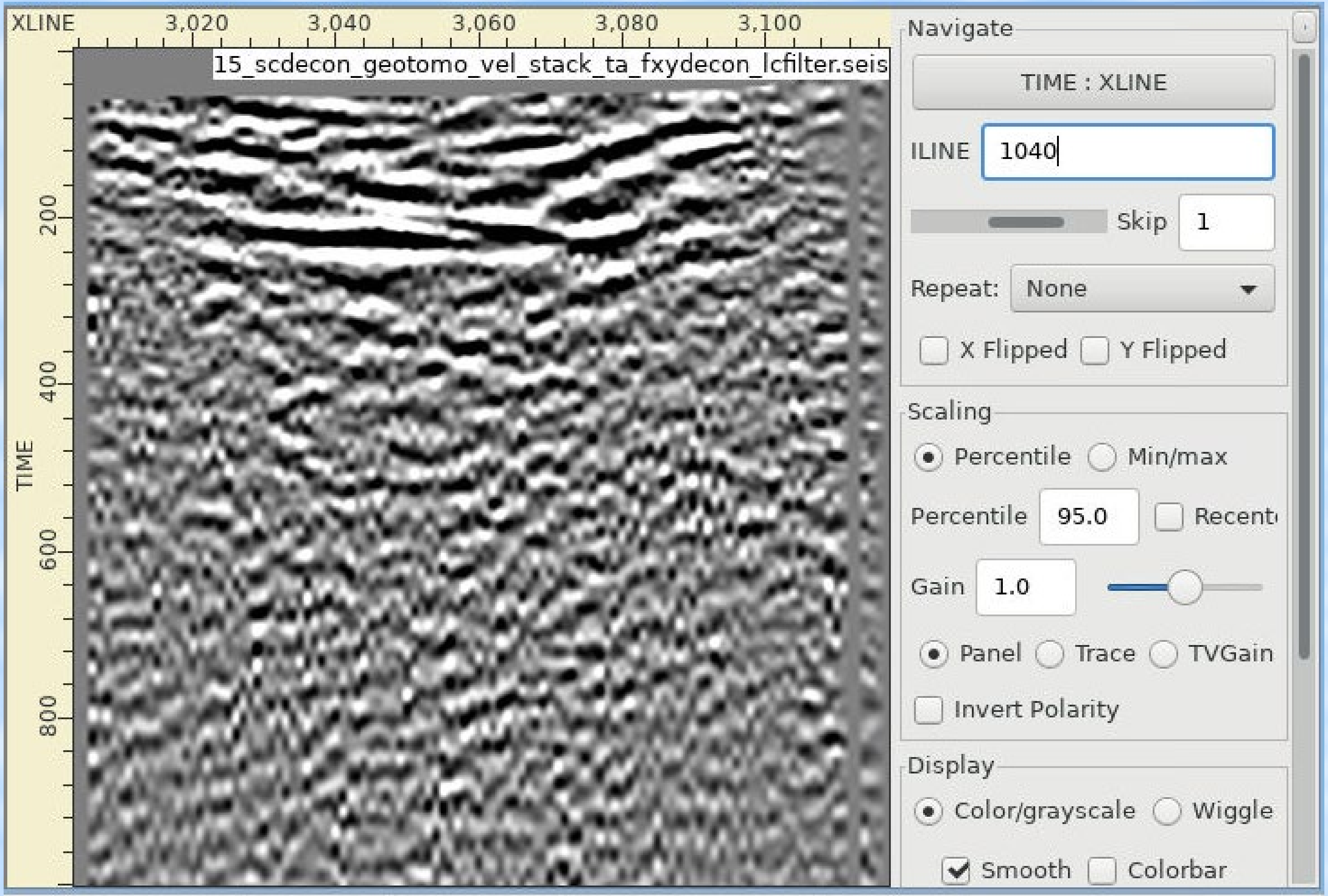
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

SC Decon: Stack - IL 1040



ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

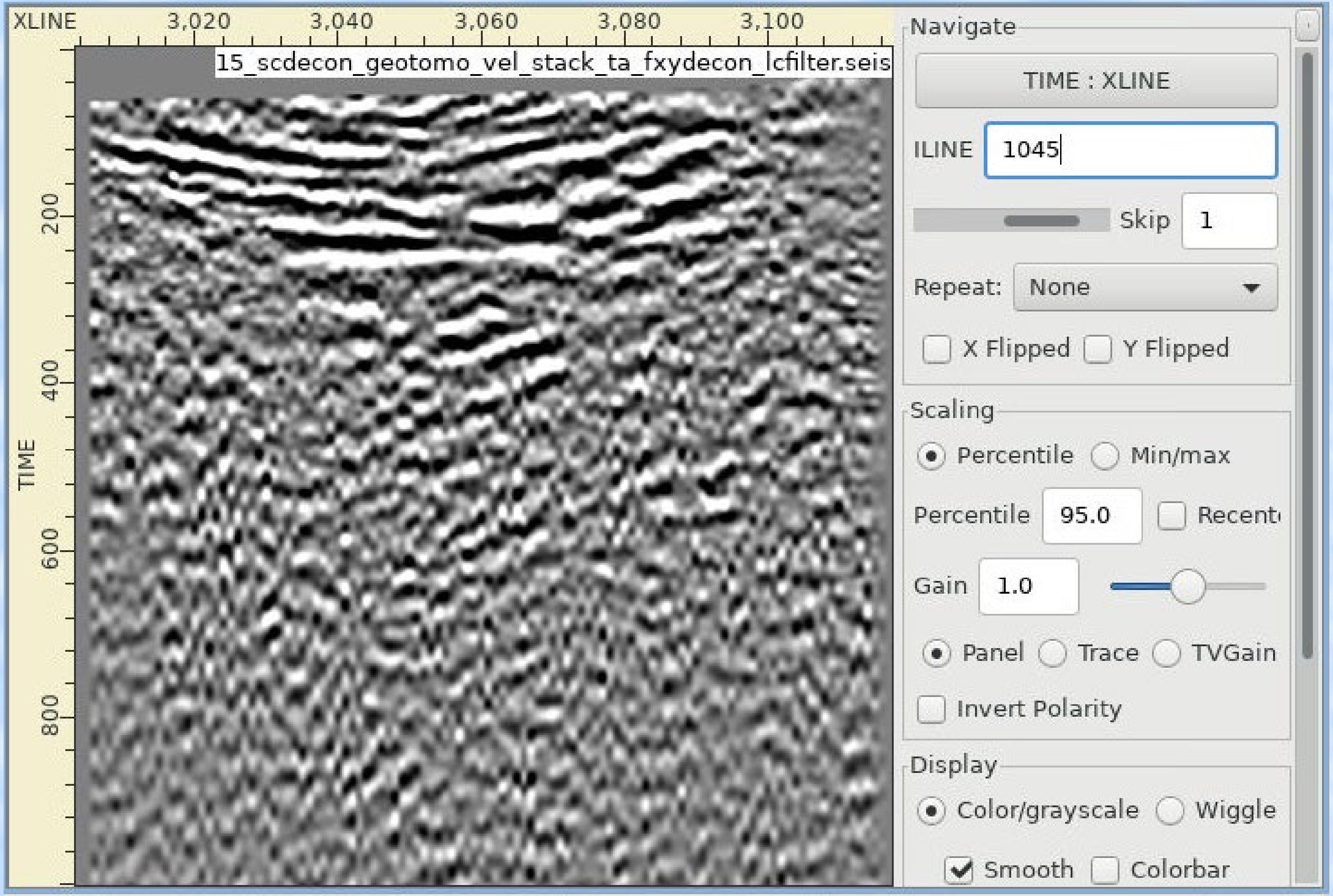
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

SC Decon: Stack - IL 1045



15_scdecon_geotomo_vel_stack_ta_fxydecon_lcfilter.seis

ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Residual Statics and Q-Compensation

- Residual Statics was done to enhance continuity of horizons.
- Q-Compensation was done to compensate for loss of frequency due to low Q (Quality Factor).

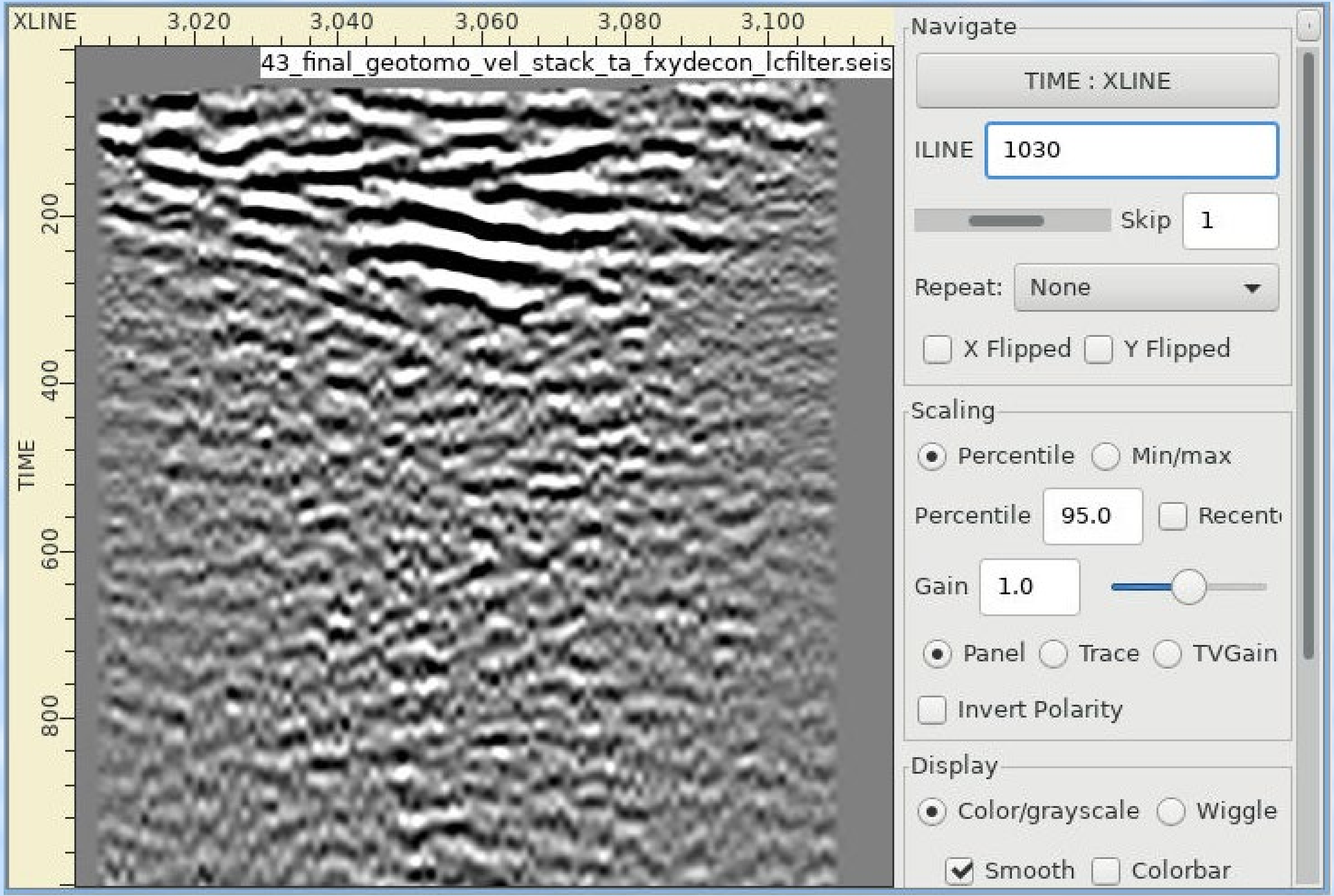
Final Processing

- Final processing steps included Residual Statics and Q-Compensation.
- Residual Statics was done to enhance continuity of horizons.
- Q-Compensation was done to compensate for loss of frequency due to low Q (Quality Factor).
- Often, additional denoising is done in the final stage of processing. However, in this case because the data was clean no additional denoising was done.

Final Processing: Stack

Inlines

Final Processing: Stack - IL 1030



ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

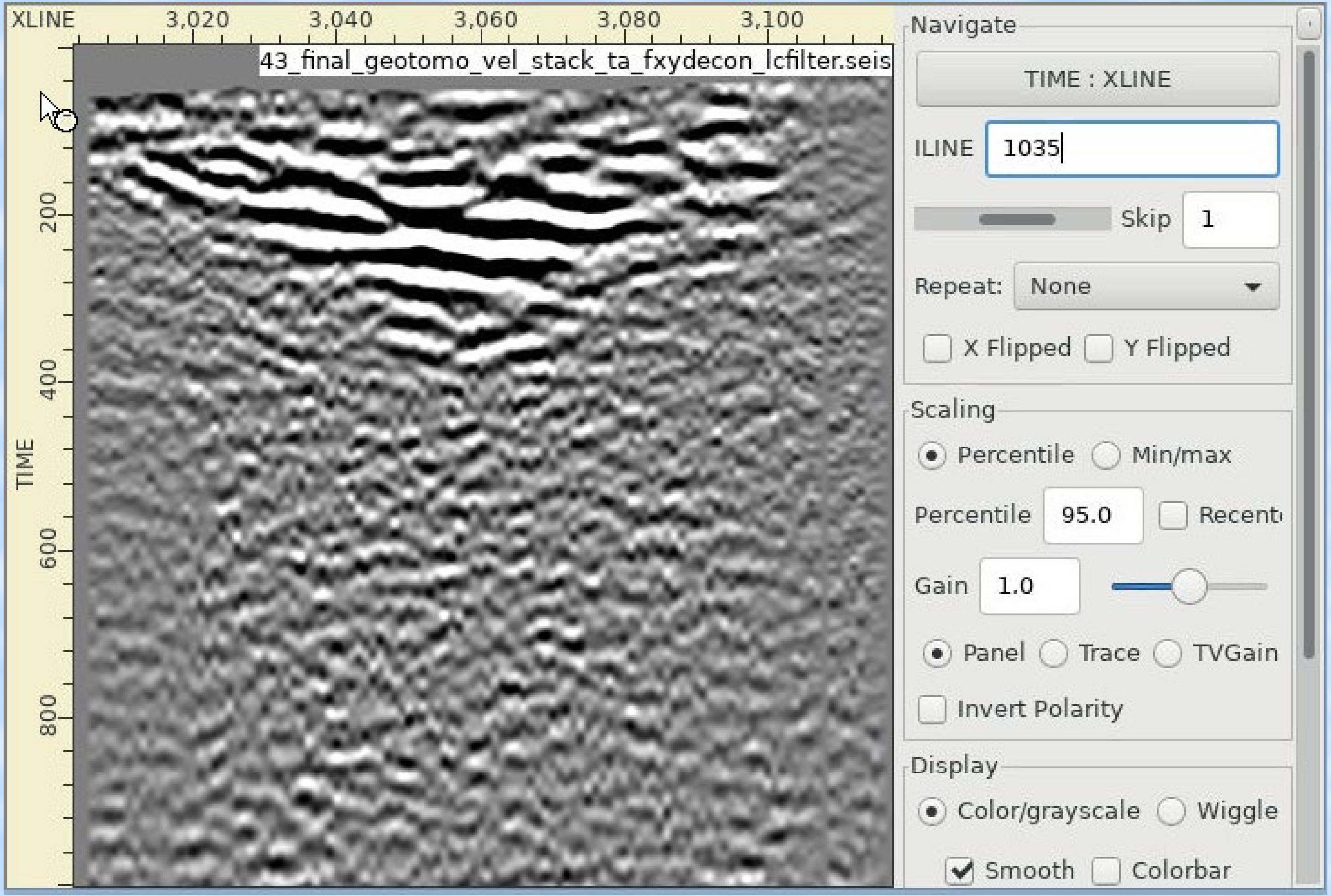
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: Stack - IL 1035



43_final_geotomo_vel_stack_ta_fxydecon_lcfilter.seis

ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

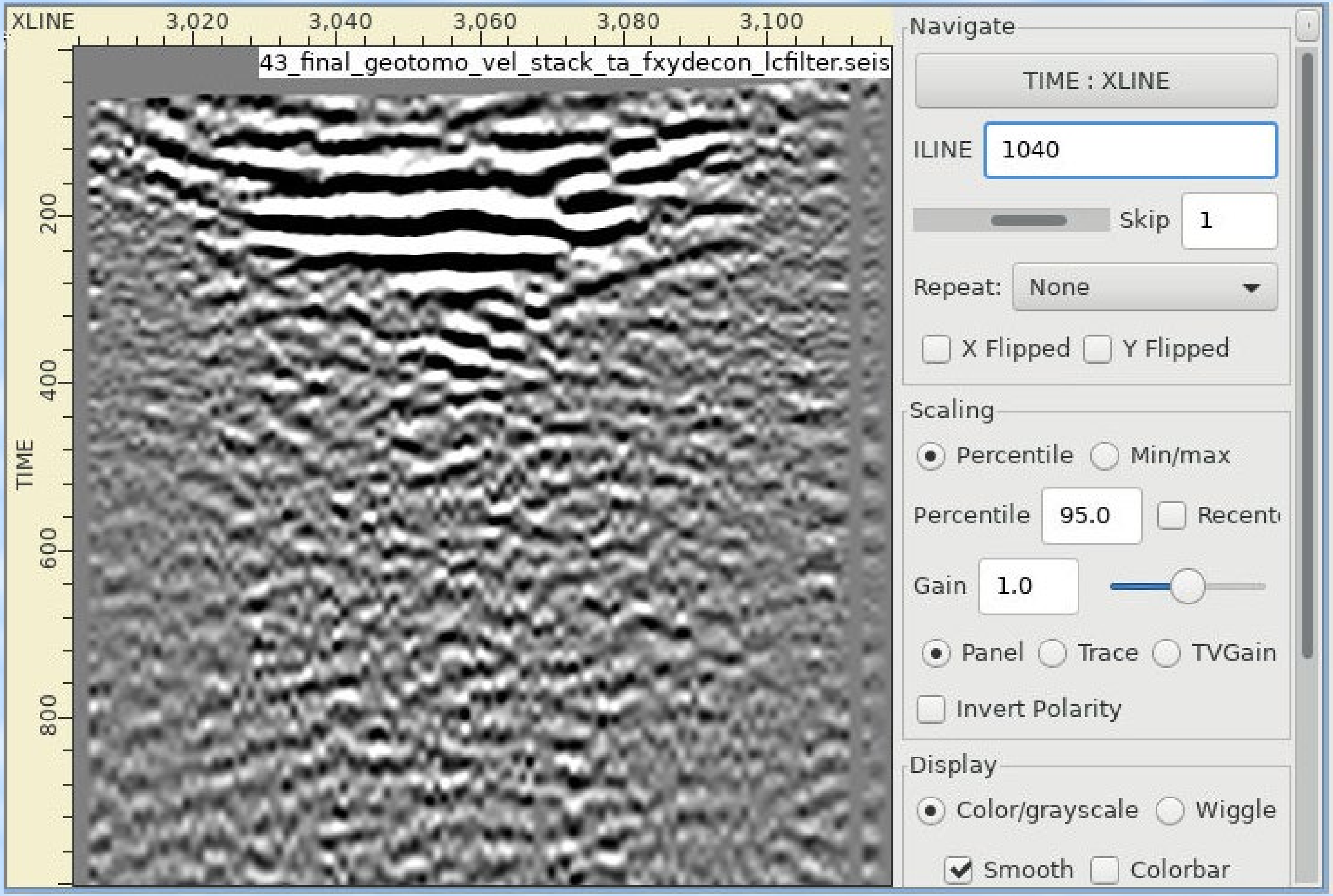
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: Stack - IL 1040



Navigate

TIME : XLINE

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

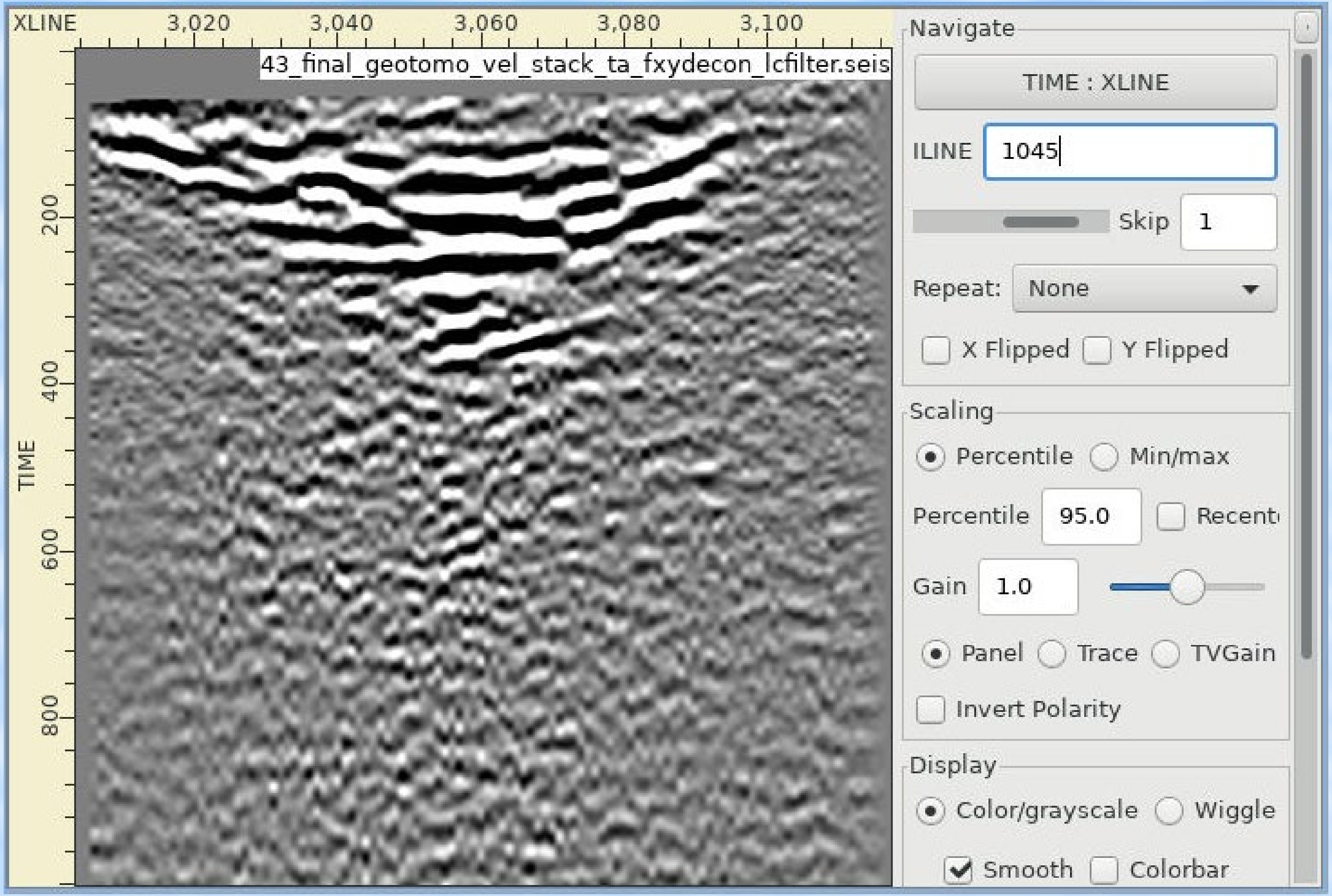
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: Stack - IL 1045



43_final_geotomo_vel_stack_ta_fxydecon_lcfilter.seis

ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

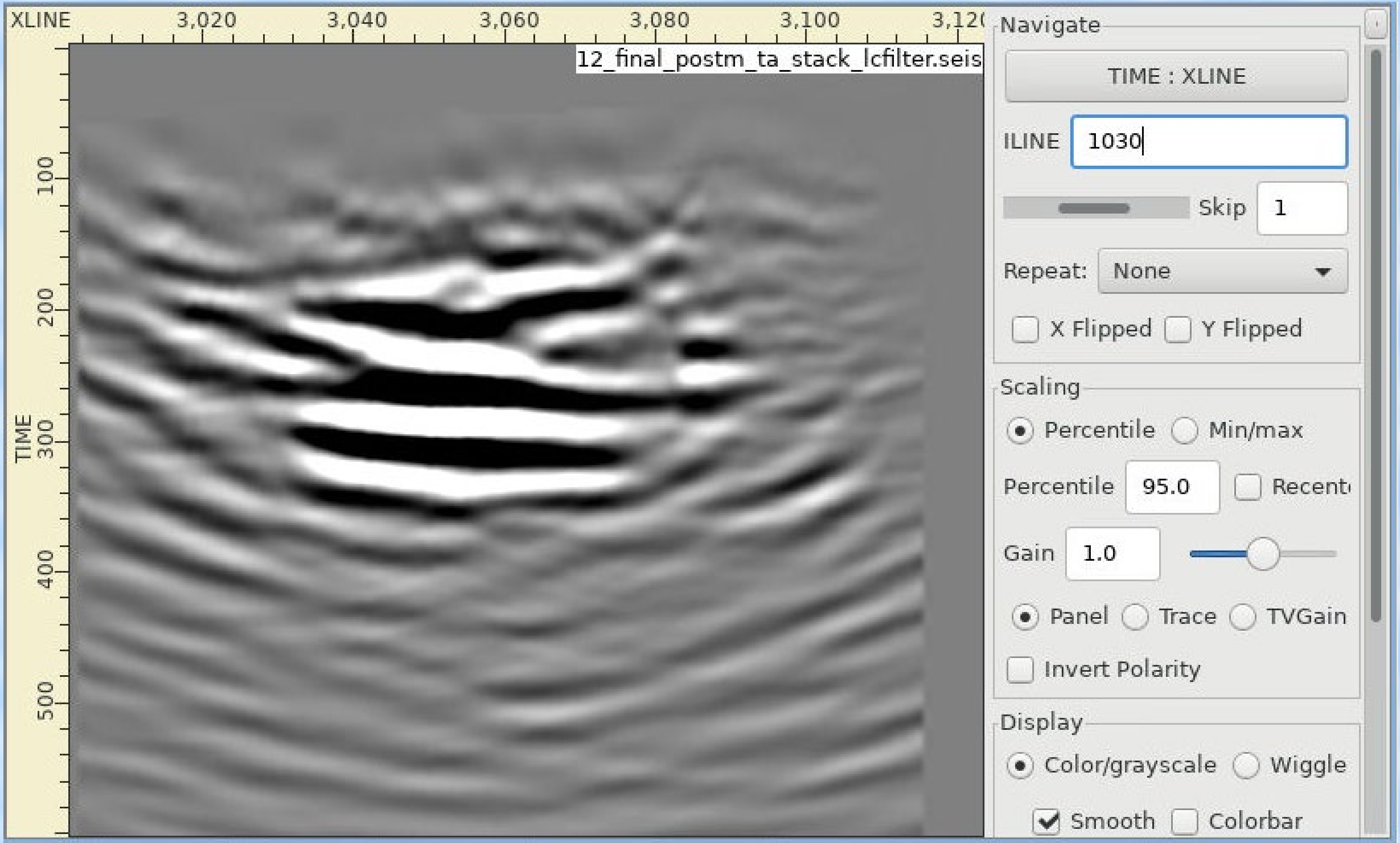
Time Migration

- Migration is done in order collapse diffraction hyperbolas at reflectors and faults as well as to correctly position steeply dipping seismic events.
- Two types of seismic time migration were tested:
    - Kirchhoff Post-stack Time Migration (PoSTM)
    - Kirchhoff Pre-stack Time Migration (PSTM)
- Better results were produced by Kirchhoff PoSTM.

Final Processing: PoSTM Stack

Inlines

Final Processing: PoSTM Stack - IL 1030



12_final_postm_ta_stack_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1030

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

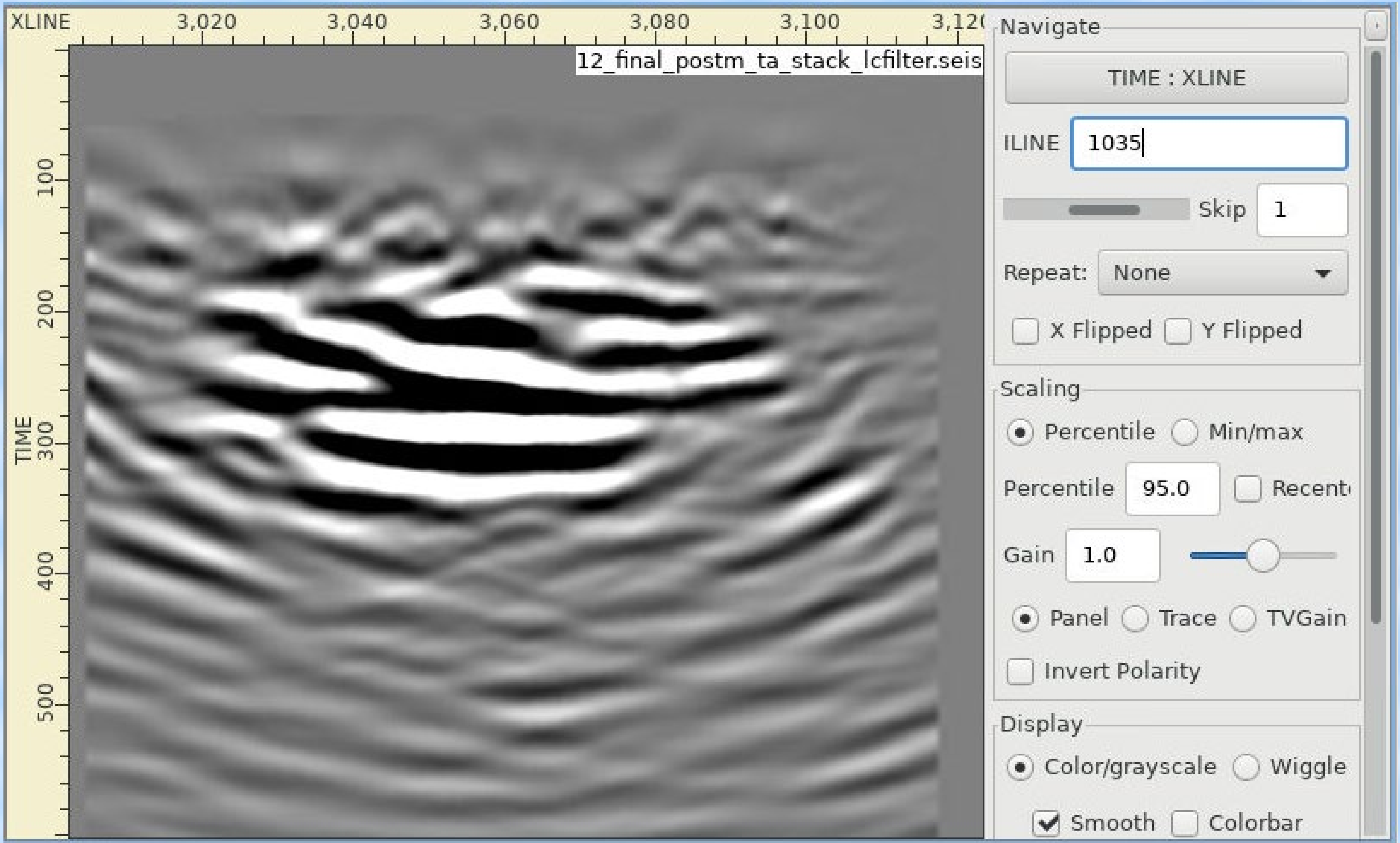
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: PoSTM Stack - IL 1035



12_final_postm_ta_stack_lcfilter.seis

ILINE 1035

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

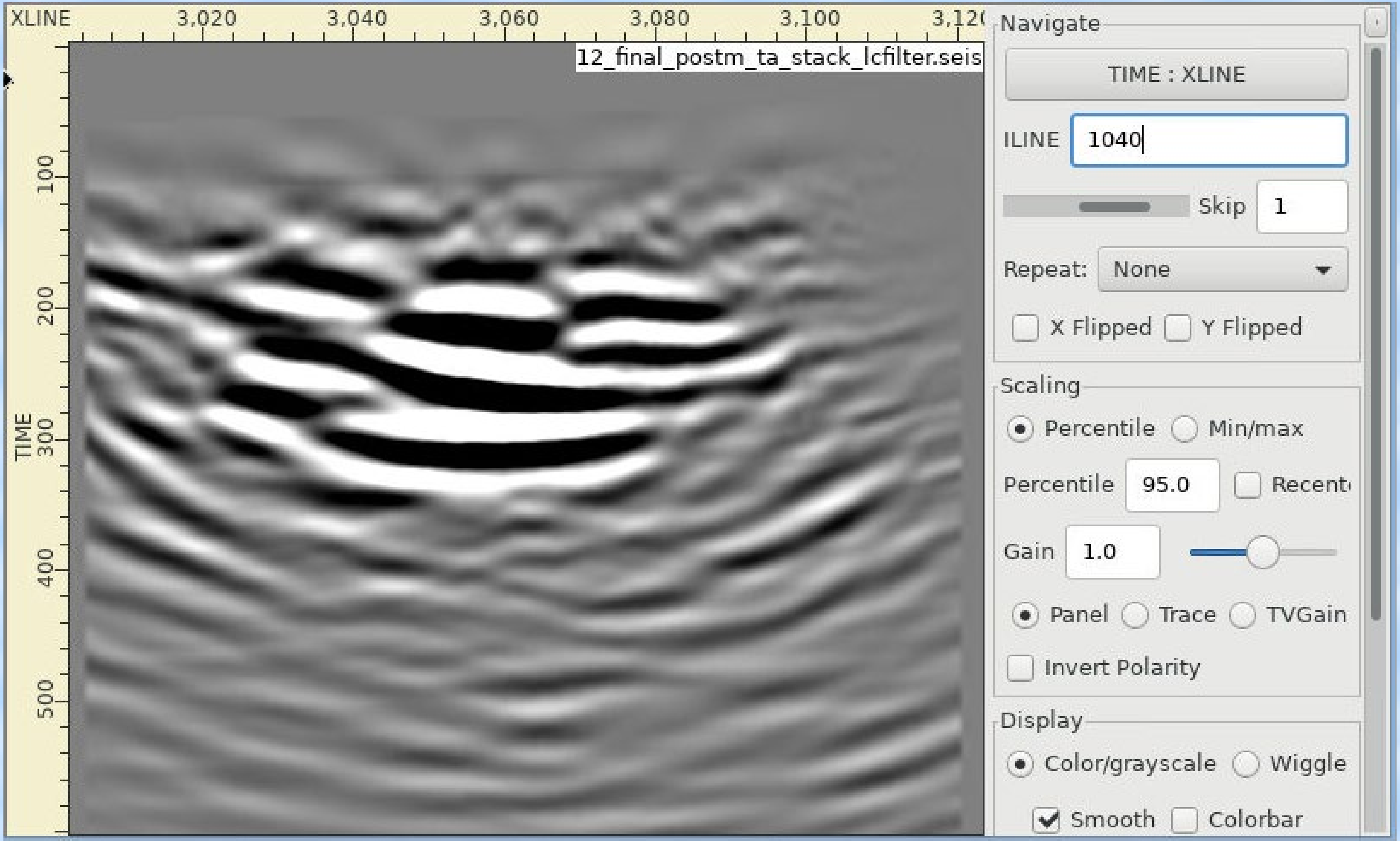
● Panel ○ Trace ○ TVGain

☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: PoSTM Stack - IL 1040



12_final_postm_ta_stack_lcfilter.seis

Navigate

TIME : XLINE

ILINE 1040

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

Scaling

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

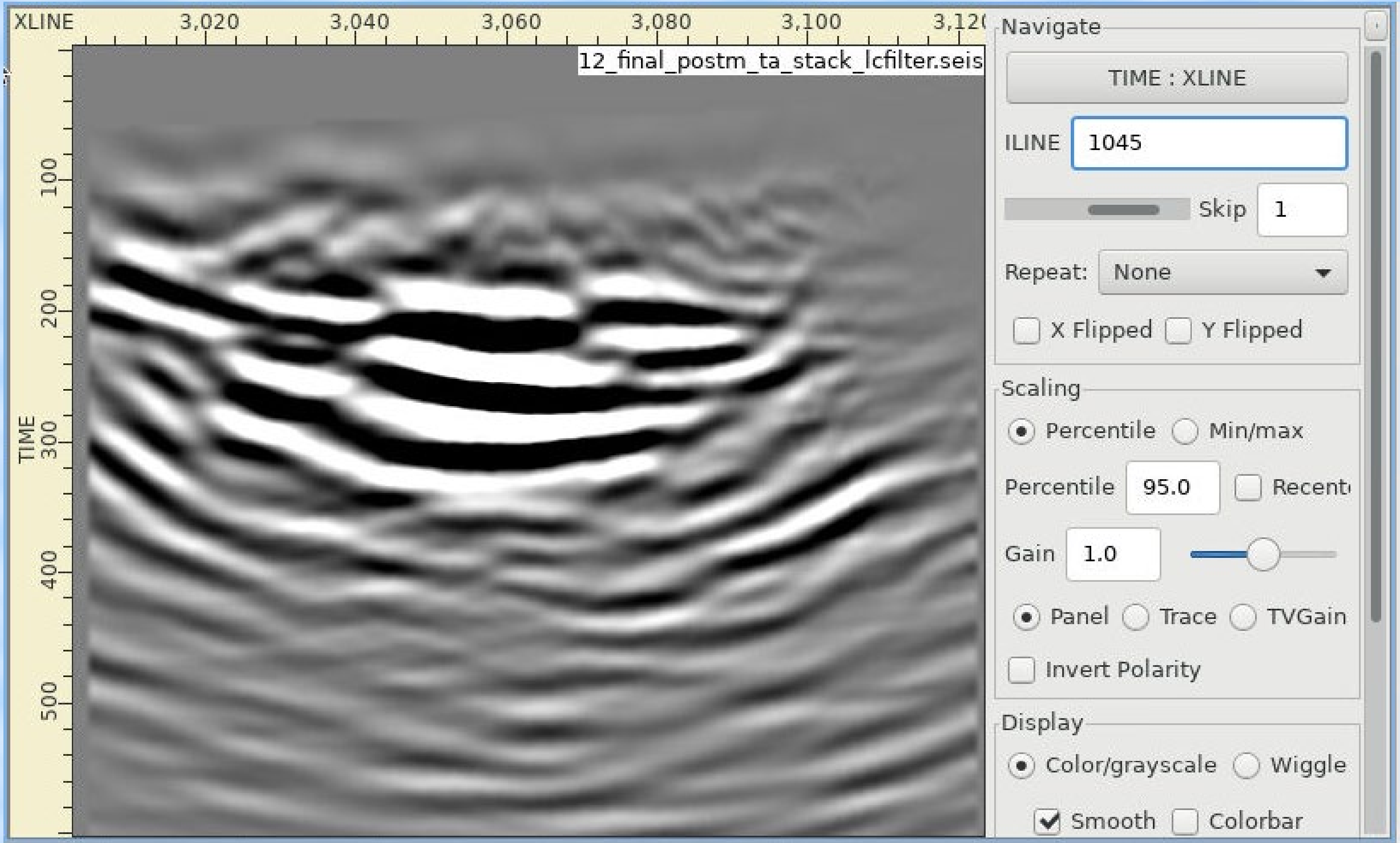
☐ Invert Polarity

Display

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Processing: PoSTM Stack - IL 1045



ILINE 1045

Skip 1

Repeat: None

☐ X Flipped ☐ Y Flipped

● Percentile ○ Min/max

Percentile 95.0 ☐ Recent

Gain 1.0

● Panel ○ Trace ○ TVGain

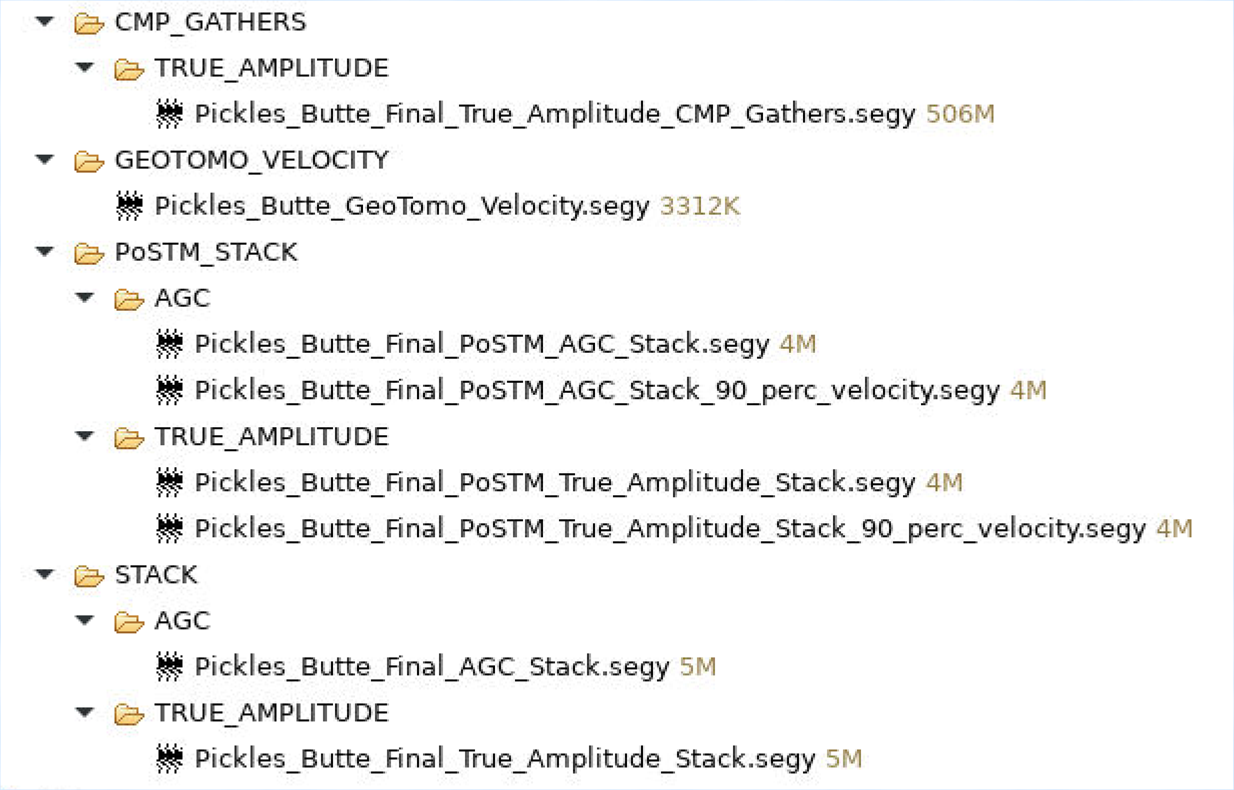
☐ Invert Polarity

● Color/grayscale ○ Wiggle

☑ Smooth ☐ Colorbar

Final Deliverables

- Pickles Butte seismic processing Final Deliverables are shown below:



- CMP_GATHERS
  - TRUE_AMPLITUDE
    - Pickles_Butte_Final_True_Amplitude_CMP_Gathers.segy 506M
- GEOTOMO_VELOCITY
  - Pickles_Butte_GeoTomo_Velocity.segy 3312K
- PoSTM_STACK
  - AGC
    - Pickles_Butte_Final_PoSTM_AGC_Stack.segy 4M
    - Pickles_Butte_Final_PoSTM_AGC_Stack_90_perc_velocity.segy 4M
  - TRUE_AMPLITUDE
    - Pickles_Butte_Final_PoSTM_True_Amplitude_Stack.segy 4M
    - Pickles_Butte_Final_PoSTM_True_Amplitude_Stack_90_perc_velocity.segy 4M
- STACK
  - AGC
    - Pickles_Butte_Final_AGC_Stack.segy 5M
  - TRUE_AMPLITUDE
    - Pickles_Butte_Final_True_Amplitude_Stack.segy 5M

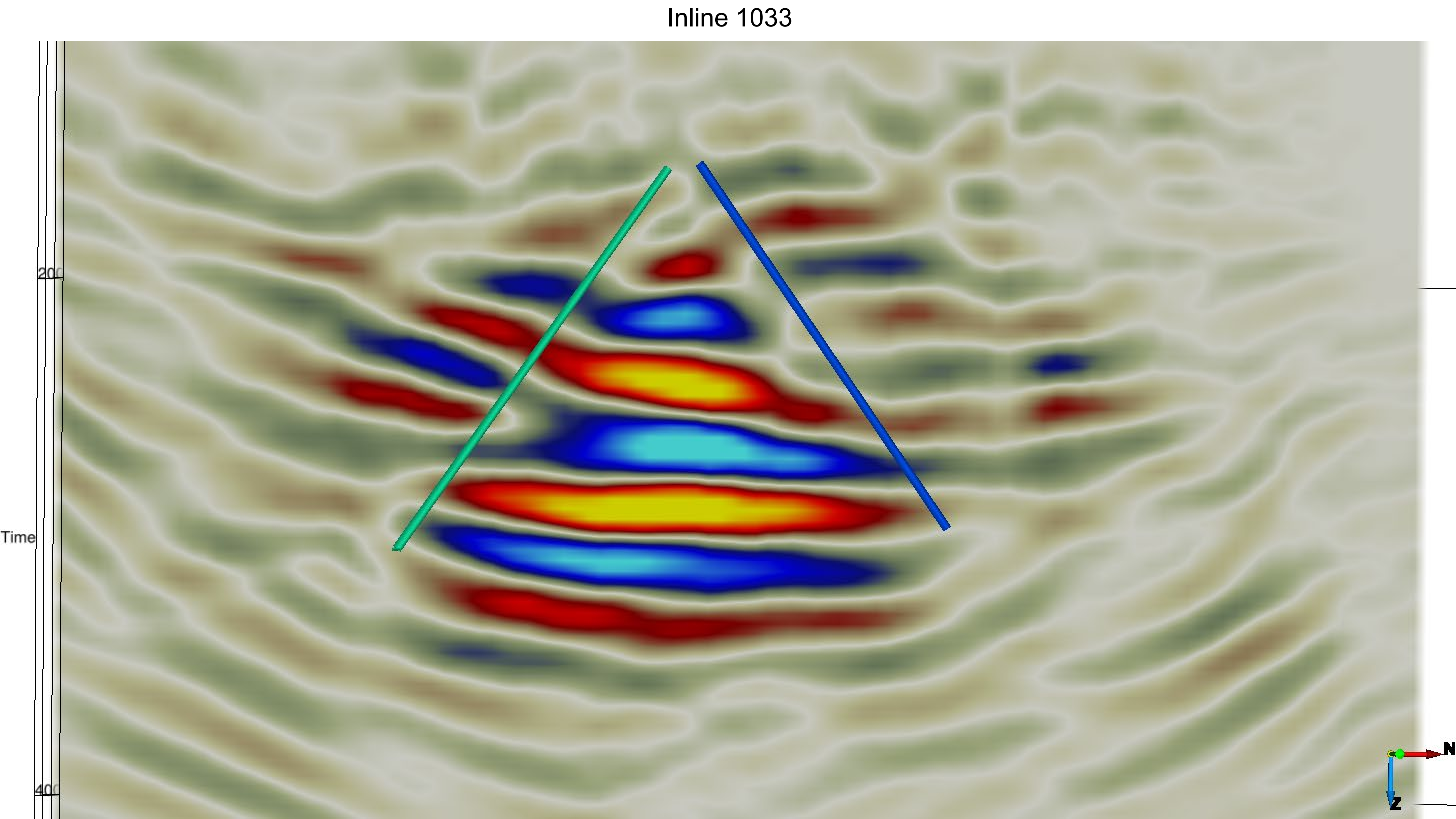
Conclusions

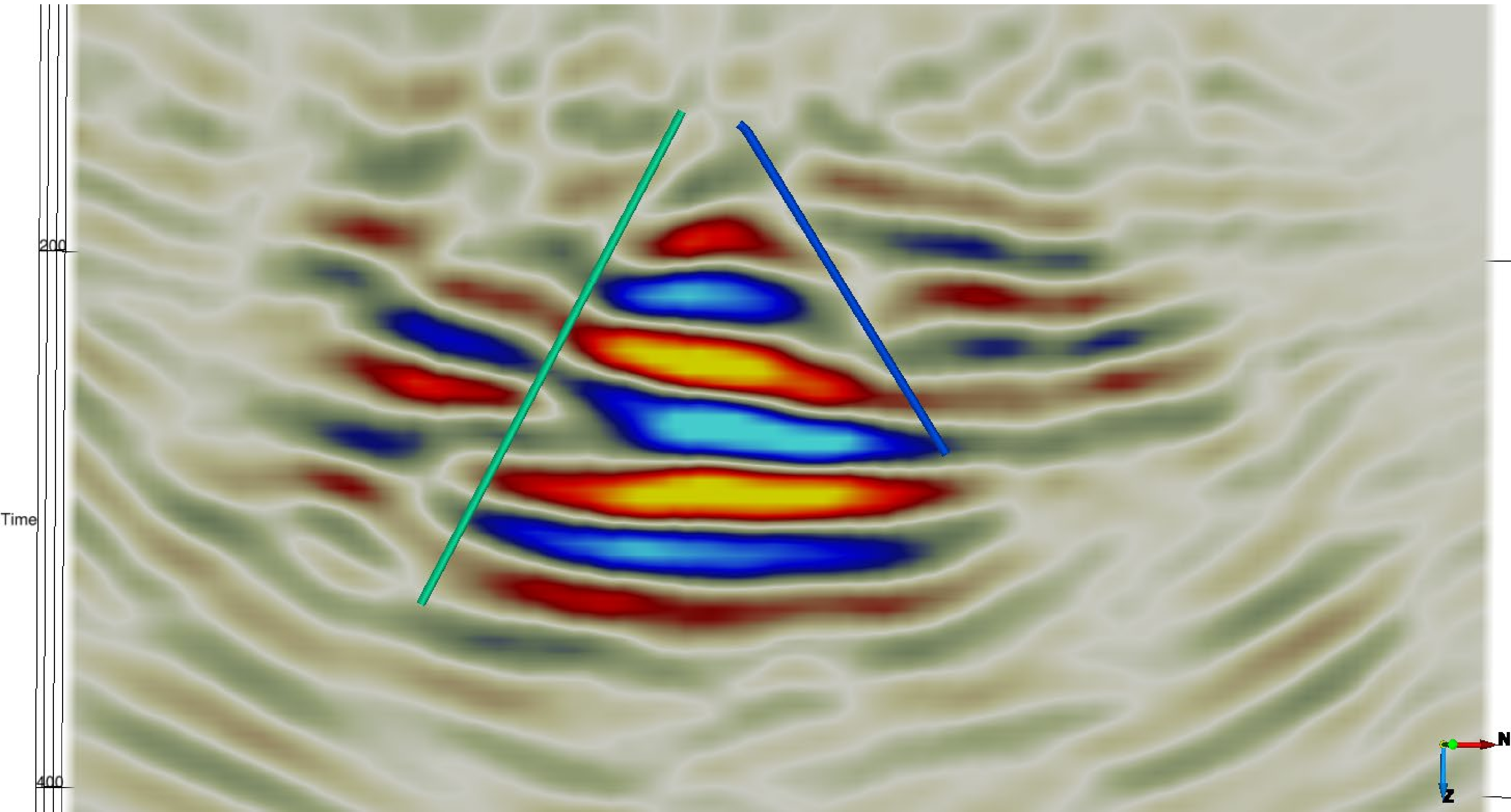
- Pickles Butte seismic surveys was processed through time migration.
- Data was clean as far as environmental noise is concerned but it had strong surface waves.
- Clean data enabled good First Break (FB) picks and that is important for refraction Tomography.
- Denoising goal was to attenuate surface waves.
- SC Decon improved resolution of the data.
- Residual statics improved continuity of the data.
- Both Kirchhoff PoSTM and PSTM were tested. PoSTM results were better.

Appendix B

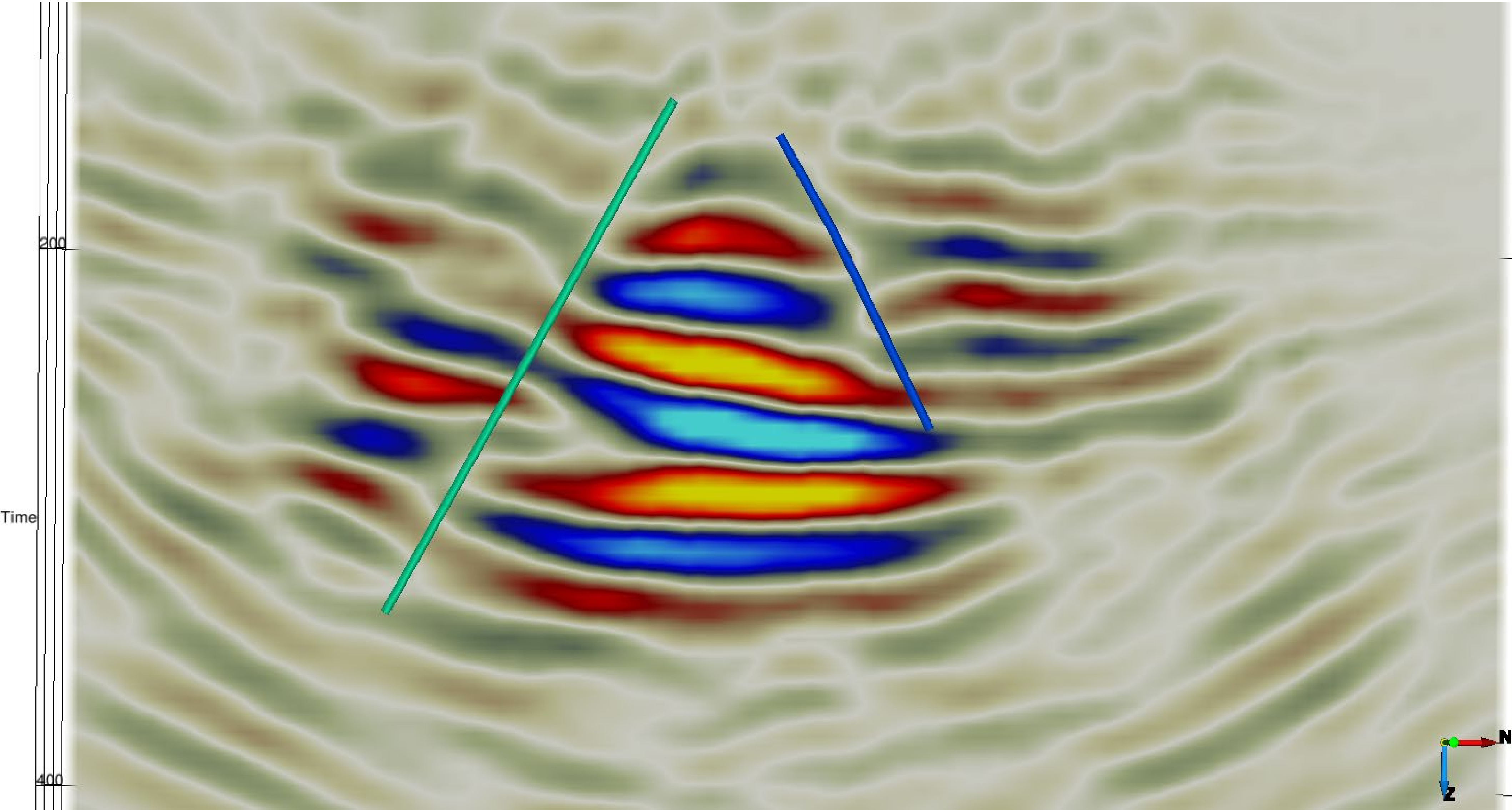
True Amplitude Inline Snapshots With Fault Picks

Pickles Butte 3D Seismic Survey Report
Pickles Butte, Idaho
Project No. 114-571040-2022


Inline 1033
200
Time
400
N
Z

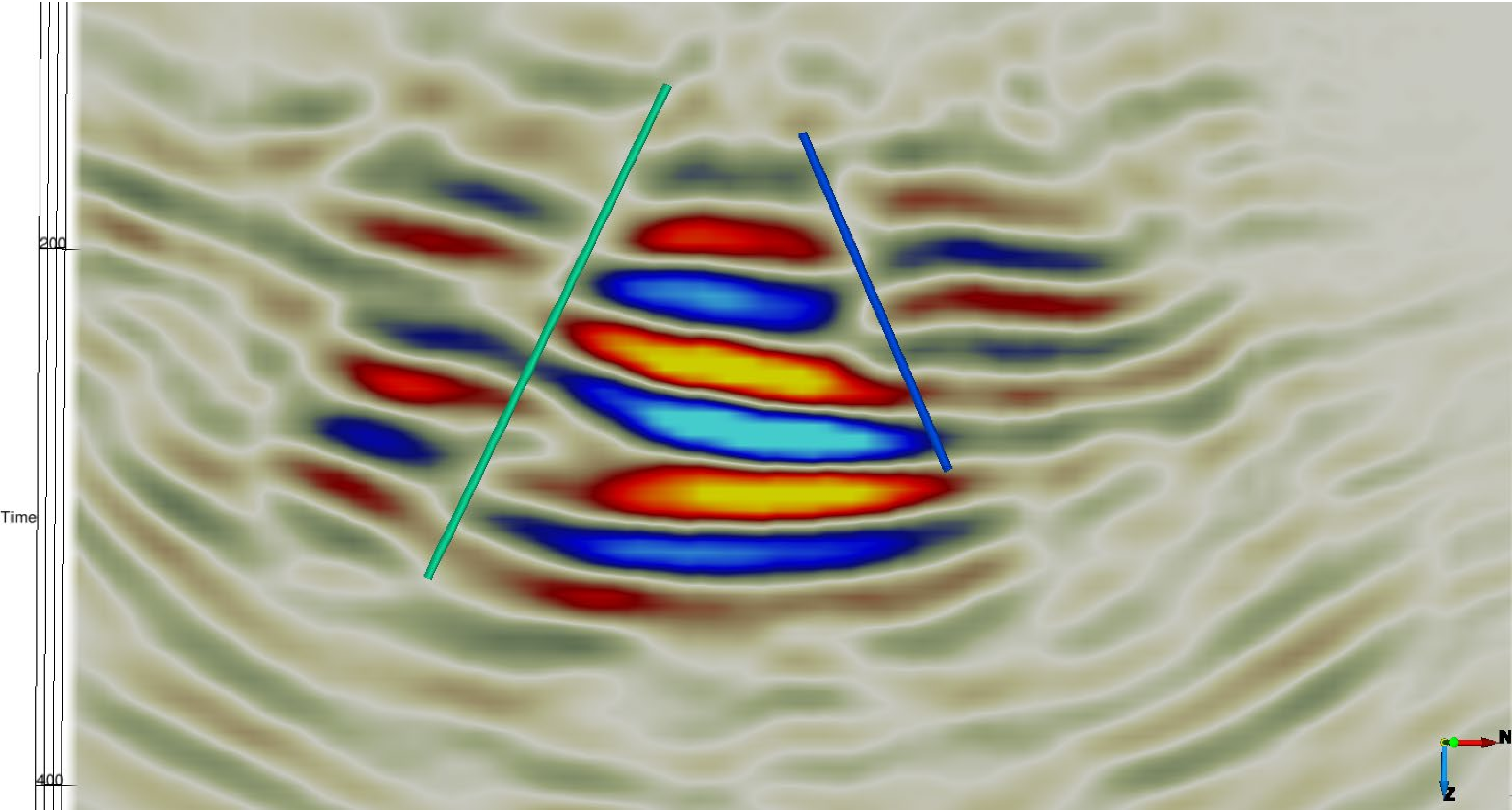


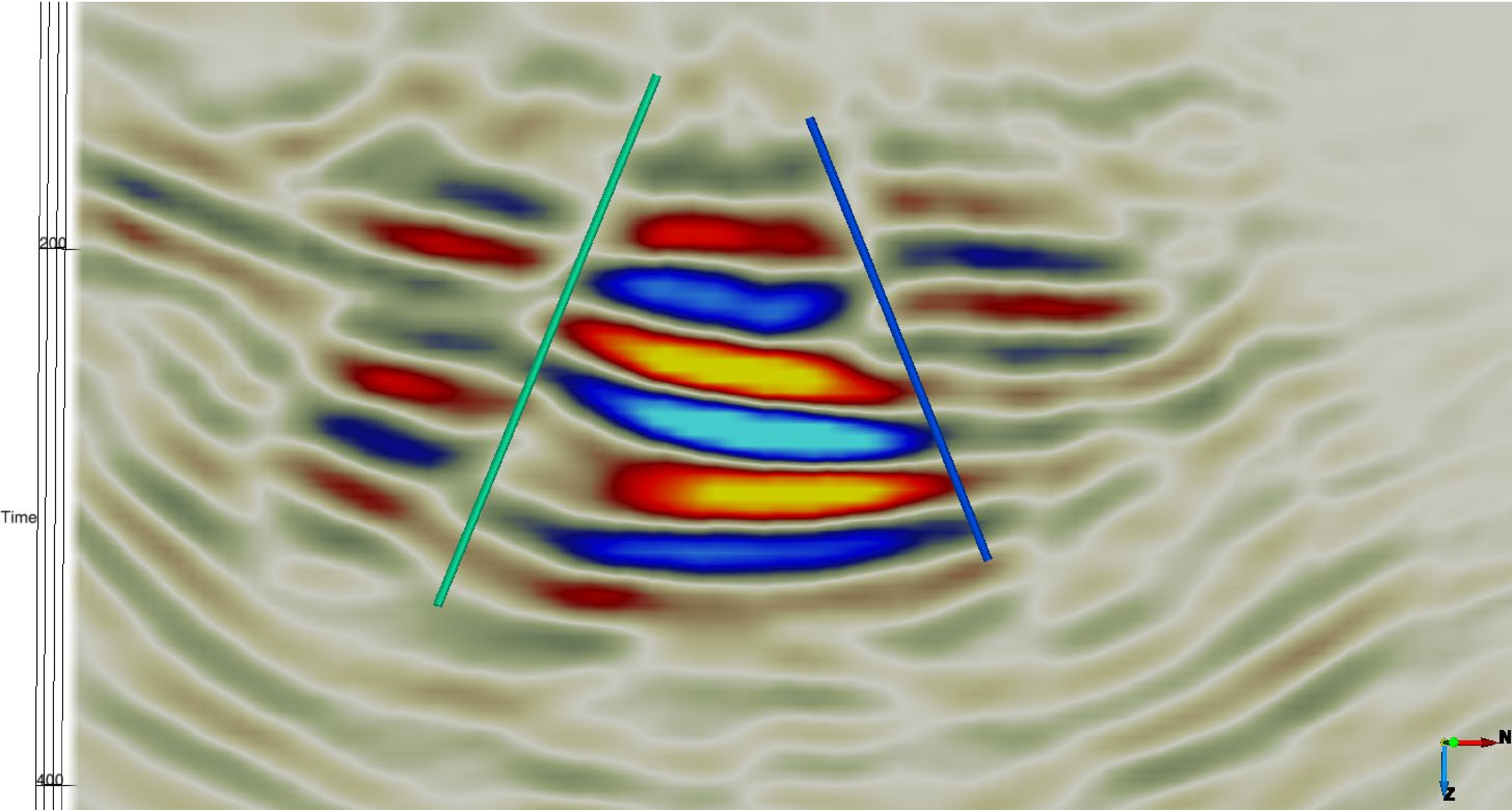
Inline 1036

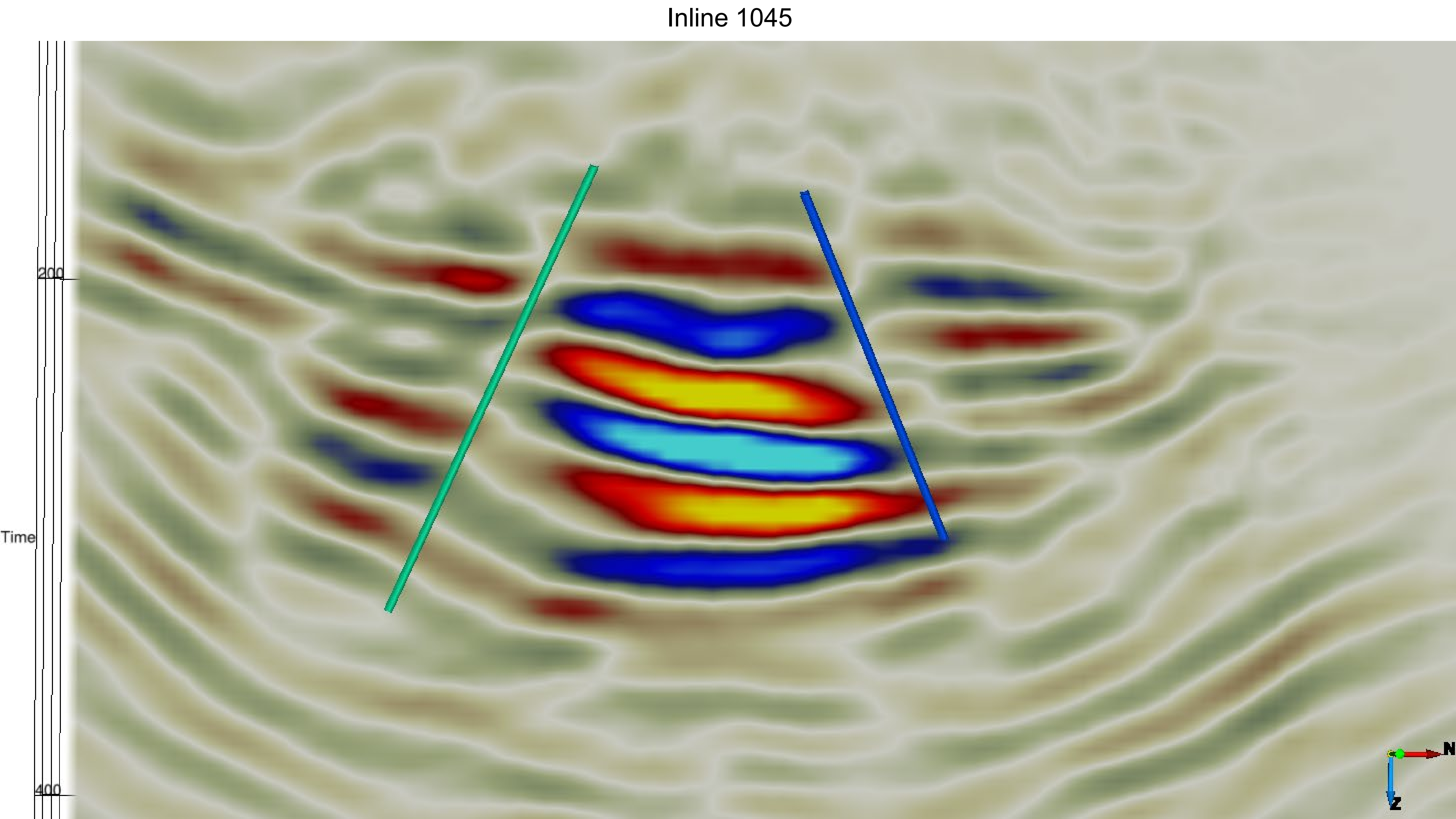


Inline 1038

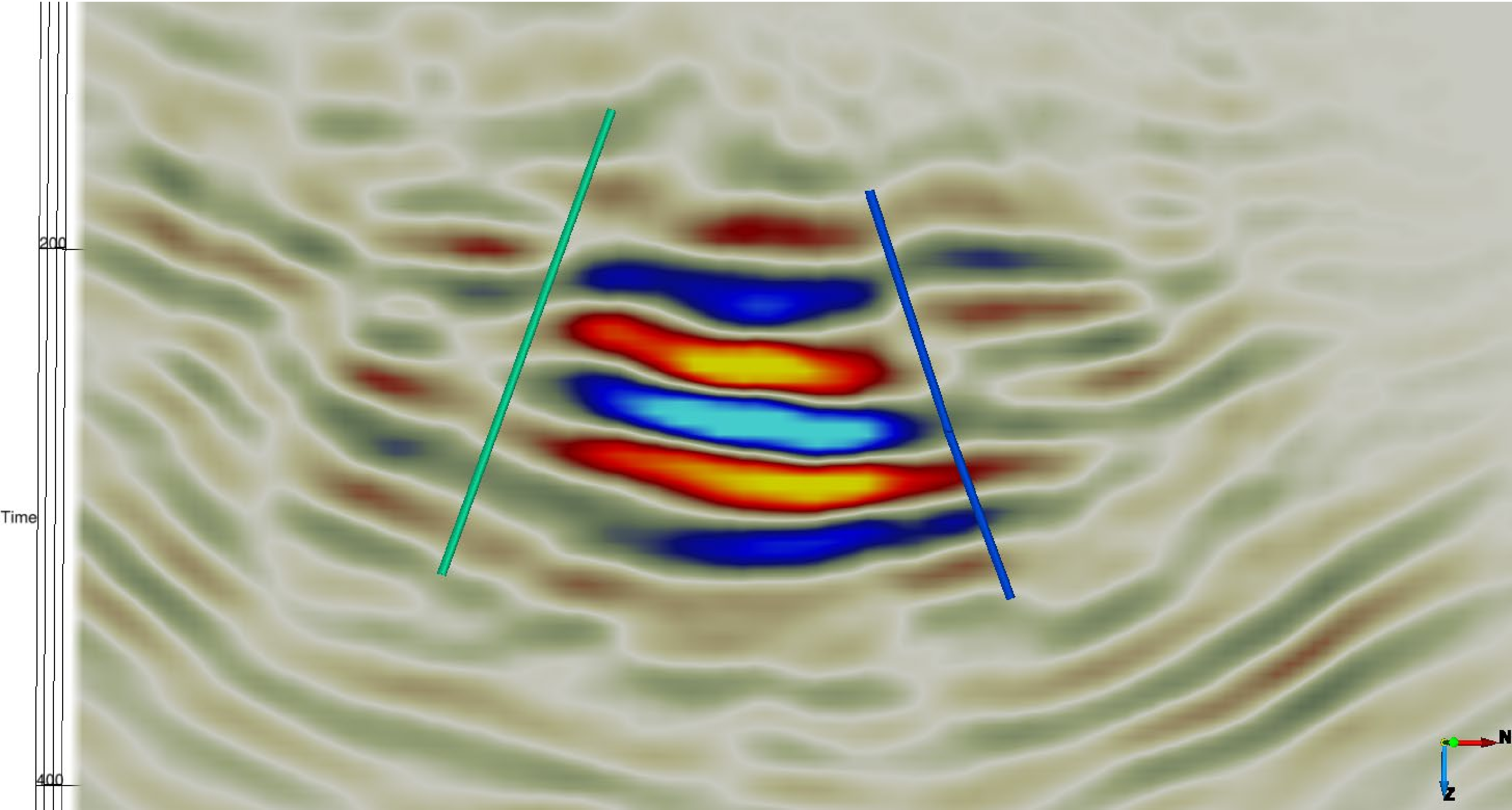
Inline 1040



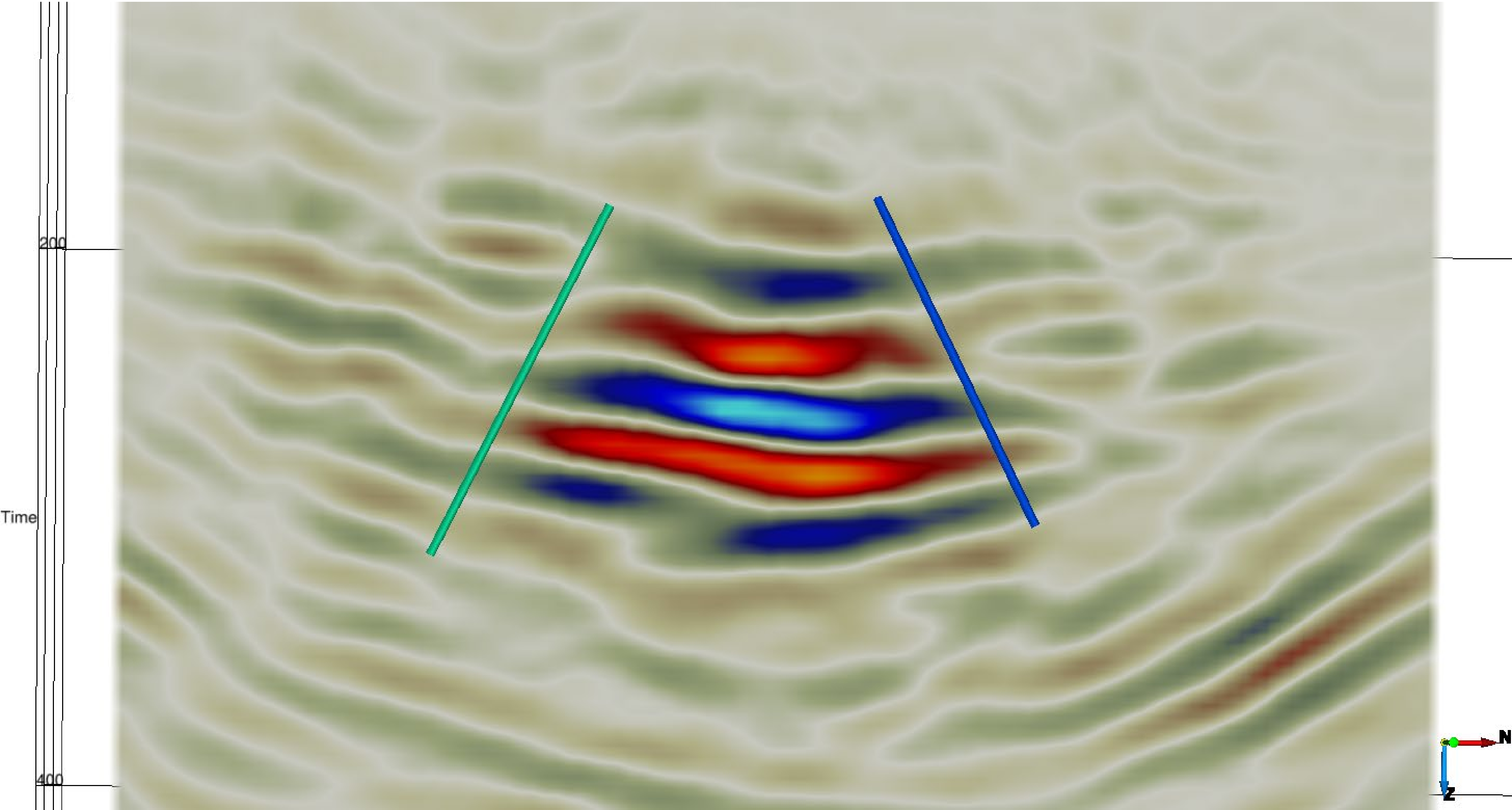

Inline 1042


Inline 1045
200
Time
400
N
Z

Inline 1048



Inline 1053



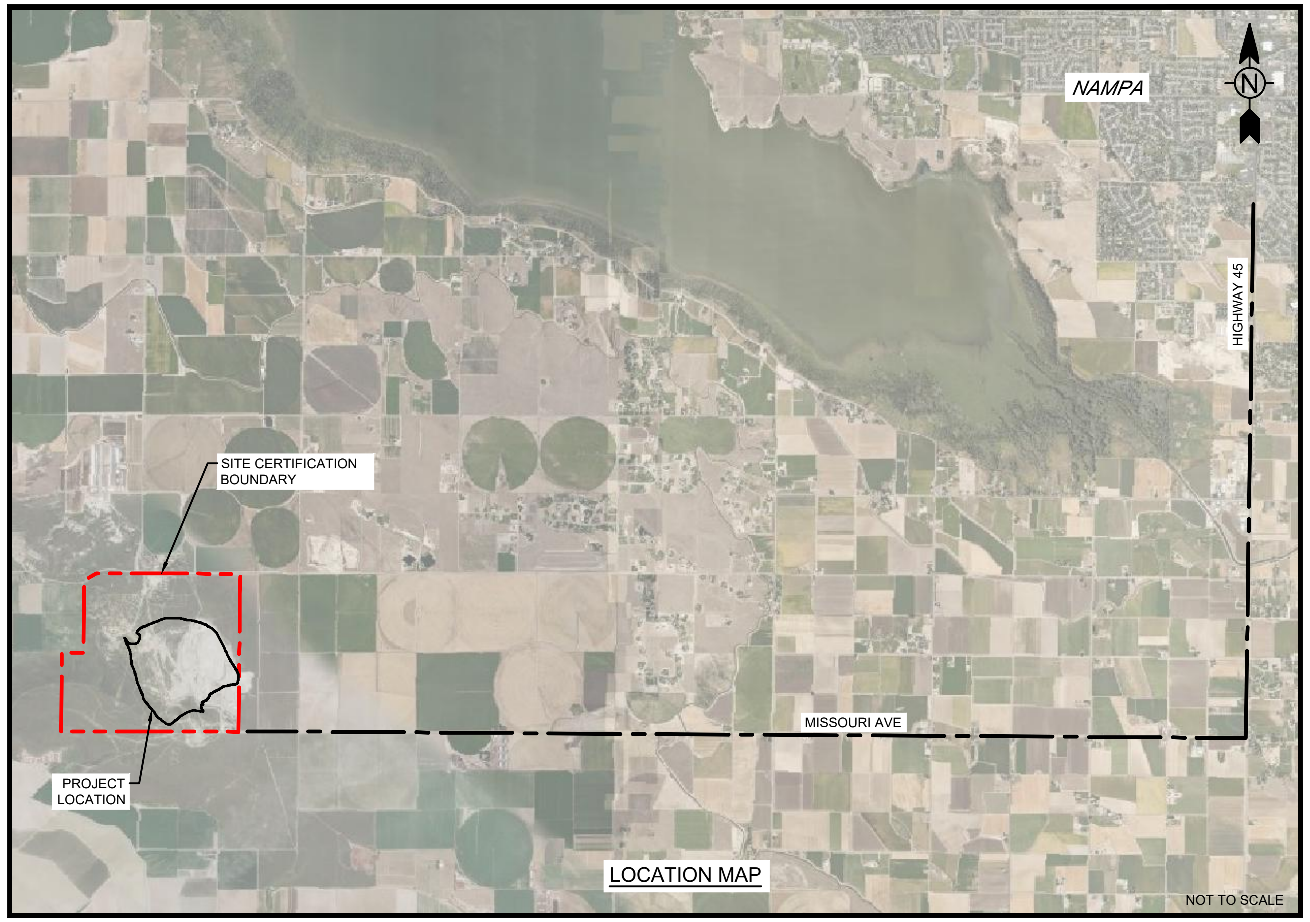
APPENDIX H: LANDFILL EXPANSION DESIGN DRAWINGS

PICKLES BUTTE LANDFILL
CANYON COUNTY, ID
PHASE 5 EXPANSION

3380 AMERICANA TERRACE, SUITE 201
BOISE, IDAHO 83706
PHONE: 208-389-1030
www.tetratech.com

TETRA TECH

SHEET INDEX

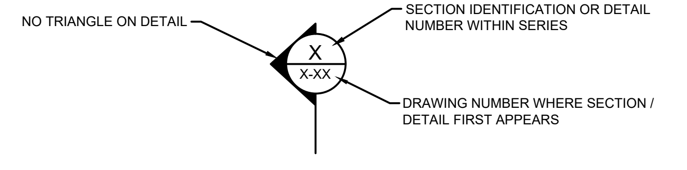


LOCATION MAP

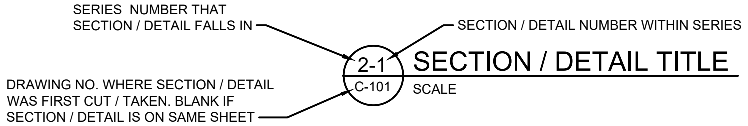
NOT TO SCALE

SURVEY DATUM INFORMATION PER IDAHO SURVEY GROUP MAPPING DATED OCTOBER 4, 2023
LOCATION: SECTION 21, T2N, R3W, CANYON COUNTY, IDAHO
BASIS OF BEARING: IDAHO STATE PLANE - WEST
VERTICAL DATUM: NAVD 88
UNIT OF MEASURE: U.S. SURVEY FOOT

SECTION AND DETAIL DESIGNATION



SECTION CUT / DETAIL CALLOUT SYMBOL



TITLE FOR SECTION CUT / DETAIL

ABBREVIATIONS

#	NUMBER	HDPE	HIGH-DENSITY POLYETHYLENE
&	AND	MAX.	MAXIMUM
Ø	DIAMETER	MIN.	MINIMUM
%	PERCENT	NOM.	NOMINAL
CF	CUBIC FEET	NTS	NOT TO SCALE
CY	CUBIC YARD	PBL	PICKLES BUTTE LANDFILL
CMP	CORRUGATED METAL PIPE	QTY	QUANTITY
DIA	DIAMETER	STA	STATION
DWG	DRAWING	SF	SQUARE FEET
EG	EXISTING GROUND	SY	SQUARE YARD
ELEV	ELEVATION	TYP	TYPICAL
FG	FINISH GRADE		
LF	LINEAR FEET		
LFG	LANDFILL GAS		

16021
MAUREEN A. McGRAW
01/23/2025

PROJECT LOCATION:

INTERSECTION OF MISSOURI AVENUE
AND PERCH ROAD

CLIENT INFORMATION:

PICKLES BUTTE LANDFILL
15500 MISSOURI AVENUE
NAMPA, ID 83686

Tt PROJECT No.:

114-571040-2024

CLIENT PROJECT No.:

NONE

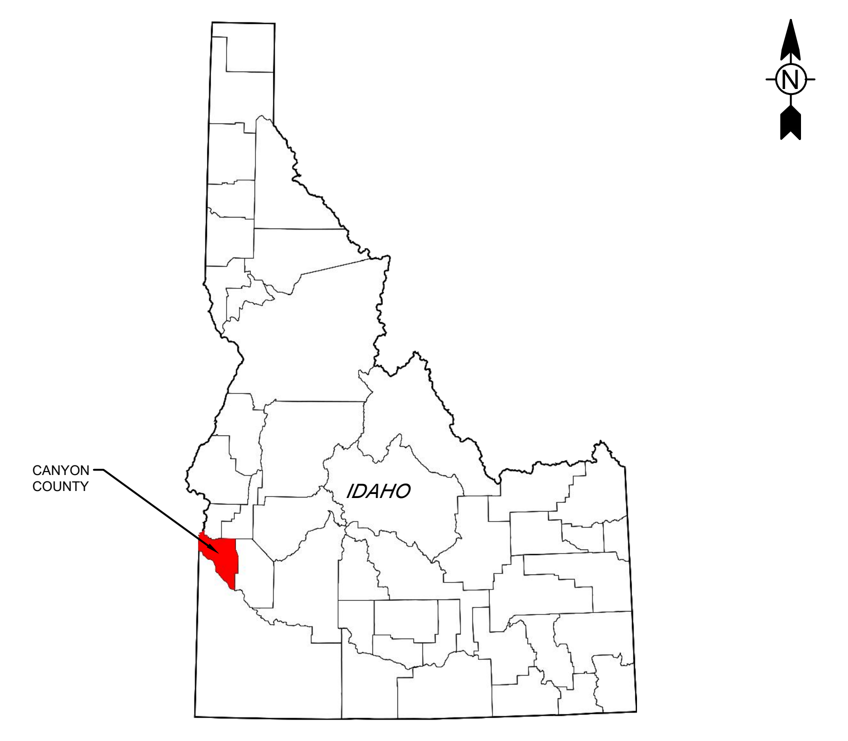
PROJECT DESCRIPTION / NOTES:

PHASE 5 EXPANSION DESIGN

ISSUED:

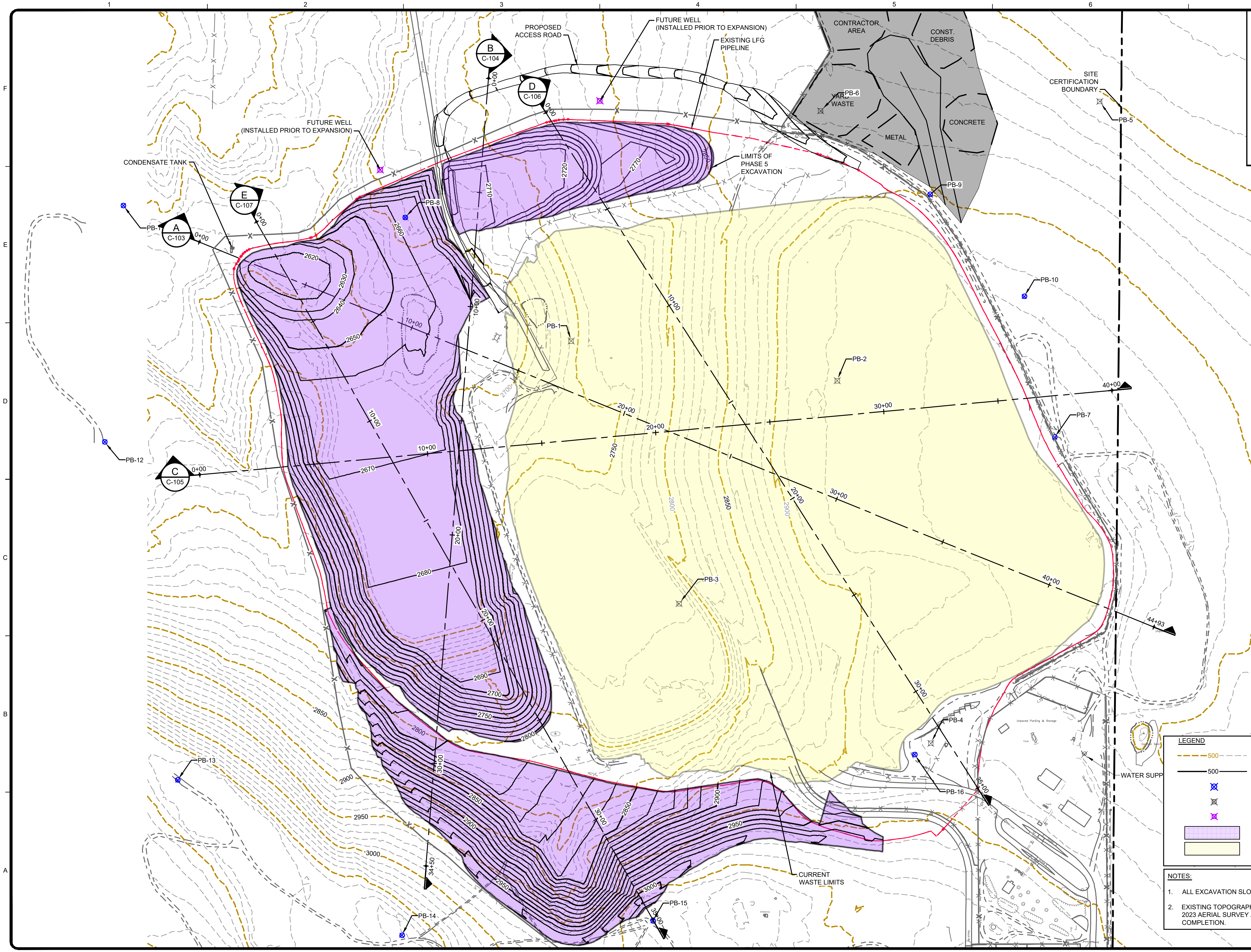
7/2024 ISSUED FOR REVIEW
10/2024 REGULATORY SUBMITTAL
1/2025 SUBMITTAL OF FINAL EXPANSION DESIGN

VICINITY MAP:



NOT TO SCALE

10/2/2024 1:03:01 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-1_EXCAVATION PLAN.DWG - SANDERS, JIM1



EARTHWORK QUANTITIES

DESCRIPTION	CUT (CY)
EXCAVATION PLAN	1,806,895

N

0 100 200 400

SCALE: 1" = 200'

LEGEND

500	EXISTING CONTOUR (MAJR/MINR)
500	PROPOSED CONTOUR (MAJR/MINR)
⊗	GW MONITORING WELL (ACTIVE)
⊠	GW MONITORING WELL (ABANDONED)
⊠	GW MONITORING WELL (FUTURE)
▨	EXCAVATION AREA
▨	CURRENT WASTE AREA

NOTES:

1. ALL EXCAVATION SLOPES ARE 2:1.
2. EXISTING TOPOGRAPHY SHOWN REPRESENTATIVE OF 2023 AERIAL SURVEY AND PHASE 3 EXCAVATION PLAN COMPLETION.

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. McGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

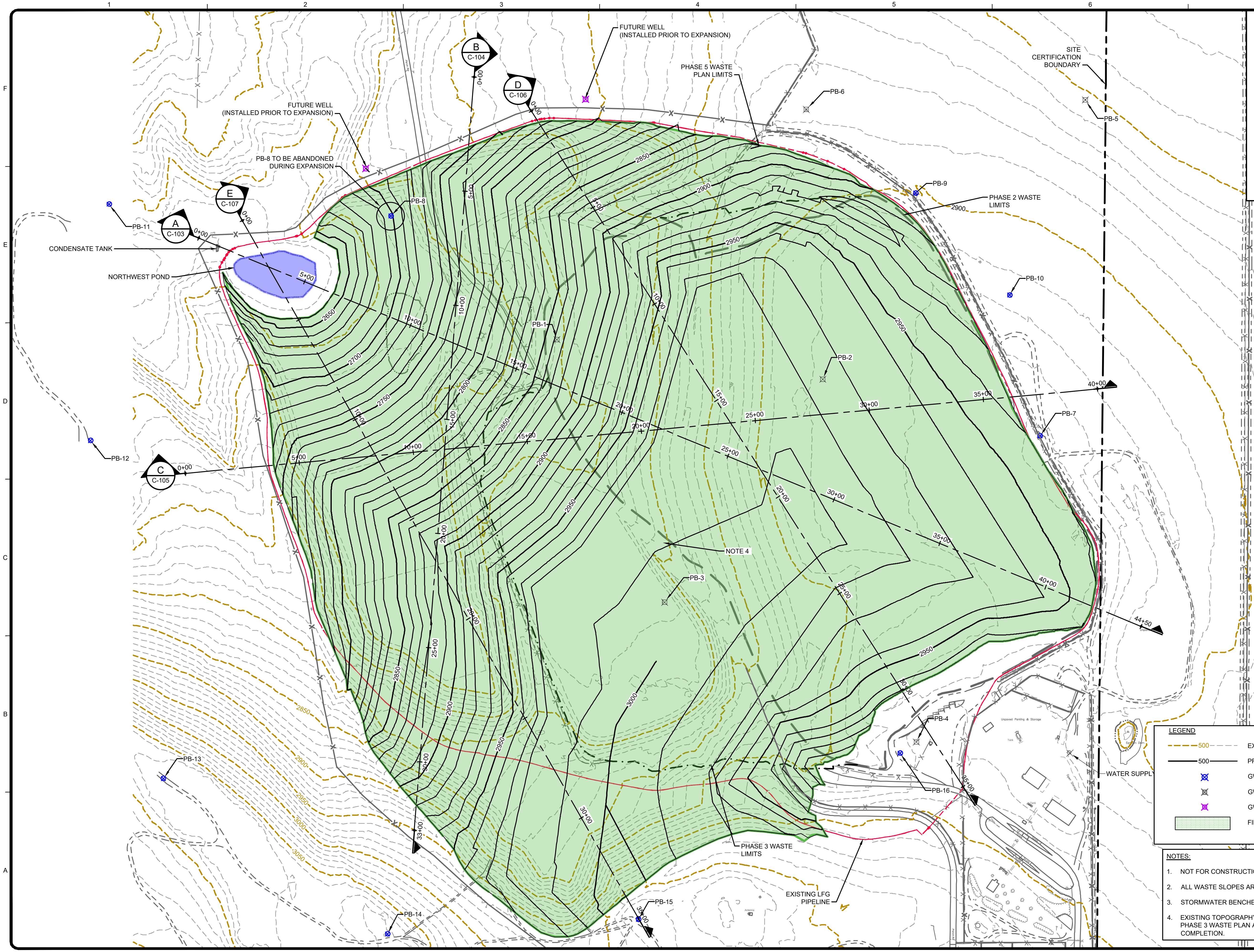
PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

PHASE 5 EXPANSION PLAN

EXCAVATION PLAN

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

C-101



0 100 200 400
SCALE: 1" = 200'

EARTHWORK QUANTITIES	
DESCRIPTION	FILL (CY)
TOP OF WASTE PLAN	31,503,216

*FILL INCLUSIVE OF AREA CREATED BY PHASE 5 EXCAVATION PLAN.

LEGEND

500 (dashed)	EXISTING CONTOUR (MAJR/MINR)
500 (solid)	PROPOSED CONTOUR (MAJR/MINR)
⊠	GW MONITORING WELL (ACTIVE)
⊠	GW MONITORING WELL (ABANDONED)
⊠	GW MONITORING WELL (FUTURE)
🟩	FILL AREA

NOTES:

1. NOT FOR CONSTRUCTION.
2. ALL WASTE SLOPES ARE 4:1.
3. STORMWATER BENCHES NOT INCLUDED IN DESIGN
4. EXISTING TOPOGRAPHY SHOWN REPRESENTATIVE OF PHASE 3 WASTE PLAN AND CONCEPTUAL EXCAVATION COMPLETION.

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

LICENSED PROFESSIONAL ENGINEER 16021 STATE OF IDAHO MAUREEN A. MCGRAW
01/23/2025

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	
C	1/2025	REMOVE "PROPOSED" FROM NORTHWEST POND	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

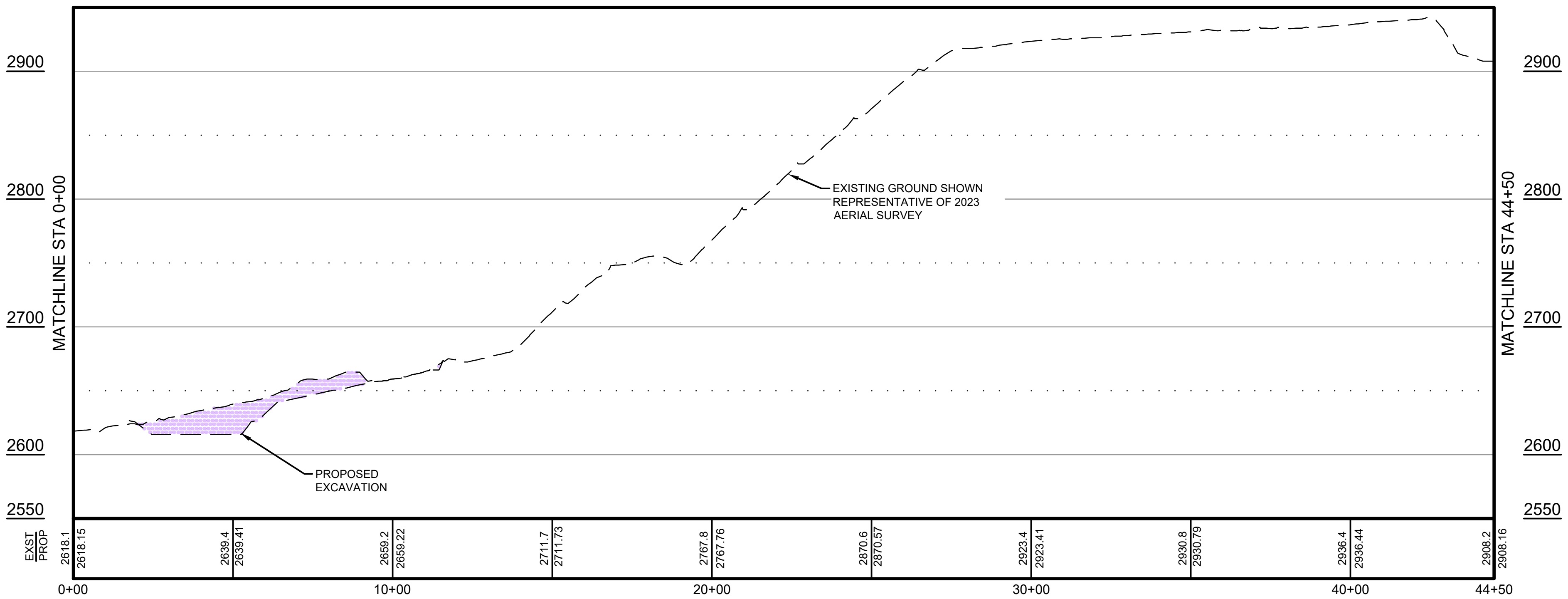
PHASE 5 EXPANSION PLAN

TOP OF WASTE PLAN

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

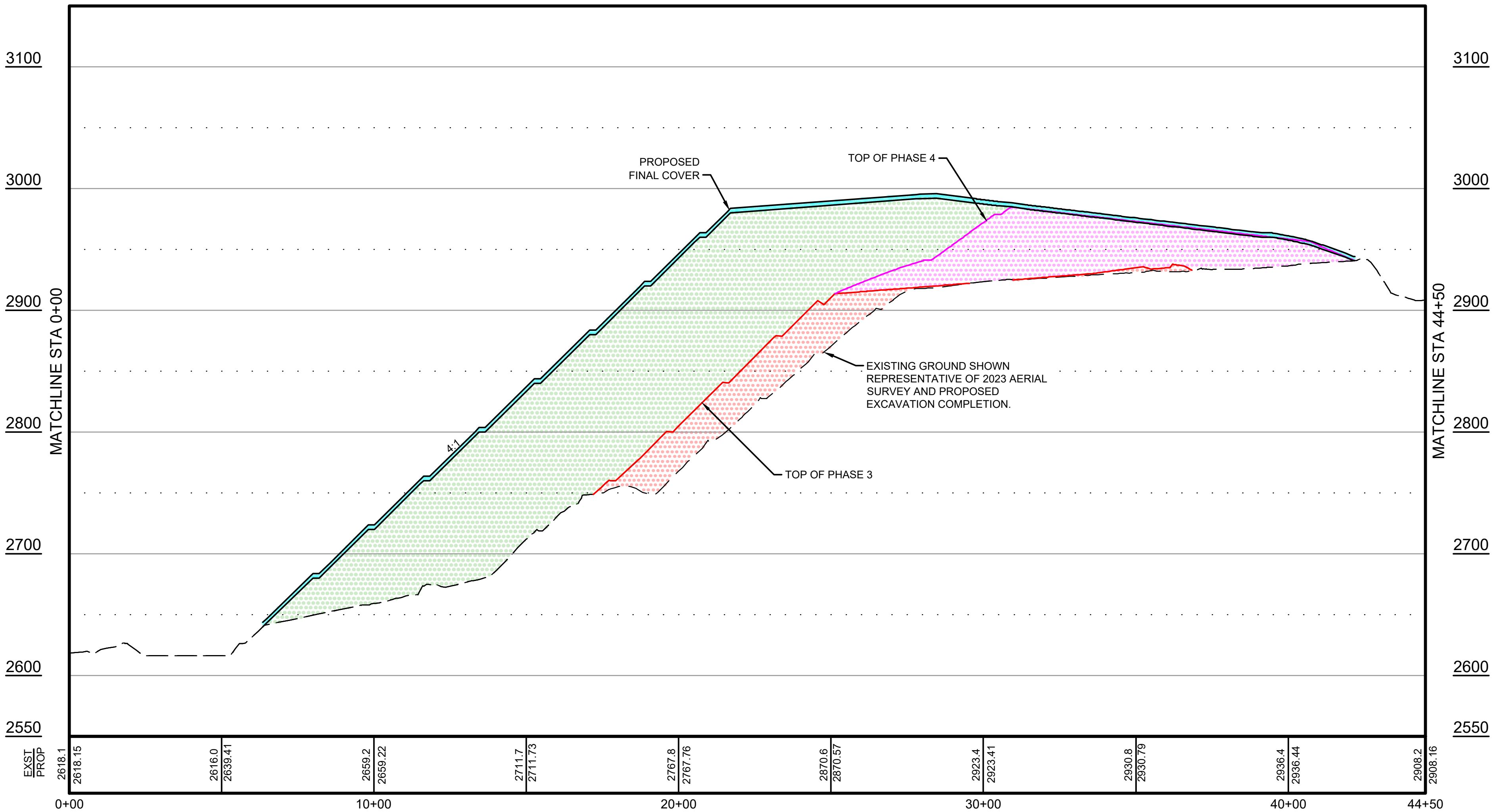
C-102

1/23/2025 3:36:57 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-2-6_WASTE PLAN & SECTIONS_2023.DWG - SANDERS, JIM1



EXCAVATION PLAN PROFILE SECTION A

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'



WASTE PLAN PROFILE SECTION A

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'

LEGEND

▨	EXCAVATION
▨	PHASE 3
▨	PHASE 4
▨	PHASE 5
▨	COVER

NOTES:

1. PROPOSED FINAL COVER THICKNESS IS 42"
2. ALL EXCAVATION SLOPES ARE 2:1.
3. ALL WASTE SLOPES ARE 4:1.
4. STORMWATER BENCHES NOT INCLUDED IN DESIGN

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

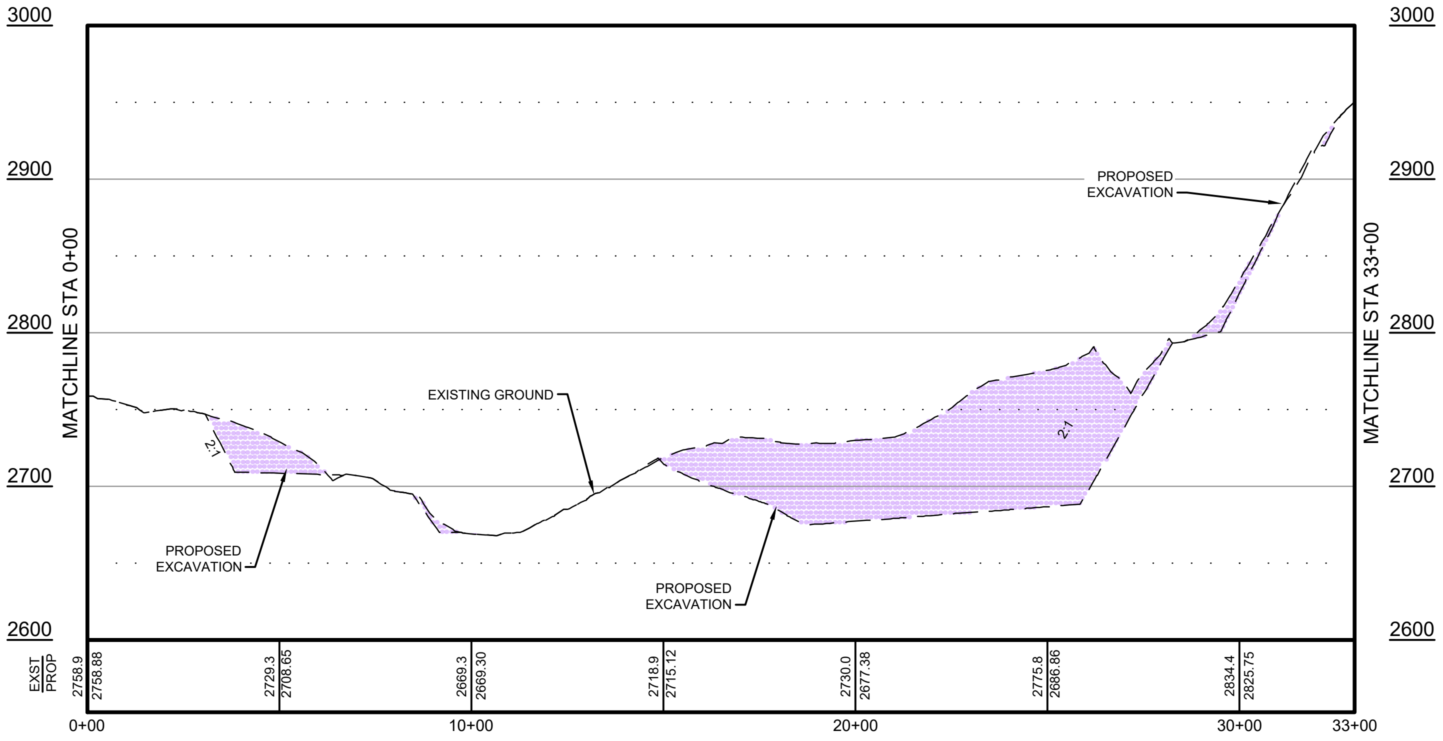
PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO
PHASE 5 EXPANSION PLAN

EXCAVATION & WASTE SECTION A

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

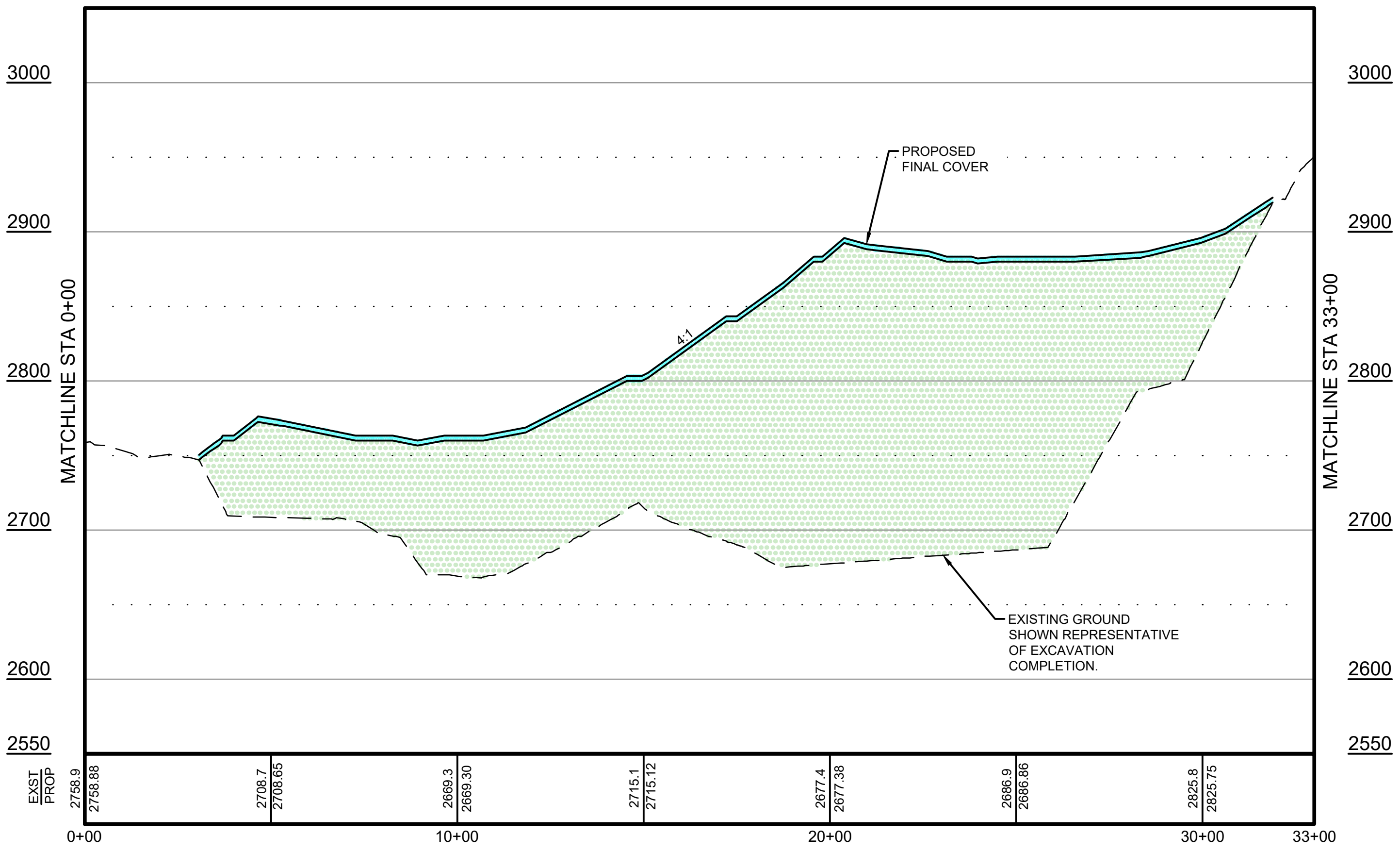
C-103

10/2/2024 12:44:08 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-2-6_WASTE PLAN & SECTIONS_2023.DWG - SANDERS, JIM1



EXCAVATION PLAN PROFILE SECTION B

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'



WASTE PLAN PROFILE SECTION B

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'

LEGEND

🟪	EXCAVATION
🟩	PHASE 5
🟦	COVER

NOTES:

1. PROPOSED FINAL COVER THICKNESS IS 42"
2. ALL EXCAVATION SLOPES ARE 2:1.
3. ALL WASTE SLOPES ARE 4:1.
4. STORMWATER BENCHES NOT INCLUDED IN DESIGN

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

PROFESSIONAL ENGINEER LICENSED 16021 STATE OF IDAHO MAUREEN A. MCGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

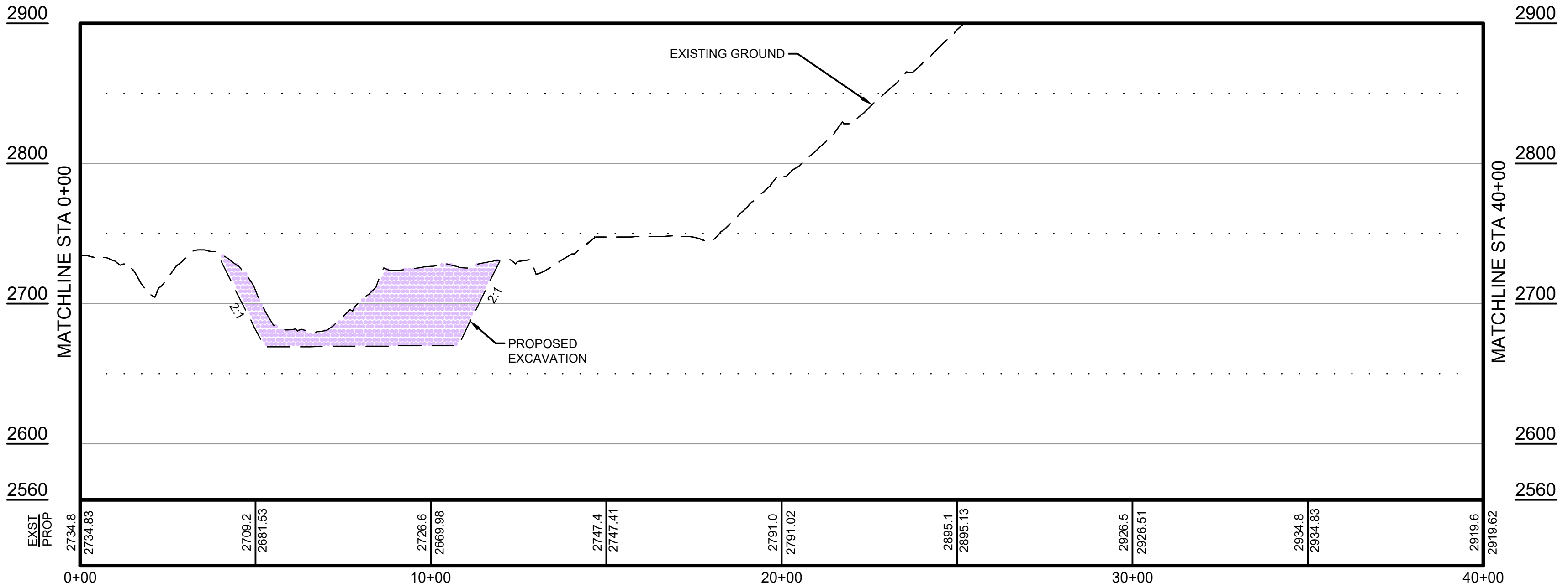
PHASE 5 EXPANSION PLAN

EXCAVATION & WASTE SECTION B

Project No.: 114-571040-2024
Designed By: MM
Drawn By: JSS
Checked By: MM

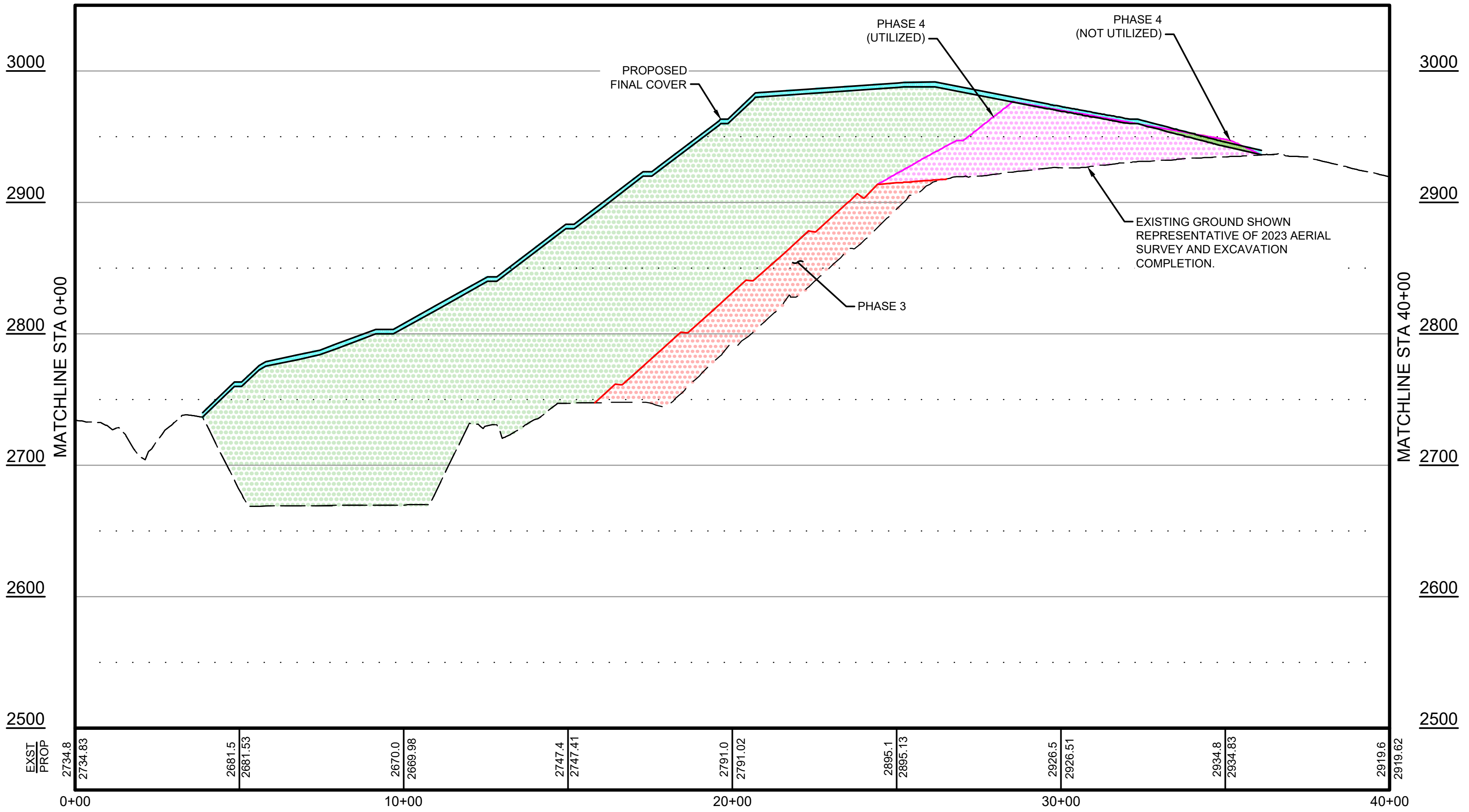
C-104

10/2/2024 12:43:57 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-2-6_WASTE PLAN & SECTIONS_2023.DWG - SANDERS, JIM1



EXCAVATION PLAN PROFILE SECTION C

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'



WASTE PLAN PROFILE SECTION C

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'

LEGEND

🟪	EXCAVATION
🟥	PHASE 3
🟪	PHASE 4
🟨	PHASE 4 (NOT UTILIZED)
🟩	PHASE 5
🟦	COVER

NOTES:

1. PROPOSED FINAL COVER THICKNESS IS 42"
2. ALL EXCAVATION SLOPES ARE 2:1.
3. ALL WASTE SLOPES ARE 4:1.
4. STORMWATER BENCHES NOT INCLUDED IN DESIGN

TETRA TECH
www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. McGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

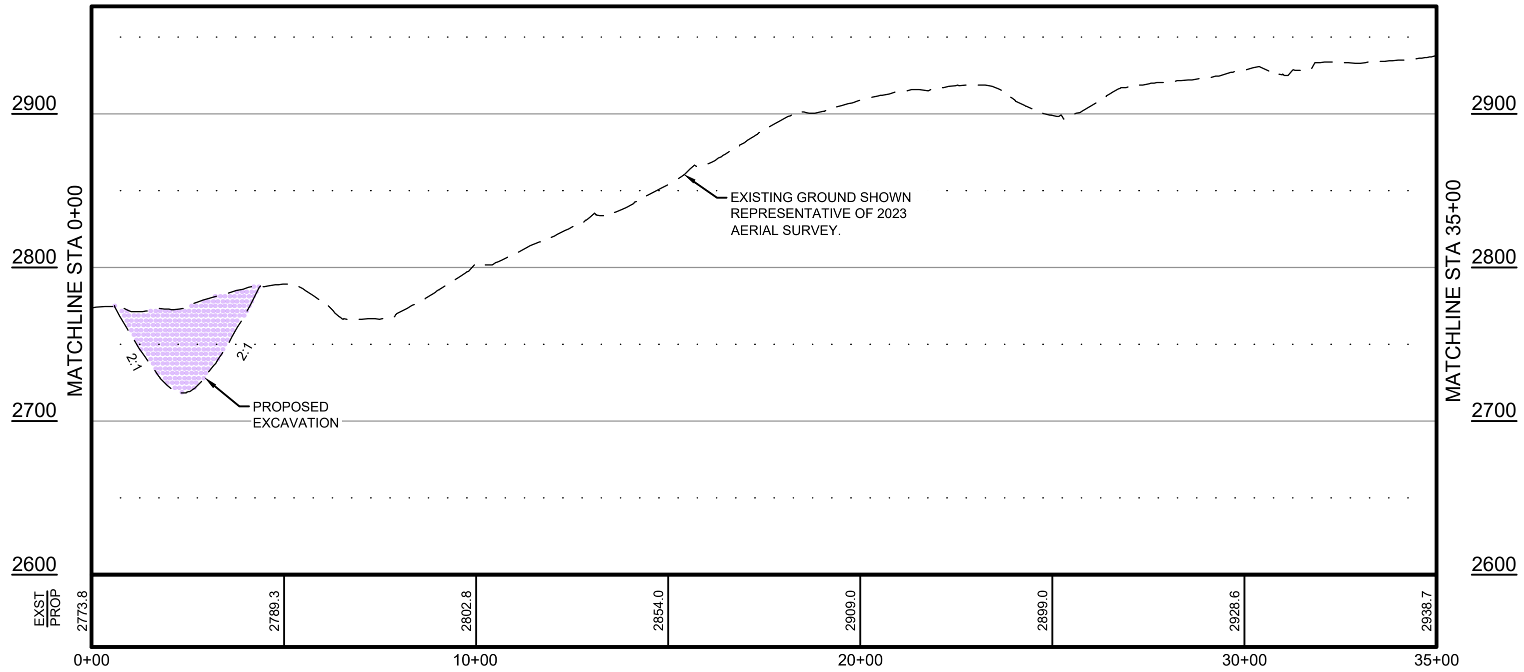
PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

PHASE 5 EXPANSION PLAN

EXCAVATION & WASTE SECTION C

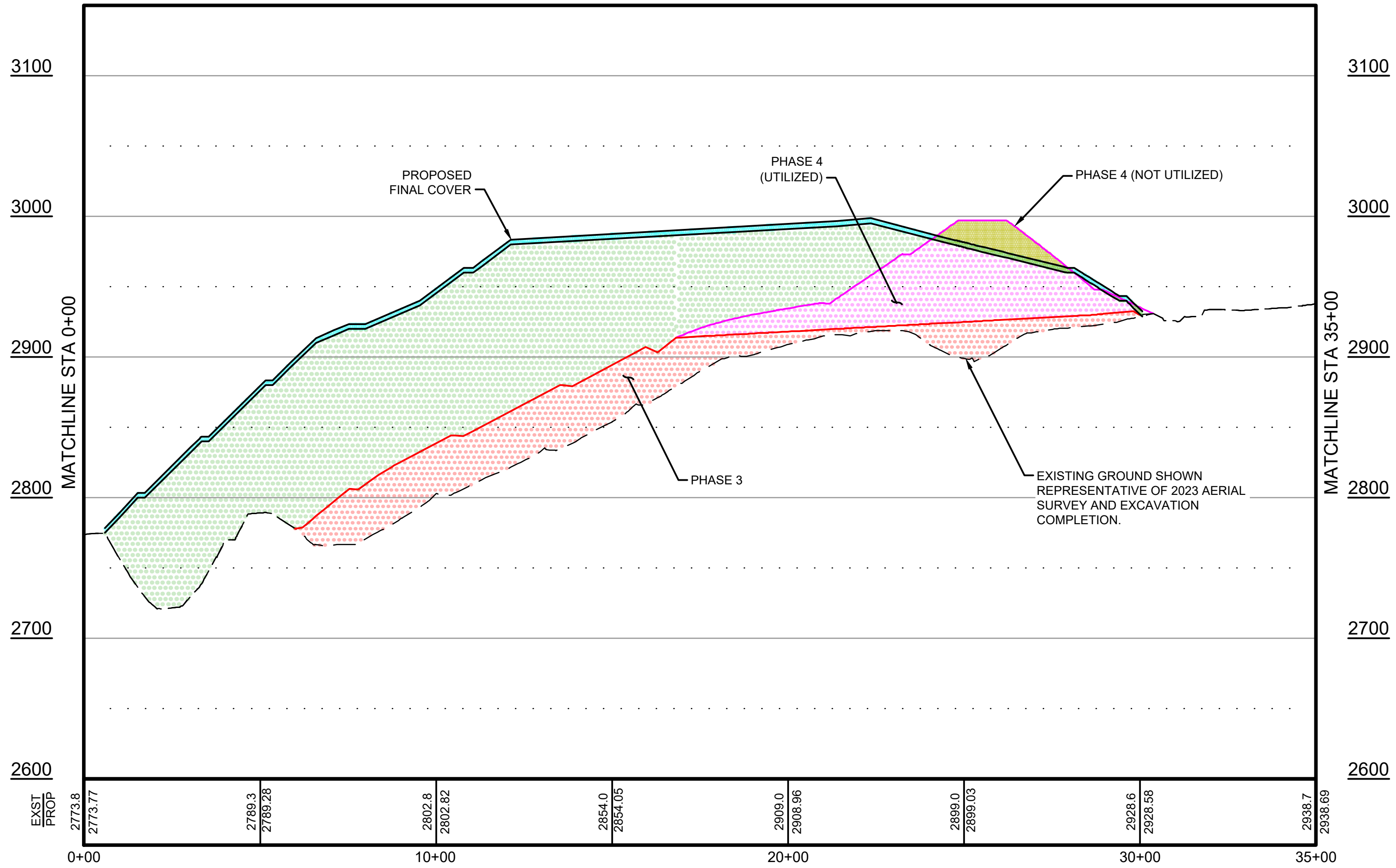
Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

C-105



EXCAVATION PLAN PROFILE SECTION D

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'



WASTE PLAN PROFILE SECTION D

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'

LEGEND

🟪	EXCAVATION
🟥	PHASE 3
🟪	PHASE 4
🟨	PHASE 4 (NOT UTILIZED)
🟩	PHASE 5
🟦	COVER

NOTES:

1. PROPOSED FINAL COVER THICKNESS IS 42"
2. ALL EXCAVATION SLOPES ARE 2:1.
3. ALL WASTE SLOPES ARE 4:1.
4. STORMWATER BENCHES NOT INCLUDED IN DESIGN

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. MCGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

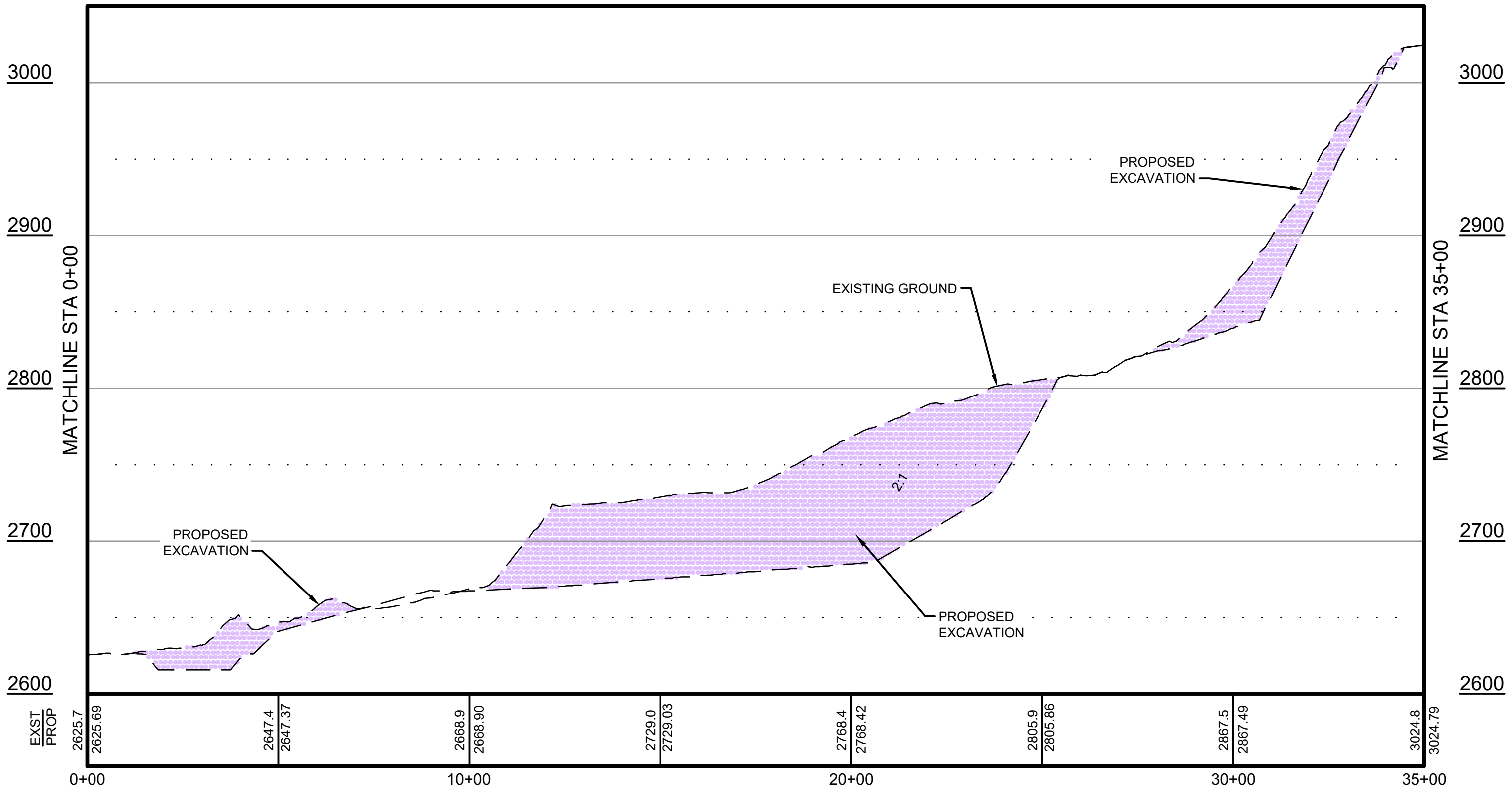
PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

PHASE 5 EXPANSION PLAN

EXCAVATION & WASTE SECTION D

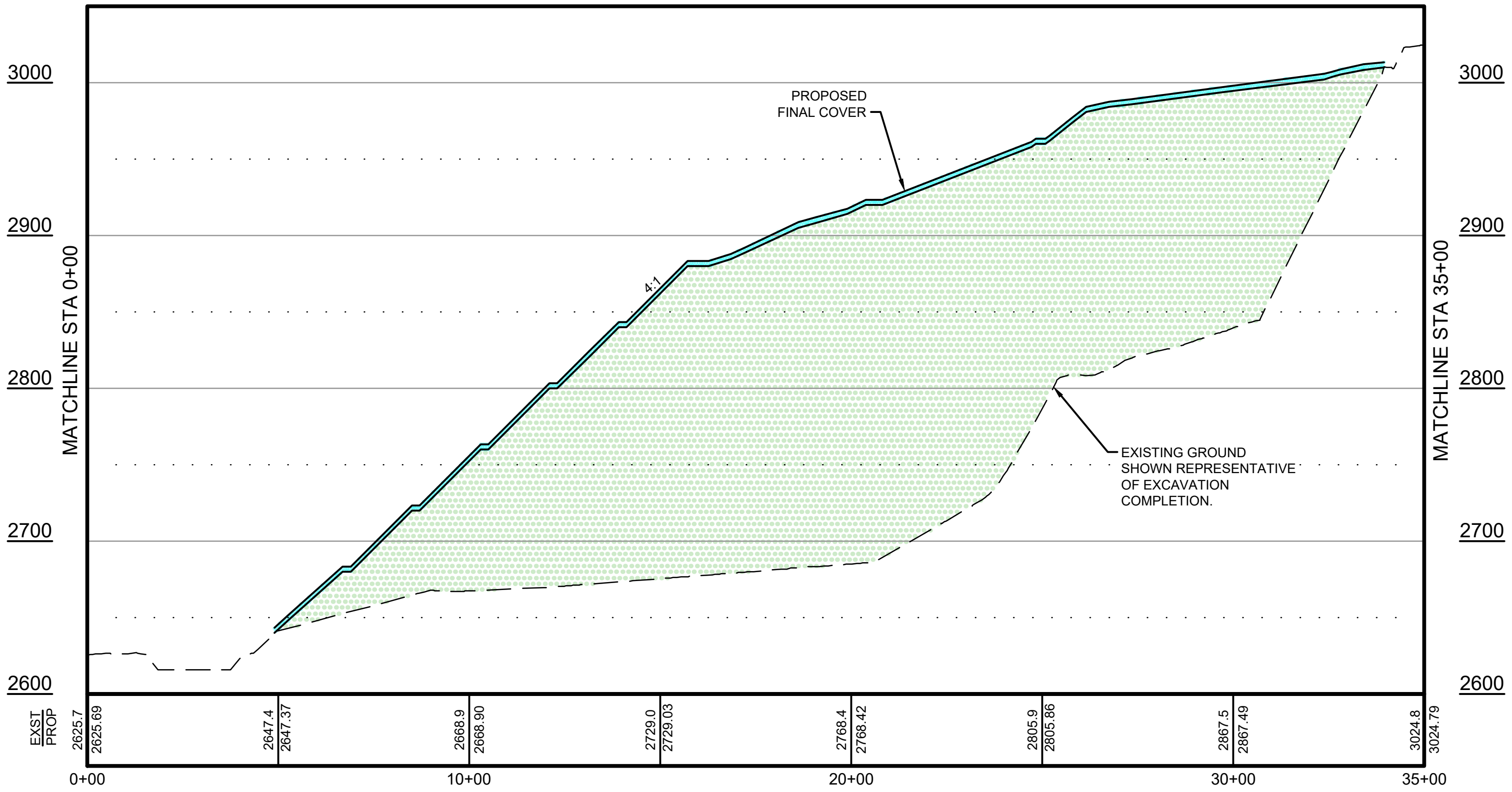
Project No.: 114-571040-2024
Designed By: MM
Drawn By: JSS
Checked By: MM

C-106



EXCAVATION PLAN PROFILE SECTION E

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'



WASTE PLAN PROFILE SECTION E

SCALE: HORIZ: 1"= 20' VERT: 1"= 5'

LEGEND

🟪	EXCAVATION
🟩	PHASE 5
🟦	COVER

NOTES:

1. PROPOSED FINAL COVER THICKNESS IS 42"
2. ALL EXCAVATION SLOPES ARE 2:1.
3. ALL WASTE SLOPES ARE 4:1.
4. STORMWATER BENCHES NOT INCLUDED IN DESIGN

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. McGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

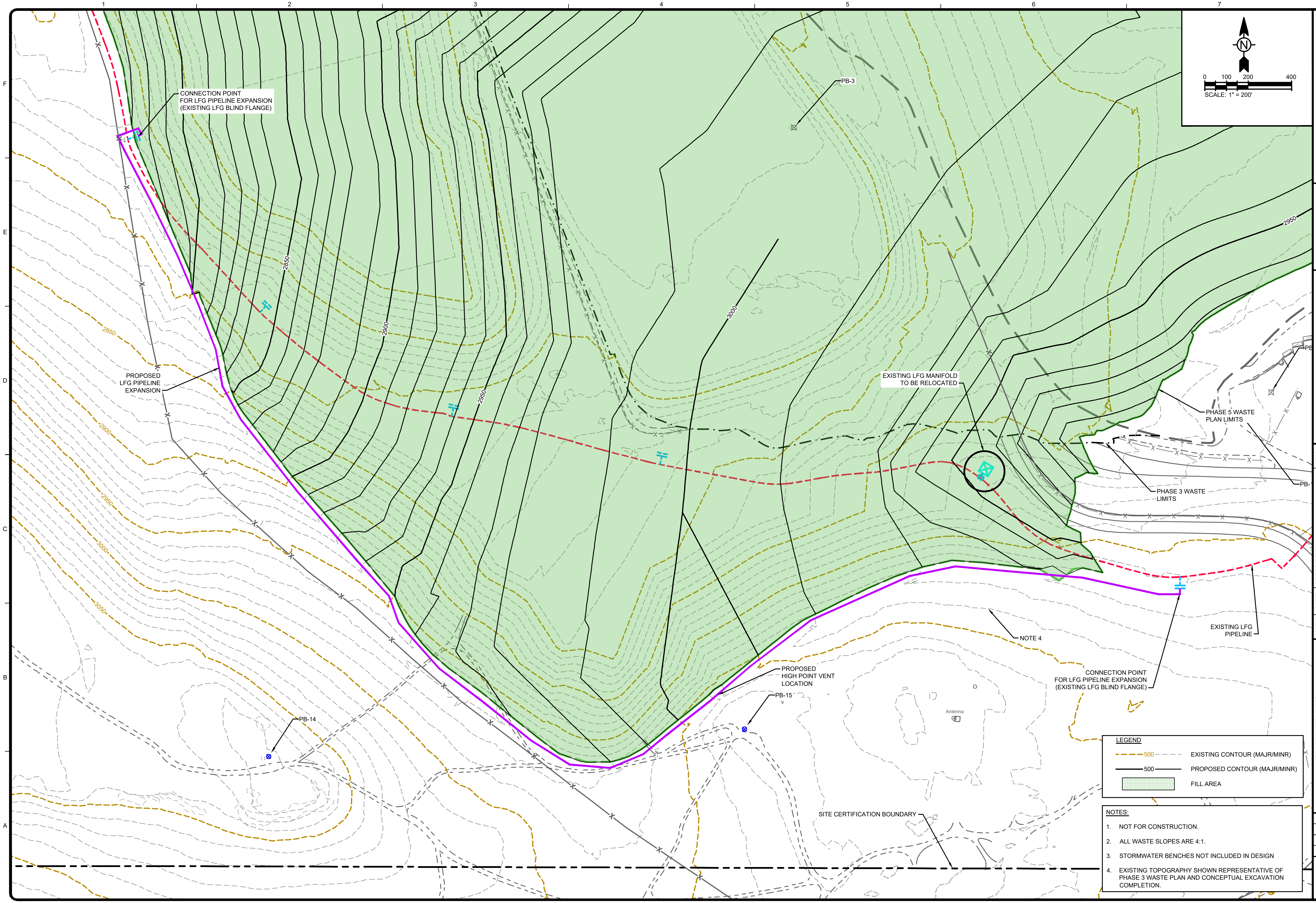
PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO
PHASE 5 EXPANSION PLAN

EXCAVATION & WASTE SECTION E

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

C-107

10/2/2024 12:43:17 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-2-6_WASTE PLAN & SECTIONS_2023.DWG - SANDERS, JIM1



LEGEND

500 (dashed)	EXISTING CONTOUR (MAJR/MINR)
500 (solid)	PROPOSED CONTOUR (MAJR/MINR)
🟩	FILL AREA

NOTES:

1. NOT FOR CONSTRUCTION.
2. ALL WASTE SLOPES ARE 4:1.
3. STORMWATER BENCHES NOT INCLUDED IN DESIGN
4. EXISTING TOPOGRAPHY SHOWN REPRESENTATIVE OF PHASE 3 WASTE PLAN AND CONCEPTUAL EXCAVATION COMPLETION.

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

LICENSED PROFESSIONAL ENGINEER 16021 STATE OF IDAHO MAUREEN A. MCGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

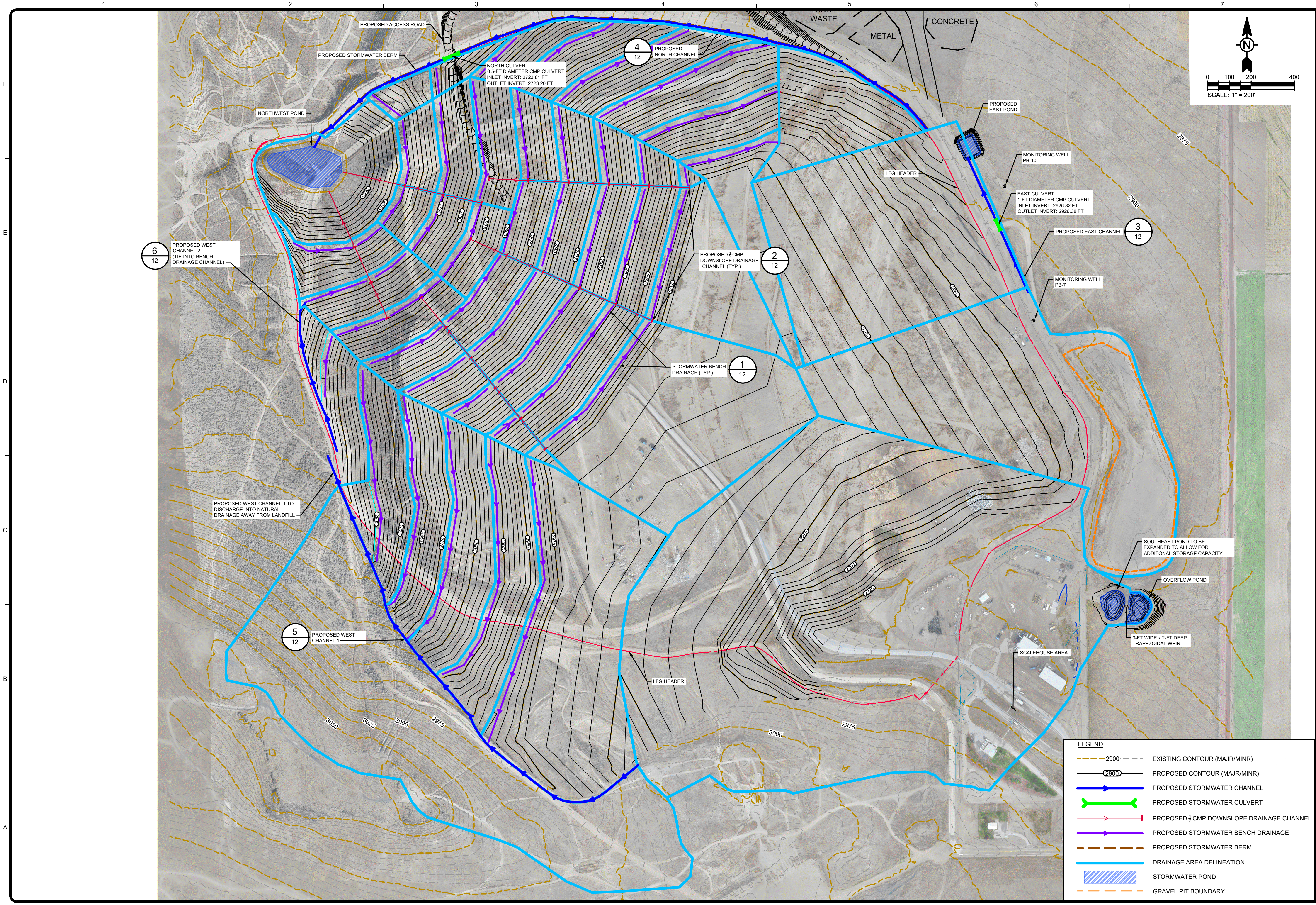
PHASE 5 EXPANSION PLAN

LANDFILL GAS PIPELINE EXPANSION

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

C-108

10/2/2024 12:43:07 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-2-6_WASTE PLAN & SECTIONS_2023.DWG - SANDERS, JIM1



LEGEND

2900	EXISTING CONTOUR (MAJR/MINR)
2900	PROPOSED CONTOUR (MAJR/MINR)
	PROPOSED STORMWATER CHANNEL
	PROPOSED STORMWATER CULVERT
	PROPOSED ½ CMP DOWNSLOPE DRAINAGE CHANNEL
	PROPOSED STORMWATER BENCH DRAINAGE
	PROPOSED STORMWATER BERM
	DRAINAGE AREA DELINEATION
▨	STORMWATER POND
	GRAVEL PIT BOUNDARY

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

LICENSED PROFESSIONAL ENGINEER 16021 STATE OF IDAHO MAUREEN A. McGRAW
01/23/2025

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	
C	1/2025	ADD GRAVEL PIT BNDY, REMOVE "PROPOSED" FR NORTHWEST POND.	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

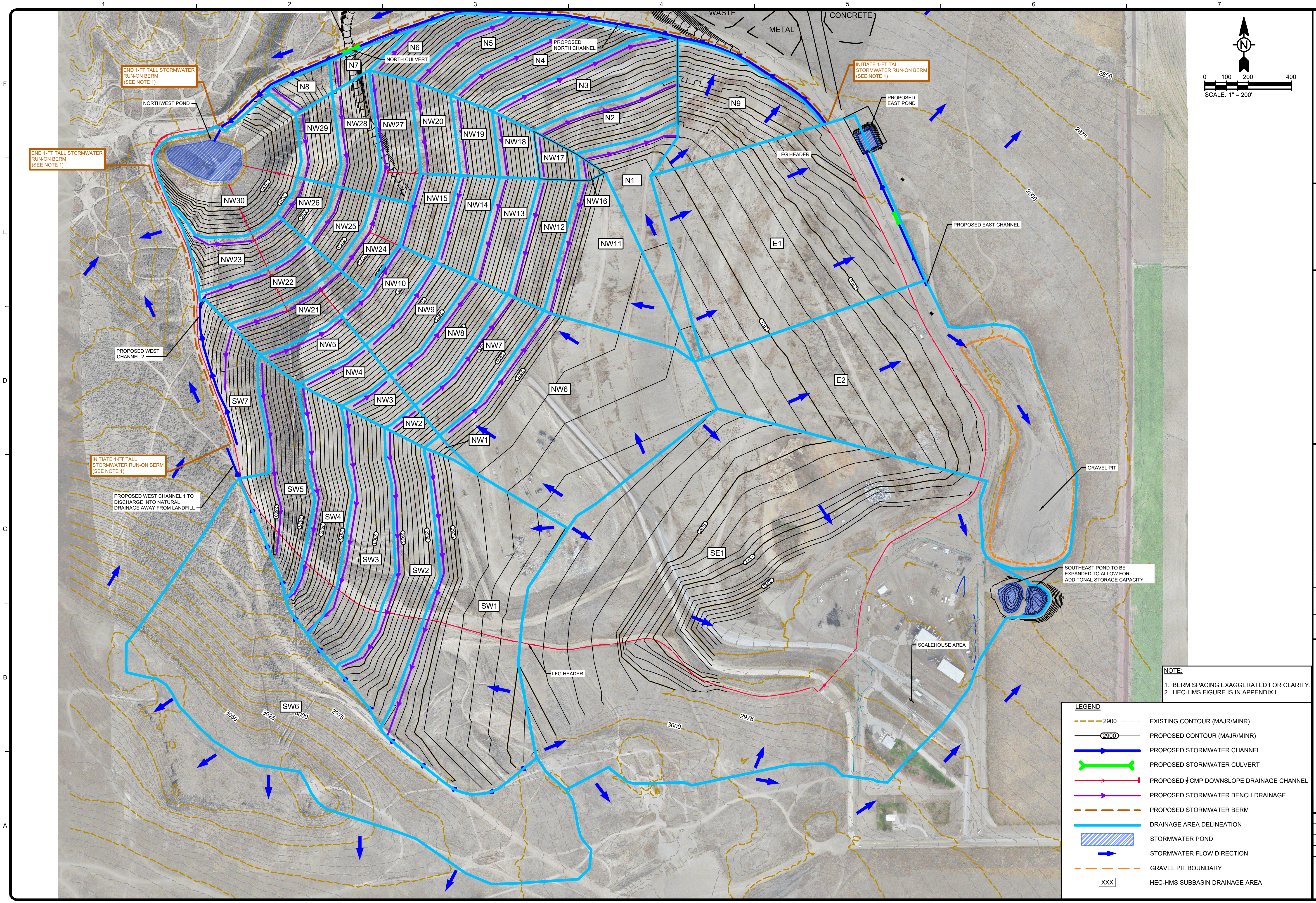
PHASE 5 EXPANSION PLAN

STORMWATER MANAGEMENT PLAN

Project No.: 114-571040-2024
Designed By:
Drawn By:
Checked By:

C-109

1/23/2025 4:00:15 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-X_STORMWATER PLAN.DWG - SANDERS, JIM1



NOTE:
1. BERM SPACING EXAGGERATED FOR CLARITY.
2. HEC-HMS FIGURE IS IN APPENDIX I.

LEGEND

2900	EXISTING CONTOUR (MAJR/MINR)
2900	PROPOSED CONTOUR (MAJR/MINR)
	PROPOSED STORMWATER CHANNEL
	PROPOSED STORMWATER CULVERT
	PROPOSED ½ CMP DOWNSLOPE DRAINAGE CHANNEL
	PROPOSED STORMWATER BENCH DRAINAGE
	PROPOSED STORMWATER BERM
	DRAINAGE AREA DELINEATION
▨	STORMWATER POND
→	STORMWATER FLOW DIRECTION
	GRAVEL PIT BOUNDARY
XXX	HEC-HMS SUBBASIN DRAINAGE AREA

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

PROFESSIONAL ENGINEER
LICENSED
16021
STATE OF IDAHO
MAUREEN A. McGRAW
01/23/2025

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	
C	1/2025	ADD GRAVEL PIT BNDY& SUBBASIN DRAINAGE AREAS, REMOVE "PROPOSED" FR NORTHWEST POND,	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

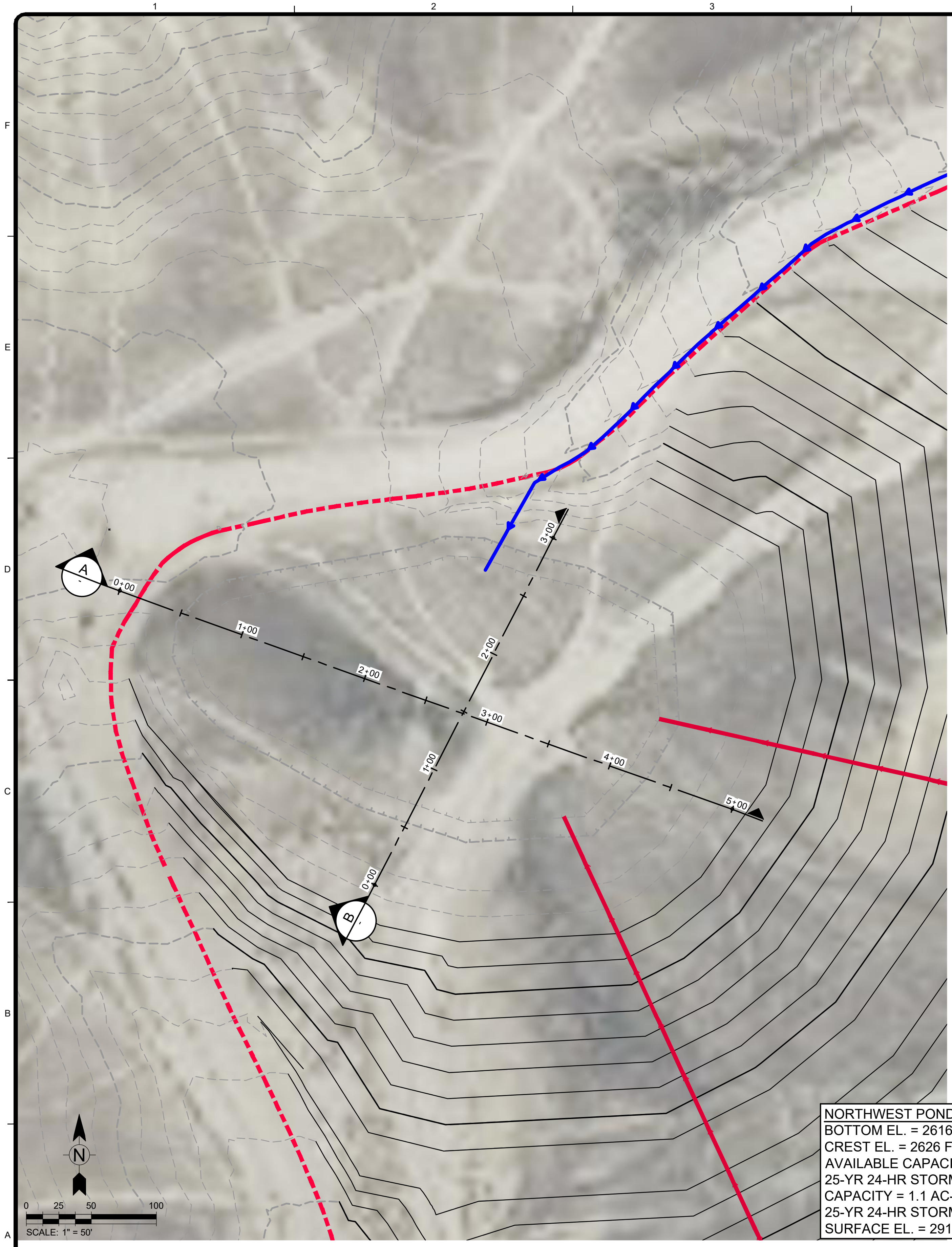
PHASE 5 EXPANSION PLAN

STORMWATER R RUN-OFF/RUN-ON PLAN

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

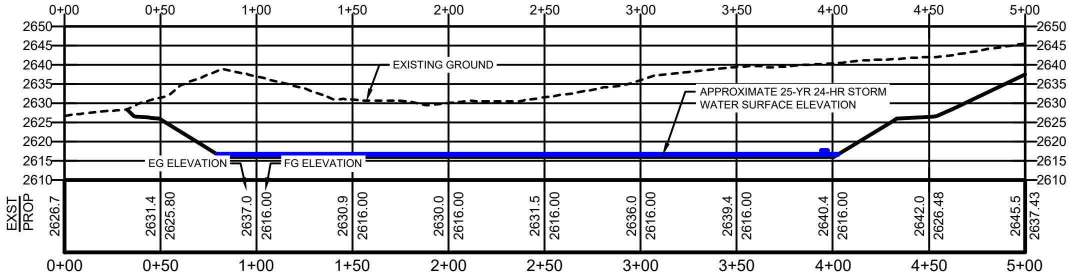
C-110

1/23/2025 4:12:16 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-X_STORMWATER RUNOFF PLAN.DWG - SANDERS, JIM1

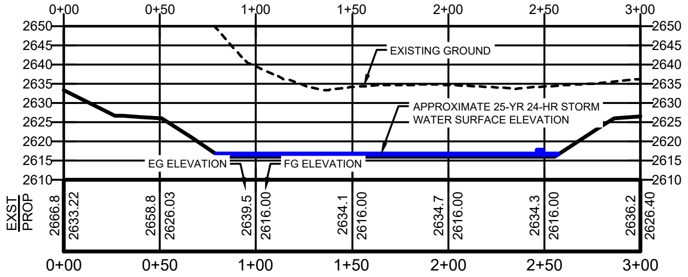


NORTHWEST POND
BOTTOM EL. = 2616 FT
CREST EL. = 2626 FT
AVAILABLE CAPACITY AT CREST = 13.0 AC-FT
25-YR 24-HR STORM EVENT REQUIRED CAPACITY = 1.1 AC-FT
25-YR 24-HR STORM EVENT APPROX. WATER SURFACE EL. = 2917 FT

NORTHWEST POND PLAN



A
-
SECTION A
SCALE: HORIZ. 1" = 50' VERT 2X



B
-
SECTION B
SCALE: HORIZ. 1" = 50' VERT 2X

TETRA TECH
www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. MCGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

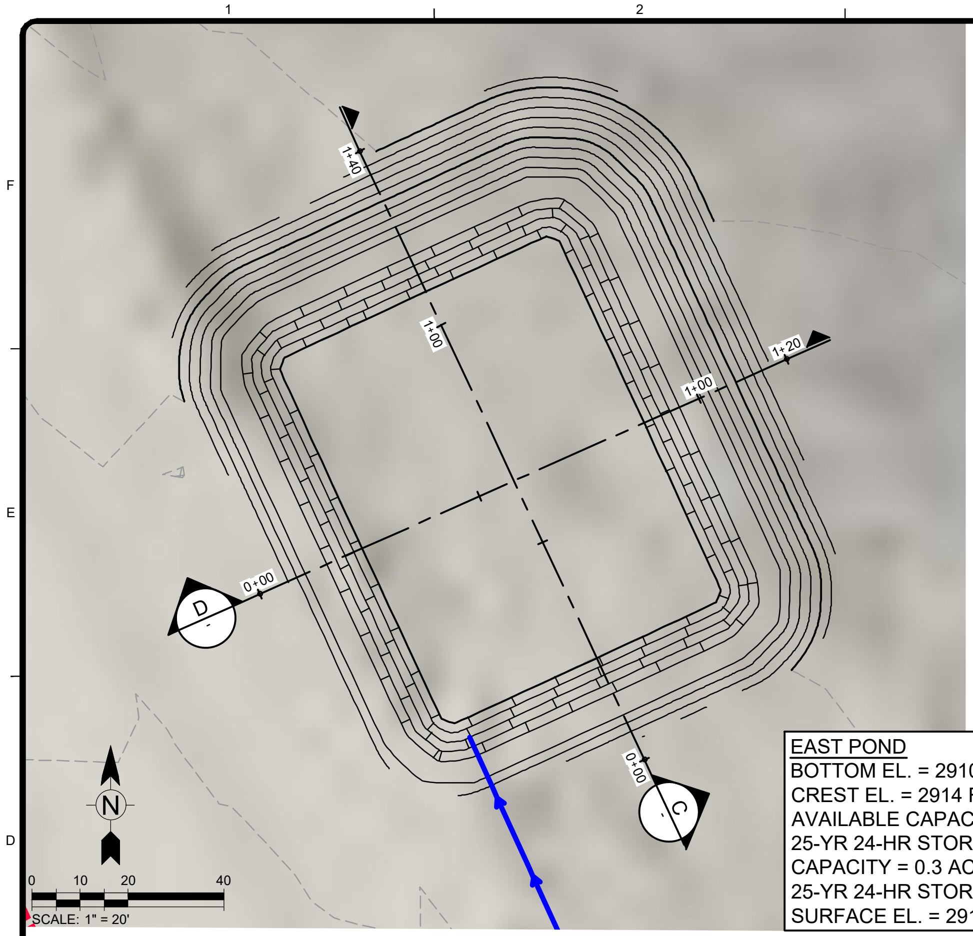
PHASE 5 EXPANSION PLAN

STORMWATER PONDS
SECTIONS 1

Project No.: 114-571040-2024
Designed By: MM
Drawn By: JSS
Checked By: MM

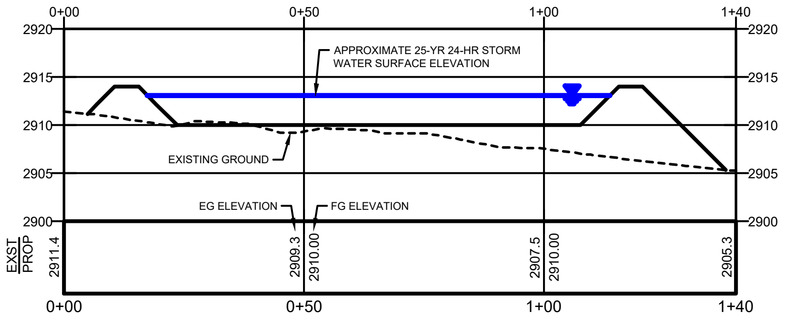
C-111

10/2/2024 2:31:43 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-X_STORMWATER PONDS SECTIONS.DWG - SANDERS, JIM1



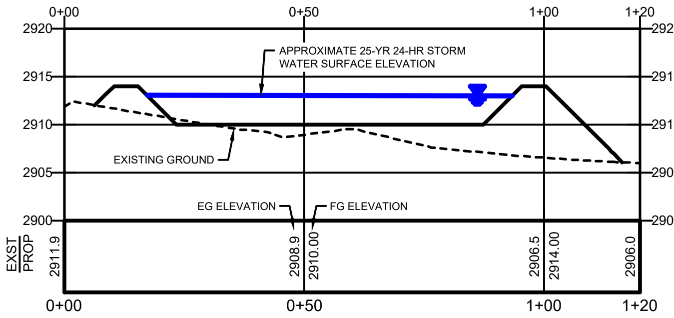
EAST POND PLAN

EAST POND
BOTTOM EL. = 2910 FT
CREST EL. = 2914 FT
AVAILABLE CAPACITY AT CREST = 0.67 AC-FT
25-YR 24-HR STORM EVENT REQUIRED
CAPACITY = 0.3 AC-FT
25-YR 24-HR STORM EVENT APPROX. WATER
SURFACE EL. = 2912 FT



SECTION C

C
-
SCALE: HORIZ. 1" = 20' VERT 2X



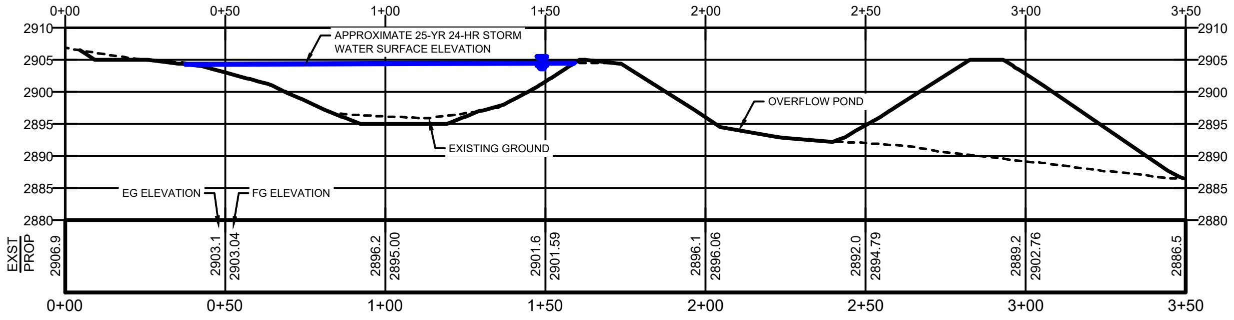
SECTION D

B
-
SCALE: HORIZ. 1" = 20' VERT 2X

SOUTHEAST AND OVERFLOW POND PLAN

SOUTHEAST POND
BOTTOM EL. = 2895 FT
CREST EL. = 2905 FT
AVAILABLE CAPACITY AT CREST = 1.47 AC-FT
25-YR 24-HR STORM EVENT REQUIRED
CAPACITY = 1.1 AC-FT
25-YR 24-HR STORM EVENT APPROX. WATER
SURFACE EL. = 2914 FT

OVERFLOW POND
BOTTOM EL. = 2892 FT
CREST EL. = 2905 FT
AVAILABLE CAPACITY AT CREST = 1.76 AC-FT



SECTION E

E
-
SCALE: HORIZ. 1" = 30' VERT 2X

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

16021
MAUREEN A. MCGRAW
10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

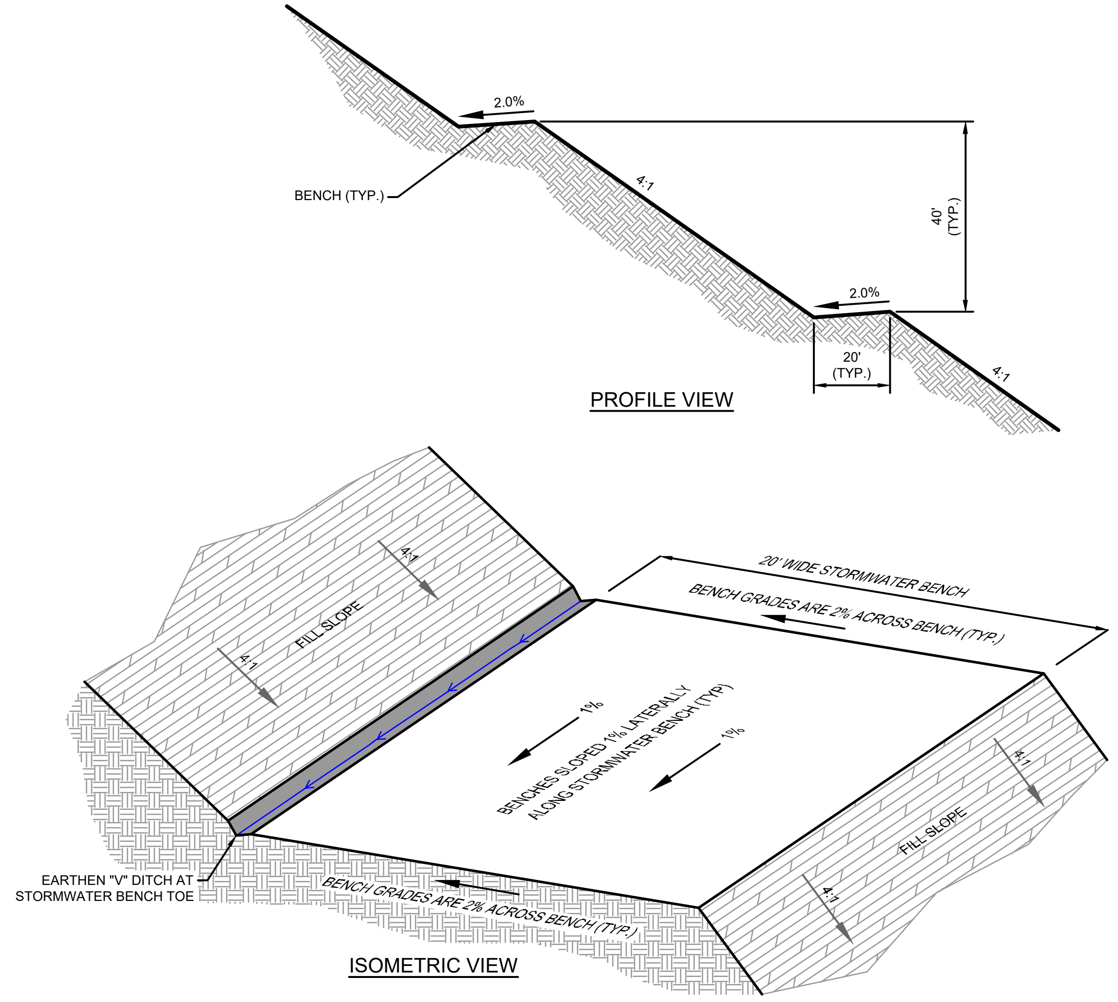
PHASE 5 EXPANSION PLAN

STORMWATER PONDS
SECTIONS 2

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

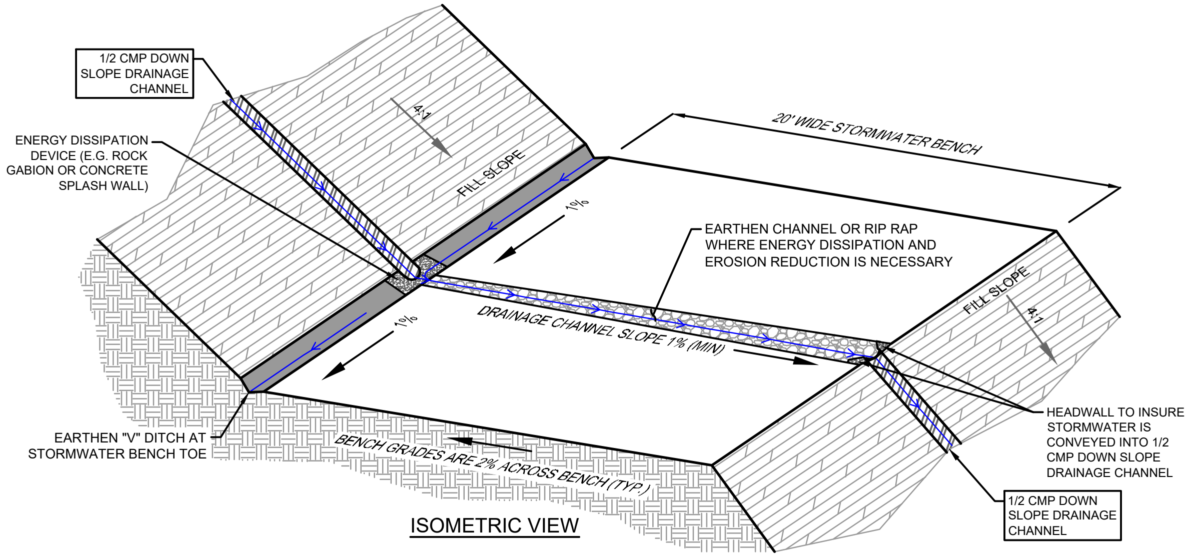
C-112

10/2/2024 2:32:45 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-X_STORMWATER PONDS SECTIONS.DWG - SANDERS, JIM1



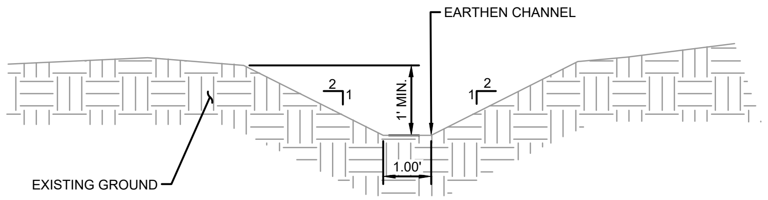
1 / X **STORMWATER BENCH DETAIL**

NOT TO SCALE



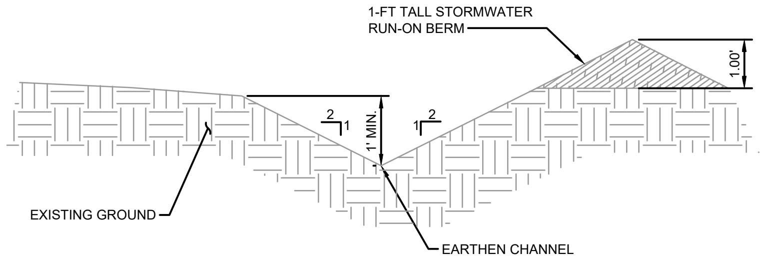
2 / X **1/2 CMP DOWN SLOPE DRAINAGE CHANNEL DETAIL**

NOT TO SCALE



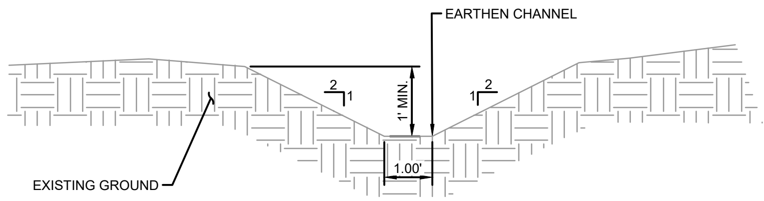
3 / X **EAST STORMWATER CHANNEL SECTION (TYP.)**

NOT TO SCALE



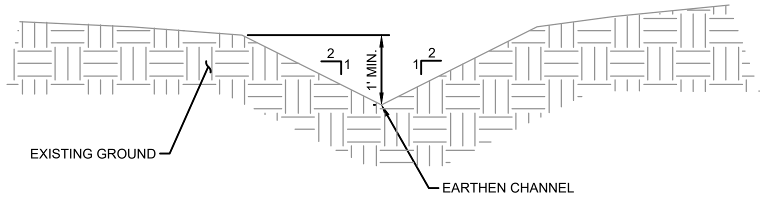
4 / X **NORTH STORMWATER CHANNEL SECTION (TYP.)**

NOT TO SCALE



5 / X **WEST STORMWATER CHANNEL 1 SECTION (TYP.)**

NOT TO SCALE



6 / X **WEST STORMWATER CHANNEL 2 SECTION (TYP.)**

NOT TO SCALE

TETRA TECH

www.tetratech.com
3380 Americana Terrace, Suite 201
Boise, ID 83706
Phone: 208.389.1030

LICENSED PROFESSIONAL ENGINEER 16021 STATE OF IDAHO MAUREEN A. MCGRAW

10/07/2024

MARK	DATE	DESCRIPTION	BY
A	7/2024	ISSUED FOR REVIEW	JSS
B	10/2024	REGULATORY SUBMITTAL	

PICKLES BUTTE LANDFILL
CANYON COUNTY, IDAHO

PHASE 5 EXPANSION PLAN

STORMWATER SECTIONS AND DETAILS

Project No.:	114-571040-2024
Designed By:	MM
Drawn By:	JSS
Checked By:	MM

C-113

10/2/2024 2:33:20 PM - P:\A-G\CANYON COUNTY IDAHO\114-571040-2023 - PICKLES BUTTE 2023 LANDFILL\07-CAD\SHEETFILES\FIG-X_STORMWATER SECTIONS AND DETAILS.DWG - SANDERS, JIM1

APPENDIX I: HYDROLOGY AND HYDRAULIC CALCULATIONS

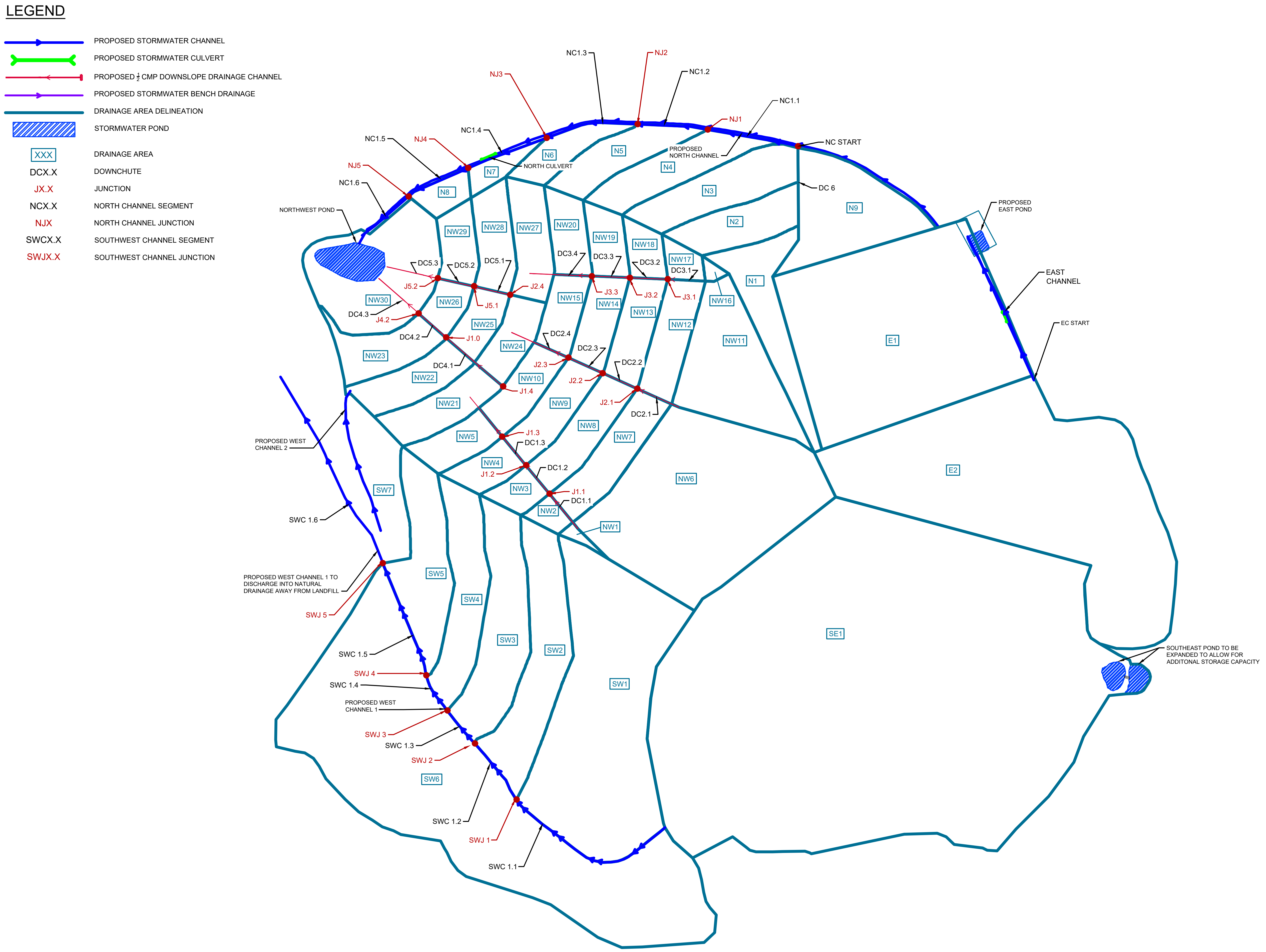


FIGURE 1 - PBSL HEC-HMS DRAINAGE BASINS, DOWNCHUTES, JUNCTIONS, AND CHANNEL SECTIONS

Worksheet for North Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.090	ft/ft
Left Side Slope	2.000	H:V
Right Side Slope	2.000	H:V
Discharge	0.20	cfs

Results

Normal Depth	2.4	in
Flow Area	0.1	ft²
Wetted Perimeter	0.9	ft
Hydraulic Radius	1.1	in
Top Width	0.80	ft
Critical Depth	2.7	in
Critical Slope	0.043	ft/ft
Velocity	2.53	ft/s
Velocity Head	0.10	ft
Specific Energy	0.30	ft
Froude Number	1.415	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.4	in
Critical Depth	2.7	in
Channel Slope	0.090	ft/ft
Critical Slope	0.043	ft/ft

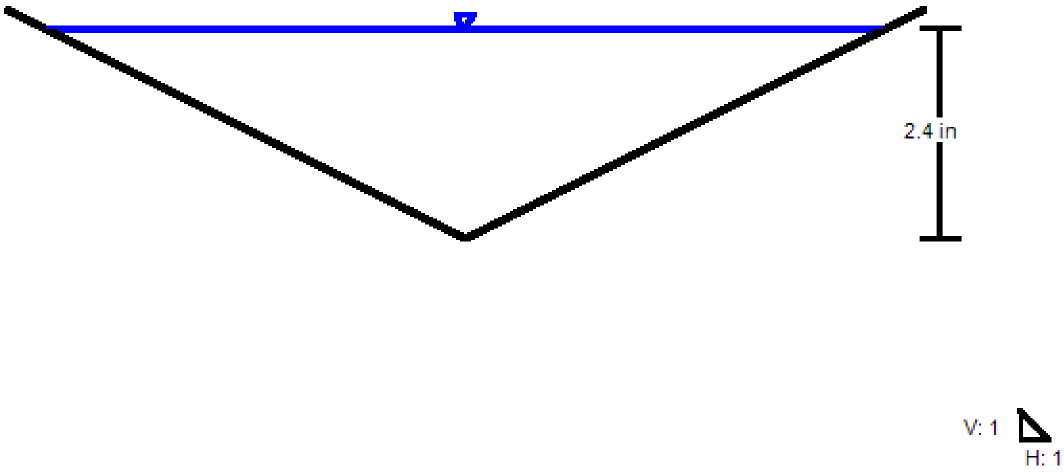
Cross Section for North Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.090 ft/ft
Normal Depth	2.4 in
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	0.20 cfs



Worksheet for East Channel

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.020	ft/ft
Left Side Slope	2.000	H:V
Right Side Slope	2.000	H:V
Bottom Width	1.00	ft
Discharge	1.20	cfs

Results

Normal Depth	4.0	in
Flow Area	0.5	ft²
Wetted Perimeter	2.5	ft
Hydraulic Radius	2.7	in
Top Width	2.32	ft
Critical Depth	3.5	in
Critical Slope	0.032	ft/ft
Velocity	2.20	ft/s
Velocity Head	0.07	ft
Specific Energy	0.40	ft
Froude Number	0.797	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.0	in
Critical Depth	3.5	in
Channel Slope	0.020	ft/ft
Critical Slope	0.032	ft/ft

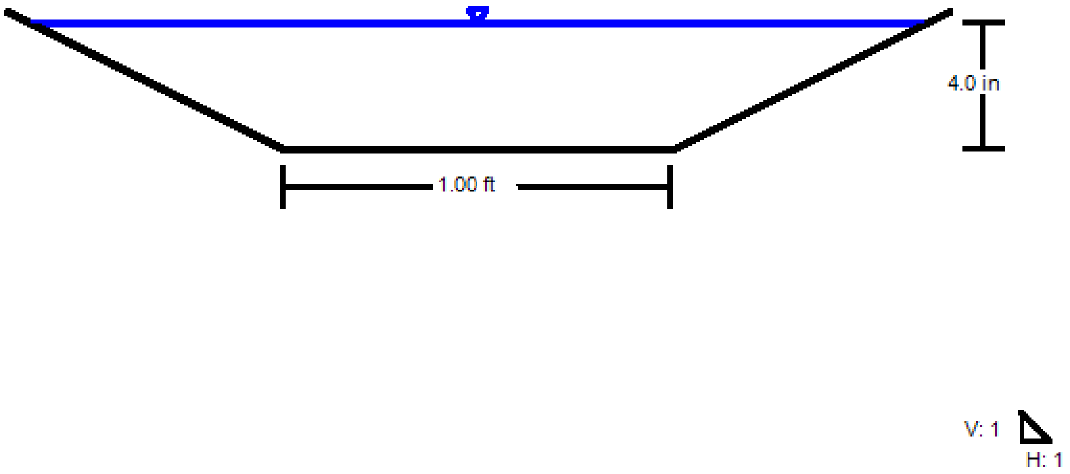
Cross Section for East Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.020 ft/ft
Normal Depth	4.0 in
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	1.00 ft
Discharge	1.20 cfs



Worksheet for West Channel 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.020 ft/ft
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	1.00 ft
Discharge	1.60 cfs

Results

Normal Depth	4.6 in
Flow Area	0.7 ft²
Wetted Perimeter	2.7 ft
Hydraulic Radius	3.0 in
Top Width	2.53 ft
Critical Depth	4.1 in
Critical Slope	0.031 ft/ft
Velocity	2.38 ft/s
Velocity Head	0.09 ft
Specific Energy	0.47 ft
Froude Number	0.811
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.6 in
Critical Depth	4.1 in
Channel Slope	0.020 ft/ft
Critical Slope	0.031 ft/ft

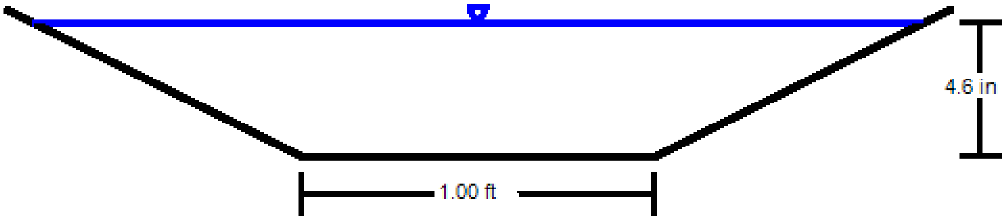
Cross Section for West Channel 1

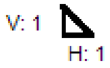
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.020 ft/ft
Normal Depth	4.6 in
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Bottom Width	1.00 ft
Discharge	1.60 cfs





Worksheet for West Channel 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.200	ft/ft
Left Side Slope	2.000	H:V
Right Side Slope	2.000	H:V
Discharge	0.20	cfs

Results

Normal Depth	2.1	in
Flow Area	0.1	ft²
Wetted Perimeter	0.8	ft
Hydraulic Radius	0.9	in
Top Width	0.68	ft
Critical Depth	2.7	in
Critical Slope	0.043	ft/ft
Velocity	3.42	ft/s
Velocity Head	0.18	ft
Specific Energy	0.35	ft
Froude Number	2.060	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.1	in
Critical Depth	2.7	in
Channel Slope	0.200	ft/ft
Critical Slope	0.043	ft/ft

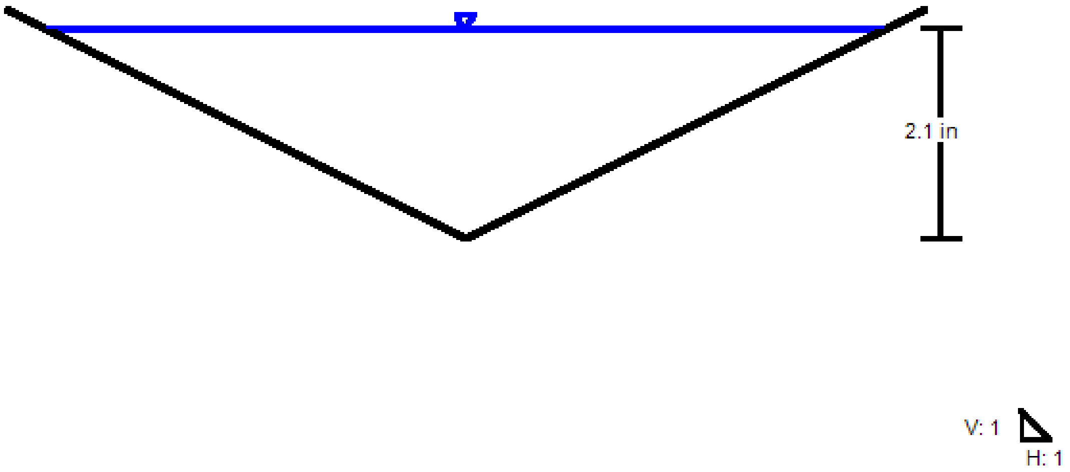
Cross Section for West Channel 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.200 ft/ft
Normal Depth	2.1 in
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	0.20 cfs



Worksheet for Bench Channel (Typ.)

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.010	ft/ft
Left Side Slope	2.000	H:V
Right Side Slope	2.000	H:V
Discharge	0.80	cfs

Results

Normal Depth	6.1	in
Flow Area	0.5	ft²
Wetted Perimeter	2.3	ft
Hydraulic Radius	2.7	in
Top Width	2.02	ft
Critical Depth	4.8	in
Critical Slope	0.035	ft/ft
Velocity	1.57	ft/s
Velocity Head	0.04	ft
Specific Energy	0.54	ft
Froude Number	0.552	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	6.1	in
Critical Depth	4.8	in
Channel Slope	0.010	ft/ft
Critical Slope	0.035	ft/ft

Cross Section for Bench Channel (Typ.)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035
Channel Slope	0.010 ft/ft
Normal Depth	6.1 in
Left Side Slope	2.000 H:V
Right Side Slope	2.000 H:V
Discharge	0.80 cfs

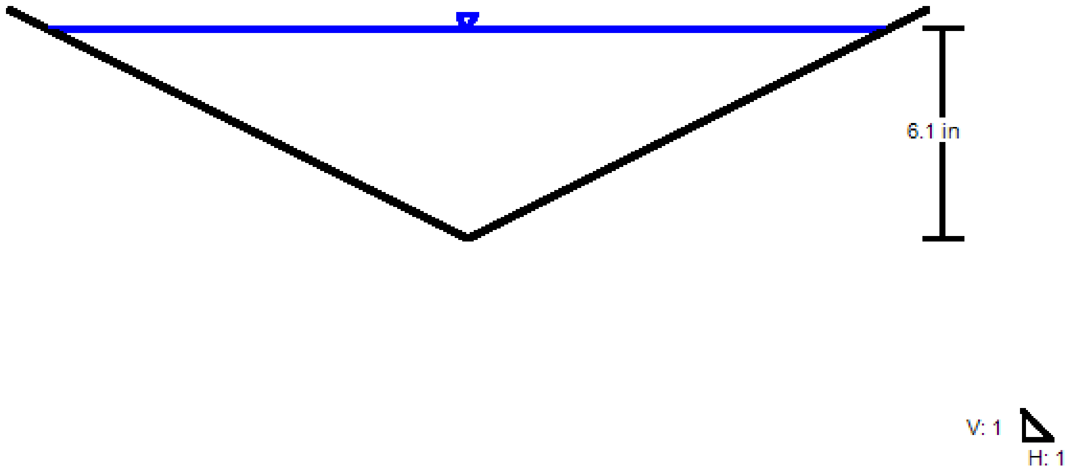


TABLE 1
Phase 5 Expansion, 25-Year, 24-Hour HEC-HMS Results - Northwest Pond
Pickles Butte Sanitary Landfill, Nampa, Idaho

End Discharge	Drainage Area ID	Area (Ac)	CN	Landcover Description	Hydrologic Soil Group	Time of Concentration (min)	Peak Discharge (cfs)
Northwest Pond	NW-1	0.22	70	Closure Cover	B	5.7	0.0
	NW-2	0.54	70	Closure Cover	B	9.3	0.0
	NW-3	0.91	70	Closure Cover	B	13.7	0.1
	NW-4	1.29	70	Closure Cover	B	18.0	0.1
	NW-5	1.61	70	Closure Cover	B	20.4	0.1
	NW-6	16.38	70	Closure Cover	B	33.7	0.8
	NW-7	2.94	70	Closure Cover	B	30.7	0.1
	NW-8	2.60	70	Closure Cover	B	27.8	0.1
	NW-9	2.26	70	Closure Cover	B	24.7	0.1
	NW-10	1.91	70	Closure Cover	B	21.3	0.1
	NW-11	6.28	70	Closure Cover	B	28.9	0.3
	NW-12	2.42	70	Closure Cover	B	26.4	0.1
	NW-13	2.14	70	Closure Cover	B	23.7	0.1
	NW-14	1.85	70	Closure Cover	B	21.0	0.1
	NW-15	1.57	70	Closure Cover	B	18.2	0.1
	NW-16	0.19	70	Closure Cover	B	6.2	0.0
	NW-17	0.71	70	Closure Cover	B	11.6	0.0
	NW-18	1.08	70	Closure Cover	B	15.5	0.1
	NW-19	1.40	70	Closure Cover	B	18.5	0.1
	NW-20	1.66	70	Closure Cover	B	21.1	0.1
	NW-21	2.35	70	Closure Cover	B	26.5	0.1
	NW-22	2.33	70	Closure Cover	B	26.4	0.1
	NW-23	2.39	70	Closure Cover	B	26.1	0.1
	NW-24	1.74	70	Closure Cover	B	19.6	0.1
	NW-25	1.38	70	Closure Cover	B	15.8	0.1
	NW-26	1.01	70	Closure Cover	B	11.7	0.1
	NW-27	2.40	70	Closure Cover	B	27.1	0.1
	NW-28	2.10	70	Closure Cover	B	22.0	0.1
	NW-29	1.50	70	Closure Cover	B	16.3	0.1
	NW-30	6.86	70	Closure Cover	B	2.6	0.5
	SW-7	2.86	70	Closure Cover	B	15.4	0.2
	N-1	3.65	70	Closure Cover	B	56.2	0.1
	N-2	2.69	70	Closure Cover	B	31.2	0.1
	N-3	3.75	70	Closure Cover	B	36.7	0.2
	N-4	3.17	70	Closure Cover	B	31.6	0.2
	N-5	2.56	70	Closure Cover	B	26.4	0.1
	N-6	1.66	70	Closure Cover	B	16.1	0.1
	N-7	0.80	70	Closure Cover	B	8.9	0.1
	N-8	0.90	70	Closure Cover	B	10.3	0.1
	N-9	5.56	70	Closure Cover	B	10	0.3

TABLE 2
Phase 5 Expansion, 25-Year, 24-Hour Run-off Summary - Natural Drainage
Pickles Butte Sanitary Landfill, Nampa, Idaho

End Discharge	Drainage Area ID	Area (Ac)	CN	Landcover Description	Hydrologic Soil Group	Time of Concentration (min)	Peak Discharge (cfs)
Natural Drainage	SW-1	17.05	70	Closure Cover	B	52.8	0.7
	SW-2	5.99	70	Closure Cover	B	47.5	0.3
	SW-3	5.58	70	Closure Cover	B	45.8	0.3
	SW-4	4.35	70	Closure Cover	B	42.6	0.2
	SW-5	4.61	70	Closure Cover	B	38.5	0.2
	SW-6	28.58	51	Sagebrush with grass understory	B	12.4	0.0

TABLE 3
Phase 5 Expansion, 25-Year, 24-Hour HEC-HMS - Results - East Pond
Pickles Butte Sanitary Landfill, Nampa, Idaho

End Discharge	Drainage Area ID	Area (Ac)	CN	Landcover Description	Hydrologic Soil Group	Time of Concentration (min)	Peak Discharge (cfs)
East Pond	E-1	19.95	70	Closure Cover	B	20.4	0.7

TABLE 4
Phase 5 Expansion, 25-Year, 24-Hour HEC-HMS - Results - Southeast Pond
Pickles Butte Sanitary Landfill, Nampa, Idaho

End Discharge	Drainage Area ID	Area (Ac)	CN[1]	Landcover Description	Hydrologic Soil Group	Time of Concentration (min)	Peak Discharge (cfs)
Southeast Pond	SE-1	68.53	70.7	Closure Cover	B	36.1	3.9

[1] CN reflects a weighted Curve Number using the following land cover types:

Closure Cover, CN = 70

Sagebrush with grass understory, fair condition, CN = 51

Streets and Roads, gravel, CN = 85

Project: Pbl 2024
Simulation Run: 25-yr 24-hr SCS II
Simulation Start: 31 July 2024, 24:00
Simulation End: 3 August 2024, 24:00

HMS Version: 4.12
Executed: 26 September 2024, 19:54

Global Parameter Summary - Subbasin

	Area (MI2)
Element Name	Area (MI2)
NW - 6	0.03
NW - 11	0.01
NW - 7	0
NW - 12	0
NW - 8	0
NW - 13	0
NW - 9	0
NW - 14	0
NW - 10	0
NW - 15	0
NW - 18	0
NW - 17	0
NW - 19	0
NW - 20	0
NW - 27	0
NW - 24	0
NW - 28	0
NW - 25	0
NW - 29	0
NW - 26	0
NW - 1	0
NW - 2	0
NW - 3	0
NW - 4	0
NW - 5	0
NW - 21	0
NW - 22	0

NW - 23	0
NW - 30	0.01
N - 6	0
N - 7	0
N - 8	0
E - 1	0.03
SW - 1	0.03
SW - 2	0.01
SW - 3	0.01
SW - 4	0.01
SW - 5	0.01
SW - 6	0.04
SE - 1	0.11
N - 1	0.01
N - 2	0
N - 9	0.01
N - 3	0.01
N - 4	0.01
N - 5	0
NW - 16	0
SW - 7	0

Downstream

Element Name	Downstream
NW - 6	Downchute 2.1
NW - 11	Downchute 2.1
NW - 7	Junction 2.1
NW - 12	Junction 2.1
NW - 8	Junction 2.2
NW - 13	Junction 2.2
NW - 9	Junction 2.3
NW - 14	Junction 2.3
NW - 10	Junction 2.4
NW - 15	Junction 2.4
NW - 18	Junction 3.2
NW - 17	Junction 3.1
NW - 19	Junction 3.3
NW - 20	Junction 3.4
NW - 27	Downchute 5.1
NW - 24	Downchute 5.1
NW - 28	Junction 5.1
NW - 25	Junction 5.1
NW - 29	Junction 5.2
NW - 26	Junction 5.2
NW - 1	Downchute 1.1
NW - 2	Junction 1.1
NW - 3	Junction 1.2
NW - 4	Junction 1.3
NW - 5	Junction 1.4
NW - 21	Downchute 4.1
NW - 22	Junction - 1
NW - 23	Junction 4.2
NW - 30	Northwest pond
N - 6	N junction 3
N - 7	N junction 4
N - 8	N junction 5
E - 1	East channel
SW - 1	Sw channel 1.1
SW - 2	Sw junction 1
SW - 3	Sw junction 2
SW - 4	Sw junction 3
SW - 5	Sw junction 4
SW - 6	Sw junction 5
SE - 1	Se pond
N - 1	Downchute 6

N - 2	Downchute 6
N - 9	N channel start
N - 3	N channel start
N - 4	N junction 1
N - 5	N junction 2
NW - 16	Downchute 3.1

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
NW - 6	0	70
NW - 11	0	70
NW - 7	0	70
NW - 12	0	70
NW - 8	0	70
NW - 13	0	70
NW - 9	0	70
NW - 14	0	70
NW - 10	0	70
NW - 15	0	70
NW - 18	0	70
NW - 17	0	70
NW - 19	0	70
NW - 20	0	70
NW - 27	0	70
NW - 24	0	70
NW - 28	0	70
NW - 25	0	70
NW - 29	0	70
NW - 26	0	70
NW - 1	0	70
NW - 2	0	70
NW - 3	0	70
NW - 4	0	70
NW - 5	0	70
NW - 21	0	70
NW - 22	0	70
NW - 23	0	70
NW - 30	0	70
N - 6	0	70
N - 7	0	70
N - 8	0	70
E - 1	0	70
SW - 1	0	70
SW - 2	0	70
SW - 3	0	70
SW - 4	0	70
SW - 5	0	70
SW - 6	0	51
SE - 1	0	70.7
N - 1	0	70

N - 2	0	70
N - 9	0	70
N - 3	0	70
N - 4	0	70
N - 5	0	70
NW - 16	0	70
SW - 7	0	70

Transform: Scs

Element Name	Lag	Unitgraph Type
NW - 6	24.3	Standard
NW - 11	20.9	Standard
NW - 7	22.2	Standard
NW - 12	19	Standard
NW - 8	20.1	Standard
NW - 13	17.1	Standard
NW - 9	17.8	Standard
NW - 14	15.2	Standard
NW - 10	15.4	Standard
NW - 15	13.1	Standard
NW - 18	11.2	Standard
NW - 17	8.4	Standard
NW - 19	13.3	Standard
NW - 20	15.2	Standard
NW - 27	19.6	Standard
NW - 24	14.1	Standard
NW - 28	15.9	Standard
NW - 25	11.4	Standard
NW - 29	11.7	Standard
NW - 26	8.4	Standard
NW - 1	4.1	Standard
NW - 2	6.7	Standard
NW - 3	9.9	Standard
NW - 4	13	Standard
NW - 5	14.7	Standard
NW - 21	19.1	Standard
NW - 22	19	Standard
NW - 23	18.8	Standard
NW - 30	1.9	Standard
N - 6	11.6	Standard
N - 7	6.5	Standard
N - 8	7.4	Standard
E - 1	14.7	Standard
SW - 1	31.7	Standard
SW - 2	28.5	Standard
SW - 3	27.5	Standard
SW - 4	25.6	Standard
SW - 5	23.1	Standard
SW - 6	7.4	Standard
SE - 1	21.7	Standard
N - 1	40.5	Standard

N - 2	22.5	Standard
N - 9	10	Standard
N - 3	26.5	Standard
N - 4	22.8	Standard
N - 5	19.1	Standard
NW - 16	4.5	Standard
SW - 7	9.3	Standard

Global Parameter Summary - Reach

Downstream

Element Name	Downstream
Downchute 2.1	Junction 2.1
Downchute 2.2	Junction 2.2
Downchute 2.3	Junction 2.3
Downchute 2.4	Junction 2.4
Downchute 3.2	Junction 3.2
Downchute 3.3	Junction 3.3
Downchute 3.4	Junction 3.4
Downchute 5.1	Junction 5.1
Downchute 5.2	Junction 5.2
Downchute 5.3	Northwest pond
Downchute 1.1	Junction 1.1
Downchute 1.2	Junction 1.2
Downchute 1.3	Junction 1.3
Downchute 1.4	Junction 1.4
Downchute 4.1	Junction - 1
Downchute 4.2	Junction 4.2
Downchute 4.3	Northwest pond
N channel 1.3	N junction 3
N channel 1.4	N junction 4
N channel 1.5	N junction 5
N channel 1.6	Northwest pond
East channel	East pond
Sw channel 1.1	Sw junction 1
Sw channel 1.2	Sw junction 2
Sw channel 1.3	Sw junction 3
Sw channel 1.4	Sw junction 4
Sw channel 1.5	Sw junction 5
Sw channel 1.6	West channel 1 sink
Downchute 6	N channel start

N channel 1.2	N junction 2

Route: Lag

Element Name	Method	Initial Variable	Lag
Downchute 2.1	Lag	Combined Inflow	0.5
Downchute 2.2	Lag	Combined Inflow	0.5
Downchute 2.3	Lag	Combined Inflow	0.5
Downchute 2.4	Lag	Combined Inflow	0.2
Downchute 3.2	Lag	Combined Inflow	0.5
Downchute 3.3	Lag	Combined Inflow	0.5
Downchute 3.4	Lag	Combined Inflow	0.2
Downchute 5.1	Lag	Combined Inflow	0.5
Downchute 5.2	Lag	Combined Inflow	0.5
Downchute 5.3	Lag	Combined Inflow	0.5
Downchute 1.1	Lag	Combined Inflow	0.5
Downchute 1.2	Lag	Combined Inflow	0.5
Downchute 1.3	Lag	Combined Inflow	0.5
Downchute 1.4	Lag	Combined Inflow	0.5
Downchute 4.1	Lag	Combined Inflow	0.5
Downchute 4.2	Lag	Combined Inflow	0.5
Downchute 4.3	Lag	Combined Inflow	0.5
N channel 1.3	Lag	Combined Inflow	2.4
N channel 1.4	Lag	Combined Inflow	2.4
N channel 1.5	Lag	Combined Inflow	2.4
N channel 1.6	Lag	Combined Inflow	2.4
East channel	Lag	Combined Inflow	10.1
Sw channel 1.1	Lag	Combined Inflow	2.4
Sw channel 1.2	Lag	Combined Inflow	2.4
Sw channel 1.3	Lag	Combined Inflow	2.4
Sw channel 1.4	Lag	Combined Inflow	2.4
Sw channel 1.5	Lag	Combined Inflow	2.4
Sw channel 1.6	Lag	Combined Inflow	2.4
Downchute 6	Lag	Combined Inflow	0.5
N channel 1.1	Lag	Combined Inflow	2.4
N channel 1.2	Lag	Combined Inflow	2.4
Downchute 3.1	Lag	Combined Inflow	0.5

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
NW - 6	0.03	0.81	01Aug2024, 12:30	0.17
NW - 11	0.01	0.31	01Aug2024, 12:30	0.17

Downchute 2.1	0.04	1.13	01Aug2024, 12:30	0.17
NW - 7	0	0.15	01Aug2024, 12:30	0.17
NW - 12	0	0.13	01Aug2024, 12:15	0.17
Junction 2.1	0.04	1.4	01Aug2024, 12:30	0.17
Downchute 2.2	0.04	1.4	01Aug2024, 12:30	0.17
NW - 8	0	0.13	01Aug2024, 12:15	0.17
NW - 13	0	0.12	01Aug2024, 12:15	0.17
Junction 2.2	0.05	1.63	01Aug2024, 12:30	0.17
Downchute 2.3	0.05	1.63	01Aug2024, 12:30	0.17
NW - 9	0	0.12	01Aug2024, 12:15	0.17
NW - 14	0	0.11	01Aug2024, 12:15	0.17
Junction 2.3	0.06	1.83	01Aug2024, 12:30	0.17
Downchute 2.4	0.06	1.83	01Aug2024, 12:30	0.17
NW - 10	0	0.11	01Aug2024, 12:15	0.17
NW - 15	0	0.1	01Aug2024, 12:15	0.17
Junction 2.4	0.06	1.99	01Aug2024, 12:30	0.17
NW - 18	0	0.06	01Aug2024, 12:15	0.17
NW - 17	0	0.05	01Aug2024, 12:00	0.17
Junction 3.1	0	0.05	01Aug2024, 12:00	0.17
Downchute 3.2	0	0.05	01Aug2024, 12:00	0.17
Junction 3.2	0	0.11	01Aug2024, 12:00	0.17
Downchute 3.3	0	0.11	01Aug2024, 12:00	0.17
NW - 19	0	0.08	01Aug2024, 12:15	0.17
Junction 3.3	0.01	0.19	01Aug2024, 12:15	0.17
Downchute 3.4	0.01	0.19	01Aug2024, 12:15	0.17
NW - 20	0	0.1	01Aug2024, 12:15	0.17
Junction 3.4	0.01	0.29	01Aug2024, 12:15	0.17
NW - 27	0	0.12	01Aug2024, 12:15	0.17
NW - 24	0	0.1	01Aug2024, 12:15	0.17
Downchute 5.1	0.08	2.49	01Aug2024, 12:15	0.17
NW - 28	0	0.12	01Aug2024, 12:15	0.17
NW - 25	0	0.08	01Aug2024, 12:15	0.17
Junction 5.1	0.08	2.69	01Aug2024, 12:15	0.17
Downchute 5.2	0.08	2.69	01Aug2024, 12:15	0.17
NW - 29	0	0.09	01Aug2024, 12:15	0.17
NW - 26	0	0.07	01Aug2024, 12:00	0.17
Junction 5.2	0.09	2.84	01Aug2024, 12:15	0.17
Downchute 5.3	0.09	2.84	01Aug2024, 12:15	0.17
NW - 1	0	0.01	01Aug2024, 12:00	0.17
NW - 2	0	0.04	01Aug2024, 12:00	0.17
Downchute 1.1	0	0.01	01Aug2024, 12:00	0.17
Junction 1.1	0	0.05	01Aug2024, 12:00	0.17
NW - 3	0	0.06	01Aug2024, 12:00	0.17

Downchute 1.2	0	0.05	01Aug2024, 12:00	0.17
Junction 1.2	0	0.11	01Aug2024, 12:00	0.17
Downchute 1.3	0	0.11	01Aug2024, 12:00	0.17
NW - 4	0	0.08	01Aug2024, 12:15	0.17
Junction 1.3	0	0.17	01Aug2024, 12:15	0.17
Downchute 1.4	0	0.17	01Aug2024, 12:15	0.17
NW - 5	0	0.09	01Aug2024, 12:15	0.17
Junction 1.4	0.01	0.26	01Aug2024, 12:15	0.17
NW - 21	0	0.13	01Aug2024, 12:15	0.17
Downchute 4.1	0.01	0.39	01Aug2024, 12:15	0.17
NW - 22	0	0.12	01Aug2024, 12:15	0.17
Junction - 1	0.01	0.51	01Aug2024, 12:15	0.17
Downchute 4.2	0.01	0.51	01Aug2024, 12:15	0.17
NW - 23	0	0.13	01Aug2024, 12:15	0.17
Junction 4.2	0.02	0.64	01Aug2024, 12:15	0.17
Downchute 4.3	0.02	0.64	01Aug2024, 12:15	0.17
NW - 30	0.01	0.5	01Aug2024, 12:00	0.17
N - 6	0	0.1	01Aug2024, 12:15	0.17
N channel 1.3	0	0	31Jul2024, 24:00	Not specified
N junction 3	0	0.1	01Aug2024, 12:15	0.17
N channel 1.4	0	0.1	01Aug2024, 12:15	0.17
N - 7	0	0.06	01Aug2024, 12:00	0.17
N junction 4	0	0.14	01Aug2024, 12:15	0.17
N channel 1.5	0	0.14	01Aug2024, 12:15	0.17
N - 8	0	0.07	01Aug2024, 12:00	0.17
N junction 5	0.01	0.19	01Aug2024, 12:15	0.17
N channel 1.6	0.01	0.19	01Aug2024, 12:15	0.17
Northwest pond	0.12	0	31Jul2024, 24:00	0
E - 1	0.03	1.19	01Aug2024, 12:15	0.17
East channel	0.03	1.11	01Aug2024, 12:30	0.17
SW - 1	0.03	0.74	01Aug2024, 12:45	0.17
Sw channel 1.1	0.03	0.74	01Aug2024, 12:45	0.17
SW - 2	0.01	0.28	01Aug2024, 12:30	0.17
Sw junction 1	0.04	1	01Aug2024, 12:45	0.17
Sw channel 1.2	0.04	1	01Aug2024, 12:45	0.17
SW - 3	0.01	0.26	01Aug2024, 12:30	0.17
Sw junction 2	0.04	1.23	01Aug2024, 12:45	0.17
Sw channel 1.3	0.04	1.23	01Aug2024, 12:45	0.17
SW - 4	0.01	0.21	01Aug2024, 12:30	0.17
Sw junction 3	0.05	1.41	01Aug2024, 12:45	0.17
Sw channel 1.4	0.05	1.41	01Aug2024, 12:45	0.17
SW - 5	0.01	0.23	01Aug2024, 12:30	0.17
Sw junction 4	0.06	1.6	01Aug2024, 12:45	0.17

Sw channel 1.5	0.06	1.59	01Aug2024, 12:45	0.17
SW - 6	0.04	0	31Jul2024, 24:00	0
Sw junction 5	0.1	1.59	01Aug2024, 12:45	0.1
Sw channel 1.6	0.1	1.57	01Aug2024, 12:45	0.1
SE - 1	0.11	3.94	01Aug2024, 12:30	0.18
Se pond	0.11	3.94	01Aug2024, 12:30	0.18
West channel 1 sink	0.1	1.57	01Aug2024, 12:45	0.1
East pond	0.03	1.11	01Aug2024, 12:30	0.17
N - 1	0.01	0.14	01Aug2024, 12:45	0.17
N - 2	0	0.13	01Aug2024, 12:30	0.17
Downchute 6	0.01	0.26	01Aug2024, 12:45	0.17
N - 9	0.01	0.34	01Aug2024, 12:00	0.17
N - 3	0.01	0.18	01Aug2024, 12:30	0.17
N channel start	0.02	0.68	01Aug2024, 12:30	0.17
N channel 1.1	0.02	0.68	01Aug2024, 12:30	0.17
N - 4	0.01	0.16	01Aug2024, 12:30	0.17
N junction 1	0.01	0.16	01Aug2024, 12:30	0.17
N channel 1.2	0.01	0.16	01Aug2024, 12:30	0.17
N - 5	0	0.14	01Aug2024, 12:15	0.17
N junction 2	0.01	0.28	01Aug2024, 12:30	0.17
NW - 16	0	0.01	01Aug2024, 12:00	0.17
SW - 7	0	0.19	01Aug2024, 12:00	0.17
Downchute 3.1	0	0.01	01Aug2024, 12:00	0.17

Subbasin: NW-6

Area (MI2) : 0.03
Downstream : Downchute 2.1

Loss Rate: Scs

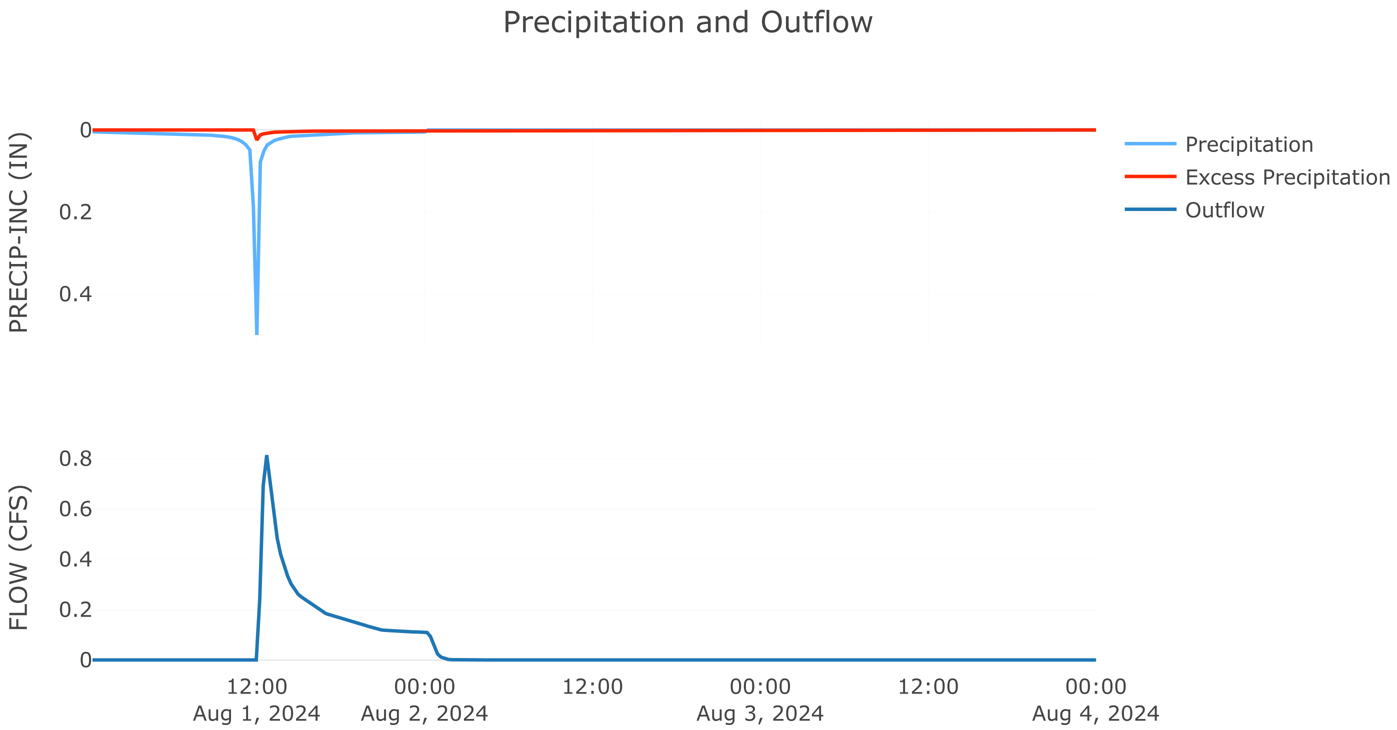
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	24.3
Unitgraph Type	Standard

Results: NW-6

Peak Discharge (CFS)	0.81
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	2.46
Loss Volume (AC - FT)	2.23
Excess Volume (AC - FT)	0.23
Direct Runoff Volume (AC - FT)	0.23
Baseflow Volume (AC - FT)	0



Subbasin: NW-11

Area (MI2) : 0.01
Downstream : Downchute 2.1

Loss Rate: Scs

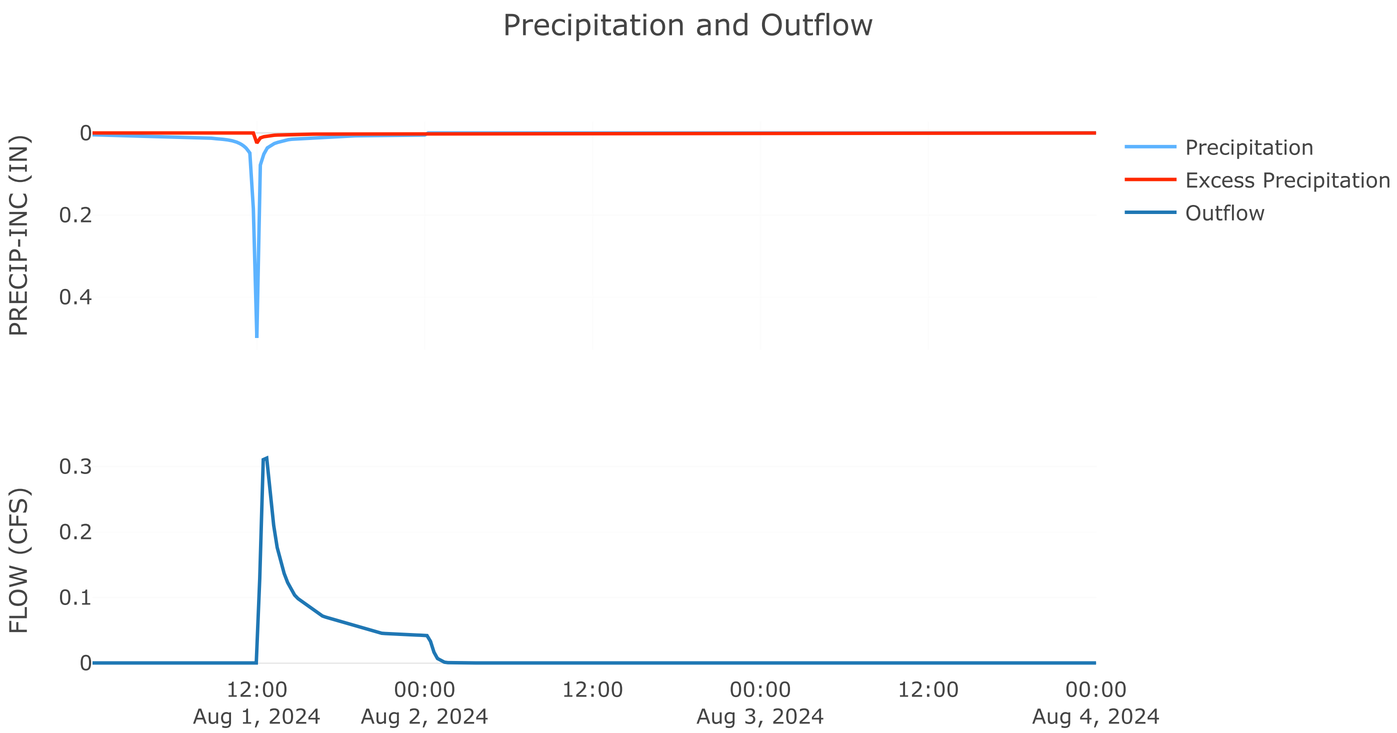
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	20.9
Unitgraph Type	Standard

Results: NW-11

Peak Discharge (CFS)	0.31
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.94
Loss Volume (AC - FT)	0.85
Excess Volume (AC - FT)	0.09
Direct Runoff Volume (AC - FT)	0.09
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 2.1

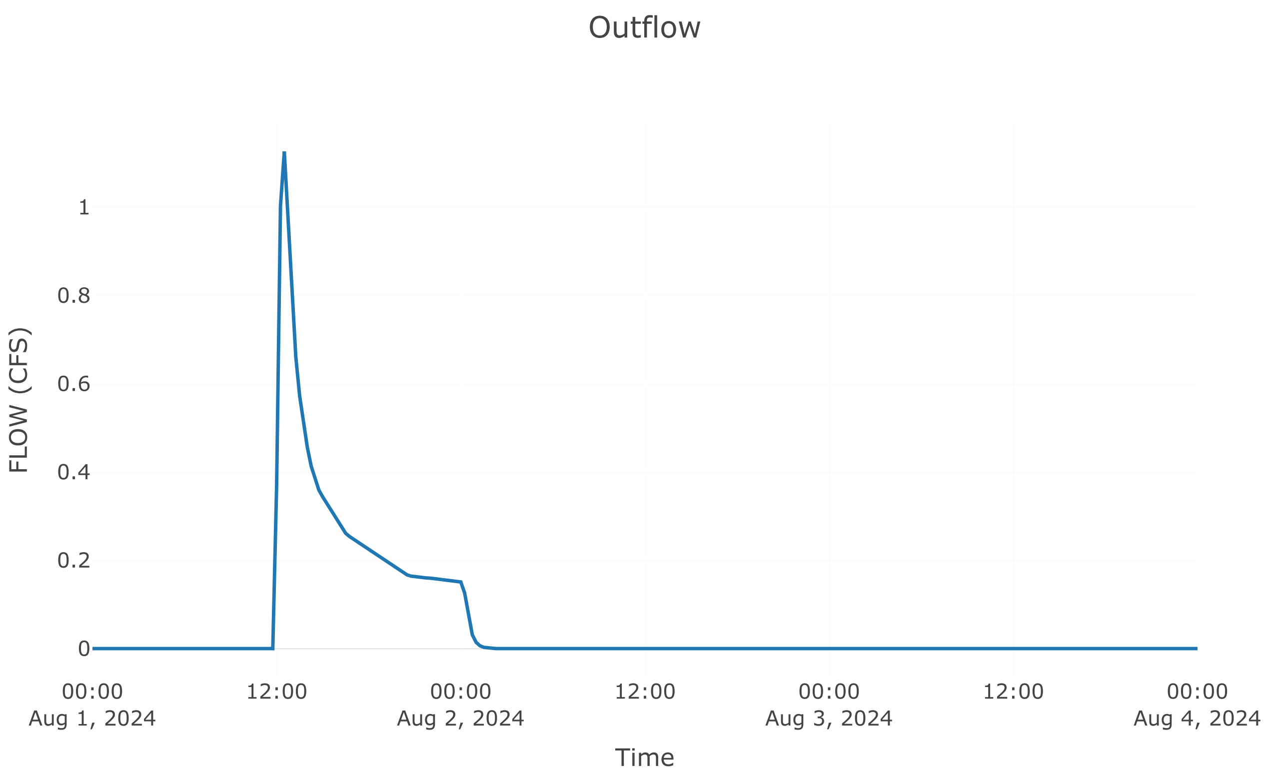
Downstream : Junction 2.1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 2.1

Peak Discharge (CFS)	1.13
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	1.13
Inflow Volume (AC - FT)	0.32



Subbasin: NW-7

Area (MI2) : 0
Downstream : Junction 2.1

Loss Rate: Scs

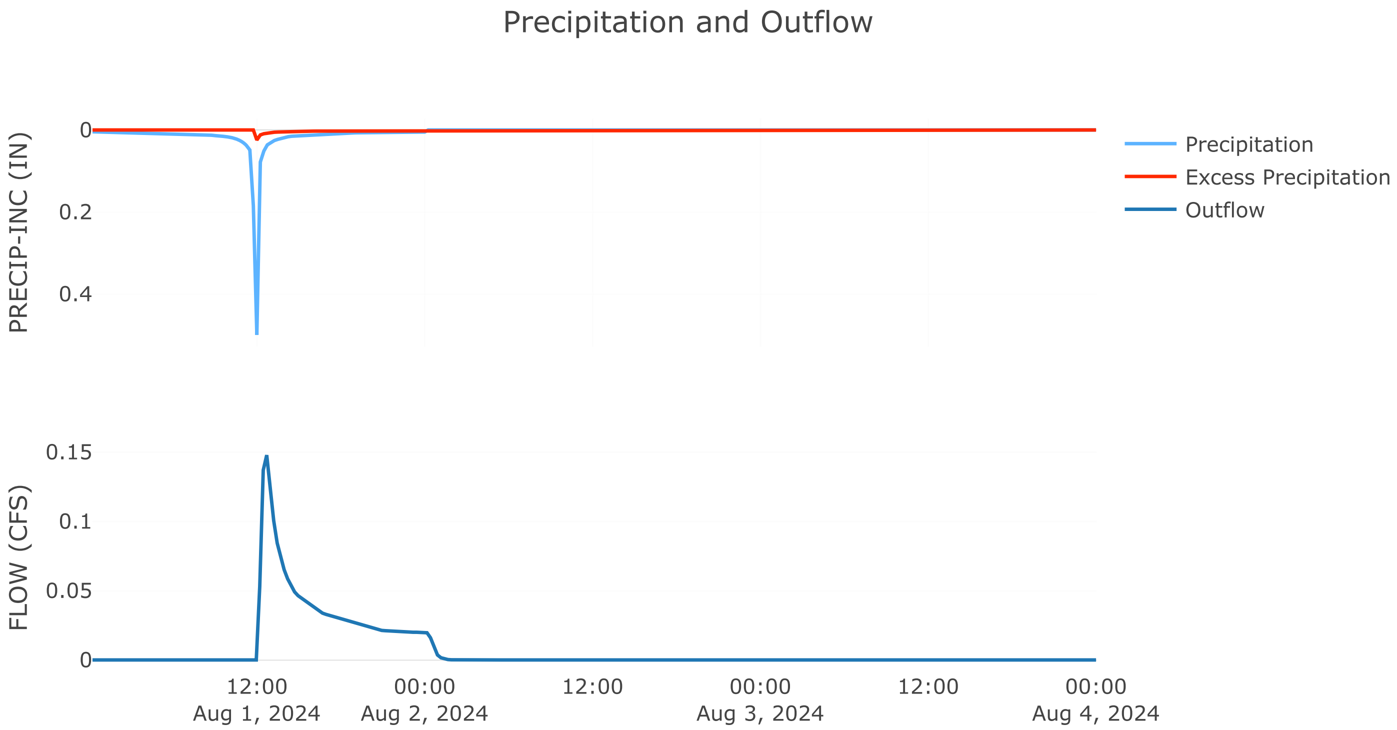
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	22.2
Unitgraph Type	Standard

Results: NW-7

Peak Discharge (CFS)	0.15
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.44
Loss Volume (AC - FT)	0.4
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0



Subbasin: NW-12

Area (MI2) : 0
Downstream : Junction 2.1

Loss Rate: Scs

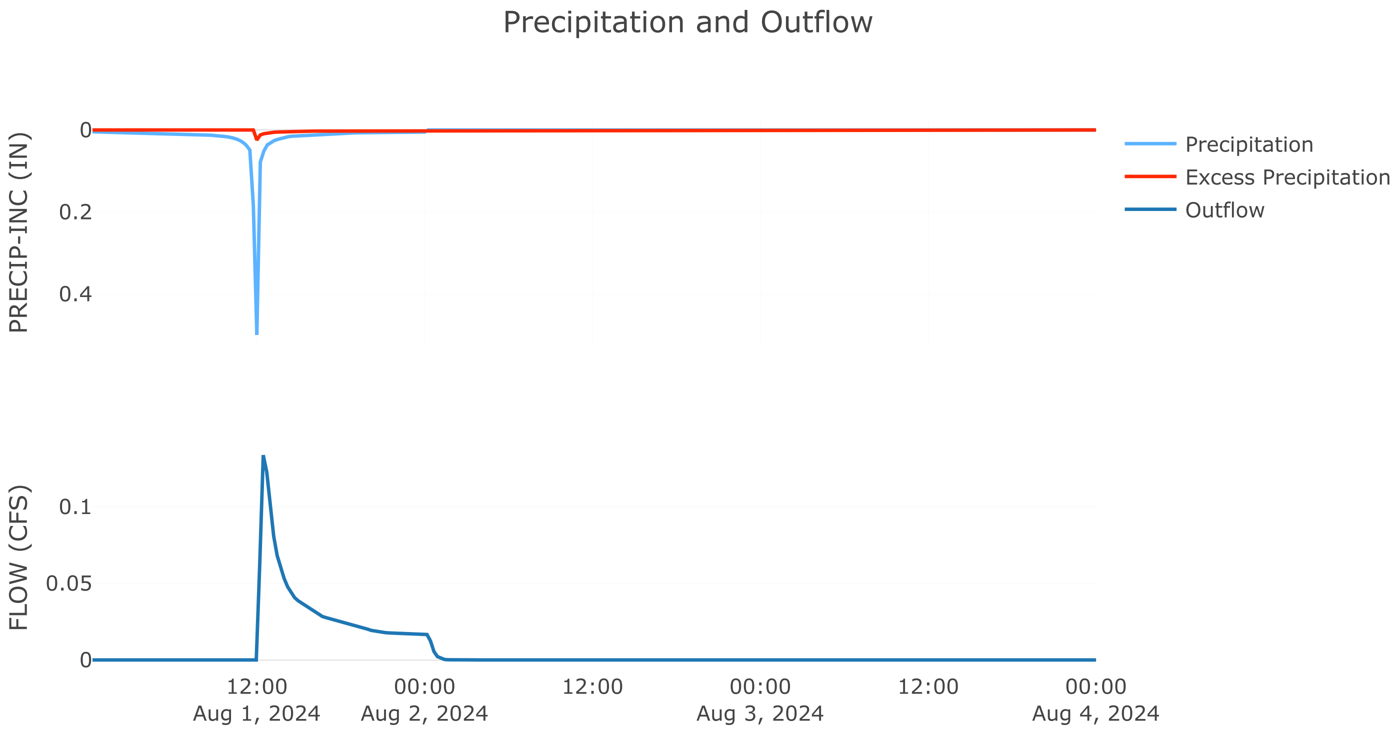
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	19
Unitgraph Type	Standard

Results: NW-12

Peak Discharge (CFS)	0.13
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.37
Loss Volume (AC - FT)	0.34
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0

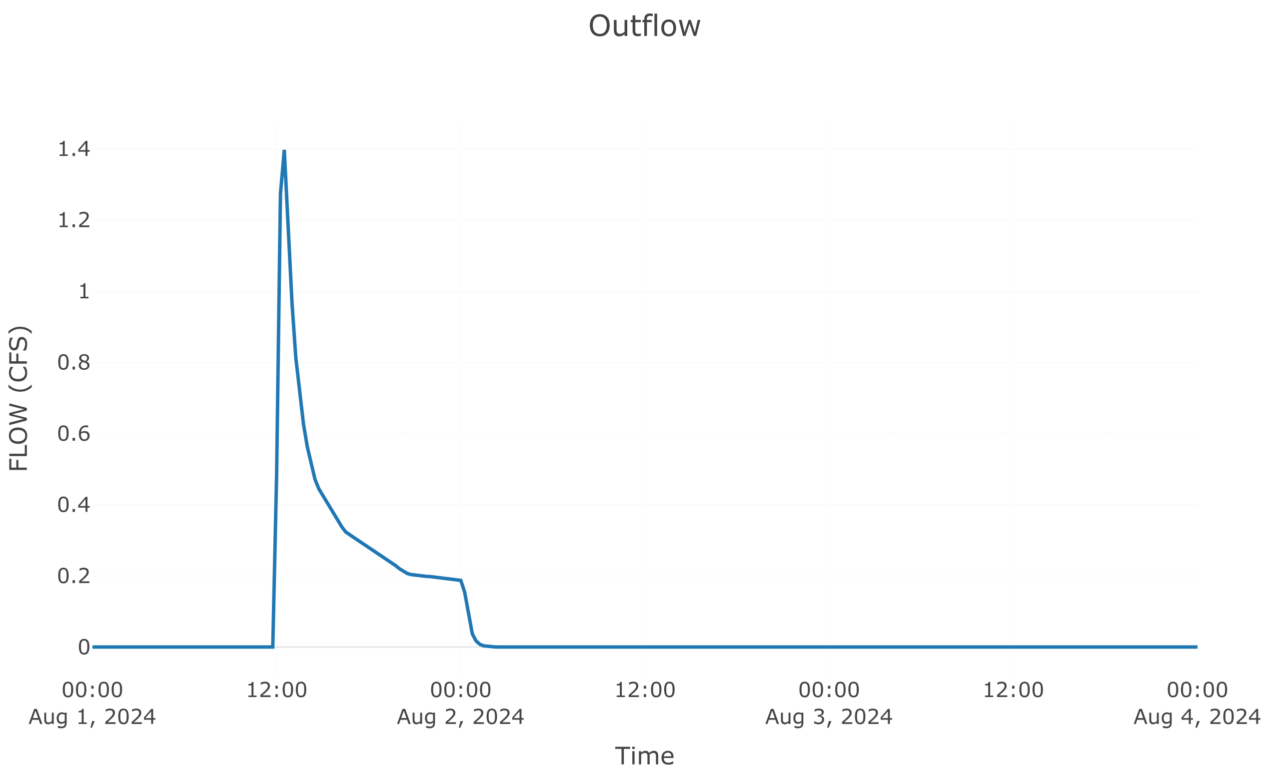


Junction: JUNCTION 2.1

Downstream : Downchute 2.2

Results: JUNCTION 2.1

Peak Discharge (CFS)	1.4
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Reach: DOWNCHUTE 2.2

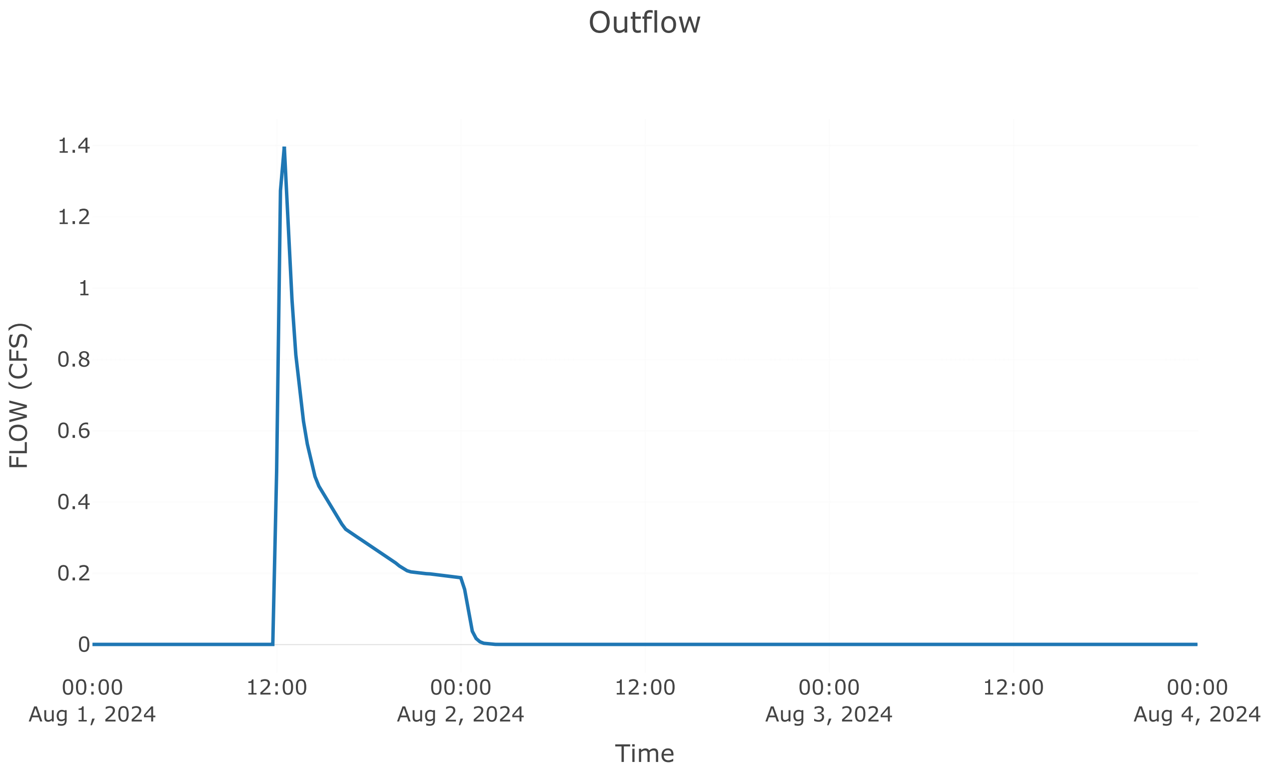
Downstream : Junction 2.2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 2.2

Peak Discharge (CFS)	1.4
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	1.4
Inflow Volume (AC - FT)	0.4



Subbasin: NW-8

Area (MI2) : 0
Downstream : Junction 2.2

Loss Rate: Scs

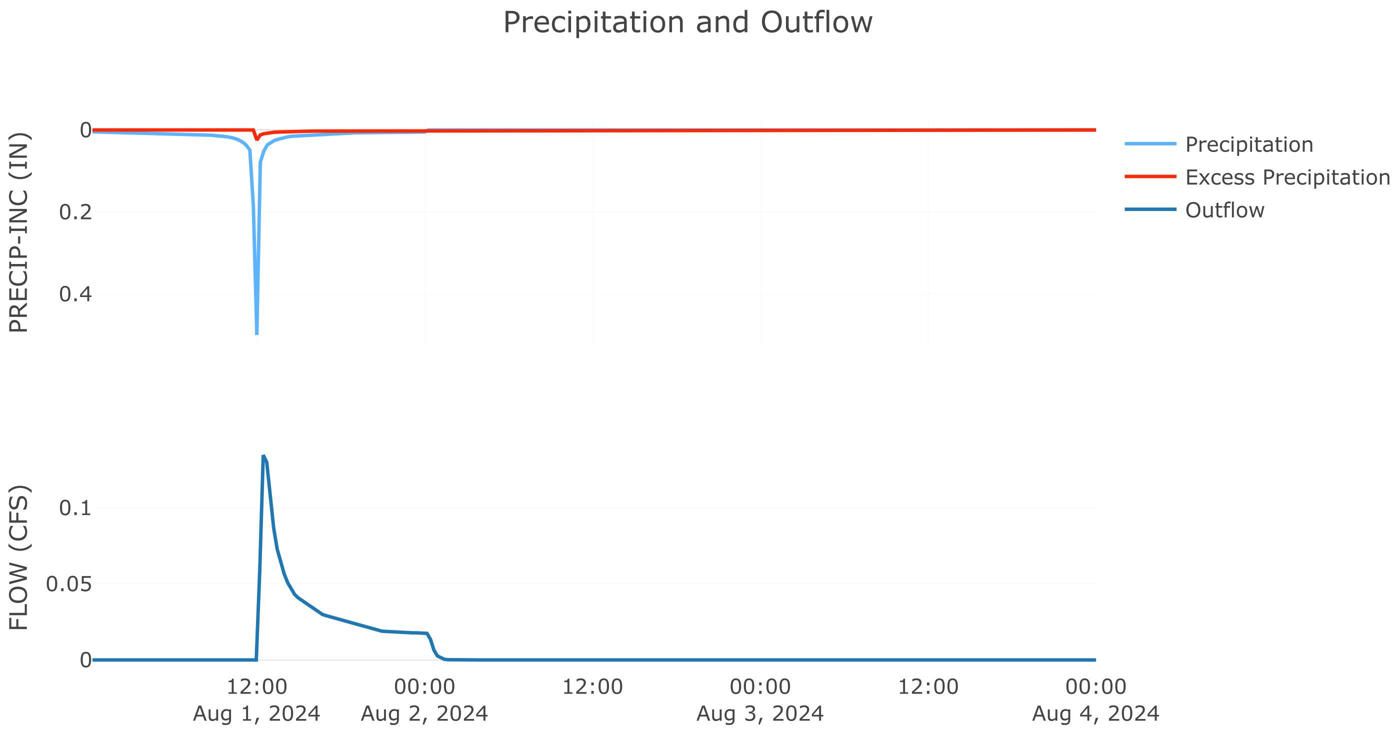
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	20.1
Unitgraph Type	Standard

Results: NW-8

Peak Discharge (CFS)	0.13
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.39
Loss Volume (AC - FT)	0.36
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0



Subbasin: NW-13

Area (MI2) : 0
Downstream : Junction 2.2

Loss Rate: Scs

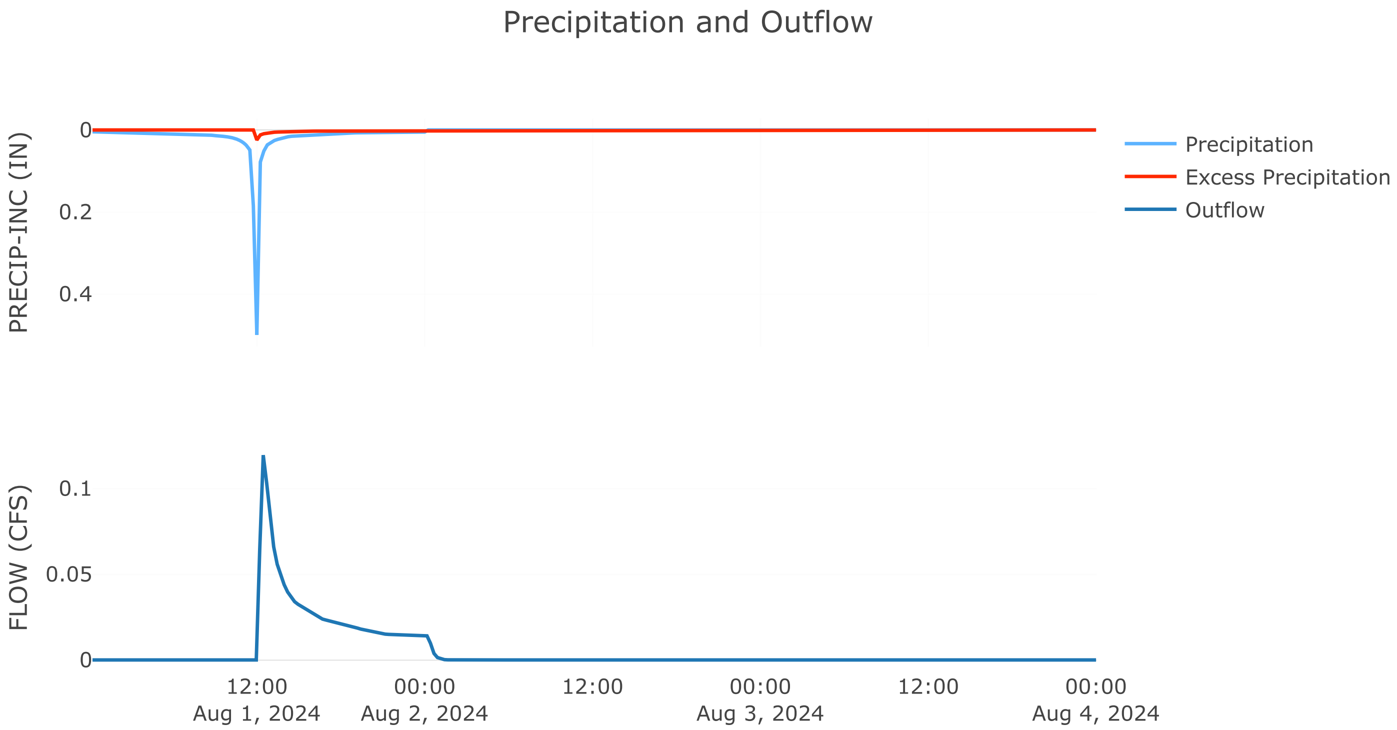
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	17.1
Unitgraph Type	Standard

Results: NW-13

Peak Discharge (CFS)	0.12
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.32
Loss Volume (AC - FT)	0.29
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0

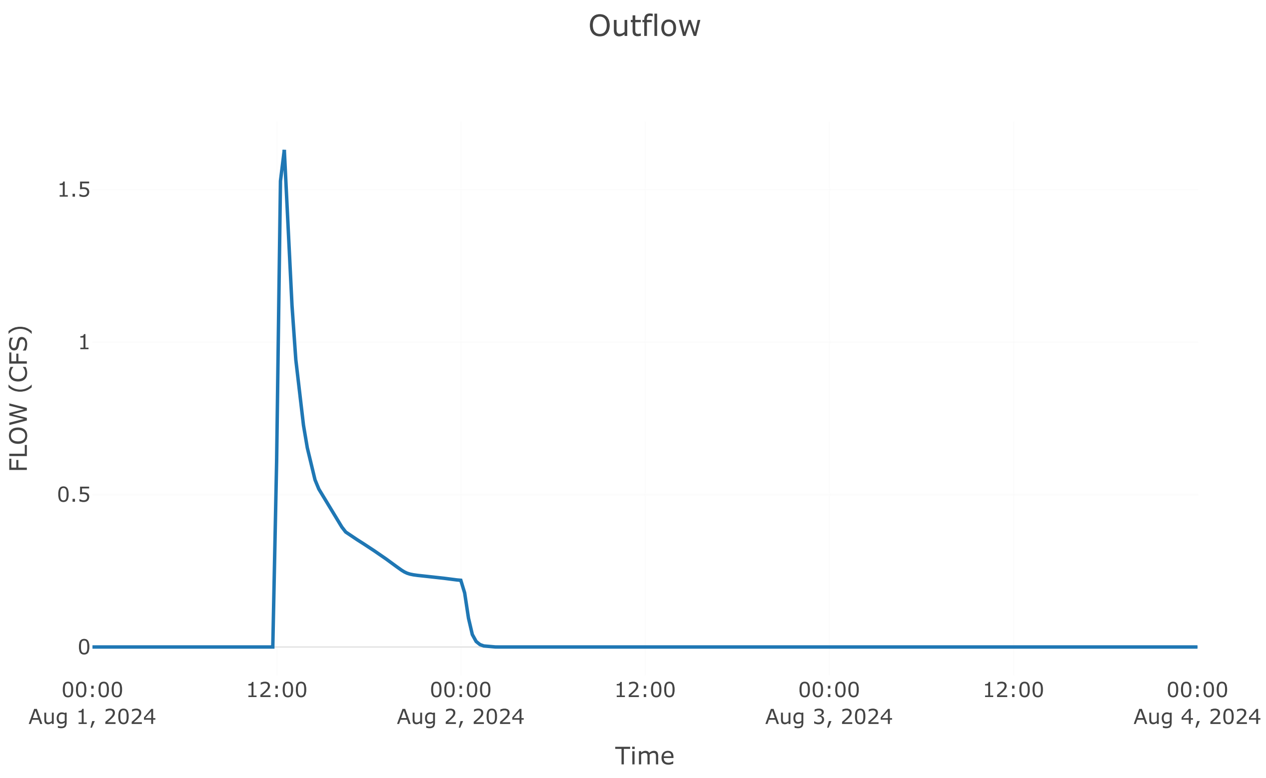


Junction: JUNCTION 2.2

Downstream : Downchute 2.3

Results: JUNCTION 2.2

Peak Discharge (CFS)	1.63
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Reach: DOWNCHUTE 2.3

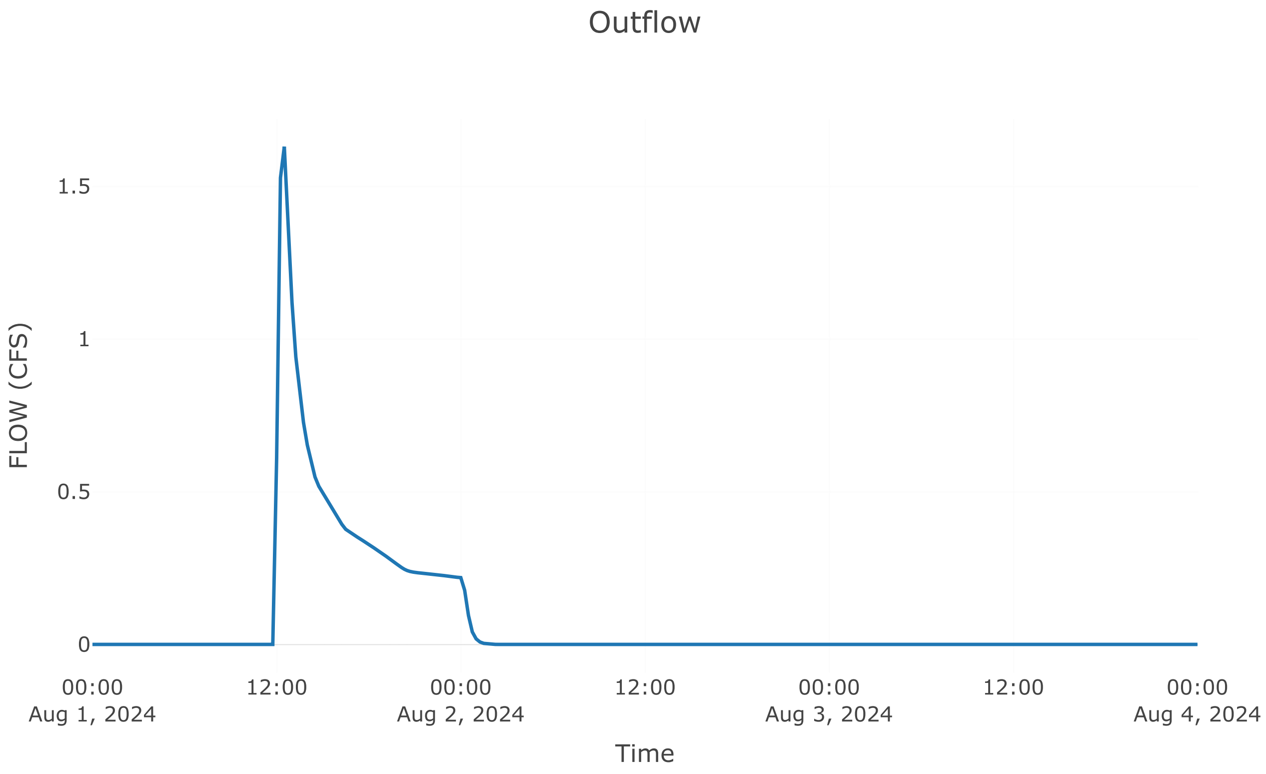
Downstream : Junction 2.3

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 2.3

Peak Discharge (CFS)	1.63
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	1.63
Inflow Volume (AC - FT)	0.47



Subbasin: NW-9

Area (MI2) : 0
Downstream : Junction 2.3

Loss Rate: Scs

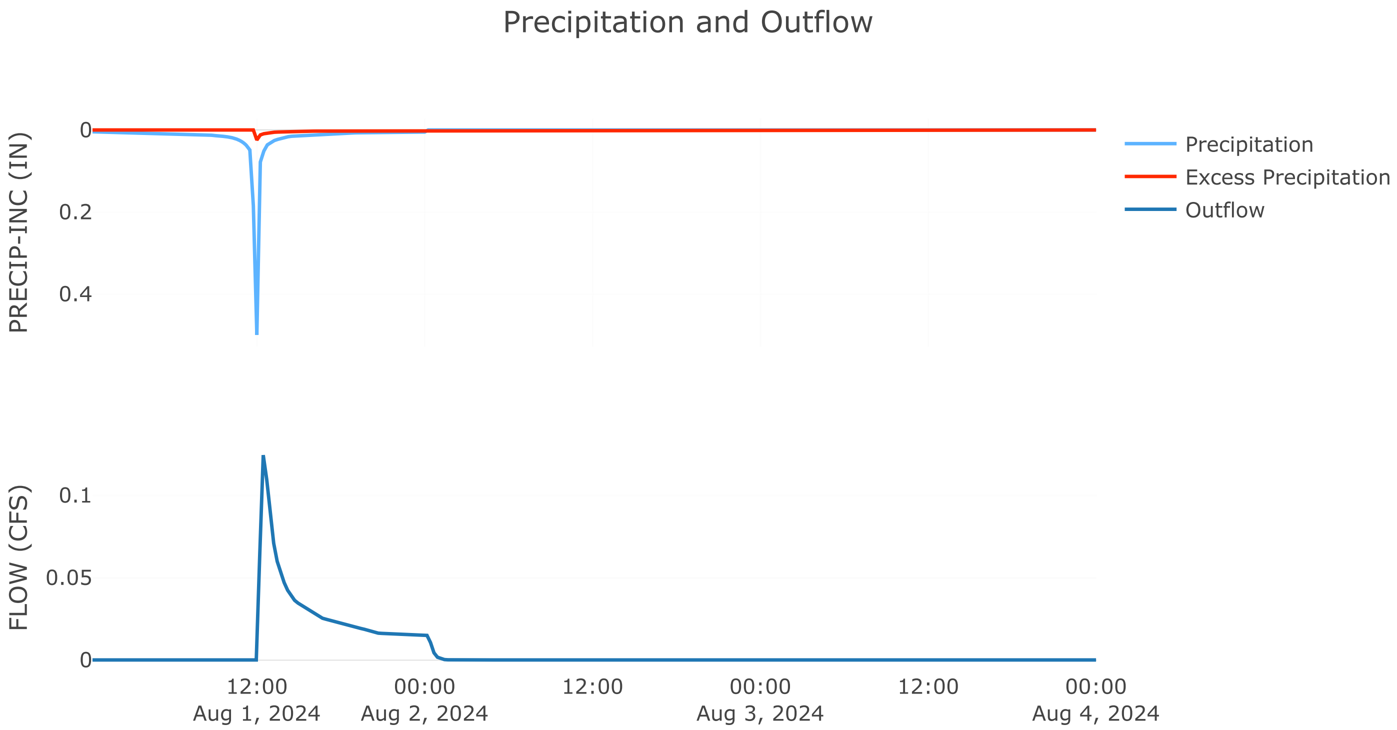
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	17.8
Unitgraph Type	Standard

Results: NW-9

Peak Discharge (CFS)	0.12
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.34
Loss Volume (AC - FT)	0.3
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0



Subbasin: NW-14

Area (MI2) : 0
Downstream : Junction 2.3

Loss Rate: Scs

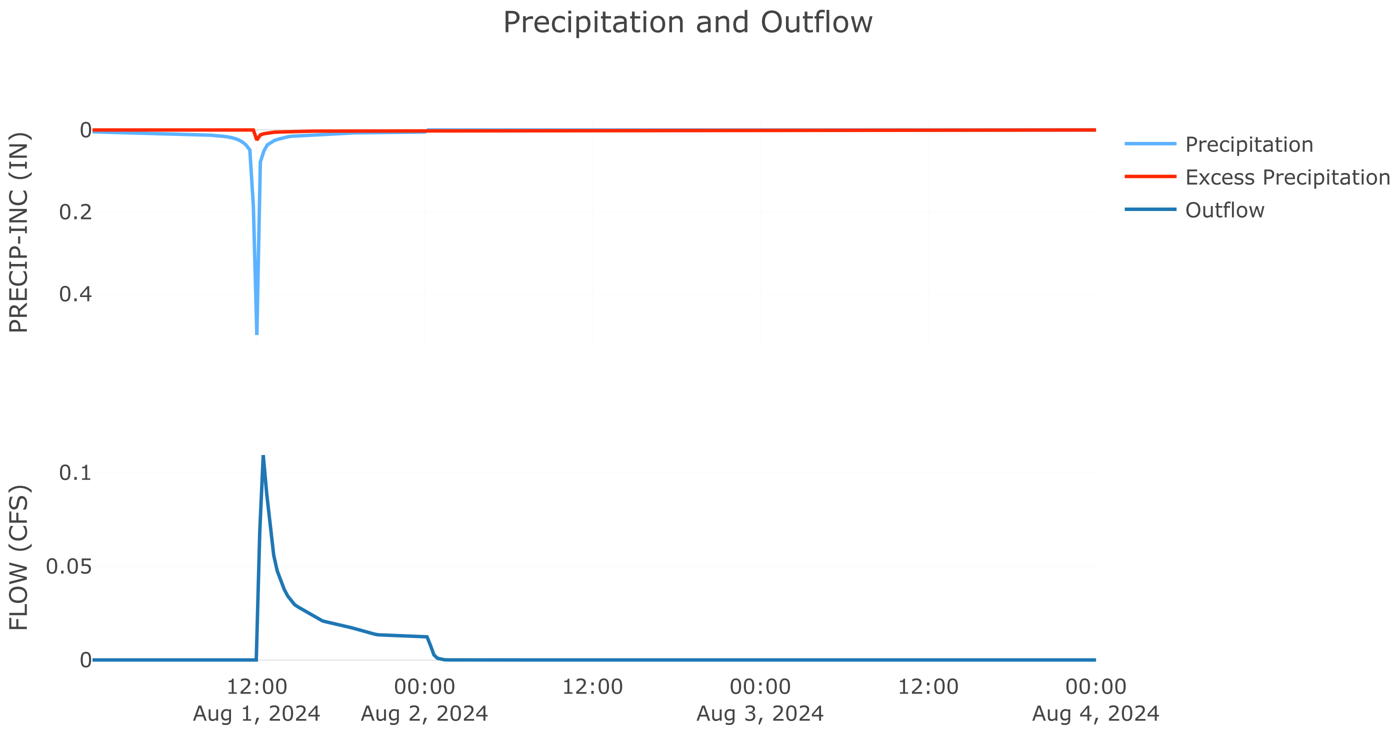
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	15.2
Unitgraph Type	Standard

Results: NW-14

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.28
Loss Volume (AC - FT)	0.25
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0

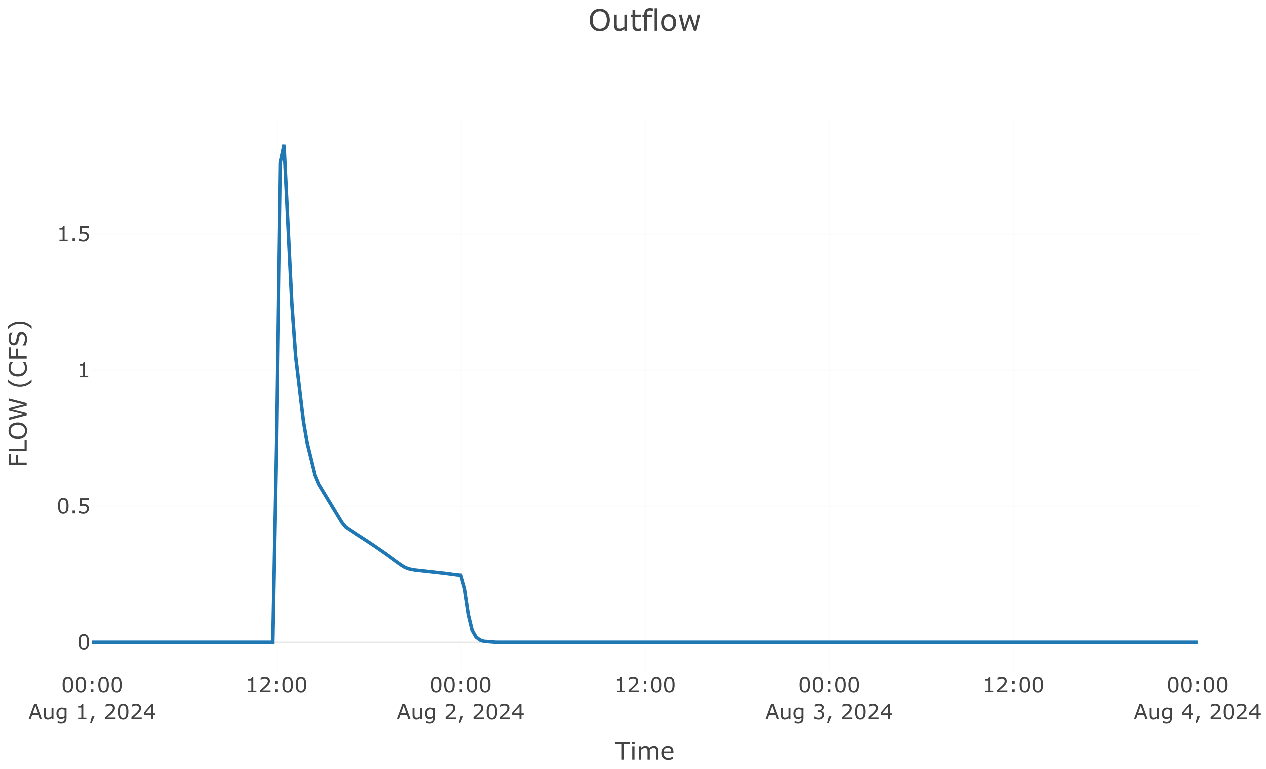


Junction: JUNCTION 2.3

Downstream : Downchute 2.4

Results: JUNCTION 2.3

Peak Discharge (CFS)	1.83
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Reach: DOWNCHUTE 2.4

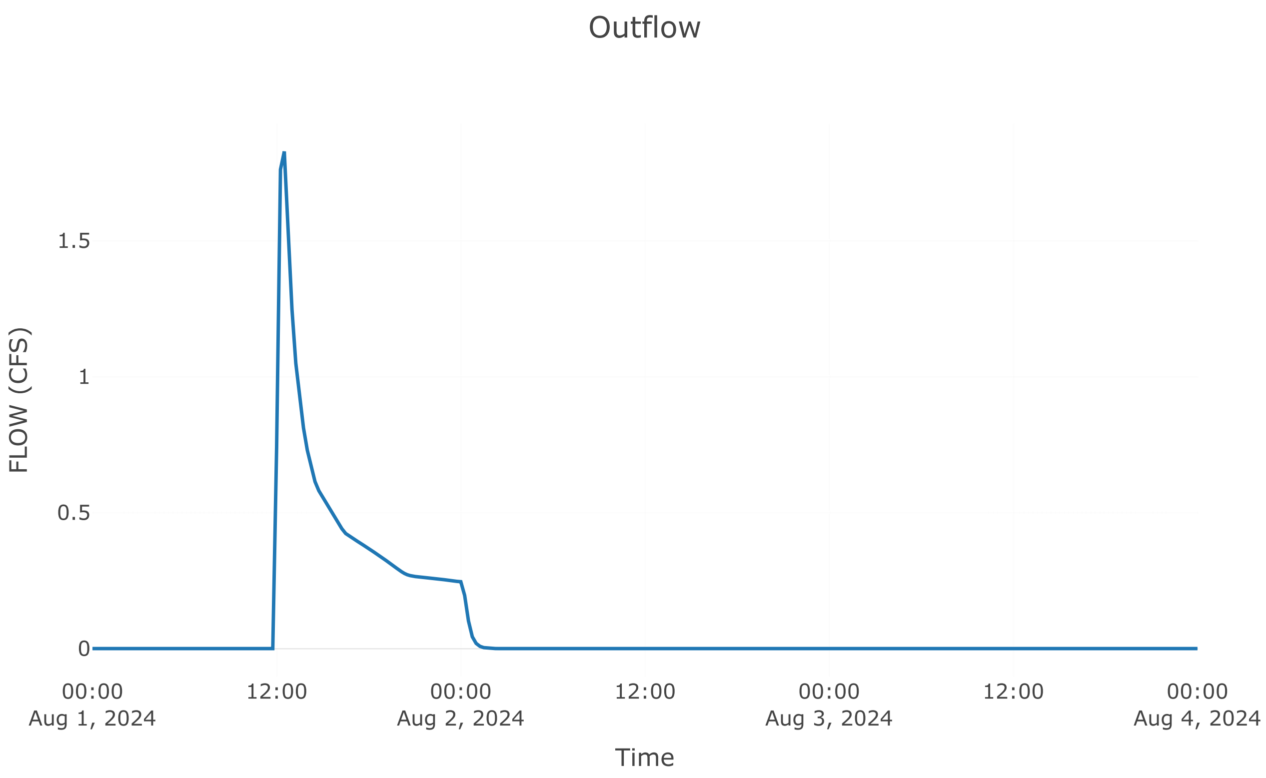
Downstream : Junction 2.4

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.2

Results: DOWNCHUTE 2.4

Peak Discharge (CFS)	1.83
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	1.83
Inflow Volume (AC - FT)	0.52



Subbasin: NW-10

Area (MI2) : 0
Downstream : Junction 2.4

Loss Rate: Scs

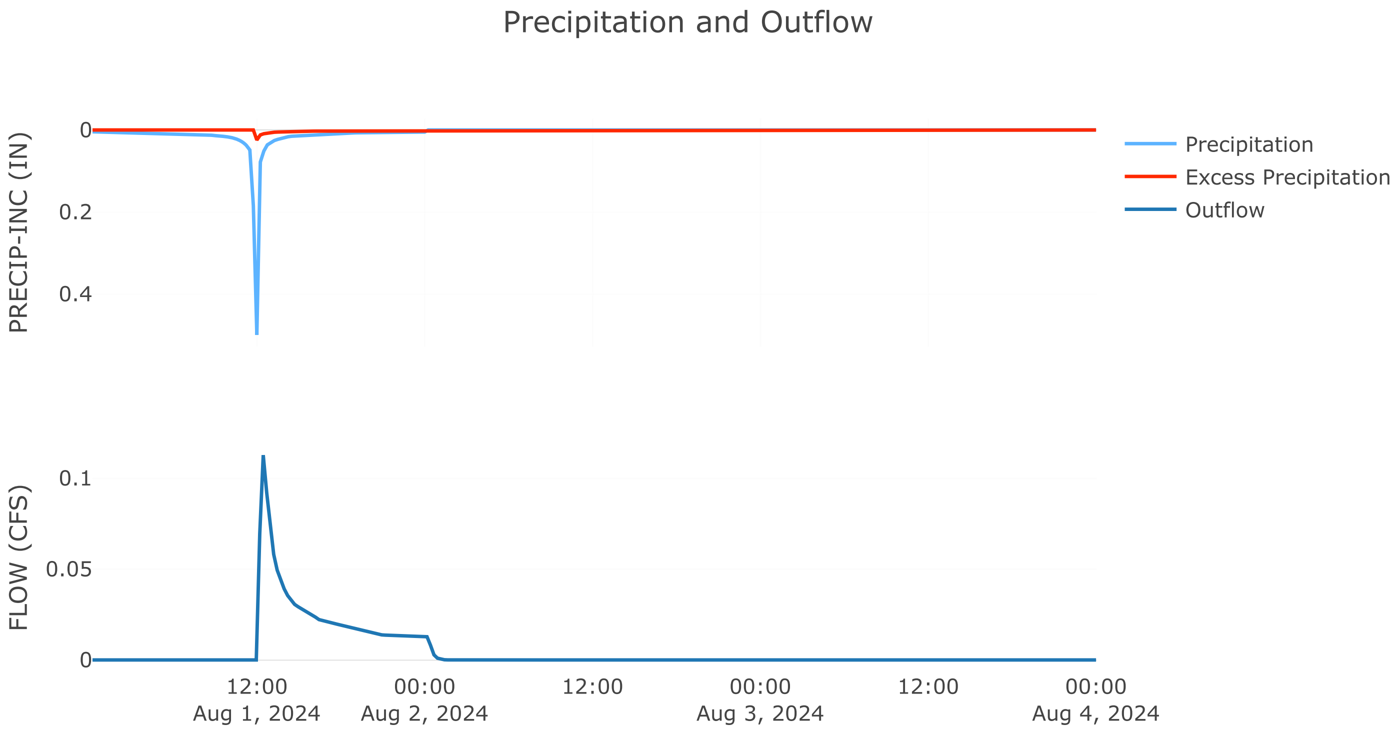
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	15.4
Unitgraph Type	Standard

Results: NW-10

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.29
Loss Volume (AC - FT)	0.26
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0



Subbasin: NW-15

Area (MI2) : 0
Downstream : Junction 2.4

Loss Rate: Scs

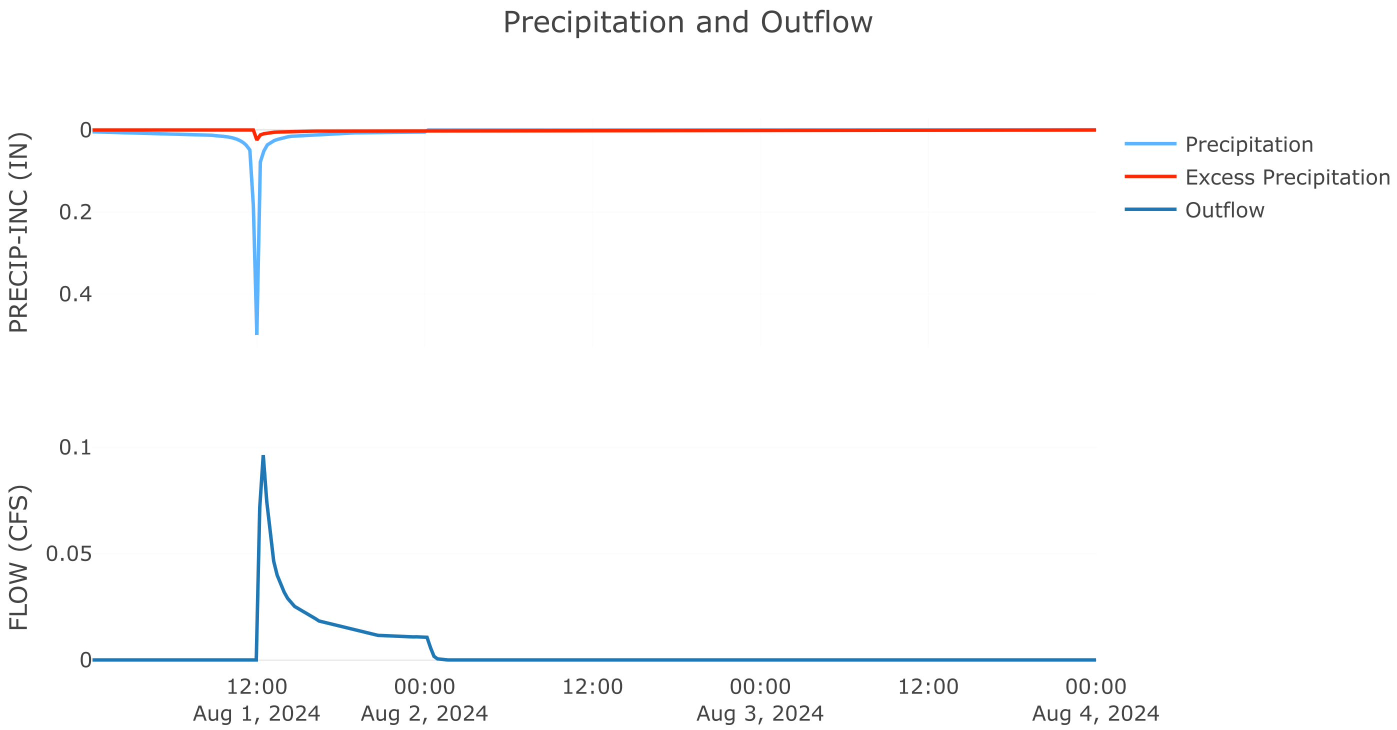
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	13.1
Unitgraph Type	Standard

Results: NW-15

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.24
Loss Volume (AC - FT)	0.22
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

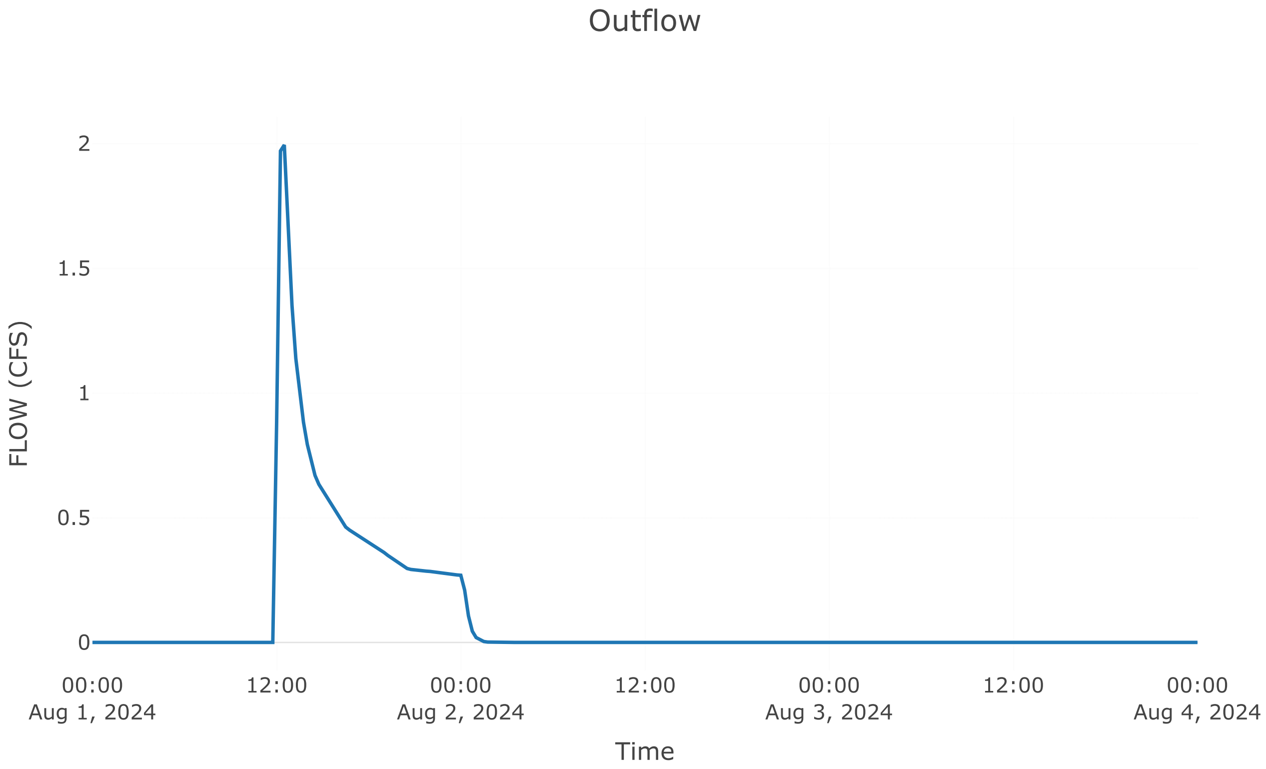


Junction: JUNCTION 2.4

Downstream : Downchute 5.1

Results: JUNCTION 2.4

Peak Discharge (CFS)	1.99
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Subbasin: NW-18

Area (MI2) : 0
Downstream : Junction 3.2

Loss Rate: Scs

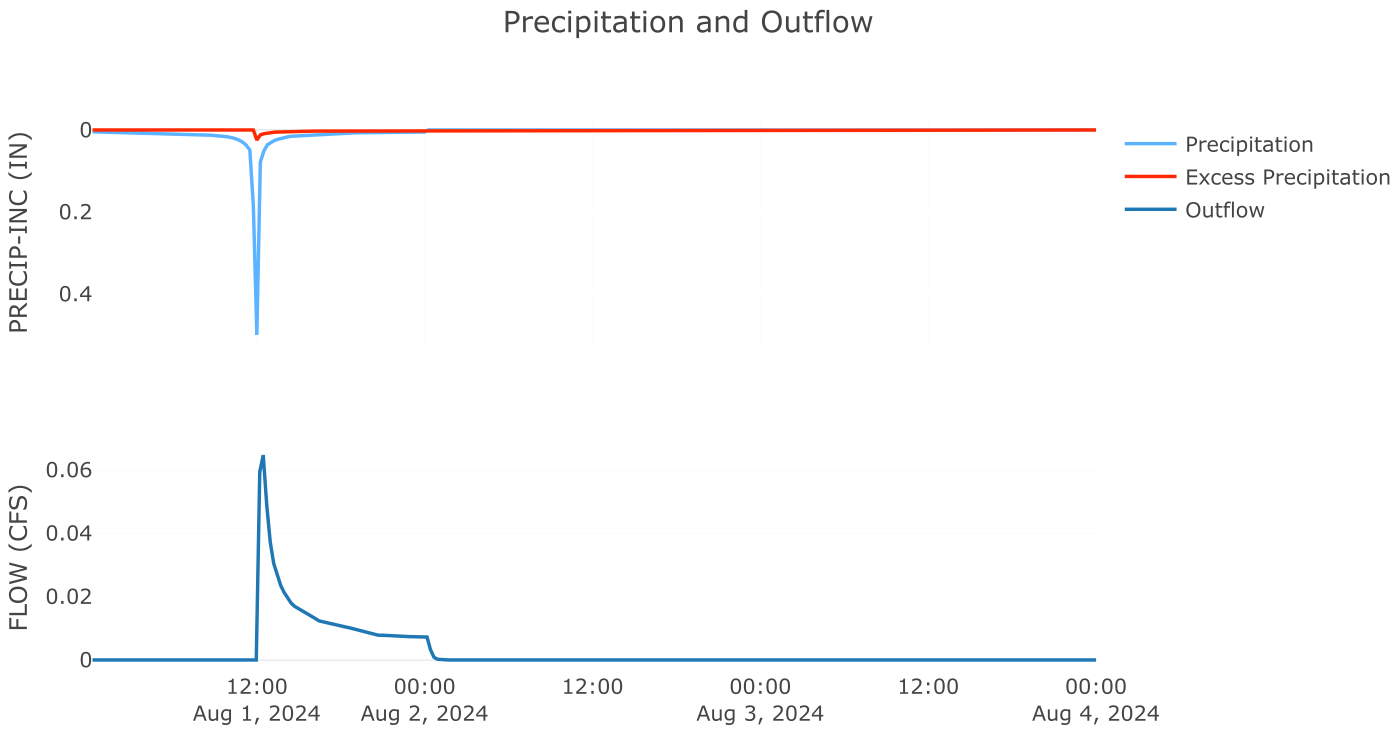
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	11.2
Unitgraph Type	Standard

Results: NW-18

Peak Discharge (CFS)	0.06
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.16
Loss Volume (AC - FT)	0.15
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0



Subbasin: NW-17

Area (MI2) : 0
Downstream : Junction 3.1

Loss Rate: Scs

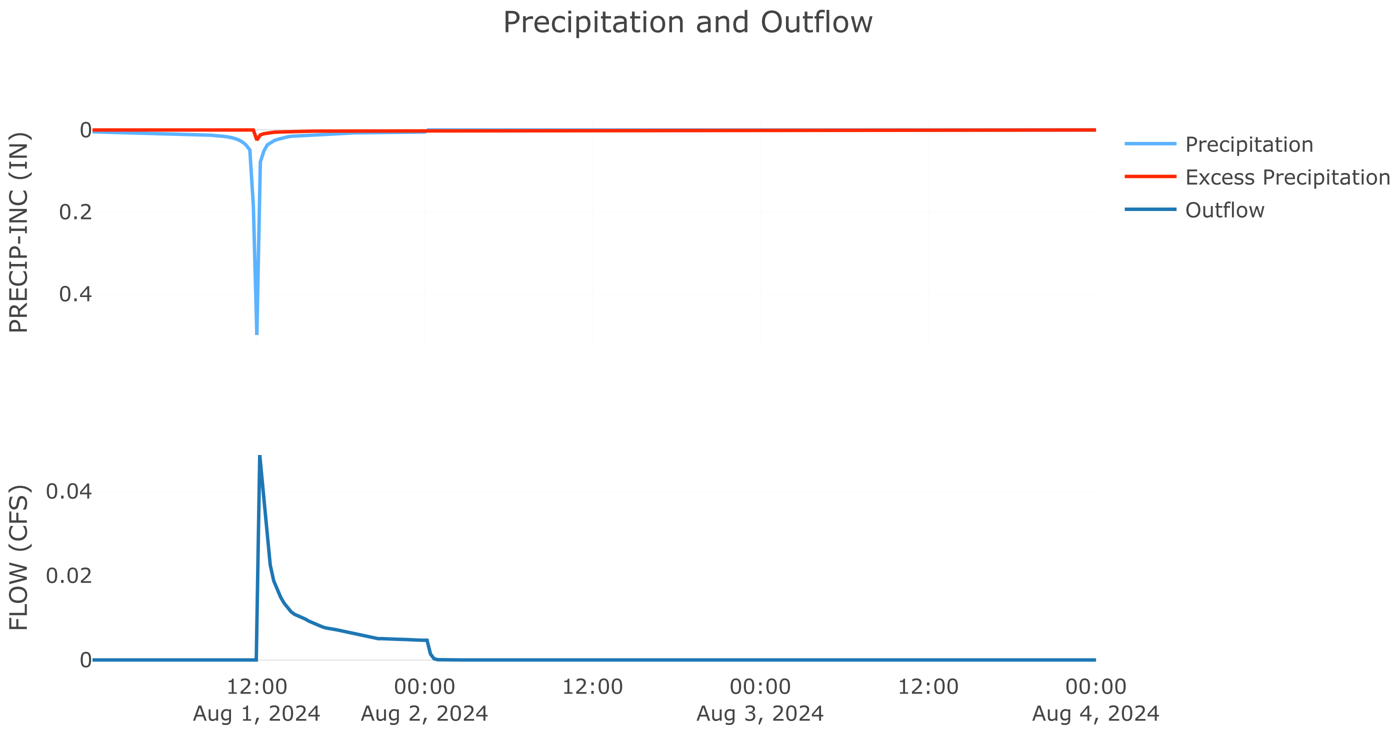
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	8.4
Unitgraph Type	Standard

Results: NW-17

Peak Discharge (CFS)	0.05
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.11
Loss Volume (AC - FT)	0.1
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0

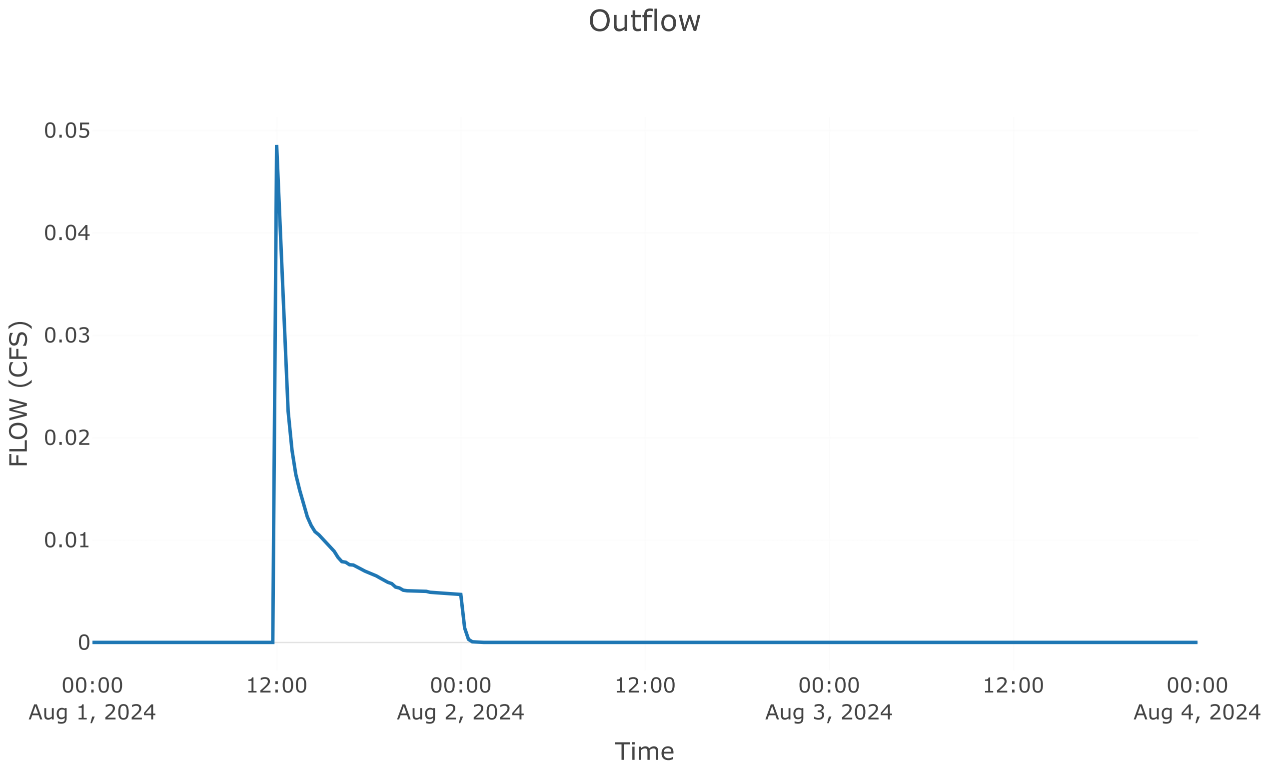


Junction: JUNCTION 3.1

Downstream : Downchute 3.2

Results: JUNCTION 3.1

Peak Discharge (CFS)	0.05
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17



Reach: DOWNCHUTE 3.2

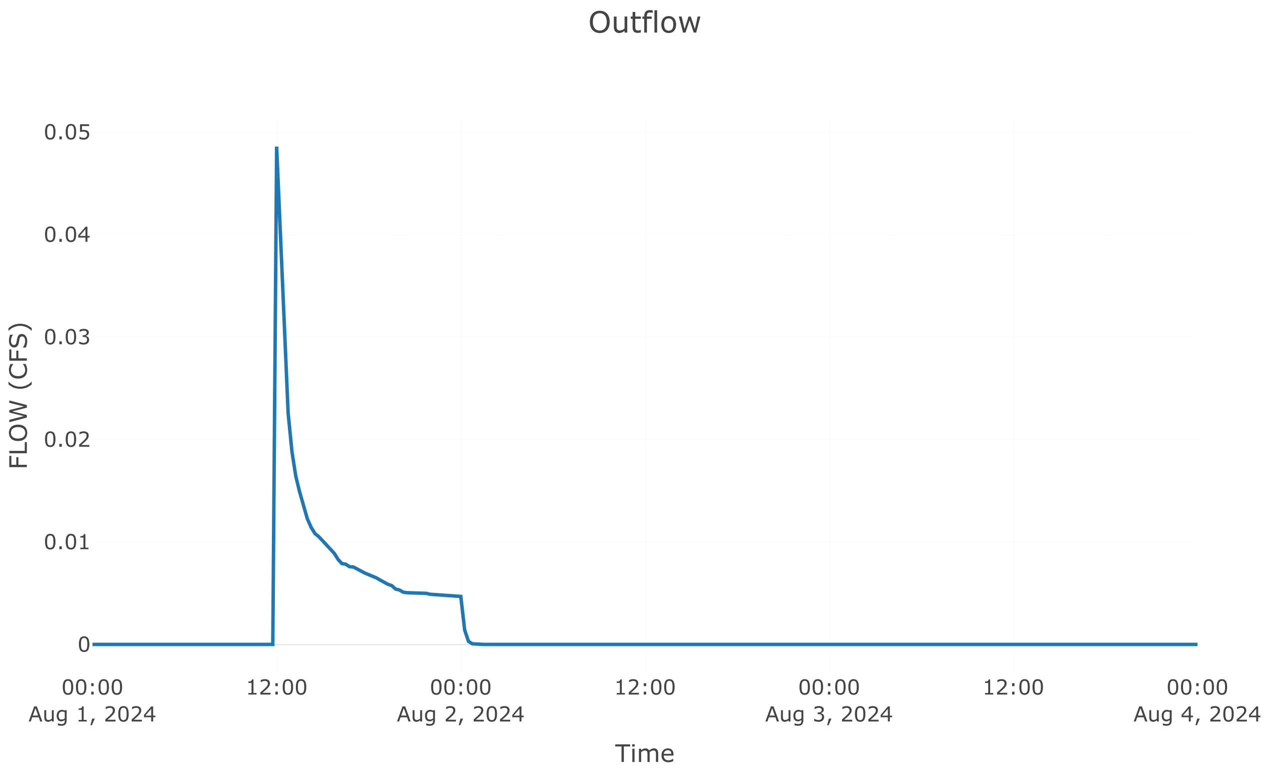
Downstream : Junction 3.2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 3.2

Peak Discharge (CFS)	0.05
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.05
Inflow Volume (AC - FT)	0.01

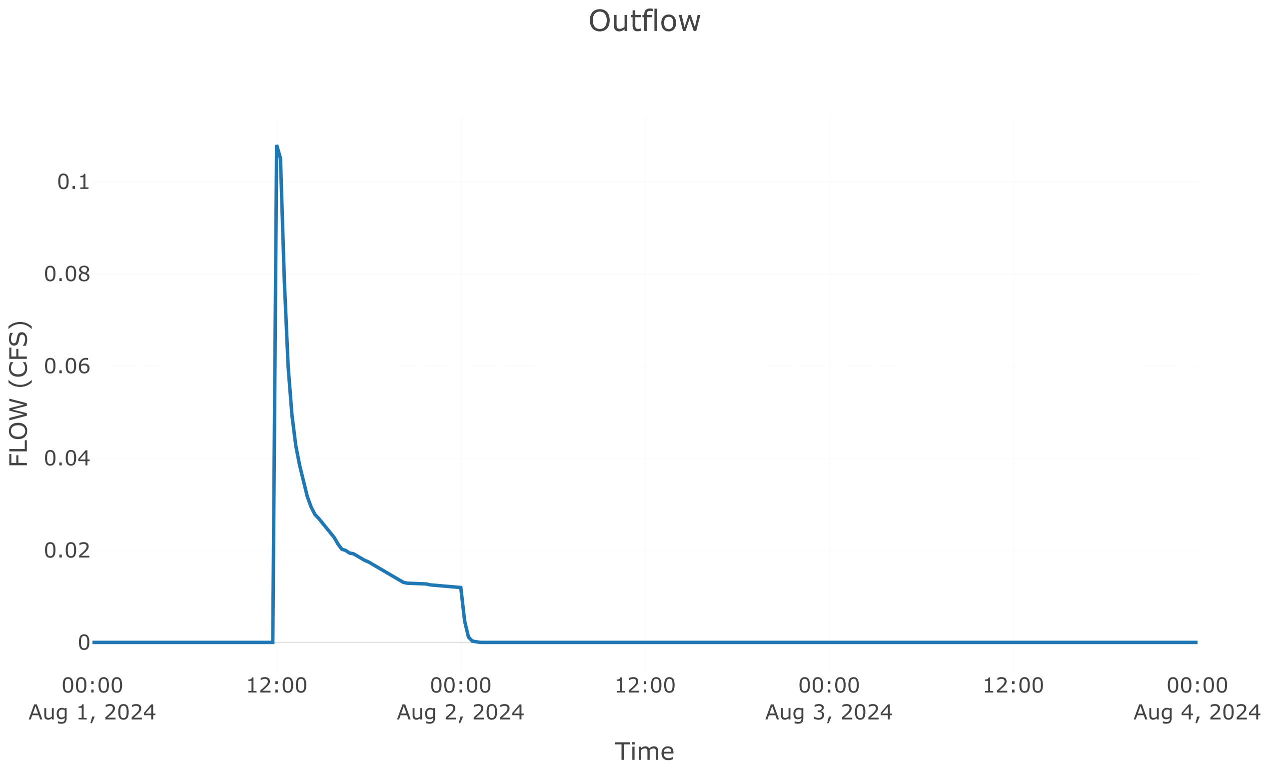


Junction: JUNCTION 3.2

Downstream : Downchute 3.3

Results: JUNCTION 3.2

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17



Reach: DOWNCHUTE 3.3

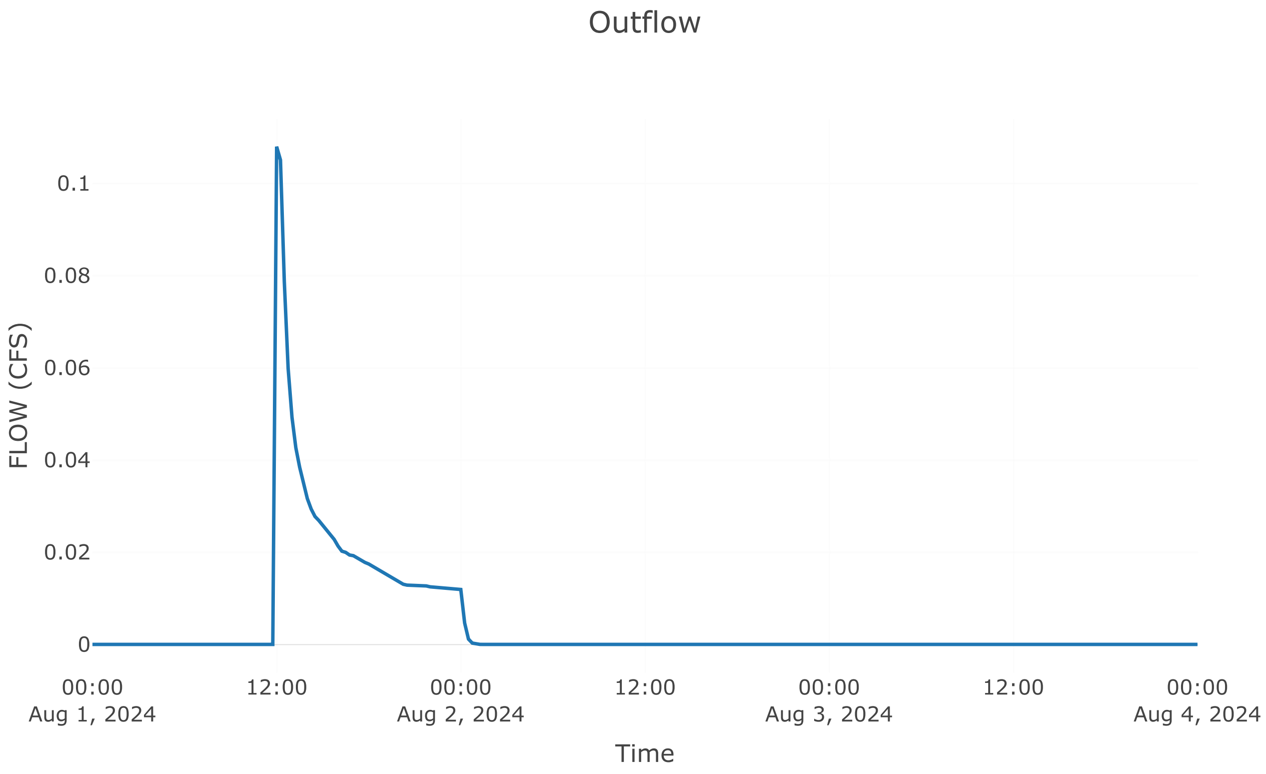
Downstream : Junction 3.3

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 3.3

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.11
Inflow Volume (AC - FT)	0.03



Subbasin: NW-19

Area (MI2) : 0
Downstream : Junction 3.3

Loss Rate: Scs

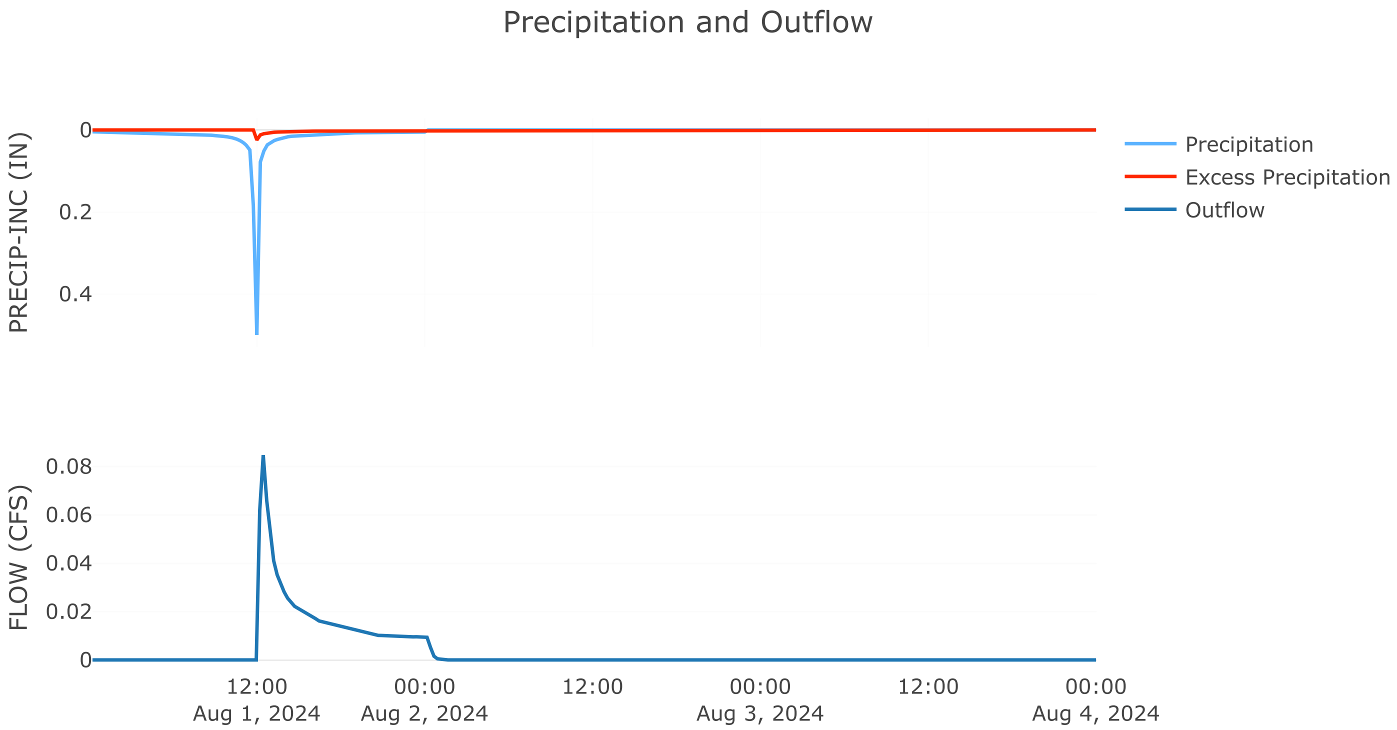
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	13.3
Unitgraph Type	Standard

Results: NW-19

Peak Discharge (CFS)	0.08
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.21
Loss Volume (AC - FT)	0.19
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

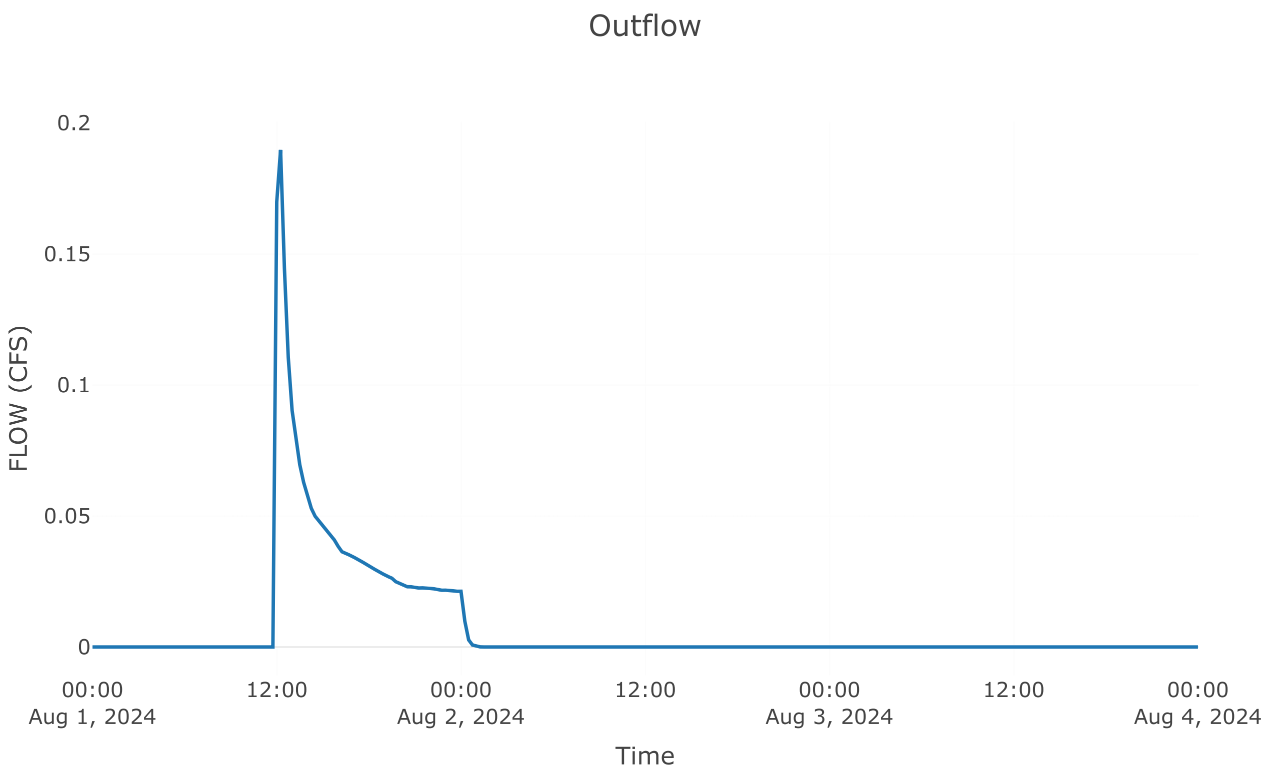


Junction: JUNCTION 3.3

Downstream : Downchute 3.4

Results: JUNCTION 3.3

Peak Discharge (CFS)	0.19
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 3.4

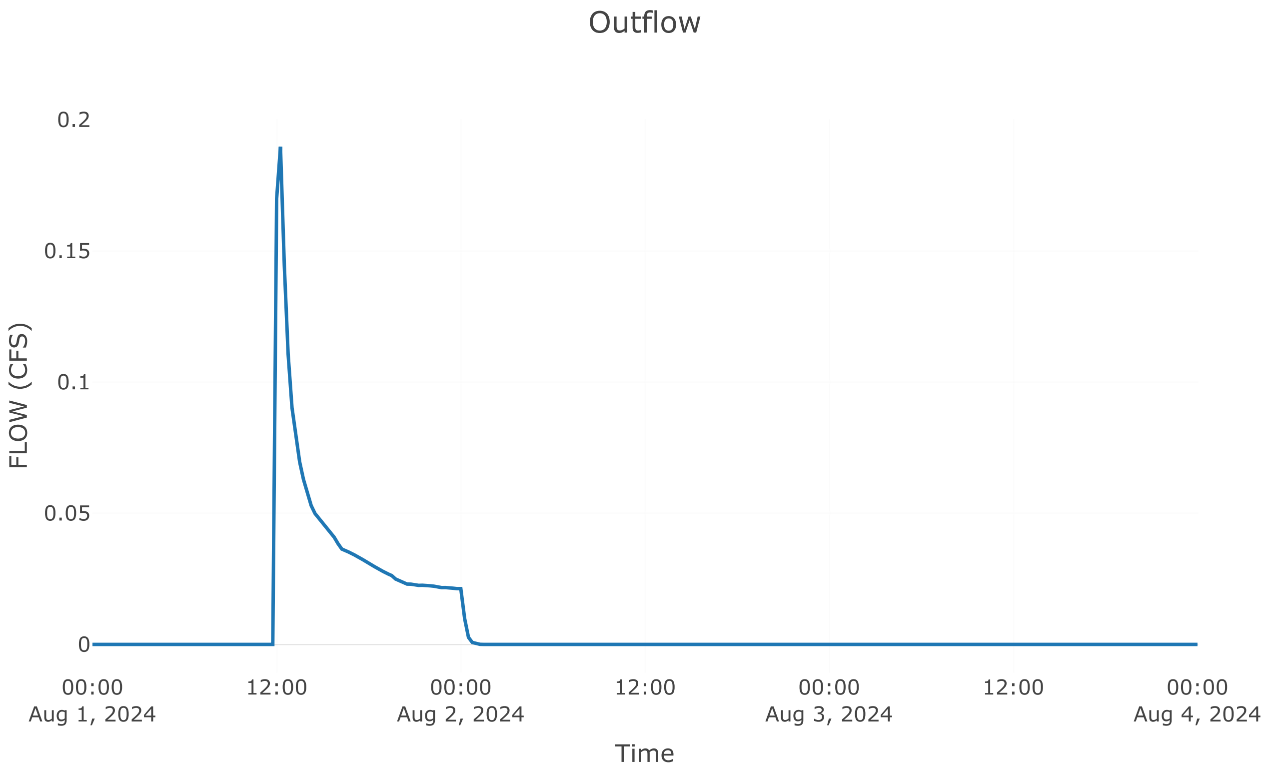
Downstream : Junction 3.4

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.2

Results: DOWNCHUTE 3.4

Peak Discharge (CFS)	0.19
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.19
Inflow Volume (AC - FT)	0.05



Subbasin: NW-20

Area (MI2) : 0
Downstream : Junction 3.4

Loss Rate: Scs

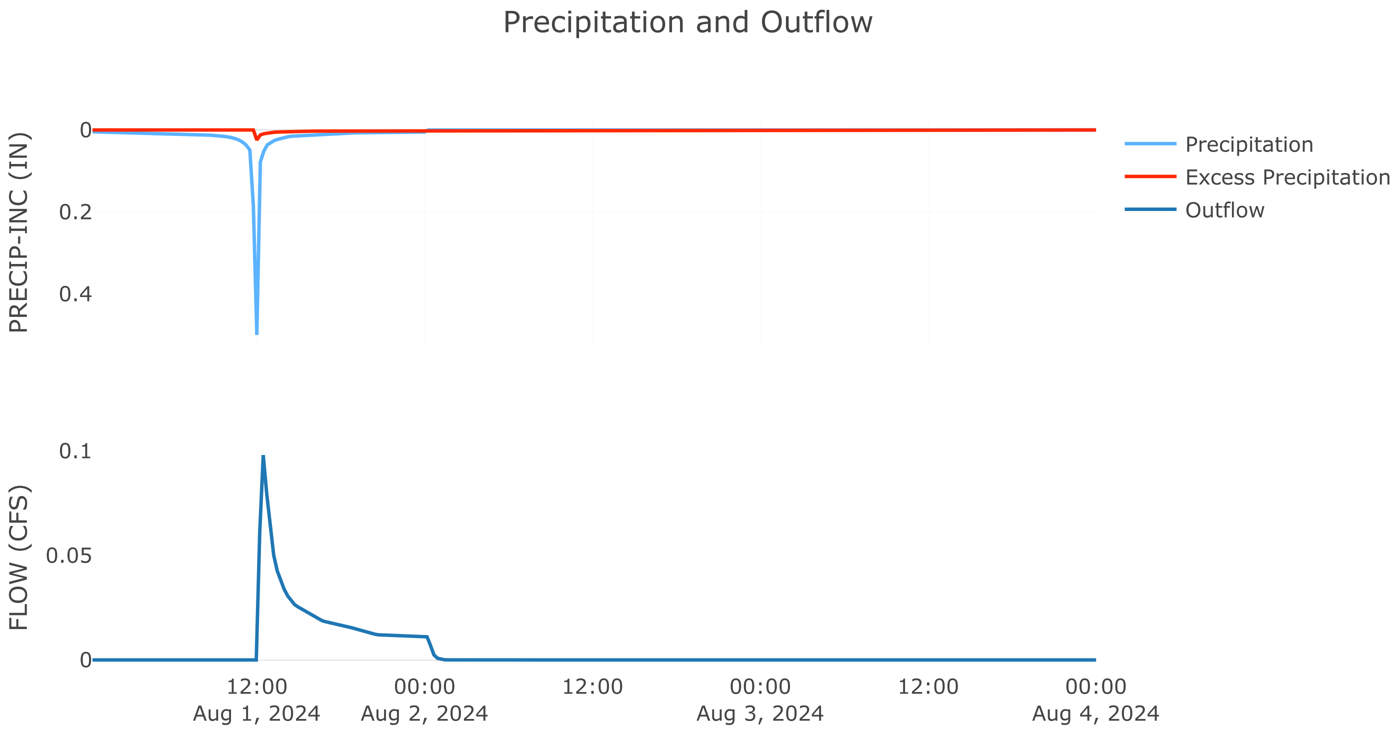
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	15.2
Unitgraph Type	Standard

Results: NW-20

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.25
Loss Volume (AC - FT)	0.23
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

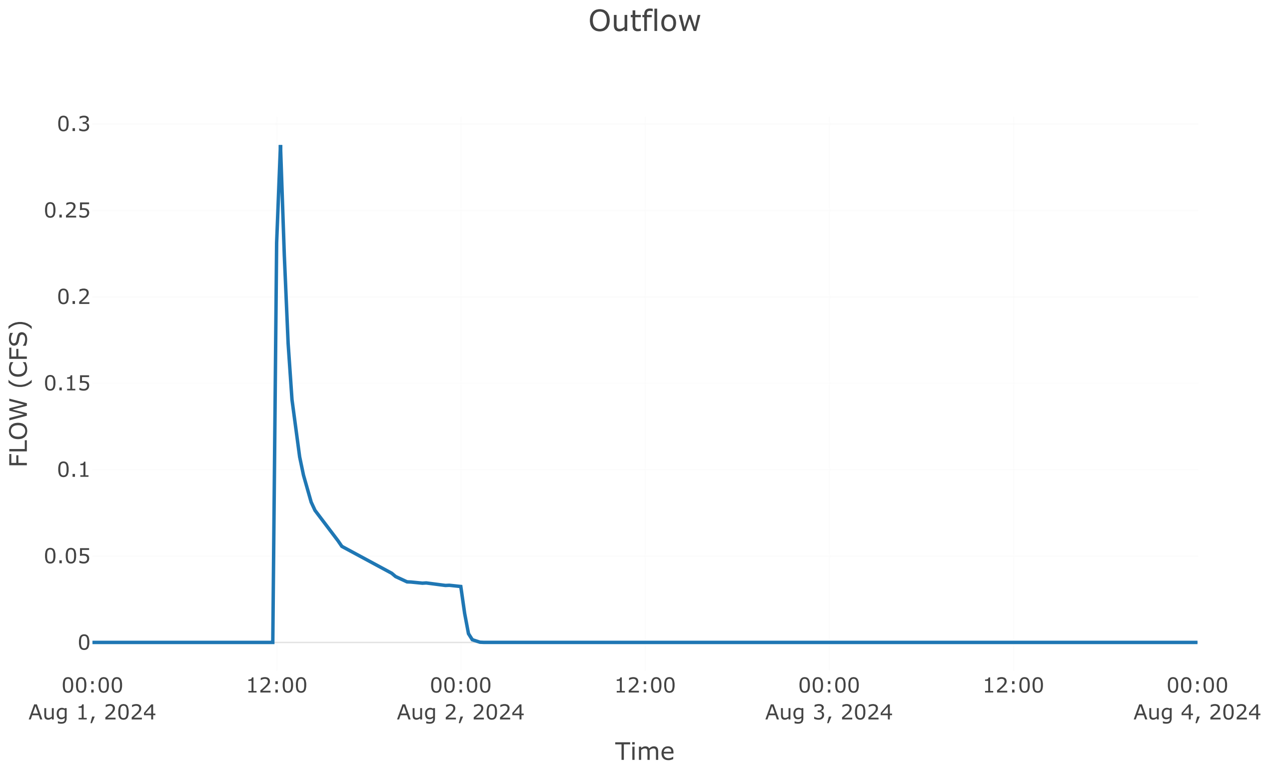


Junction: JUNCTION 3.4

Downstream : Downchute 5.1

Results: JUNCTION 3.4

Peak Discharge (CFS)	0.29
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Subbasin: NW-27

Area (MI2) : 0
Downstream : Downchute 5.1

Loss Rate: Scs

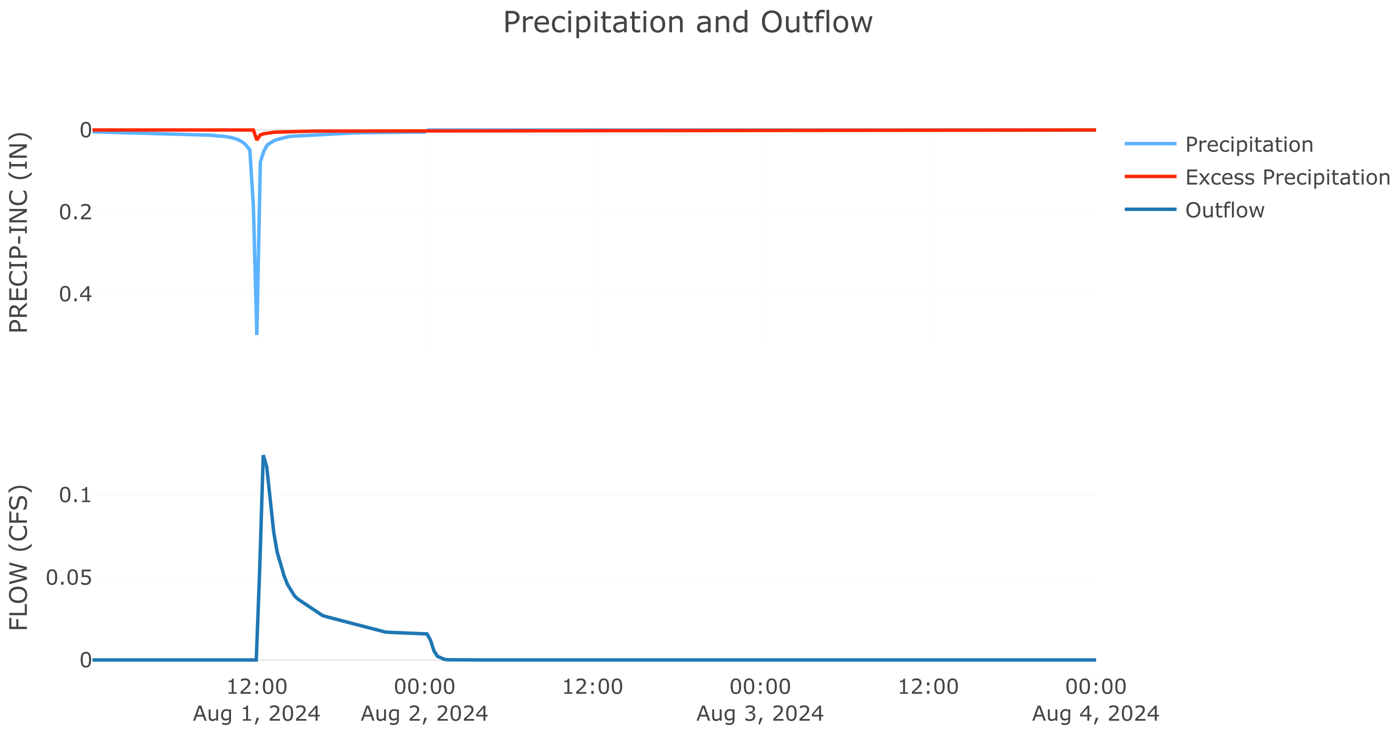
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	19.6
Unitgraph Type	Standard

Results: NW-27

Peak Discharge (CFS)	0.12
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.36
Loss Volume (AC - FT)	0.32
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0



Subbasin: NW-24

Area (MI2) : 0
Downstream : Downchute 5.1

Loss Rate: Scs

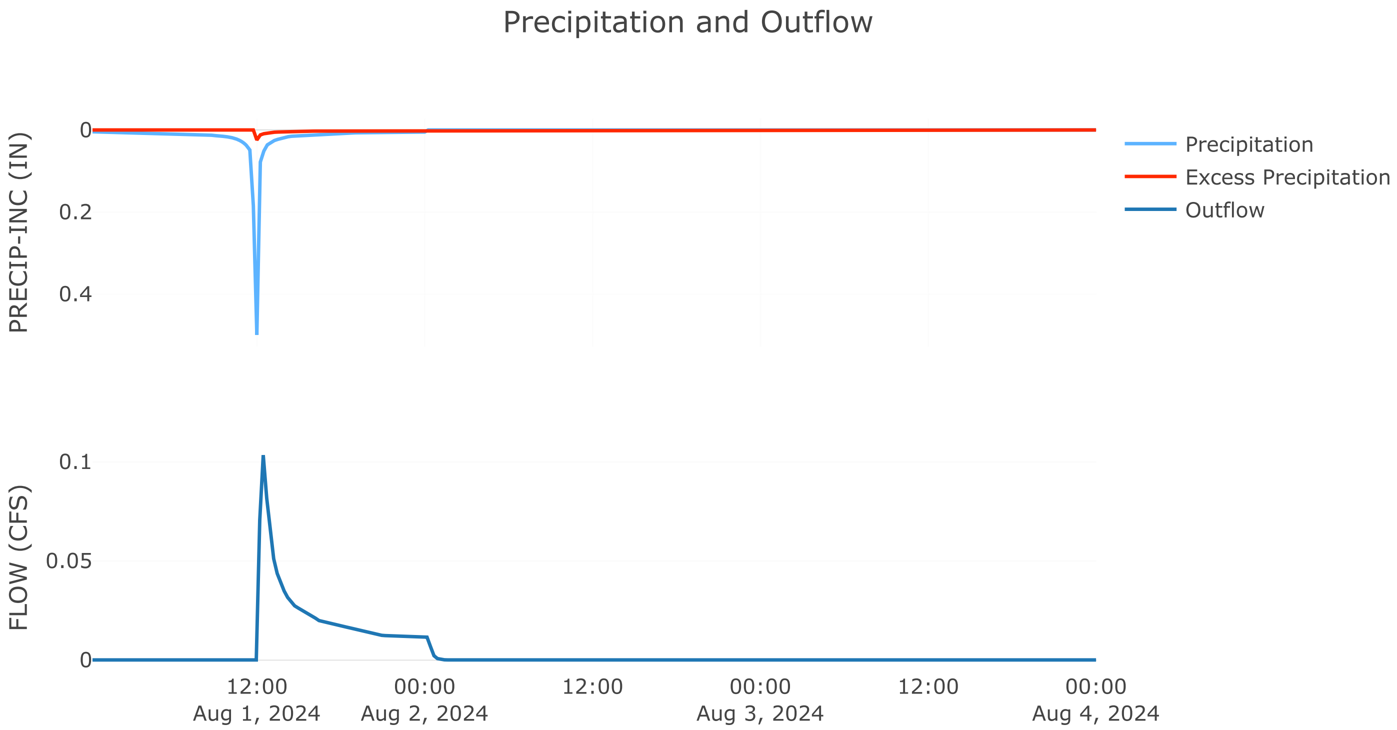
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	14.1
Unitgraph Type	Standard

Results: NW-24

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.26
Loss Volume (AC - FT)	0.23
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 5.1

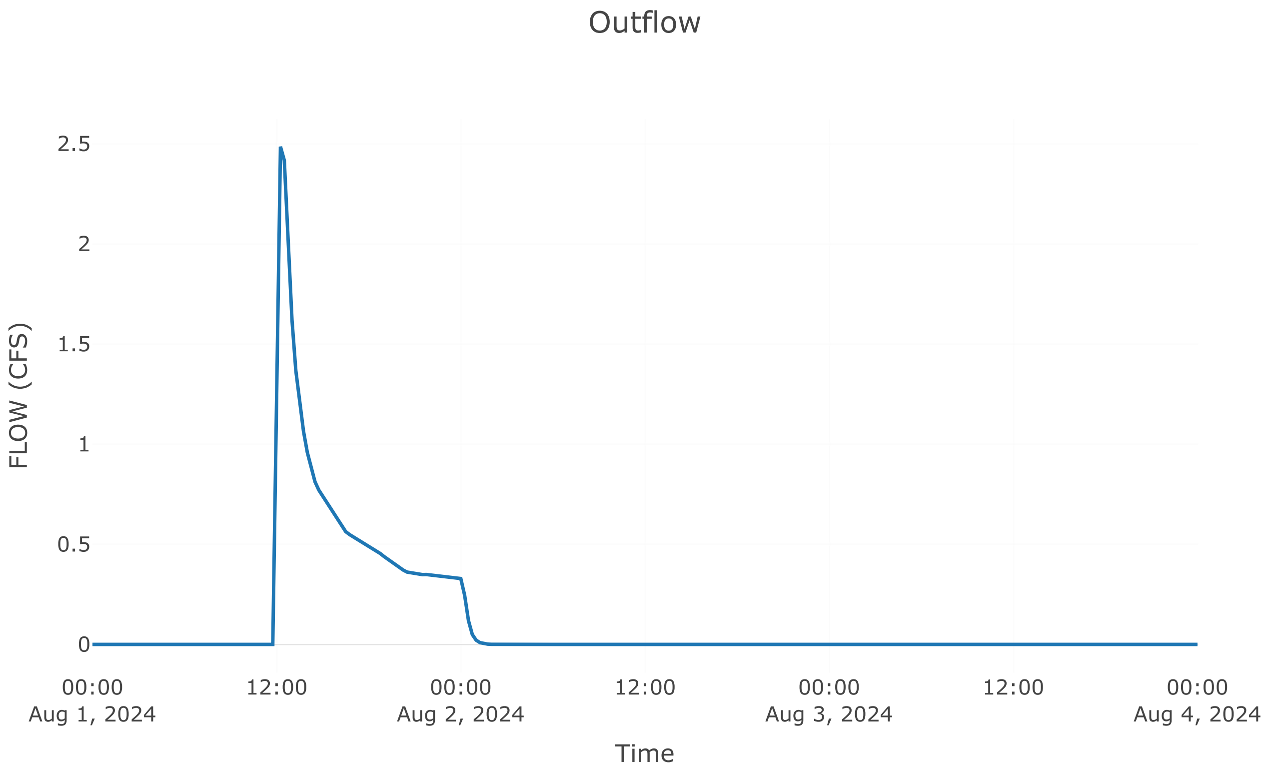
Downstream : Junction 5.1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 5.1

Peak Discharge (CFS)	2.49
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	2.49
Inflow Volume (AC - FT)	0.7



Subbasin: NW-28

Area (MI2) : 0
Downstream : Junction 5.1

Loss Rate: Scs

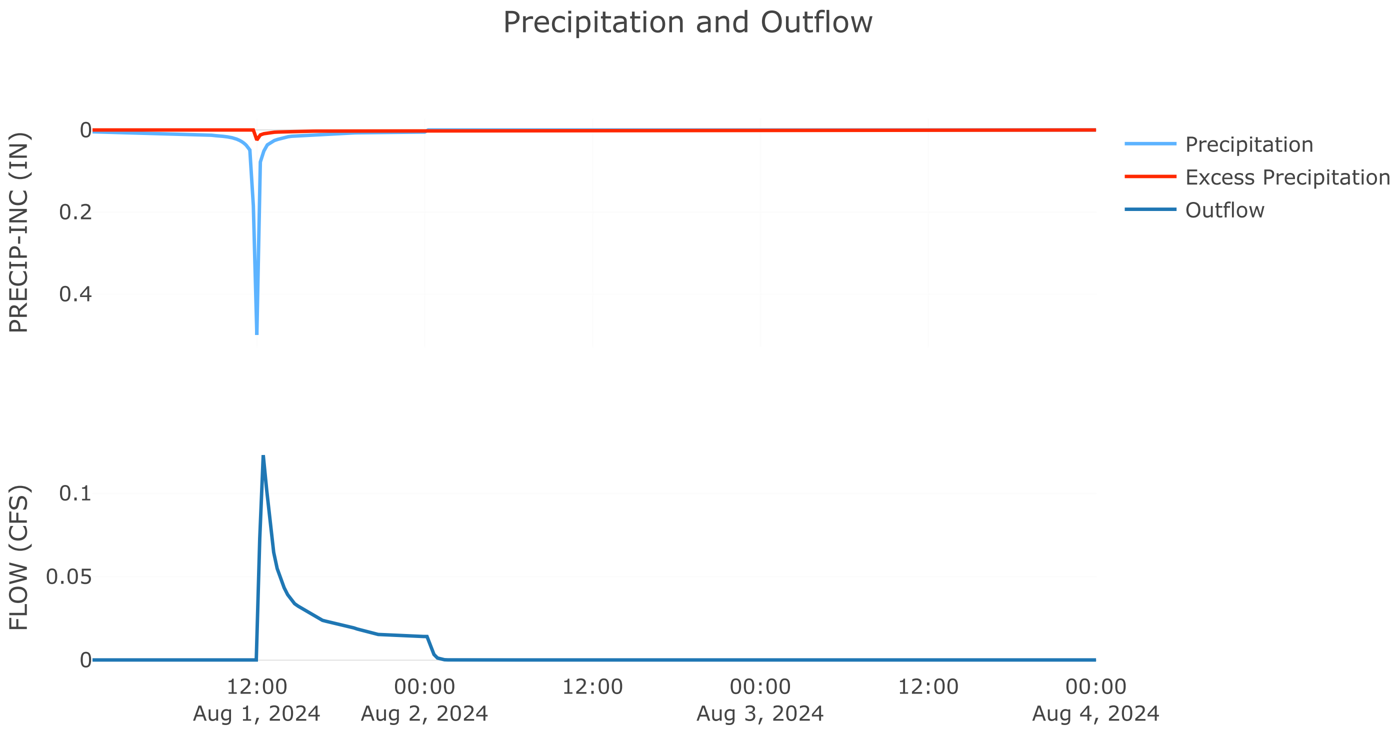
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	15.9
Unitgraph Type	Standard

Results: NW-28

Peak Discharge (CFS)	0.12
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.32
Loss Volume (AC - FT)	0.29
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0



Subbasin: NW-25

Area (MI2) : 0
Downstream : Junction 5.1

Loss Rate: Scs

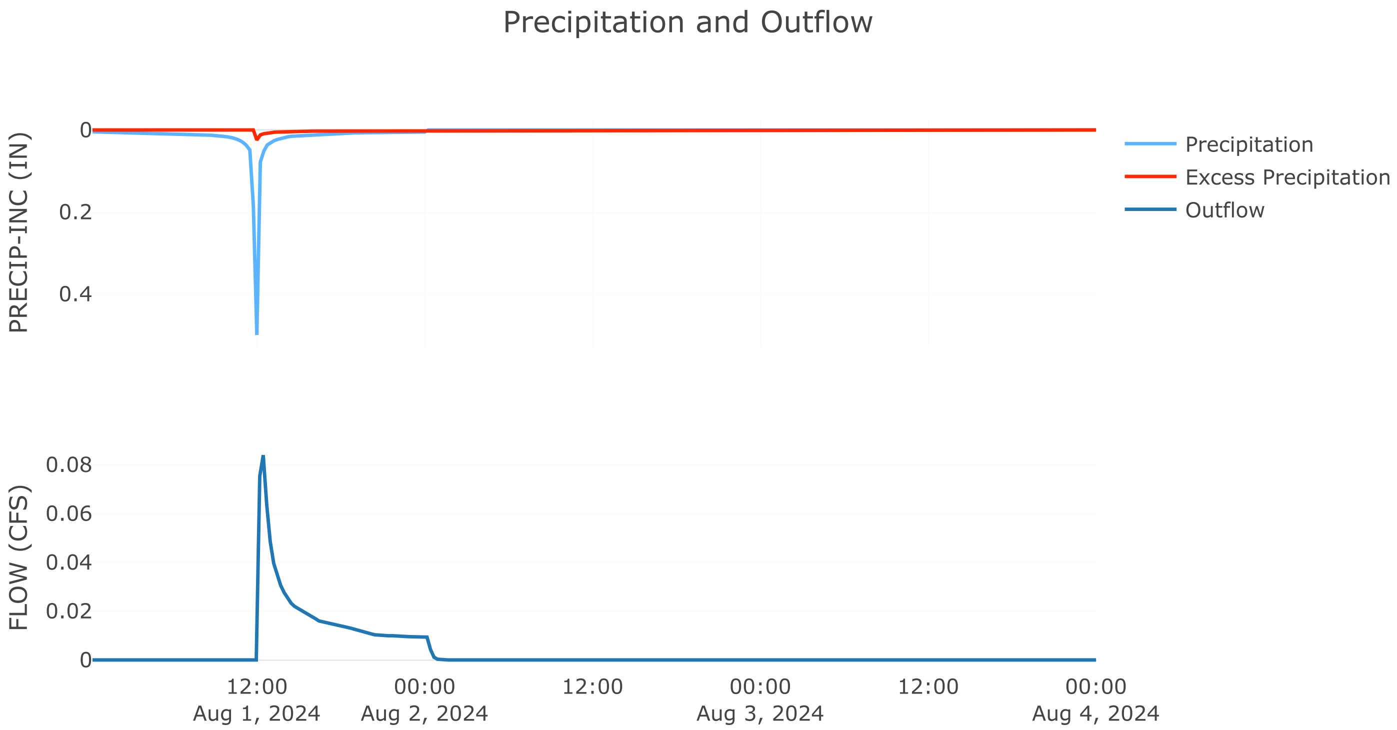
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	11.4
Unitgraph Type	Standard

Results: NW-25

Peak Discharge (CFS)	0.08
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.21
Loss Volume (AC - FT)	0.19
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

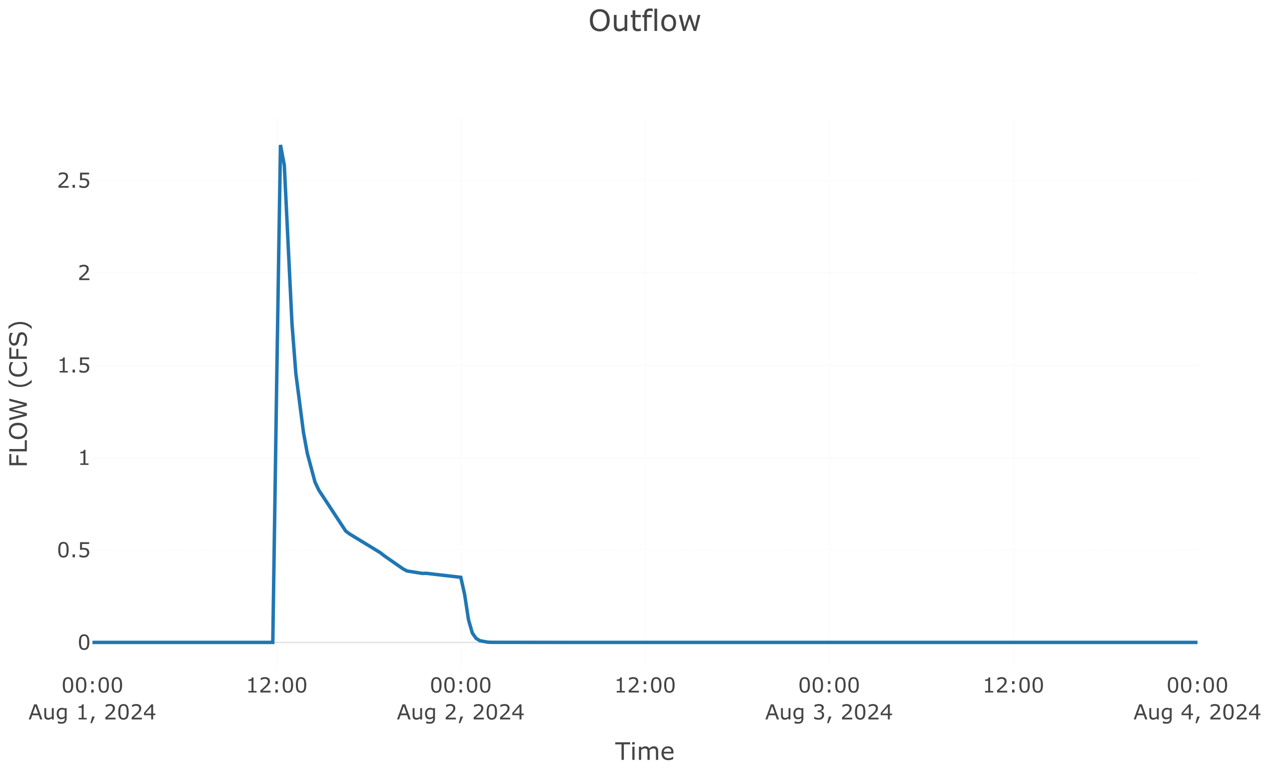


Junction: JUNCTION 5.1

Downstream : Downchute 5.2

Results: JUNCTION 5.1

Peak Discharge (CFS)	2.69
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 5.2

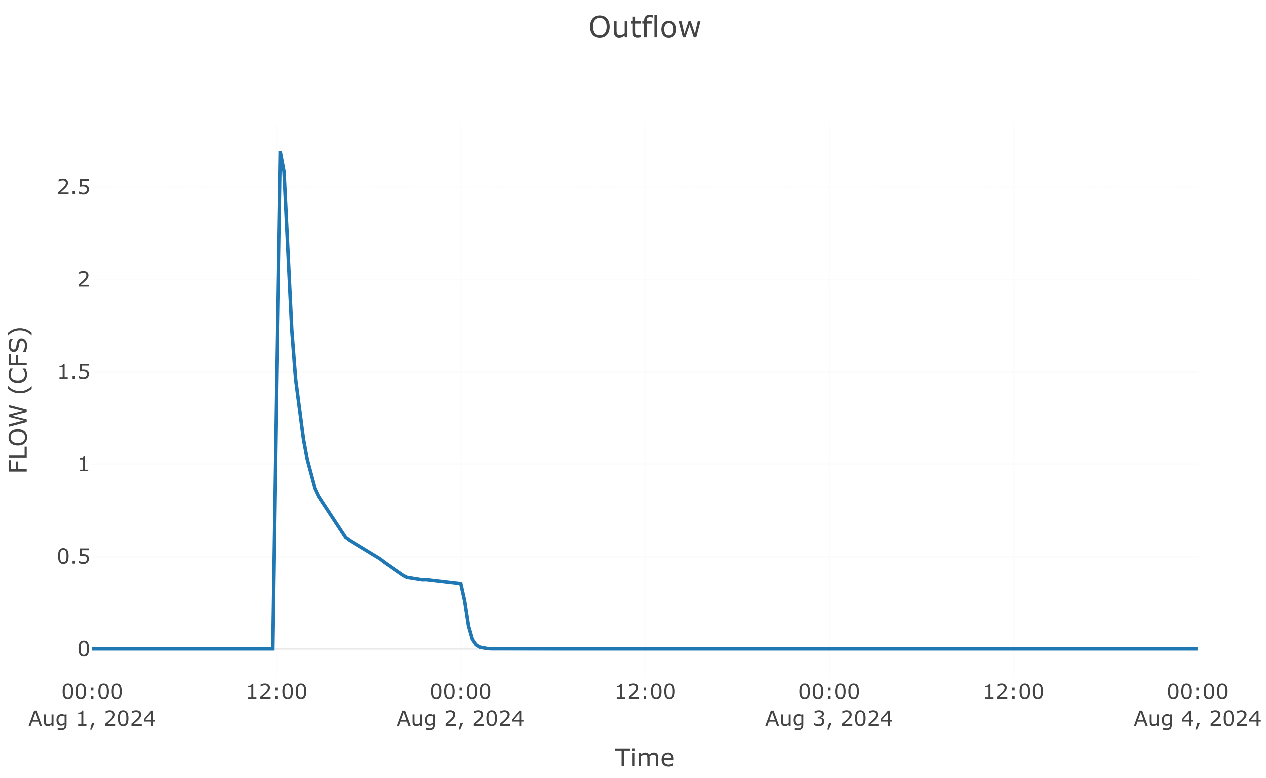
Downstream : Junction 5.2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 5.2

Peak Discharge (CFS)	2.69
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	2.69
Inflow Volume (AC - FT)	0.75



Subbasin: NW-29

Area (MI2) : 0
Downstream : Junction 5.2

Loss Rate: Scs

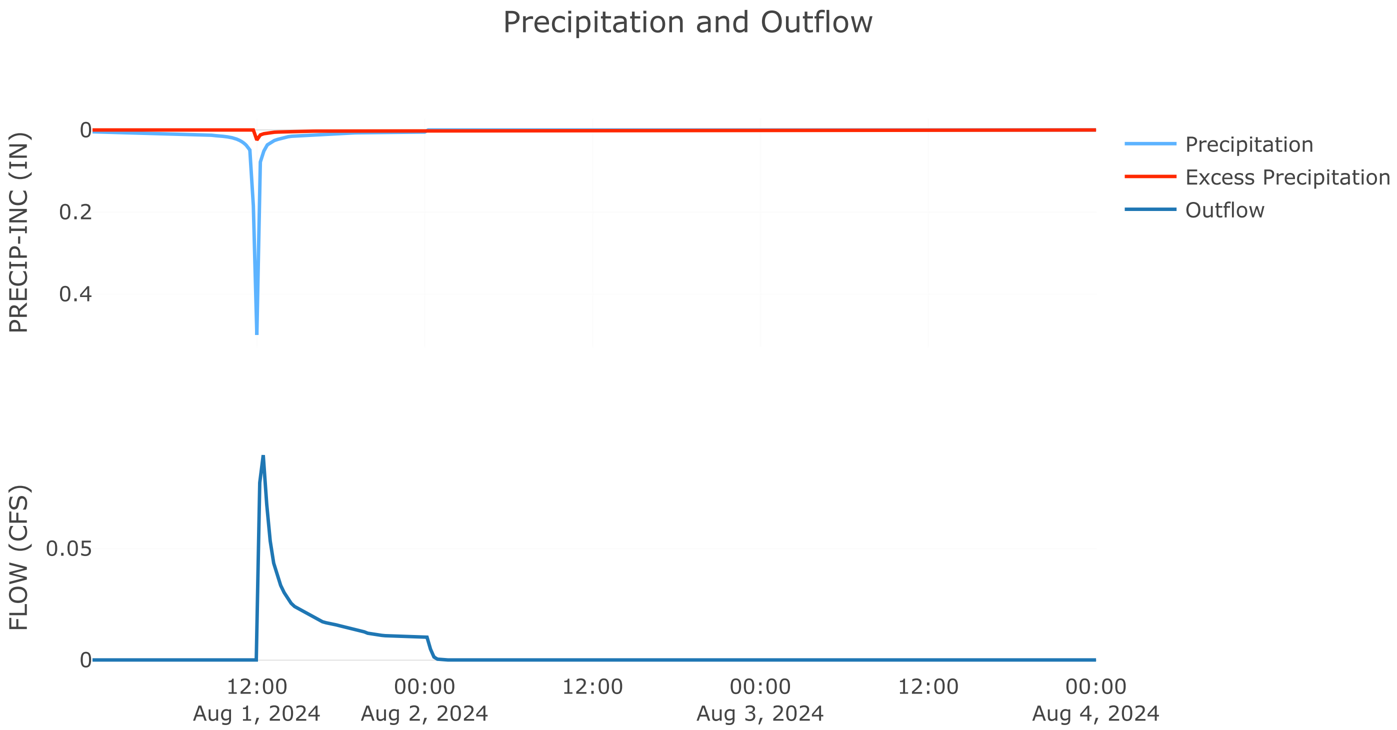
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	11.7
Unitgraph Type	Standard

Results: NW-29

Peak Discharge (CFS)	0.09
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.23
Loss Volume (AC - FT)	0.21
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0



Subbasin: NW-26

Area (MI2) : 0
Downstream : Junction 5.2

Loss Rate: Scs

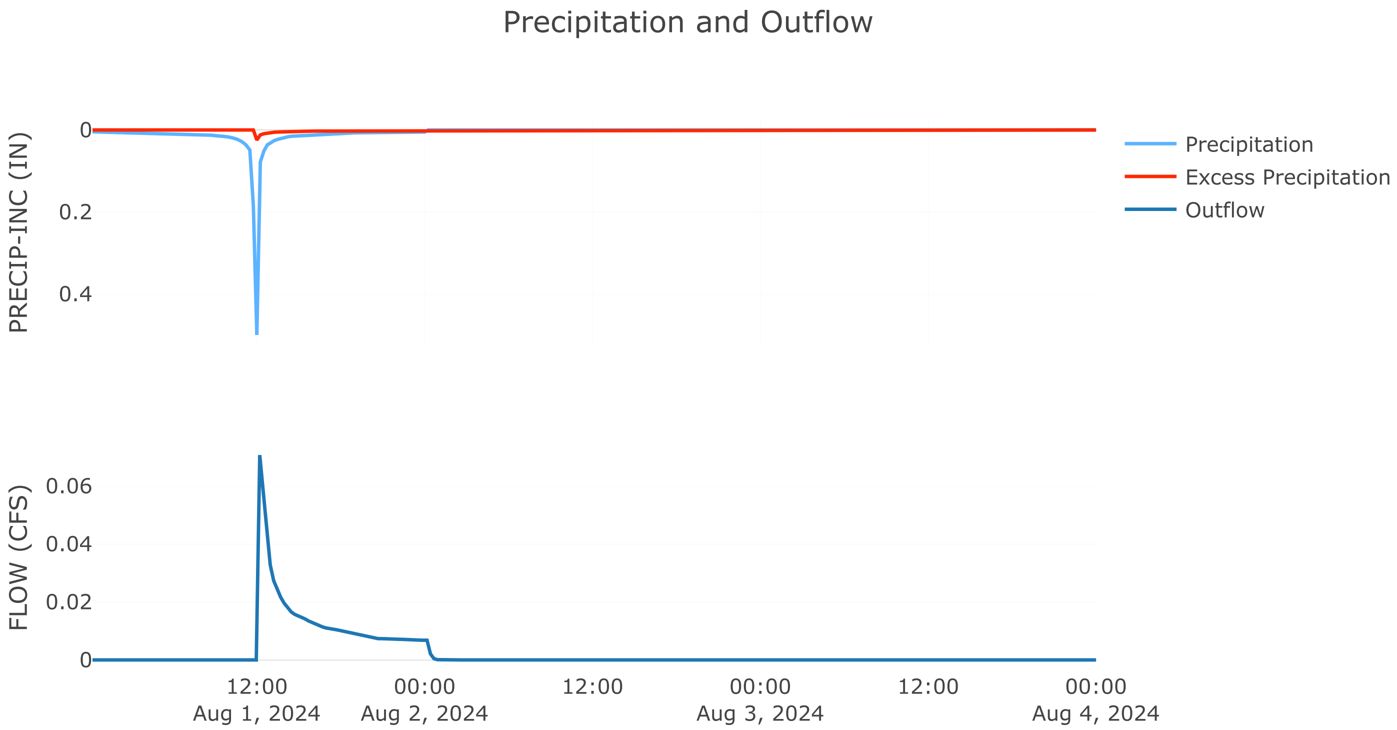
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	8.4
Unitgraph Type	Standard

Results: NW-26

Peak Discharge (CFS)	0.07
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.15
Loss Volume (AC - FT)	0.14
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0

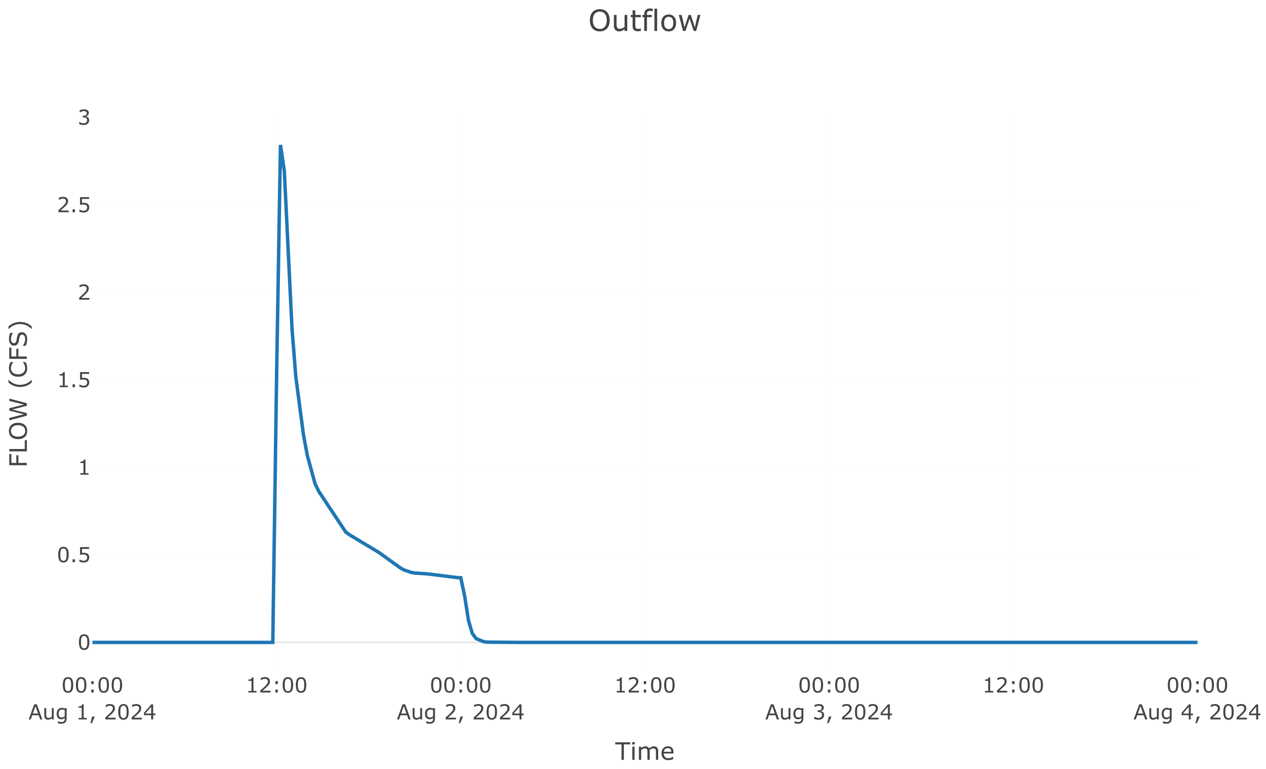


Junction: JUNCTION 5.2

Downstream : Downchute 5.3

Results: JUNCTION 5.2

Peak Discharge (CFS)	2.84
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 5.3

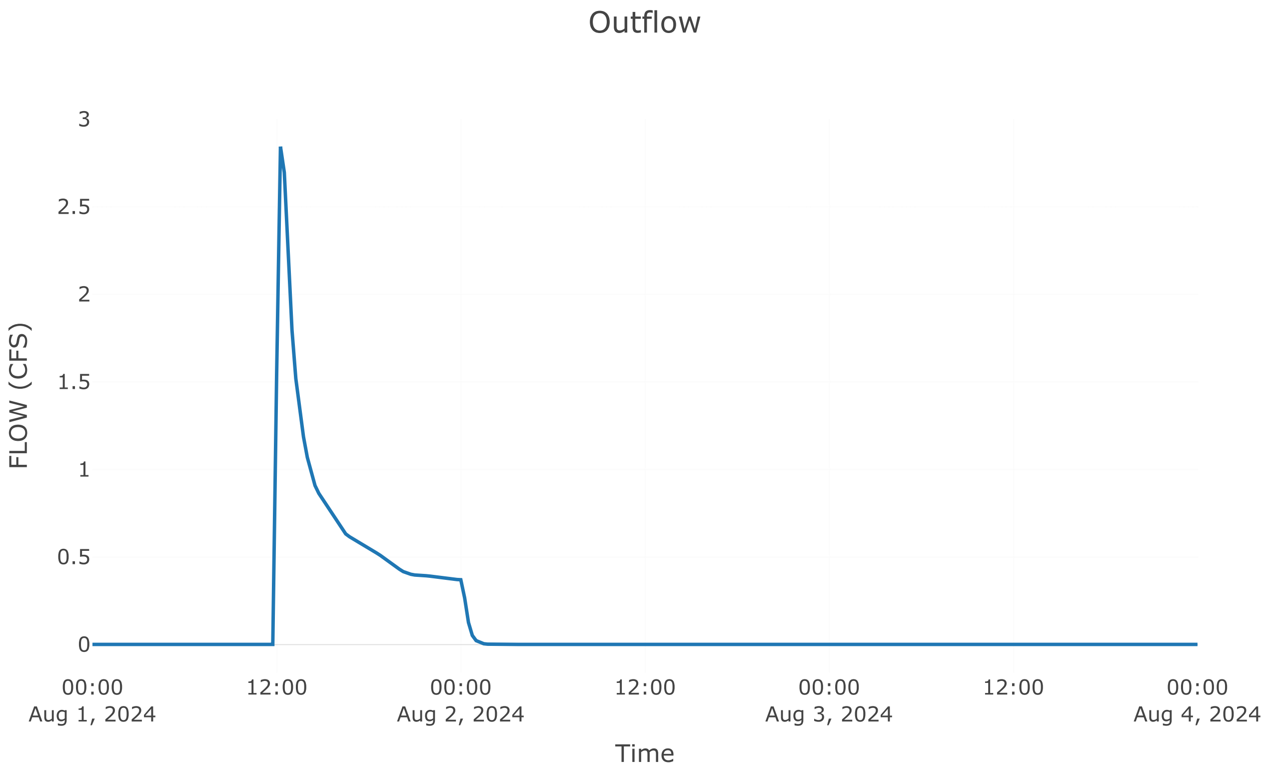
Downstream : Northwest pond

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 5.3

Peak Discharge (CFS)	2.84
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	2.84
Inflow Volume (AC - FT)	0.79



Subbasin: NW-1

Area (MI2) : 0
Downstream : Downchute 1.1

Loss Rate: Scs

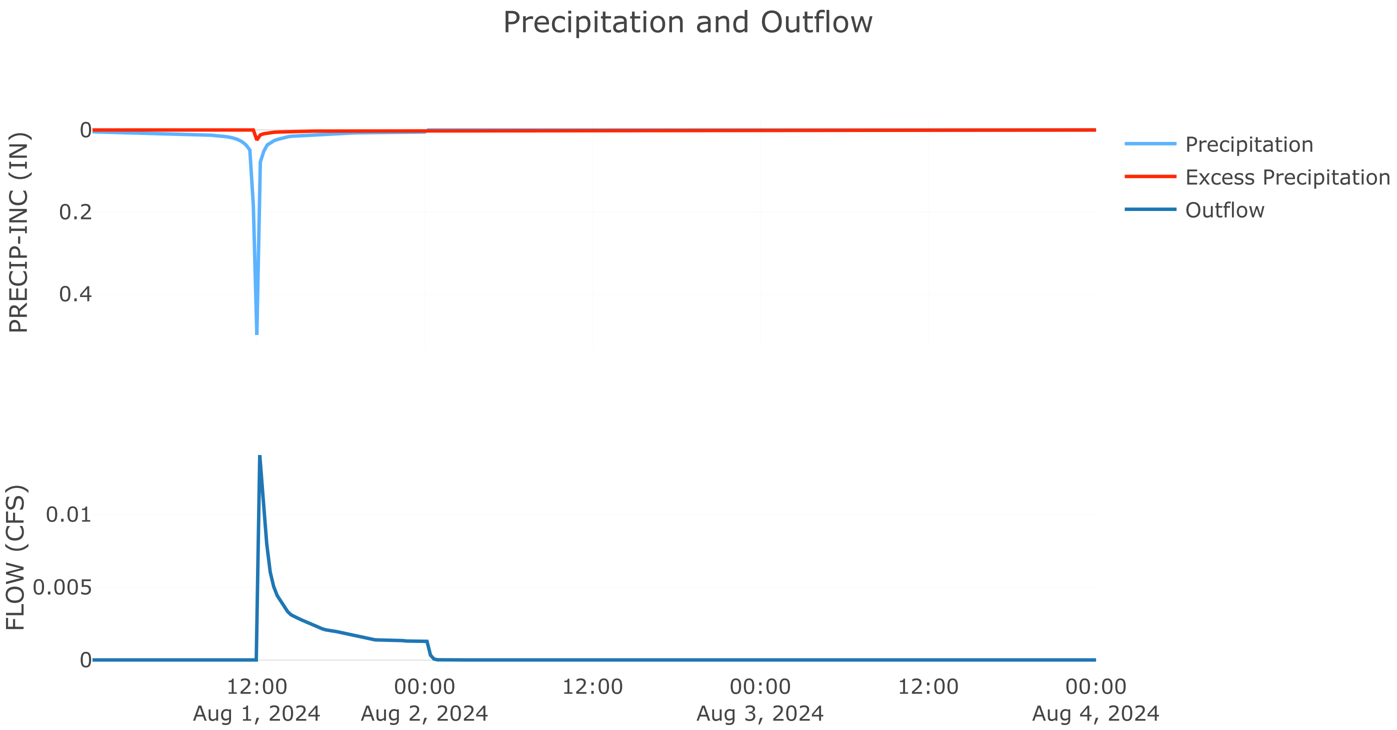
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	4.1
Unitgraph Type	Standard

Results: NW-1

Peak Discharge (CFS)	0.01
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.03
Loss Volume (AC - FT)	0.03
Excess Volume (AC - FT)	0
Direct Runoff Volume (AC - FT)	0
Baseflow Volume (AC - FT)	0



Subbasin: NW-2

Area (MI2) : 0
Downstream : Junction 1.1

Loss Rate: Scs

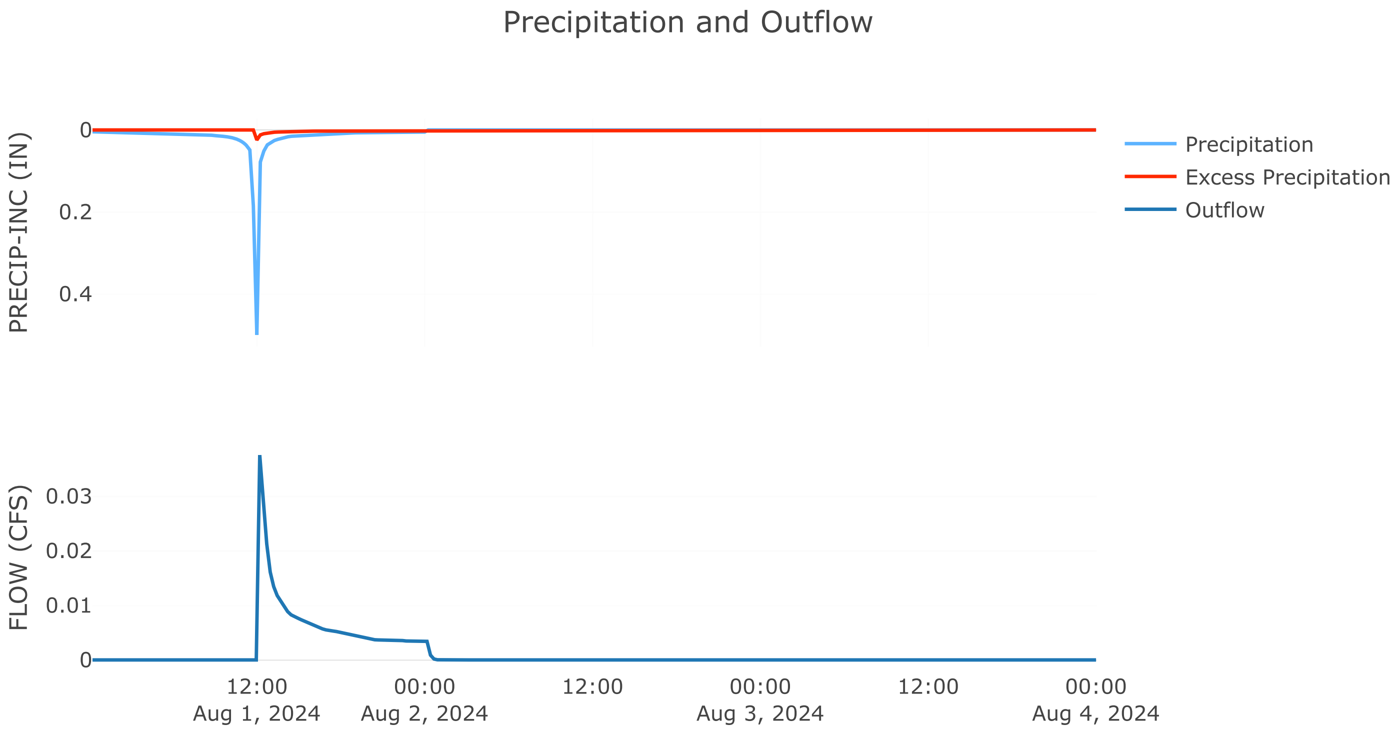
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	6.7
Unitgraph Type	Standard

Results: NW-2

Peak Discharge (CFS)	0.04
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.08
Loss Volume (AC - FT)	0.07
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 1.1

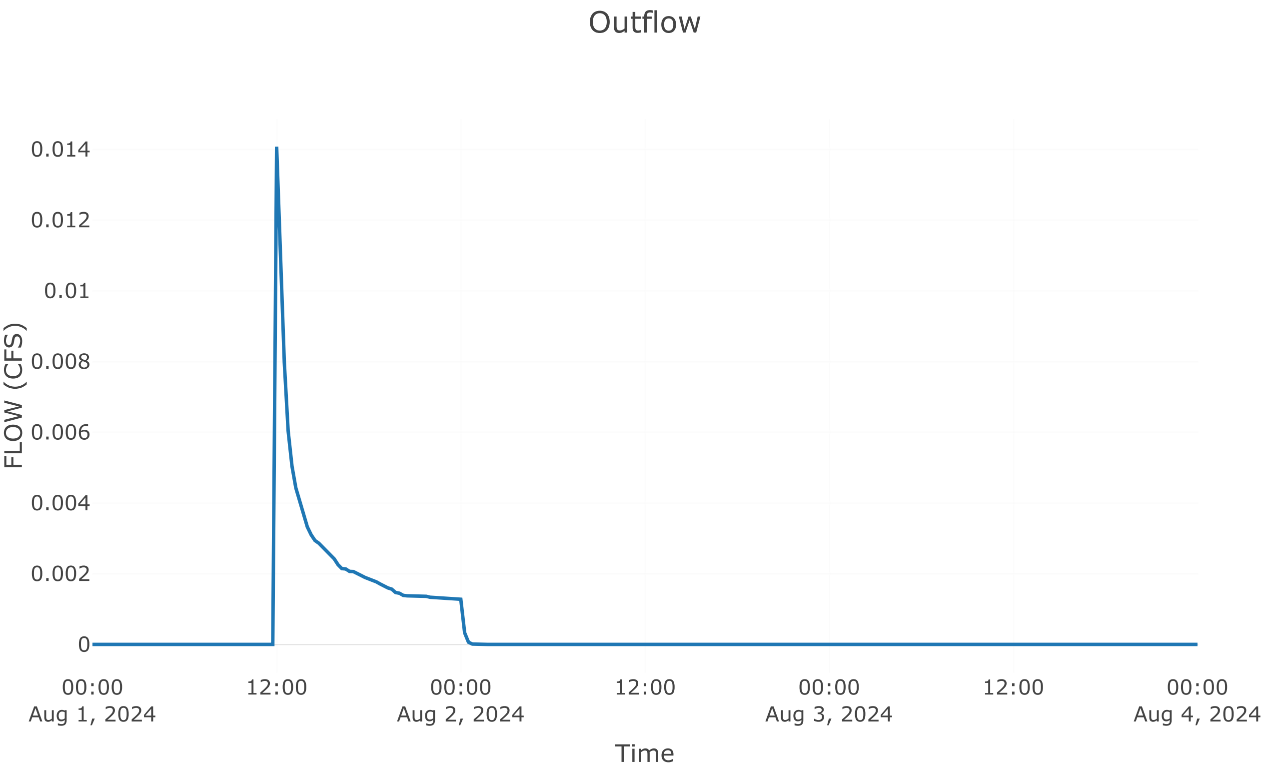
Downstream : Junction 1.1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 1.1

Peak Discharge (CFS)	0.01
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.01
Inflow Volume (AC - FT)	0

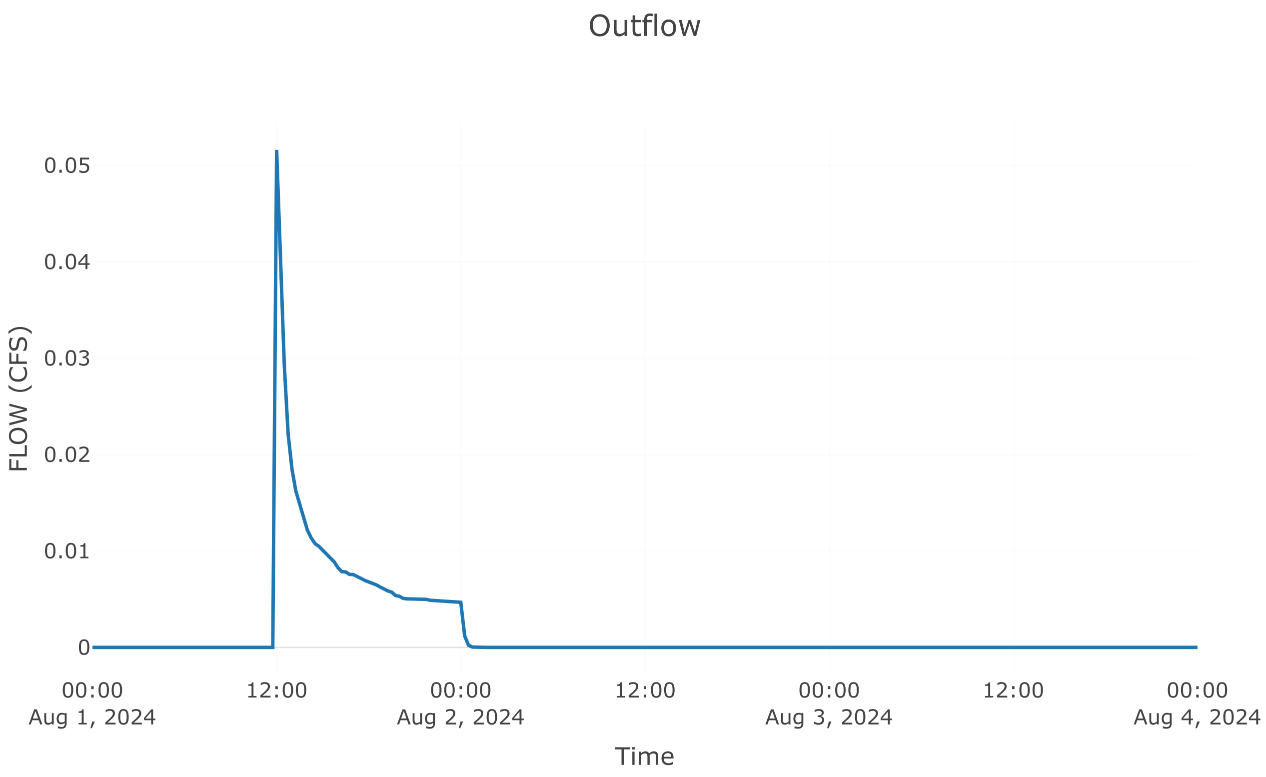


Junction: JUNCTION 1.1

Downstream : Downchute 1.2

Results: JUNCTION 1.1

Peak Discharge (CFS)	0.05
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17



Subbasin: NW-3

Area (MI2) : 0
Downstream : Junction 1.2

Loss Rate: Scs

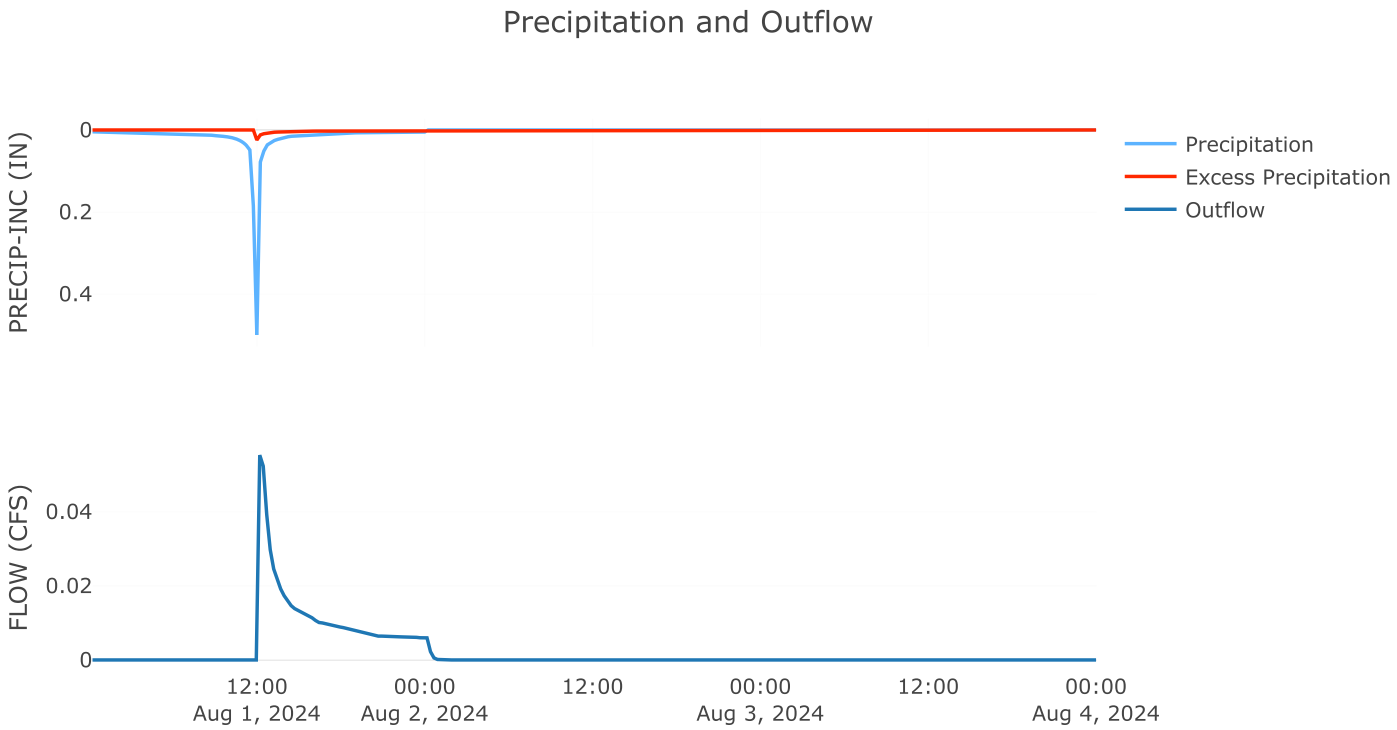
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	9.9
Unitgraph Type	Standard

Results: NW-3

Peak Discharge (CFS)	0.06
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.13
Loss Volume (AC - FT)	0.12
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 1.2

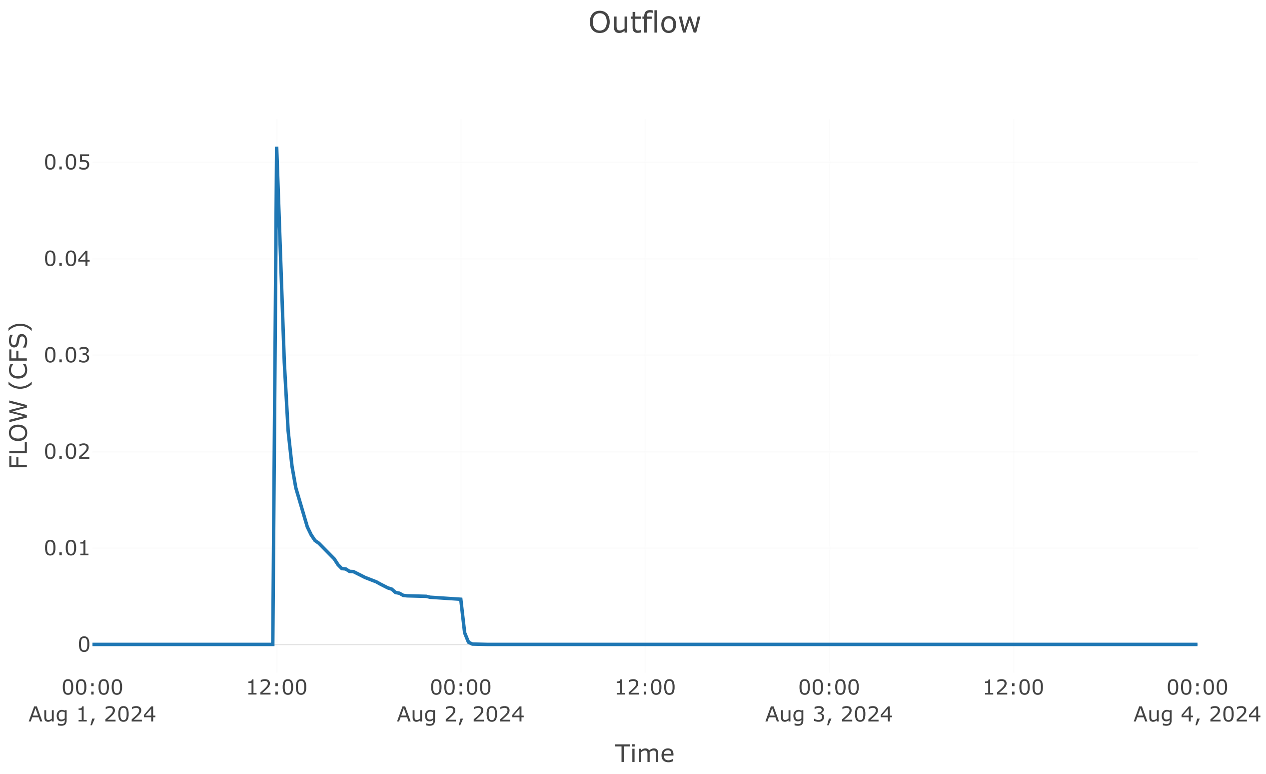
Downstream : Junction 1.2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 1.2

Peak Discharge (CFS)	0.05
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.05
Inflow Volume (AC - FT)	0.01

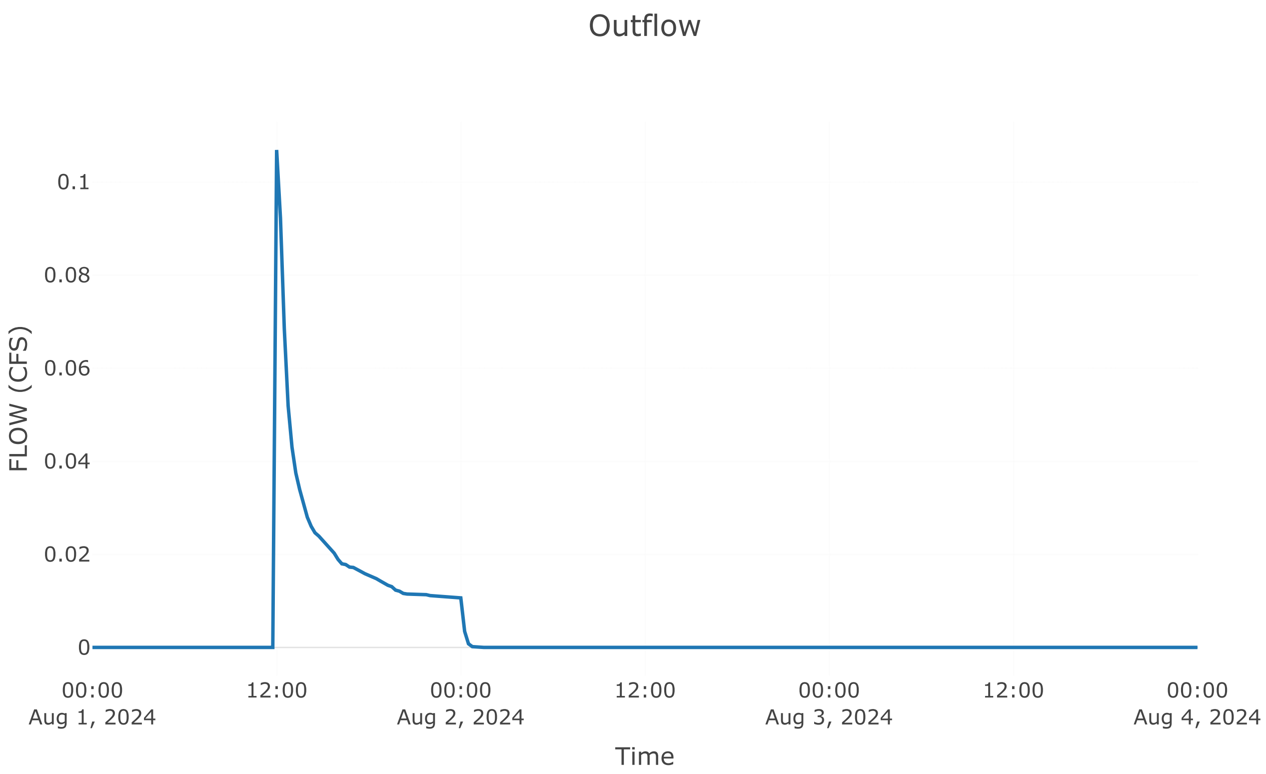


Junction: JUNCTION 1.2

Downstream : Downchute 1.3

Results: JUNCTION 1.2

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17



Reach: DOWNCHUTE 1.3

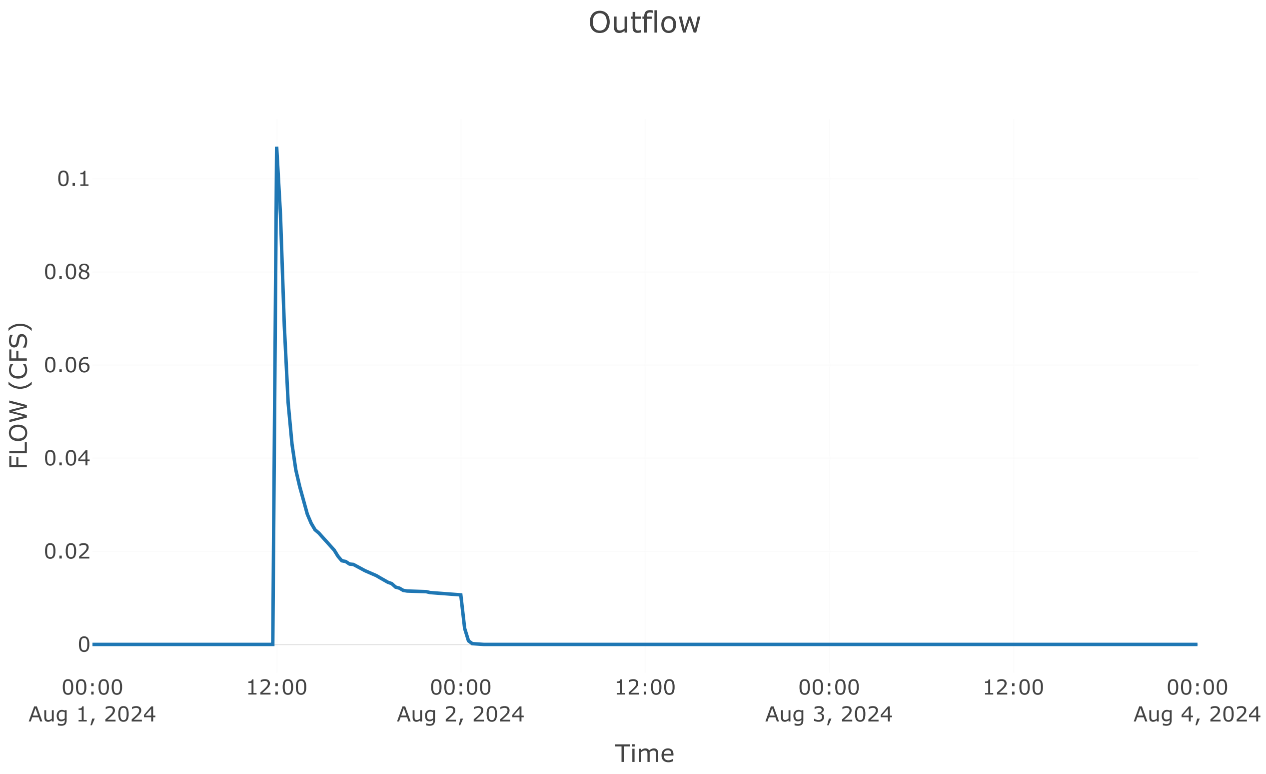
Downstream : Junction 1.3

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 1.3

Peak Discharge (CFS)	0.11
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.11
Inflow Volume (AC - FT)	0.02



Subbasin: NW-4

Area (MI2) : 0
Downstream : Junction 1.3

Loss Rate: Scs

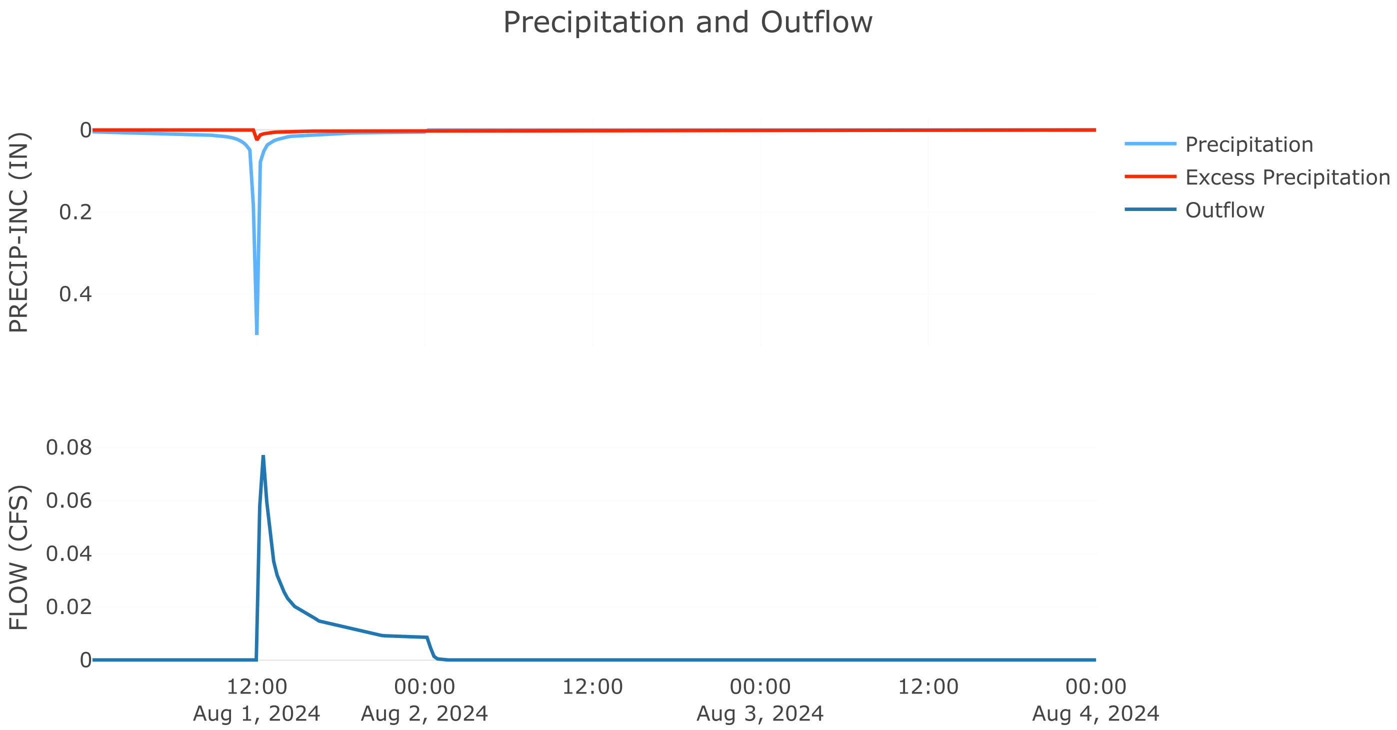
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	13
Unitgraph Type	Standard

Results: NW-4

Peak Discharge (CFS)	0.08
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.19
Loss Volume (AC - FT)	0.17
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

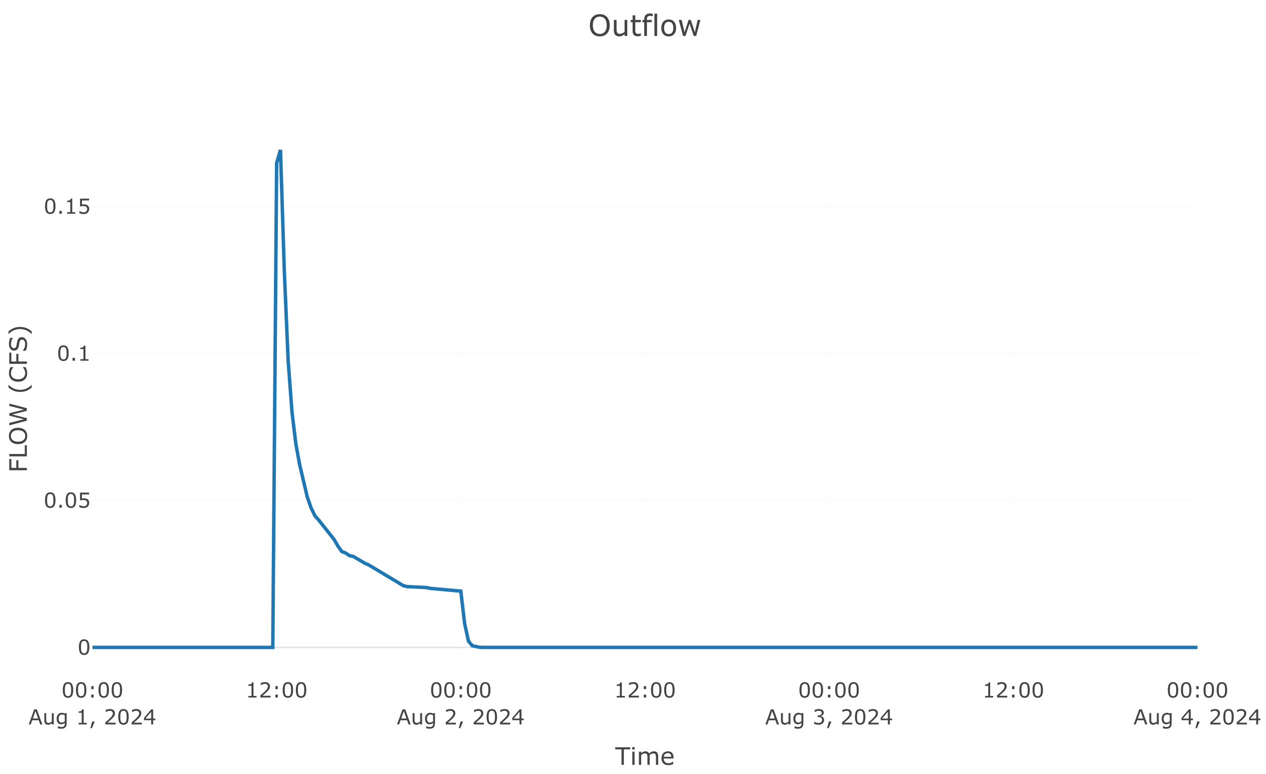


Junction: JUNCTION 1.3

Downstream : Downchute 1.4

Results: JUNCTION 1.3

Peak Discharge (CFS)	0.17
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 1.4

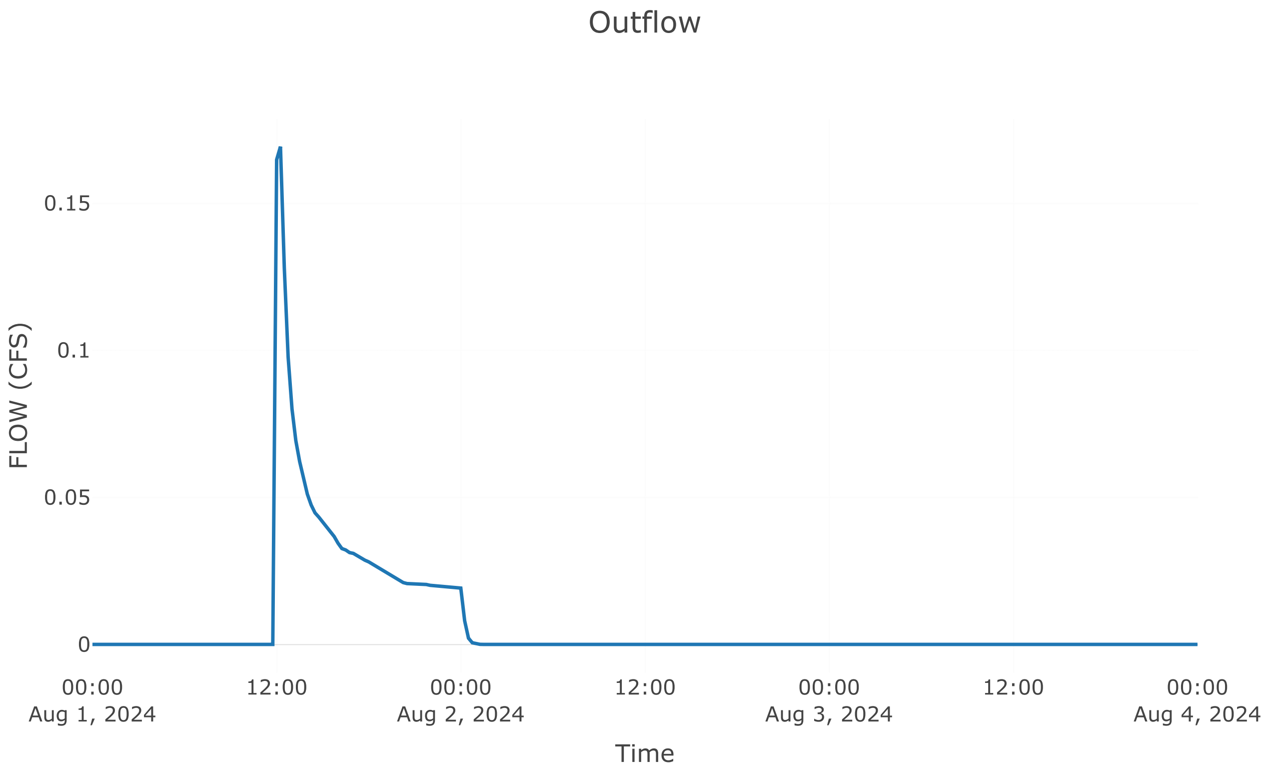
Downstream : Junction 1.4

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 1.4

Peak Discharge (CFS)	0.17
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.17
Inflow Volume (AC - FT)	0.04



Subbasin: NW-5

Area (MI2) : 0
Downstream : Junction 1.4

Loss Rate: Scs

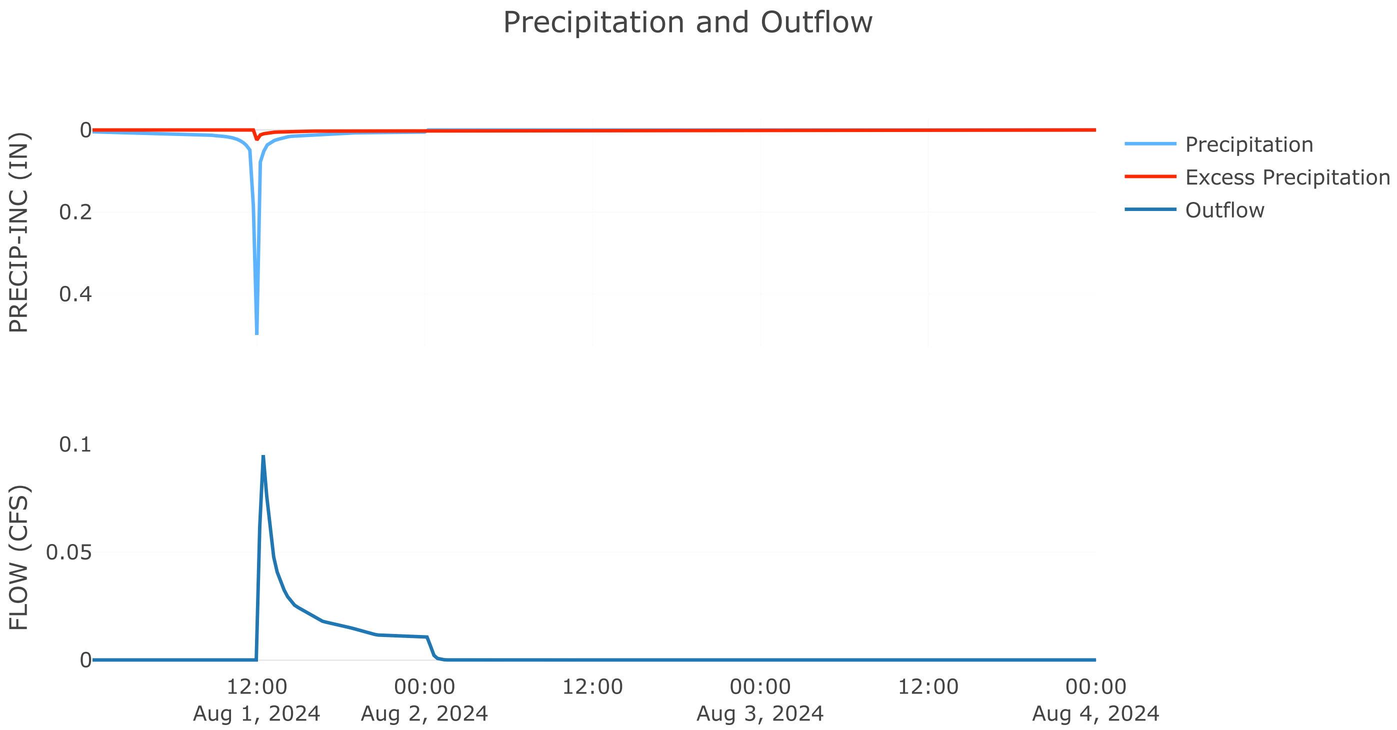
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	14.7
Unitgraph Type	Standard

Results: NW-5

Peak Discharge (CFS)	0.09
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.24
Loss Volume (AC - FT)	0.22
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0

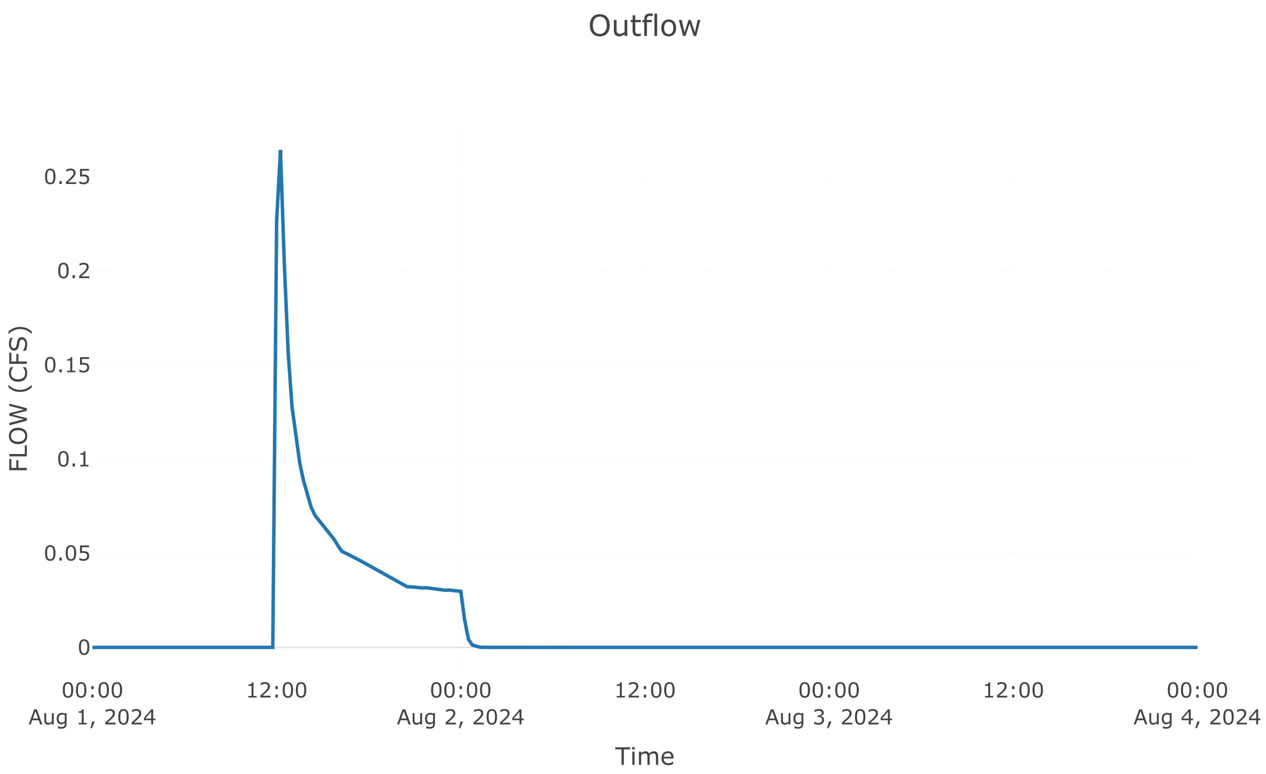


Junction: JUNCTION 1.4

Downstream : Downchute 4.1

Results: JUNCTION 1.4

Peak Discharge (CFS)	0.26
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Subbasin: NW-21

Area (MI2) : 0
Downstream : Downchute 4.1

Loss Rate: Scs

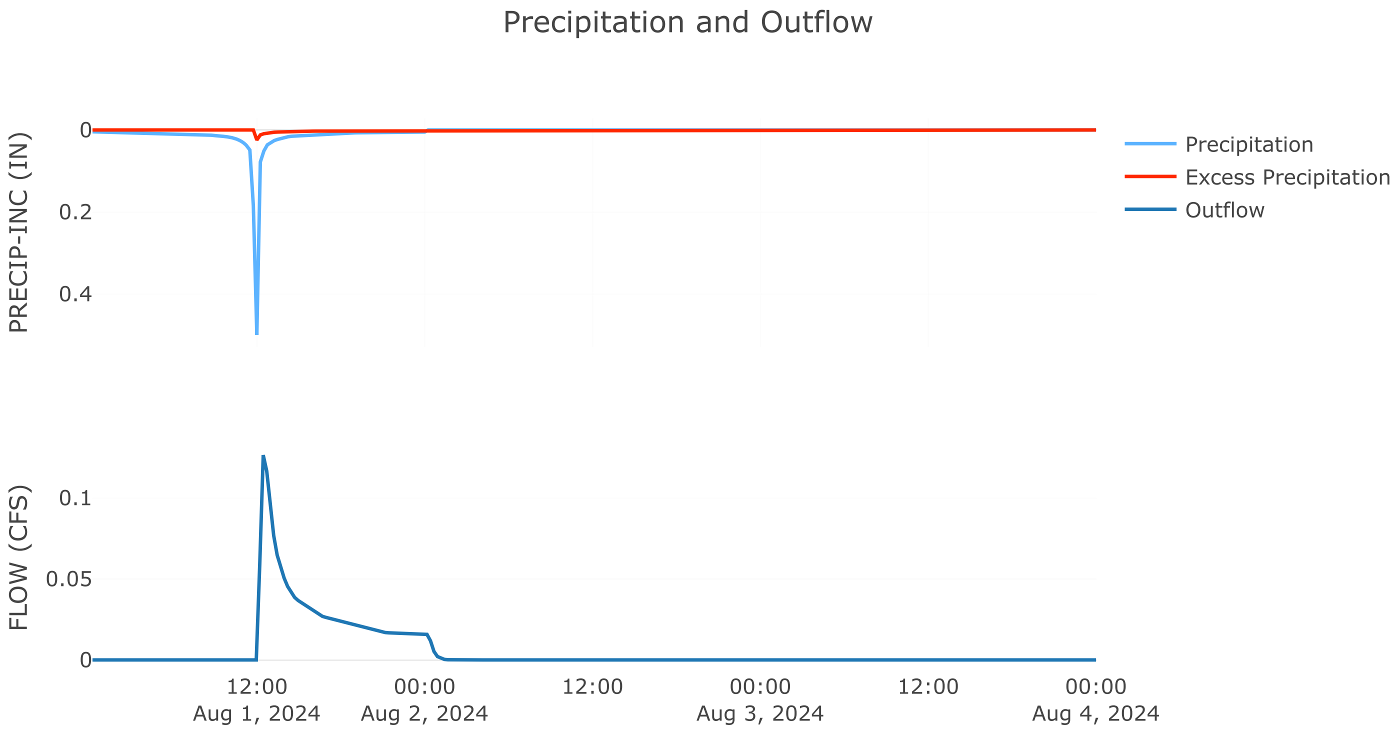
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	19.1
Unitgraph Type	Standard

Results: NW-21

Peak Discharge (CFS)	0.13
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.36
Loss Volume (AC - FT)	0.32
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 4.1

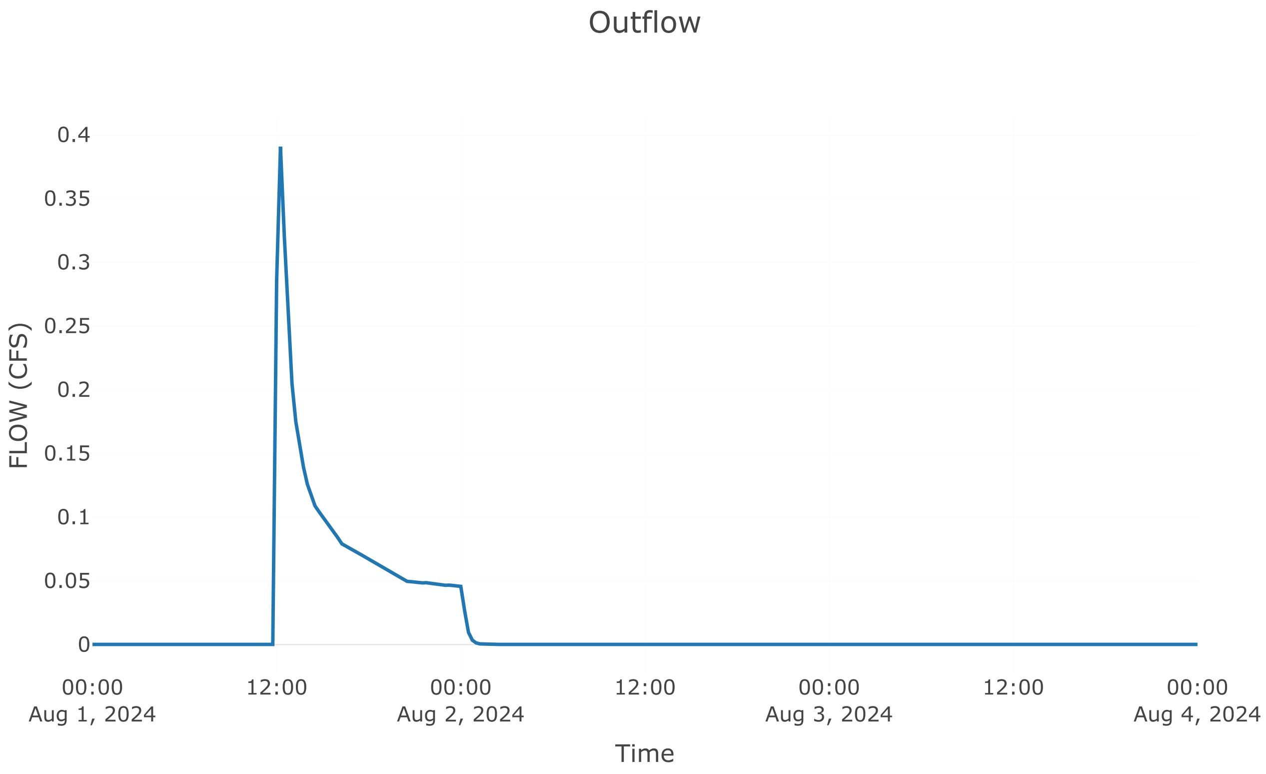
Downstream : Junction - 1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 4.1

Peak Discharge (CFS)	0.39
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.39
Inflow Volume (AC - FT)	0.1



Subbasin: NW-22

Area (MI2) : 0
Downstream : Junction - 1

Loss Rate: Scs

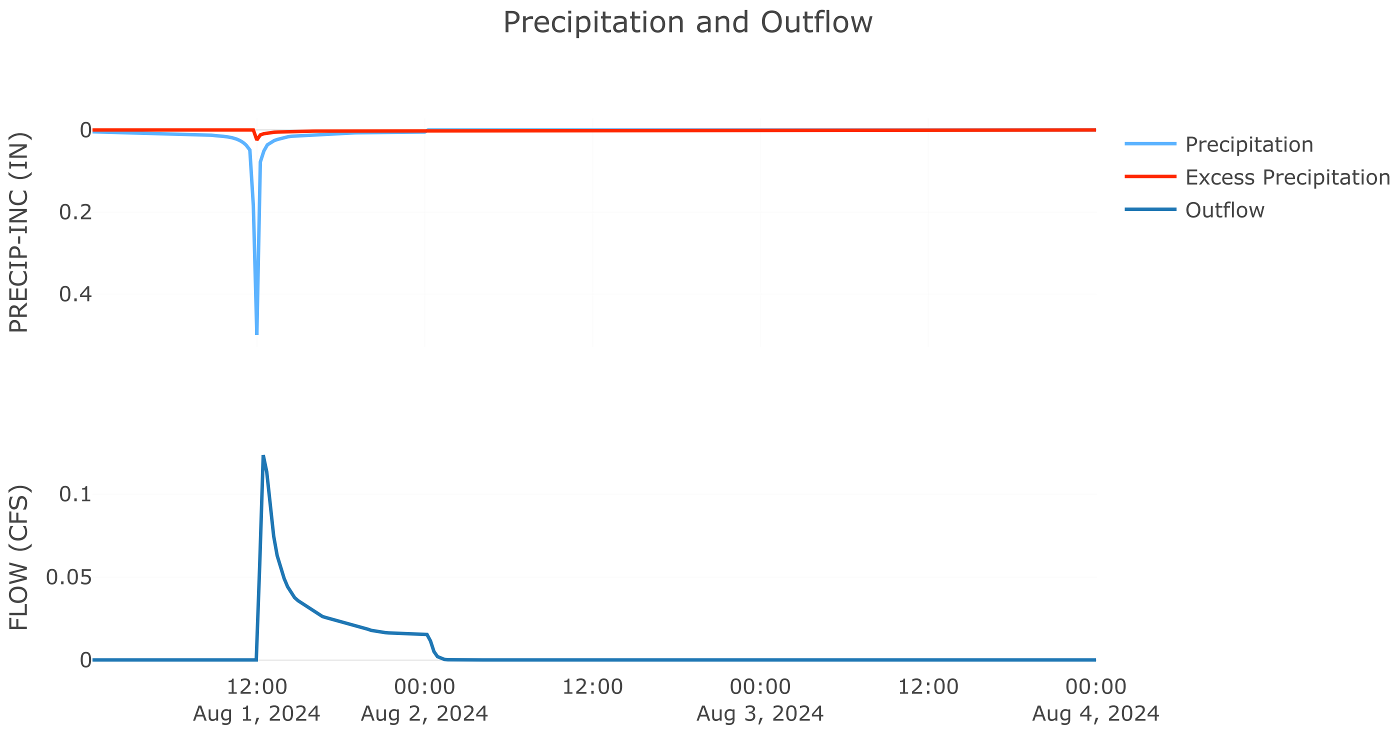
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	19
Unitgraph Type	Standard

Results: NW-22

Peak Discharge (CFS)	0.12
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.35
Loss Volume (AC - FT)	0.31
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0

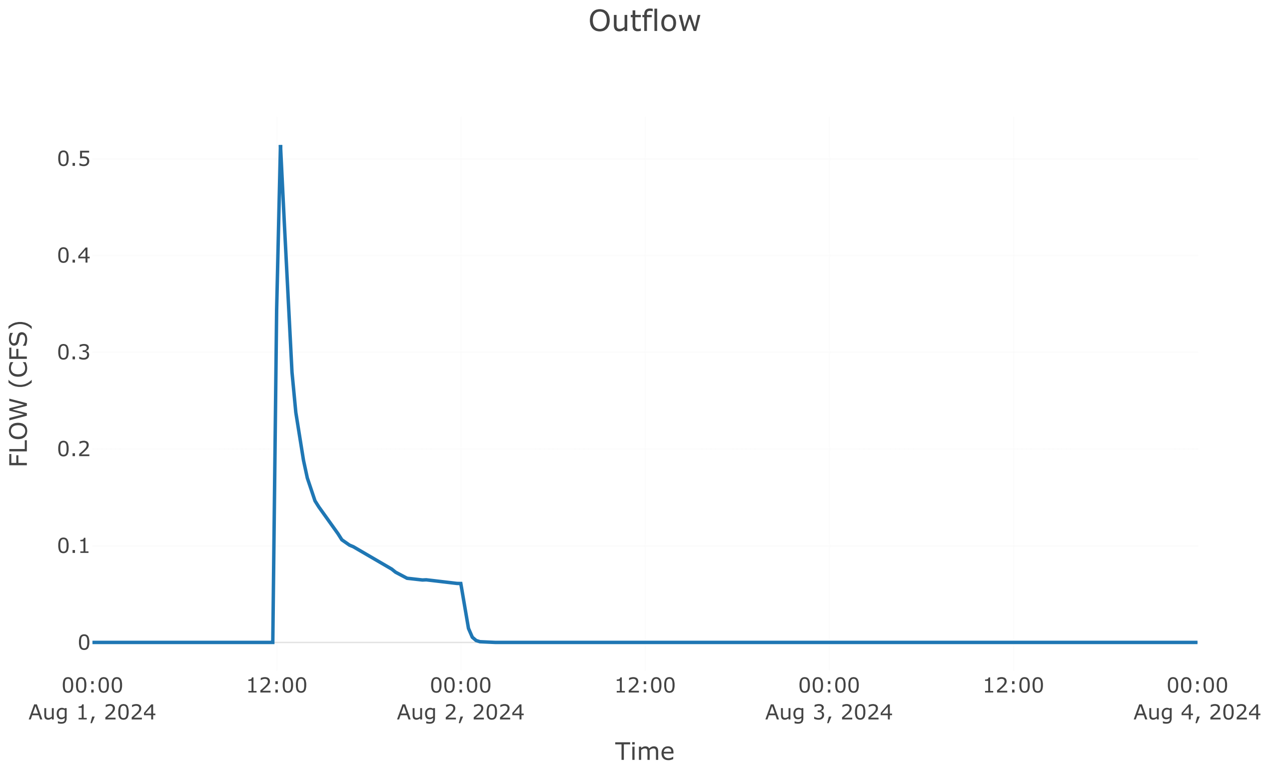


Junction: Junction-1

Downstream : Downchute 4.2

Results: Junction-1

Peak Discharge (CFS)	0.51
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 4.2

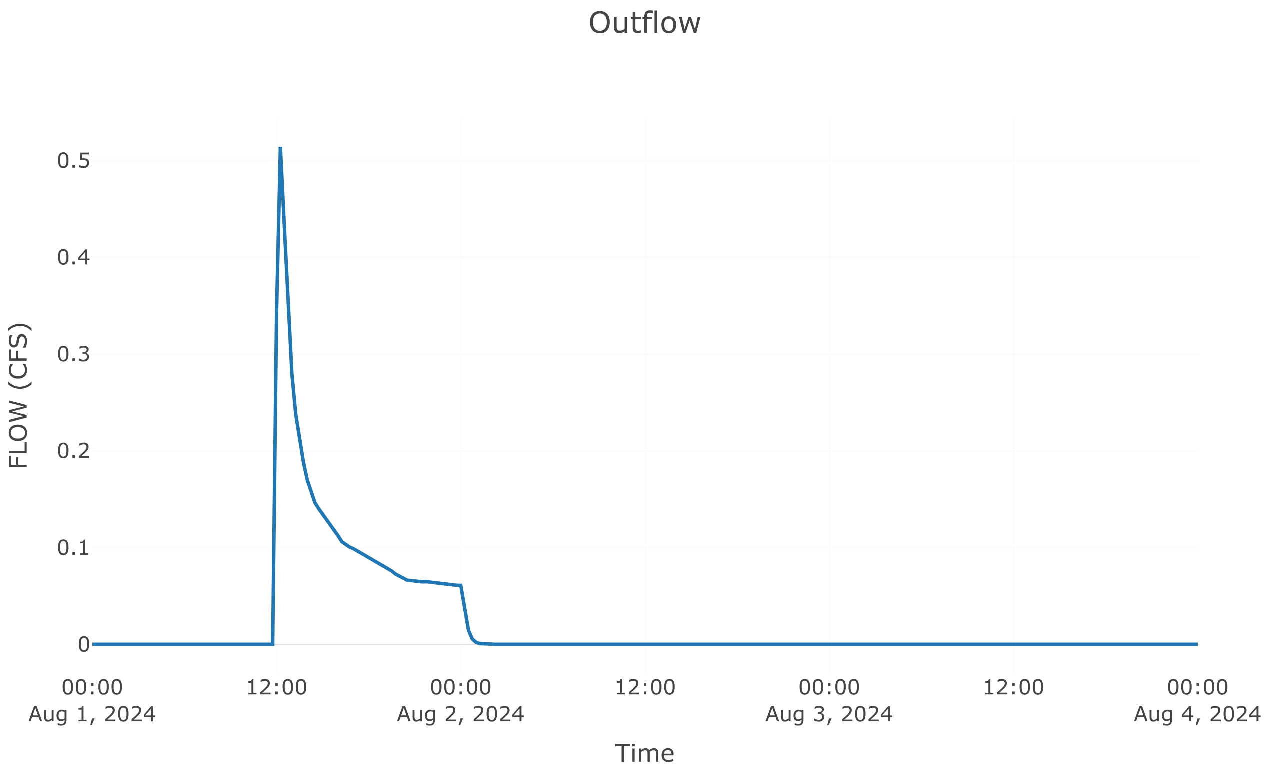
Downstream : Junction 4.2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 4.2

Peak Discharge (CFS)	0.51
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.51
Inflow Volume (AC - FT)	0.13



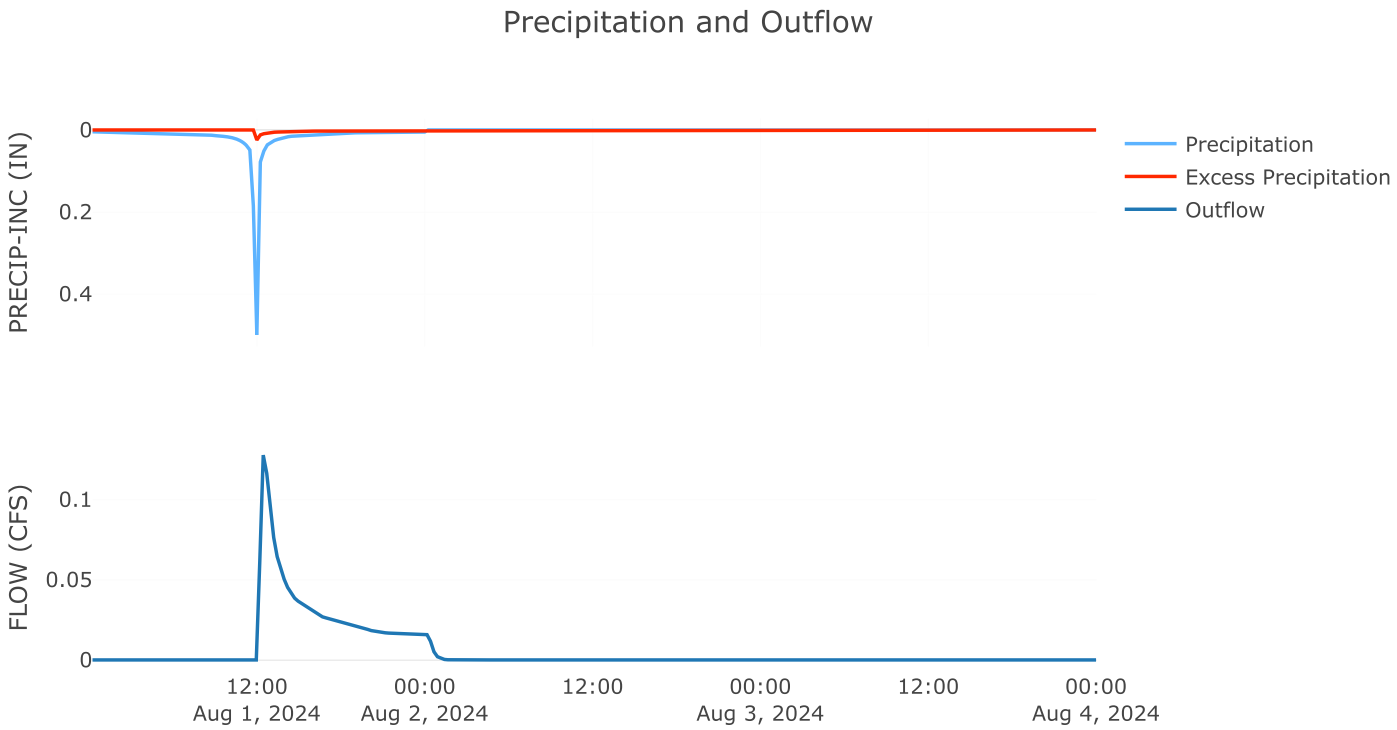
Subbasin: NW-23

Area (MI2) : 0
Downstream : Junction 4.2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	70

Transform: Scs	
Lag	18.8
Unitgraph Type	Standard

Results: NW-23	
Peak Discharge (CFS)	0.13
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.36
Loss Volume (AC - FT)	0.32
Excess Volume (AC - FT)	0.03
Direct Runoff Volume (AC - FT)	0.03
Baseflow Volume (AC - FT)	0

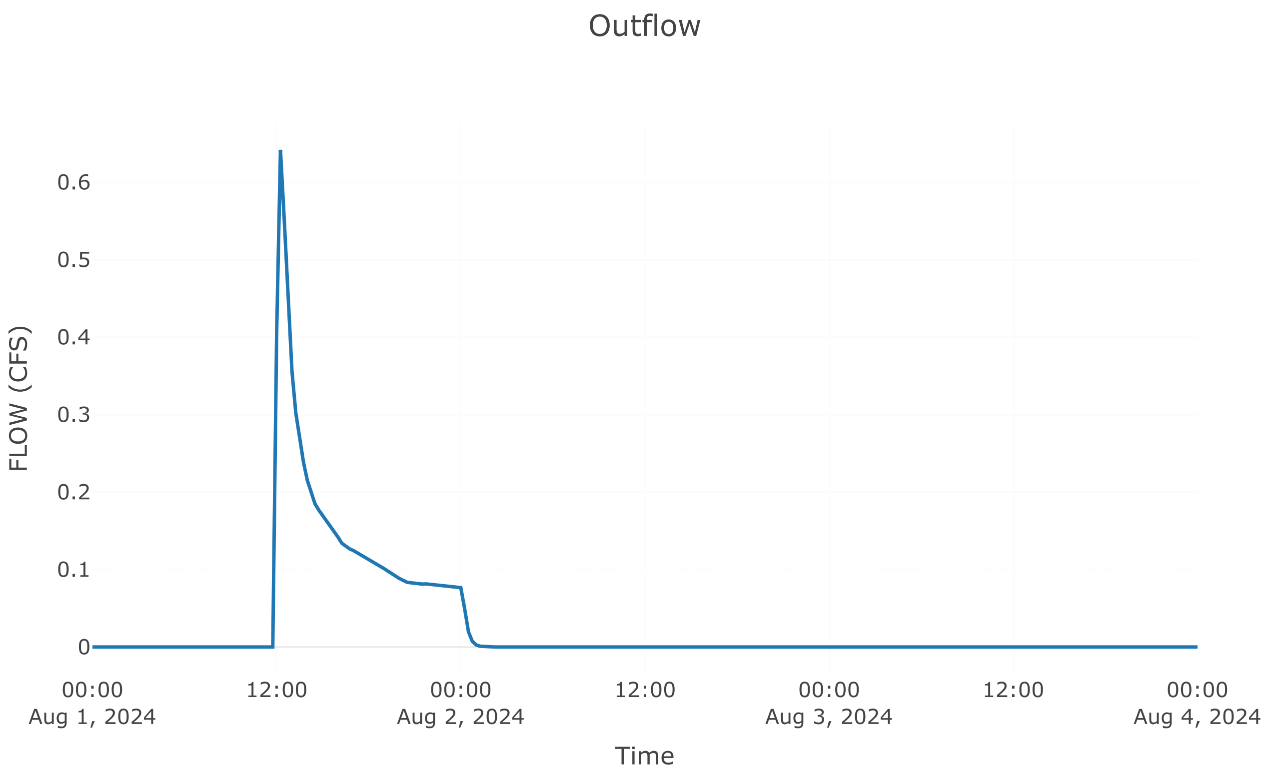


Junction: JUNCTION 4.2

Downstream : Downchute 4.3

Results: JUNCTION 4.2

Peak Discharge (CFS)	0.64
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: DOWNCHUTE 4.3

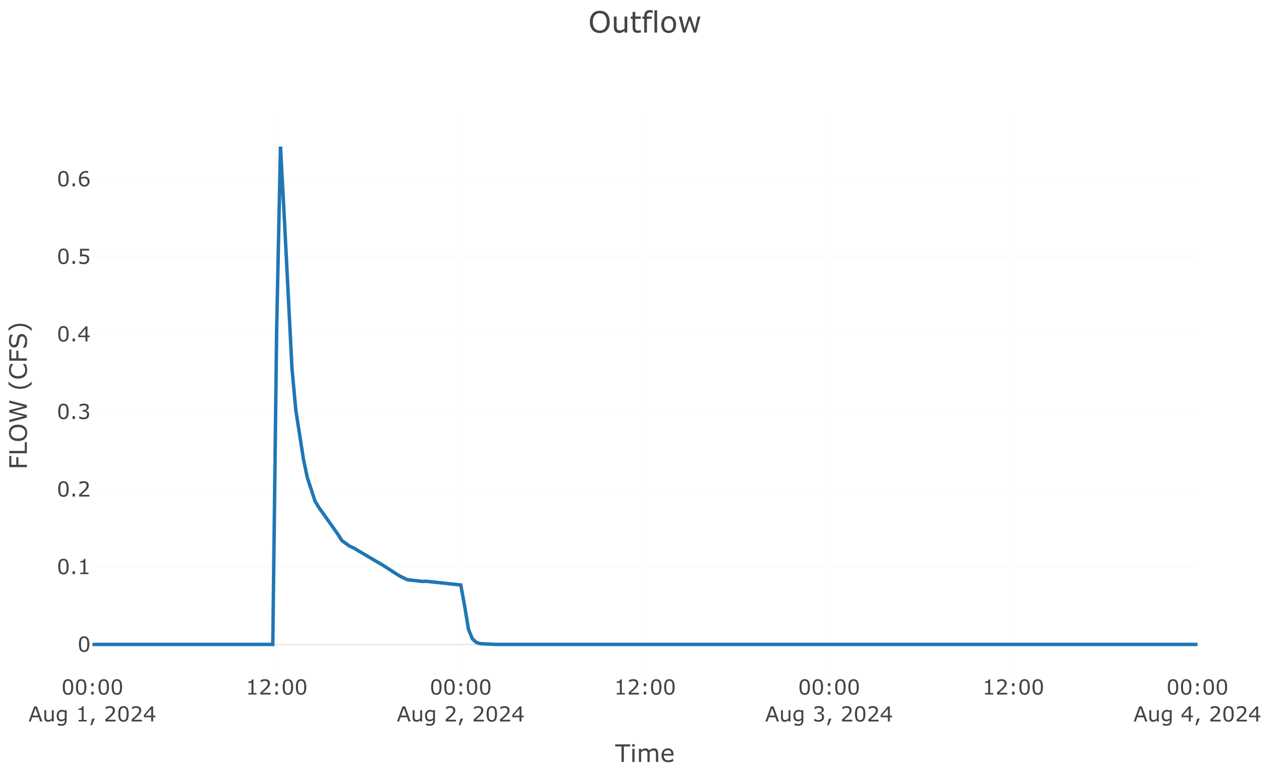
Downstream : Northwest pond

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 4.3

Peak Discharge (CFS)	0.64
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.64
Inflow Volume (AC - FT)	0.16



Subbasin: NW-30

Area (MI2) : 0.01
Downstream : Northwest pond

Loss Rate: Scs

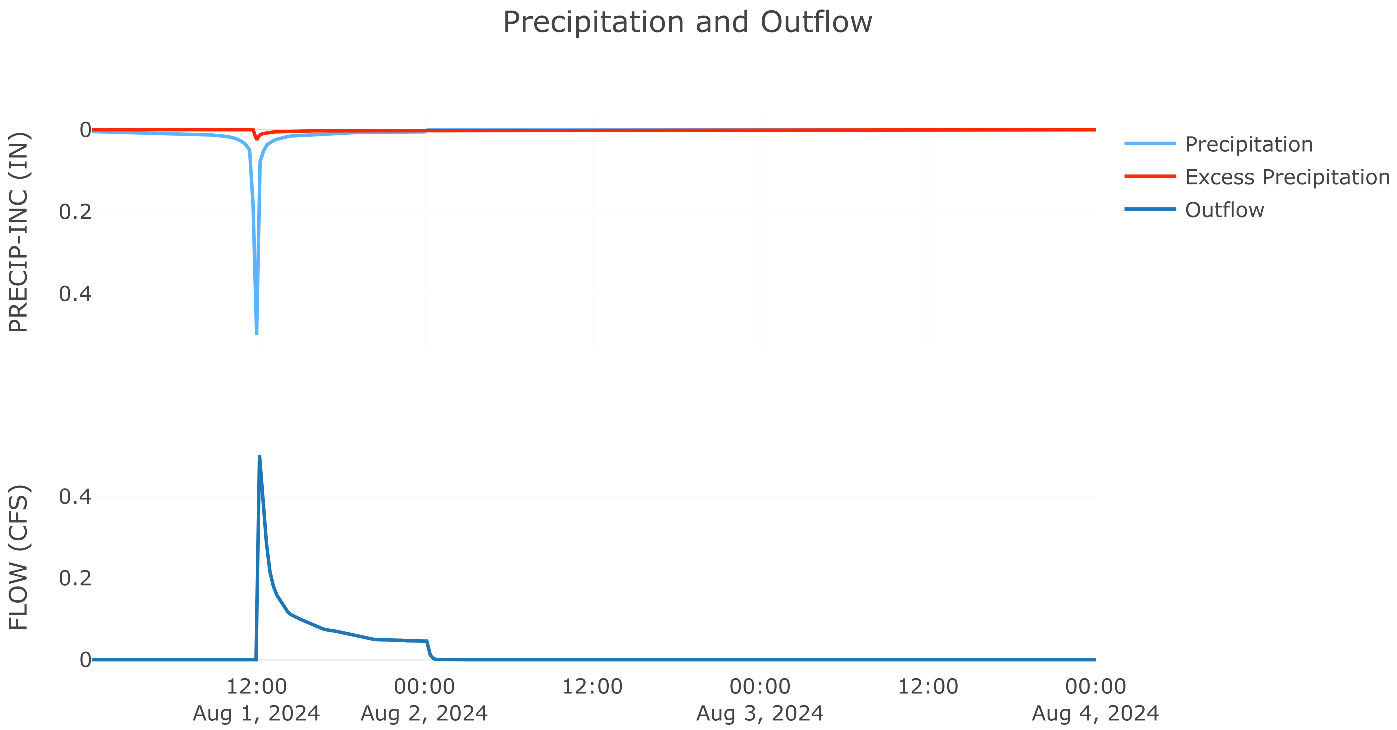
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	1.9
Unitgraph Type	Standard

Results: NW-30

Peak Discharge (CFS)	0.5
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	1.03
Loss Volume (AC - FT)	0.93
Excess Volume (AC - FT)	0.1
Direct Runoff Volume (AC - FT)	0.1
Baseflow Volume (AC - FT)	0



Subbasin: N-6

Area (MI2) : 0
Downstream : N junction 3

Loss Rate: Scs

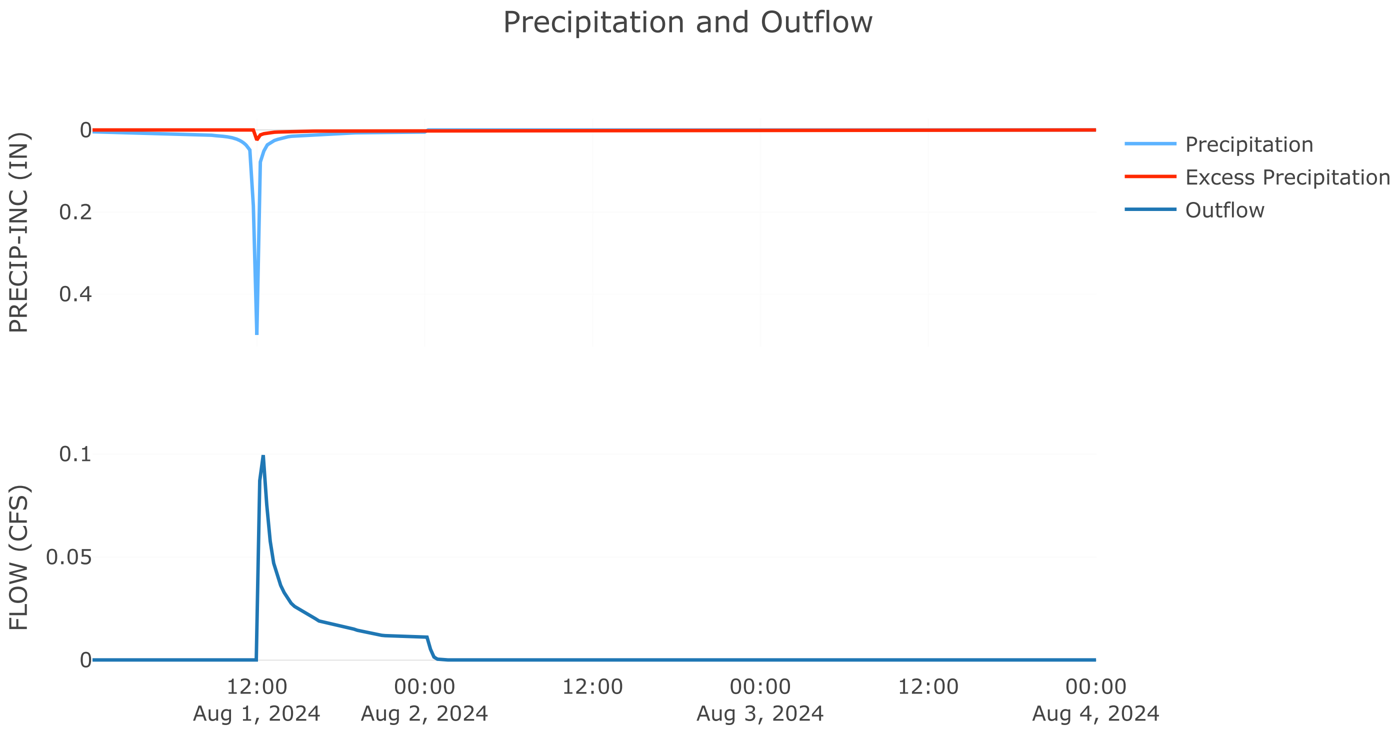
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	11.6
Unitgraph Type	Standard

Results: N-6

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.25
Loss Volume (AC - FT)	0.23
Excess Volume (AC - FT)	0.02
Direct Runoff Volume (AC - FT)	0.02
Baseflow Volume (AC - FT)	0



Reach: N CHANNEL 1.3

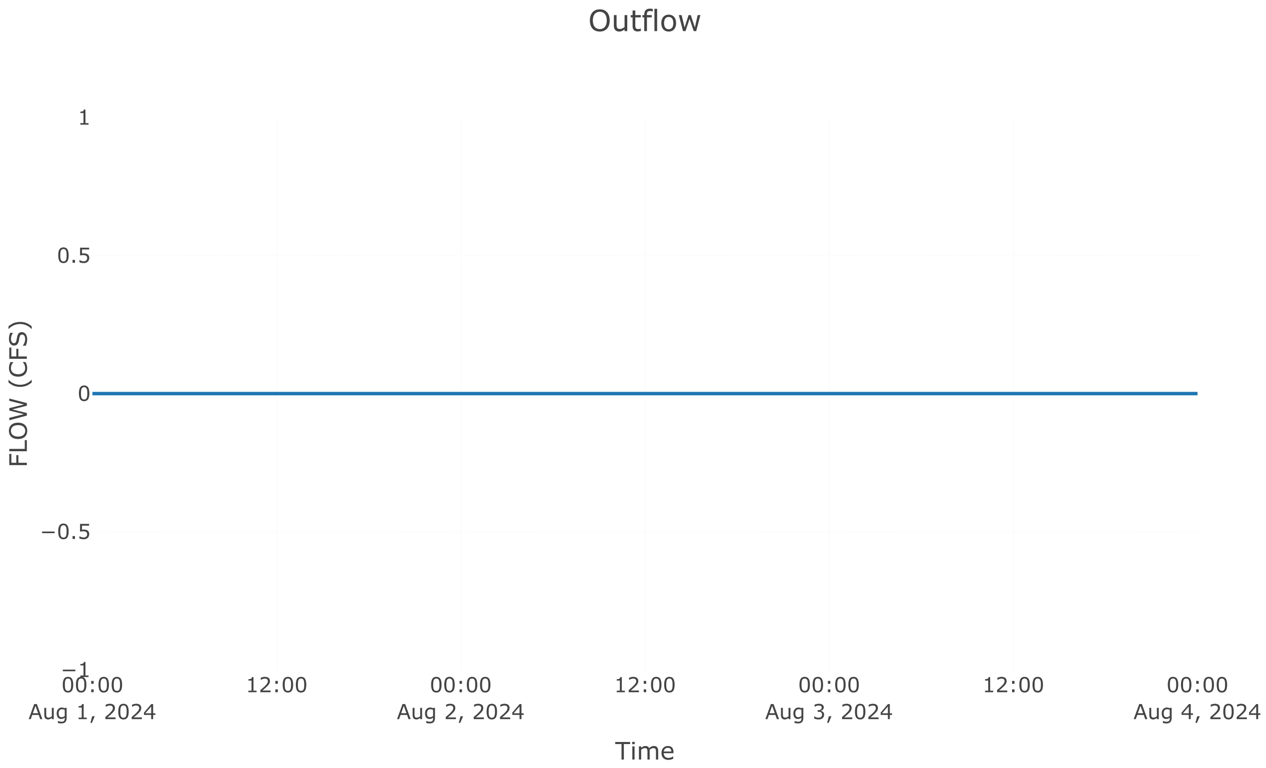
Downstream : N junction 3

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.3

Peak Discharge (CFS)	0
Time of Peak Discharge	31Jul2024, 24:00
Peak Inflow (CFS)	0
Inflow Volume (AC - FT)	0

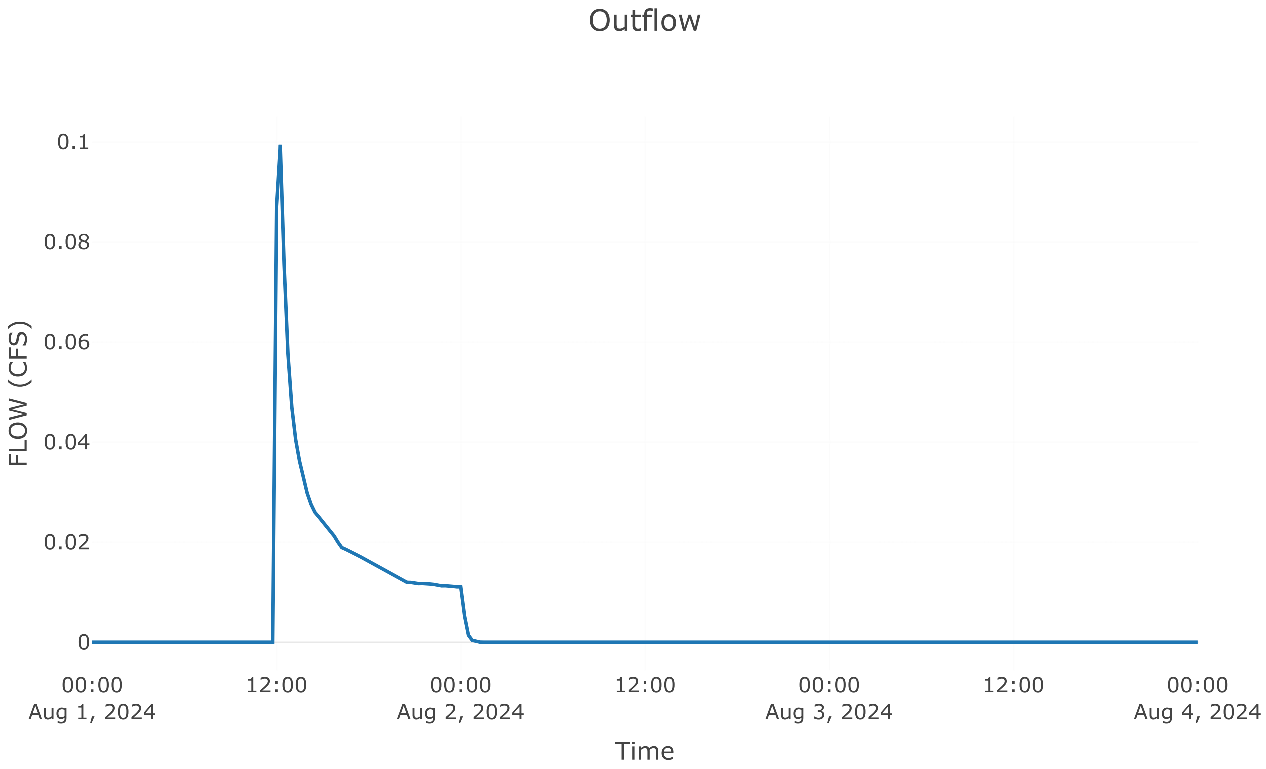


Junction: N JUNCTION 3

Downstream : N channel 1.4

Results: N JUNCTION 3

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: N CHANNEL 1.4

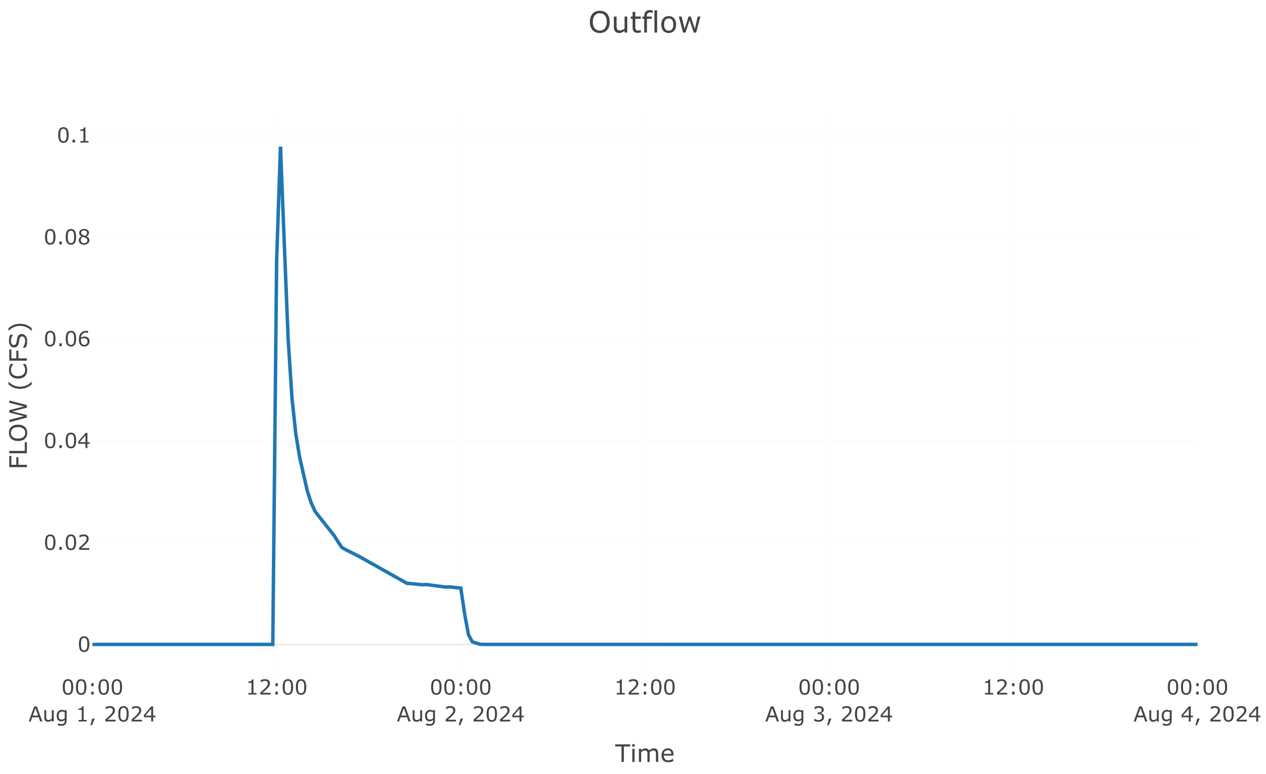
Downstream : N junction 4

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.4

Peak Discharge (CFS)	0.1
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.1
Inflow Volume (AC - FT)	0.02



Subbasin: N-7

Area (MI2) : 0
Downstream : N junction 4

Loss Rate: Scs

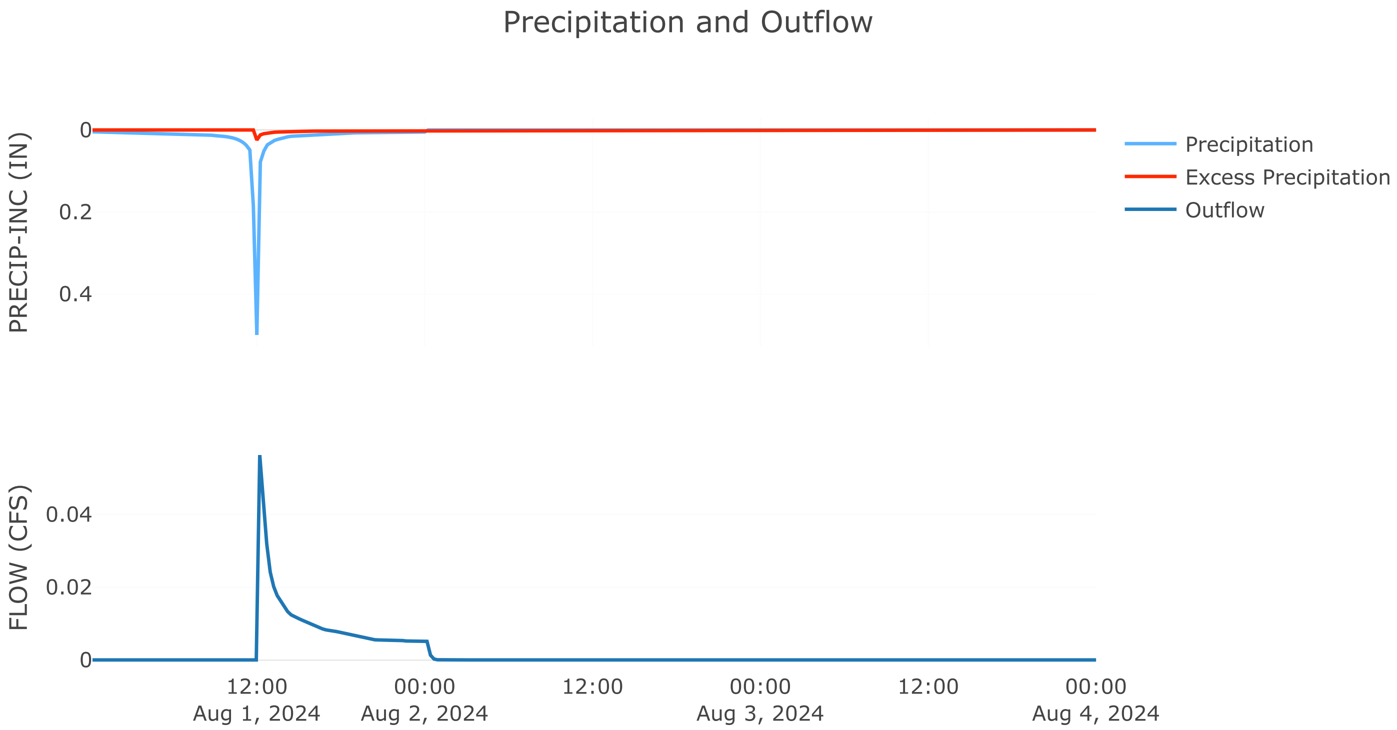
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	6.5
Unitgraph Type	Standard

Results: N-7

Peak Discharge (CFS)	0.06
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.12
Loss Volume (AC - FT)	0.1
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0

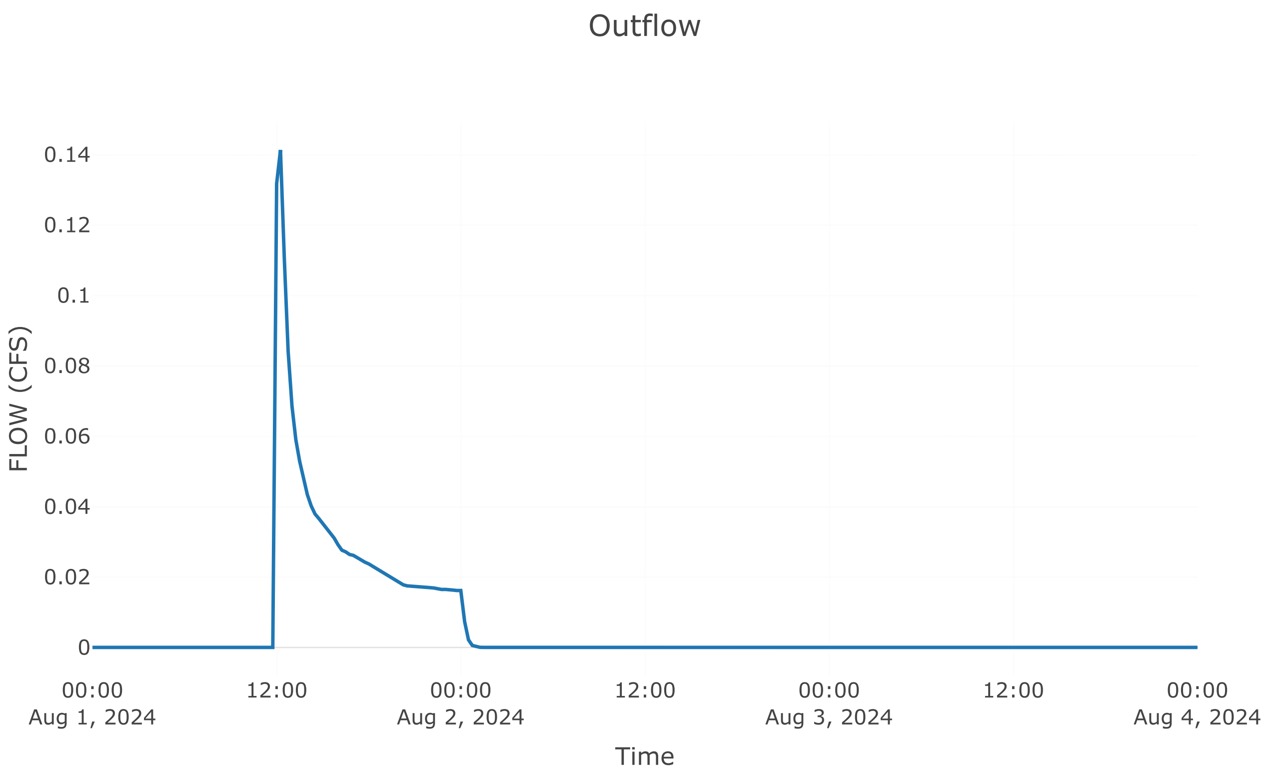


Junction: N JUNCTION 4

Downstream : N channel 1.5

Results: N JUNCTION 4

Peak Discharge (CFS)	0.14
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: N CHANNEL 1.5

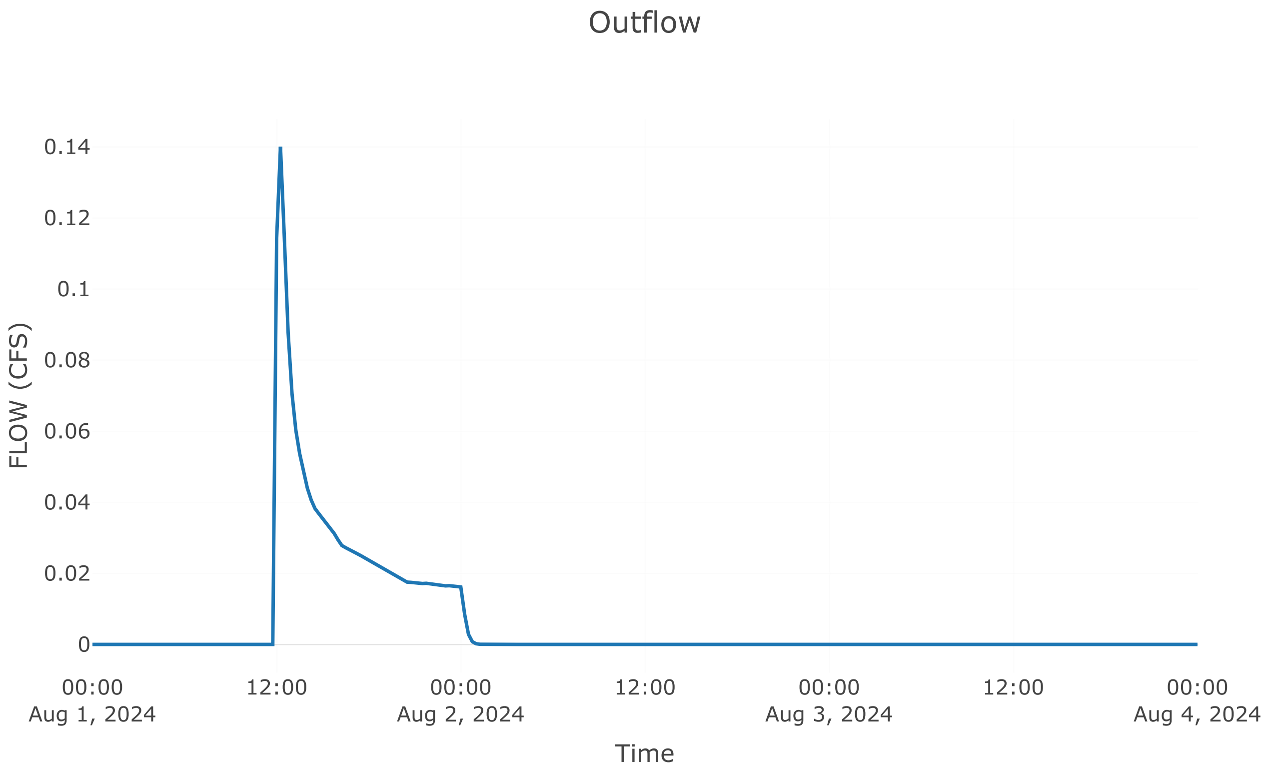
Downstream : N junction 5

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.5

Peak Discharge (CFS)	0.14
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.14
Inflow Volume (AC - FT)	0.03



Subbasin: N-8

Area (MI2) : 0
Downstream : N junction 5

Loss Rate: Scs

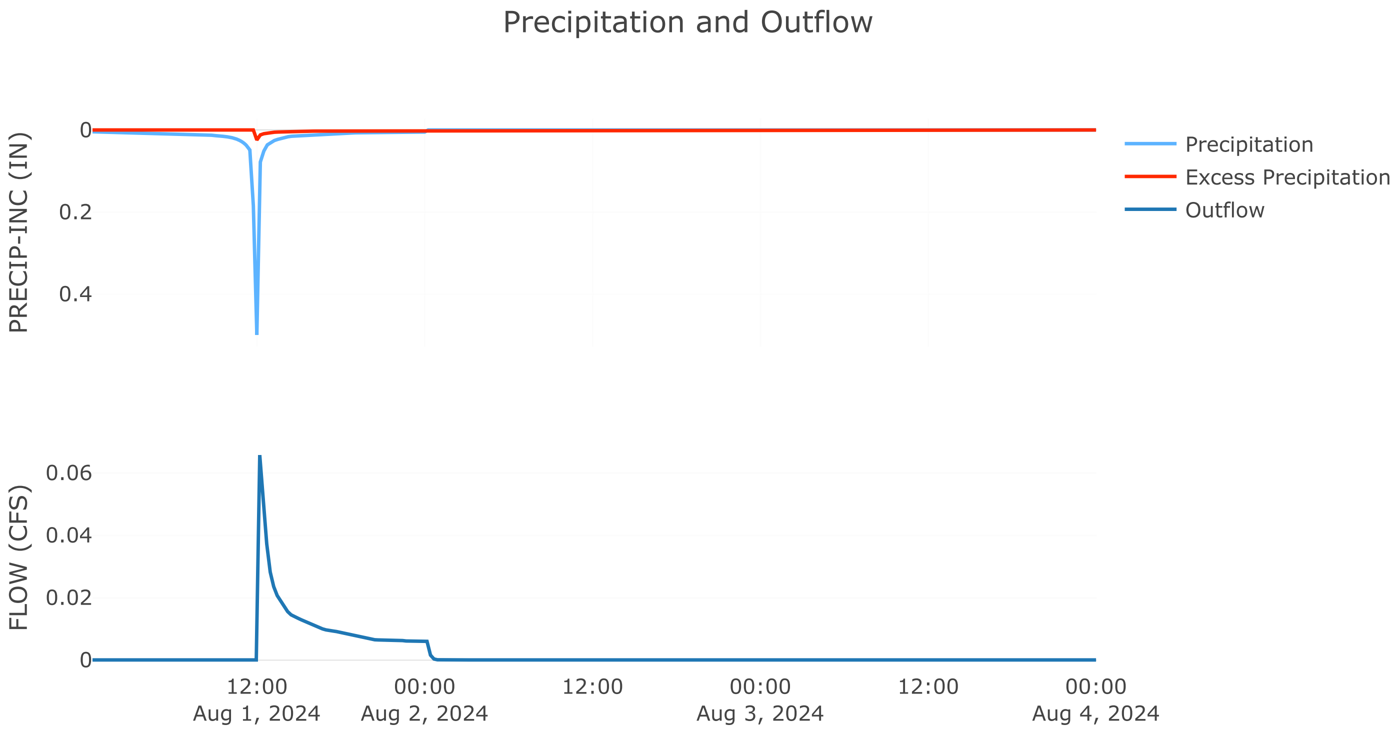
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	7.4
Unitgraph Type	Standard

Results: N-8

Peak Discharge (CFS)	0.07
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.13
Loss Volume (AC - FT)	0.12
Excess Volume (AC - FT)	0.01
Direct Runoff Volume (AC - FT)	0.01
Baseflow Volume (AC - FT)	0

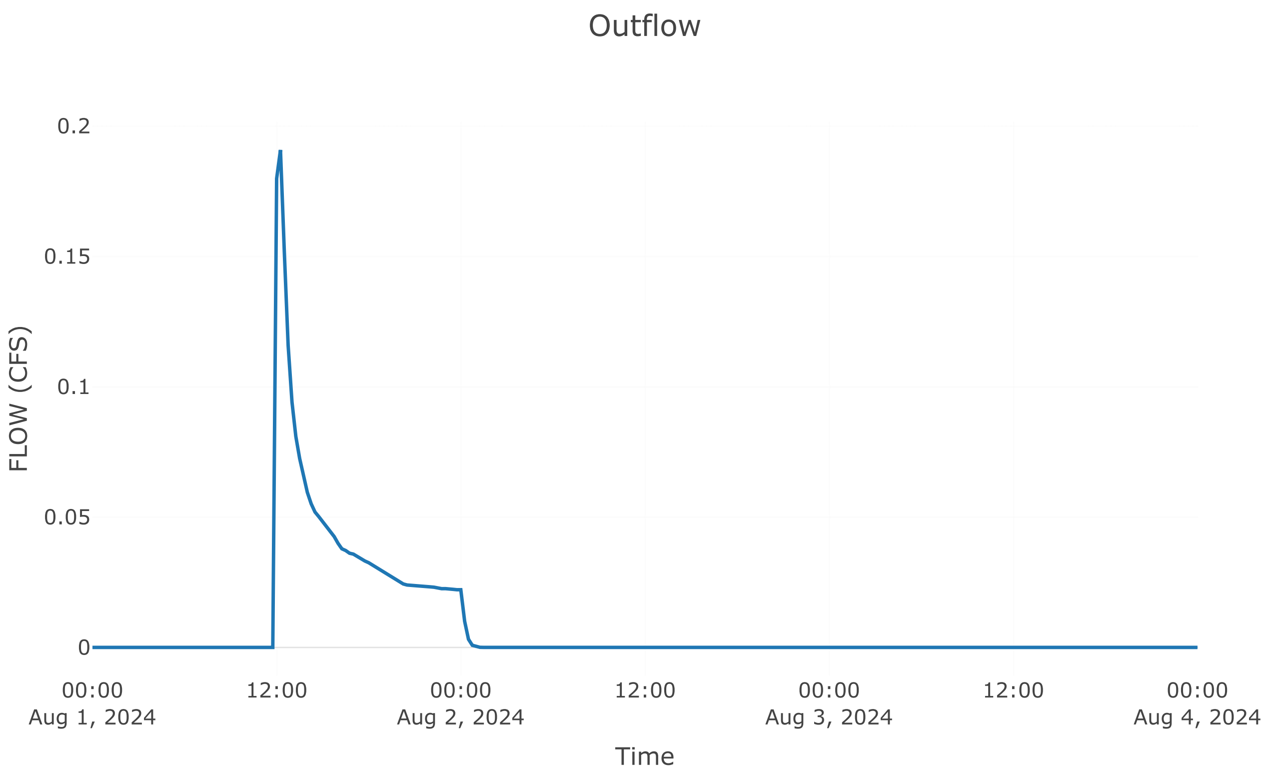


Junction: N JUNCTION 5

Downstream : N channel 1.6

Results: N JUNCTION 5

Peak Discharge (CFS)	0.19
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17



Reach: N CHANNEL 1.6

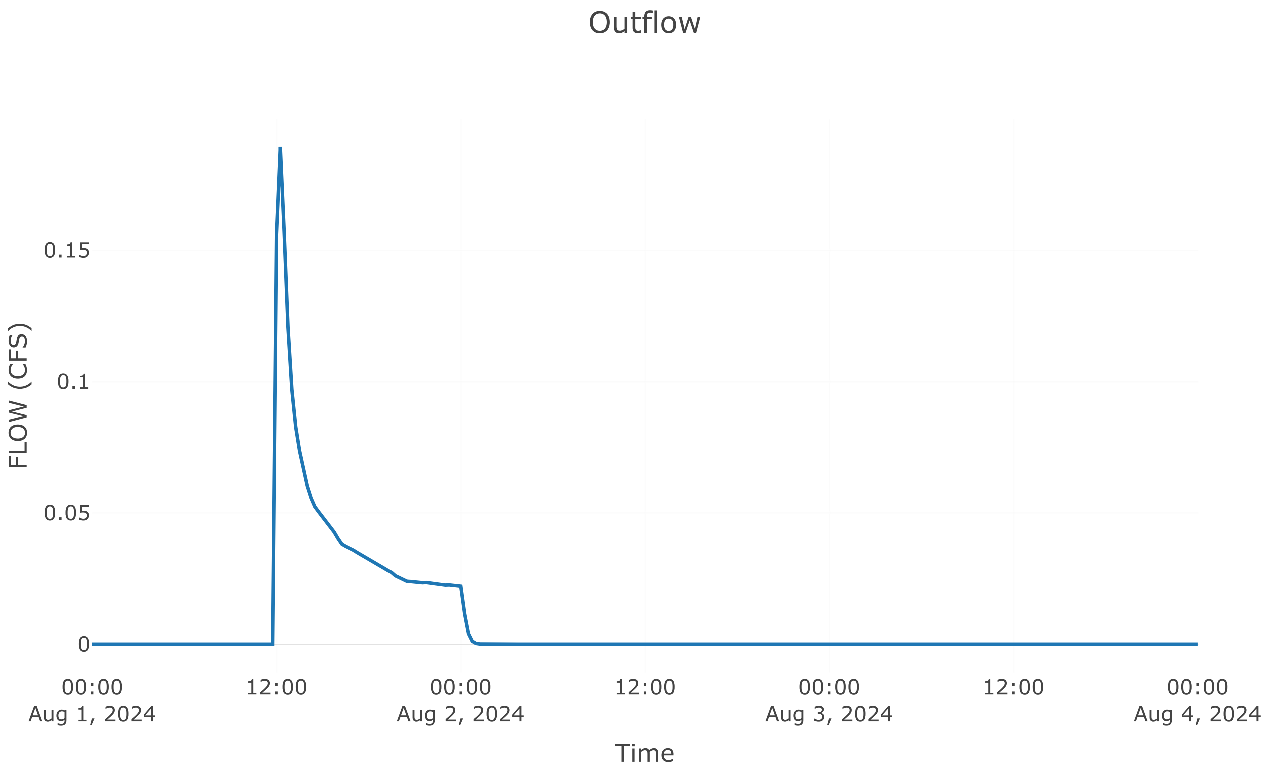
Downstream : Northwest pond

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.6

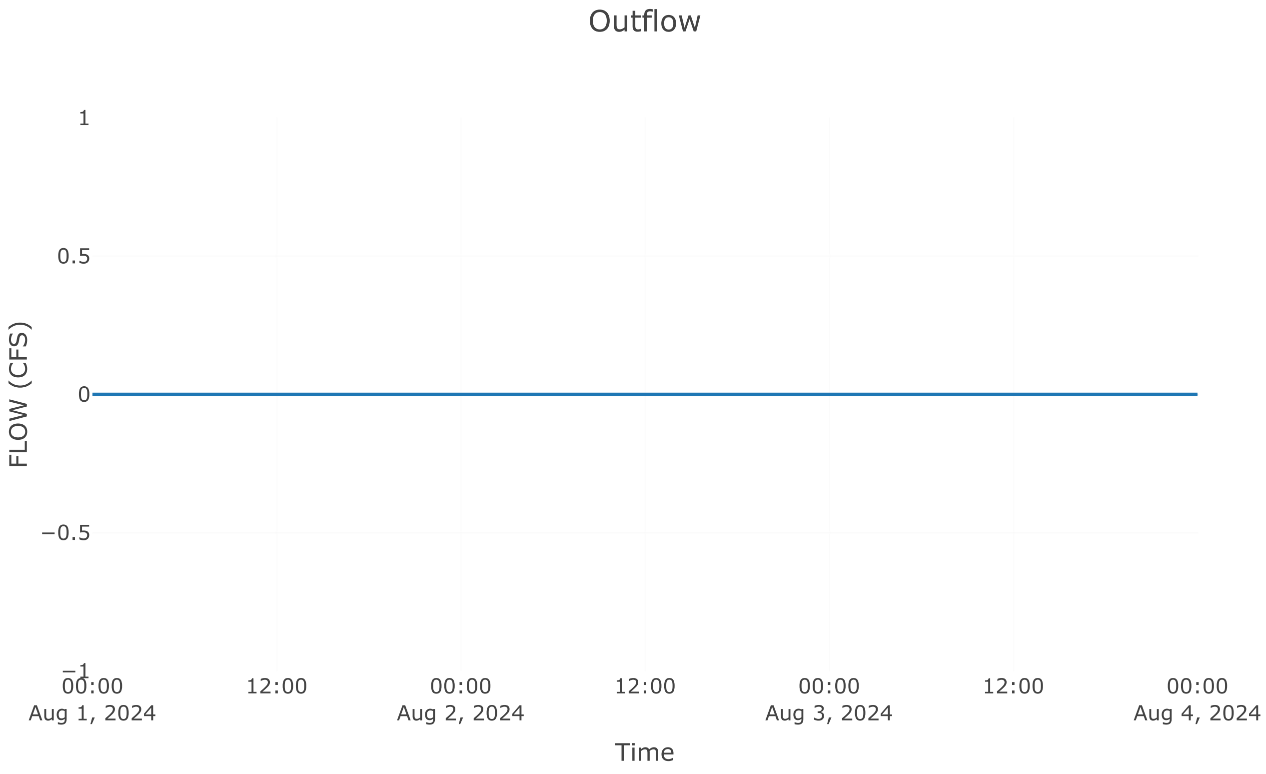
Peak Discharge (CFS)	0.19
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Peak Inflow (CFS)	0.19
Inflow Volume (AC - FT)	0.05



Reservoir: NORTHWEST POND

Results: NORTHWEST POND

Peak Discharge (CFS)	0
Time of Peak Discharge	31Jul2024, 24:00
Volume (IN)	0
Peak Inflow (CFS)	4.06
Time of Peak Inflow	01Aug2024, 12:15
Inflow Volume (AC - FT)	1.09
Maximum Storage (AC - FT)	1.09
Peak Elevation (FT)	2617.07
Discharge Volume (AC - FT)	0



Subbasin: E-1

Area (MI2) : 0.03
Downstream : East channel

Loss Rate: Scs

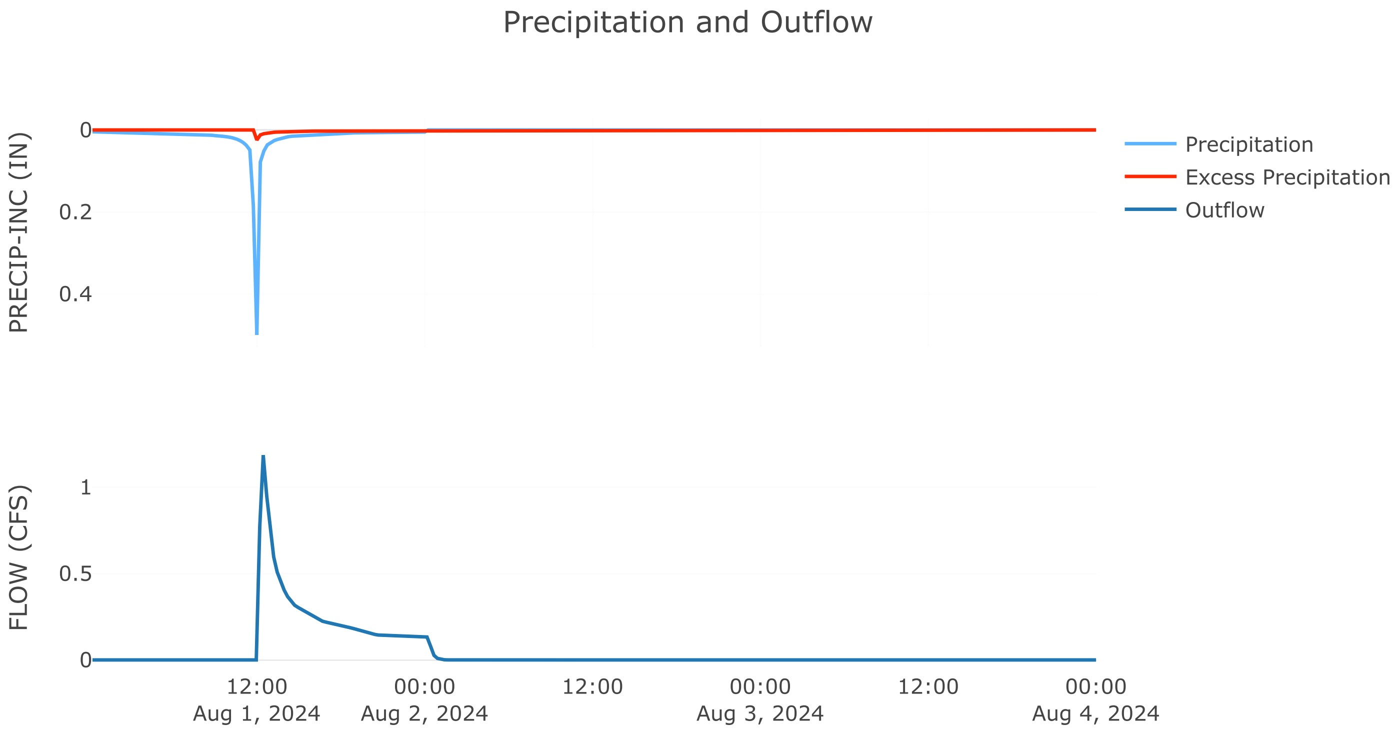
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	14.7
Unitgraph Type	Standard

Results: E-1

Peak Discharge (CFS)	1.19
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	3
Loss Volume (AC - FT)	2.71
Excess Volume (AC - FT)	0.28
Direct Runoff Volume (AC - FT)	0.28
Baseflow Volume (AC - FT)	0



Reach: EAST CHANNEL

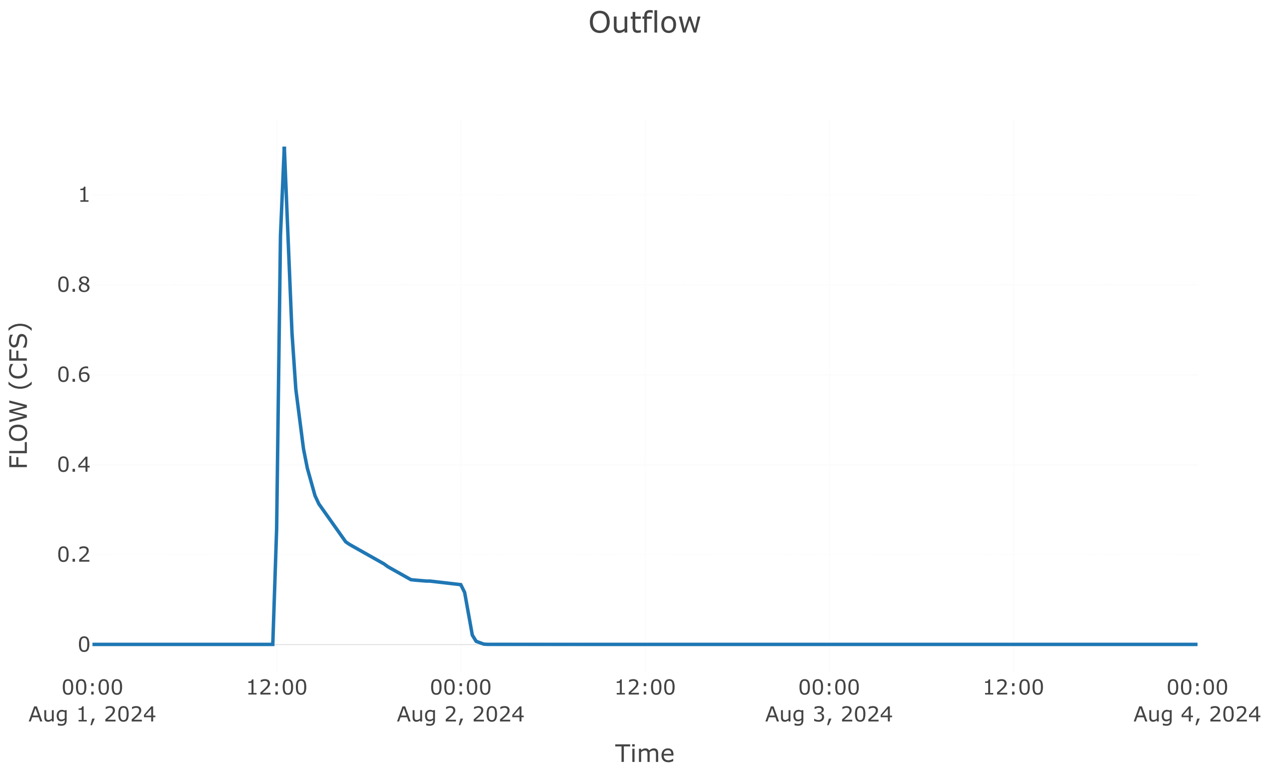
Downstream : East pond

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	10.1

Results: EAST CHANNEL

Peak Discharge (CFS)	1.11
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	1.19
Inflow Volume (AC - FT)	0.28



Subbasin: SW-1

Area (MI2) : 0.03
Downstream : Sw channel 1.1

Loss Rate: Scs

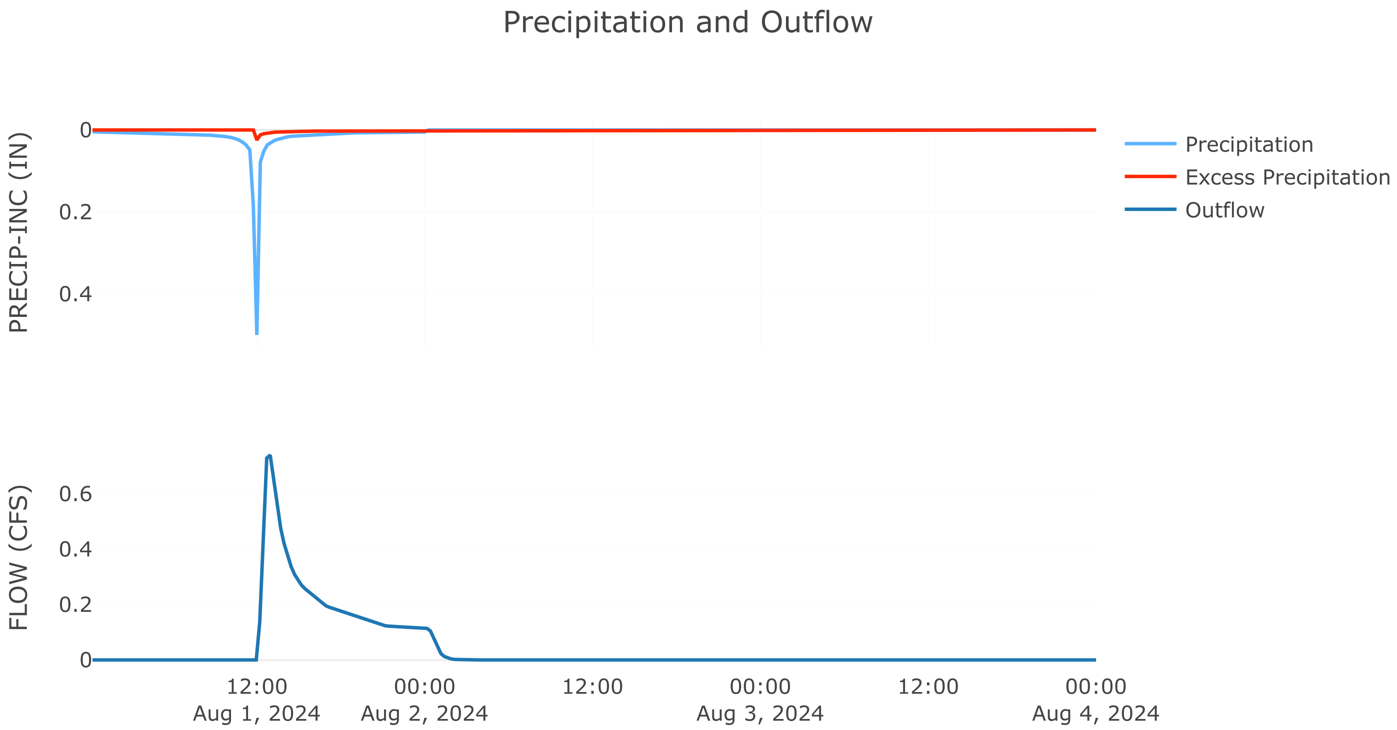
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	31.7
Unitgraph Type	Standard

Results: SW-1

Peak Discharge (CFS)	0.74
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Precipitation Volume (AC - FT)	2.55
Loss Volume (AC - FT)	2.31
Excess Volume (AC - FT)	0.24
Direct Runoff Volume (AC - FT)	0.24
Baseflow Volume (AC - FT)	0



Reach: SW CHANNEL 1.1

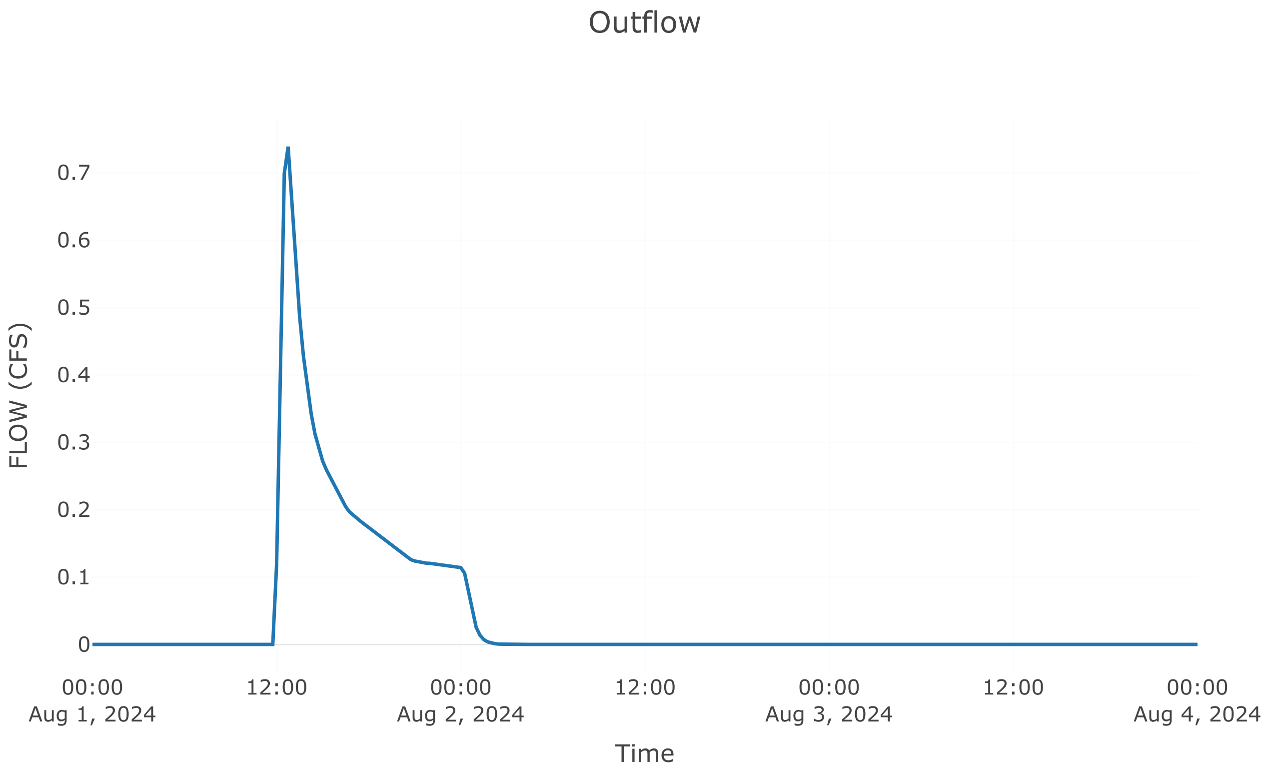
Downstream : Sw junction 1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.1

Peak Discharge (CFS)	0.74
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	0.74
Inflow Volume (AC - FT)	0.24



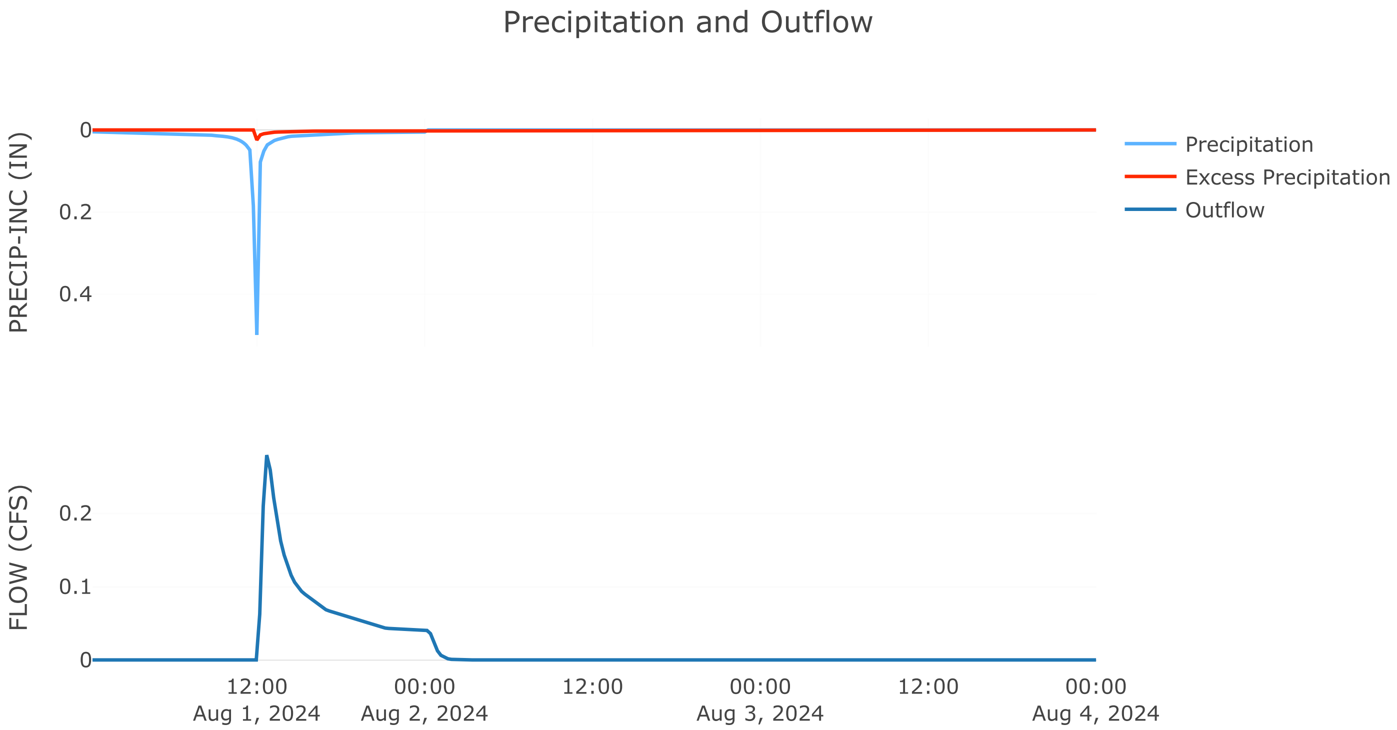
Subbasin: SW-2

Area (MI2) : 0.01
Downstream : Sw junction 1

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	70

Transform: Scs	
Lag	28.5
Unitgraph Type	Standard

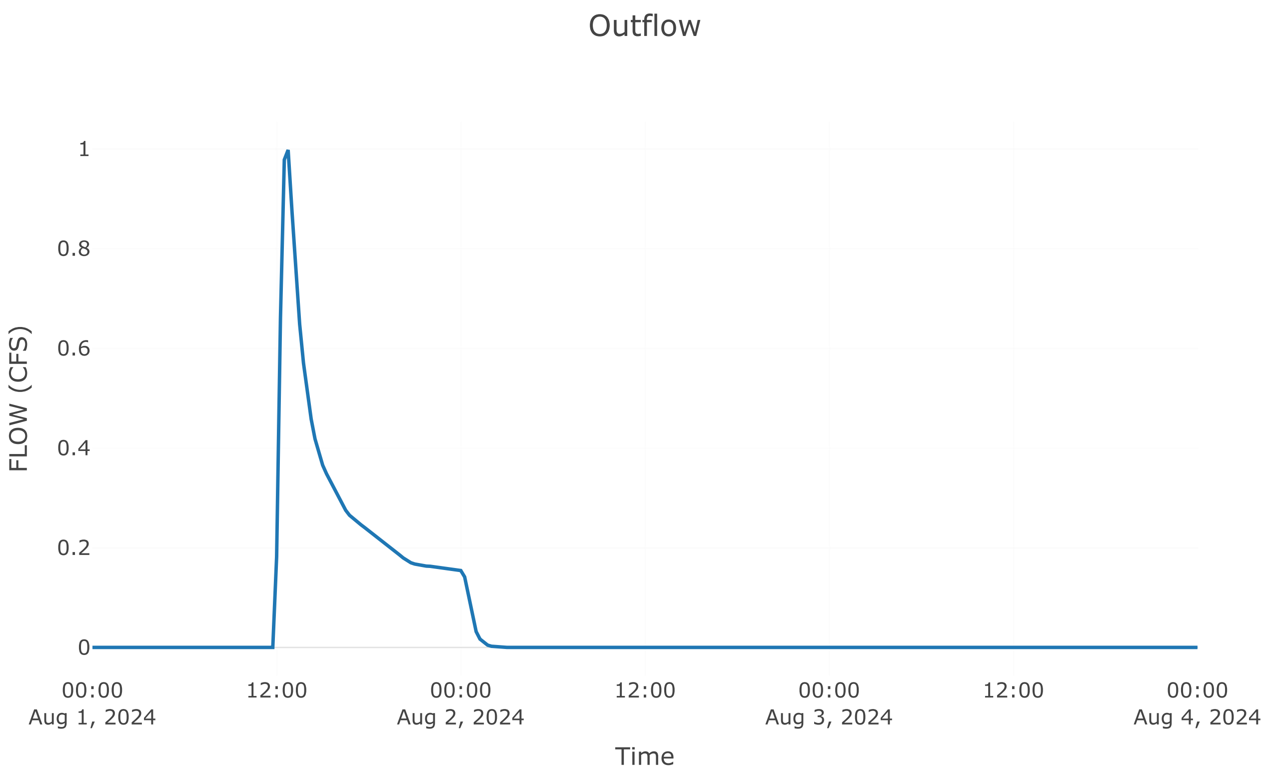
Results: SW-2	
Peak Discharge (CFS)	0.28
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.9
Loss Volume (AC - FT)	0.82
Excess Volume (AC - FT)	0.09
Direct Runoff Volume (AC - FT)	0.09
Baseflow Volume (AC - FT)	0



Junction: SW JUNCTION 1

Downstream : Sw channel 1.2

Results: SW JUNCTION 1	
Peak Discharge (CFS)	1
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17



Reach: SW CHANNEL 1.2

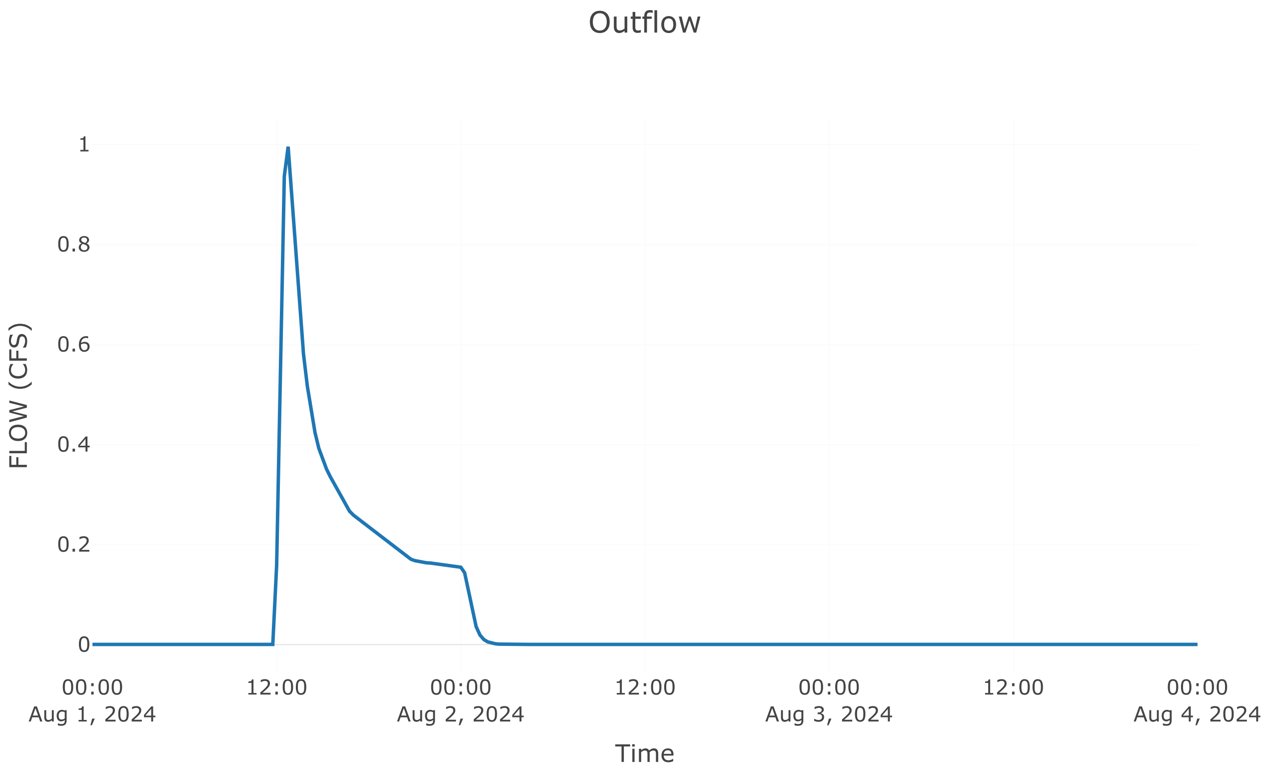
Downstream : Sw junction 2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.2

Peak Discharge (CFS)	1
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	1
Inflow Volume (AC - FT)	0.33



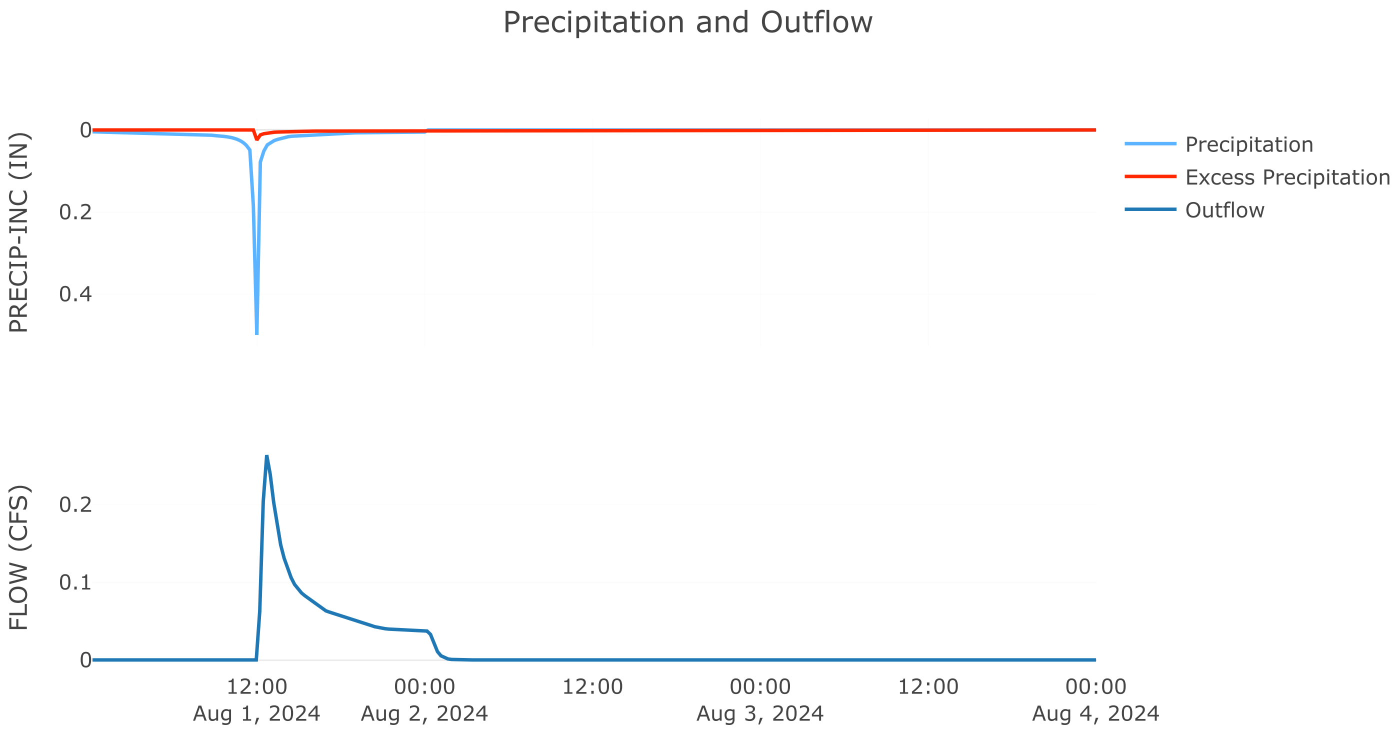
Subbasin: SW-3

Area (MI2) : 0.01
Downstream : Sw junction 2

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	70

Transform: Scs	
Lag	27.5
Unitgraph Type	Standard

Results: SW-3	
Peak Discharge (CFS)	0.26
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.84
Loss Volume (AC - FT)	0.76
Excess Volume (AC - FT)	0.08
Direct Runoff Volume (AC - FT)	0.08
Baseflow Volume (AC - FT)	0

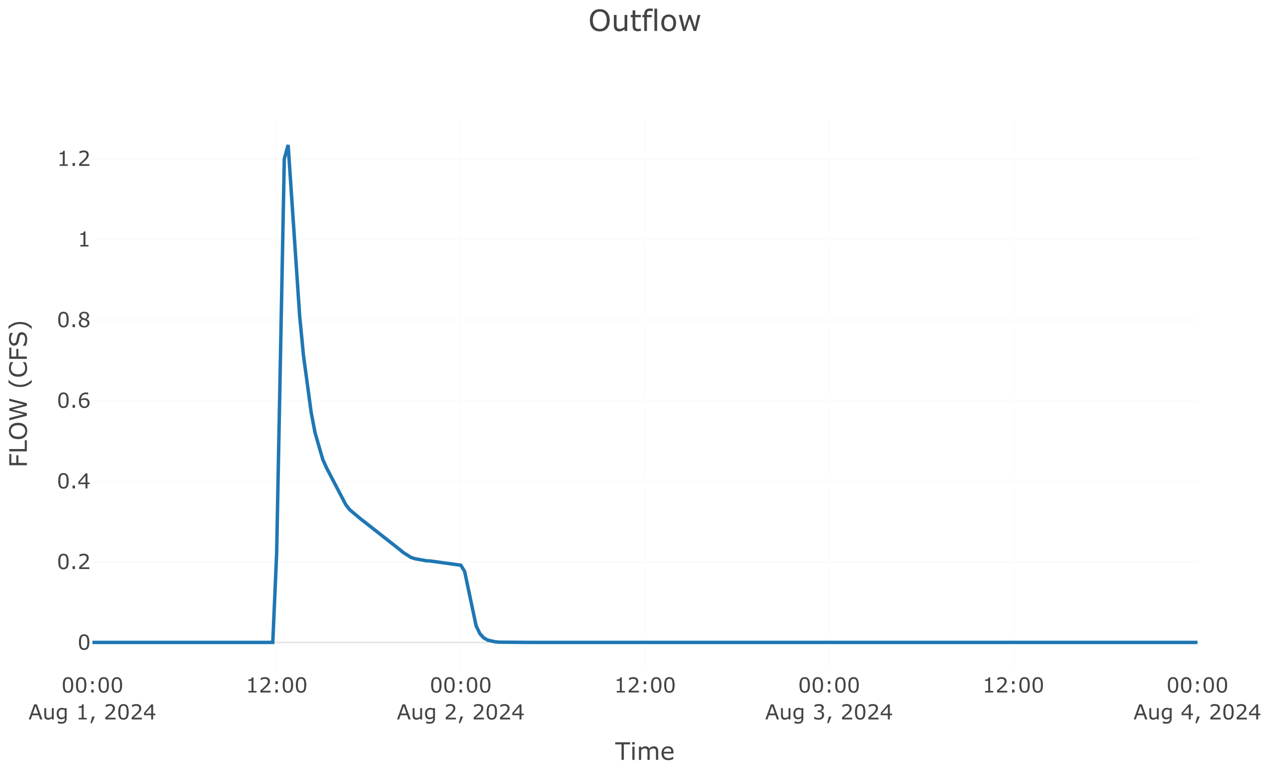


Junction: SW JUNCTION 2

Downstream : Sw channel 1.3

Results: SW JUNCTION 2

Peak Discharge (CFS)	1.23
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17



Reach: SW CHANNEL 1.3

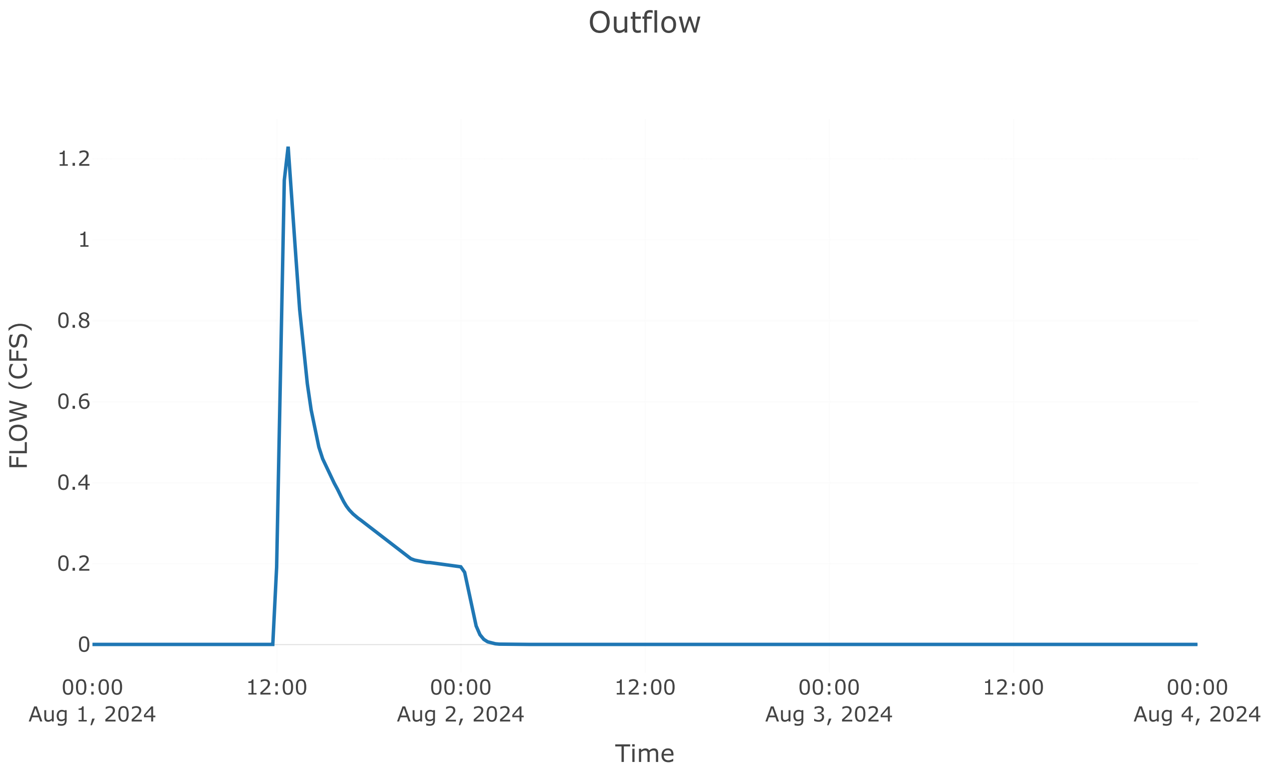
Downstream : Sw junction 3

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.3

Peak Discharge (CFS)	1.23
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	1.23
Inflow Volume (AC - FT)	0.41



Subbasin: SW-4

Area (MI2) : 0.01
Downstream : Sw junction 3

Loss Rate: Scs

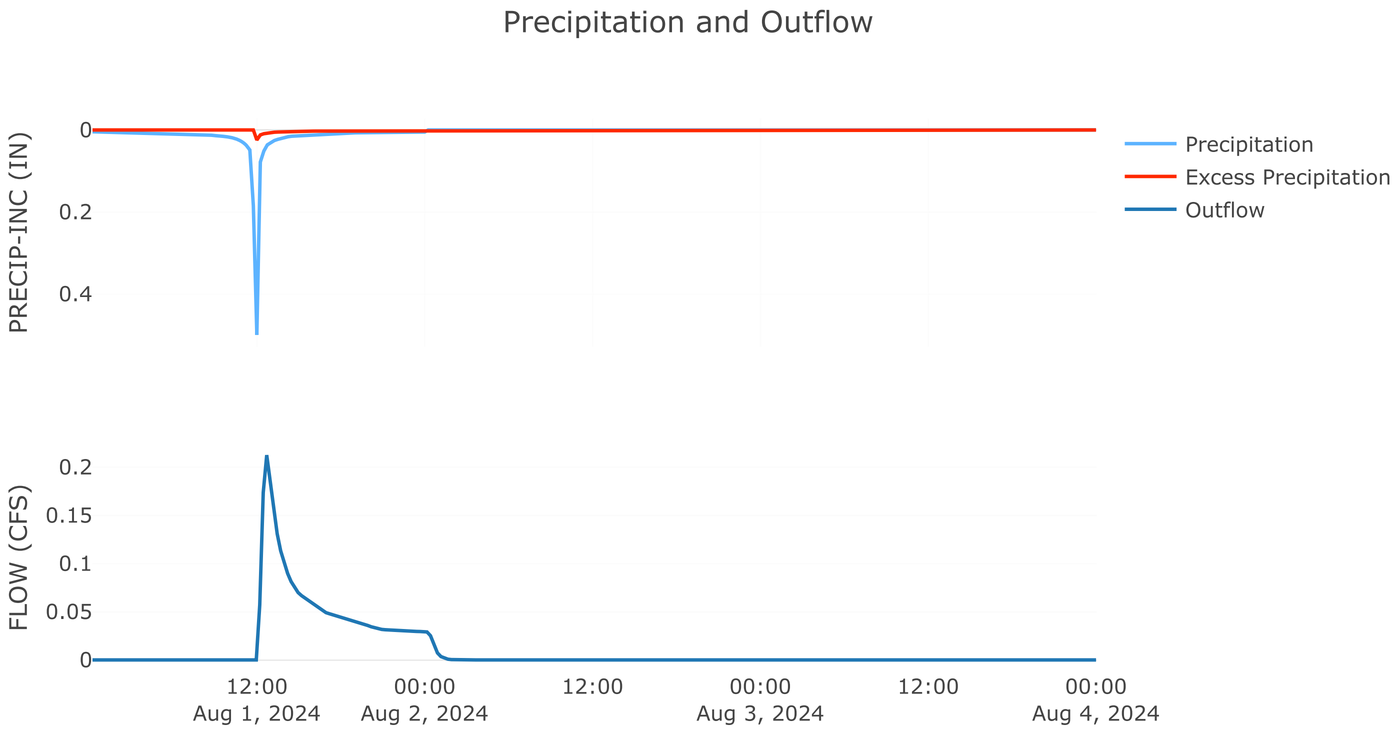
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	25.6
Unitgraph Type	Standard

Results: SW-4

Peak Discharge (CFS)	0.21
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.65
Loss Volume (AC - FT)	0.59
Excess Volume (AC - FT)	0.06
Direct Runoff Volume (AC - FT)	0.06
Baseflow Volume (AC - FT)	0

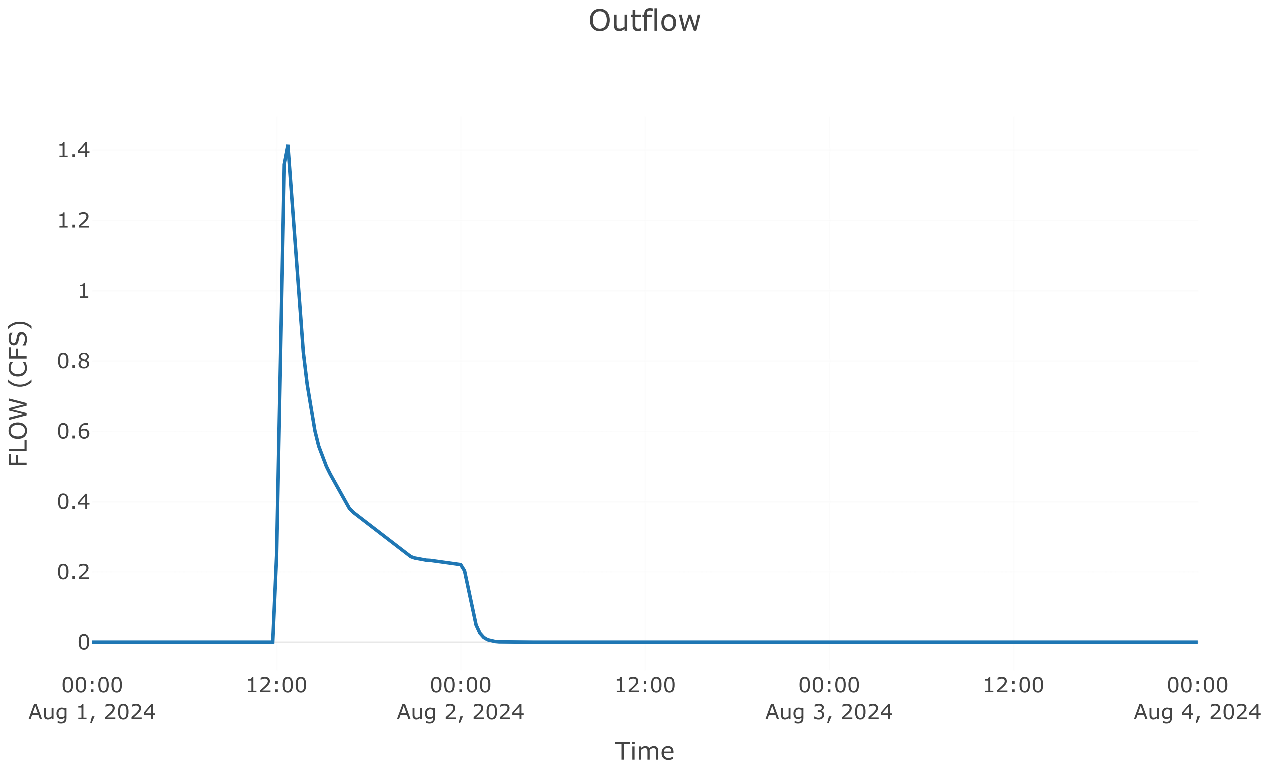


Junction: SW JUNCTION 3

Downstream : Sw channel 1.4

Results: SW JUNCTION 3

Peak Discharge (CFS)	1.41
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17



Reach: SW CHANNEL 1.4

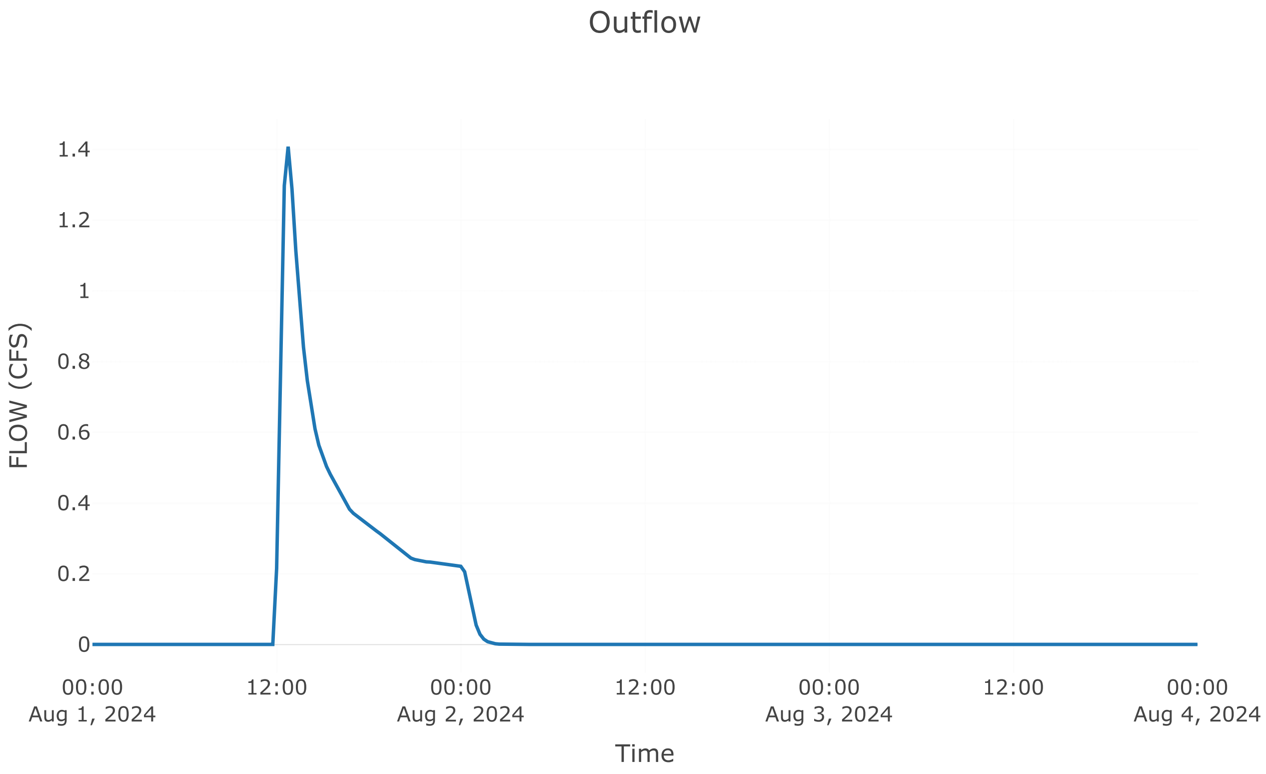
Downstream : Sw junction 4

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.4

Peak Discharge (CFS)	1.41
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	1.41
Inflow Volume (AC - FT)	0.47



Subbasin: SW-5

Area (MI2) : 0.01
Downstream : Sw junction 4

Loss Rate: Scs

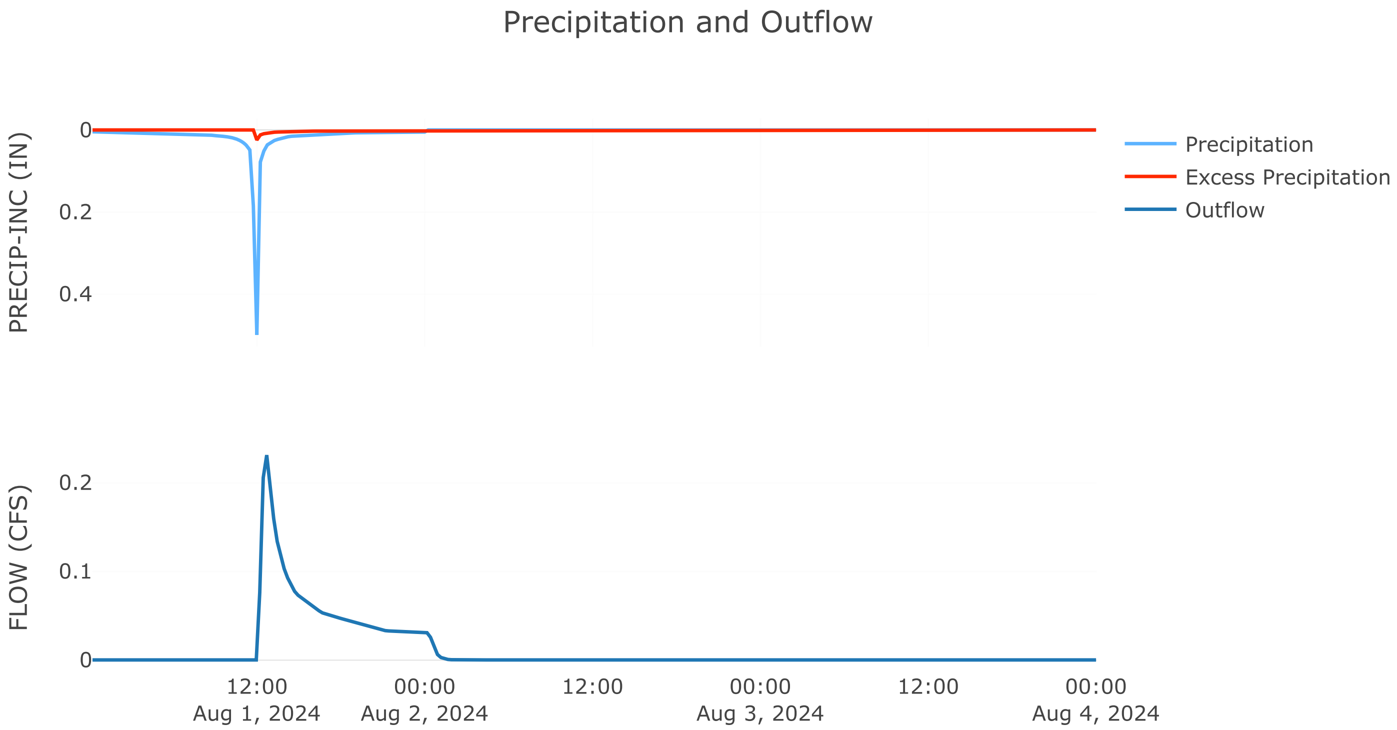
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	23.1
Unitgraph Type	Standard

Results: SW-5

Peak Discharge (CFS)	0.23
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.69
Loss Volume (AC - FT)	0.63
Excess Volume (AC - FT)	0.07
Direct Runoff Volume (AC - FT)	0.07
Baseflow Volume (AC - FT)	0

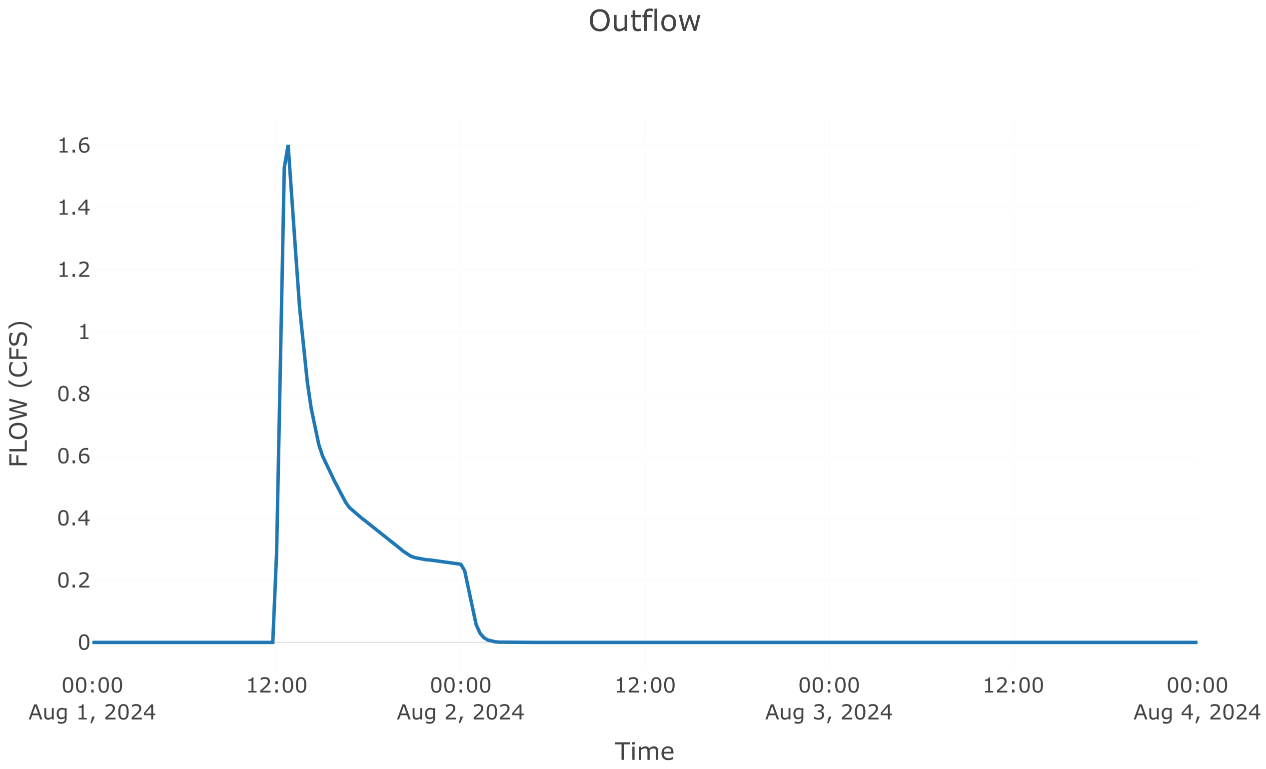


Junction: SW JUNCTION 4

Downstream : Sw channel 1.5

Results: SW JUNCTION 4

Peak Discharge (CFS)	1.6
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17



Reach: SW CHANNEL 1.5

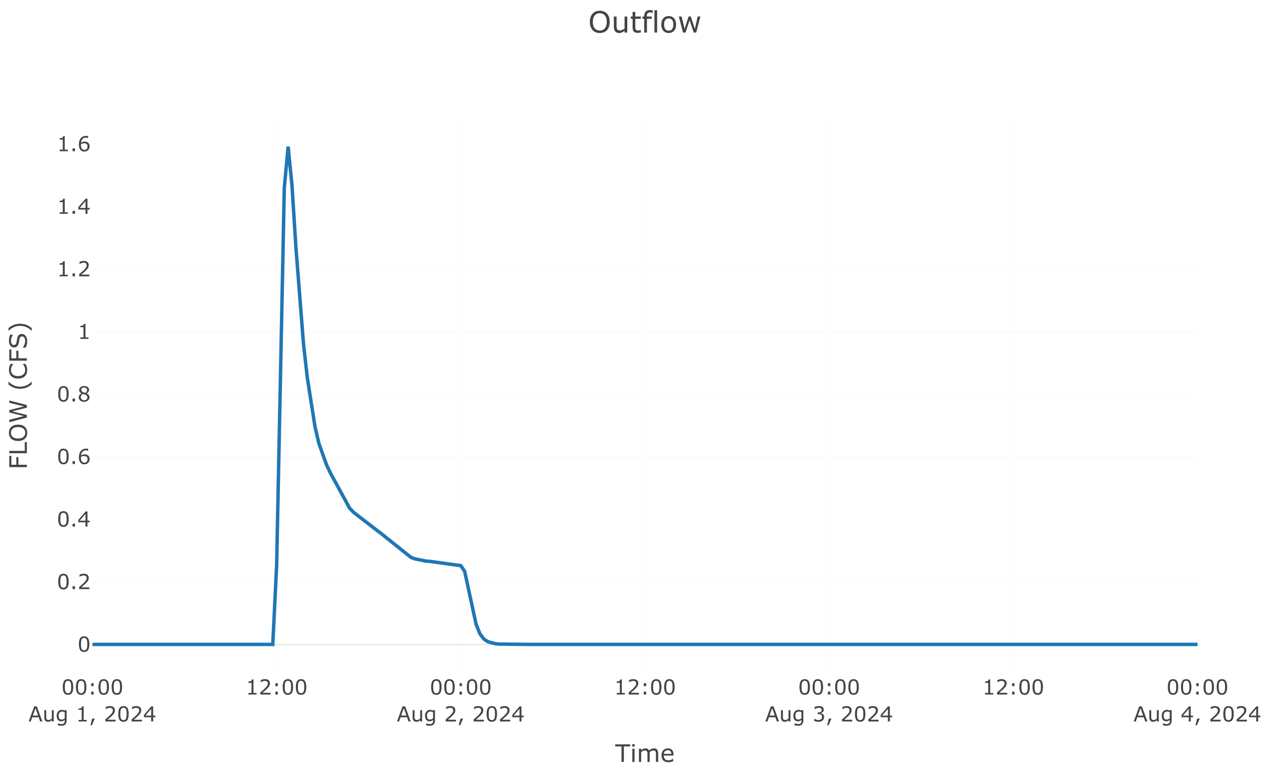
Downstream : Sw junction 5

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.5

Peak Discharge (CFS)	1.59
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	1.6
Inflow Volume (AC - FT)	0.53



Subbasin: SW-6

Area (MI2) : 0.04
Downstream : Sw junction 5

Loss Rate: Scs

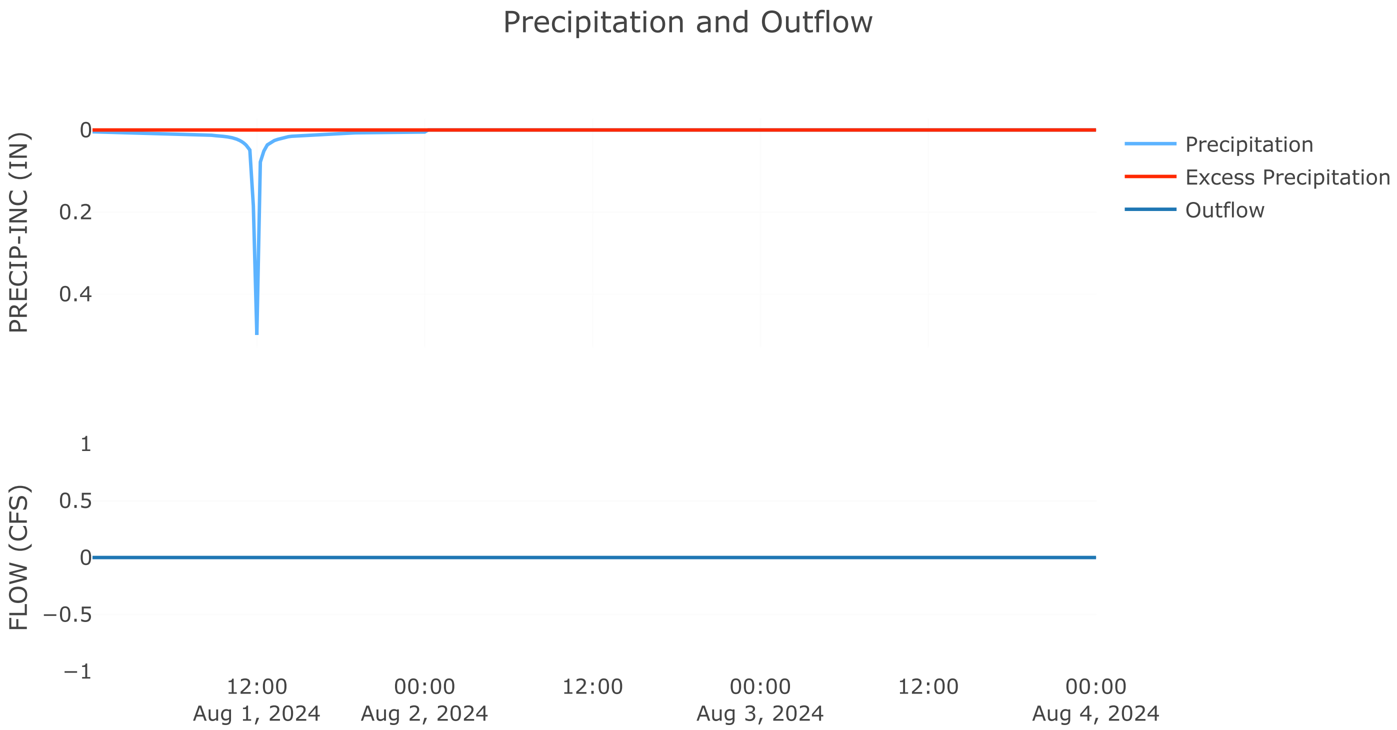
Percent Impervious Area	0
Curve Number	51

Transform: Scs

Lag	7.4
Unitgraph Type	Standard

Results: SW-6

Peak Discharge (CFS)	0
Time of Peak Discharge	31Jul2024, 24:00
Volume (IN)	0
Precipitation Volume (AC - FT)	4.29
Loss Volume (AC - FT)	4.29
Excess Volume (AC - FT)	0
Direct Runoff Volume (AC - FT)	0
Baseflow Volume (AC - FT)	0

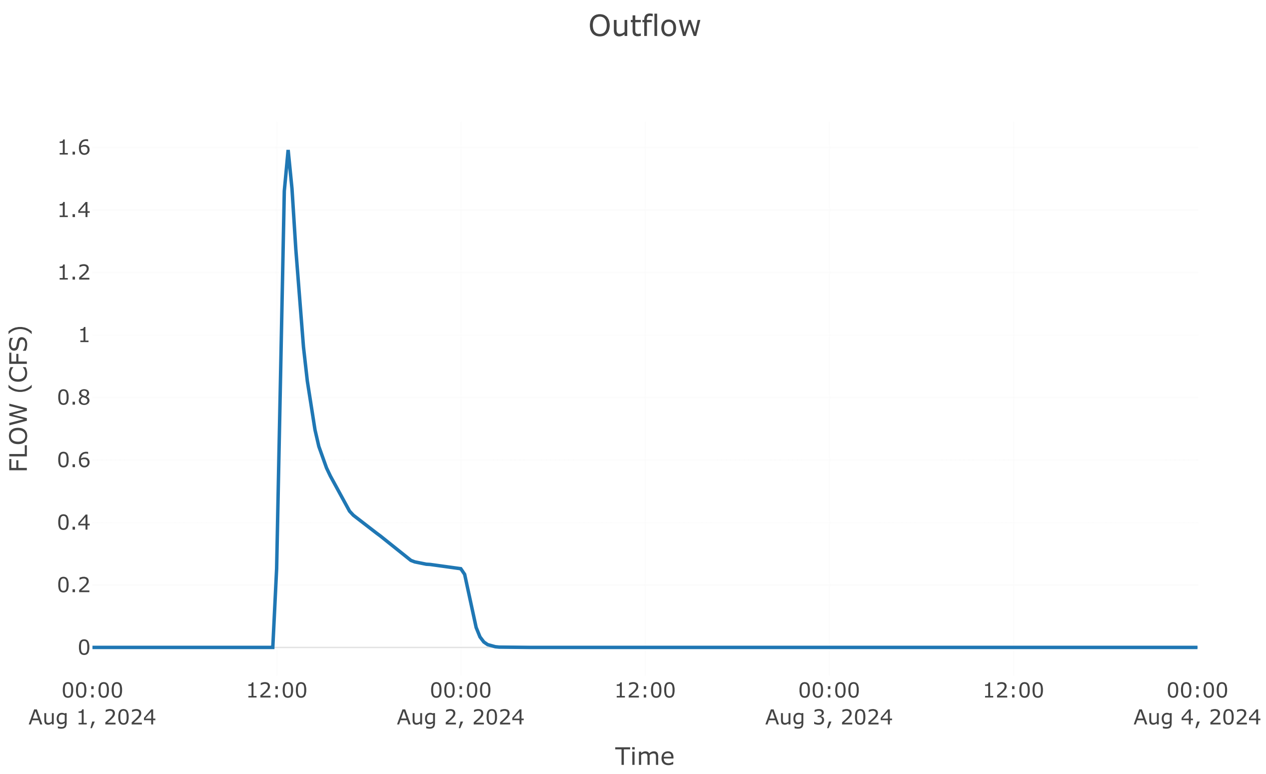


Junction: SW JUNCTION 5

Downstream : Sw channel 1.6

Results: SW JUNCTION 5

Peak Discharge (CFS)	1.59
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.1



Reach: SW CHANNEL 1.6

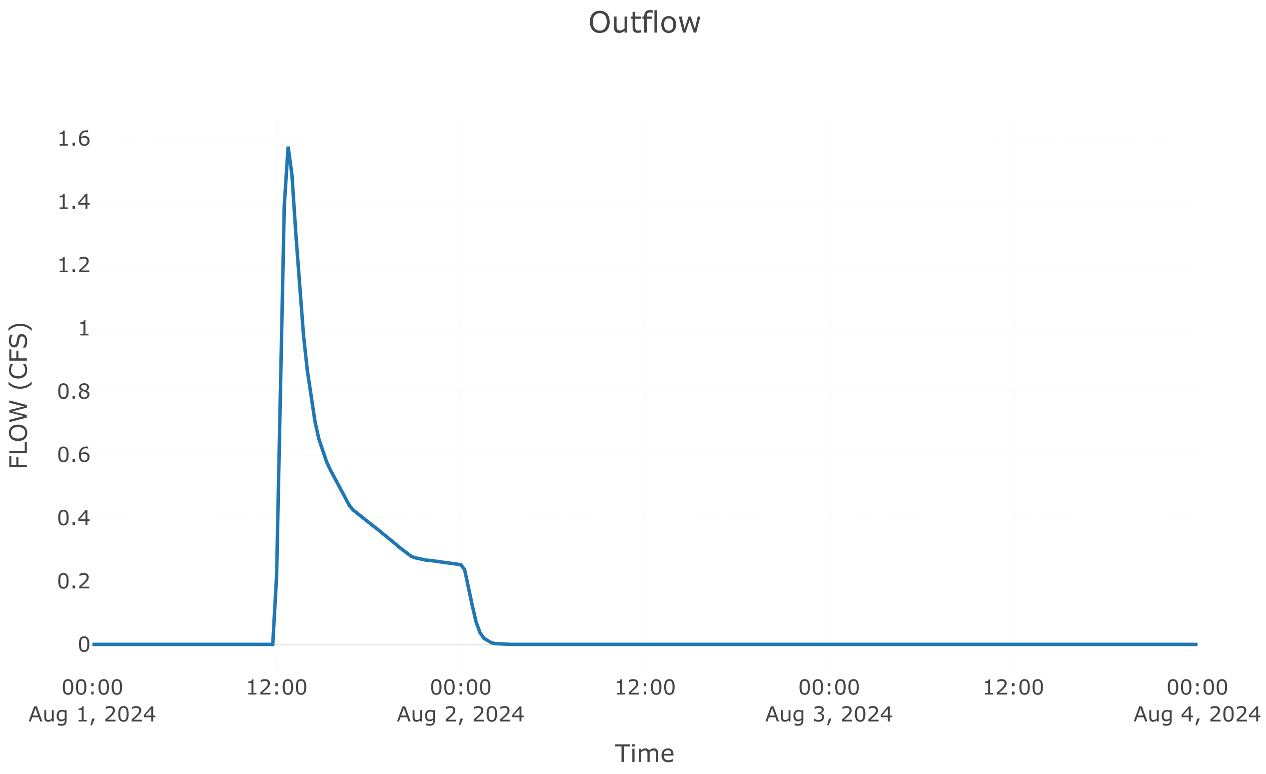
Downstream : West channel 1 sink

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: SW CHANNEL 1.6

Peak Discharge (CFS)	1.57
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.1
Peak Inflow (CFS)	1.59
Inflow Volume (AC - FT)	0.53



Subbasin: SE-1

Area (MI2) : 0.11
Downstream : Se pond

Loss Rate: Scs

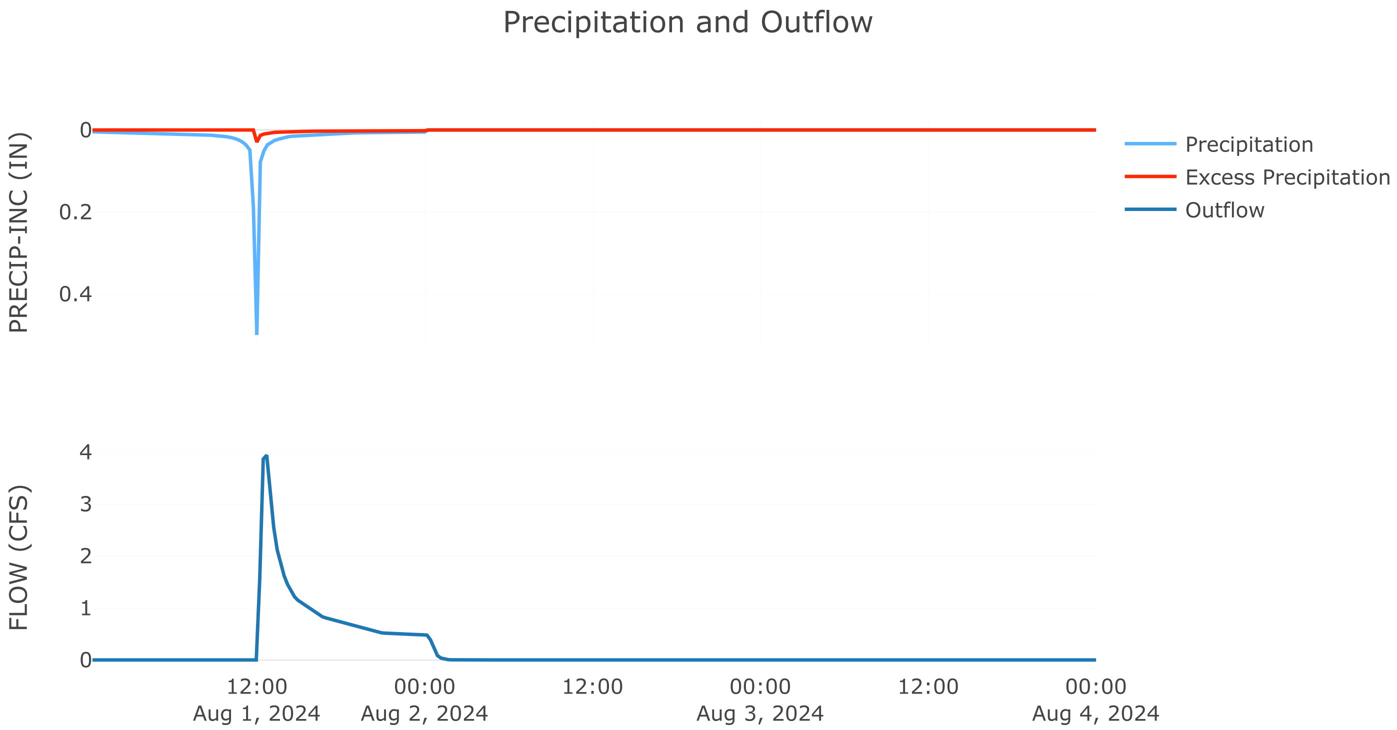
Percent Impervious Area	0
Curve Number	70.7

Transform: Scs

Lag	21.7
Unitgraph Type	Standard

Results: SE-1

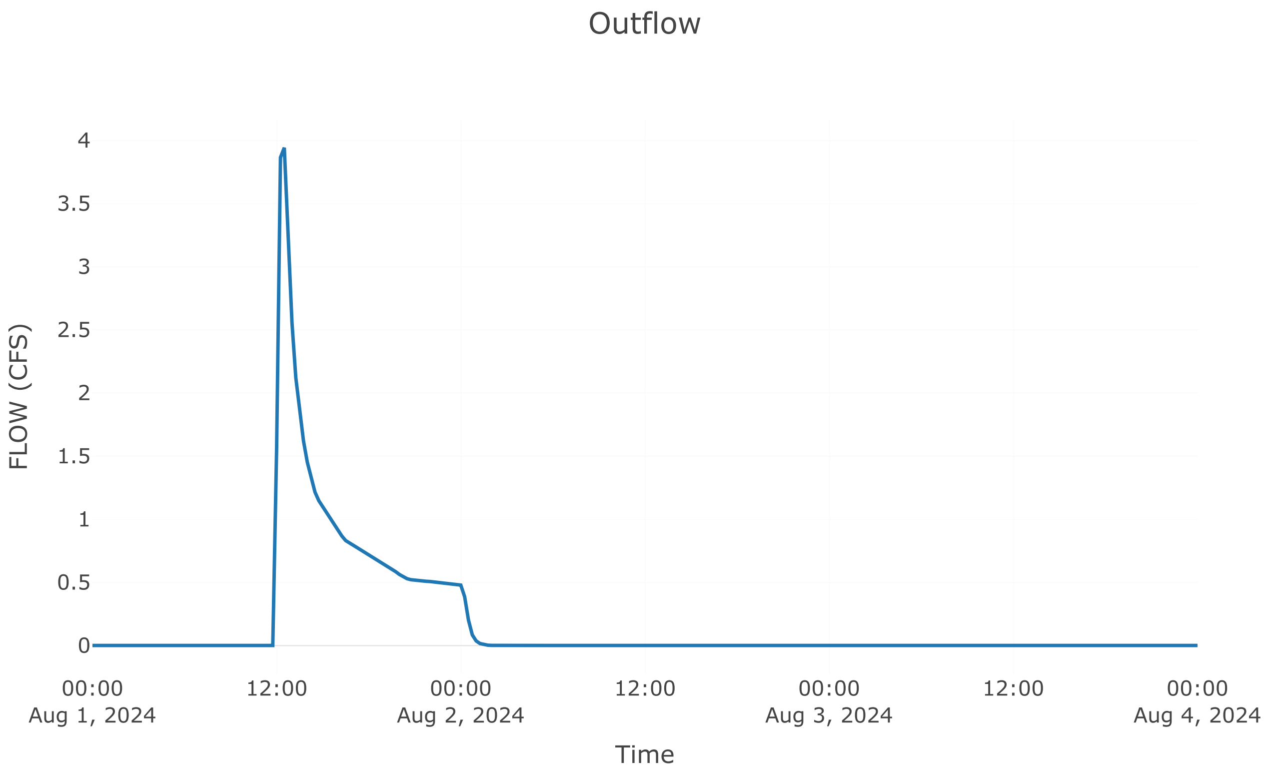
Peak Discharge (CFS)	3.94
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.18
Precipitation Volume (AC - FT)	10.28
Loss Volume (AC - FT)	9.23
Excess Volume (AC - FT)	1.05
Direct Runoff Volume (AC - FT)	1.05
Baseflow Volume (AC - FT)	0



Reservoir: SE POND

Results: SE POND

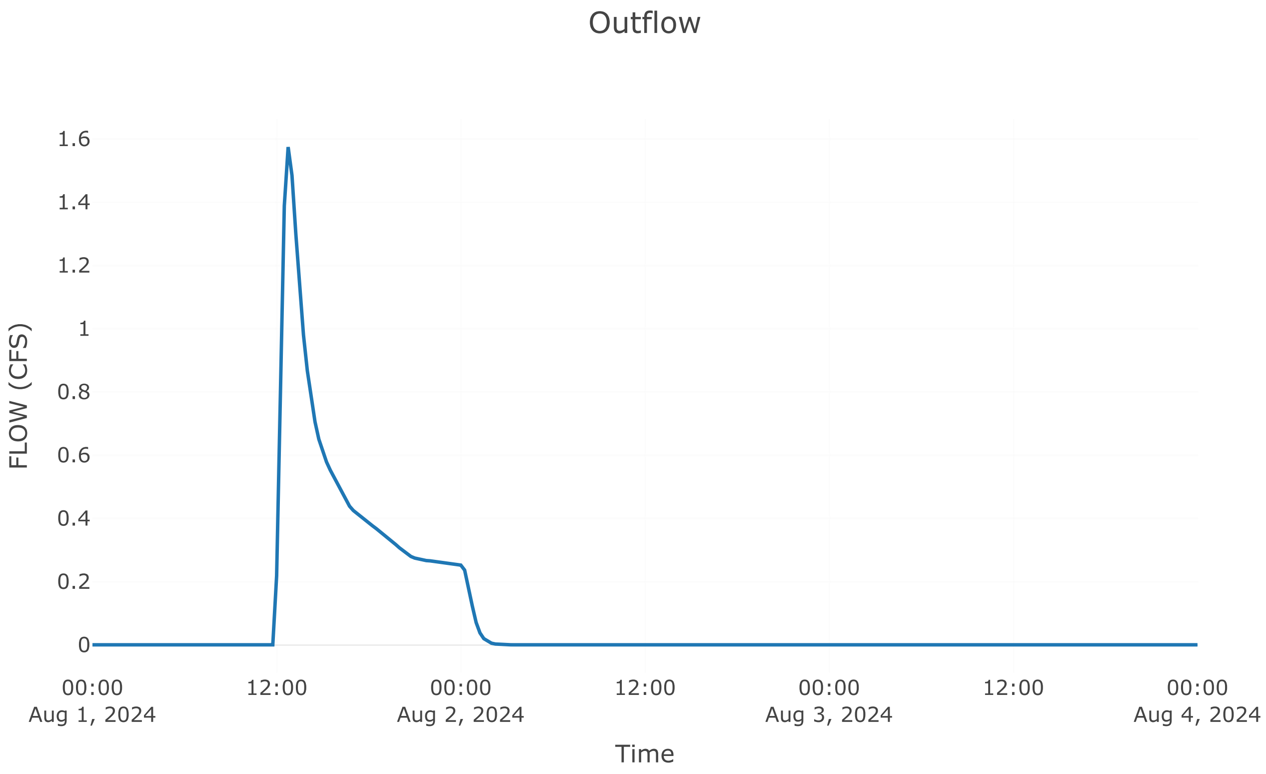
Peak Discharge (CFS)	3.94
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.18
Peak Inflow (CFS)	3.94
Time of Peak Inflow	01Aug2024, 12:30
Inflow Volume (AC - FT)	1.05
Discharge Volume (AC - FT)	1.05



Sink: WEST CHANNEL 1 SINK

Results: WEST CHANNEL 1 SINK

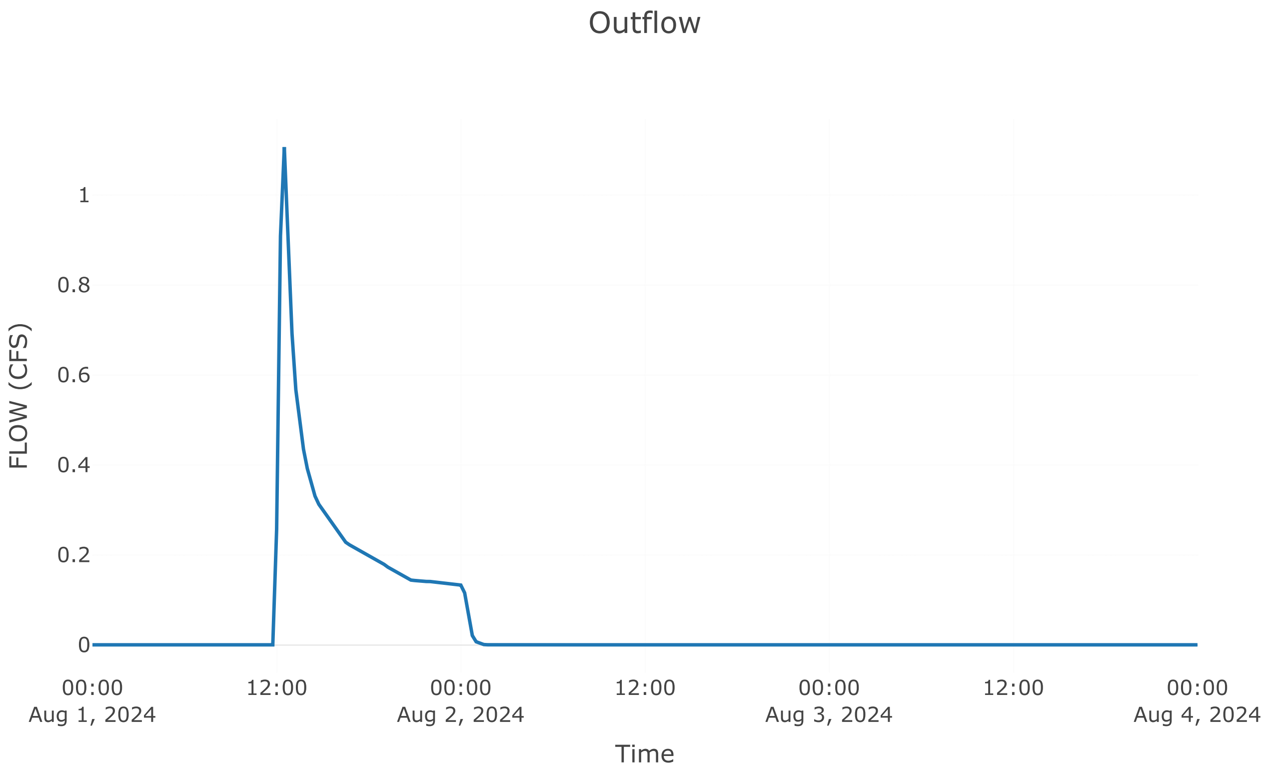
Peak Discharge (CFS)	1.57
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.1



Sink: EAST POND

Results: EAST POND

Peak Discharge (CFS)	1.11
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Subbasin: N-1

Area (MI2) : 0.01
Downstream : Downchute 6

Loss Rate: Scs

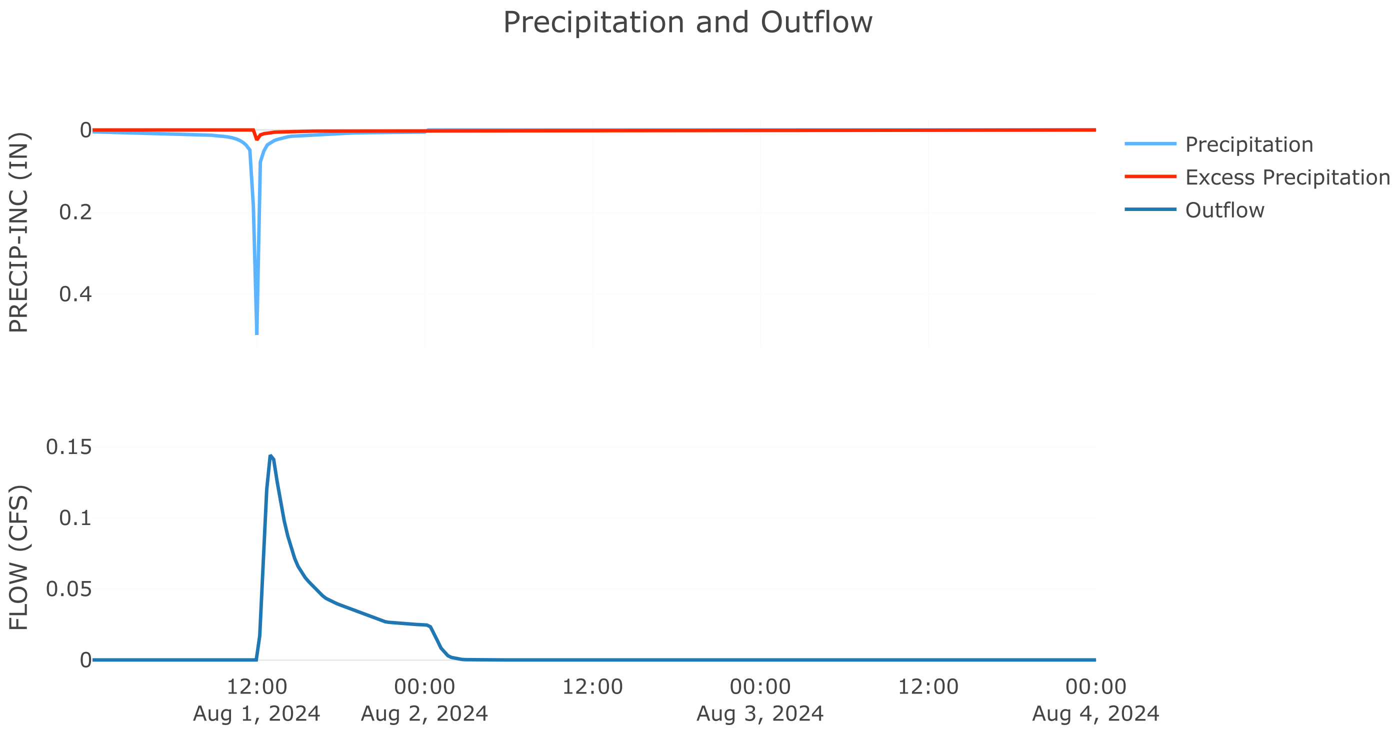
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	40.5
Unitgraph Type	Standard

Results: N-1

Peak Discharge (CFS)	0.14
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.55
Loss Volume (AC - FT)	0.5
Excess Volume (AC - FT)	0.05
Direct Runoff Volume (AC - FT)	0.05
Baseflow Volume (AC - FT)	0



Subbasin: N-2

Area (MI2) : 0
Downstream : Downchute 6

Loss Rate: Scs

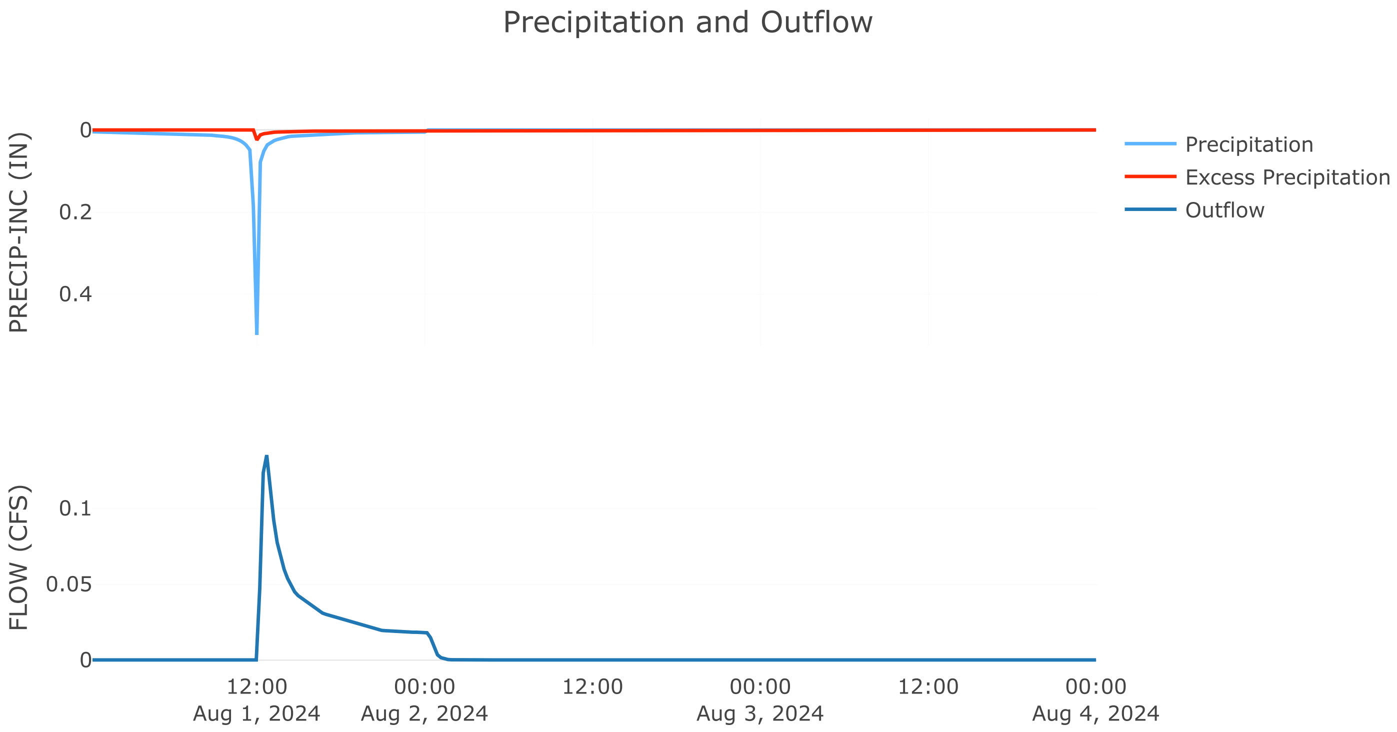
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	22.5
Unitgraph Type	Standard

Results: N-2

Peak Discharge (CFS)	0.13
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.4
Loss Volume (AC - FT)	0.37
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0



Reach: DOWNCHUTE 6

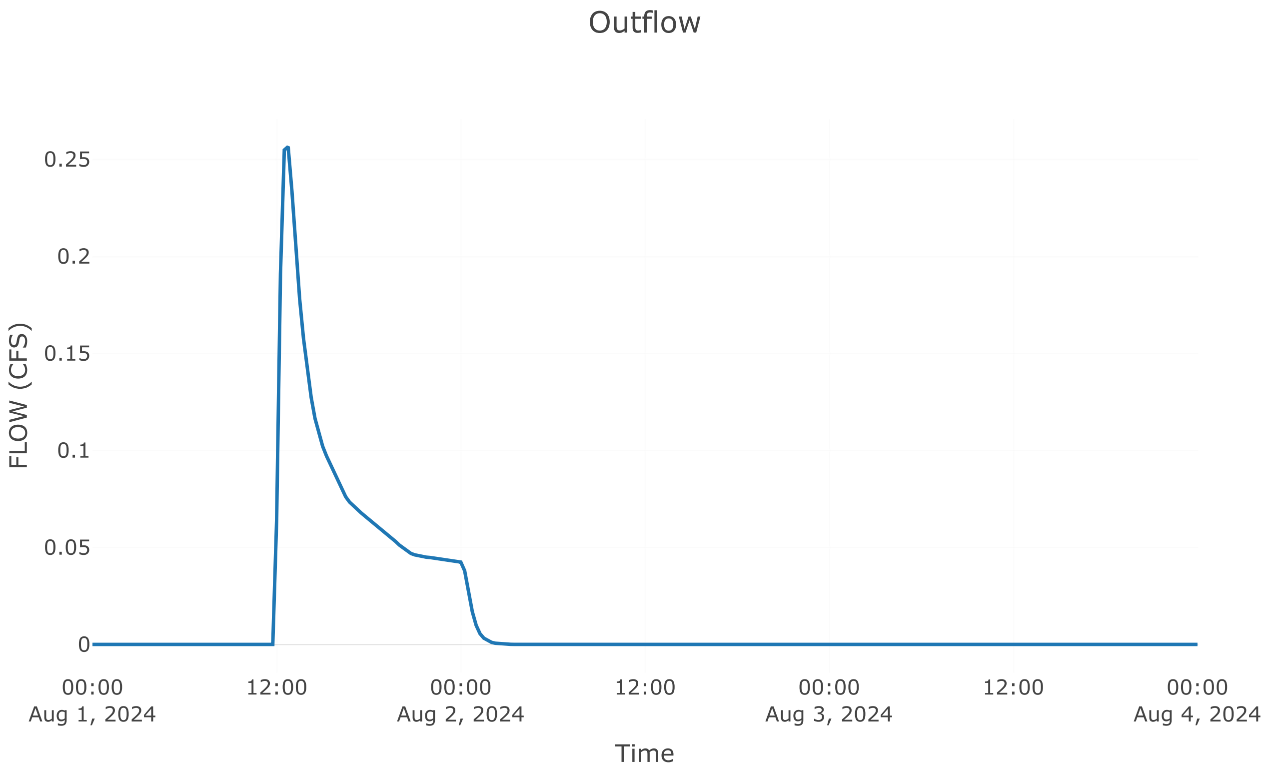
Downstream : N channel start

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 6

Peak Discharge (CFS)	0.26
Time of Peak Discharge	01Aug2024, 12:45
Volume (IN)	0.17
Peak Inflow (CFS)	0.26
Inflow Volume (AC - FT)	0.09



Subbasin: N-9

Area (MI2) : 0.01
Downstream : N channel start

Loss Rate: Scs

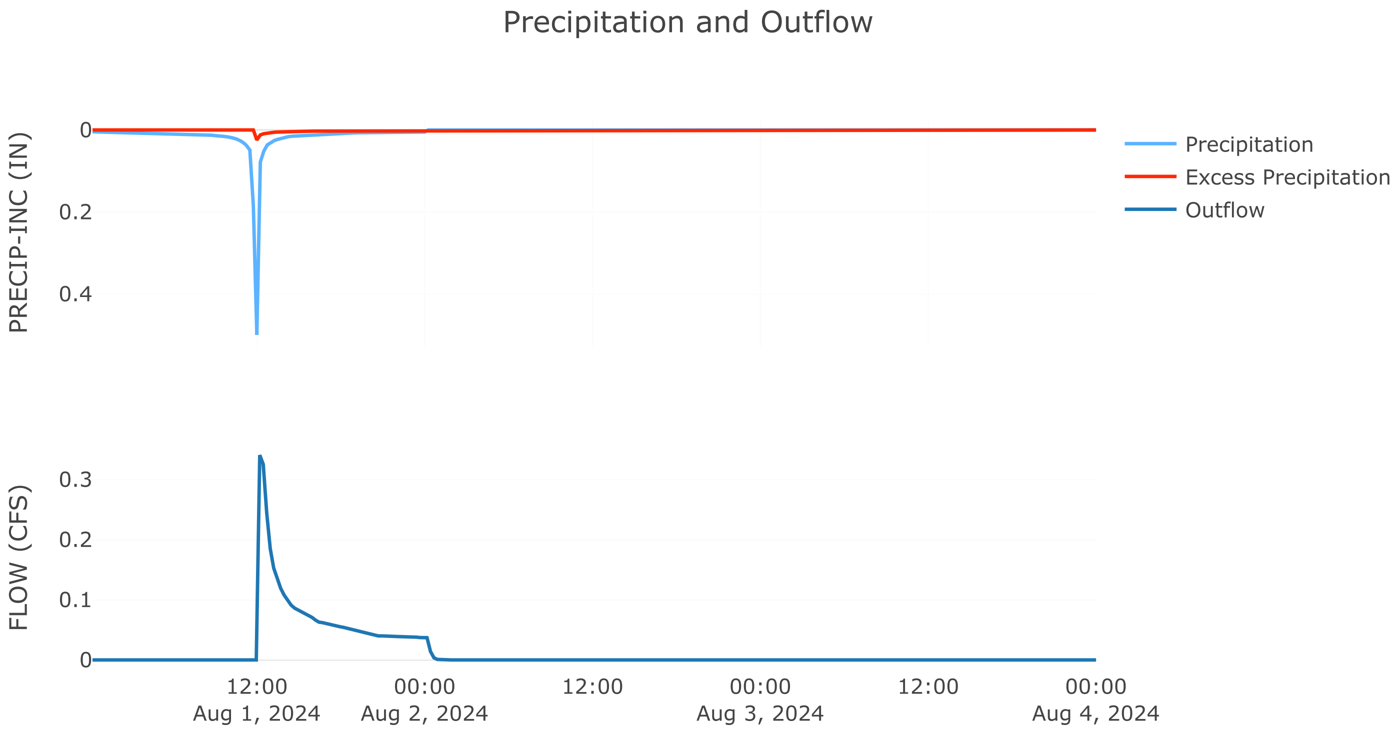
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	10
Unitgraph Type	Standard

Results: N-9

Peak Discharge (CFS)	0.34
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.84
Loss Volume (AC - FT)	0.76
Excess Volume (AC - FT)	0.08
Direct Runoff Volume (AC - FT)	0.08
Baseflow Volume (AC - FT)	0



Subbasin: N-3

Area (MI2) : 0.01
Downstream : N channel start

Loss Rate: Scs

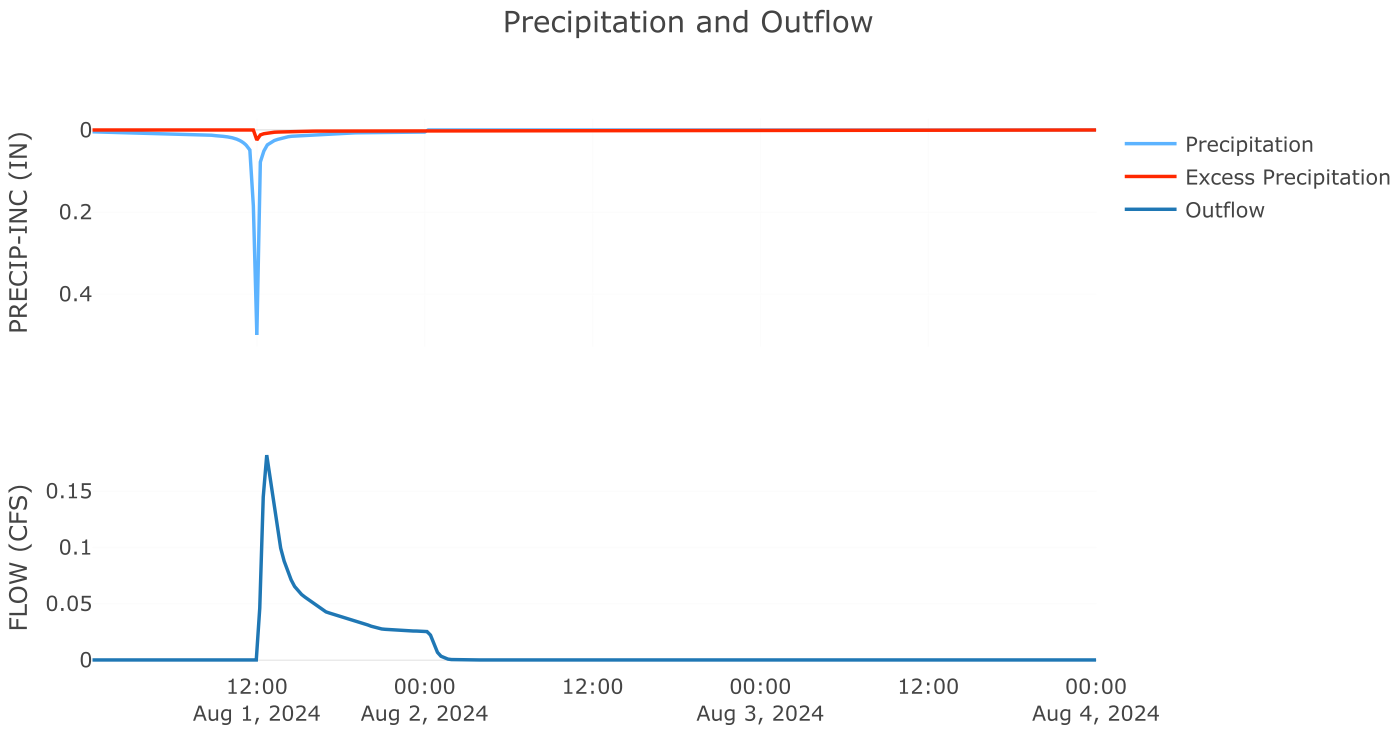
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	26.5
Unitgraph Type	Standard

Results: N-3

Peak Discharge (CFS)	0.18
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.57
Loss Volume (AC - FT)	0.51
Excess Volume (AC - FT)	0.05
Direct Runoff Volume (AC - FT)	0.05
Baseflow Volume (AC - FT)	0

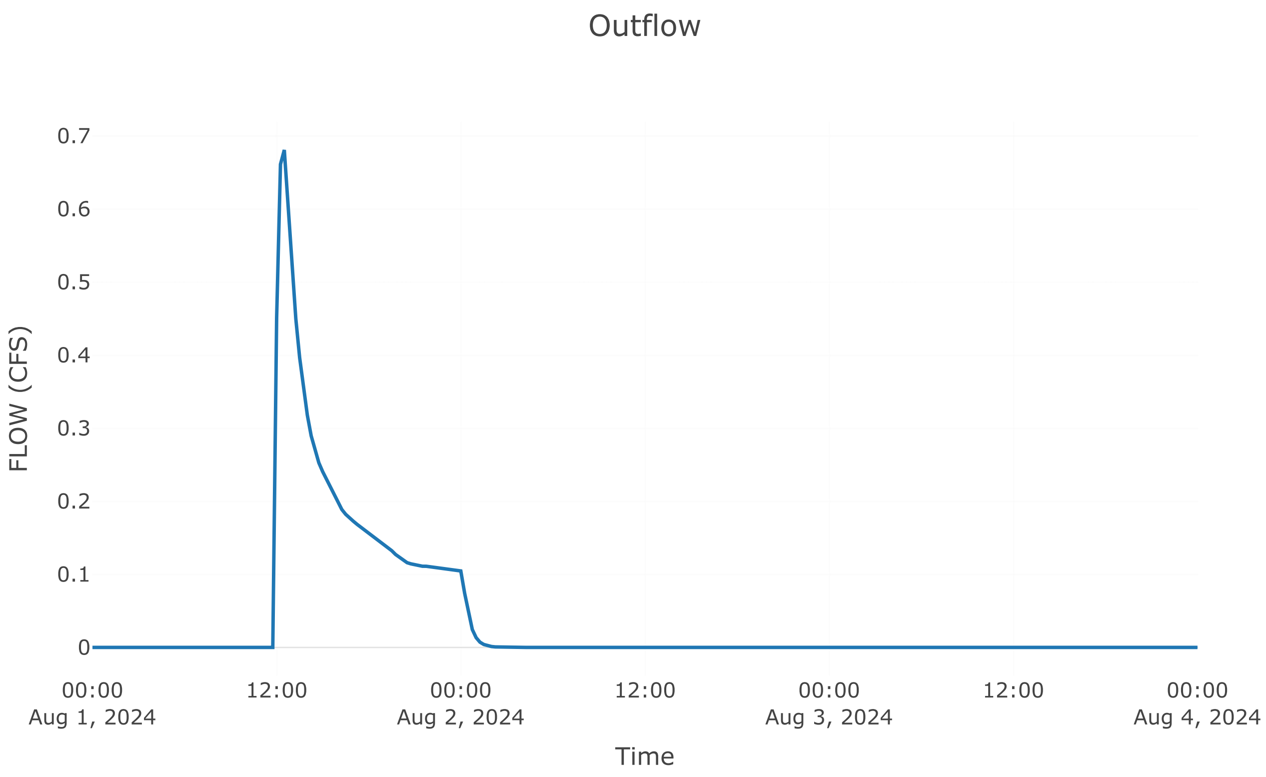


Junction: N CHANNEL START

Downstream : N channel 1.1

Results: N CHANNEL START

Peak Discharge (CFS)	0.68
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



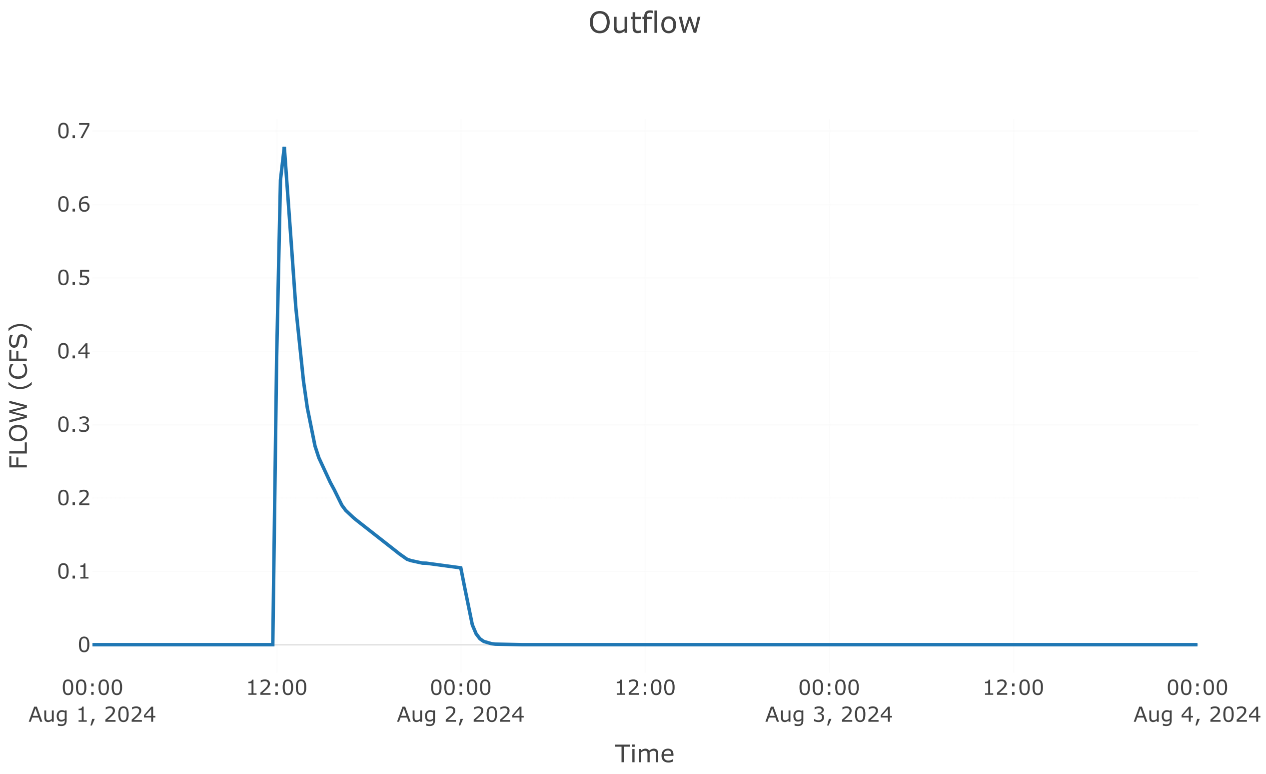
Reach: N CHANNEL 1.1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.1

Peak Discharge (CFS)	0.68
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	0.68
Inflow Volume (AC - FT)	0.22



Subbasin: N-4

Area (MI2) : 0.01
Downstream : N junction 1

Loss Rate: Scs

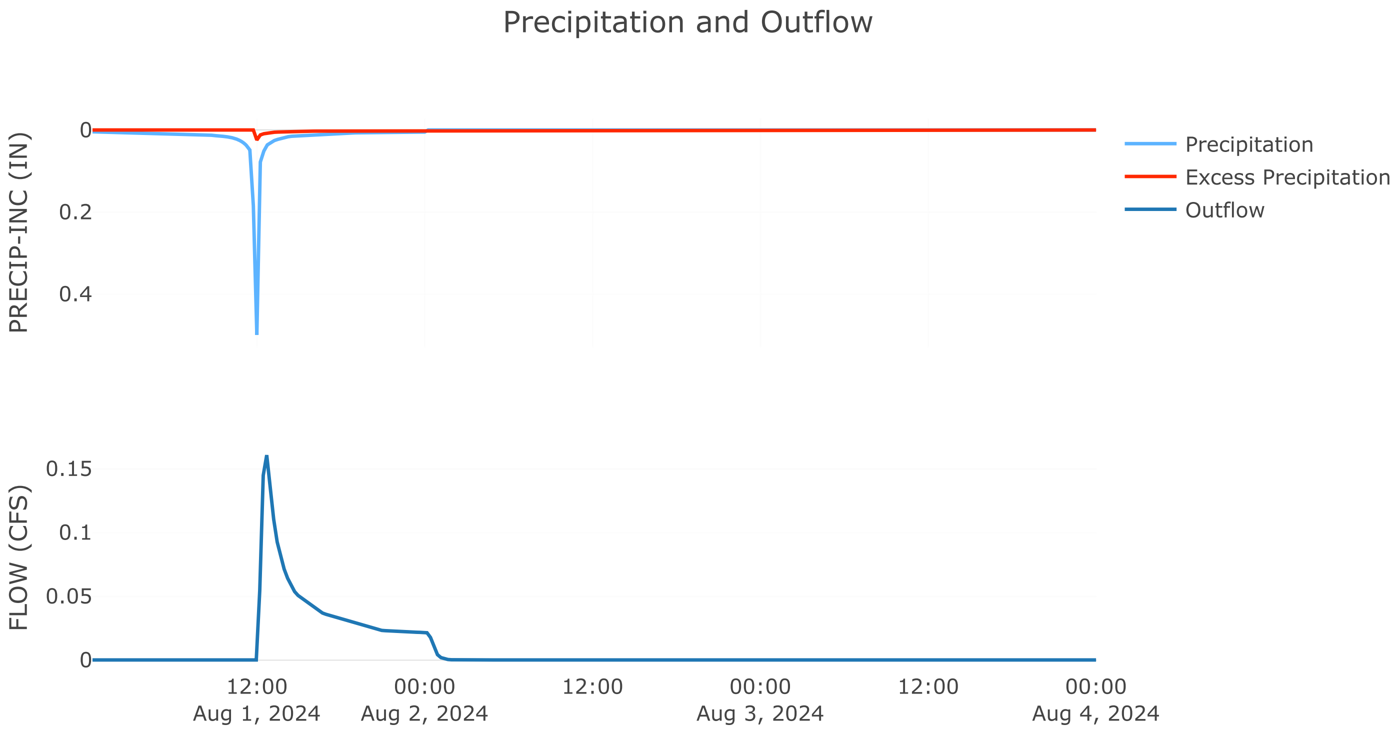
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	22.8
Unitgraph Type	Standard

Results: N-4

Peak Discharge (CFS)	0.16
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.48
Loss Volume (AC - FT)	0.43
Excess Volume (AC - FT)	0.05
Direct Runoff Volume (AC - FT)	0.05
Baseflow Volume (AC - FT)	0

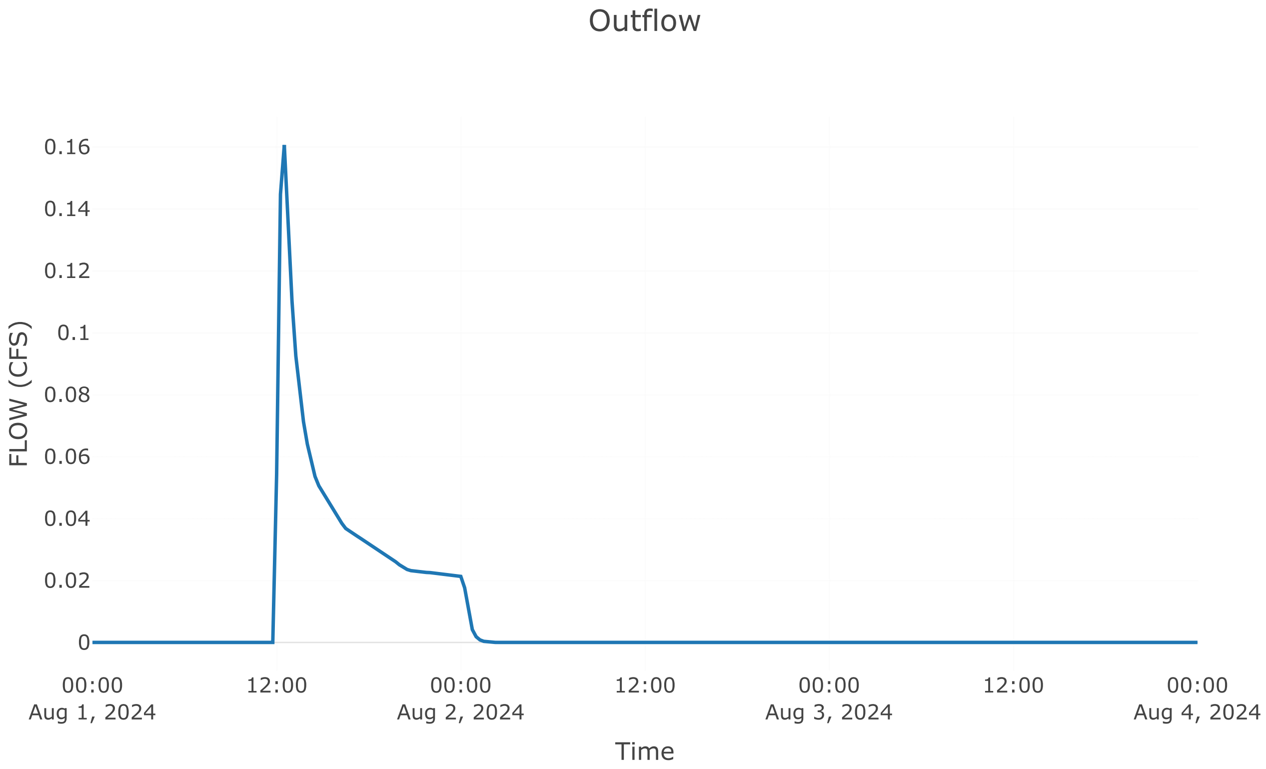


Junction: N JUNCTION 1

Downstream : N channel 1.2

Results: N JUNCTION 1

Peak Discharge (CFS)	0.16
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Reach: N CHANNEL 1.2

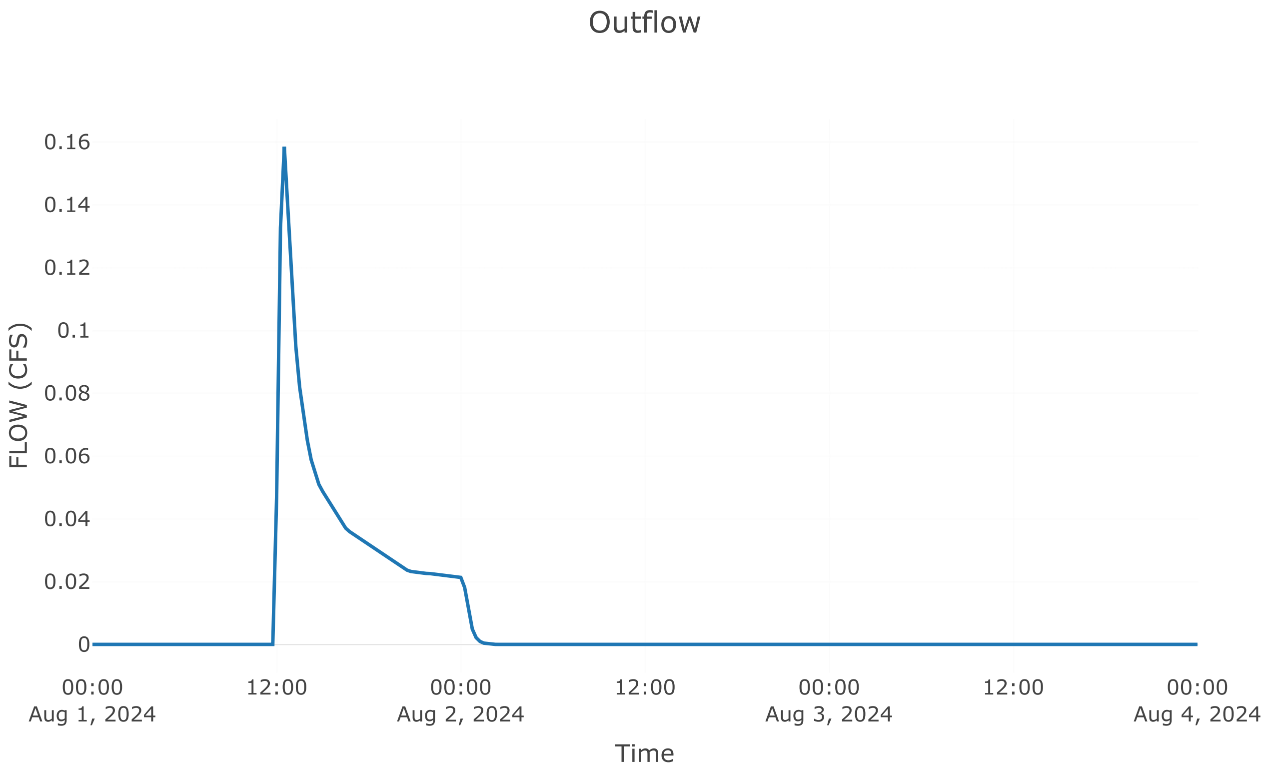
Downstream : N junction 2

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	2.4

Results: N CHANNEL 1.2

Peak Discharge (CFS)	0.16
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17
Peak Inflow (CFS)	0.16
Inflow Volume (AC - FT)	0.05



Subbasin: N-5

Area (MI2) : 0
Downstream : N junction 2

Loss Rate: Scs

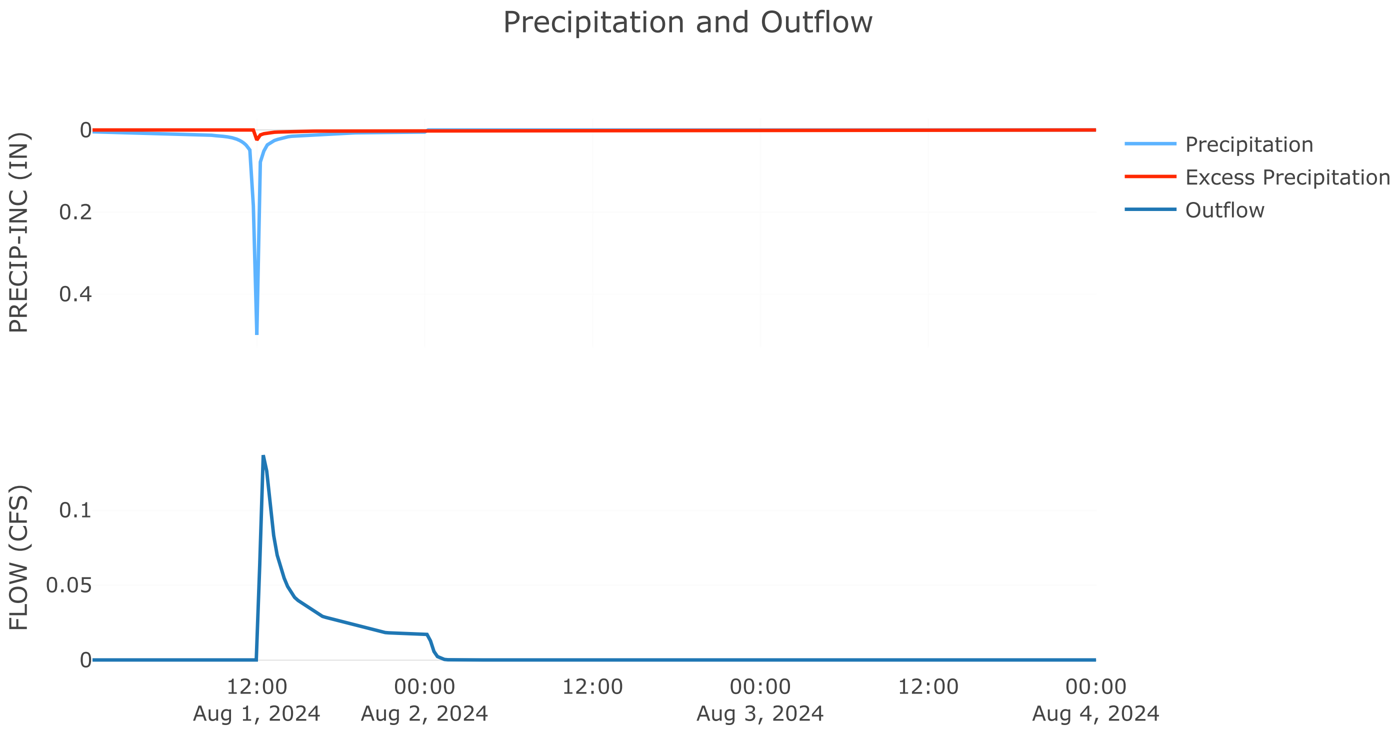
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	19.1
Unitgraph Type	Standard

Results: N-5

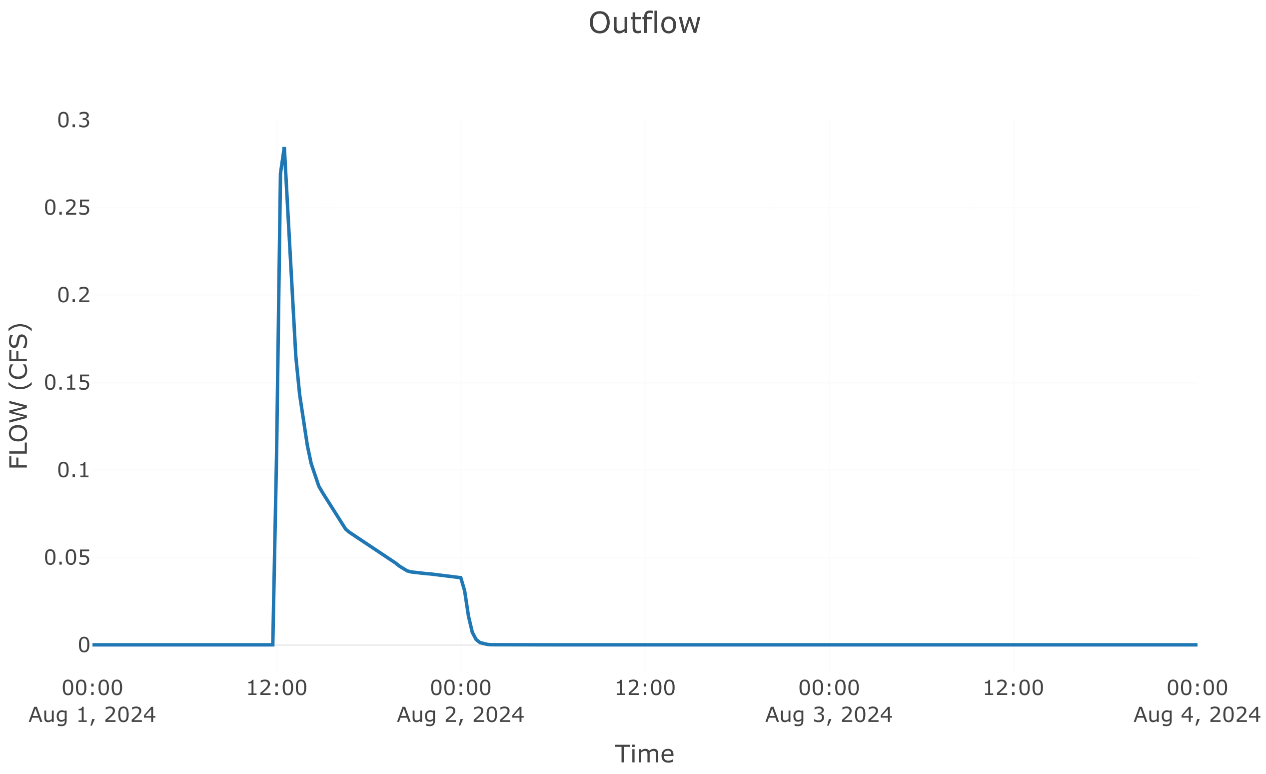
Peak Discharge (CFS)	0.14
Time of Peak Discharge	01Aug2024, 12:15
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.38
Loss Volume (AC - FT)	0.35
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0



Junction: N JUNCTION 2

Results: N JUNCTION 2

Peak Discharge (CFS)	0.28
Time of Peak Discharge	01Aug2024, 12:30
Volume (IN)	0.17



Subbasin: NW-16

Area (MI2) : 0
Downstream : Downchute 3.1

Loss Rate: Scs

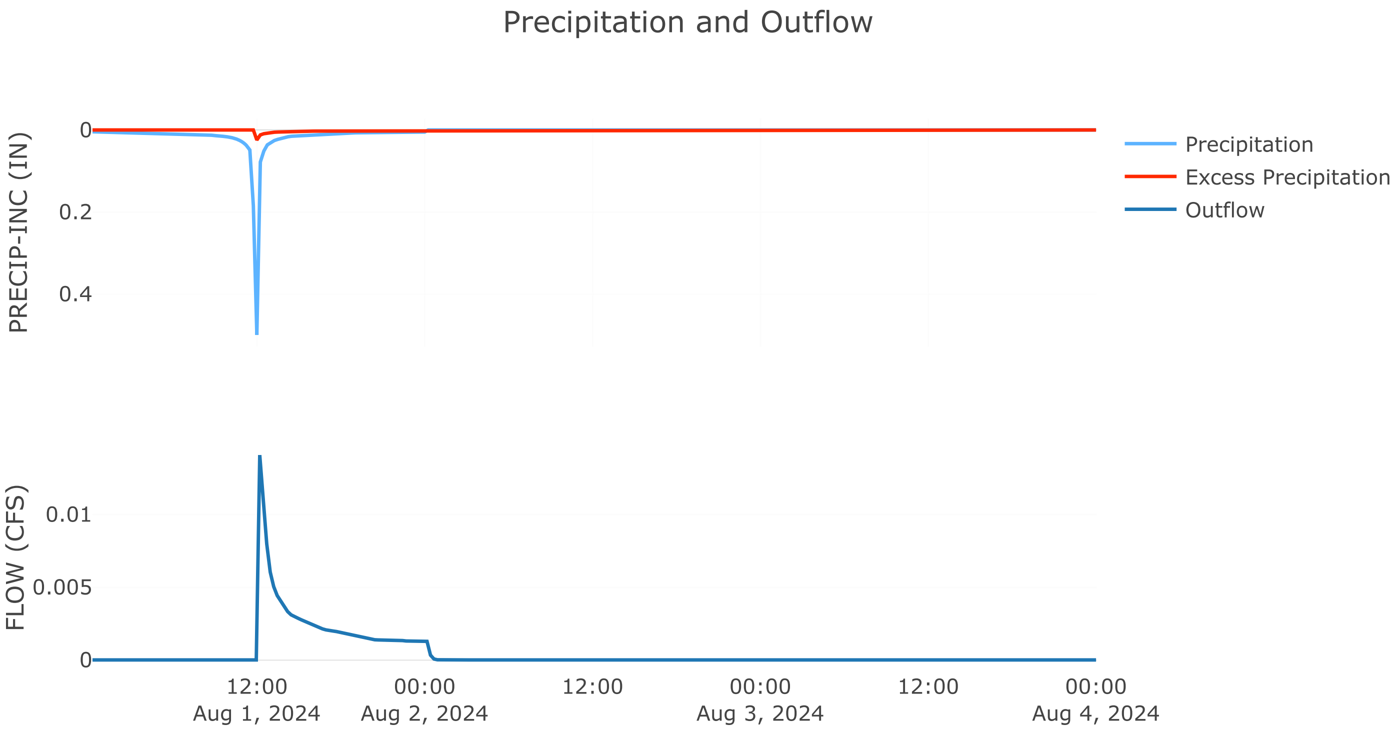
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	4.5
Unitgraph Type	Standard

Results: NW-16

Peak Discharge (CFS)	0.01
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.03
Loss Volume (AC - FT)	0.03
Excess Volume (AC - FT)	0
Direct Runoff Volume (AC - FT)	0
Baseflow Volume (AC - FT)	0



Subbasin: SW-7

Area (MI2) : 0

Loss Rate: Scs

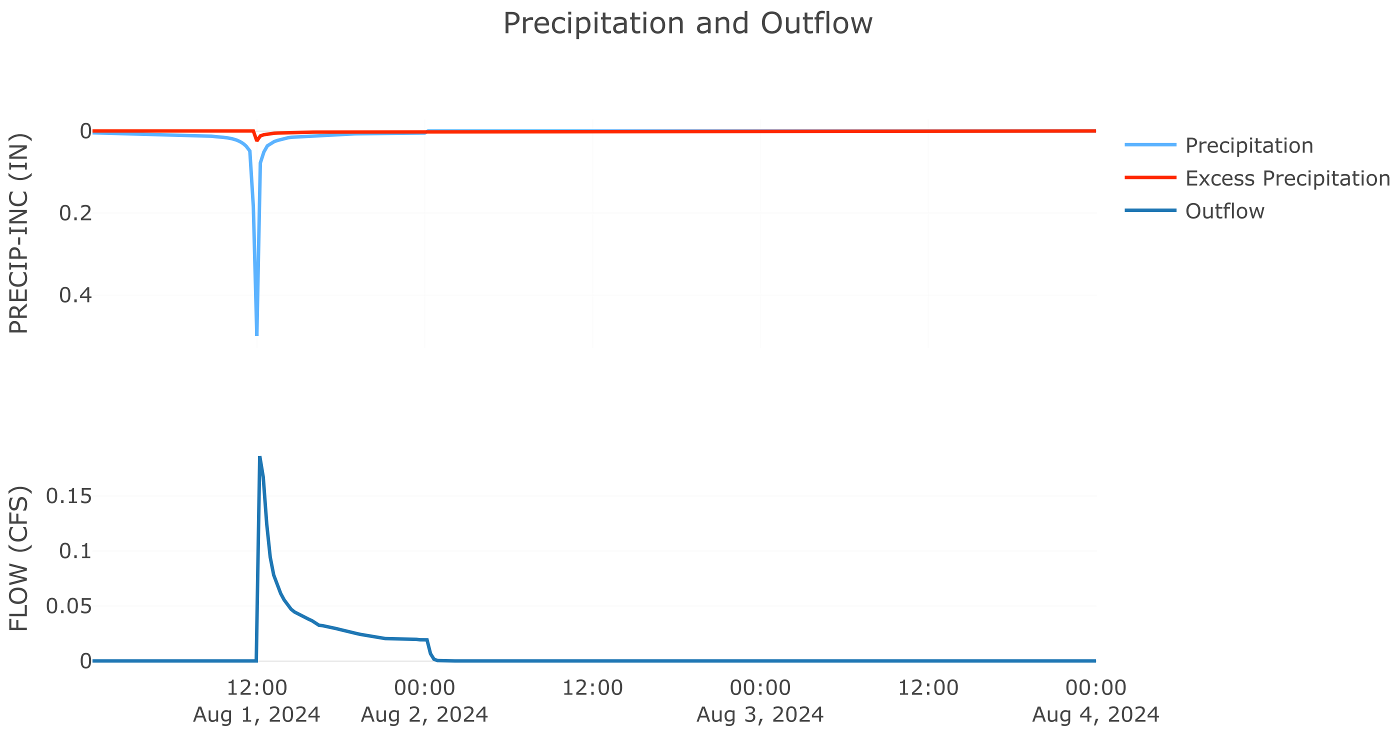
Percent Impervious Area	0
Curve Number	70

Transform: Scs

Lag	9.3
Unitgraph Type	Standard

Results: SW-7

Peak Discharge (CFS)	0.19
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Precipitation Volume (AC - FT)	0.43
Loss Volume (AC - FT)	0.39
Excess Volume (AC - FT)	0.04
Direct Runoff Volume (AC - FT)	0.04
Baseflow Volume (AC - FT)	0



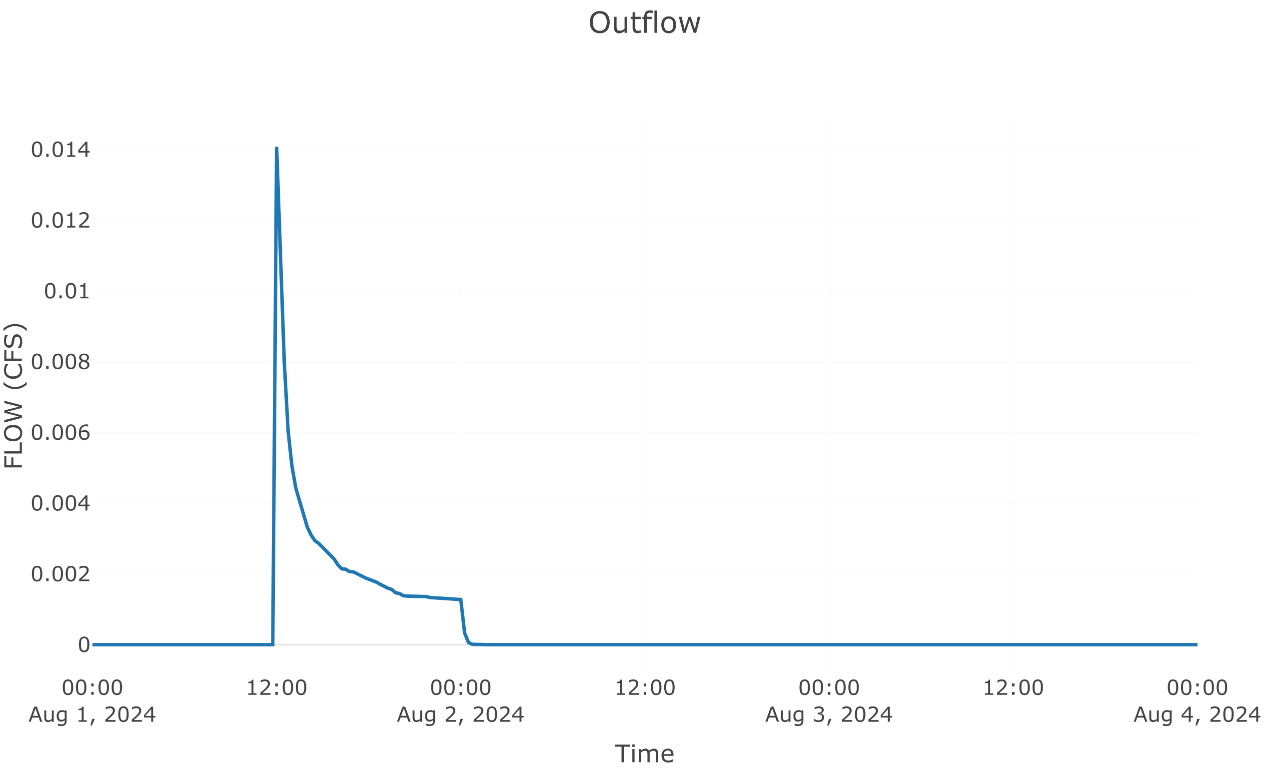
Reach: DOWNCHUTE 3.1

Route: Lag

Method	Lag
Initial Variable	Combined Inflow
Lag	0.5

Results: DOWNCHUTE 3.1

Peak Discharge (CFS)	0.01
Time of Peak Discharge	01Aug2024, 12:00
Volume (IN)	0.17
Peak Inflow (CFS)	0.01
Inflow Volume (AC - FT)	0



HY-8 Culvert Analysis Report

Pickles Butte Landfill Phase 5 Expansion

Table 1 - Summary of Culvert Flows at Crossing: East Channel Culvert

Headwater Elevation (ft)	Total Discharge (cfs)	East Channel Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2926.82	0.00	0.00	0.00	1
2927.05	0.12	0.12	0.00	1
2927.11	0.24	0.24	0.00	1
2927.18	0.36	0.36	0.00	1
2927.24	0.48	0.48	0.00	1
2927.29	0.60	0.60	0.00	1
2927.34	0.72	0.72	0.00	1
2927.39	0.84	0.84	0.00	1
2927.43	0.96	0.96	0.00	1
2927.48	1.08	1.08	0.00	1
2927.62	1.20	1.20	0.00	1
2929.00	3.99	3.99	0.00	Overtopping

Rating Curve Plot for Crossing: East Channel Culvert

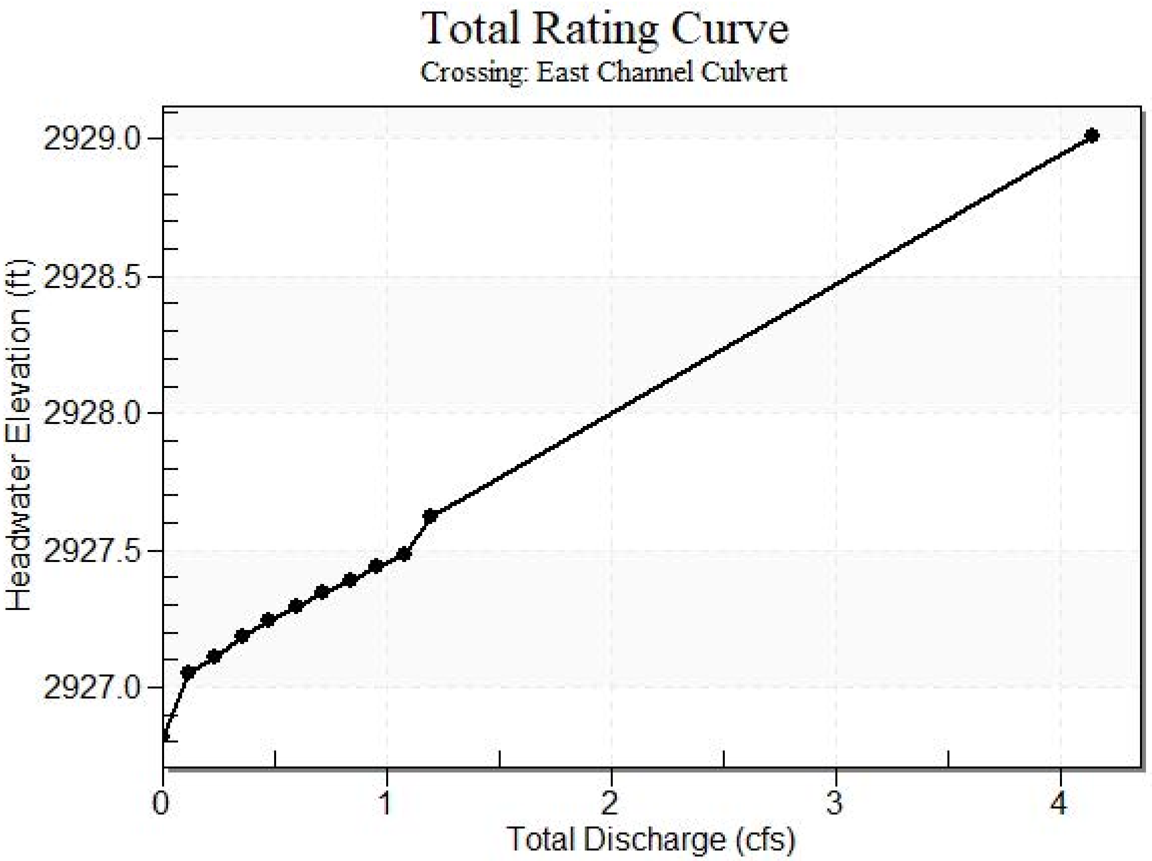


Table 2 - Culvert Summary Table: East Channel Culvert

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2926.82	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.12	0.12	2927.05	0.203	0.233	2-M2c	0.142	0.141	0.141	0.019	1.771	6.270
0.24	0.24	2927.11	0.291	0.0*	1-S2n	0.200	0.201	0.200	0.029	2.145	8.227
0.36	0.36	2927.18	0.359	0.0*	1-S2n	0.245	0.248	0.245	0.037	2.414	9.608
0.48	0.48	2927.24	0.418	0.0*	1-S2n	0.284	0.287	0.284	0.045	2.620	10.729
0.60	0.60	2927.29	0.471	0.0*	1-S2n	0.318	0.322	0.318	0.051	2.792	11.669
0.72	0.72	2927.34	0.521	0.0*	1-S2n	0.350	0.354	0.350	0.058	2.937	12.496
0.84	0.84	2927.39	0.569	0.019	1-S2n	0.380	0.383	0.380	0.063	3.064	13.236
0.96	0.96	2927.43	0.615	0.069	1-S2n	0.409	0.411	0.409	0.069	3.176	13.900
1.08	1.08	2927.48	0.660	0.121	1-S2n	0.437	0.437	0.437	0.074	3.277	14.510
1.20	1.20	2927.62	0.703	0.799	2-M2c	0.464	0.462	0.462	0.080	3.384	15.083

* Full Flow Headwater elevation is below inlet invert.

****

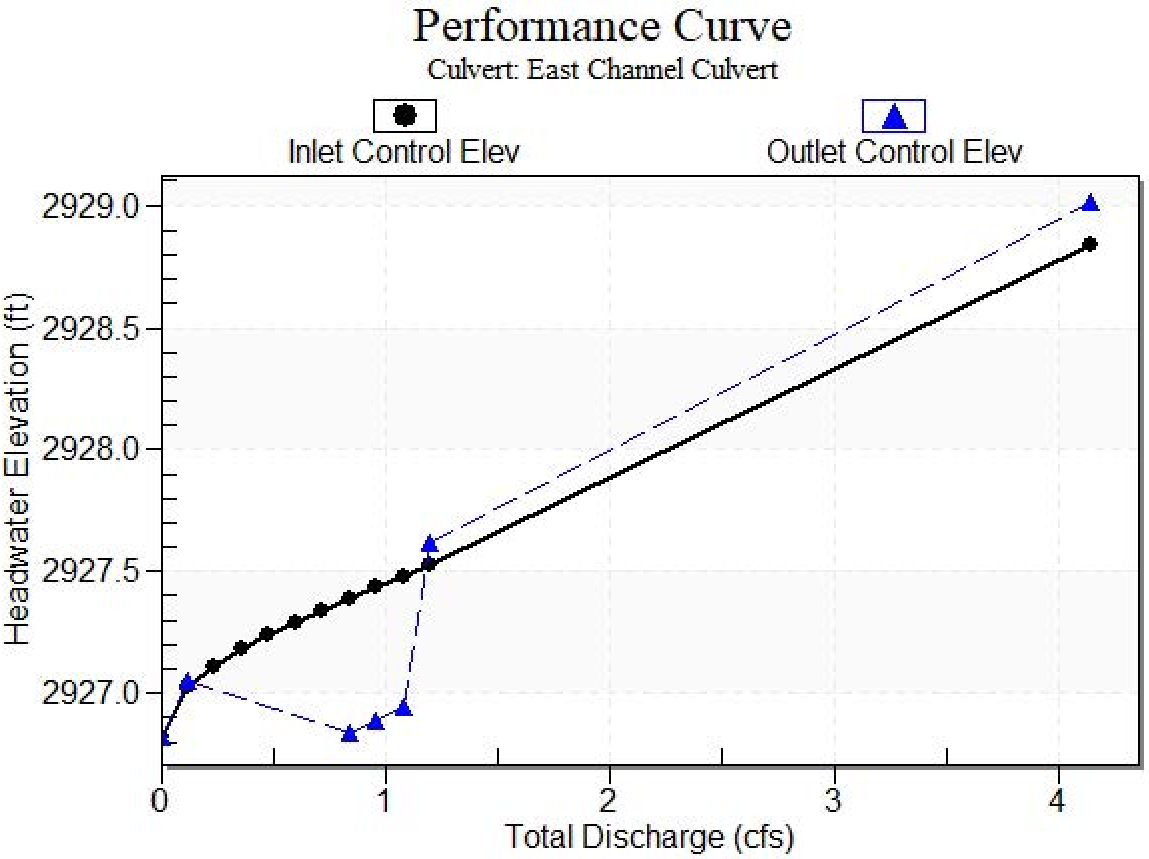
Straight Culvert

Inlet Elevation (invert): 2926.82 ft, Outlet Elevation (invert): 2926.38 ft

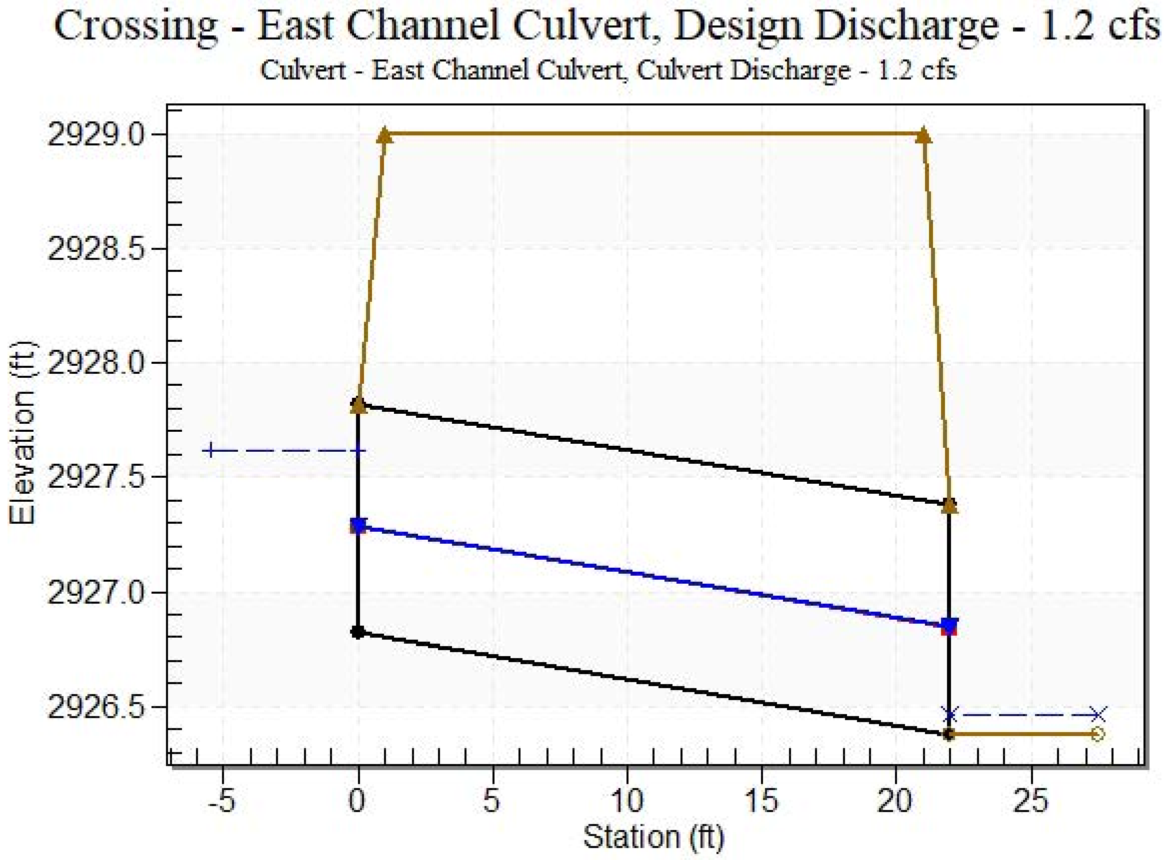
Culvert Length: 22.00 ft, Culvert Slope: 0.0200

****

Culvert Performance Curve Plot: East Channel Culvert



Water Surface Profile Plot for Culvert: East Channel Culvert



Site Data - East Channel Culvert

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2926.82 ft

Outlet Station: 22.00 ft

Outlet Elevation: 2926.38 ft

Number of Barrels: 1

Culvert Data Summary - East Channel Culvert

Barrel Shape: Circular

Barrel Diameter: 1.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: East Channel Culvert)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2926.38	0.00	0.00	0.00	0.00
0.12	2926.40	0.02	6.27	5.37	7.99
0.24	2926.41	0.03	8.23	8.19	8.49
0.36	2926.42	0.04	9.61	10.52	8.75
0.48	2926.42	0.04	10.73	12.56	8.94
0.60	2926.43	0.05	11.67	14.44	9.07
0.72	2926.44	0.06	12.50	16.18	9.17
0.84	2926.44	0.06	13.24	17.82	9.26
0.96	2926.45	0.07	13.90	19.39	9.32
1.08	2926.45	0.07	14.51	20.90	9.37
1.20	2926.46	0.08	15.08	22.34	9.42

Tailwater Channel Data - East Channel Culvert

Tailwater Channel Option: Rectangular Channel

Bottom Width: 1.00 ft

Channel Slope: 4.5000

Channel Manning's n: 0.0350

Channel Invert Elevation: 2926.38 ft

Roadway Data for Crossing: East Channel Culvert

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2929.00 ft

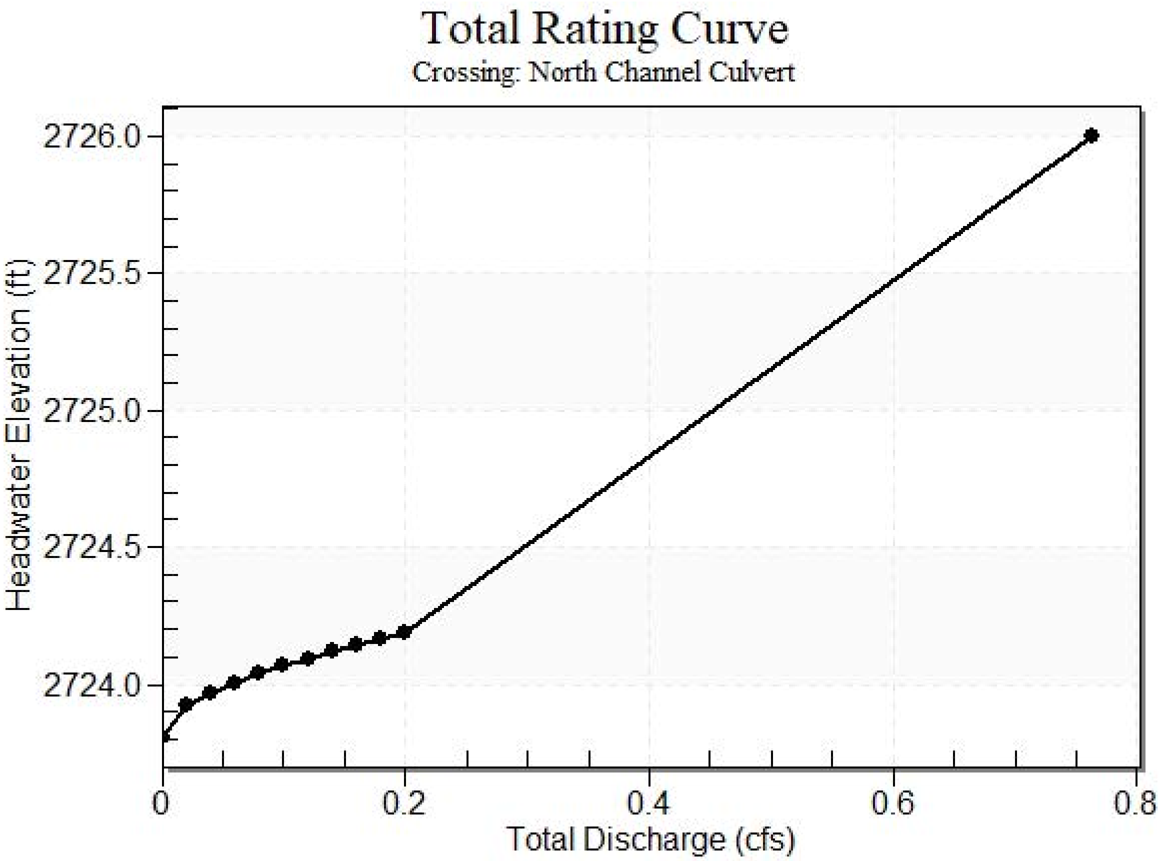
Roadway Surface: Gravel

Roadway Top Width: 20.00 ft

Table 4 - Summary of Culvert Flows at Crossing: North Channel Culvert

Headwater Elevation (ft)	Total Discharge (cfs)	North Channel Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2723.81	0.00	0.00	0.00	1
2723.92	0.02	0.02	0.00	1
2723.97	0.04	0.04	0.00	1
2724.01	0.06	0.06	0.00	1
2724.04	0.08	0.08	0.00	1
2724.07	0.10	0.10	0.00	1
2724.09	0.12	0.12	0.00	1
2724.12	0.14	0.14	0.00	1
2724.14	0.16	0.16	0.00	1
2724.16	0.18	0.18	0.00	1
2724.18	0.20	0.20	0.00	1
2726.00	0.74	0.74	0.00	Overtopping

Rating Curve Plot for Crossing: North Channel Culvert



Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	2723.81	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.02	0.02	2723.92	0.099	0.110	2-M2c	0.074	0.069	0.069	0.034	1.234	8.741
0.04	0.04	2723.97	0.141	0.158	2-M2c	0.104	0.098	0.098	0.044	1.482	10.395
0.06	0.06	2724.01	0.174	0.196	2-M2c	0.128	0.120	0.120	0.051	1.654	11.504
0.08	0.08	2724.04	0.203	0.228	2-M2c	0.148	0.139	0.139	0.057	1.792	12.362
0.10	0.10	2724.07	0.229	0.257	2-M2c	0.166	0.156	0.156	0.062	1.909	13.071
0.12	0.12	2724.09	0.252	0.284	2-M2c	0.183	0.172	0.172	0.066	2.012	13.680
0.14	0.14	2724.12	0.275	0.308	2-M2c	0.199	0.186	0.186	0.070	2.105	14.218
0.16	0.16	2724.14	0.297	0.331	2-M2c	0.214	0.199	0.199	0.074	2.192	14.700
0.18	0.18	2724.16	0.319	0.354	2-M2c	0.228	0.212	0.212	0.077	2.273	15.140
0.20	0.20	2724.18	0.339	0.375	2-M2c	0.243	0.224	0.224	0.080	2.349	15.544

Table 5 - Culvert Summary Table: North Channel Culvert

****

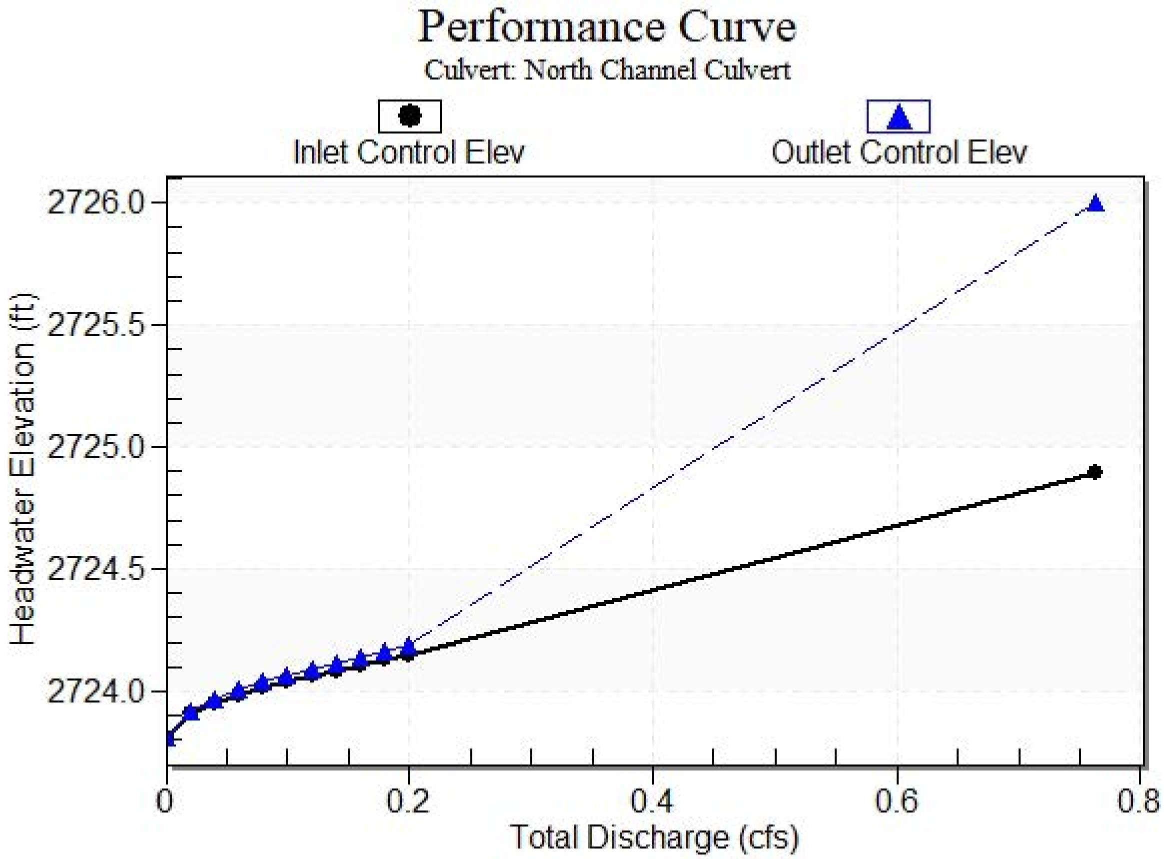
Straight Culvert

Inlet Elevation (invert): 2723.81 ft, Outlet Elevation (invert): 2723.20 ft

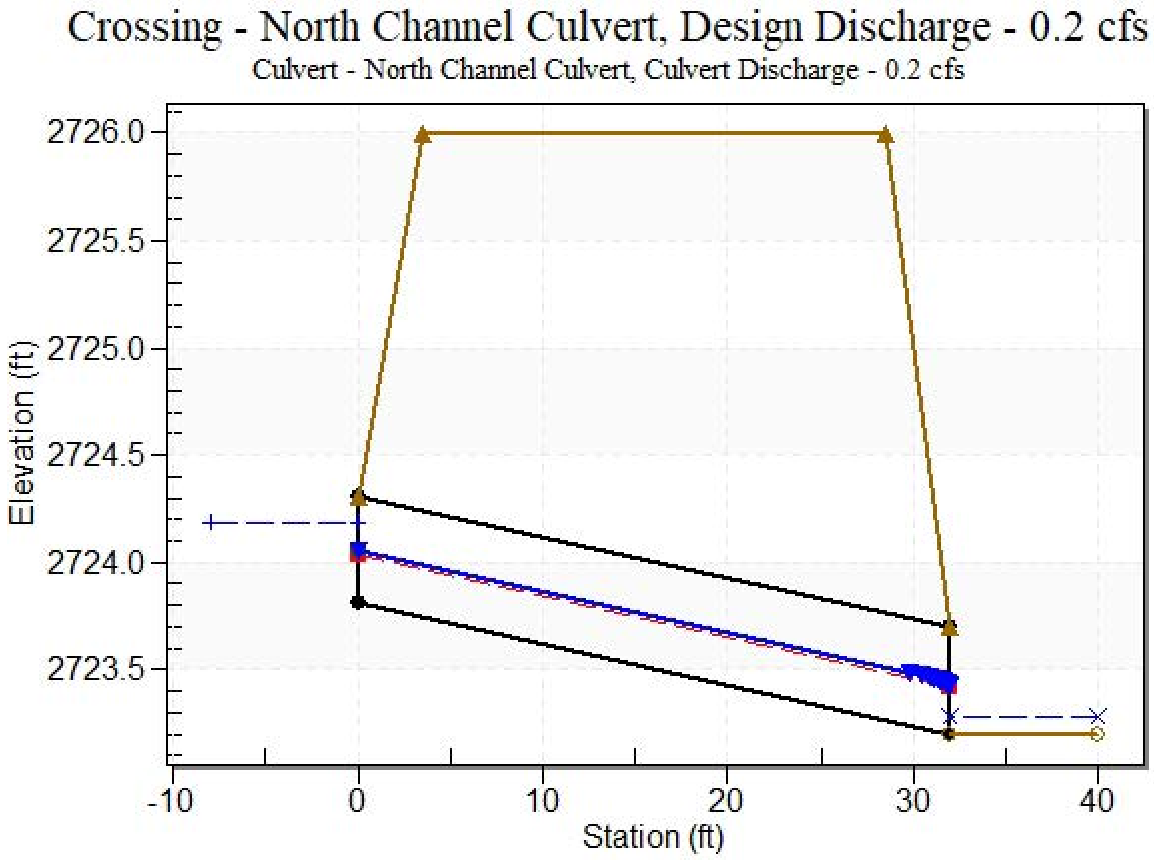
Culvert Length: 32.01 ft, Culvert Slope: 0.0191

****

Culvert Performance Curve Plot: North Channel Culvert



Water Surface Profile Plot for Culvert: North Channel Culvert



Site Data - North Channel Culvert

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2723.81 ft

Outlet Station: 32.00 ft

Outlet Elevation: 2723.20 ft

Number of Barrels: 1

Culvert Data Summary - North Channel Culvert

Barrel Shape: Circular

Barrel Diameter: 0.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: North Channel Culvert)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	2723.20	0.00	0.00	0.00	0.00
0.02	2723.23	0.03	8.74	23.91	11.84
0.04	2723.24	0.04	10.39	31.01	12.37
0.06	2723.25	0.05	11.50	36.10	12.69
0.08	2723.26	0.06	12.36	40.22	12.92
0.10	2723.26	0.06	13.07	43.73	13.10
0.12	2723.27	0.07	13.68	46.82	13.25
0.14	2723.27	0.07	14.22	49.61	13.38
0.16	2723.27	0.07	14.70	52.15	13.49
0.18	2723.28	0.08	15.14	54.51	13.59
0.20	2723.28	0.08	15.54	56.71	13.68

Tailwater Channel Data - North Channel Culvert

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 11.3300

Channel Manning's n: 0.0350

Channel Invert Elevation: 2723.20 ft

Roadway Data for Crossing: North Channel Culvert

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.00 ft

Crest Elevation: 2726.00 ft

Roadway Surface: Gravel

Roadway Top Width: 25.00 ft

NOAA Atlas 14, Volume 12, Version 2
Location name: Caldwell, Idaho, USA*
Latitude: 43.515°, Longitude: -116.7205°
Elevation: 2737 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Carl Trypaluk, Dale Unruh, Michael St.Laurent, Austin Jordan, Rama Sesha Sridhar Mantripragada, Sandra Pavlovic, Greg Fall, Fernando Salas

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.102** (0.088-0.118)	**0.152** (0.131-0.178)	**0.231** (0.196-0.275)	**0.295** (0.245-0.356)	**0.380** (0.303-0.468)	**0.443** (0.341-0.554)	**0.505** (0.367-0.646)	**0.565** (0.386-0.751)	**0.642** (0.406-0.904)	**0.698** (0.426-1.03)
10-min	**0.142** (0.122-0.164)	**0.211** (0.182-0.247)	**0.321** (0.272-0.382)	**0.409** (0.340-0.494)	**0.527** (0.421-0.650)	**0.615** (0.472-0.769)	**0.700** (0.510-0.896)	**0.784** (0.536-1.04)	**0.890** (0.563-1.25)	**0.968** (0.591-1.43)
15-min	**0.165** (0.141-0.191)	**0.245** (0.211-0.287)	**0.373** (0.316-0.443)	**0.475** (0.395-0.574)	**0.612** (0.489-0.755)	**0.714** (0.549-0.893)	**0.814** (0.592-1.04)	**0.911** (0.622-1.21)	**1.04** (0.654-1.46)	**1.12** (0.686-1.66)
30-min	**0.201** (0.172-0.233)	**0.299** (0.258-0.349)	**0.454** (0.385-0.540)	**0.579** (0.482-0.699)	**0.746** (0.596-0.920)	**0.871** (0.669-1.09)	**0.992** (0.722-1.27)	**1.11** (0.758-1.48)	**1.26** (0.798-1.78)	**1.37** (0.837-2.02)
60-min	**0.241** (0.206-0.279)	**0.357** (0.308-0.417)	**0.541** (0.458-0.644)	**0.690** (0.573-0.833)	**0.888** (0.709-1.09)	**1.04** (0.796-1.30)	**1.18** (0.858-1.51)	**1.32** (0.902-1.75)	**1.50** (0.948-2.11)	**1.63** (0.995-2.41)
2-hr	**0.330** (0.286-0.374)	**0.453** (0.395-0.522)	**0.649** (0.557-0.763)	**0.809** (0.681-0.965)	**1.02** (0.829-1.25)	**1.18** (0.927-1.47)	**1.34** (1.00-1.71)	**1.50** (1.06-1.99)	**1.70** (1.11-2.40)	**1.84** (1.17-2.74)
3-hr	**0.400** (0.353-0.451)	**0.524** (0.462-0.597)	**0.722** (0.626-0.839)	**0.884** (0.751-1.04)	**1.10** (0.904-1.34)	**1.27** (1.01-1.57)	**1.43** (1.09-1.82)	**1.59** (1.16-2.12)	**1.80** (1.23-2.55)	**1.96** (1.29-2.92)
6-hr	**0.532** (0.477-0.591)	**0.656** (0.588-0.735)	**0.859** (0.755-0.978)	**1.02** (0.886-1.19)	**1.25** (1.05-1.49)	**1.43** (1.17-1.74)	**1.60** (1.27-2.01)	**1.78** (1.36-2.33)	**2.01** (1.46-2.80)	**2.18** (1.53-3.21)
12-hr	**0.674** (0.614-0.740)	**0.801** (0.729-0.884)	**1.01** (0.910-1.13)	**1.19** (1.06-1.34)	**1.43** (1.24-1.65)	**1.62** (1.38-1.90)	**1.82** (1.52-2.18)	**2.02** (1.64-2.52)	**2.28** (1.78-3.03)	**2.48** (1.89-3.46)
24-hr	**0.827** (0.762-0.902)	**0.962** (0.886-1.05)	**1.19** (1.08-1.30)	**1.38** (1.25-1.52)	**1.64** (1.47-1.83)	**1.85** (1.63-2.09)	**2.06** (1.79-2.38)	**2.28** (1.94-2.74)	**2.58** (2.14-3.27)	**2.80** (2.28-3.73)
2-day	**0.969** (0.895-1.06)	**1.12** (1.04-1.22)	**1.37** (1.26-1.50)	**1.58** (1.44-1.74)	**1.87** (1.68-2.07)	**2.09** (1.86-2.35)	**2.31** (2.03-2.65)	**2.53** (2.19-3.02)	**2.82** (2.40-3.56)	**3.05** (2.54-4.03)
3-day	**1.06** (0.980-1.16)	**1.23** (1.13-1.34)	**1.50** (1.37-1.64)	**1.72** (1.56-1.89)	**2.02** (1.81-2.25)	**2.25** (2.00-2.54)	**2.47** (2.18-2.86)	**2.70** (2.34-3.23)	**2.99** (2.55-3.78)	**3.20** (2.70-4.25)
4-day	**1.14** (1.05-1.24)	**1.32** (1.22-1.44)	**1.61** (1.47-1.76)	**1.84** (1.67-2.02)	**2.16** (1.93-2.40)	**2.39** (2.12-2.70)	**2.62** (2.30-3.03)	**2.85** (2.48-3.41)	**3.14** (2.69-3.98)	**3.35** (2.84-4.45)
7-day	**1.35** (1.25-1.48)	**1.56** (1.43-1.70)	**1.89** (1.72-2.06)	**2.15** (1.94-2.37)	**2.50** (2.24-2.80)	**2.77** (2.45-3.14)	**3.03** (2.65-3.52)	**3.28** (2.84-3.95)	**3.60** (3.08-4.60)	**3.84** (3.24-5.15)
10-day	**1.54** (1.41-1.68)	**1.76** (1.62-1.92)	**2.12** (1.93-2.32)	**2.41** (2.17-2.66)	**2.80** (2.50-3.13)	**3.09** (2.73-3.51)	**3.38** (2.95-3.93)	**3.66** (3.16-4.42)	**4.01** (3.41-5.14)	**4.27** (3.58-5.76)
20-day	**2.04** (1.88-2.23)	**2.32** (2.13-2.54)	**2.77** (2.52-3.04)	**3.14** (2.82-3.45)	**3.62** (3.22-4.05)	**3.98** (3.51-4.52)	**4.32** (3.78-5.04)	**4.66** (4.02-5.65)	**5.09** (4.32-6.54)	**5.41** (4.54-7.28)
30-day	**2.45** (2.26-2.67)	**2.78** (2.55-3.03)	**3.30** (3.00-3.61)	**3.72** (3.35-4.09)	**4.27** (3.80-4.77)	**4.67** (4.13-5.31)	**5.06** (4.42-5.90)	**5.44** (4.70-6.58)	**5.91** (5.03-7.58)	**6.24** (5.28-8.40)
45-day	**3.03** (2.79-3.30)	**3.42** (3.13-3.73)	**4.04** (3.66-4.40)	**4.52** (4.07-4.96)	**5.15** (4.59-5.74)	**5.60** (4.96-6.36)	**6.02** (5.29-7.03)	**6.43** (5.59-7.78)	**6.92** (5.95-8.86)	**7.26** (6.25-9.76)
60-day	**3.54** (3.26-3.87)	**3.99** (3.65-4.35)	**4.68** (4.24-5.11)	**5.22** (4.70-5.73)	**5.91** (5.28-6.60)	**6.39** (5.68-7.27)	**6.84** (6.04-7.99)	**7.26** (6.36-8.79)	**7.75** (6.74-9.93)	**8.08** (7.07-10.9)

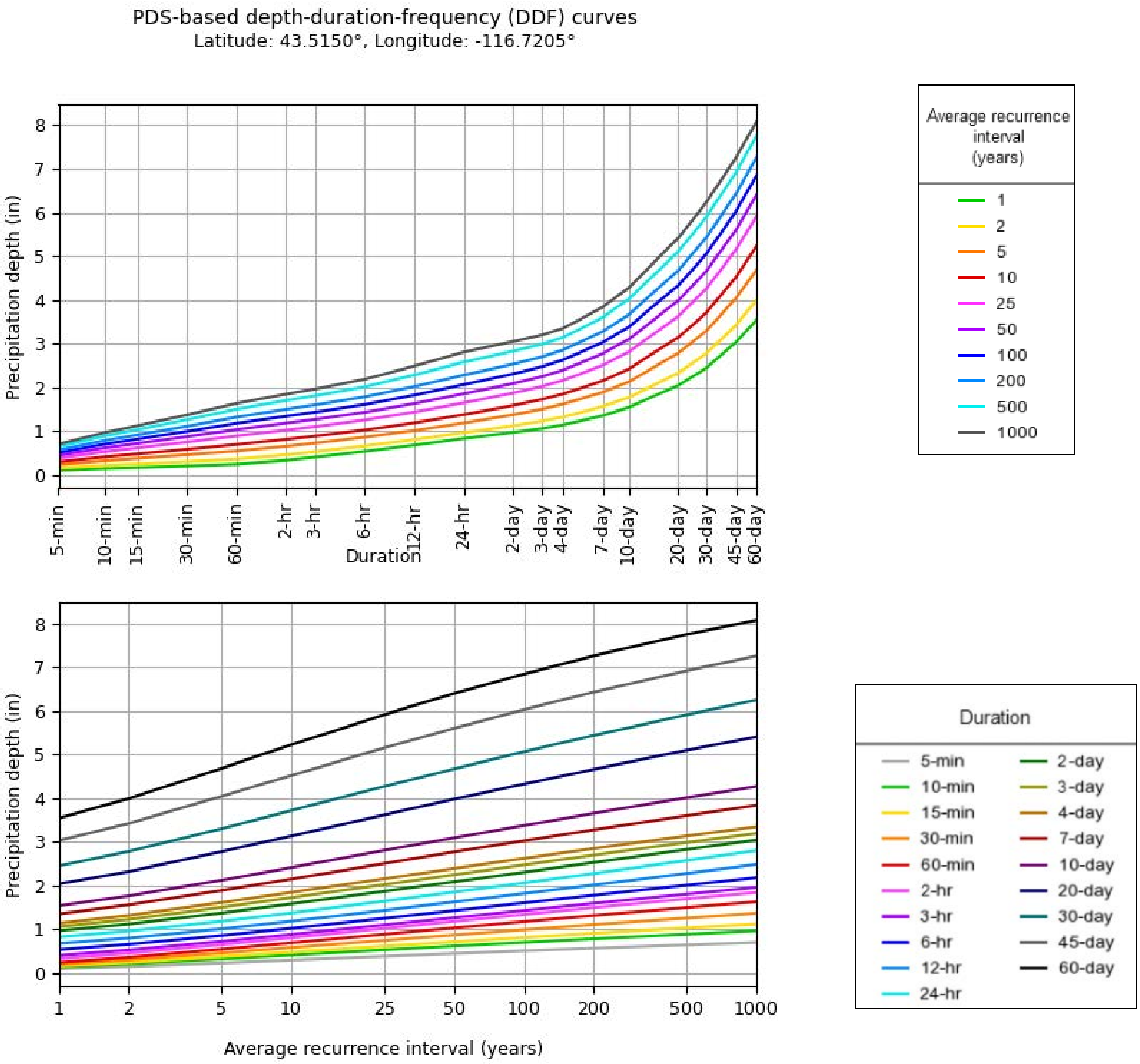
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



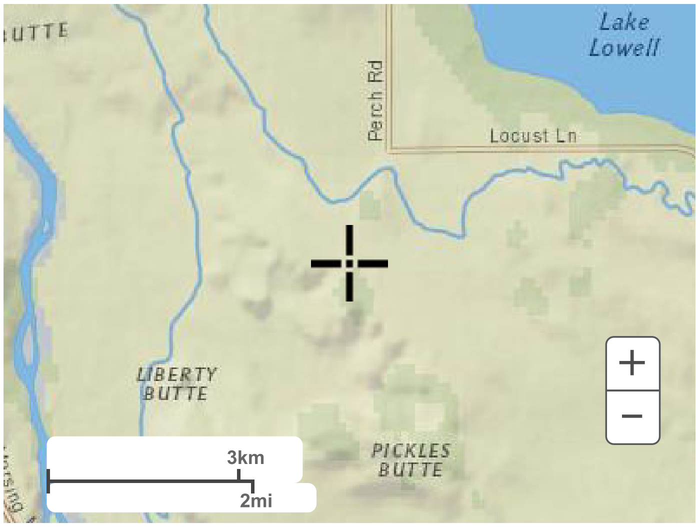
PDS-based depth-duration-frequency (DDF) curves
Latitude: 43.5150°, Longitude: -116.7205°

NOAA Atlas 14, Volume 12, Version 2 Created (GMT): Mon Jan 13 18:44:19 2025

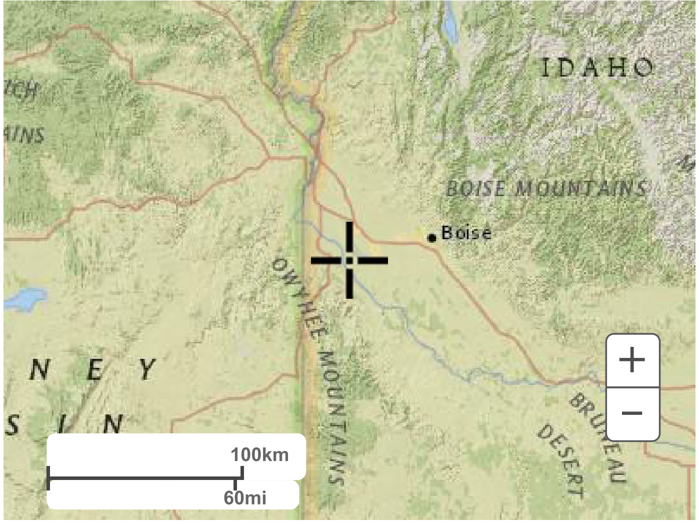
Back to Top

Maps & aerials

Small scale terrain

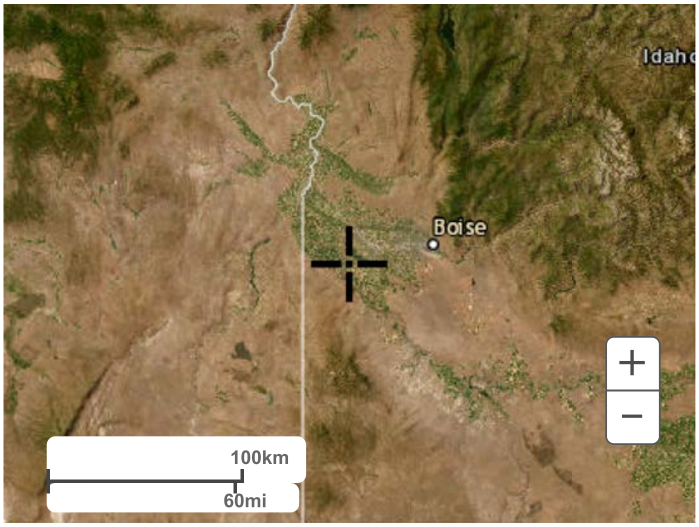


Large scale terrain



Large scale map

Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer