EXHIBIT 5
PHASE II GEOTECHNICAL EXPLORATION REPORT

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COFFIN BUTTE LANDFILL SOUTH EXPANSION AREA
28972 COFFIN BUTTE ROAD
CORVALLIS, OREGON

July 15, 2024

Wallace Group Project No. 21129 (1)

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A Report Prepared For:

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EXECUTIVE SUMMARY

The Wallace Group, Inc., (Wallace Group) completed geotechnical-engineering explorations for the proposed Coffin Butte Landfill South Expansion Area, located in Corvallis, Oregon (**Figure 1**, *Vicinity Map*). A figure with exploration locations is shown on **Figure 2**, *Exploration Location Map*. Wallace Group performed the geotechnical explorations in two phases, beginning in September 2021. Before a Phase I geotechnical exploration report was published, Wallace Group performed additional subsurface explorations, beginning in November 2022. Thus, this exploration report is considered the Phase II geotechnical exploration report.

Coffin Butte Landfill (CBLF) is an operating municipal solid waste disposal facility owned and operated by Valley Landfills, Inc. Draft development plans were provided by Civil and Environmental Consultants, Inc. (CEC), dated April 2022. Based on the draft development plans, a new landfill cell is planned south of the existing CBLF cells and Coffin Butte Road. Construction for the expansion area will include cuts of up to 155 feet into the northern flank of Tampico Ridge. To construct the planned access roads, up to 50 feet of structural fill will be placed within the valley in the south-central portion of the site and up to 10 feet of structural fill will be placed northeast of the new cell. Two new leachate ponds will be constructed east of the new cell and cuts for pond construction will be up to 50 feet deep. Additional improvements will include the construction of a new landfill administration office, asphalt-paved parking lot, and access roads.

Subsurface explorations generally encountered 6- to 25-feet of fine-grained alluvium (Willamette Silt) underlain by weathered basalt and basalt in the lower elevations. Competent basalt was encountered in the lower elevations at depths ranging between 22- and 65-feet below ground surface (bgs). The higher elevations of the site are underlain by fine-grained to coarse-grained colluvium and volcanic saprolites, which are generally coarser with increasing elevation. These soils are underlain by brecciated and altered basalt bedrock, with the depth to rock generally decreasing with increased elevation. On the western hillside of Tampico Ridge, basalt was encountered at depths ranging between 10- and 25-feet bgs. On the eastern hillslope, surface soil was generally weaker than the western hillslope and basalt was encountered at depths ranging between 19- and 45-feet bgs. In the valley formed between the two hillsides, the depth to basalt ranged from 21- to 23-feet bgs.

Based on this exploration, the sites appear suitable for the expected development from a geotechnical perspective, provided the recommendations contained in this report are incorporated into design and construction.

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1.0 INTRODUCTION

1.1 GENERAL

The Wallace Group performed geotechnical explorations in two phases, beginning in September 2021. Before a Phase I geotechnical exploration report was published, Wallace Group performed additional subsurface explorations, beginning in November 2022. Thus, this exploration report is considered the Phase II geotechnical exploration report.

The Wallace Group, Inc., (Wallace Group) completed a geotechnical-engineering exploration for the proposed Coffin Butte Landfill (CBLF) South Expansion Area, located at 28972 Coffin Butte Road, Corvallis, Oregon (**Figure 1**, *Vicinity Map*). CBLF is located approximately 11 miles north of downtown Corvallis. Figures with exploration locations are shown on **Figures 2a and 2b**, *Exploration Location Map*.

1.2 PROJECT DESCRIPTION

CBLF is an operating municipal solid waste disposal facility owned and operated by Valley Landfills, Inc. Development areas for the south expansion area include the following tax lots:

- Tax Lot 104180001101: 3.89-acres
- Tax Lot 104180001104: 3.80-acres
- Tax Lot 104180001107: 59.2-acres
- Tax Lot 104180001200: 82.7-acres

Draft development plans were provided by Civil and Environmental Consultants, Inc. (CEC), dated April 2022. Based on the draft development plans, a new landfill cell is proposed south of the existing CBLF cells and Coffin Butte Road. Construction for the expansion area will include cuts of up to 160-feet into the northern flank of Tampico Ridge. To facilitate the construction of new access roads, up to 50 feet of structural fill will be placed and compacted within the valley in the south-central portion of the site and up to 10 feet of structural fill will be placed northeast of the new cell. Two new leachate ponds will be constructed east of the proposed cell and cuts for pond construction will be up to 50-feet deep. Additional improvements will include the construction of a new landfill administration office, asphalt-paved parking lot, and access roads.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this exploration was to evaluate general subsurface conditions within the potential development areas and provide geotechnical design recommendations which will be incorporated into project documents for Oregon DEQ-approval prior to the start of construction. The geotechnical exploration and site characterization work performed by Wallace Group was conducted in general accordance with applicable sections of Oregon DEQ's Solid Waste Landfill Guidance and included the following tasks:

- Reviewed and evaluated available geologic, hydrogeologic, and geotechnical data for the Coffin Butte Landfill site and surrounding Benton County area.
- Notified the One-Call Utility Notification Service to identify any public or private utilities near the proposed exploration locations.
- Drilled nineteen (19) borings within the proposed landfill expansion and proposed leachate pond areas using a track-mounted drilling rig equipped with mud-rotary drilling/rock coring equipment.
- Excavated fifteen (15) backhoe test pits within the proposed landfill expansion and leachate pond areas.
- Performed nine (9) cone penetration tests (CPTs) and advanced geoprobes adjacent to the CPT locations within the proposed landfill expansion and leachate pond areas.
- Converted two borings into temporary piezometers to measure depth to groundwater.
- Supervised, sampled, and logged test pits and borings. Soil samples were retrieved, sealed, and transported to the Wallace Group's A2LA-accredited geotechnical laboratory for further evaluation and testing or distribution to other geotechnical laboratories for specialized geotechnical testing.
- Performed geotechnical laboratory testing to measure and confirm the engineering and index properties of the soil and rock materials encountered.
- Performed geotechnical engineering analyses and provided recommendations and design criteria for excavating into soil and rock, maintaining cell and pond slope stability, designing foundations for the planned office building, and performing the planned earthwork, including recommendations for fill placement and compaction, and site drainage.
- Prepared this geotechnical exploration report summarizing our findings, conclusions, and recommendations.

2.0 FIELD EXPLORATION

2.1 SUBSURFACE EXPLORATION

Subsurface conditions were explored by advancing nineteen (19) borings (designated BH-01 through BH-19), fifteen (15) test pits (designated TP-01 through TP-05, TP-08 through TP-13, and TP-15 through TP-18), and nine (9) cone penetration tests (CPTs) with geoprobe sampling (designated GP/CPT-01 through GP/CPT-09). TP-06, TP-07, and TP-14 were not excavated due to conflicts with utilities and access or equipment failure.

Borings BH-01 through BH-14 were drilled between September 7 and 28, 2021 by Western States Soil Conservation Inc. of Hubbard, Oregon, and BH-15 through BH-19 were drilled between November 8 through 23, 2022 by HazTech Drilling of Nampa, Idaho. Test pits were excavated between August 16 and September 28, 2021, using a CAT 310 excavator operated by RL Reimers Excavation of Albany, Oregon. CPTs and geoprobes were advanced by Oregon Geotechnical Explorations of Salem, Oregon between September 21 through November 8, 2022. A Wallace Group geotechnical professional logged the test pits and borings, supervised the CPTs and geoprobe work, performed dynamic-cone penetrometer (DCP) testing at selected test pit locations, and visually classified the soil and rock materials encountered at the exploration locations. The exploration logs, located in **Appendix A**, describe the materials encountered at each location explored. The soil and bedrock types between explorations are anticipated to be similar; however, variation should be expected. The stratigraphic contacts presented on the exploration logs represent the approximate boundaries between various soil and bedrock types. The approximate locations of the exploration locations are shown in **Figures 2a and 2b**.

A more complete description of the sampling techniques and soil-classification terminology is presented in **Appendix A**.

3.0 LABORATORY TESTING

Soil samples were transported to the Wallace Group geotechnical laboratory in Bend, Oregon, where they were visually classified, and either prepared for in-house laboratory testing or transported to Northwest Testing, Inc. of Wilsonville, Oregon, or Cooper Testing Laboratory of Mountain View, California for specialized geotechnical laboratory testing. Laboratory tests were conducted in general accordance with standard procedures and included the following tests:

- Moisture Content, ASTM D2216;
- Gradation Analyses, ASTM C117 / C136 and D422;
- Classification of Soil for Engineering Purposes, ASTM D2487;
- Atterberg Limits, ASTM D4318;
- Consolidation, ASTM D2435;
- UU Triaxial, ASTM D2850;
- CD Triaxial, ASTM D4767;
- CD Direct Shear, ASTM D3080;
- Flexible Wall Permeability, ASTM D5084 Method C; and
- Unconfined Point Load Testing, ASTM D5731.

Laboratory test results are included in **Appendix B**.

4.0 EXISTING SITE CONDITIONS

4.1 SURFACE CONDITIONS

The subject property includes the development of an approximate 42-acre area located south of the active CBLF. The CBLF south expansion area includes the northern flank of Tampico Ridge to the south extending to Coffin Butte Road on the north. Tampico Ridge includes hilltop peaks with elevations of 510 feet mean sea level (msl) on the west and 570 feet on the east. A valley is present between the two hilltop peaks in the south-central portion of the proposed landfill cell. The development area slopes down towards the south near Coffin Butte Road where elevations range from 260 feet msl on the east to 290 feet msl on the west. Groundcover consists of dense thickets of blackberry, poison oak, and coniferous trees in the steep upland areas. The lower topography areas of the site, near existing landfill infrastructure, are generally cleared and planted with agricultural vegetation and/or grasses.

4.2 SUBSURFACE CONDITIONS

Subsurface explorations generally encountered soil over weathered bedrock which becomes competent bedrock at deeper depths. More specifically, there are differences in the types of soil and depths to bedrock at upper and lower regions of the project area.

Subsurface conditions at lower elevations generally consist of fine-grained alluvium (Willamette Silt) and is primarily underlain by weathered basalt (bedrock) which becomes more competent at deeper depths. At higher elevations of the project area, the surficial soils primarily consist of fine-grained to coarse-grained colluvium and volcanic saprolites, which are generally coarser at higher elevations. These soils are primarily underlain by weathered basalt and more competent brecciated and altered basalt bedrock at deeper depths. The colluvium/saprolite soil cover generally becomes thinner at higher elevations. On the western hillside of Tampico Ridge, competent basalt was encountered at depths ranging between 10 and 25 feet bgs. On the eastern hillslope, surface soils were generally weaker and thicker than the western hillslope and competent basalt was encountered at depths ranging between 19 and 45 feet bgs. At lower elevations in the valley, the depth to competent basalt ranged from 22 and 65 feet bgs.

4.2.1 Willamette Silt

Willamette Silt was encountered in the northeast portion of the project area at BH-2, BH-14, GP/CPT-01, and GP/CPT-02 and extended from the surface to depths ranging between 17 to 25 feet below ground surface (bgs). Gradation and index tests indicate the native soil generally classifies as sandy -silt (ML) and sandy-fat-clay (CH), according to the Unified Soil Classification

System (USCS). The sandy silt and sandy clay were slightly moist to wet and brown, dark brown, tan, dark greenish gray, and gray with rounded to subrounded granular particles. Based on standard penetration testing, the Willamette Silt was generally medium stiff to stiff.

Where tested, the Willamette Silt samples contained 62 to 98 percent clay- and silt-sized particles and had moisture contents ranging between 30 to 36 percent. Atterberg limits testing indicates the soil is highly expansive with plasticity indices ranging from 31 to 39. Consolidated undrained (CU) triaxial testing indicates a total cohesion value of 1,000 pounds per square foot (psf) and total friction angle (phi) of 8.8 degrees at confining pressures ranging between about 2.9 and 3.7 kips per square foot (ksf). In the areas explored, the Willamette Silt was found to be underlain by weathered-in-place basalt.

4.2.2 Low Elevation Alluvium

Alluvial soil was encountered in GP/CPT-09 at the northwest portion of the development area, near the proposed new office building site. The alluvial soil layer extended from the surface to a depth of 6.5 feet bgs. Gradation and index tests indicate the native soil generally classifies as clay (CH), according to the USCS. The clay was moist and brown and dark gray in color. Based on CPT testing, the alluvial soil was generally stiff to very stiff.

Where tested, the clay contained 93 percent clay- and silt-sized particles and had a moisture content of 28 percent. Atterberg limits testing indicates the soil exhibited very high expansion potential and had plasticity index of 53. Consolidation testing on the alluvial fine-grained material indicates that it is slightly over-consolidated with over-consolidation ratios (OCRs) ranging between 2.3 and 8.4. In the areas explored, the alluvial soil was underlain by weathered-in-place basalt.

4.2.3 Volcanic Saprolite and Colluvium

Volcanic saprolite (in-place soil derived from the chemical weathering of rock) and colluvium (unconsolidated material derived from rain and gravity-driven soil movement) mantles the weathered basalt and competent basalt on the Tampico Ridge hillside. Volcanic saprolite and colluvium were encountered extending from the surface to depths ranging between 7 to 45 feet bgs. Colluvium was encountered in isolated areas and the soil mantle primarily consists of volcanic saprolite. Localized areas of thicker colluvial deposits may be encountered during construction.

Gradation and index tests indicate the soil generally classifies as silty-sand-with-gravel (SM), silty-sand (SM), clayey-sand (SC), sandy-silt-with-gravel (ML), sandy-silt (MH), and sandy-clay (CL), according to the field classifications and USCS. The silty-sand was moist to wet, tan, black, brown, orange, red, and gray, fine to coarse grained with subangular to subrounded particles. Based on SPT testing, the volcanic soil was generally found to be medium dense to very dense and very soft to hard. In general, the volcanic soil and colluvium are weaker and less dense on the eastern knob and northeastern portion of the site than the western knob and northwestern portion of the site.

Where tested, the clay contained 22.7 to 65.9 percent clay- and silt-sized particles and had moisture contents of 33.5 to 75.6 percent. Atterberg limits testing indicates the soil exhibits very high expansion potential with plasticity indices ranging from 19 to 41. In the areas explored, the alluvial soil was underlain by weathered-in-place basalt.

4.2.4 Granular Weathered Basalt

Willamette Silt, alluvial soil, volcanic saprolite, and colluvial soil were underlain by granular weathered basalt bedrock at depths ranging between 7 to 45 feet bgs. Gradation and field classifications indicate the weathered basalt generally classifies as silty -sand-with-gravel (SM), silty-sand (SM), silty-gravel-with-sand (GM), sandy-silt (ML), and sandy-clay (CL). The granular weathered basalt was moist to wet, gray, red, orange, and brown, fine to coarse grained, angular to subangular, and contains cobbles in some areas. Based on SPT testing, the weathered basalt is generally loose to very dense or medium stiff to hard.

Where tested, the weathered basalt contains 13.2 to 48.2 percent clay- and silt-sized particles with moisture contents ranging from 4.1 to 66.3 percent. Atterberg limits testing indicates the weathered rock exhibited moderate expansion potential with a plasticity index of 21. Where exploration locations were advanced through the granular weathered rock, it was underlain by basalt bedrock.

4.2.5 Brecciated and Altered Basalt Bedrock

Competent basalt bedrock was encountered at depths ranging between 10 to 65 feet bgs. The competent basalt encountered in borings was typically unweathered to moderately weathered, slightly to moderately fractured, with varying levels of brecciation, interbedding, and schistose/phyllitic alteration. Alterations generally occurred near high angle (55° to 90°) fractures and joints that were accompanied by chloritic siltstone interbeds, pyrite, calcite, and clay infilling. The bedrock ranged from very low strength to high strength with field strength indices of R0 to R4. Basalt textures were waxy to smooth, and the bedrock varied from dark gray to greenish gray. Basalt bedrock was encountered in borings BH-03, BH-04, BH-05, BH-09, and BH-13. No bedrock was encountered within the depths explored in BH-01, BH-02, BH-06, BH-07, BH-08, BH-10, BH-11, BH-12, and BH-14. The test pits encountered refusal on basalt at the higher elevation areas of the site, such as at TP-01, TP-02, TP-03, TP-04, TP-05, TP-08, TP11, TP-12, and TP-13, which typically will require drilling and blasting, hydraulic hammers, or large equipment to remove competent bedrock.

4.3 GROUNDWATER

Groundwater was encountered during the exploration at depths ranging between 4.6 and 67 feet bgs with the groundwater level generally deeper towards the northeast. We expect groundwater will be present within fractures of the weathered and competent bedrock, perched above the interface between soil and bedrock, and within alluvial soils at the lower elevation areas. Fractures provide the primary transport mechanism of groundwater in the bedrock; therefore, the occurrence and amount of groundwater encountered during the excavation of the expansion cell and ponds will depend on the nature, distribution, and interconnection of the fractures.

5.0 SEISMIC CONSIDERATIONS

5.1 REGIONAL AND SITE GEOLOGY

The Coffin Butte Landfill site is located approximately 11 miles north of downtown Corvallis, on the border of the Willamette Valley and Coast Range physiographic provinces. The Willamette Valley is a flat, riverine valley, formed by the cyclic damming and flooding of the Willamette River during the last ice age. This resulted in a broad flat valley with deep deposits of silt, clay, and organic soil, and a generally shallow water table (Orr, 1992).

The Coast Range is a volcanic complex and forearc basin which was accreted on the western edge of the North American plate between 66 and 30 million years ago (mya) (Snavely, et al, 1965). The Coast Range is locally composed of the Siletz River Volcanics, which are a Paleocene to middle Eocene aged sequence of pillow basalt flows, basalt breccias and conglomerates, and basaltic sedimentary interbeds (Walker and MacLeod, 1991). These rocks are generally altered and/or zeolitized and veined with calcite (Keith and Staples, 1985).

The site is generally divided into two zones: rocky upland areas underlain by the Siletz River Volcanics, and lowland areas composed of soft and or elastic fine-grained soils either derived from the Willamette Silt or volcanic saprolites. The Siletz River Volcanic uplands are generally composed of a thin mantle of granular soils overlying hard and competent basalt. These units have groundwater present in discontinuous layers and fracture zones of the basalt.

The lowland areas, present in the northeast and eastern portions of the site, are composed of fine-grained soils. These areas generally have shallow groundwater, and either consist of Willamette Silt, or highly weathered Siltez River volcanics that have been weathered in-place due to the influence of groundwater.

5.2 REGIONAL SEISMICITY

There are two primary earthquake source types that have been identified in the Pacific Northwest region: Cascadia Subduction Zone sources and shallow crustal sources. These sources result in three earthquake source classifications: (1) shallow crustal earthquakes, (2) deep earthquakes with a moment magnitude greater than 7.0 on the seismogenic part of the subducting plate of the Cascadia Subduction Zone, and (3) an earthquake with a possible moment magnitude of 9.0 (+/- 0.2) on the seismogenic part of the interface between the Juan de Fuca Plate and the North American Plate on the Cascadia Subduction Zone. Historic seismic activity in the Corvallis area has been primarily from shallow crustal sources associated with the locally mapped Corvallis Fault Zone (Personius-USGS, 2002).

For evaluating the earthquake ground motions at this site, we relied on the work of Geomatrix (1995) for the Oregon Department of Transportation (ODOT Report) and information more recently published by the United States Geological Survey (USGS). The geotechnical seismic design recommendations contained herein are provided in accordance with the Oregon Structural Special Code (OSSC), based on ASCE 7-22. The approach used for evaluating seismic conditions is based on the following:

- Earthquake sources in Oregon are identified primarily from published geologic records rather than recorded seismic data. Of the three source mechanisms considered in OSSC Section 1803.3.2, recorded seismic data are available only for shallow crustal events. The potential for periodic, large-magnitude subduction zone events along the Oregon Coast is based primarily on geologic evidence, as large, subduction zone events are believed to occur at intervals of 300 to 500 years. The most recent significant subduction zone earthquake occurred in the year 1700, based on a tsunami recorded in Japan. As a result, there are significant uncertainties associated with evaluating many of the key parameters required to assess earthquake hazards.
- To prepare the ODOT Report, Geomatrix assessed the seismic hazard in Oregon using probabilistic seismic hazard analysis techniques. The analyses performed included quantitatively addressing the uncertainties associated with the required input parameters for each of the identified potential earthquake sources. Based on the results of the analyses conducted, earthquake ground motion maps were generated for the State of Oregon for 500-year, 1,000-year and 2,500-year return periods for peak ground acceleration and 5-percent-damped spectral accelerations at spectral periods of 0.3 and 1.0 seconds. Generalized elastic response spectra were also developed for various regions of Oregon based on the relative influence of subduction zone seismic sources and shallow crustal sources to the overall seismic hazard.
- We also reviewed the 2023 USGS fault maps for the State of Oregon. Information provided by the USGS is consistent with the Geomatrix report, for seismic events with return intervals of 2,500 years (approximately equivalent to the two percent probability of exceedance in 50 years), specified in the OSSC.

The following sections include more detailed descriptions of the potential seismic sources, the methods used to evaluate peak ground accelerations, the methods used to develop the site-specific response spectra, and a discussion of the specific seismic concerns.

5.2.1 Subduction Zone Sources

An active subduction zone is located where the Juan de Fuca Plate is subducting beneath the North American Plate approximately 50 miles off the Oregon Coast. Earthquake types associated with the subduction zone include interface events at the boundary where two plates intersect and intra-slab events within the subducting Juan de Fuca Plate. Potential ground shaking and accelerations at the project site are expected to be significant. The northeastern portion of the site will be at risk of ground shaking amplification where soft, river plain sediments are present.

5.2.2 Crustal Sources

In the analyses associated with the Geomatrix ODOT Report, crustal sources incorporated into the analyses modeled both regional source zones and specific identified geologic faults.

Regional Zone: In this model, earthquakes are assumed to occur randomly within a general region. The advantage of this approach is that it allows provision for the possibility of unidentified or unknown fault sources. Maximum earthquake magnitudes are estimated for each source zone based on historic seismicity, maximum seismogenic depth and threshold of surface faulting. The project site is located in the southern Willamette Valley. Maximum earthquake magnitudes associated with crustal sources in the southern Willamette Valley and return interval of 2,500 years is Moment Magnitude (M_w) 5.75.

Specific Faults: The following discrete faults or fault zones are classified in the ODOT Report as "probable Quaternary Age" or later faults and are located within about 25 miles of the site. The ODOT Report and United States Geological Survey (USGS) identified two, isolated, northeast trending faults that displace late Quaternary deposits or geomorphic surfaces (less than 780,000 years old) in the southern Willamette Valley. These faults are located on the western and eastern borders of Corvallis. The Corvallis fault (west) and Owl Creek fault (east) are generally characterized as "inactive" and are up to approximately 40 km long.

The Corvallis fault, which forms the western boundary of the Willamette Valley near Corvallis, is mapped as close as four miles to the south of the site. The Corvallis fault is interpreted as northeast-trending, southwest-dipping Tertiary thrust fault, that thrusts the Eocene aged Siletz River Volcanics over the Eocene Tyee formation (Personius-USGS, 2002). The fault may also have been reactivated as a steeply dipping left lateral strike slip fault. Although there is no evidence that the fault is active due to late Pleistocene or Holocene displacement, USGS data suggests that the fault may be active with a long recurrence interval. Two alternative maximum rupture lengths are possible; 23 km length with a probability of 0.4 or 35 km length with a probability of 0.4. The calculated movement of the fault is approximately 0.2 mm/year, and it is classified as Class B.

The Owl Creek fault, in southern Willamette Valley, is located six miles to the southeast of the site. The steeply east-dipping Owl Creek fault is a reverse fault associated with an anticline in the Eocene Spencer Formation mapped in the subsurface east of Corvallis on the floor of the southern Willamette Valley. The fault, which has no geomorphic expression, apparently offsets the middle to late Pleistocene Rowland Formation, but does not offset the latest Pleistocene Willamette Formation. The most recent movement on the Owl Creek fault is defined as middle and late Quaternary, less than 750,000 years old. The Owl Creek fault is interpreted as northeast striking and approximately 12 km long (USGS, 2022). The calculated movement of the fault is approximately 0.2 mm/year.

5.3 EARTHQUAKE GROUND MOTIONS

5.3.1 Ground Response Spectra

Local geologic deposits can significantly amplify the ground response and the response of structures (represented by a response spectrum) as earthquake motions are propagated from bedrock to the soil surface.

Based on the conditions encountered during our field exploration program and shear wave velocity measurements collected in CPT-08, 2022 ASCE 7 Site Class D (Stiff Soil) is recommended for use in design. Based on the site's latitude, longitude, and subsurface conditions, site-specific response spectra were developed. The spectra shown in Appendix C includes the criteria for Site Class D (Stiff Soil) from the 2022 OSSC, with a return interval of 2,500 years (approximately equivalent to a two percent probability of exceedance in 50 years). For Site Class D, the resulting short period spectral response acceleration (0.2 second) for the site (S_S) is 1.05g, and the 1.0 second (S_1) spectral response acceleration is 0.44g. The five percent damped design spectral response acceleration at short periods (S_{DS}) is 0.9g. The seismic curve is presented in **Appendix C**.

5.3.2 Peak Ground Acceleration

The peak ground accelerations developed in the ODOT report were estimated by combining the earthquake sources discussed above with published attenuation relationships (Sadigh et. al, 1993; Idriss, 1991; Boore et. al., 1993). Peak ground accelerations and spectral accelerations incorporated into the 2022 OSSC have been periodically modified based on more recent USGS studies.

Based on the USGS Seismic Design Maps using the 2022 ASCE 7, the risk-based peak ground acceleration recommended for this site is 0.61g for Site Class D (Stiff Soil). Based on our understanding of previous geotechnical studies performed for landfill cells constructed on the north side of Coffin Butte Road, the site-specific PGA was 0.33g. Subsurface conditions in the southern expansion area include deeper soil over brecciated and altered basalt bedrock than encountered in the landfill cells to the north. We anticipate that a risk-based PGA of 0.61g is appropriate for the southern expansion area and will be more conservative than using a site-specific PGA.

5.4 SEISMIC HAZARDS SUMMARY

The OSSC specifically requires that certain geologic hazards be addressed in a site-specific seismic study. These are summarized in this section.

Ground Motion: Discussed in Section 5.3, Earthquake Ground Motions.

Liquefaction/Settlement: The potential for seismically induced liquefaction to develop within the profile was evaluated using the procedure outlined by Youd et. al. (2001). The procedure uses standard penetration test (SPT) blow counts and other soil data to estimate the cyclic resistance ratio (CRR) profile with depth (ratio of the cyclic shear stress required to cause liquefaction to the initial vertical effective stress). The cyclic stress ratio (CSR) profile with depth (ratio of cyclic shear stress to initial vertical effective stress) resulting from the design level earthquake is estimated from the total and effective stresses, the peak ground surface acceleration value, the magnitude of the design level earthquake, and a depth dependent stress reduction factor.

Based on the results of our geotechnical exploration, and lack of loose, saturated soils with a plasticity index of less than 12, the liquefaction potential at the site is low.

Landslide/Lateral Spreading: There is a risk from earthquake-induced landslides and the landslide potential analyses are presented in Section 6. The risk for lateral spreading is low due to the lack of significant potentially liquefiable zones.

Fault Rupture: The trace of the nearest mapped fault is associated with the Corvallis fault. This northeast trending fault is approximately four miles south of the project site (USGS, 2023). Based on our geologic research and local experience, the fault is reasonably mapped, and while in relatively close proximity to the project, it does not appear likely for fault rupture to occur at the proposed landfill site.

Tsunami or Seiche: There is no risk, based on the inland location of the site and lack of significant bodies of water in the immediate vicinity of the project.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of field exploration, laboratory testing, engineering analyses, and our local experience, it is our opinion that the site is suitable for the anticipated development from a geotechnical perspective. The primary geotechnical concerns are the highly expansive silts and clays in the lowland areas, potential settlement of new fills, and static and seismic slope stability of the new landfill cell and leachate pond excavations.

6.1 ROADWAY EMBANKMENT FILLS

Embankment fills for access roads will be constructed in the northeast portion of the site and in the south-central portion of the site. Fill placed for embankment roads in the northeast and south-central will be approximately 10 and 50 feet thick, respectively. Subsurface conditions vary from soft alluvial deposits in the northeast to dense volcanic soil in the south-central area. Based on the subsurface explorations, we expect that the 10-foot-tall roadway embankment constructed in the northeast will be underlain by approximately 13 to 28 feet of alluvial deposits, consisting of soft to very stiff silt and clay, underlain by very loose to very dense weathered basalt. The 50-foot-tall south-central embankment will be underlain by 10 to 25 feet of medium dense to very dense sand and gravel and hard clay, over basalt bedrock. In general, the upper five feet of soil in the south-central area is medium dense and the density increases with depth.

6.1.1 Roadway Embankment Site Preparation

We recommend that all development areas are stripped of organic soil to expose native soil. The development areas should be considered to extend five feet beyond the perimeter of the embankment fill areas. We anticipate deeper stripping depth will be required where mature trees are removed or were previously removed. All roots larger than 0.5-inch diameter should be removed. Once the organic soil and roots are removed, the subgrade should be scarified to a depth of at least eight (8) inches, moisture-conditioned at least three (3) percent above the optimum moisture content and compacted to at least 95 percent of the maximum Standard Proctor dry density as determined by ASTM D698 using suitable compaction equipment. The exposed soil subgrade should be kept moist until covered by new structural fill and/or pavement.

In the lowland area, soil exposed after stripping may be weak, saturated, and/or incapable of supporting the weight of construction equipment or achieving proper compaction; therefore, subgrade stabilization may be required prior to adding new fill. We first recommend that a

Wallace Group representative evaluate the exposed subgrade and determine the most appropriate procedure for subgrade stabilization. Acceptable subgrade stabilization approaches include: 1) over-excavating and removing weak material to expose firm subgrade, and subsequently backfilling the excavation with compacted select fill, as described in a subsequent section of this report, and 2) over-excavating and removing weak material to a depth of at least two feet, and subsequently placing geogrid across the base of the excavation, placing a poorly graded, ¾-inch drain rock or crushed rock material over the geogrid in horizontal uncompacted lift of 12 inches or less, and compacting the granular material to the satisfaction of the Wallace Group representative; the process should be repeated until the over-excavated area has been fully backfilled.

In the south-central embankment area, the upper five (5) feet of medium dense sand should be removed to expose very dense sand and gravel or hard clay. The exposed subgrade should be scarified to a depth of at least eight (8) inches, moisture conditioned to above the optimum moisture content, and compacted to at least 95 percent of the maximum Standard Proctor dry density, as determined by ASTM D698 using suitable equipment. The exposed soil subgrade should be kept moist until covered by new structural fill and/or pavement. Embankment slopes should be no steeper than 2.5 to 1 (H to V).

6.1.2 Roadway Embankment Structural Fill and Placement

Where structural fill is needed to construct roadway embankments, we recommend it consist of appropriately graded sand and gravel having 100 percent passing a two-inch sieve, less than 30 percent retained on the ¾-inch sieve, and less than 20 percent passing a No. 200 sieve. On-site, non-organic, native soil, will not likely be suitable for reuse as structural fill due to the high content of silt and clay-sized particles and highly expansive properties. We recommend the structural fill have a maximum dry density (ASTM D698) of at least 90 pounds per cubic foot (pcf).

In addition, we recommend:

- Structural fill be placed in horizontal lifts not exceeding 8 inches in uncompacted thickness, moisture-conditioned to within a range of +/- 2 percent of optimum moisture content, and compacted as recommended in **Table 6.1.2**, *Engineered Fill Specifications Summary.*
- Structural fill should be placed in level lifts and benched into slopes. During the benching process, a Wallace Group representative should determine if subsurface

drainage should be installed to collect water that seeps from the existing hillslope and redirect the water to a suitable outlet.

- Structural fill should not be placed during freezing weather or on frozen subgrade to avoid potential thaw settlement.
- Compaction of fill should be performed to achieve the minimum relative compaction shown in **Table 6.1.2**. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D698 laboratory compaction procedure.
- A Wallace Group representative should periodically observe the fill placement and test the fill for grain-size, fines content, plasticity, and compaction.

The southern slope of the roadway embankment fill placed in the Tampico Ridge valley, in the south-central portion of the site, should be constructed with drainage elements to prevent potential erosion and piping of the embankment fill. Wallace Group recommends that the embankment is constructed with concrete lined v-ditches near the southern base of the embankment to direct surface water away from the embankment. The embankment should be graded such that the crest directs water away and reduces the potential for surface water flow over the crest. The potential for erosion should be reduced by constructing benches into the southern slope every 15 vertical feet. The benches should be wide enough to allow maintenance and should be sloped towards the embankment and constructed with concrete lined v-ditches which direct water away from the slope. In addition, the soil slope face should be hydroseeded to reduce surface erosion. Concrete lined v-ditches should be monitored and maintained.

As an alternative to the construction of benches and intermediate concrete lined v-ditches includes covering the soil slope surface with an erosion mat which is hydroseeded. The erosion control mat should be constructed with an anchor trench at the top of slope in accordance with the manufacturer's recommendations and be secured using high load anchors. The concrete lined v-ditch at the base of the southern slope should also be included to direct surface water away from the embankment.

Table 6.1.2, below, summarizes the placement and compaction specifications for anticipated uses of structural fill for this project.

Table 6.1.2
Engineered Fill Specifications Summary
Coffin Butte Landfill Southern Expansion Area
28972 Coffin Butte Road
Corvallis, Oregon

Material Type & Specifications	Placement Location	Placement Specifications
Base Course – Crushed Aggregate, ¾-inch minus, <8% passing #200 sieve.	Base Course Beneath Slabs on Grade, Pavement, and Footings	Maximum 6" lifts; compacted to minimum 95% of Standard Proctor density (ASTM D698) for floor slabs, footings, 92% for pavement, exterior slabs and sidewalks.
Structural Fill - Granular, Inorganic soil, 2-inch minus, <30% retained on ¾-inch sieve, <20% passing #200 sieve. Non-plastic. Maximum dry density of at least 90 pcf.	Beneath Slabs on Grade, Exterior Slabs, Pavement, Sidewalks, Utility Trench Backfill, and Footings	Maximum 8" lifts; compacted to minimum 95% of Standard Proctor density (ASTM D698) for floor slabs, footings, all fill exceeding 5 feet vertical, 92% for pavement, exterior slabs and sidewalks.
Granular Landscape Fill – Inorganic soil, 3-inch minus.	Landscaped Areas	Fill depth less than 4 feet, compaction not required. Fill depths greater than 4 feet, compact to a minimum of 90% of Standard Proctor (ASTM D698).

6.2 LANDFILL CELL SITE PREPARATION

We recommend that all development areas are stripped of organic soil to expose native soil. Based on the depths of proposed excavation, softer volcanic soil, alluvial deposits, and Willamette Silt will be removed. However, there is potential for some softer soil to remain along the northern and eastern perimeter and in the valley between the east and west knob. If subgrade stabilization measures are needed, the process described in Section 6.1.1 should be utilized.

6.3 EXCAVATIONS

To construct the CBLF southern expansion area, cuts will be up to 155-feet at the western knob of Tampico Ridge, up to 110-feet at the eastern knob, and up to 50-feet for the construction of the leachate ponds (**Figure 2b**, *Exploration Location Map*). Cuts to remove the native silt, clay, and gravel soil can generally be excavated with conventional earth-moving equipment such as excavators and small dozers.

Competent basalt bedrock will likely require rock hammers or drilling and blasting to excavate. The western hillside may be excavatable mechanically; however, it will result in a ragged final slope which may be problematic over time. The eastern hillside is more competent and mechanical excavation methods will not be appropriate. We recommend that drilling and blasting is used during rock excavation. The rock excavation method should be performed in a manner that limits as much as practical blasting disturbance beyond the rock cut. We recommend the project documents incorporate the latest Oregon Department of Transportation (ODOT) Standard Specifications, Section 00335, for blasting and that a qualified blasting consultant is used. Groundwater will be encountered during the expected earthwork operations and dewatering operations are recommended during the construction of the leachate ponds.

The excavation areas have been divided into three areas based on the subsurface conditions: the western hillside slope, eastern hillside slope, and leachate ponds. In general, the western hillslope was underlain by volcanic soil consisting of medium dense to very dense sand and gravel and hard clay which was up to approximately 35-feet thick and underlain by weathered basalt and fresh basalt. The basalt in the western hillslope was intensely brecciated with infilling of siltstone.

The volcanic soil overlying bedrock in the eastern slope and within the valley was generally weaker than encountered in the west. The eastern slope was generally underlain by up to 27-

feet of very soft to hard silt and clay underlain by weathered basalt and basalt. The bedrock encountered in the eastern hillslope was generally intact basalt with only isolated intervals of brecciation and was primarily composed of basalt with minor siltstone matrix. The subsurface conditions near the leachate ponds consisted of up to 28-feet of soft to very stiff fine-grained alluvial deposits underlain by weathered basalt and basalt bedrock.

Based on current plans, excavations in the landfill cell below the access road will be sloped at 2 to 1 horizontal to vertical (H to V) to accommodate the landfill liner. The access road loops around the cell to the south and the slope above the road is sloped at 1.5 to 1 (H to V). The two leachate ponds will be constructed with bottom of pond elevations of 257 feet and 272 feet msl on the north and south, respectively. The slope from the ponds will continue to the south at 2.5 to 1 (H to V) where it meets Tampico Ridge near elevation 400 feet msl.

6.4.1 Slope Stability Model Soil and Rock Design Values

The proposed excavations were evaluated using the SLIDE2 program, developed by Rocscience. Wallace Group teamed with Delve Underground to complete the excavation recommendations for the southern expansion. Subsurface conditions and engineering properties were selected based upon applicable Wallace Group borings, CPTs, and test pits and laboratory test results. Strength of the alluvial and volcanic soil was represented using the Mohr-Coulomb criteria for both short-term (after construction) and long-term conditions. Acceptable factors of safety were considered to be greater than or equal to 1.3 for short and long-term conditions and 1.0 for seismic analysis.

Strength of the volcanic breccia of the west slope and the basalt of the east slope were modeled using the Generalized Hoek-Brown relationships. The following tables summarize the soil and rock strengths used in the slope stability models.

Table 6.4.1-1
Assumed Engineering Properties
West Slope

Geologic Unit	Unit Weight (pcf)	Strength Model	Friction Angle (degrees)	Cohesion (psf)	UCS (psf)	GSI
Soil (Colluvium)	125	Mohr-Coulomb	34	100	-	-
Weathered Rock	165	Generalized Hoek-Brown	-	-	30,000	30
Volcanic Breccia	170	Generalized Hoek-Brown	-	-	200,000	45

Table 6.4.1-2
Assumed Engineering Properties
East Slope

Geologic Unit	Unit Weight (pcf)	Strength Model	Friction Angle (degrees)	Cohesion (psf)	UCS (psf)	GSI
Soil (Colluvium)	125	Mohr-Coulomb	30	150	-	-
Weathered Rock	165	Generalized Hoek-Brown	-	-	30,000	30
Basalt	175	Generalized Hoek-Brown	-	-	480,000	55

Table 6.4.1-3
Assumed Engineering Properties
South Central Embankment

Geologic Unit	Unit Weight (pcf)	Strength Model	Friction Angle (degrees)	Cohesion (psf)	UCS (psf)	GSI
Embankment Fill	120	Mohr-Coulomb	38	0	-	-
Hard Clay	95	Mohr-Coulomb	0	2,000	-	-
Shale	120	Generalized Hoek-Brown	-	-	500,000	10
Basalt	175	Generalized Hoek-Brown	-	-	480,000	55

Table 6.4.1-4
Assumed Short-Term Engineering Properties
Leachate Ponds

Geologic Unit	Unit Weight (pcf)	Strength Model	Friction Angle (degrees)	Cohesion (psf)	UCS (psf)	GSI
Willamette Silt	95	Mohr-Coulomb	9	1000	-	-
Soil (Volcanic/ Colluvium)	95	Mohr-Coulomb	0	1039	-	-
Weak Weathered Rock	120	Mohr-Coulomb	14	750	-	-
Dense Weathered Rock	165	Generalized Hoek-Brown	-	-	30,000	30
Basalt	175	Generalized Hoek-Brown	-	-	480,000	55

Table 6.4.1-5
Assumed Long-Term Engineering Properties
Leachate Ponds

Geologic Unit	Unit Weight (pcf)	Strength Model	Friction Angle (degrees)	Cohesion (psf)	UCS (psf)	GSI
Willamette Silt	95	Mohr-Coulomb	9	1000	-	-
Soil (Volcanic/ Colluvium)	95	Mohr-Coulomb	33	0	-	-
Weak Weathered Rock	120	Mohr-Coulomb	22	400	-	-
Dense Weathered Rock	165	Generalized Hoek-Brown	-	-	30,000	30
Basalt	175	Generalized Hoek-Brown	-	-	480,000	55

6.4.2 Eastern and Western Hillside Excavations

Delve utilized the Markland Analysis technique with mapped joint orientations and an estimated rock mass peak friction angle to study the kinematic stability of the overall rock mass with respect to the proposed cut slope orientation. Delve concluded that the rock slope should not be cut an at angle steeper than 53 degrees (approximately 0.75 to 1, H to V). Limited rock reinforcement, scaling, and rockfall mitigation (ditch or mesh) may still be required for a 53-degree cut slope). Rockfall mitigation techniques are discussed in detail in **Appendix E**.

Global stability of the eastern and western hillside cut was evaluated using a 2D limit equilibrium analysis. The analysis was performed using the Rocscience SLIDE2 computer program and the material strength properties presented in **Section 6.3.1**. The selected subsurface conditions were based on cross-sections B-B' at the western slope and Section D-D' at the eastern slope. Configuration of the models assumed the following cut inclinations:

- Slope of 2H:1V below the access road
- Slope of 0.75H:1V in rock and weathered rock above the access road
- Slope of 1.5H:1V at the brow of the slope where colluvium is encountered on the west slope.
- Slope of 2.5H:1V at the brow of the slope where colluvium is encountered on the east slope.

As discussed in **Appendix E**, the limit equilibrium analysis suggests stable conditions provided the west and east slopes are cut at the following inclinations or shallower:

- Volcanic Breccia and Basalt: 0.75H:1V
- Weathered Rock: 0.75H:1V
- Colluvium soil: 1.5H:1V at the west slope
- Colluvium soil: 2H:1V at the east slope below the access road and 2.5H:1V above the access road

The interpreted boundary between soil and weathered rock will dictate where the cut-slope transitions from 0.75H:1V to 1.5H:1V or 2H:1V to 2.5H:1V. Because of the assumptions made and variation in subsurface conditions, representation of subsurface geometry along the height of the cut should be considered approximate. Transition in the cut slope angle from colluvium to rock should be confirmed and modified as necessary during construction. See **Appendix E** for further discussion on the rock cut analysis and conclusions. Acceptable excavation slopes are presented on **Figure 12**.

6.4.3 Leachate Pond Excavations

Wallace Group evaluated the global stability of the leachate pond cut using a 2D limit equilibrium analysis for short-term (during construction), long-term, and seismic conditions. The analysis was performed using the Rocscience SLIDE2 computer program and the material strength properties are presented in **Section 6.3.1**. The selected subsurface conditions were based on cross-section E-E.' Configuration of the model assumed the cut slope is 2.5H:1V from the base of the leachate pond cut to the intersection with the slope to the south at an approximate elevation of 400 feet msl. Based on the available groundwater data, the models were evaluated assuming that the groundwater is approximately 17-feet bgs at the south and 5-feet bgs at the north. Seismic loading conditions were assumed to be 40 percent of the PGA, a seismic load of approximately 0.25g.

Based on the results of the slope stability modeling, the following table summarizes the minimum factors of safety for the three conditions:

Table 6.4.3-1
Modeling Factor of Safety Summary
Leachate Ponds

Slope Stability Condition	Estimated Factor of Safety
Short-Term	1.3
Long-Term	1.3
Seismic	1.0

The global factors of safety for the planned 2.5H:1V cut slope will be acceptable for the short-term, long-term, and seismic conditions. Some localized slope failures of the leachate pond edges are possible; therefore, Wallace Group recommends that the leachate pond slopes are constructed using compacted structural fill which extends from the bottom of pond to a lateral distance of at least 25-feet. Structural fill should be placed in level lifts and bear on dense soil or hard weathered basalt. Cuts into native soil for the construction of the ponds should not be steeper than 2.5H:1V. We recommend the slope is cut, then benches are constructed during fill placement. Benches in the native soil should be approximately 5 feet deep and 5 feet high. A keyway should be constructed at the base of the fill that is at least 8-feet wide and 6-feet deep. If a long-term slope stability factor of 1.5 is preferred, horizontal drains should be constructed upslope of the leachate pond to lower the groundwater elevation to below the very dense weathered basalt. Output slope models are presented in **Appendix F**.

The safety of the workers and equipment in or near excavations is the responsibility of the contractor. During construction, Wallace Group should observe cut slopes to confirm the inclinations are appropriate for the conditions encountered. It is the responsibility of the contractor to maintain safe and stable slopes during construction. The slope stability analyses did not include surcharge loading from construction equipment or stockpiled material.

6.5 SETTLEMENT ESTIMATES

The laboratory consolidation test results indicate that the Willamette Silt and volcanic/colluvial soil is overconsolidated with overconsolidation ratios (OCRs) ranging from 2.3 to 8.4. Dependent on the landfill cell thickness, new loads added to the base of the landfill could result in recompression and a new cycle of primary consolidation. Considering the variable thickness of new fill and the amount of Willamette Silt and volcanic/colluvial soil which will remain after excavation, the amount of settlement will differ across the site. Based on an assumed landfill material unit weight of 80 pounds per square foot, we estimate up to 24 inches of consolidation settlement will occur within 50-years. Settlement estimates were computed using the computer modeling program Settle3 by Rocscience and the settlement contours are illustrated on **Figure 13**.

Roadway embankment fill placed in the lowland area will be underlain by weak fine-grained silt and clay. Where new fill is placed, total settlement is expected to be up to 8- to 10-inches within 50 years. It should be expected that some repairs to the embankment fill will be needed over time.

7.0 ADDITIONAL SERVICES

7.1 DESIGN AND CONSTRUCTION PERIOD ENGINEERING SERVICES

Wallace Group will review the geotechnical and civil aspects of the project design plans and specifications, when completed, to confirm that our recommendations are incorporated into the project documents, and to make appropriate modifications, if necessary. We currently anticipate performing design review of foundation, grading, and drainage plans to document that our recommendations are incorporated into design. This review will reduce misinterpretation of our recommendations and reduce the potential for costly design changes and construction delays.

7.2 CONSTRUCTION INSPECTION AND TESTING

To maintain our role as the geotechnical engineer of record, Wallace Group will also observe and monitor earthwork construction including site preparation, placement, and compaction of engineered fill in building pad areas, utility trench backfill, foundation, and slab preparation. The purpose of these services will be to help document that site grading and development-area-subgrade preparation complies with the recommendations of this geotechnical report and the approved project plans and specifications. If subsurface conditions are encountered during construction that differ from the conditions described herein, we will review our recommendations considering these different conditions and recommend changes in design or construction procedures.

8.0 LIMITATIONS

Exploratory test pits, borings, CPTs, and geoprobes performed for this study were placed to obtain an understanding of underground conditions for evaluation and design purposes. The exploration was performed using a mutually-agreed-upon scope of services. Variations from these conditions, not indicated by the test pits, are possible. These variations are sometimes enough to necessitate design modifications. CEC (Client) must recognize that it is impossible to predict every physical condition that will be encountered. If unexpected conditions are observed during construction, or if the size, type, elevation, or location of the proposed structures should differ significantly from the preliminary plans, we should be notified to review the recommendations contained in this report. The professional judgments expressed in this report meet the standard of care of our profession; however, no warranty is expressed or implied.

This report may be used only by the Client and only for the intended site and for the purposes stated within a reasonable time from its issuance, but in no event, later than five (5) years from the date of the report. Land or facility use, on- and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time. Any party other than the Client or their design team who wishes to use this report shall notify the Wallace Group of such intended use. Based on the intended use of the report, the Wallace Group may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release Wallace Group from any liability resulting from the use of this report by any unauthorized party.

The contractor selected for this project is responsible for supervision and direction of the actual work performed by his employees, subcontractors, and agents. Wallace Group will use accepted geotechnical engineering and testing procedures; however, our testing and observations will not relieve the contractor of his primary responsibility to produce a completed project conforming to the project plans and specifications.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor’s operations, and we cannot be responsible for the safety of personnel other than our own on the site. The safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein unsafe.

9.0 REFERENCES

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10.0 PROFESSIONAL AUTHENTICITY

This report has been authored and reviewed by the undersigned, respectively. This report is void if the original seal(s) and signature(s) are not included.

91706PE
JANUARY 10, 2017
LISA M. SPLITTER
Renewal Date 6/30/26

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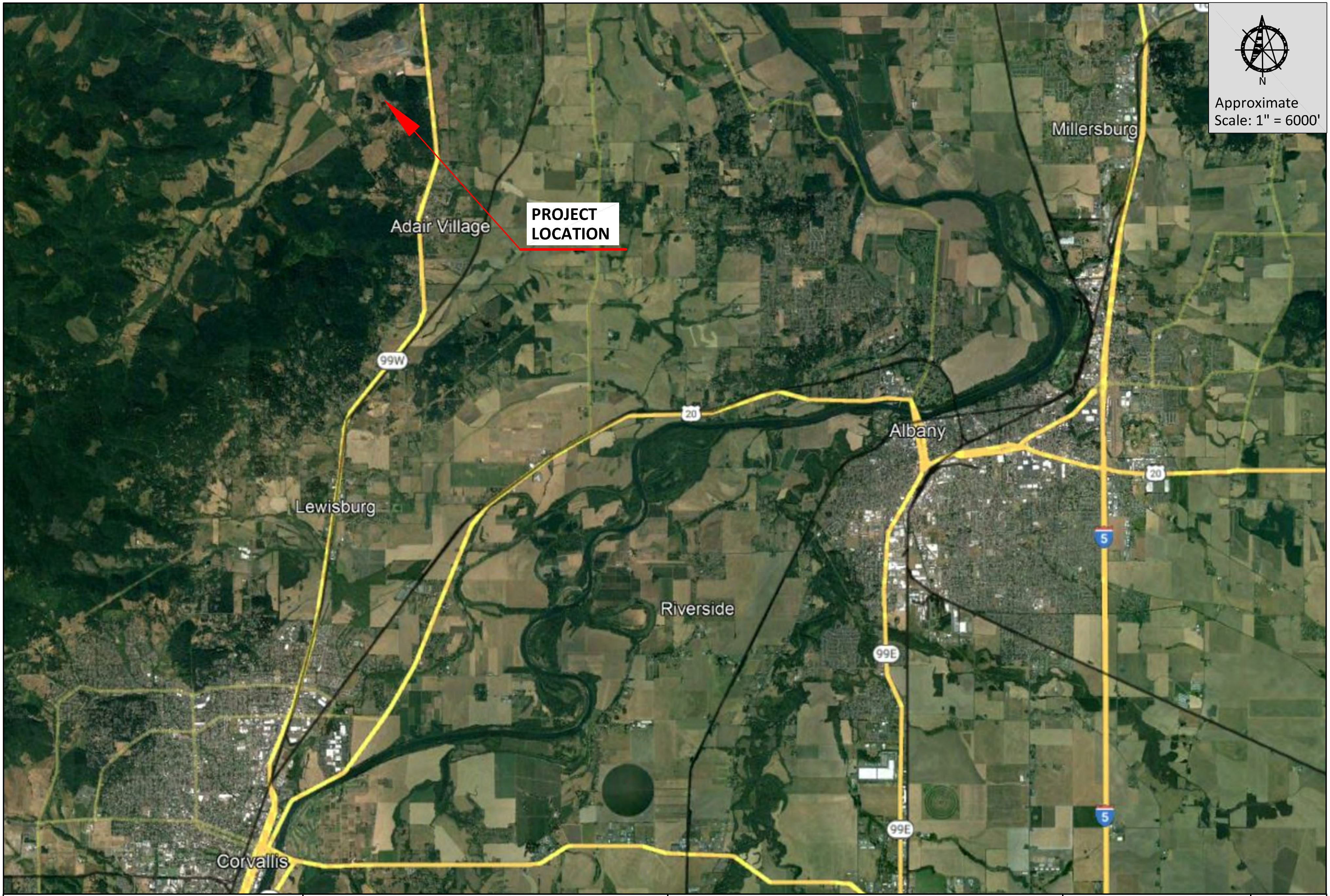
SEPTEMBER 13, 2017
ADAM LARSON
Renewal Date: 12/31/24

Adam Larson, P.E.
Project Geotechnical Engineer

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

FIGURES



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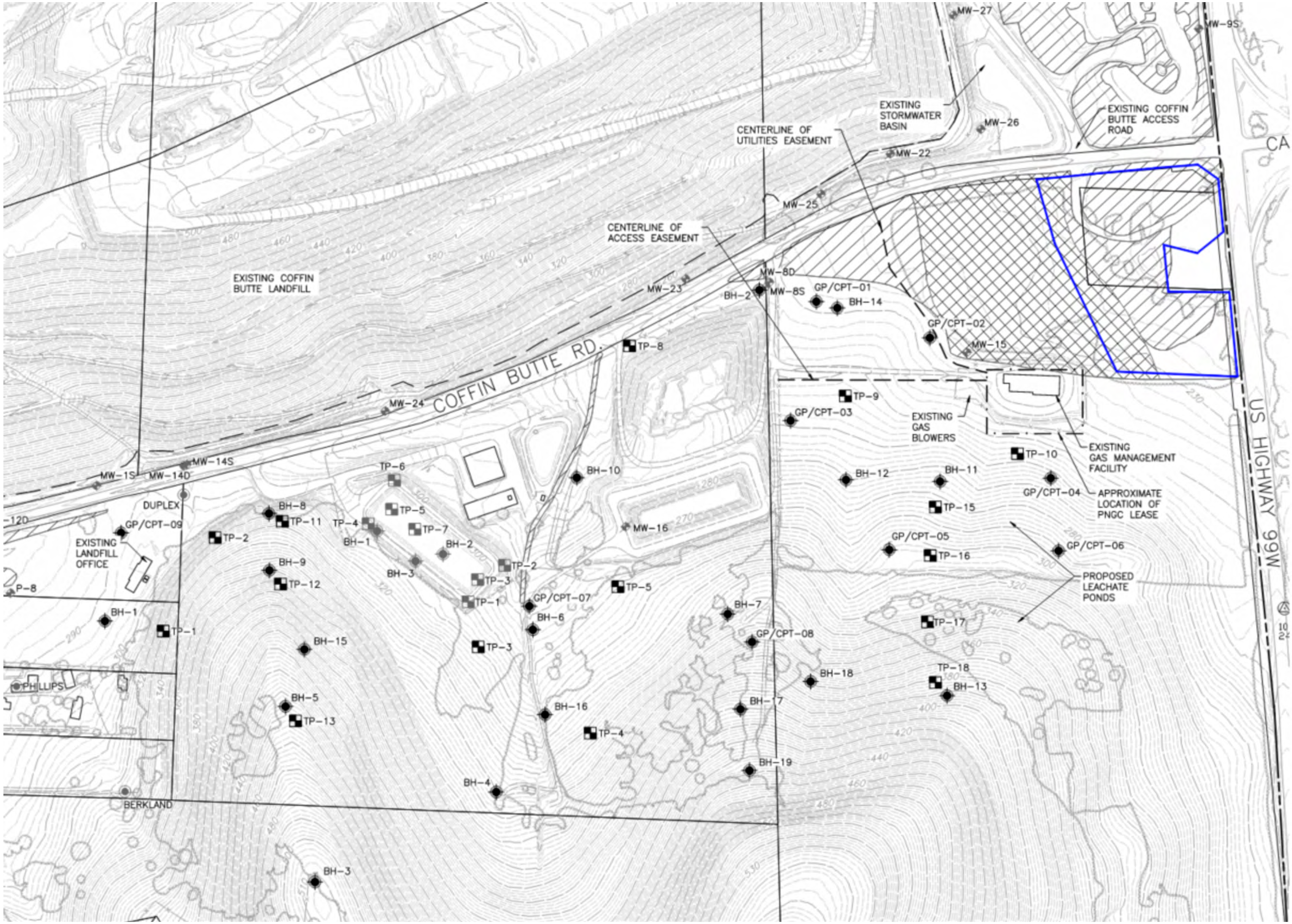
VICINITY MAP
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No:	21129 (1)
DRAWN:	January 31, 2022
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME:	21129 (1) Figure 1

FIGURE
1



LEGEND

PROPERTY BOUNDARY
EXISTING LANDFILL BOUNDARY
TAX LOT BOUNDARY
EXISTING 10-FT CONTOUR
EXISTING 2-FT CONTOUR
EXISTING PALUSTRINE FORESTED WETLAND
EXISTING PALUSTRINE EMERGENT WETLAND
EXISTING GROUNDWATER MONITORING WELLS/PIEZOMETER
DECOMMISSIONED MONITORING WELLS
EXISTING WATER SUPPLY WELLS
EXISTING BORE HOLE
PROPOSED BORE HOLE
EXISTING TEST PIT
PROPOSED TEST PIT

PROPOSED BOREHOLE/TEST PIT TABLE

POINT #	DESCRIPTION	EXISTING GROUND ELEVATION	DESIGN GROUND ELEVATION	ELEVATION DIFFERENCE (FT)	NORTHING	EASTING
1	BH	291.73	314.31	+22.58	386993.30	7491228.00
2	BH	240.75	247.73	+6.98	388028.01	7493274.15
3	BH	510.00	500.01	-9.99	386177.39	7491884.63
4	BH	343.89	362.49	+18.60	386458.65	7492451.61
5	BH	443.43	313.86	-129.57	386726.13	7491792.60
6	BH	291.19	293.82	+2.63	386966.17	7492565.95
7	BH	338.92	321.62	-17.30	387015.13	7493175.46
8	BH	309.25	292.60	-16.65	387329.59	7491740.75
9	BH	359.05	295.02	-64.03	387151.79	7491742.28
10	BH	263.11	271.53	+8.42	387441.49	7492703.58
11	BH	274.77	265.00	-9.77	387429.86	7493839.53
12	BH	270.70	278.46	+7.76	387429.86	7493839.53
13	BH	390.17	376.93	-13.24	386760.08	7493861.25
14	BH	239.03	253.00	+13.97	387972.34	7493517.97
1	TP	323.66	331.61	+7.95	386961.84	7491410.53
2	TP	301.95	293.05	-8.90	387254.49	7491572.23
3	TP	308.29	297.30	-10.99	386912.70	7492395.46
4	TP	334.16	345.53	+11.37	386643.02	7492745.75
5	TP	297.77	286.17	-11.60	387100.73	7492831.97
8	TP	251.57	252.52	+0.95	387853.25	7492868.49
9	TP	253.18	265.38	+12.20	387697.22	7493543.05

N

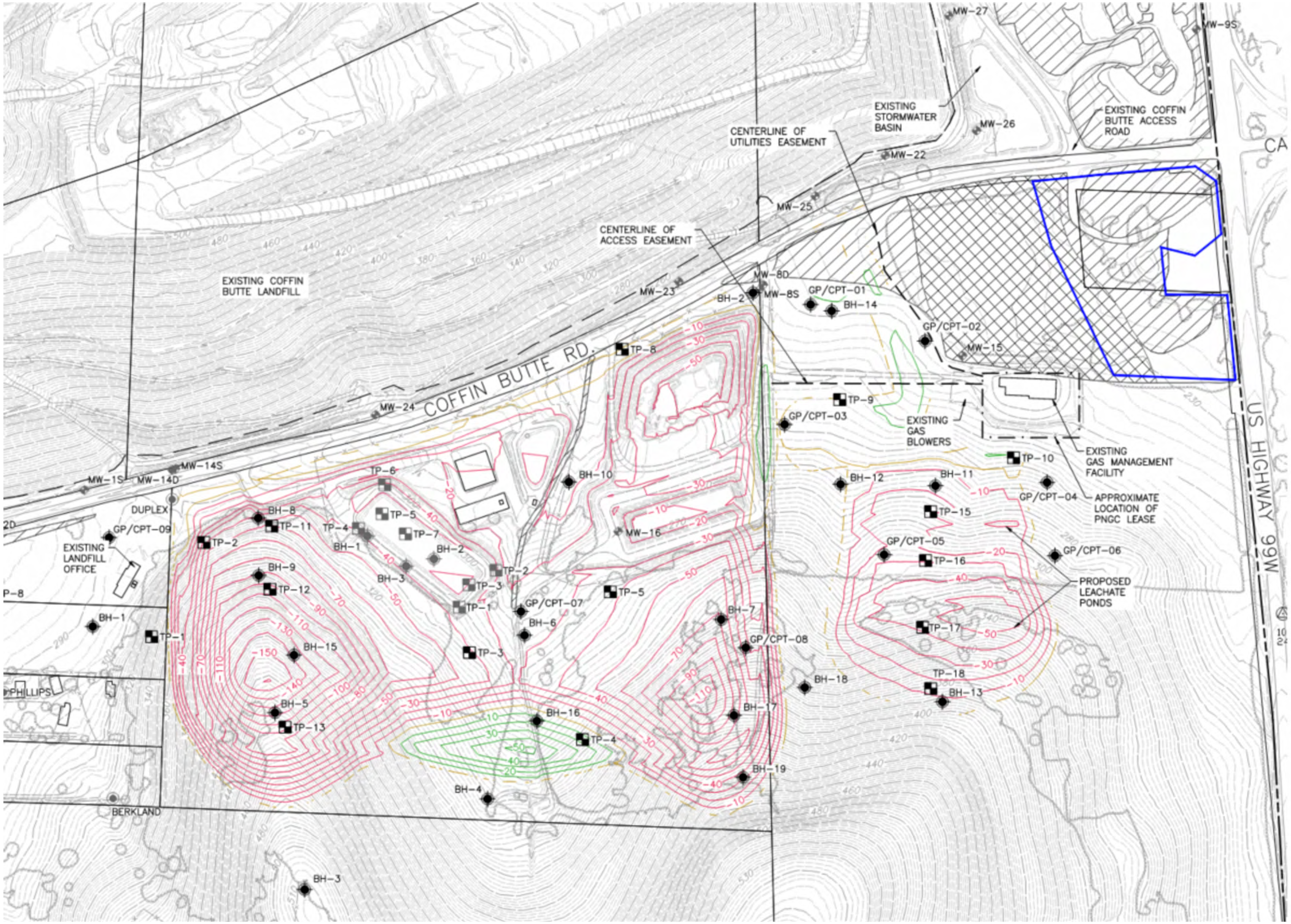
APPROXIMATE SCALE
1" = 350'

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

EXPLORATION LOCATION MAP
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No:	21129 (1)
DRAWN:	January 31, 2022
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME:	21129 (1) Figure 2a

FIGURE:
2a



LEGEND

- PROPERTY BOUNDARY
- EXISTING LANDFILL BOUNDARY
- TAX LOT BOUNDARY
- 300 EXISTING 10-FT CONTOUR
- EXISTING 2-FT CONTOUR
- ▨ EXISTING PALUSTRINE FORESTED WETLAND
- ▨ EXISTING PALUSTRINE EMERGENT WETLAND
- EXISTING GROUNDWATER MONITORING WELLS/PIEZOMETER
- DECOMMISSIONED MONITORING WELLS
- ● EXISTING WATER SUPPLY WELLS
- EXISTING BORE HOLE
- ◆ PROPOSED BORE HOLE
- EXISTING TEST PIT
- PROPOSED TEST PIT

PROPOSED BOREHOLE/TEST PIT TABLE

POINT #	DESCRIPTION	EXISTING GROUND ELEVATION	DESIGN GROUND ELEVATION	ELEVATION DIFFERENCE (FT)	NORTHING	EASTI
1	GP/CPT	238.82	247.90	-9.08	387992.07	749345
2	GP/CPT	237.06	237.06	0.00	387878.79	749380
3	GP/CPT	258.82	263.12	-4.30	387619.91	749337
4	GP/CPT	263.42	263.42	0.00	387440.30	749418
5	GP/CPT	302.68	280.00	22.68	387216.21	749368
6	GP/CPT	290.84	290.84	0.00	387213.16	749420
7	GP/CPT	287.77	264.57	23.20	387040.06	749255
8	GP/CPT	360.17	315.26	44.91	386928.09	749325
9	GP/CPT	288.85	288.85	0.00	387269.13	749127

N

APPROXIMATE SCALE
1" = 350'

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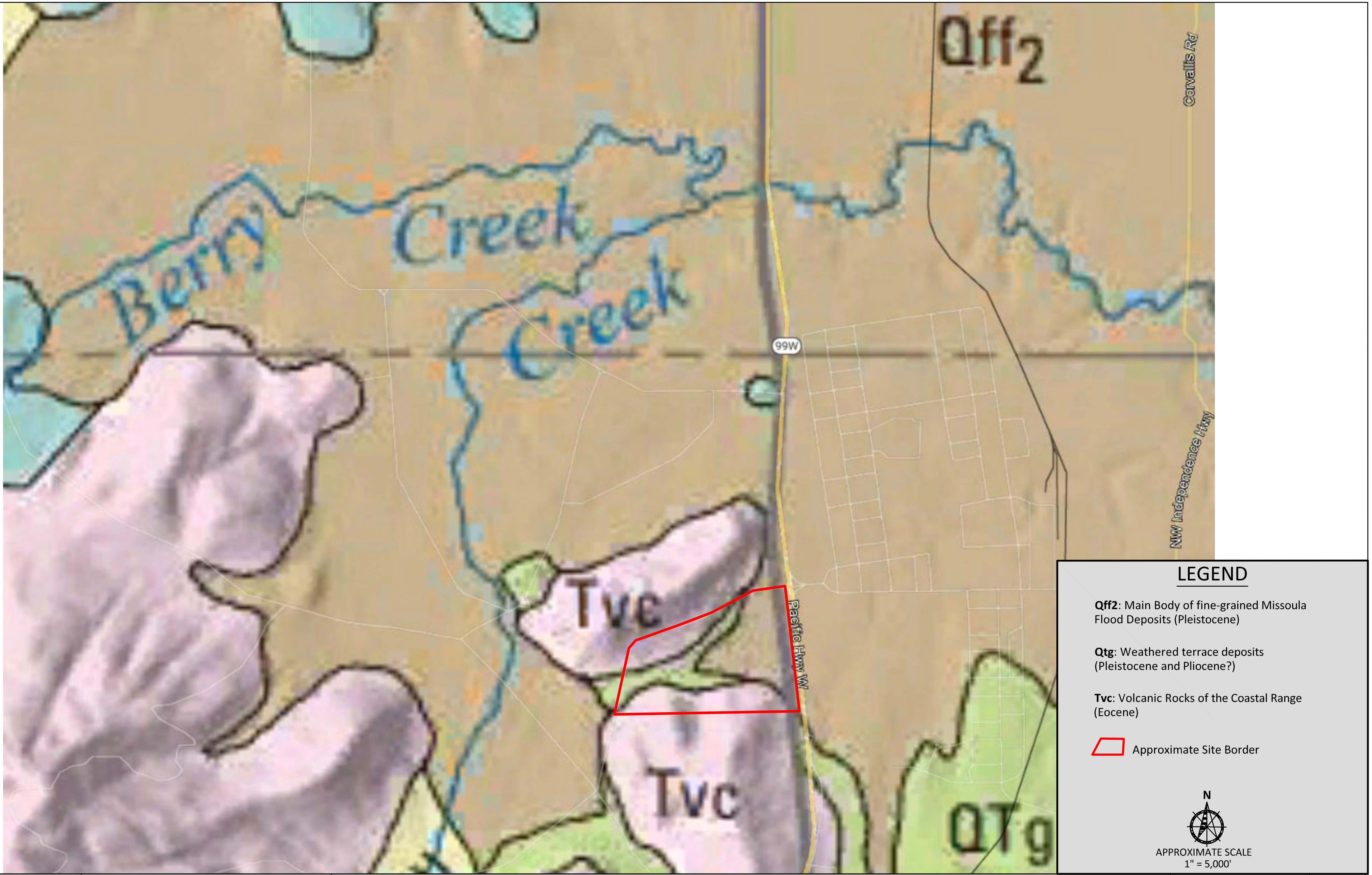
NORTHWEST GEOSYSTEM EXPERTS

EXPLORATION LOCATION MAP
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No: 21129 (1)
DRAWN: January 31, 2022
DRAWN BY: KAK
CHECKED BY: LMS
FILE NAME:
21129 (1) Figure 2b

FIGURE:
2b



LEGEND

Qff2: Main Body of fine-grained Missoula Flood Deposits (Pleistocene)

Qtg: Weathered terrace deposits (Pleistocene and Pliocene?)

Tvc: Volcanic Rocks of the Coastal Range (Eocene)

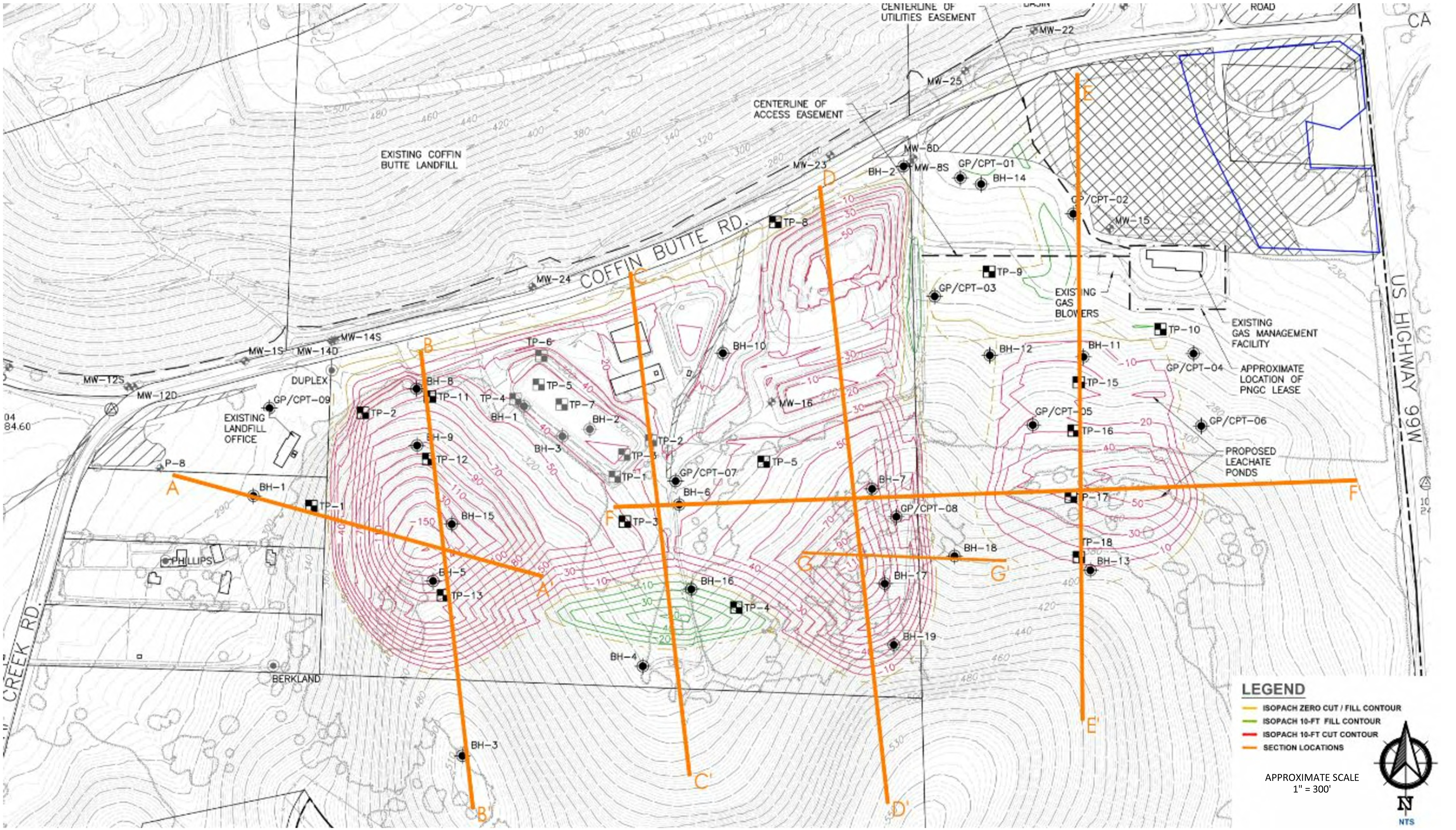
▭ Approximate Site Border

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

SURFACE GEOLOGY MAP
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No:	21129 (1)
DRAWN:	January 31, 2022
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME:	21129 (1) Figure 3

FIGURE:
3

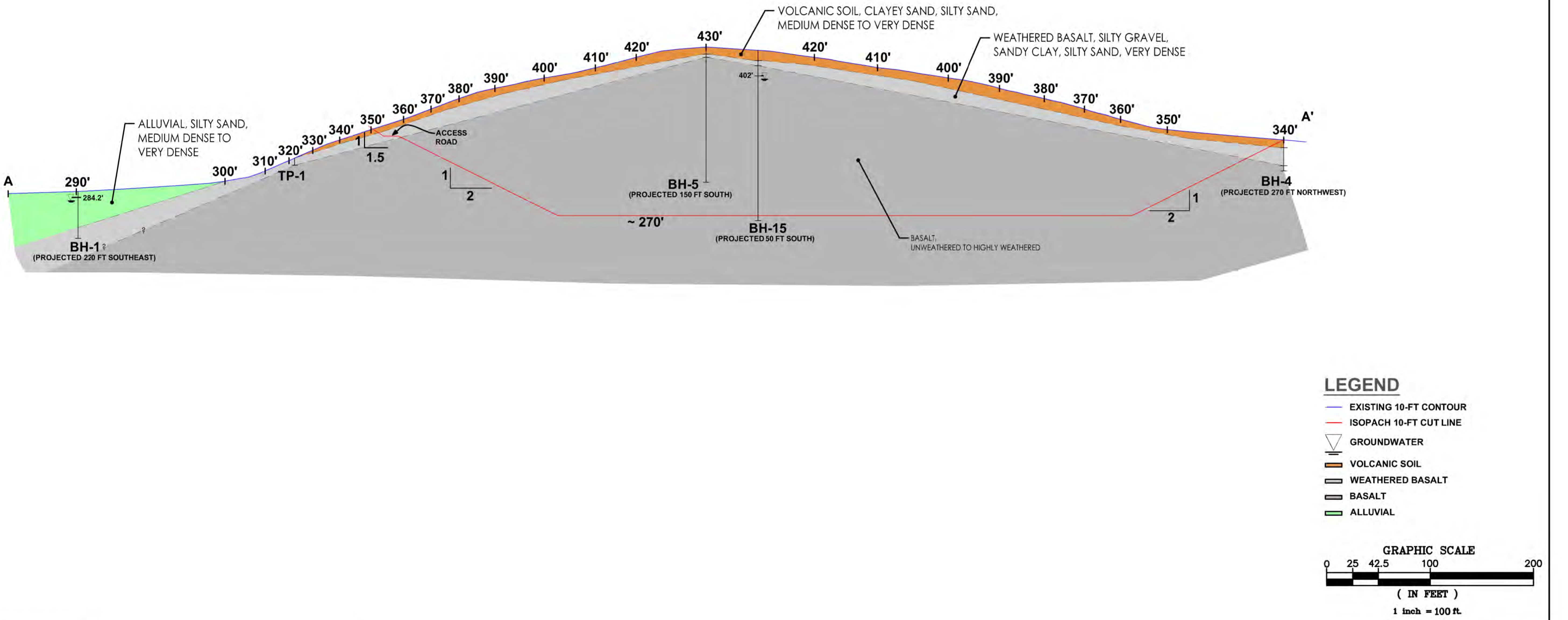


WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS SECTION LOCATION MAP
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No:	21129 (1)
DRAWN:	January 31, 2022
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME: 21129 (1) Figure 4	

FIGURE:
4

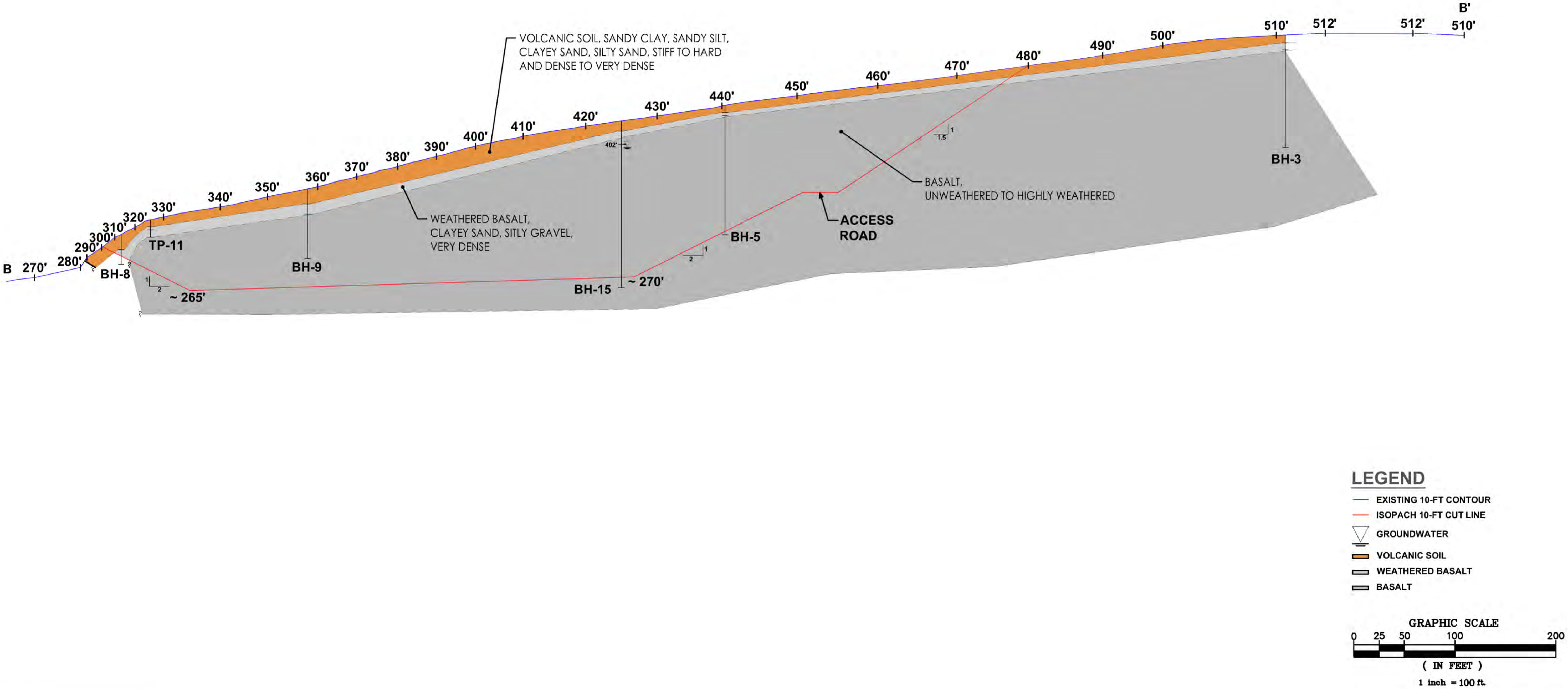


WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION A-A'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	October 24, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	23050 (1)_FIGURE_5.DWG

FIGURE
5

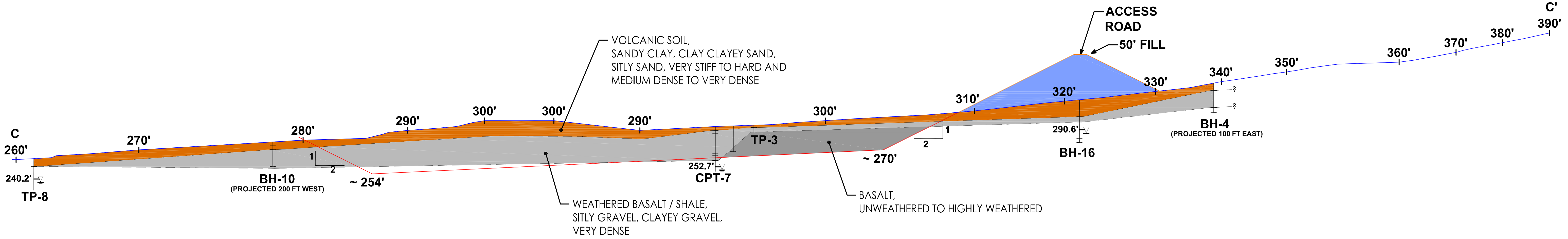


WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION B-B'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_6.DWG

FIGURE
6



LEGEND

- EXISTING 10-FT CONTOUR
- ISOPACH 10-FT CUT LINE
- ISOPACH ZERO CUT/ FILL LINE
- ▽ GROUNDWATER
- ▬ VOLCANIC SOIL
- ▬ WEATHERED BASALT
- ▬ BASALT
- ▬ FILL

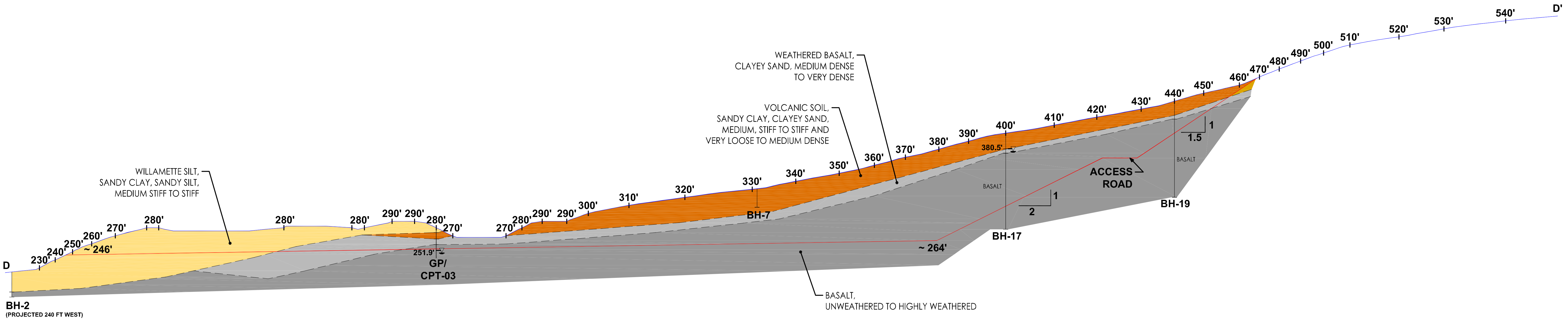
GRAPHIC SCALE
0 25 50 100 200
(IN FEET)
1 inch = 100 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION C-C'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_7.DWG

FIGURE
7



LEGEND

- EXISTING 10-FT CONTOUR
- ISOPACH 10-FT CUT LINE
- ▽ GROUNDWATER
- ▭ WILLAMETTE SILT
- ▭ VOLCANIC SOIL
- ▭ WEATHERED BASALT
- ▭ BASALT

GRAPHIC SCALE

0 30 60 120 240

(IN FEET)

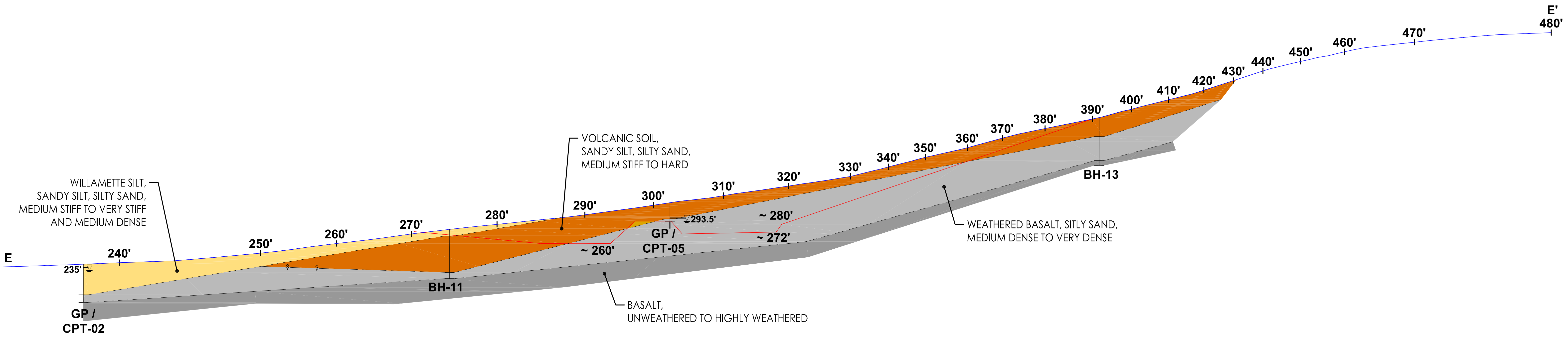
1 inch = 120 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION D-D'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_8.DWG

FIGURE
8



LEGEND

- EXISTING 10-FT CONTOUR
- ISOPACH 10-FT CUT LINE
- ▽ GROUNDWATER
- ▭ WILLAMETTE SILT
- ▭ VOLCANIC SOIL
- ▭ WEATHERED BASALT
- ▭ BASALT

GRAPHIC SCALE

0 25 50 100 200

(IN FEET)

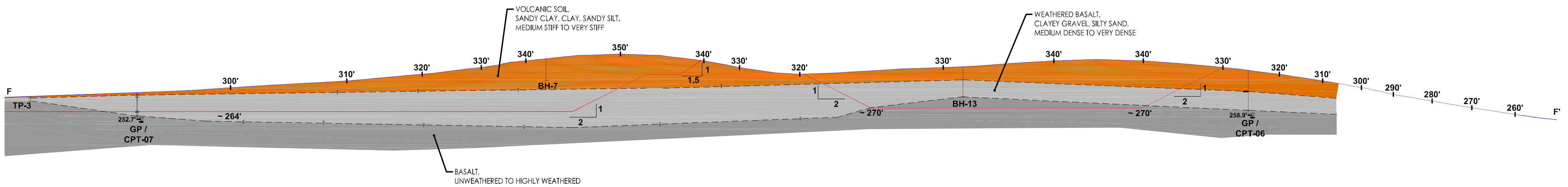
1 inch = 100 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION E-E'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_9.DWG

FIGURE
9



LEGEND

— EXISTING 10-FT CONTOUR

— ISOPACH 10-FT CUT LINE

▽ GROUNDWATER

▬ VOLCANIC SOIL

▭ WEATHERED BASALT

▬ BASALT

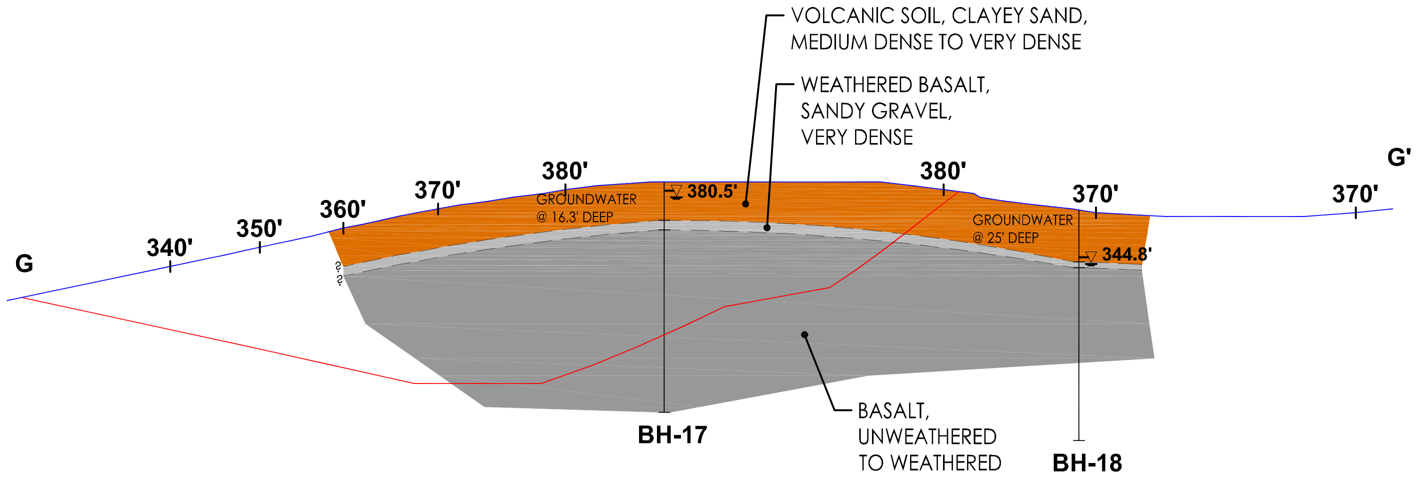
GRAPHIC SCALE
0 50 100 200 400
(IN FEET)
1 inch = 200ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION F-F'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_10.DWG

FIGURE
10



LEGEND

- EXISTING 10-FT CONTOUR
- ISOPACH 10-FT CUT LINE
- ▽ GROUNDWATER
- ▬ VOLCANIC SOIL
- ▬ WEATHERED BASALT
- ▬ BASALT

GRAPHIC SCALE

0 25 50 100 200

(IN FEET)

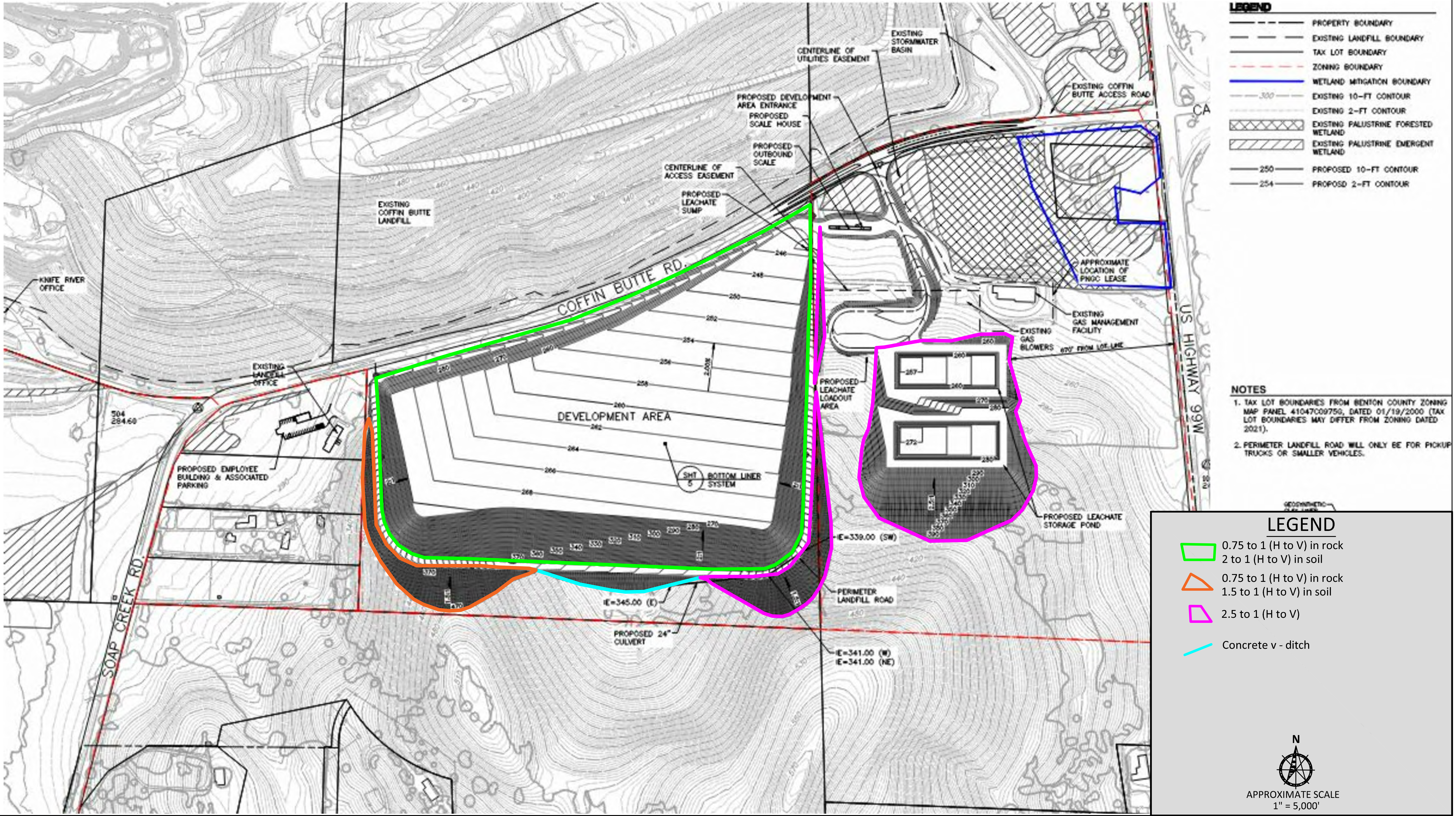
1 inch = 100 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION G-G'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: October 24, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_11.DWG

FIGURE
11



NOTES

1. TAX LOT BOUNDARIES FROM BENTON COUNTY ZONING MAP PANEL 41047C0975G, DATED 01/19/2000 (TAX LOT BOUNDARIES MAY DIFFER FROM ZONING DATED 2021).
2. PERIMETER LANDFILL ROAD WILL ONLY BE FOR PICKUP TRUCKS OR SMALLER VEHICLES.

LEGEND

🟩	0.75 to 1 (H to V) in rock 2 to 1 (H to V) in soil
🟧	0.75 to 1 (H to V) in rock 1.5 to 1 (H to V) in soil
🟪	2.5 to 1 (H to V)
—	Concrete v - ditch

N

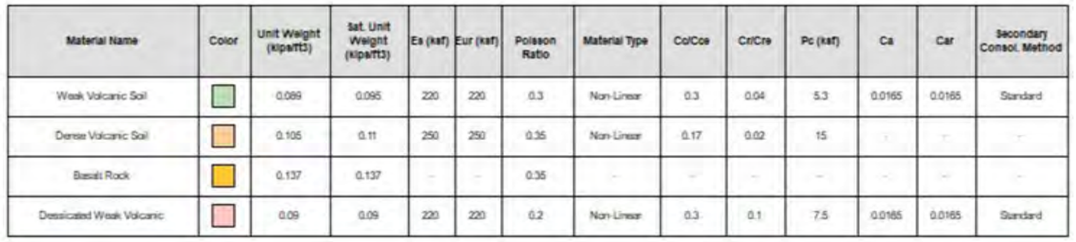
APPROXIMATE SCALE
1" = 5,000'

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

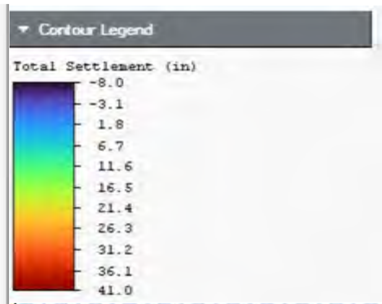
EXCAVATION PLAN
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

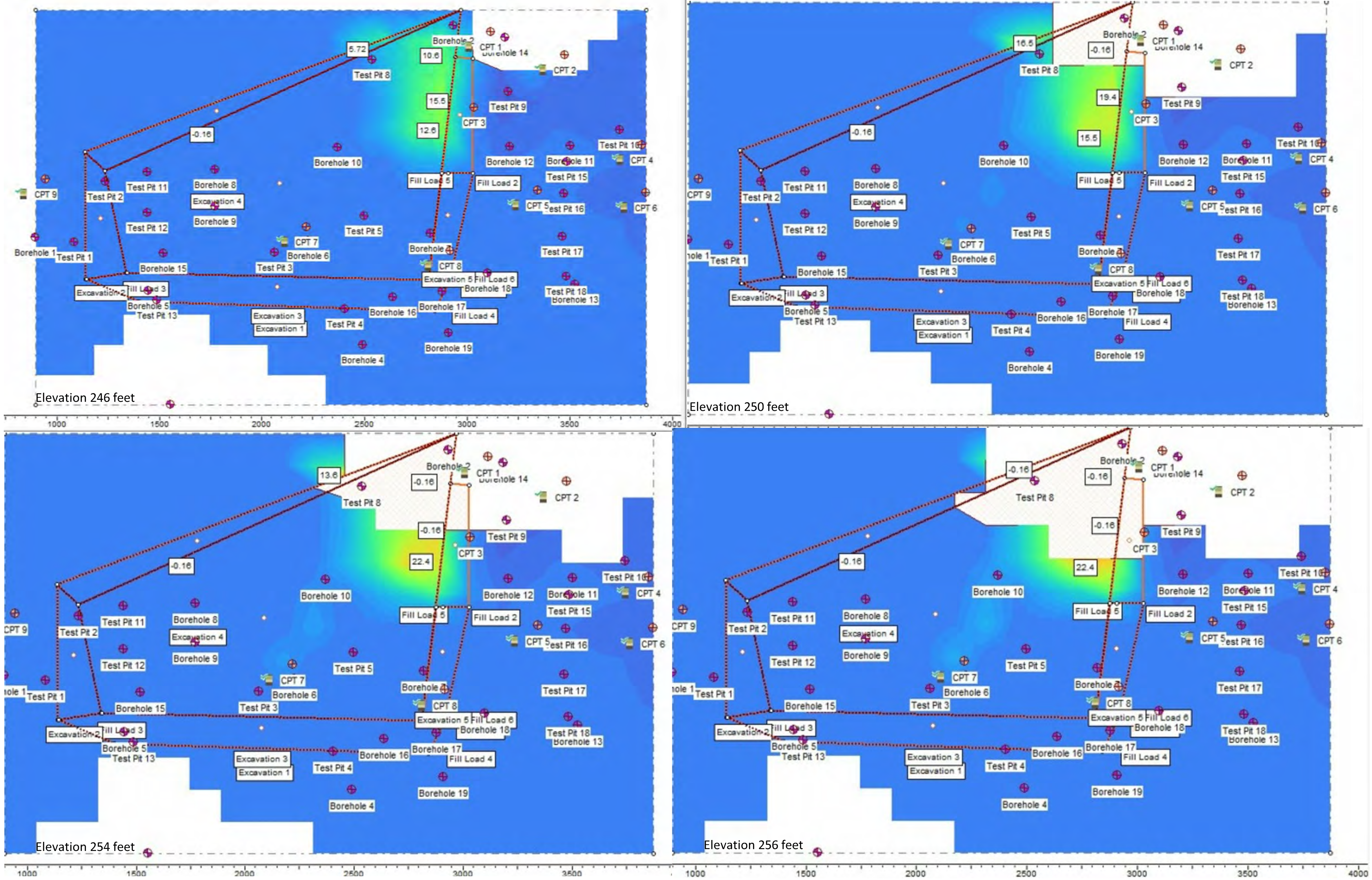
PROJECT No:	21129 (1)
DRAWN:	June 4, 2024
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME:	21129 (1) Figure 12

FIGURE:
12



Material Name	Color	Unit Weight (kips/ft3)	Sat. Unit Weight (kips/ft3)	Es (ksf)	Eur (ksf)	Poisson Ratio	Material Type	Cc/Cce	Cr/Cre	Pc (ksf)	Ca	Car	Secondary Consol. Method
Weak Volcanic Soil	🟩	0.089	0.095	220	220	0.3	Non-Linear	0.3	0.04	5.3	0.0165	0.0165	Standard
Dense Volcanic Soil	🟧	0.105	0.11	250	250	0.35	Non-Linear	0.17	0.02	15	-	-	-
Basalt Rock	🟨	0.137	0.137	-	-	0.35	-	-	-	-	-	-	-
Dessicated Weak Volcanic	🟥	0.09	0.09	220	220	0.2	Non-Linear	0.3	0.1	7.5	0.0165	0.0165	Standard





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WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

SETTLEMENT ESTIMATES VS. GROUND SURFACE ELEVATION
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No:	21129 (1)
DRAWN:	June 7, 2024
DRAWN BY:	KAK
CHECKED BY:	LMS
FILE NAME:	21129 (1) Figure 13

FIGURE:
13

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

APPENDIX A

APPENDIX A
FIELD EXPLORATION SUMMARY

GENERAL

Subsurface conditions for the proposed Coffin Butte Landfill South Expansion Area, located in Corvallis, Oregon, were explored by advancing nineteen (19) borings (designated BH-01 through BH-19), fifteen (15) test pits (designated TP-01 through TP-05, TP-08 through TP-13, and TP-15 through TP-18), and nine (9) cone penetration tests with geoprobe sampling (designated GP/CPT-01 through GP/CPT-09) at the approximate locations shown on **Figures 2a and 2b**, *Exploration Location Map*. TP-06, TP-07, and TP-14 were not excavated due to conflicts with utilities, access restrictions, and a mechanical breakdown. Boring, test pit, CPT, and geoprobe logs are included in this appendix. The procedures used to advance the borings and test pits, collect soil samples, and other field techniques are described in detail in this appendix. Unless otherwise noted, all soil sampling and classification procedures followed local engineering practices which are in general conformance with relevant ASTM procedures and the Unified Soil Classification System (USCS). “General conformance” means that certain local and common excavation and descriptive practices and methodologies have been followed.

TEST PITS

Fifteen (15) test pits were advanced with a CAT 310 trackhoe, operated by RL Reimers Excavation of Albany, Oregon between August 16 and September 23, 2021. The test pits were observed by a Wallace Group geotechnical professional who maintained a detailed log of subsurface conditions and materials encountered, collected soil samples, and documented backfilling. The test pits were advanced to depths ranging from 7- to 12-feet below ground surface (bgs). Grab samples were retrieved for laboratory testing. Test pits were backfilled using spoils from the excavations.

Dynamic Cone Penetration (DCP) testing was conducted to evaluate the relative density of the soil. DCP procedures are generally described in ASTM Special Technical Publication 399, which have been modified by Wallace Group to provide better representation of soil relative density or stiffness. During the DCP test, a 1.5-inch diameter steel cone is driven up to 18 inches into the soil using a 15-pound hammer dropped from a height of 18 inches. The number of blows is recorded and can be roughly correlated to the Standard Penetration Test. The number of blows required to drive the cone 12 inches into the soil provides a measure of the relative density of granular soils such as sand and gravel, and the strength of fine-grained soils such as silt and clay.

BORINGS

Nineteen (19) borings, advanced with a combination of hollow-stem augers (HSA), mud rotary, and HQ rock coring techniques. Borings BH-01 through BH-14 were drilled by using a track-mounted CME drilling rig, operated by Western States Drilling of Hubbard, Oregon on September 7 through 28, 2021. Borings BH-15 through BH-19 were drilled using a track-mounted CME drilling rig, operated by HazTech Drilling of Nampa, Idaho on November 8 through 16, 2022. The borings were observed by a Wallace Group geotechnical professional who maintained a detailed log of subsurface conditions and materials encountered, collected soil samples, and documented backfilling. The borings were advanced to depths ranging from 25.1- to 165-feet below ground surface (bgs). Disturbed (SPT), relatively undisturbed (Shelby tube), and rock core (HQ wireline) samples were retrieved for laboratory testing. Borings were abandoned using bentonite backfill.

BH-16 and BH-17 were converted into temporary piezometers (designated MW-16 and MW-17, respectively) by Oregon Geotechnical Explorations on November 21 and 22, 2022. Piezometers were installed to depths of 20-feet bgs in MW-16 and 100-feet bgs in MW-17.

CONE PENETRATION TESTING

Nine (9) CPTs were advanced by Oregon Geotechnical Explorations of Salem, Oregon between September 21 through November 8, 2022. The CPTs were performed by hydraulically-pushing a 1.4-inch-diameter, cone-tipped probe, with a projected area of 10 square centimeters, into the ground. The cone tip measures tip resistance, and a friction sleeve behind the cone tip measures frictional resistance. Electrical strain gauges or load cells within the cone continuously measured cone tip resistance and frictional resistance during the entire depth of each probing. Accumulated data was processed to provide engineering information, such as the types and approximate strength characteristics of the soil encountered. CPT’s were advanced to depths between 10- to 65-feet bgs. Pore pressure dissipation testing was performed at all CPT locations to evaluate the depth to groundwater. Shear wave velocity measurements were collected in CPT-08.

Nine geoprobes (GP) were advanced adjacent to CPT locations to collect soil samples for laboratory testing. Geoprobes were advanced adjacent to CPT-01 through CPT-09 and were designated GP-01 through GP-09, as shown on Figure 2. Geoprobes were advanced by vibrating a 1.25-inch-diameter casing to depths ranging between 10- and 30-feet bgs. CPT and GP holes were abandoned with bentonite.

MATERIAL DESCRIPTIONS

Soil samples were visually classified in the field as they were collected. Consistency, color, and other distinguishing characteristics of the samples were noted. Afterwards, the soil samples were re-examined in the laboratory and the field descriptions were modified where necessary. The terminology used in the rock descriptions are defined in the following sections.

SAMPLING AND LABORATORY TESTING

Disturbed and relatively undisturbed soil samples were retrieved from the borings. The samples were classified and capped, sealed in plastic bags, or placed into core boxes for further examination and physical testing in our laboratory for gradation, moisture content, rock specimen point load testing, Atterberg limits, triaxial, and permeability.

BORING, TEST PIT, AND GP/CPT LOGS

Figure A is a Legend explaining the information and symbols presented on the test pit and boring logs. The logs are presented on Figures A-1 through A-15 (Test Pits), A-16 through A-36 (Borings and Piezometers), A-37 through A-45 (Geoprobes), and A-46 through A-54 (CPTs). The logs describe the materials encountered and the depths where materials and/or characteristics of these materials changed, although the changes may be gradual. Where material types and descriptions changed between samples, the contacts were interpreted. On each boring log, the types of samples collected (including their identification number) are reported, including laboratory test results and blow counts. Corrected N-values, as presented on the boring logs, represent sampler blow counts that have been corrected for sampler type and hammer energy.

GROUNDWATER

Groundwater was encountered during subsurface exploration for this project and groundwater elevations during drilling are presented on the logs in Appendix A.

TERMINOLOGY USED TO DESCRIBE SOIL AND ROCK

Soils exist in mixtures with varying proportions of components. The predominant soil, i.e., greater than 50 percent based upon total dry weight, is the primary soil type and is capitalized in our log descriptions, e.g., SAND, GRAVEL, SILT or CLAY. "General Accordance" means that certain local and common descriptive practices have been followed. In accordance with ASTM D2488, group symbols (such as GP or CH) are applied on that portion of the soil passing the 3-inch (75mm) sieve based upon visual examination. The following describes the use of soil names and modifying terms used to describe fine- and coarse-grained soils.

Fine - Grained SOILS (More than 50% fines passing 0.074 mm, #200 sieve)

The primary soil type i.e. SILT or CLAY is designated through visual – manual procedures to evaluate soil toughness, dilatancy, dry strength, and plasticity. The following describes the terminology used to describe fine - grained soils and varies from ASTM 2488 terminology in the use of some common terms.

Primary Soil Name and Symbols		
SILT (ML & MH)	CLAY (CL & CH)	ORGANIC SILT & CLAY (OL & OH)

Descriptions of plasticity are described based on the plasticity index results of Atterberg limits testing, as follows:

Plasticity Description	**Plasticity Index (PI)**
Non-Plastic	0 - 3
Low Plasticity	4 - 10
Medium Plasticity	>10 – 20
High Plasticity	>20 – 40
Very High Plasticity	>40

Modifying terms describing secondary constituents, estimated to 5 percent increments, are applied as follows:

Description	% Composition
Trace sand, trace gravel	5% - 10%
With sand; with gravel	15% - 25%
Sandy, or gravelly	30% - 45%

Borderline Symbols, for example CH/MH, are used where soils are not distinctly in one category or where variable soil units contain more than one soil type. Dual Symbols, for example CL-ML, are used where two symbols are required in accordance with ASTM D2488.

Soil Consistency. Consistency terms are applied to fine-grained soils (fines content > 50 percent). Descriptive terms are based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84, as follows.

Consistency Term	SPT N-value	Unconfined Compressive Strength	
		Tons/sq.ft.	kPa
Very soft	Less than 2	Less than 0.25	Less than 24
Soft	2 - 4	0.25 - 0.5	24 - 48
Medium stiff	5 - 8	0.5 - 1.0	48 – 96
Stiff	9 - 15	1.0 - 2.0	96 – 192
Very stiff	16 - 30	2.0 - 4.0	192 – 383
Hard	Over 30	Over 4.0	Over 383

Coarse-Grained Soils (less than 50% fines)

Coarse-grained soil descriptions, i.e., SAND or GRAVEL, are based on that portion of materials passing a 3-inch (75mm) sieve. Coarse-grained soil group symbols are applied in accordance with ASTM D2488 based upon the degree of grading, or distribution of grain sizes of the soil. For example, well graded sand containing a wide range of grain sizes is designated SW; poorly graded gravel, GP, contains high percentages of only certain grain sizes. Terms applied to grain sizes follow.

	Particle Diameter	
	Inches	Millimeters
Sand	0.003 - 0.19	0.075 - 4.8
Gravel	0.19 - 3.0	4.8 - 75
	Additional Constituents	
Cobble	3.0 - 12	75 - 300
Boulder	12 - 120	300 - 3050
Rock Block	>120	>3050

The amount of 'fines' in the soil are described as indicated by the following examples. Other soil mixtures will provide similar descriptive names.

Example: Coarse-Grained Soil Descriptions with Fines

Less than 5% fines	5 to 12% fines (Dual Symbols)	Greater than 12% to Less than 50% fines
GRAVEL: GW or GP	GRAVEL WITH SILT, GW-GM	SILTY GRAVEL: GM
SAND: SW or SP	SAND WITH CLAY, SP-SC	SILTY SAND: SM

Cohesionless Soil Structure terms are applied to granular, non-plastic soils based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586.

Cohesionless Soil Structure Term	***SPT N-value***
Very loose	0 - 4
Loose	4 - 10
Medium dense	10 - 30
Dense	30 - 50
Very dense	> 50

Terminology Used to Describe Rock

The descriptions of rock strength, joint space or bedding, vesicularity, and quality are as follows:

Scale of Rock Strength

Description	Designation	Unconfined Compressive Strength, psi	Unconfined Compressive Strength, MP	Field Identification
Very low strength	R1	100 – 1000	0.7 – 7	Crumbles under firm blows with point of geology pick; can be peeled by a pocketknife.
Low strength	R2	1,000 – 4,000	7 – 28	Can be peeled by a pocketknife with difficulty; shallow indentation made by firm blows of geology pick.
Moderate strength	R3	4,000 – 8,000	28 – 55	Cannot by scraped or peeled with a pocketknife; specimen can be fractured with a single firm blow of geology hammer.
Medium high strength	R4	8,000 – 16,000	55 – 110	Specimen requires more than one blow with a geology hammer to fracture it.
High strength	R5	16,000 – 32,000	110 – 120	Specimen requires many blows of geology hammer to fracture it.
Very high strength	R6	> 32,000	> 220	Specimen can only be chipped with geology pick.

Descriptive Terminology for Joint Spacing or Bedding

Descriptive Term	*Spacing of Joints*	
Very close	Less than 2 inches	< 50 mm
Close	2 inches - 1 foot	50 mm – 300 mm
Moderately close	1 foot - 3 feet	300 mm – 1 m
Wide	3 feet -10 feet	1 m – 3 m
Very wide	Greater than 10 feet	> 3 m

Descriptive Terminology for Vesicularity

Descriptive Term	*Percent voids by volume*
Dense	< 1%
Slightly vesicular	1 – 10%
Moderately vesicular	10 – 30%
Highly vesicular	30 – 50%
Scoriaceous	> 50%

Correlation of RQD and Rock Quality

Rock Quality Descriptor	RQD Value
Very poor	0 – 25
Poor	25 - 50
Fair	50 - 75
Good	75 - 90

Scale of Rock Weathering

Stage	*Description*	*Quality Distinction*
Fresh	Rock is fresh, crystals are bright, a few joints may show slight staining because of ground water.	Discoloration
Very Slight	Rock is generally fresh, joints are stained, some joints may have thin clay coatings, crystals in broken faces show bright.	Discoloration only on major discontinuity surfaces [i]
Slight	Rock is generally fresh, joints are stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some feldspar crystals are dull and discolored. Rocks ring under hammer if crystalline.	Discoloration on all discontinuity surfaces and on rock
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some are clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.	Decomposition and/or disintegration < 50% of rock [ii]
Moderately Severe	All rock, except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.	Decomposition and/or disintegration > 50%, but not complete
Severe	All rock, except quartz, discolored or stained. Rock "fabric" is clear and evident but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of harder rock usually left, such as corestones in basalt.	Decomposition and/or disintegration > 75%, nearly complete
Very Severe	All rock, except quartz, discolored or stained. Rock "fabric" is discernible, but mass effectively reduced to "soil" with only fragments of harder rock remaining.	Decomposition and/or disintegration 100% with structure/fabric intact
Complete	Rock is reduced to "soil". Rock "fabric" is not discernible, or only in small scattered locations. Quartz may be present as dikes or stringers.	Decomposition and/or disintegration 100% with structure/fabric destroyed

---

NOTES: [i] Discontinuities consist of any natural break (joint, fracture or fault) or plane of weakness (shear or gouge zone, bedding plane) in a rock mass

[ii] Decomposition refers to chemical alteration of mineral grains; disintegration refers to mechanical breakdown

[iii] Stage and description from ASCE Manual No. 56 (1976), quality distinction from Murray (1981)

KEY TO SYMBOLS

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

CLIENT CEC, Inc.
PROJECT NUMBER 21129-1
PROJECT NAME Coffin Butte Landfill
PROJECT LOCATION Corvallis, OR

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

BASALT: Basalt
CH: USCS High Plasticity Clay
CL: USCS Low Plasticity Clay
CL-ML: USCS Low Plasticity Silty Clay
FILL: Fill (artificial fill)
GC: USCS Clayey Gravel
GM: USCS Silty Gravel
MH: USCS Elastic Silt
ML: USCS Silt
SANDSTONE: Sandstone
SC: USCS Clayey Sand
SC-SM: USCS Clayey Sand
SHALE: Shale
SM: USCS Silty Sand

SAMPLER SYMBOLS

Grab Sample
Rock Core (RC)
Standard Penetration Test
Shelby Tube

WELL CONSTRUCTION SYMBOLS

Bentonite Seal
Filter Pack
Slotted Pipe
Top Cap: 1 pipe group, 1st pipe

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
MC - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
FINES - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
OC - ORGANIC CONTENT (%)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UCCS- UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time of Drilling, or as Shown
▼ Water Level at End of Drilling, or as Shown
▼ Water Level After 24 Hours, or as Shown

Figure: A

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TEST PIT NUMBER TP-01

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/17/21 **COMPLETED** 8/17/21
GROUND ELEVATION 323.7 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		CL	▨	SANDY LEAN CLAY WITH GRAVEL, moist, reddish brown, fine to coarse grained, angular to subangular, organics to 1', more gravel with depth	
2.5	✋ GB S-1				
5.0					
			7.0		316.7

Refusal at 7.0 feet on basalt.
Bottom of test pit at 7.0 feet.

TWG-TEST PITS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 12:47 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

Figure: A - 1

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

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TEST PIT NUMBER TP-02

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/17/21 **COMPLETED** 8/17/21
GROUND ELEVATION 302 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		19 18 35	CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff, moist, dark brown, fine to coarse grained, subangular, organic soil	
2.0			CL	▨	LEAN CLAY WITH SAND, stiff, moist, reddish brown, fine grained, subangular	300.0
5.0	GB S-1		GC		CLAYEY GRAVEL WITH SAND, stiff, moist, red with gray, fine to coarse grained, angular, friable	297.0
10.0					Refusal at 10.0 feet on basalt. Bottom of test pit at 10.0 feet.	292.0

Figure: A - 2

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TEST PIT NUMBER TP-03

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/16/21 **COMPLETED** 8/16/21

GROUND ELEVATION 308.3 ft

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		CL		SANDY LEAN CLAY, stiff, moist, dark brown to black, fine grained, organic	
2.5		GC	2.5	CLAYEY GRAVEL WITH SAND, moist, tan with reddish brown, fine to coarse grained, subangular, with cobbles and weathered in-place pillow basalt	305.8
	GB S-1				
5.0					
			7.0		301.3

Refusal at 7.0 feet on basalt.
Bottom of test pit at 7.0 feet.

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TEST PIT NUMBER TP-04

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/16/21 **COMPLETED** 8/16/21

GROUND ELEVATION 334.2 ft

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0			CL	▨	SANDY LEAN CLAY, stiff, moist, reddish brown, fine grained	
2.5	GB S-1	54 68 75				
5.0						
6.0			CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff, moist, dark reddish brown	328.2
7.5						
10.0						324.2

Refusal at 10.0 feet on basalt.
Bottom of test pit at 10.0 feet.

WALLACE GROUP NORTHWEST GEOSYSTEM EXPERTS

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TEST PIT NUMBER TP-05

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/16/21 **COMPLETED** 8/16/21
GROUND ELEVATION 297.8 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		45 67 78	CL	▨	SANDY LEAN CLAY, stiff, moist, reddish brown, fine grained	
	GB S-1					
2.5						
5.0					5.0	292.8
	GB S-2		CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff, moist, dark reddish brown	
7.5						
					9.0	288.8
			GM		SILTY GRAVEL WITH SAND, moist, dark gray, fine to coarse grained, angular, weathered in-place basalt	
10.0					10.0	287.8

Refusal at 10.0 feet on basalt.
Bottom of test pit at 10.0 feet.

TWG-TEST PITS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 12:48 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

Figure: A - 5

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TEST PIT NUMBER TP-08

PAGE 1 OF 1

CLIENT	CEC, Inc.	**PROJECT NAME**	Coffin Butte Landfill
PROJECT NUMBER	21129-1	**PROJECT LOCATION**	Corvallis, OR
DATE STARTED	9/28/21 **COMPLETED** 9/28/21	**GROUND ELEVATION**	247.7 ft
EXCAVATION CONTRACTOR	Sure Flow INC	**GROUND WATER LEVELS:**	
EXCAVATION METHOD	Hydro Excavation	▽ **AT TIME OF EXCAVATION**	7.50 ft / Elev 240.20 ft
LOGGED BY	SMW **CHECKED BY** LMS	▼ **24HRS AFTER EXCAVATION**	---
NOTES			

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0			▨	SANDY LEAN CLAY, moist, dark brown, fine grained	
2.5	GB S-1		▨		
		CL	▨		
5.0			▨		
7.5			▨	▽	
			8.0		239.7

Refusal at 8.0 feet on basalt.
Bottom of test pit at 8.0 feet.

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TEST PIT NUMBER TP-09

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/16/21 **COMPLETED** 8/16/21
GROUND ELEVATION 253.2 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		29 35 41	ML		SILT WITH SAND, stiff, moist, gray to reddish brown, fine grained	
2.5						
	GB S-1					
5.0						
7.5						
10.0						
	GB S-2					
					12.0	241.2

Refusal at 12.0 feet on limit of excavator.
Bottom of test pit at 12.0 feet.

TWG-TEST PITS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 12:48 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

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TEST PIT NUMBER TP-10

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/16/21 **COMPLETED** 8/16/21

GROUND ELEVATION 256.3 ft

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		CL	▨	LEAN CLAY WITH SAND, stiff, moist, gray, fine grained	
2.5			▨		
4.0		CL	▨	SANDY LEAN CLAY, stiff, moist, red with gray	252.3
5.0	✋ GB S-1		▨		
7.5			▨		
10.0			▨		
11.0					245.3

Refusal at 11.0 feet on limit of excavator.
Bottom of test pit at 11.0 feet.

Figure: A - 8

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TEST PIT NUMBER TP-11

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CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/17/21 **COMPLETED** 8/17/21
GROUND ELEVATION 310 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0			CL	▨	SANDY LEAN CLAY, stiff, moist, dark brown, fine grained, with organics	
2.5						
					3.0	307.0
		61 68 74	SC	▨	CLAYEY SAND, moist, yellowish brown, fine grained, trace cobbles	
	GB S-1					
5.0						
					7.0	303.0
7.5			GC	▨	CLAYEY GRAVEL WITH SAND, moist, dark red, fine to coarse grained, angular to subangular, weathered basalt	
10.0					10.0	300.0

Refusal at 10.0 feet on basalt.
Bottom of test pit at 10.0 feet.

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TEST PIT NUMBER TP-12

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/17/21 **COMPLETED** 8/17/21

GROUND ELEVATION 360 ft

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		35 19 24	CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff, moist, reddish brown, fine to coarse grained, organic to 1'	
2.5						
4.0			GC	▨	CLAYEY GRAVEL, moist, dark reddish brown, fine to coarse grained, angular, gravel increases with depth	356.0
5.0	✋ GB S-1					
7.5						
9.0						351.0

Refusal at 9.0 feet on basalt.
Bottom of test pit at 9.0 feet.

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

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TEST PIT NUMBER TP-13

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/17/21 **COMPLETED** 8/17/21
GROUND ELEVATION 445 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		ML		SANDY SILT, stiff, moist, dark brown, fine grained, low plasticity, roots and organics	
			2.0		443.0
2.5 5.0	✋ GB S-1	GC		CLAYEY GRAVEL WITH SAND, stiff, moist, dark reddish tan, fine to coarse grained, angular to subangular, increasing gravel with depth	
			7.0		438.0

Refusal at 7.0 feet on basalt.
Bottom of test pit at 7.0 feet.

Figure: A - 11

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TEST PIT NUMBER TP-15

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/16/21 **COMPLETED** 8/16/21
GROUND ELEVATION 288 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0			▨	SANDY LEAN CLAY, stiff, moist, red with gray, fine grained, medium plasticity	
2.5			▨		
5.0	GB S-1	CL	▨		
7.5			▨		
10.0			▨		
			▨	11.0	277.0

Refusal at 11.0 feet on limit of excavator.
Bottom of test pit at 11.0 feet.

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TEST PIT NUMBER TP-16

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/16/21 **COMPLETED** 8/16/21

GROUND ELEVATION 309 ft

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0		CL	▨	SANDY LEAN CLAY, stiff, moist, red with gray, fine grained	
2.5					
	✋ GB S-1				
5.0					
7.5					
10.0					
	✋ GB S-2				
				12.0	297.0

Refusal at 12.0 feet on limit of excavator.
Bottom of test pit at 12.0 feet.

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TEST PIT NUMBER TP-17

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 8/16/21 **COMPLETED** 8/16/21

GROUND ELEVATION

EXCAVATION CONTRACTOR RL Reimers

GROUND WATER LEVELS:

EXCAVATION METHOD CAT 310 Excavator

AT TIME OF EXCAVATION ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER EXCAVATION ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0			▨	SANDY LEAN CLAY, stiff, moist, red with gray, fine grained
2.5			▨	
	GB S-1		▨	
5.0		CL	▨	
7.5			▨	
10.0			▨	
			11.0	

Refusal at 11.0 feet on limit of excavator.
Bottom of test pit at 11.0 feet.

Figure: A - 14

Wallace Group Inc.
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TEST PIT NUMBER TP-18

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 8/16/21 **COMPLETED** 8/16/21
GROUND ELEVATION 390 ft
EXCAVATION CONTRACTOR RL Reimers
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 310 Excavator
AT TIME OF EXCAVATION ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER EXCAVATION ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	DCP BLOW COUNTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0.0			CL	▨	SANDY LEAN CLAY, stiff, moist, red with gray, fine grained	
2.5		50 64 78				
5.0						
7.5						
	GB S-1					
10.0					10.0	380.0

Refusal at 10.0 feet on limit of excavator.
Bottom of test pit at 10.0 feet.

Figure: A - 15

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
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BORING NUMBER BH-01

PAGE 1 OF 2

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/9/21 **COMPLETED** 9/24/21
GROUND ELEVATION 291.7 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
▽ **AT TIME OF DRILLING** 7.50 ft / Elev 284.20 ft
LOGGED BY SMW **CHECKED BY** LMS
▼ **24HRS AFTER DRILLING** ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						SM		SILTY SAND WITH GRAVEL, medium dense, moist, brown with grayish white, fine to coarse grained, subangular to subrounded, medium plasticity	
	SPT S-1	93	8 8 8	19	-				
5									
	SPT S-2	87	10 11 13	29	-				
	SPT S-3	93	9 10 8	22	LL: 52 PI: 19 Fines: 33.3% MC: 33.7%			▽	
10									
	SPT S-4	93	10 20 25	54	very dense wet				
15									
	SPT S-5	87	13 17 21	46	dense				
20								20.0	271.7
						SC-SM		SILTY SAND, clayey sand, very dense, wet, tan with black, fine to coarse grained, subangular to subrounded, low plasticity	
	SPT S-6	100	11 23 43	55					
25									
	SPT S-7	100	29 47 50	116					
30									
	SPT S-8	100	16 23 30	64	MC: 39.1% Fines: 36.0%				
35								35.0	256.7

Figure: A - 16.1

BORING NUMBER BH-01

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	SPT S-9	100	50/4"	60/4"		SM		SILTY SAND WITH GRAVEL, very dense, wet, dark gray, fine to coarse grained, angular to subangular, weathered basalt	
40	SPT S-10	100	42 50/3"	50/5"					
45	SPT S-11	100	50/5"	60/5"				45.4	246.3

Bottom of borehole at 45.4 feet.

BORING NUMBER BH-02

PAGE 1 OF 2

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CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/28/21 **COMPLETED** 9/28/21
GROUND ELEVATION 244 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
▽ **AT TIME OF DRILLING** 4.90 ft / Elev 239.10 ft
LOGGED BY SMW **CHECKED BY** LMS
▼ **24HRS AFTER DRILLING** ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL	▨	SANDY LEAN CLAY, moist, dark brown, fine grained, medium plasticity	
5							▨	▽	
10.0	SPT S-1	100	1 2 2	5	-	CL	▨	LEAN CLAY, medium stiff, wet, olive brown, fine grained, subrounded to rounded, medium plasticity	234.0
	ST ST-1	100			MC: 36.1% DD: 83 / 85 / 86 pcf c: 1000 psf phi: 8.8 degrees		▨		
15.0	SPT S-2	100	3 3 5	10		CL	▨	SANDY LEAN CLAY, stiff, wet, dark greenish gray, fine grained, subrounded to rounded, high plasticity	229.0
20	SPT S-3	100	2 2 3	6	medium stiff		▨		
25.0	SPT S-4	100	4 6 7	16		ML	▥	SANDY SILT, very stiff, wet, tan with gray, fine to coarse grained, angular to subangular, weathered in-place basalt, trace gravel	219.0
30	SPT S-5	100	6 19 22	49	hard		▥		
35									

Figure: A - 17.1

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BORING NUMBER BH-02

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	SPT S-6	100	17 25 24	59		ML		SANDY SILT, very stiff, wet, tan with gray, fine to coarse grained, angular to subangular, weathered in-place basalt, trace gravel *(continued)*	
40	SPT S-7	100	7 10 18	34					
45	SPT S-8	100	8 12 14	31					
50	SPT S-9	100	50	60/6"				50.5	193.5

Bottom of borehole at 50.5 feet.

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BORING NUMBER BH-03

PAGE 1 OF 3

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/10/21 **COMPLETED** 9/16/21

GROUND ELEVATION 510 ft

DRILLING CONTRACTOR Western States Soil Conservation Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	Approximate Elevation
0						ML			SANDY SILT WITH GRAVEL, hard, moist, reddish brown with gray, fine to coarse grained, angular to subangular, medium plasticity, with cobbles	
	SPT S-1	87	10 13 14	32	-					
5	SPT S-2	86	14 33 50/5"	106/11"						
								8.0		502.0
10	SPT S-3	67	43 50/1"	60/1"	MC: 20.0% Fines: 13.2%	GM			SILTY GRAVEL WITH SAND, very dense, moist, grayish red with brown, fine to coarse grained, angular to subangular, low plasticity, with cobbles, weathered basalt	
15								15.0		495.0
	SPT S-4	100	50/1"	60/1"					BASALT, unweathered to highly weathered, greenish gray, low strength to medium high strength, R1 - R3/R4, fractures are filled with siltstone, chlorite alteration in places, basalt is brecciated	
	RC C-1	58 (0)								
20	RC C-2	97 (68)								
25	RC C-3	85 (52)			21.5': UCS: 624 psi					
30	RC C-4	67 (45)			28.5': UCS: 5377 psi					
35	RC C-5	97 (75)			32.5': UCS: 2297 psi					

Figure: A - 18.1

BORING NUMBER BH-03

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, unweathered to highly weathered, greenish gray, low strength to medium high strength, R1 - R3/R4, fractures are filled with siltstone, chlorite alteration in places, basalt is brecciated *(continued)*	
40	RC C-6	100 (70)			36.5': UCS: 264 psi				
45	RC C-7	100 (58)							
50	RC C-8	80 (48)			47.5': UCS: 439 psi				
55	RC C-9	97 (57)							
60	RC C-10	78 (43)			60': UCS: 248 psi				
65	RC C-11	73 (18)							
70	RC C-12	100 (62)			67': UCS: 2460 psi				
75	RC C-13	90 (33)			73': UCS: 473 psi				

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BORING NUMBER BH-03

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75								BASALT, unweathered to highly weathered, greenish gray, low strength to medium high strength, R1 - R3/R4, fractures are filled with siltstone, chlorite alteration in places, basalt is brecciated *(continued)*	
80	RC C-14	93 (68)			79': UCS: 473 psi				
85	RC C-15	100 (53)			85': UCS: 677 psi				
90	RC C-16	100 (27)			87': UCS: 979 psi				
95	RC C-17	85 (40)							
100	RC C-18	48 (0)							
105	RC C-19	100 (65)			103': UCS: 223 psi 105': UCS: 3242 psi				
110	RC C-20	65 (18)			108': UCS: 640 psi			111.0	399.0

Bottom of borehole at 111.0 feet.

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BORING NUMBER BH-04

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/27/21 **COMPLETED** 9/27/21

GROUND ELEVATION 343.9 ft

DRILLING CONTRACTOR Western States Soil Conservation Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	MATERIAL DESCRIPTION	Approximate Elevation
0						SC-SM	SILTY SAND, clayey sand, stiff, moist, brownish gray, fine to coarse grained, angular to subangular, medium plasticity	
	SPT S-1	100	3 6 10	19	MC: 36.9% Fines: 41.2%			
5	SPT S-2	100	10 50/5"	60/5"	medium dense			
7.5	SPT S-3	100	50/3"	60/3"		GM	SILTY GRAVEL WITH SAND, very dense, moist, gray, fine to coarse grained, angular to subangular, low plasticity, highly weathered and fractured in-place basalt	336.4
10	SPT S-4	100	50/3"	60/3"				
15	SPT S-5	100	50/2"	60/2"				
20	SPT S-6	100	50/2"	60/2"				
25.0	SPT S-7	100	50/2"	60/2"			BASALT, slightly weathered, slightly fractured, greenish gray, low strength to medium high strength, brecciated, palagonite/chlorite infilling, R3/R1	318.9
	RC C-1	97 (60)						
30.0							Bottom of borehole at 30.0 feet.	313.9

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BORING NUMBER BH-05

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/17/21 **COMPLETED** 9/20/21

GROUND ELEVATION 443.4 ft

DRILLING CONTRACTOR Western States Soil Conservation Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						SM		SILTY SAND WITH GRAVEL, dense, moist, reddish brown with gray, fine to coarse grained, angular to subangular, medium plasticity, with cobbles	
	SPT S-1	20	12 17 21	46	LL: 67 PI: 30 MC: 37.2% Fines: 22.7%				
5	SPT S-2	60	10 14 18	38					
7.0						GM		SILTY GRAVEL WITH SAND, very dense, moist, gray with reddish brown, fine to coarse grained, angular to subangular, low plasticity, with cobbles	436.4
	SPT S-3	96	47 50/4"	60/4"					
10.0								BASALT, slightly weathered to moderately weathered, moderately fractured, greenish gray, very low strength to high strength, R0 - R3/R4, fractures are filled with siltstone, chlorite alteration in places, basalt is brecciated	433.4
	SPT S-4	0	50/3"	60/3"					
	RC C-1	89 (0)							
15	RC C-2	40 (0)			11': UCS: 929 psi				
20	RC C-3	65 (10)							
	RC C-4	40 (0)							
25.0								BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, basalt is brecciated with a siltstone matrix	418.4
30	RC C-5	80 (15)			30': UCS: 1022 psi				
35	RC C-6	40 (7)							

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, basalt is brecciated with a siltstone matrix *(continued)*	
40	RC C-7	38 (0)							
45	RC C-8	50 (0)							
50	RC C-9	40 (0)			47': UCS: 5332 psi				
55	RC C-10	43 (0)							
60	RC C-11	33 (0)							
65	RC C-12	55 (0)			61': UCS: 324 psi				
70	RC C-13	32 (0)							
75	RC C-14	33 (0)							

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75								BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, basalt is brecciated with a siltstone matrix *(continued)*	
80	RC C-15	47 (0)							
85	RC C-16	60 (0)							
90	RC C-17	33 (0)			90': UCS: 18061 psi				
95	RC C-18	37 (0)							
100	RC C-19	40 (0)							
105	RC C-20	93 (45)			105': UCS: 374 psi				
110	RC C-21	40 (0)							
115	RC C-22	60 (25)							

BORING NUMBER BH-05

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
115								BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, basalt is brecciated with a siltstone matrix *(continued)*	
	RC C-23	72 (45)			119.5': UCS: 1059 psi				
120									
	RC C-24	67 (0)			125': UCS: 1529 psi				
125									
	RC C-25	80 (50)			127': UCS: 1204 psi				
130									
								131.0	312.4

Bottom of borehole at 131.0 feet.

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BORING NUMBER BH-06

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/27/21 **COMPLETED** 9/27/21
GROUND ELEVATION 291.2 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL	▨	SANDY LEAN CLAY, medium stiff to very stiff, moist, brown with gray, fine grained, high plasticity	
	SPT S-1	67	4 5 5	12	-				
5	SPT S-2 ST ST-1	100 100	0 2 5	8	200 - 250 psi				
	SPT S-3	100	2 2 3	6	medium stiff				
10	SPT S-4	100	3 3 6	11	stiff				
15	SPT S-5	100	6 7 12	23	very stiff				
20	SPT S-6	93	3 5 5	12	stiff				
25	SPT S-7	100	5 4 6	12				26.5	264.7

Bottom of borehole at 26.5 feet.

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BORING NUMBER BH-07

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/28/21 **COMPLETED** 9/28/21
GROUND ELEVATION 338.9 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0							▨	SANDY LEAN CLAY, stiff, moist, reddish brown with black, fine to coarse grained, angular to subangular, high plasticity, weathered and decomposed basalt	
	SPT S-1	100	5 4 5	11	-		▨		
5	SPT S-2	100	2 3 5	10			▨		
	SPT S-3	100	1 3 4	8			▨		
10	SPT S-4 ST ST-1	100 100	1 1 3	5	medium stiff MC: 65.0% DD: 54 pcf c: 350 psf phi: 37 degrees consol test - see App B		▨		
15	SPT S-5	100	2 3 4	8	stiff	CL	▨		
20	SPT S-6	100	2 3 5	10			▨		
25	SPT S-7	100	1 1 4	6	medium stiff		▨		
30	SPT S-8	100	2 3 6	11	stiff		▨	31.5	307.4

Bottom of borehole at 31.5 feet.

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Bend, OR 97701

BORING NUMBER BH-08

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/24/21 **COMPLETED** 9/24/21
GROUND ELEVATION 309.3 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL	▨	SANDY LEAN CLAY, very stiff, moist, orangeish brown with gray, fine to coarse grained, medium plasticity, weathered in-place basalt	
	SPT S-1	93	6 7 6	16	-				
5	SPT S-2	80	14 17 17	41	hard				
	SPT S-3	93	12 19 14	40					
10	SPT S-4	100	10 10 13	28	very stiff				
15							15.0		294.3
	SPT S-5	100	18 22 37	71		SC	▨	CLAYEY SAND WITH GRAVEL, very dense, moist, orangeish brown with gray, fine to coarse grained, angular to subangular, medium plasticity, basalt texture, weathered basalt	
20	SPT S-6	100	30 23 46	83	MC: 23.2% Fines: 21.3%				
25	SPT S-7	100	17 39 50/4"	107/10"			26.3		283.0
								Bottom of borehole at 26.3 feet.	

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BORING NUMBER BH-09

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/22/21 **COMPLETED** 9/23/21

GROUND ELEVATION 359.1 ft

DRILLING CONTRACTOR Western States Soil Conservation Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						ML		SANDY SILT WITH GRAVEL, stiff, moist, reddish brown with gray, fine to coarse grained, angular to subangular, medium plasticity	
	SPT S-1	93	4 5 6	13	-				
5	SPT S-2	87	3 7 10	20	very stiff				
	SPT S-3	80	9 13 23	43	hard				
10	SPT S-4	93	29 37 21	70					
15	SPT S-5	100	50/2"	60/2"		GM		15.0 SILTY GRAVEL WITH SAND, very dense, moist, gray with reddish brown, fine to coarse grained, angular to subangular, weathered in-place basalt, with cobbles	344.1
20	SPT S-6	25	50/4"	60/4"					
25	SPT S-7	100	50/2"	60/2"				25.0 BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, fractures are filled with siltstone, chlorite/palagonite alteration in places, basalt is brecciated	334.1
	RC C-1	0 (0)							
30	RC C-2	33 (10)			26': UCS: 350 psi				
35	RC C-3	87 (15)			35': UCS: 481 psi				

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BORING NUMBER BH-09

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, highly weathered to weathered, intensely fractured, greenish gray, very low strength to medium high strength, R0 - R3, fractures are filled with siltstone, chlorite/palagonite alteration in places, basalt is brecciated *(continued)*	
40	RC C-4	40 (0)							
45	RC C-5	97 (60)			43.5': UCS: 631 psi 45.5': UCS: 1410 psi				
50	RC C-6	48 (0)							
55	RC C-7	55 (0)							
60	RC C-8	68 (17)			57': UCS: 14194 psi 57': UCS: 7636 psi				
65	RC C-9	32 (0)							
70	RC C-10	85 (54)			69': UCS: 1059 psi			70.0	289.1

Bottom of borehole at 70.0 feet.

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BORING NUMBER BH-10

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/28/21 **COMPLETED** 9/28/21

GROUND ELEVATION 263.1 ft

DRILLING CONTRACTOR Western States Soil Conservation Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL		SANDY LEAN CLAY, stiff, moist, dark brown, fine to coarse grained, subangular to subrounded, medium plasticity, [FILL]	
	SPT S-1	100	5 4 4	10	-				
						CH	4.0	SANDY FAT CLAY WITH GRAVEL, very stiff, moist, reddish brown, fine to coarse grained, angular to subangular, high plasticity	259.1
5	SPT S-2	100	3 6 9	18	LL: 60 PI: 35 MC: 32.0% Fines: 74.6%				
	SPT S-3	100	18 33 34	80					
						GM	8.0	SILTY GRAVEL WITH SAND, very dense, moist, gray, fine to coarse grained, angular to subangular, low plasticity	255.1
10	SPT S-4	100	50	60/6"					
15	SPT S-5	67	50/3"	60/3"					
20	SPT S-6	100	50/2"	60/2"	MC: 20.5% Fines: 27.0%				
25	SPT S-7	100	50/2"	60/2"			25.2	Bottom of borehole at 25.2 feet.	237.9

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BORING NUMBER BH-11

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CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/8/21 **COMPLETED** 9/9/21
GROUND ELEVATION 274.8 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						SM		SILTY SAND, medium dense, moist, dark reddish brown with gray, fine grained, high plasticity	
	SPT S-1	87	3 4 5	11	-				
5	SPT S-2	93	3 4 5	11	MC: 49.7% Fines: 33.5%				
7.0						MH		SANDY SILT, medium stiff, moist, dark reddish brown with gray, fine grained, high plasticity	267.8
	SPT S-3	100	1 2 3	6					
10	SPT S-4	100	1 2 3	6					
	ST ST-1	100			MC: 69.8% DD: 52 / 57pcf Su: 1039 psf k: 0.00000411 cm/s consol test - see App B				
15	SPT S-5	93	1 2 2	5	LL: 85 PI: 41 MC: 80.7% Fines: 65.9%				
20	SPT S-6	93	2 3 5	10	stiff				
25	SPT S-7	100	1 2 3	6	medium stiff				
30	SPT S-8	100	1 2 3	6	MC: 72.2% Fines: 54.9%				
35									

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BORING NUMBER BH-11

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35						MH		SANDY SILT, medium stiff, moist, dark reddish brown with gray, fine grained, high plasticity *(continued)*	
40	SPT S-9	100	4 8 10	22	very stiff				
45						SM	45.0	SILTY SAND, very dense, moist, greenish gray, fine grained, angular to subangular, low plasticity, weathered basalt	229.8
50	SPT S-10	100	14 21 30	61			51.5		223.3

Bottom of borehole at 51.5 feet.

BORING NUMBER BH-12

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/7/21 **COMPLETED** 9/7/21
GROUND ELEVATION 270.7 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						MH		SANDY ELASTIC SILT, stiff, moist, orangeish brown, fine grained, high plasticity, saprolitic basalt	
	SPT S-1	93	2 6 6	14	-				
5	SPT S-2	100	2 2 4	7	medium stiff				
	SPT S-3	100	1 1 3	5	LL: 78 PI: 36 MC: 61.1% Fines: 50.7%				
10	SPT S-4 ST ST-2	93 100	0 1 1	2	MC: 63.9% DD: 58 pcf Su: 1159 psf consol test - see App B				
	SPT S-5	100	1 1 1	2	soft				
15	SPT S-6	100	0 2 1	4	medium stiff				
20	SPT S-7 ST ST-3	100 100	1 2 4	7	MC: 64.9% c: 200 psf phi: 41 degrees consol test - see App B				
25	SPT S-8	100	1 2 5	8					
								28.0	242.7
						SM		SILTY SAND, loose, moist, orangeish brown, fine grained, angular to subangular, saprolitic basalt, weathered basalt	
30	SPT S-9	100	1 1 2	4	LL: 67 PI: 21 MC: 66.3% Fines: 48.2%				
35									

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BORING NUMBER BH-12

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	SPT S-10	100	2 2 3	6		SM		SILTY SAND, loose, moist, orangeish brown, fine grained, angular to subangular, saprolitic basalt, weathered basalt *(continued)*	
40	ST ST-1	80							
45	SPT S-11	100	5 10 18	34	MC: 44.2% Fines: 38.0% dense			46.5	224.2

Bottom of borehole at 46.5 feet.

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER BH-13

PAGE 1 OF 2

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/9/21 **COMPLETED** 9/9/21
GROUND ELEVATION 390.2 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						ML		SANDY SILT, very stiff, moist, dark red with gray, fine grained, medium plasticity, weathered saprolitic basalt	
	SPT S-1	67	5 10 12	26	-				
5	SPT S-2	73	5 7 6	16					
	SPT S-3	80	2 3 5	6	medium stiff				
10	SPT S-4	73	2 4 4	10	stiff				
15	SPT S-5	80	1 1 2	4	medium stiff				
20	SPT S-6	93	5 11 21	38		SM		20.0 SILTY SAND WITH GRAVEL, dense, moist, dark red with gray, fine to coarse grained, angular to subangular, weathered basalt	370.2
25	SPT S-7	93	3 6 10	19	MC: 47.7% Fines: 27.1% medium dense				
30	SPT S-8	87	18 13 34	56	MC: 25.2% Fines: 18.8%	SM		30.0 SILTY SAND WITH GRAVEL, very dense, moist, greenish gray, fine to coarse grained, angular to subangular, weathered basalt	360.2
35									

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BORING NUMBER BH-13

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	SPT S-9	100	50/3"	60/3"		SM		SILTY SAND WITH GRAVEL, very dense, moist, greenish gray, fine to coarse grained, angular to subangular, weathered basalt *(continued)*	
40	SPT S-10	0	50/1"	60/1"					
45	SPT S-11	100	50/1"	60/1"			45.0	BASALT, highly weathered to slightly weathered, moderately fractured, greenish gray, low strength to medium high strength, R1 - R3	345.2
	RC C-1	52 (26)							
50							50.0		340.2

Bottom of borehole at 50.0 feet.

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
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BORING NUMBER BH-14

PAGE 1 OF 1

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/7/21 **COMPLETED** 9/7/21
GROUND ELEVATION 239 ft
DRILLING CONTRACTOR Western States Soil Conservation Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
AT TIME OF DRILLING ---
LOGGED BY SMW **CHECKED BY** LMS
24HRS AFTER DRILLING ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS	Corrected N-Value	TESTS AND REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CH	▨	SANDY FAT CLAY, stiff, moist, brown to gray, high plasticity	
	SPT S-1	80	3 3 7	12	-				
5	SPT S-2	100	2 3 3	7	LL: 56 PI: 31 MC: 32.6% Fines: 77.8% medium stiff				
	SPT S-3	100	1 3 3	5					
10	ST ST-1	0							
12.0	ST ST-2	0				CH	▨	SANDY FAT CLAY WITH GRAVEL, stiff, moist, greenish gray, fine grained, rounded, high plasticity	227.0
15	SPT S-4	100	2 3 6	11	LL: 62 PI: 39 MC: 32.4% Fines: 62.2%				
17.0	SPT S-5	100	17 37 42	95		SM	░	SILTY SAND WITH GRAVEL, very dense, moist, greenish gray with brown, fine to coarse grained, angular to subangular, medium plasticity, weathered-in-place basalt	222.0
20	SPT S-6	100	10 27 50/5"	92/11"	MC: 15.0% Fines: 21.0%				
25	SPT S-7	100	50/1"	60/1"	MC: 4.1% Fines: 18.1%				
25.1								Bottom of borehole at 25.1 feet.	213.9

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WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
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BORING NUMBER BH-15

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 11/8/22 **COMPLETED** 11/12/22
GROUND ELEVATION 408 ft
DRILLING CONTRACTOR Haz-Tech Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD CME Track Rig
▽ **AT TIME OF DRILLING** 6.00 ft / Elev 402.00 ft
LOGGED BY KAK **CHECKED BY** LMS
▼ **24HRS AFTER DRILLING** ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						SC		CLAYEY SAND, very dense, moist, red and gray, fine to coarse grained	
5	SPT S-1		17 20 25	54				▽	
10	SPT S-2		37 50/5"	60/5"		GM	10.0	SILTY GRAVEL WITH SAND, wet, gray, fine to coarse grained, angular, weathered basalt at 10.5'	398.0
15	RC C-1	87 (0)					15.0	BASALT, slightly weathered, highly fractured, interbedded, gray to greenish gray, very low strength to moderate strength, clay infilling, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R2	393.0
20	RC C-2	67 (0)							
25	RC C-3	75 (0)							
30	RC C-4	77 (10)							
35									

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	RC C-5	50 (17)						BASALT, slightly weathered, highly fractured, interbedded, gray to greenish gray, very low strength to moderate strength, clay infilling, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R2 *(continued)*	
40	RC C-6	100 (0)							
45	RC C-7	83 (19)							
50	RC C-8	92 (60)							
	RC C-9	73 (20)							
55	RC C-10	97 (13)							
	RC C-11	75 (0)							
60	RC C-12	92 (28)							
65	RC C-13	100 (65)							
	RC C-14	73 (0)							
70	RC C-15	60 (0)			69' - 70' clayey soft highly weathered				
75	RC C-16	83 (17)							

BORING NUMBER BH-15

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75	RC C-17	120 (37)			75' - 77.5' clayey soft			BASALT, slightly weathered, highly fractured, interbedded, gray to greenish gray, very low strength to moderate strength, clay infilling, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R2 *(continued)*	
80	RC C-18	97 (88)							
85	RC C-19	97 (77)							
90	RC C-20	95 (14)							
95	RC C-21	70 (0)							
	RC C-22	86 (0)							
100	RC C-23	90 (20)							
	RC C-24	100 (0)							
	RC C-25	100 (58)							
105	RC C-26	20 (7)			106' - 110' highly weathered topsoil no returns washed out				
110	RC C-27	100 (57)							
115									

Figure: A - 30.3

BORING NUMBER BH-15

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
115	RC C-28	100 (73)						BASALT, slightly weathered, highly fractured, interbedded, gray to greenish gray, very low strength to moderate strength, clay infilling, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R2 *(continued)*	
	RC C-29	100 (80)							
120	RC C-30	100 (60)							
125	RC C-31	100 (35)							
130	RC C-32	100 (50)			132' - 133' fast advance softer				
135	RC C-33	100 (87)							
140	RC C-34	100 (40)							
145	RC C-35	100 (32)							
150	RC C-36	63 (0)							
155									

BORING NUMBER BH-15

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
155	RC C-37	100 (0)						BASALT, slightly weathered, highly fractured, interbedded, gray to greenish gray, very low strength to moderate strength, clay infilling, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R2 *(continued)*	
	RC C-38	100 (64)							
160	RC C-39	43 (0)							
165	RC C-40	100 (37)					165.0		243.0

Bottom of borehole at 165.0 feet.

WALLACE GROUP NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
62915 NE 18th Street, Suite 1
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BORING NUMBER BH-16

PAGE 1 OF 2

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 11/16/22 **COMPLETED** 11/16/22

GROUND ELEVATION 310 ft

DRILLING CONTRACTOR Haz-Tech Drilling, Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

▽ **AT TIME OF DRILLING** 19.40 ft / Elev 290.60 ft

LOGGED BY KAK **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** 4.60 ft / Elev 305.40 ft

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CH		FAT CLAY, hard, moist, brown to light brown, fine grained	
5					wet		▼		
	SPT S-1		3 10 18	34					
10	SPT S-2		18 25 35	72					
15	SPT S-3		22 29 29	70					
17.5								SHALE, slightly weathered, blueish green, fine, very low strength to low strength, basaltic rip-up clasts at contact, R0 - R1	292.5
							▽		
20	SPT S-4	0 (0)	50/5"	60/5"					
	RC C-1	100 (0)							
	RC C-2	75 (13)							
23.0								BASALT, unweathered to slightly weathered, slightly fractured, interbedded, gray to greenish gray, moderate strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R2	287.0
	RC C-3								
25	RC C-4	100 (63)							
30	RC C-5	100 (67)							
	RC C-6	100 (63)							
35									

Figure: A - 31.1

BORING NUMBER BH-16

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, unweathered to slightly weathered, slightly fractured, interbedded, gray to greenish gray, moderate strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R2 *(continued)*	
	RC C-7	100 (63)							
40								40.0	270.0

Bottom of borehole at 40.0 feet.

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER BH-17

PAGE 1 OF 4

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 11/13/22 **COMPLETED** 11/14/22

GROUND ELEVATION 400 ft

DRILLING CONTRACTOR Haz-Tech Drilling, Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

▽ **AT TIME OF DRILLING** 20.50 ft / Elev 379.50 ft

LOGGED BY KAK **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** 19.50 ft / Elev 380.50 ft

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL	▨	SANDY LEAN CLAY, stiff, moist, yellowish red to blackish gray, fine to medium grained, subangular to subrounded, medium plasticity, gravelly weak cementation, iron oxide staining	
5	SPT S-1		3 4 5	11					
10	SPT S-2		7 10 14	29	very stiff				
15	SPT S-3		2 5 7	14	organic/peat lenses at 15-16.5' stiff				
					17' - 19' weakly cemented sand organic stringers			▼ ▽	
20	SPT S-4		14 50/5"	60/5"	20' - 25' weathered top of rock augered to core point at 25'				
25	RC C-1	86 (29)			26.5' - 27.5' soil-filled fracture (clay)		25.0 ⬡	BASALT, unweathered to slightly weathered, moderately fractured, interbedded, blackish gray to greenish gray, very low strength to high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R4	375.0
30	RC C-2	80 (0)							
	RC C-3	100 (6)							
35	RC	100							

BORING NUMBER BH-17

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35	C-4	(33)						BASALT, unweathered to slightly weathered, moderately fractured, interbedded, blackish gray to greenish gray, very low strength to high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R4 *(continued)*	
	RC C-5	100 (23)			38' - 38.5 soil-filled fracture (clay/organics)				
40	RC C-6	100 (78)							
45	RC C-7	100 (63)							
50	RC C-8	100 (23)							
	RC C-9	100 (30)							
55	RC C-10	67 (0)							
	RC C-11	100 (23)							
60	RC C-12	100 (27)							
	RC C-13	100 (88)							
65	RC C-14	80 (50)							
70	RC C-15	100 (67)							
	RC C-16	100 (60)							
75									

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BORING NUMBER BH-17

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75	RC C-17	100 (24)						BASALT, unweathered to slightly weathered, moderately fractured, interbedded, blackish gray to greenish gray, very low strength to high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R4 *(continued)*	
80	RC C-18	100 (50)							
	RC C-19	100 (60)							
85	RC C-20	100 (63)							
90	RC C-21	100 (27)							
	RC C-22	100 (73)							
95	RC C-23	100 (54)							
100	RC C-24	100 (62)							
	RC C-25	100 (50)							
105	RC C-26	100 (23)							
	RC C-27	100 (0)							
110	RC C-28	100 (17)							
	RC C-29	100 (17)							
115									

BORING NUMBER BH-17

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
115	RC C-30	100 (90)						BASALT, unweathered to slightly weathered, moderately fractured, interbedded, blackish gray to greenish gray, very low strength to high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R4 *(continued)*	
120	RC C-31	100 (73)					120.0		280.0

Bottom of borehole at 120.0 feet.

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER BH-18

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 11/12/22 **COMPLETED** 11/13/22

GROUND ELEVATION 370 ft

DRILLING CONTRACTOR Haz-Tech Drilling, Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

∇ **AT TIME OF DRILLING** 25.20 ft / Elev 344.80 ft Conclusion of HSA , cor

LOGGED BY KAK **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						CL	▨	SANDY LEAN CLAY, very stiff, moist, reddish brown with blackish gray, fine grained, subangular to subrounded, medium plasticity, laminated, weak cementation, iron oxide staining	
5	SPT S-1		5 7 8	18					
10	SPT S-2		24 14 13	32	10' - 10.5' weakly cemented sand stringer hard				
15	SPT S-3		50/5"	60/5"					
20	SPT S-4		8 4 5	11	stiff				
25	SPT S-5		3 12 48	72	25' - 26' wet elastic/plastic tan clay interbed atop rock weathered rock		∇		
27.0					27' - 30' weathered top of bedrock augered to core point at 30'		⬡	BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clastic infilling, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3	343.0
30	RC C-1	100 (53)							
35	RC C-2	100 (62)							

Figure: A - 33.1

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER BH-18

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clastic infilling, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)*	
	RC C-3	100 (63)							
40									
	RC C-4	100 (67)							
45									
	RC C-5	100 (55)							
50									
	RC C-6	100 (58)							
55									
	RC C-7	100 (65)			57' - 58.5' greenish gray drilling fluids changed to brown then back to gray				
60									
	RC C-8	100 (77)							
65									
	RC C-9	100 (80)							
70									
	RC C-10	100 (67)							
75									

BORING NUMBER BH-18

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75								BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clastic infilling, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)*	
	RC C-11	100 (55)			80' - 81.5' volcaniclastic poorly-graded sand interbed (S-6)				
80	GB S-6								
	RC C-12	100 (62)							
85	RC C-13	100 (67)			C-13 and C-14 contained sloughing sand atop core from wash out at 80'				
	RC C-14	100 (67)							
	RC C-15	100 (50)							
90	RC C-16	100 (71)							
95	RC C-17	100 (90)							
	RC C-18	100 (50)							
100	RC C-19	88 (29)							
105	RC C-20	100 (71)							
	RC C-21	100 (33)							
110	RC C-22	100 (58)							
115									

Wallace Group Inc.
62915 NE 18th Street, Suite 1
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BORING NUMBER BH-18

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
115	RC C-23	100 (30)						BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clastic infilling, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)*	
120	RC C-24	100 (30)						120.0	250.0

Bottom of borehole at 120.0 feet.

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER BH-19

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 11/15/22 **COMPLETED** 11/16/22

GROUND ELEVATION 438 ft

DRILLING CONTRACTOR Haz-Tech Drilling, Inc.

GROUND WATER LEVELS:

DRILLING METHOD CME Track Rig

▽ **AT TIME OF DRILLING** 17.83 ft / Elev 420.17 ft

LOGGED BY KAK **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0						GM		SILTY GRAVEL WITH SAND, slightly moist, blackish gray, fine to coarse grained, angular to subangular, road base, [FILL]	
0.5						CH		FAT CLAY, stiff, moist, yellowish red to orangeish black, fine grained	437.5
5	SPT S-1		3 4 4	10					
10	SPT S-2		0 0 0	0	very soft				
15	SPT S-3		1 1 3	5	medium stiff				
17.83								▽	
20	SPT S-4		8 7 7	17	very stiff wet				
22.5					22.5' - 25' top of rock augered to core point at 25'			BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3	415.5
25	RC C-1	100 (28)							
	RC C-2	100 (58)							
30									
	RC C-3	100 (73)							
35									

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
35								BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)*	
	RC C-4	100 (33)							
40	RC C-5	100 (0)							
	RC C-6	100 (86)							
45	RC C-7	100 (20)							
	RC C-8	67 (0)							
50	RC C-9	100 (70)							
	RC C-10	100 (33)							
55	RC C-11	100 (0)							
60	RC C-12	61 (19)							
	RC C-13	80 (0)							
65	RC C-14	100 (8)			63.5' - 64' highly weathered rock with clay infilling				
	RC C-15	76 (12)							
70	RC C-16	100 (33)							
	RC C-17	100 (13)							
75	RC C-18	100 (47)							

CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
75								BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)*	
	RC C-19	100 (13)							
	RC C-20	100 (33)							
80									
	RC C-21	100 (35)							
85									
	RC C-22	100 (8)			86' - 87' greenish gray drilling fluids changed to brown gray again at 87'				
	RC C-23	80 (30)							
90									
	RC C-24	87 (13)							
	RC C-25	100 (0)							
95									
	RC C-26	100 (50)							
	RC C-27	100 (20)			100' - 100.5' bit jammed trip out of hole to inspect				
100									
	RC C-28	100 (0)							
	RC C-29	100 (50)							
105									
	RC C-30	100 (50)							
110									
	RC C-31	100 (63)							
115									

BORING NUMBER BH-19

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS	Corrected N-Value	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
115 120	RC C-32	100 (33)						BASALT, slightly weathered to unweathered, moderately fractured, interbedded, greenish gray to blackish gray, very low strength to medium high strength, clay infilling, moderately weathered zones, highly fractured zones, discontinuites are high angle (55 - 90 degrees) with chloritic siltstone, pyrite, and calcite infilling, joints and discontinuities are wavey to smooth with schistose/phyllitic faces, R0 - R3 *(continued)* 120.0	318.0

Bottom of borehole at 120.0 feet.

TWG-BORING LOGS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 15:02 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

Wallace Group Inc.
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Bend, OR 97701

BORING NUMBER GP-01

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/21/22 **COMPLETED** 9/22/22

GROUND ELEVATION 238.82 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

∇ **AT TIME OF DRILLING** 1.97 ft / Elev 236.85 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			CH	▨	SANDY FAT CLAY, stiff to very stiff, wet, brown to gray ∇	
	GB S-1	MC: 29.9% Fines: 98.1% LL: 58 PI: 32		▨		
5	ST ST-1			▨		
	GB S-2	MC: 35.6% Fines: 97.4% LL: 54 PI: 31		▨		
10	ST ST-2			▨		
15				▨	15.0	223.8
15	ST ST-3		CH	▨	SANDY FAT CLAY WITH GRAVEL, stiff to very stiff, wet, greenish gray	
20				▨	20.0	218.8
20			CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff to very stiff, wet, greenish gray with brown, weathered in-place basalt	
					22.5	216.3

Bottom of borehole at 22.5 feet.

BORING NUMBER GP-02

PAGE 1 OF 1

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/22/22 **COMPLETED** 9/22/22

GROUND ELEVATION 237.06 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

▽ **AT TIME OF DRILLING** 2.02 ft / Elev 235.04 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0		CL	▨	SANDY LEAN CLAY, stiff to very stiff, wet, brown to gray	
				▽	
	GB S-1				
5					
	GB S-2				
10	ST ST-1				
				12.0	225.1
		CL	▨	SANDY LEAN CLAY WITH GRAVEL, stiff to very stiff, wet, reddish brown to reddish black, weathered in-place basalt	
	GB S-3				
15	ST ST-2				
				17.0	220.1

Bottom of borehole at 17.0 feet.

Figure: A - 38

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BORING NUMBER GP-03

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/22/22 **COMPLETED** 9/22/22

GROUND ELEVATION 258.82 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

∇ **AT TIME OF DRILLING** 12.00 ft / Elev 246.82 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** 19.00 ft / Elev 239.82 ft

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	REMARKS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			CL		SANDY LEAN CLAY, stiff, moist, brown to gray	
	GB S-1					
5						
6.0			ML		SANDY SILT, stiff, moist, red with gray, fine grained, weathered in-place basalt	252.8
	GB S-2					
10	ST ST-1					
∇						
	GB S-3	wet				
14.0			SM		SILTY SAND WITH GRAVEL, dense to very dense, wet, greenish gray with red, fine to coarse grained, angular to subangular, weathered in-place basalt	244.8
15						
	GB S-4					
19.0 ▼						239.8

Bottom of borehole at 19.0 feet.

TWG-BORING LOGS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 12:47 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

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BORING NUMBER GP-04

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CLIENT CEC, Inc.
PROJECT NAME Coffin Butte Landfill
PROJECT NUMBER 21129-1
PROJECT LOCATION Corvallis, OR
DATE STARTED 9/22/22 **COMPLETED** 9/22/22
GROUND ELEVATION 263.42 ft
DRILLING CONTRACTOR Oregon Geotechnical Explorations
GROUND WATER LEVELS:
DRILLING METHOD geoprobe 6622
▽ **AT TIME OF DRILLING** 20.82 ft / Elev 242.60 ft
LOGGED BY SMW **CHECKED BY** LMS
▼ **24HRS AFTER DRILLING** ---
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			CH	▨	SANDY FAT CLAY, very stiff to hard, moist, red with gray, fine grained, weathered in-place basalt	
	GB S-1	MC: 22.6% LL: 63 PI: 38				
5						
	GB S-2	MC: 37.3%				
10	ST ST-1					
	GB S-3	MC: 40.1% LL: 75 PI: 38				
15						
17.0			MH	▥	ELASTIC SILT WITH SAND, medium stiff to very stiff, wet, red with gray, weathered in-place basalt	246.4
20	ST ST-2	MC: 70.0% C': 0 psf phi: 33.3°			▽	
22.0			MH	▥	ELASTIC SILT WITH SAND, medium stiff to very stiff, wet, red with gray, weathered in-place basalt	241.4
	GB S-4	MC: 75.6%				
25						
	GB S-5	MC: 69.7% LL: 78 PI: 30				
	GB S-6	MC: 70.3%				
30	ST ST-3	MC: 65.4 / 62.9 / 69.6% DD: 61 / 63 / 59 pcf C': 0 psf phi: 35.5°				
30.5					Bottom of borehole at 30.5 feet.	232.9

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BORING NUMBER GP-05

CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/22/22 **COMPLETED** 9/22/22

GROUND ELEVATION 302.68 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

▽ **AT TIME OF DRILLING** 15.70 ft / Elev 286.98 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			MH		ELASTIC SILT, stiff to very stiff, moist, dark brown, fine grained, weathered in-place basalt, with sand	
5	GB S-1	-				
	GB S-2	MC: 42.6% LL: 73 PI: 34				
				9.0		293.7
10	ST ST-1	MC: 41.2 / 48.2 / 41.2% DD: 79 / 71 / 79 pcf C': 150 psf phi: 39°	SC		CLAYEY SAND, medium dense, moist, red with gray, weathered in-place basalt	
				14.0		288.7
15	GB S-3	MC: 45.1% Fines: 28.9%	SC-SM		SILTY SAND, clayey sand, wet, dark gray brown, fine to coarse grained, angular to subangular, weathered in-place basalt ▽	
				17.5		285.2

Bottom of borehole at 17.5 feet.

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BORING NUMBER GP-06

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/22/22 **COMPLETED** 9/22/22

GROUND ELEVATION 290.84 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

▽ **AT TIME OF DRILLING** 31.90 ft / Elev 258.94 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			MH		ELASTIC SILT, stiff to hard, moist, red with gray, fine grained, weathered in-place volcanics	
	GB S-1	-				
5						
	GB S-2	MC: 39.0% LL: 80 PI: 36				
10	ST ST-1					
					14.0	276.8
			ML		SILT, stiff, moist, dark brown and yellow, with fine grained sand	
15	GB S-3					
	GB S-4	MC: 71.9%				
20					20.0	270.8
			MH		ELASTIC SILT, stiff, moist, light tan with reddish gray	
	ST ST-2					
25	GB S-5	MC: 75.0% LL: 84 PI: 30				
					26.0	264.8
			ML		SILT, stiff to very stiff, brownish yellow and yellowish brown	
	GB S-6	MC: 80.6%				
30	ST ST-3					
					31.0	259.8

▽

Bottom of borehole at 31.0 feet.

TWG-BORING LOGS - WALLACE GROUP DATA TEMPLATE.GDT - 12/15/23 12:47 - W:\GINT PRO - FILES\BENTLEY\GINT\PROJECTS\21129-1 COFFIN BUTTE LANDFILL.GPJ

Figure: A - 42

BORING NUMBER GP-07

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/23/22 **COMPLETED** 9/23/22

GROUND ELEVATION 287.77 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING 4.50 ft / Elev 283.27 ft

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0	GB S-1	MC: 26.9% Fines: 53.1%	CL	4.0	SANDY LEAN CLAY, moist, brown to gray, fine to coarse grained, angular to subangular, [FILL]	283.8
5	ST ST-1		CL	7.0	▽ SANDY LEAN CLAY, medium stiff, wet, dark gray to greenish gray, fine grained, organics	280.8
10	ST ST-2 GB S-2	MC: 38.3%	ML	15.0	SILT, medium dense, wet, brown and very light brown, fine to coarse grained, angular, trace sand and weathered in-place basalt	272.8
15 20 25	GB S-3 GB S-4	MC: 25.5% Fines: 45.9%	SC	25.0	CLAYEY SAND, medium dense to dense, tannish brown, fine to coarse grained, angular, weathered in-place basalt	262.8

Bottom of borehole at 25.0 feet.

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BORING NUMBER GP-08

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 11/8/22 **COMPLETED** 11/8/22

GROUND ELEVATION 360.17 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

AT TIME OF DRILLING ---

LOGGED BY SMW **CHECKED BY** LMS

24HRS AFTER DRILLING ---

NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0			▨	SANDY LEAN CLAY WITH GRAVEL, stiff to hard, moist, reddish brown with dark gray, fine to coarse grained, subangular to subrounded, with cobbles, weathered in-place basalt	
	✋ GB S-1		▨		
5			▨		
	✋ GB S-2		▨		
10		CL	▨		
	✋ GB S-3		▨		
15			▨		
	✋ GB S-4		▨		
				19.0	341.2
20			⬡	BASALT, dark gray	
				21.0	339.2

Bottom of borehole at 21.0 feet.

Wallace Group Inc.
62915 NE 18th Street, Suite 1
Bend, OR 97701

BORING NUMBER GP-09

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CLIENT CEC, Inc.

PROJECT NAME Coffin Butte Landfill

PROJECT NUMBER 21129-1

PROJECT LOCATION Corvallis, OR

DATE STARTED 9/23/22 **COMPLETED** 9/23/22

GROUND ELEVATION 288.85 ft

DRILLING CONTRACTOR Oregon Geotechnical Explorations

GROUND WATER LEVELS:

DRILLING METHOD geoprobe 6622

▽ **AT TIME OF DRILLING** 7.28 ft / Elev 281.57 ft

LOGGED BY SMW **CHECKED BY** LMS

▼ **24HRS AFTER DRILLING** ---

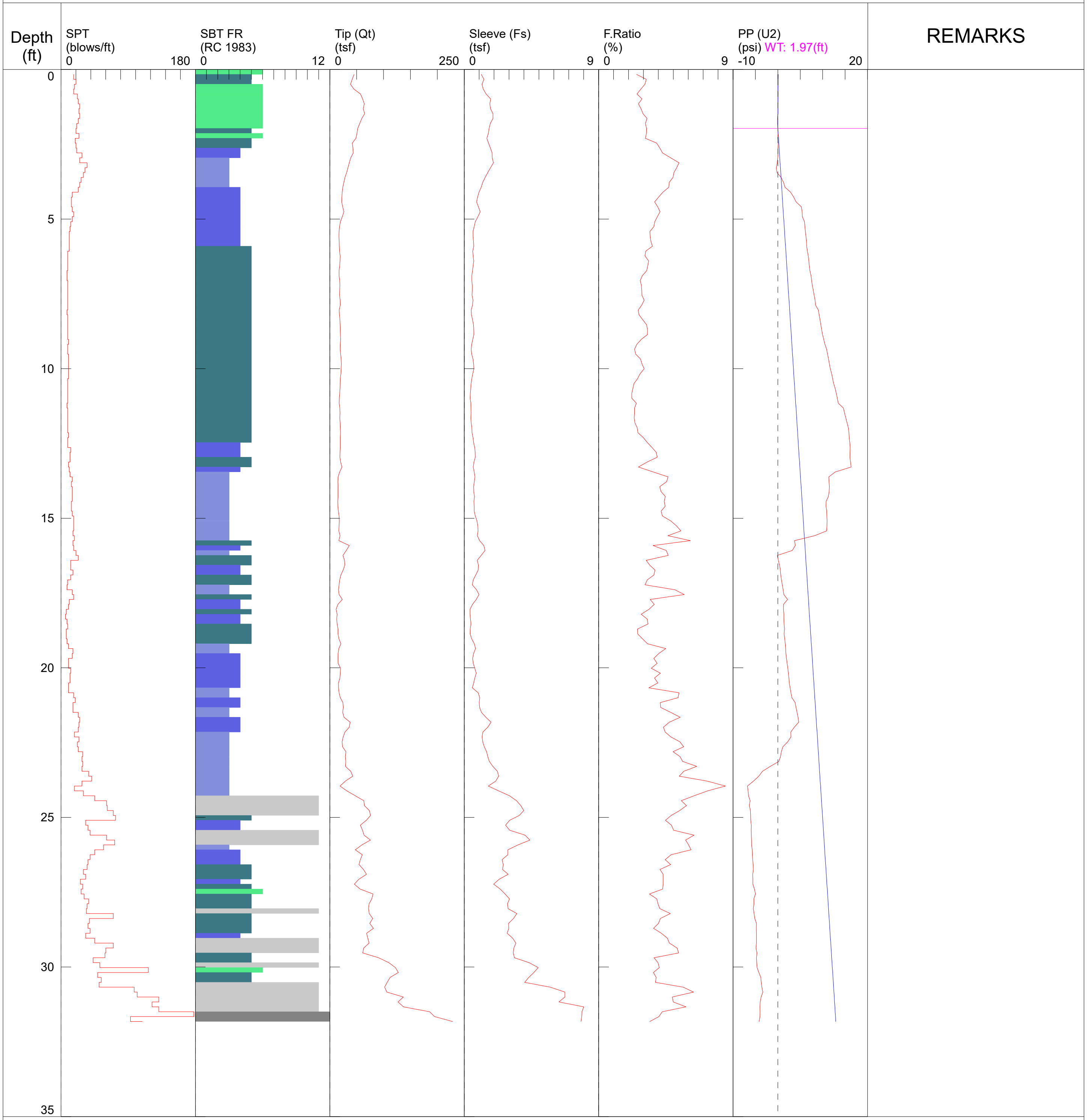
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	Approximate Elevation
0 5	GB S-1 ST ST-1	MC: 28.3% Fines: 92.9% LL: 73 PI: 53	CH	▨	FAT CLAY, stiff to very stiff, moist, dark gray, fine grained, roots and organics 6.5	282.4
10	GB S-2		SM	░	▽ SILTY SAND WITH GRAVEL, very dense, wet, tan with blackish brown, fine to coarse grained, angular to subangular, weathered basalt 10.0	278.9

Bottom of borehole at 10.0 feet.

The Wallace Group / CPT-1 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 4:21:43 PM
TOTAL DEPTH: 31.824 ft

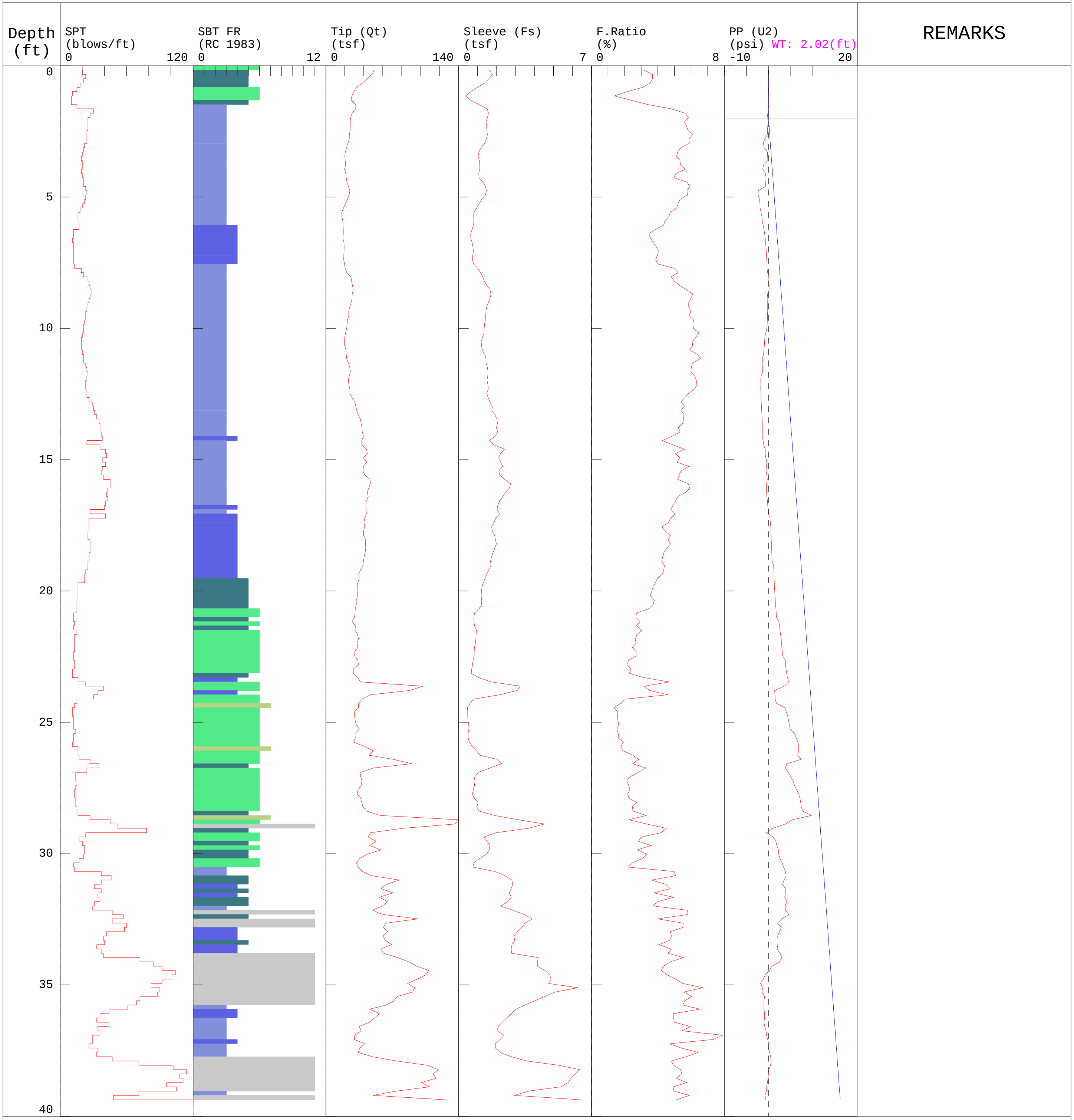


🟥 1 sensitive fine grained
🟥 2 organic material
🟦 3 clay
🟦 4 silty clay to clay
🟦 5 clayey silt to silty clay
🟩 6 sandy silt to clayey silt
🟩 7 silty sand to sandy silt
🟨 8 sand to silty sand
🟫 9 sand
🟧 10 gravelly sand to sand
⬜ 11 very stiff fine grained (*)
⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-2 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 3:15:49 PM
TOTAL DEPTH: 39.370 ft

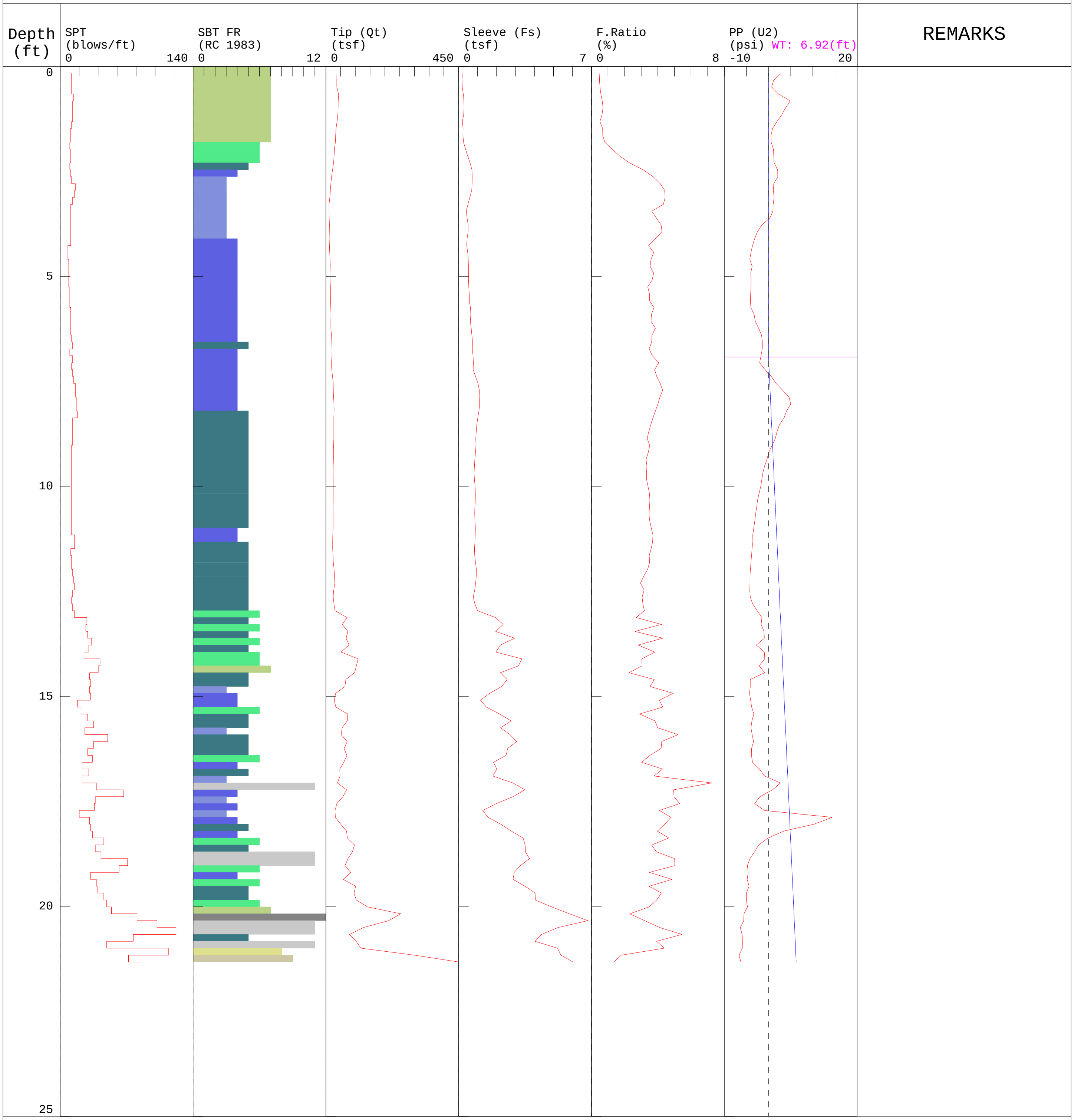


🟥 1 sensitive fine grained
🟥 2 organic material
🟦 3 clay
🟦 4 silty clay to clay
🟩 5 clayey silt to silty cl
🟩 6 sandy silt to clayey si
🟩 7 silty sand to sandy sil
🟨 8 sand to silty sand
🟫 9 sand
🟧 10 gravelly sand to sand
⬜ 11 very stiff fine grained (*)
⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-3 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 10:38:43 AM
TOTAL DEPTH: 21.325 ft

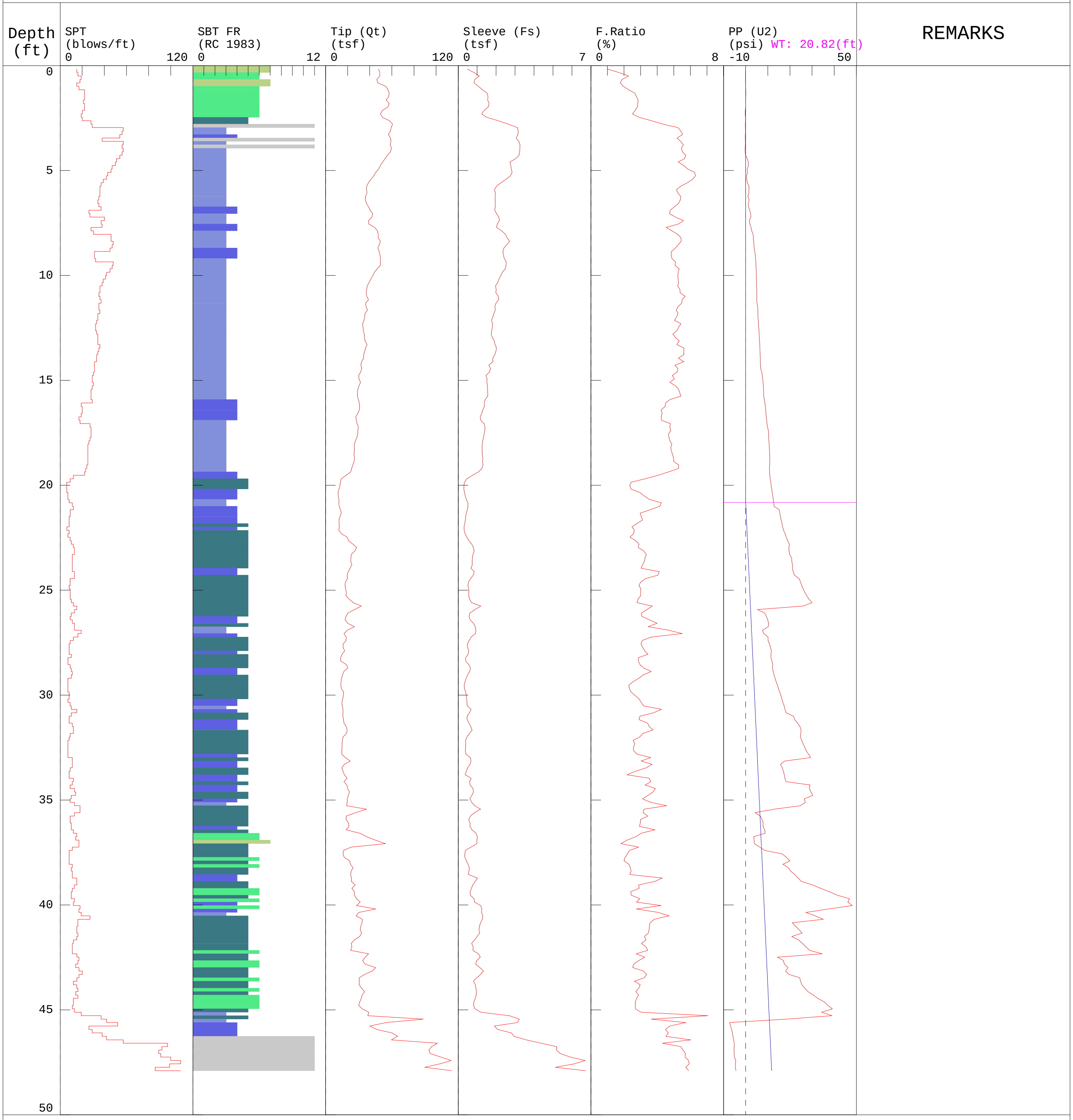


🟥 1 sensitive fine grained 🟦 4 silty clay to clay 🟩 7 silty sand to sandy sil 🟧 10 gravelly sand to sand
🟥 2 organic material 🟦 5 clayey silt to silty cl 🟨 8 sand to silty sand ⬜ 11 very stiff fine grained (*)
🟦 3 clay 🟩 6 sandy silt to clayey si 🟨 9 sand ⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-4 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 2:02:24 PM
TOTAL DEPTH: 47.900 ft

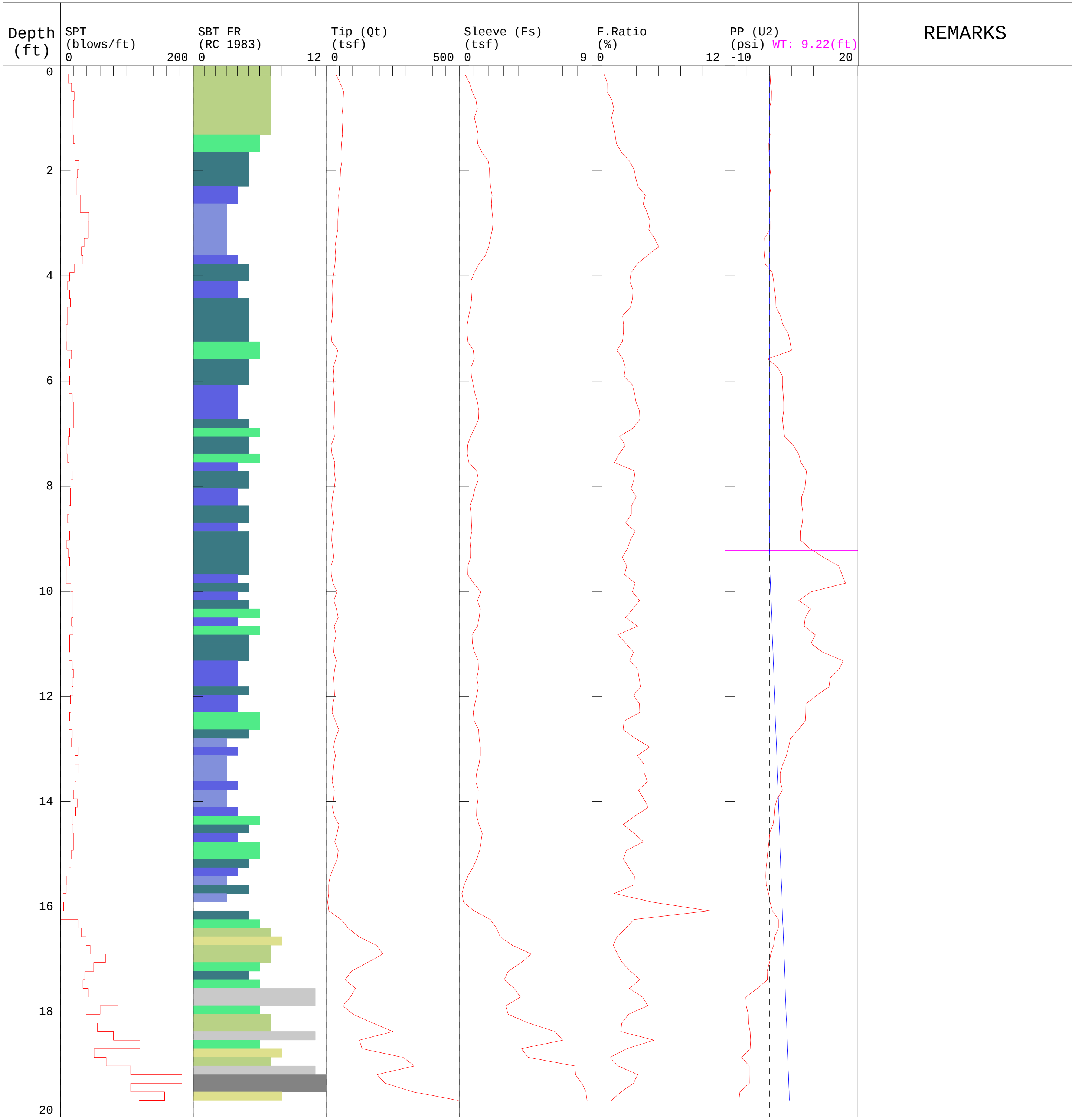


🟥	1	sensitive fine grained	🟦	4	silty clay to clay	🟩	7	silty sand to sandy sil	🟧	10	gravelly sand to sand
🟥	2	organic material	🟦	5	clayey silt to silty cl	🟨	8	sand to silty sand	⬜	11	very stiff fine grained (*)
🟦	3	clay	🟩	6	sandy silt to clayey si	🟫	9	sand	⬛	12	sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-5 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 11:37:33 AM
TOTAL DEPTH: 19.685 ft

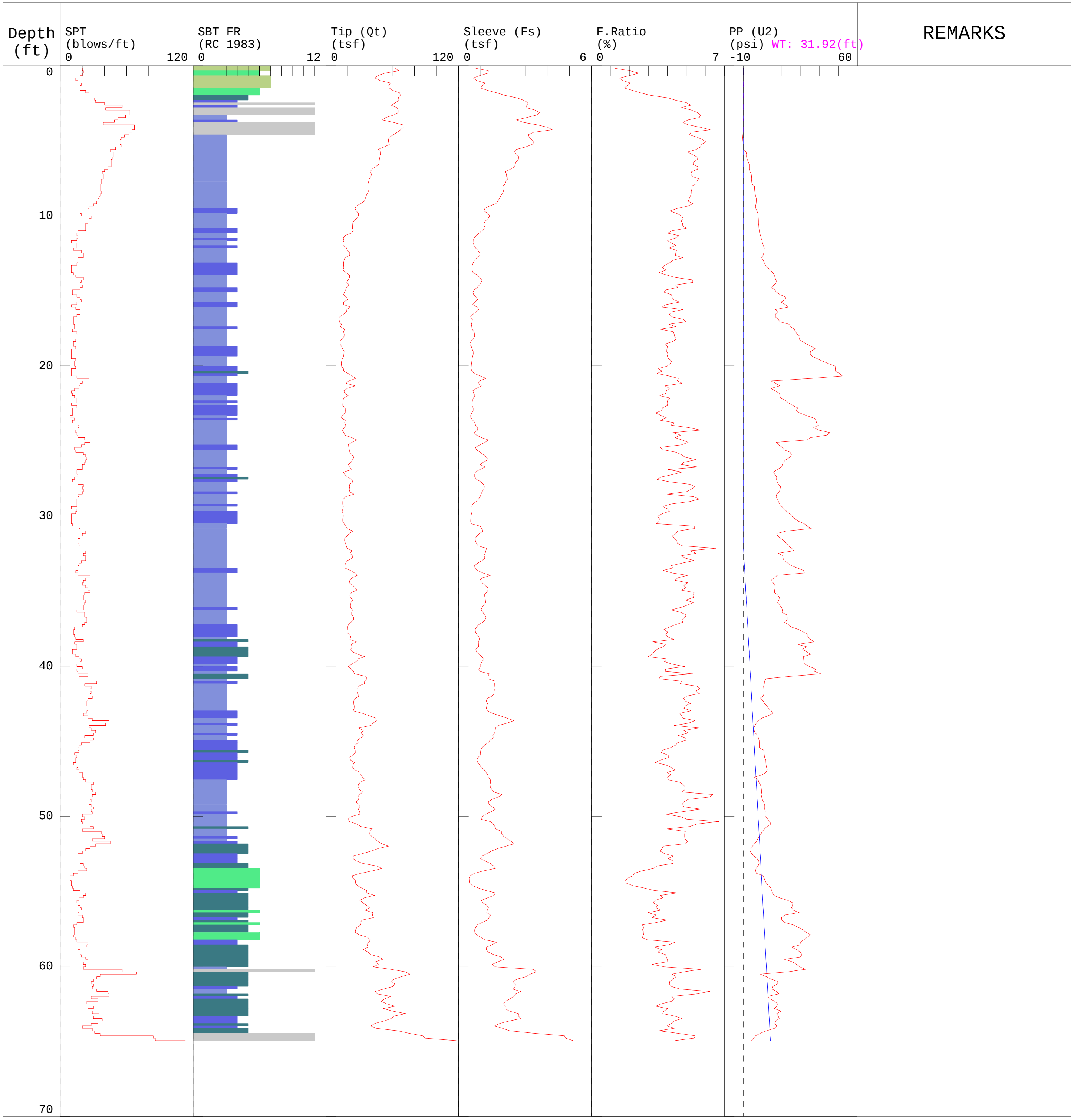


🟥	1	sensitive fine grained	🟦	4	silty clay to clay	🟩	7	silty sand to sandy sil	🟧	10	gravelly sand to sand
🟥	2	organic material	🟦	5	clayey silt to silty cl	🟨	8	sand to silty sand	⬜	11	very stiff fine grained (*)
🟦	3	clay	🟩	6	sandy silt to clayey si	🟫	9	sand	⬛	12	sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-6 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/21/2022 12:36:51 PM
TOTAL DEPTH: 64.961 ft

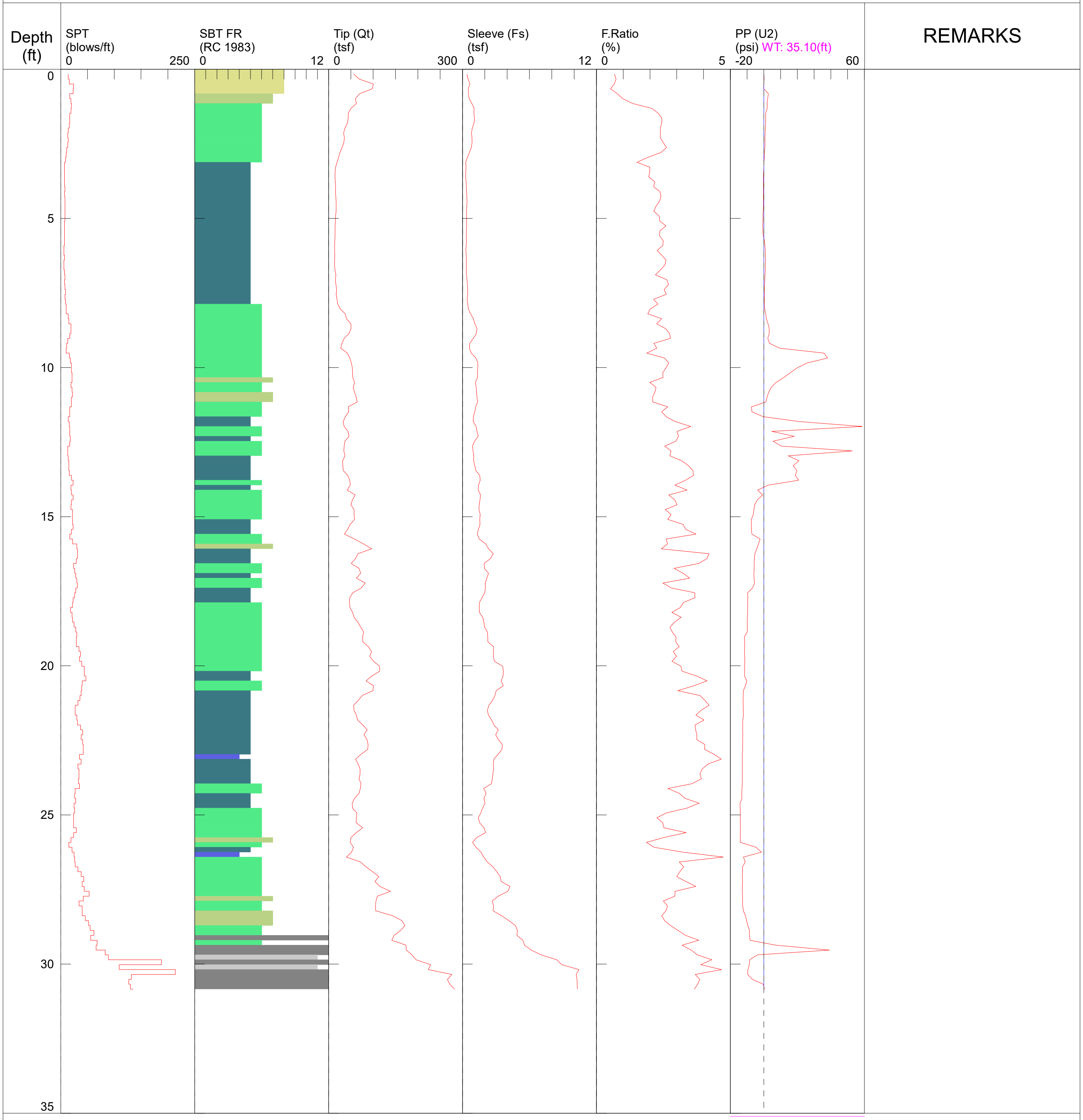


🟥	1 sensitive fine grained	🟦	4 silty clay to clay	🟩	7 silty sand to sandy sil	🟧	10 gravelly sand to sand
🟥	2 organic material	🟦	5 clayey silt to silty cl	🟨	8 sand to silty sand	⬜	11 very stiff fine grained (*)
🟦	3 clay	🟩	6 sandy silt to clayey si	🟨	9 sand	⬛	12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-7 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/23/2022 8:28:45 AM
TOTAL DEPTH: 30.840 ft



🟥 1 sensitive fine grained
🟥 2 organic material
🟦 3 clay

🟦 4 silty clay to clay
🟦 5 clayey silt to silty clay
🟩 6 sandy silt to clayey silt

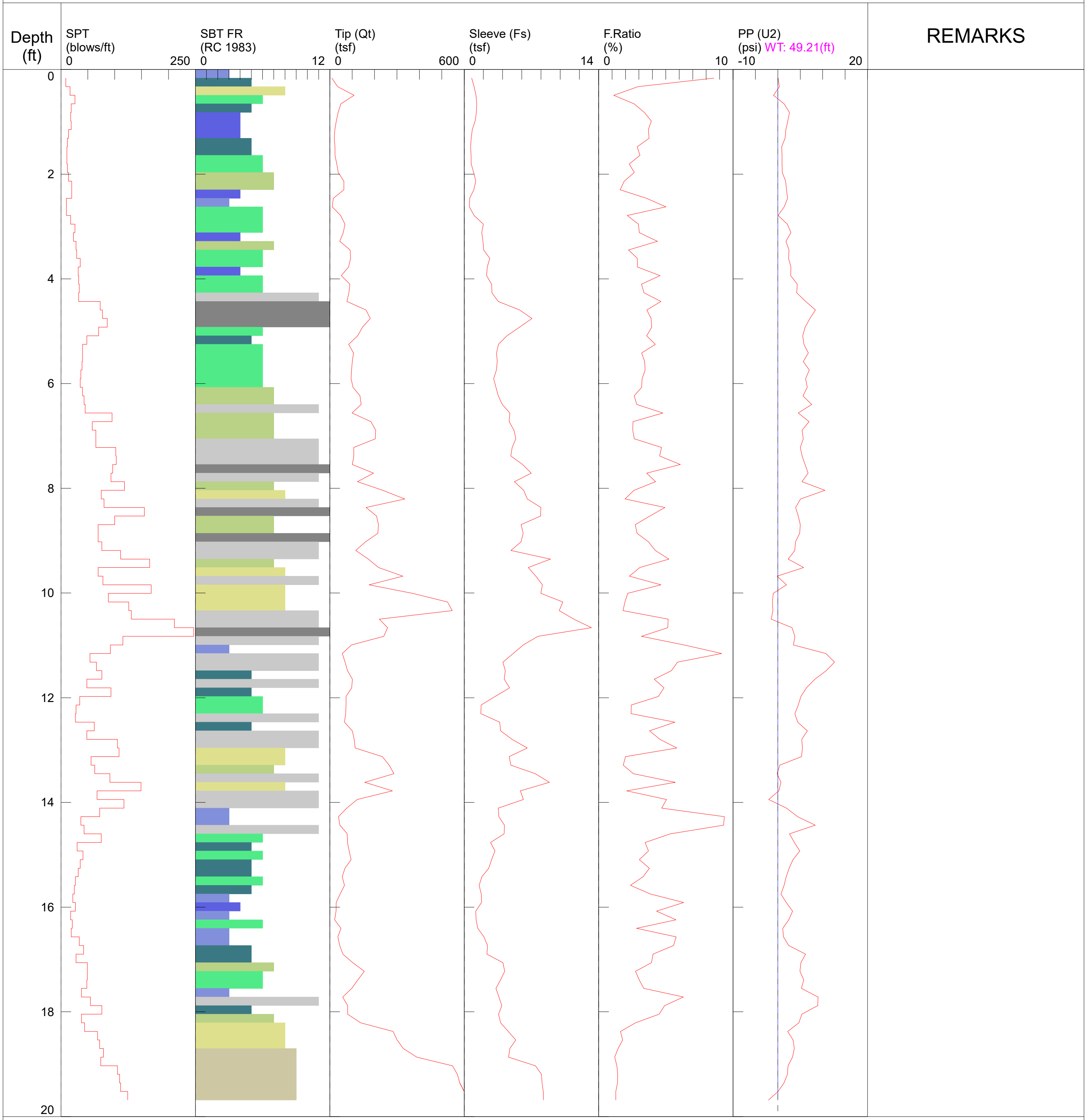
🟩 7 silty sand to sandy silt
🟨 8 sand to silty sand
🟫 9 sand

🟧 10 gravelly sand to sand
⬜ 11 very stiff fine grained (*)
⬛ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-8 / 29160 Coffin Butte Rd Corvallis

OPERATOR: OGE BAK
CONE ID: DDG1296
TEST DATE: 11/8/2022 12:20:14 PM
TOTAL DEPTH: 19.685 ft

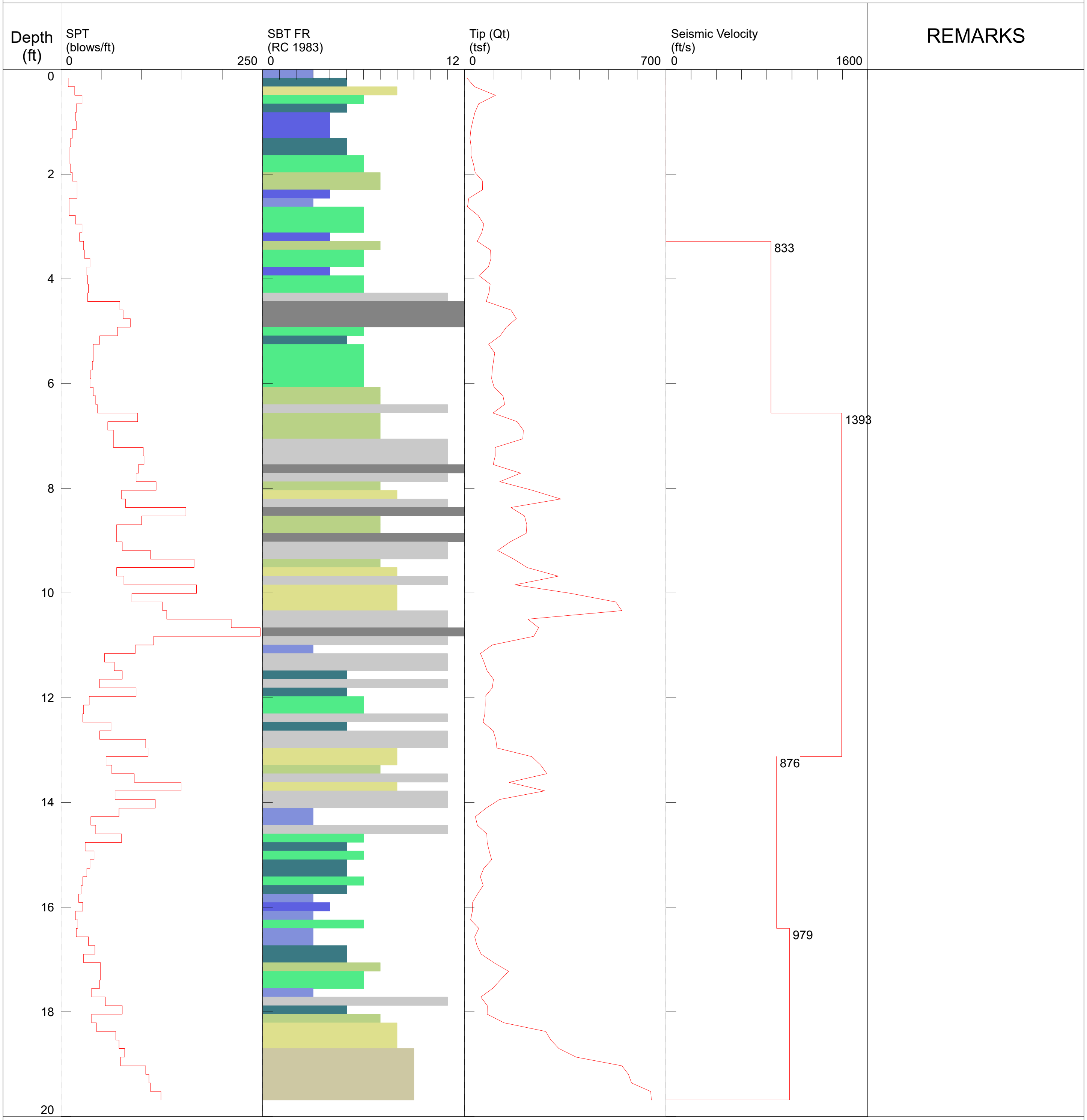


■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-8 / 29160 Coffin Butte Rd Corvallis

OPERATOR: OGE BAK
CONE ID: DDG1296
TEST DATE: 11/8/2022 12:20:14 PM
TOTAL DEPTH: 19.685 ft

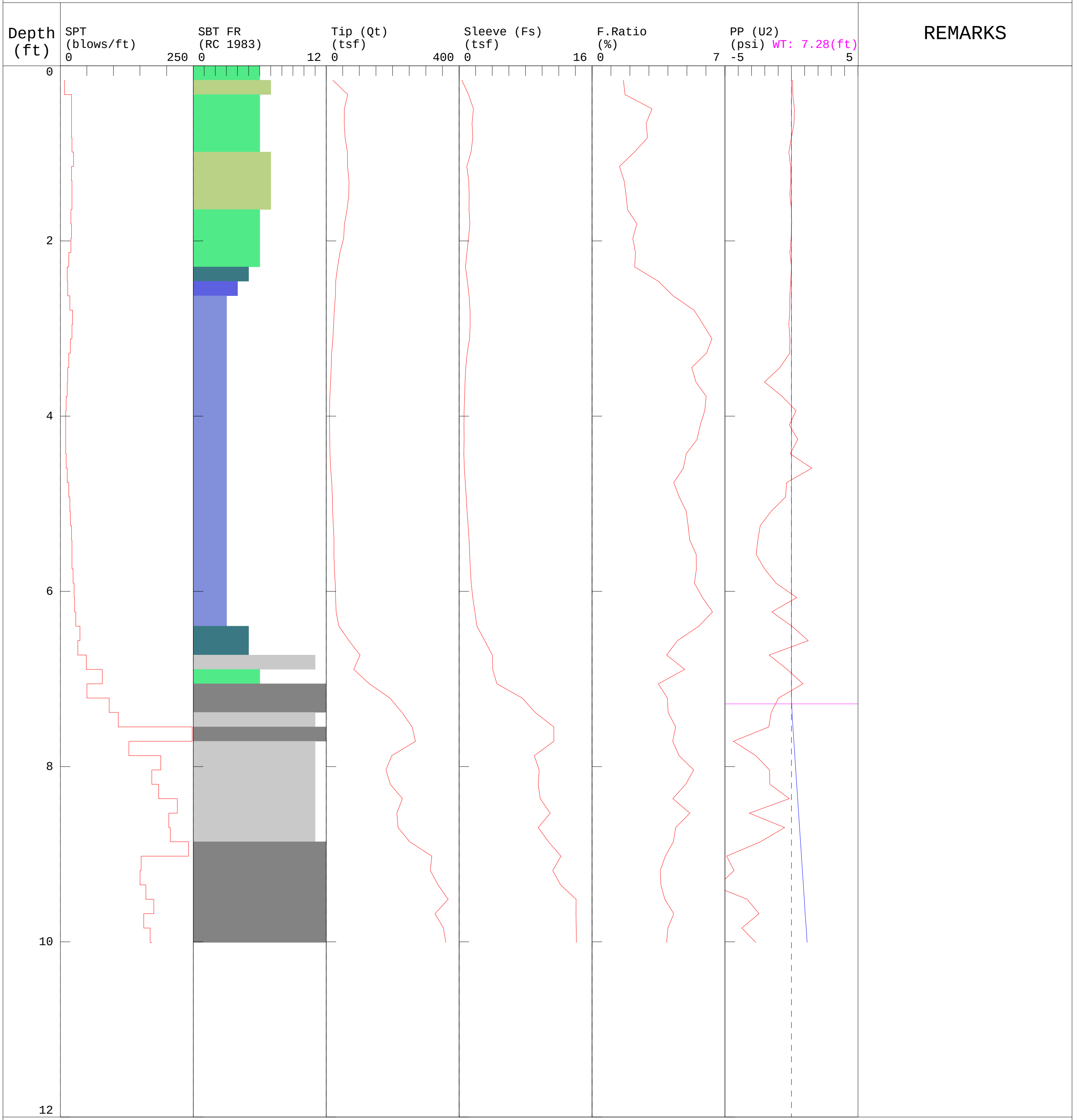


■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

The Wallace Group / CPT-9 / 29160 Coffin Butte Rd

OPERATOR: OGE DMM
CONE ID: DDG1532
TEST DATE: 9/23/2022 11:14:11 AM
TOTAL DEPTH: 10.007 ft



■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty cl
■ 6 sandy silt to clayey si
■ 7 silty sand to sandy sil
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

APPENDIX B

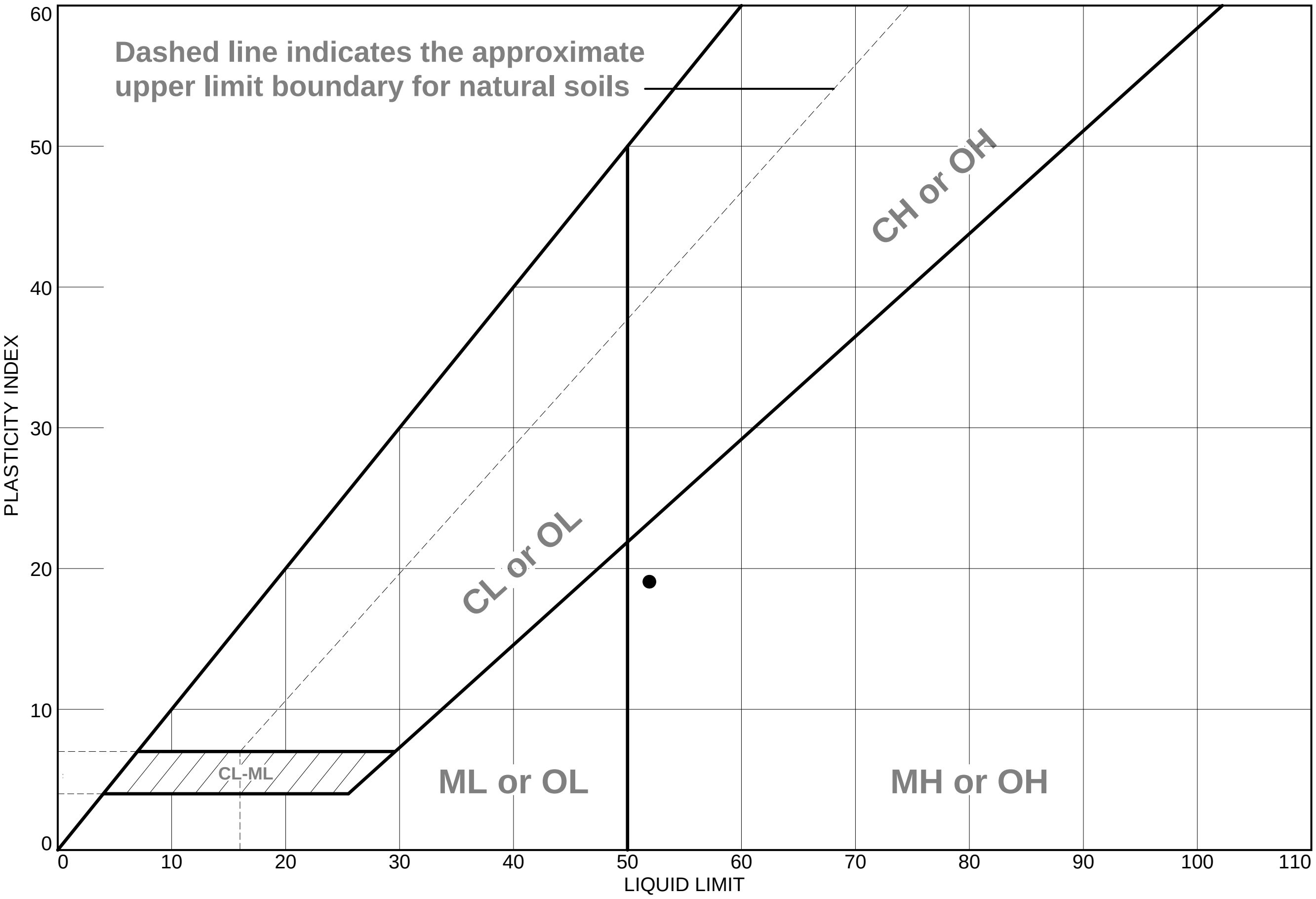
TABLE B - LABORATORY TESTING SUMMARY
Coffin Butte Landfill Expansion

Boring Number	Sample Type	Top Depth	Corrected SPT N-Value	Material Description	Moisture Content, ASTM D2216	Point Load Testing, ASTM D5731	Atterberg Limits, ASTM D4318			Grain Size, ASTM D422		Consolidation, ASTM D2435			UU Triaxial, ASTM D2850		CU Triaxial, ASTM D4767		CD Triaxial, ASTM D7181		CD Direct Shear, ASTM D3080		Flexible Wall Permeability, ASTM D5084	
		(feet, bgs)	(blows per foot)		(percent)	UCS (PSI)	Liquid Limit	Plastic Limit	Plasticity Index	Percent <#40	Percent <200	C_{EC}	C_{ER}	OCR	Cell Pressure (psf)	Deviator Stress (psf)	Total c (psf)	Total phi (degrees)	Effective c (psf)	Effective phi (degrees)	Effective c (psf)	Effective phi (degrees)	Saturation (percent)	Average k (cm/sec)
BH-01	SPT	7.5	22	SILTY SAND WITH GRAVEL (SM)	33.7	-	52	33	19	-	33.3	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-01	SPT	30.0	64	CLAYEY AND SILTY SAND (SC-SM)	39.1	-	-	-	-	-	36.0	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-02	Shelby	13	-	SANDY SILT (ML)	36.1	-	-	-	-	-	-	-	-	-	-	-	1000	8.8	-	-	-	-	-	-
BH-03	SPT	10	60/1"	SILTY GRAVEL WITH SAND (GM)	20.0	-	-	-	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	21.5	-	BRECCIATED BASALT WITH SILTSTONE	-	624	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	28.5	-	BRECCIATED BASALT WITH SILTSTONE	-	5377	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	32.5	-	BRECCIATED BASALT WITH SILTSTONE	-	2297	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	36.5	-	BRECCIATED BASALT WITH SILTSTONE	-	264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	47.5	-	BRECCIATED BASALT WITH SILTSTONE	-	439	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	60	-	BRECCIATED BASALT WITH SILTSTONE	-	248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	67	-	BRECCIATED BASALT WITH SILTSTONE	-	2460	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	73	-	BRECCIATED BASALT WITH SILTSTONE	-	473	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	79	-	BRECCIATED BASALT WITH SILTSTONE	-	473	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	85	-	BRECCIATED BASALT WITH SILTSTONE	-	677	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	87	-	BRECCIATED BASALT WITH SILTSTONE	-	979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	103	-	BRECCIATED BASALT WITH SILTSTONE	-	223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	105	-	BRECCIATED BASALT WITH SILTSTONE	-	3242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-03	HQ Core	108	-	BRECCIATED BASALT WITH SILTSTONE	-	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-04	SPT	2.5	19	CLAYEY AND SILTY SAND (SC-SM)	36.9	-	-	-	-	-	41.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	SPT	3.0	46	SILTY SAND WITH GRAVEL (SM)	37.2	-	67	37	30	-	22.7	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	11	-	BRECCIATED BASALT WITH SILTSTONE	-	929	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	30	-	BRECCIATED BASALT WITH SILTSTONE	-	1022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	47	-	BRECCIATED BASALT WITH SILTSTONE	-	5332	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	61	-	BRECCIATED BASALT WITH SILTSTONE	-	324	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	90	-	BRECCIATED BASALT WITH SILTSTONE	-	18061	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	105	-	BRECCIATED BASALT WITH SILTSTONE	-	374	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	120	-	BRECCIATED BASALT WITH SILTSTONE	-	1059	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	125	-	BRECCIATED BASALT WITH SILTSTONE	-	1529	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-05	HQ Core	127	-	BRECCIATED BASALT WITH SILTSTONE	-	1204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-06	Shelby	5.0	-	SANDY LEAN CLAY (CL)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-07	Shelby	10	-	SANDY LEAN CLAY WITH GRAVEL (CL)	65.0	-	-	-	-	-	-	0.32	0.025	4.8	-	-	-	-	-	-	350	37	-	-
BH-08	SPT	20	83	CLAYEY SAND WITH GRAVEL (SC)	23.2	-	-	-	-	-	21.3	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	26	-	BRECCIATED BASALT WITH SILTSTONE	-	350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	35	-	BRECCIATED BASALT WITH SILTSTONE	-	481	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	44	-	BRECCIATED BASALT WITH SILTSTONE	-	631	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	46	-	BRECCIATED BASALT WITH SILTSTONE	-	1410	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	57	-	BRECCIATED BASALT WITH SILTSTONE	-	14194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	57	-	BRECCIATED BASALT WITH SILTSTONE	-	7636	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-09	HQ Core	69	-	BRECCIATED BASALT WITH SILTSTONE	-	1059	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-10	SPT	5.0	18	SANDY FAT CLAY WITH GRAVEL (CH)	32.0	-	60	25	35	-	74.6	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-10	SPT	20	60/2"	SILTY GRAVEL WITH SAND (GM)	20.5	-	-	-	-	-	27.0	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-11	SPT	5.0	11	SILTY SAND (SM)	49.7	-	-	-	-	-	33.5	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-11	Shelby	12	-	SANDY SILT (ML)	80.7	-	-	-	-	-	-	0.31	0.04	4.7	880	1039	-	-	-	-	-	-	-	-
					69.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	97	$4.11x10^{-6}$
BH-11	SPT	15	5	SANDY ELASTIC SILT (MH)	65.9	-	85	44	41	-	65.9	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-11	SPT	30	6	SANDY SILT (ML)	72.2	-	-	-	-	-	54.9	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-12	SPT	7.5	5	SANDY ELASTIC SILT (MH)	61.1	-	78	42	36	-	50.7	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-12	Shelby	10	2	SANDY ELASTIC SILT (MH)	63.9	-	-	-	-	-	-	0.33	0.03	8.4	770	1154	-	-	-	-	-	-	-	-
BH-12	Shelby	20	7	SANDY ELASTIC SILT (MH)	64.9	-	-	-	-	-	-	0.17	0.025	2.3	-	-	-	-	-	-	200	41	-	-
BH-12	SPT	30	4	SILTY SAND (SM)	66.3	-	67	46	21	-	48.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-12	SPT	45	34	SILTY SAND (SM)	44.2	-	-	-	-	-	38.0	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-13	SPT	25	19	SILTY SAND WITH GRAVEL (SM)	47.7	-	-	-	-	-	27.1	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE B - LABORATORY TESTING SUMMARY
Coffin Butte Landfill Expansion

Boring Number	Sample Type	Top Depth	Corrected SPT N-Value	Material Description	Moisture Content, ASTM D2216	Point Load Testing, ASTM D5731	Atterberg Limits, ASTM D4318			Grain Size, ASTM D422		Consolidation, ASTM D2435			UU Triaxial, ASTM D2850		CU Triaxial, ASTM D4767		CD Triaxial, ASTM D7181		CD Direct Shear, ASTM D3080		Flexible Wall Permeability, ASTM D5084	
		(feet, bgs)	(blows per foot)		(percent)	UCS (PSI)	Liquid Limit	Plastic Limit	Plasticity Index	Percent <#40	Percent <200	C_{EC}	C_{ER}	OCR	Cell Pressure (psf)	Deviator Stress (psf)	Total c (psf)	Total phi (degrees)	Effective c (psf)	Effective phi (degrees)	Effective c (psf)	Effective phi (degrees)	Saturation (percent)	Average k (cm/sec)
BH-13	SPT	30	56	SILTY SAND WITH GRAVEL (SM)	25.2						18.8	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-14	SPT	5.0	7	SANDY FAT CLAY (CH)	32.6	-	56	25	31	-	77.8	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-14	SPT	15	11	SANDY FAT CLAY WITH GRAVEL (CH)	32.4	-	62	23	39	-	62.2	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-14	SPT	20	92/11"	SILTY SAND WITH GRAVEL (SM)	15.0	-	-	-	-	-	21.0	-	-	-	-	-	-	-	-	-	-	-	-	-
BH-14	SPT	25	60/1"	SILTY SAND WITH GRAVEL (SM)	4.1	-	-	-	-	-	18.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-01	Grab	3.0	-	SANDY CLAY (CH)	29.9	-	58	26	32	99.2	98.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-01	Grab	8.5	-	SANDY CLAY (CH)	35.6	-	54	23	31	99.0	97.4	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Grab	3.0	-	SANDY CLAY (CH)	22.6	-	63	25	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Grab	7.0	-	SANDY CLAY (CL)	37.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Grab	13.5	-	SANDY CLAY (CL)	40.1	-	75	37	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Shelby	18.5	-	SANDY CLAY (CL)	69.8	-	-	-	-	-	-	-	-	-	-	-	-	-	0	33.3	-	-	-	-
GP/CPT-04	Grab	22.0	-	SANDY SILT (ML)	75.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Grab	25.0	-	ELASTIC SILT WITH SAND (MH)	69.7	-	78	48	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Grab	27.0	-	SANDY SILT (ML)	70.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-04	Shelby	28.0	-	SANDY SILT (ML)	65.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	35.5	-	-
GP/CPT-05	Grab	6.5	-	ELASTIC SILT WITH SAND (MH)	42.6	-	73	39	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-05	Shelby	10.0	-	SANDY CLAY (CL)	41.2, 48.2, 41.2	-	-	-	-	-	-	-	-	-	-	-	-	-	150	39	-	-	-	-
GP/CPT-05	Grab	14.0	-	SILTY SAND WITH GRAVEL (SM)	45.1, 28.9	-	-	-	-	72	36.4	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-06	Grab	7.0	-	ELASTIC SILT (MH)	39.0	-	80	44	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-06	Grab	18.0	-	SANDY SILT (ML)	71.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-06	Grab	24.0	-	ELASTIC SILT (MH)	75.0	-	84	54	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-06	Grab	27.0	-	SANDY SILT (ML)	80.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-07	Grab	2.0	-	SANDY CLAY (CL)	26.9	-	-	-	-	81	53.1	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-07	Grab	12.0	-	CLAYEY SAND WITH GRAVEL (SC)	38.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-07	Grab	16.0	-	CLAYEY SAND (SC)	25.5	-	-	-	-	82	45.9	-	-	-	-	-	-	-	-	-	-	-	-	-
GP/CPT-09	Grab	2.0	-	CLAY (CH)	28.3	-	73	20	53	97.3	92.9	-	-	-	-	-	-	-	-	-	-	-	-	-

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty Sand with Gravel	52	33	19	Not Tested	33.3	SM

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-01 **Depth:** 7.5-9' **Sample Number:** S-1

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
Hand Rolled

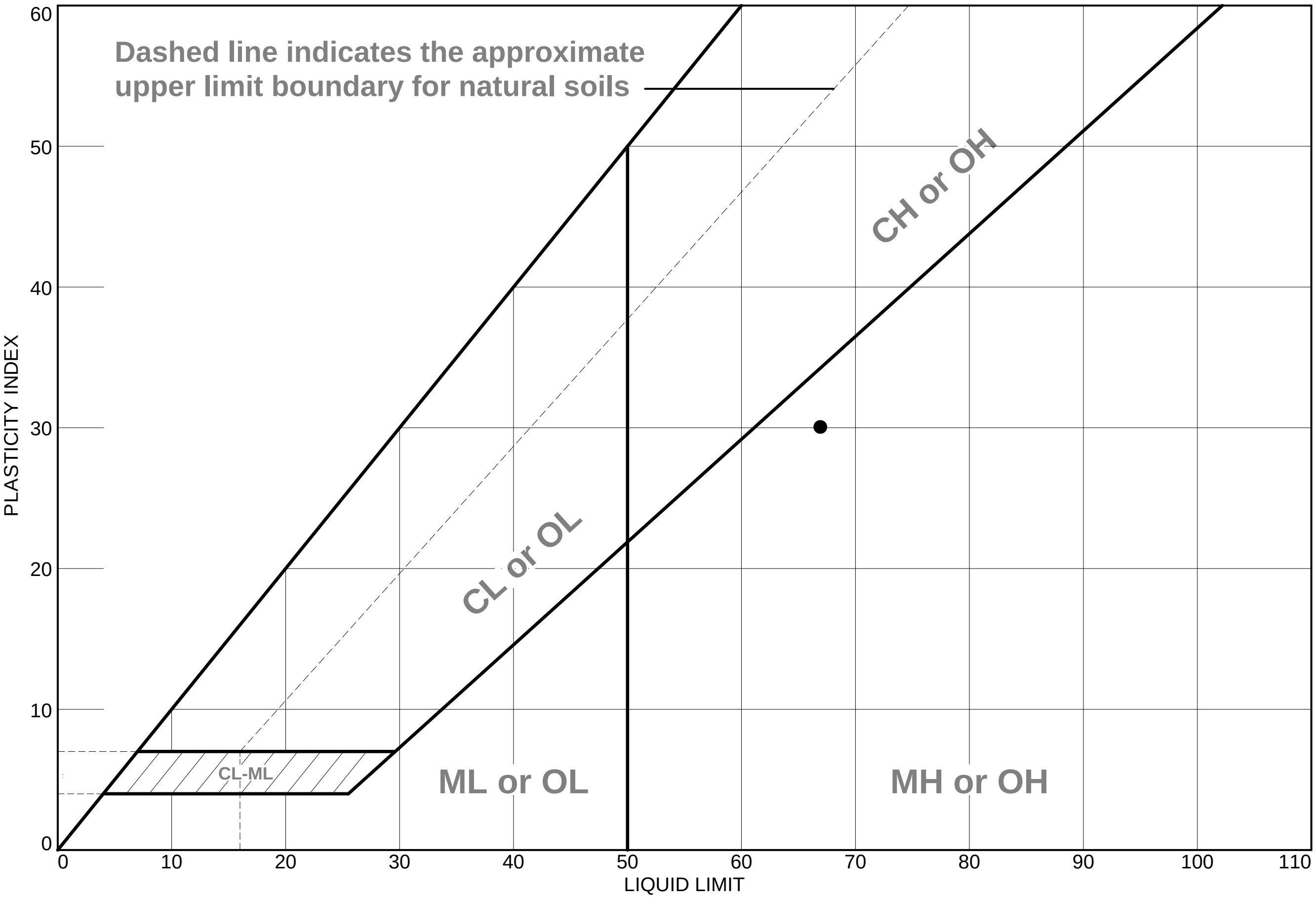
WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

P| 541.382.4707
wallacegroup-inc.com
62915 NE 18th Street, St. 1
Bend, Oregon 97701

Figure B-1

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty Sand with Gravel	67	37	30	Not Tested	22.7	SM

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-05 **Depth:** 3' **Sample Number:** S-2

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
Hand Rolled

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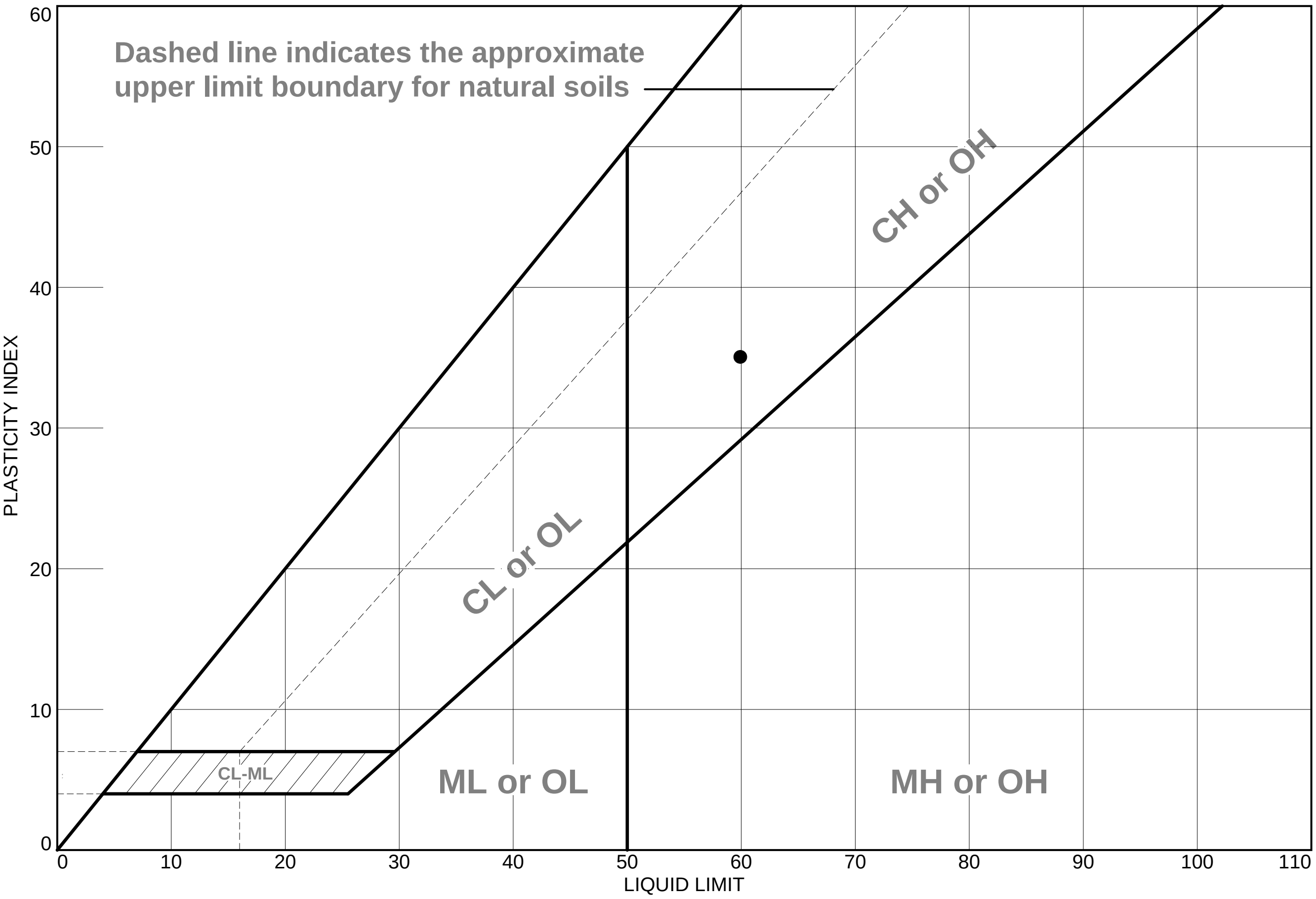
Figure B-2

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Fat Clay with Gravel	60	25	35	Not Tested	74.6	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-10 **Depth:** 5-6.5' **Sample Number:** S-2

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
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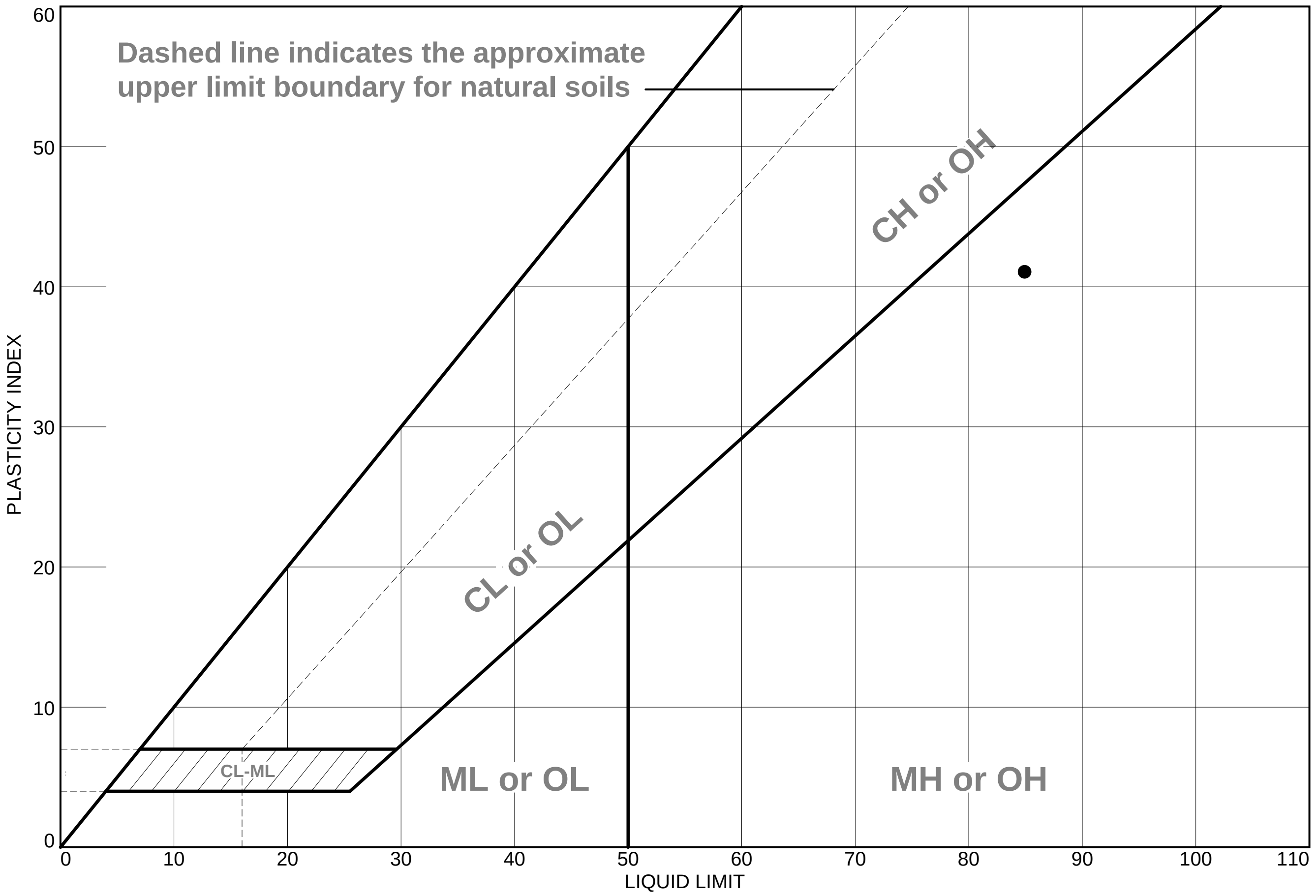
Figure B-3

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Silt	85	44	41	Not Tested	65.9	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-11 **Depth:** 15-16.5' **Sample Number:** S-7

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
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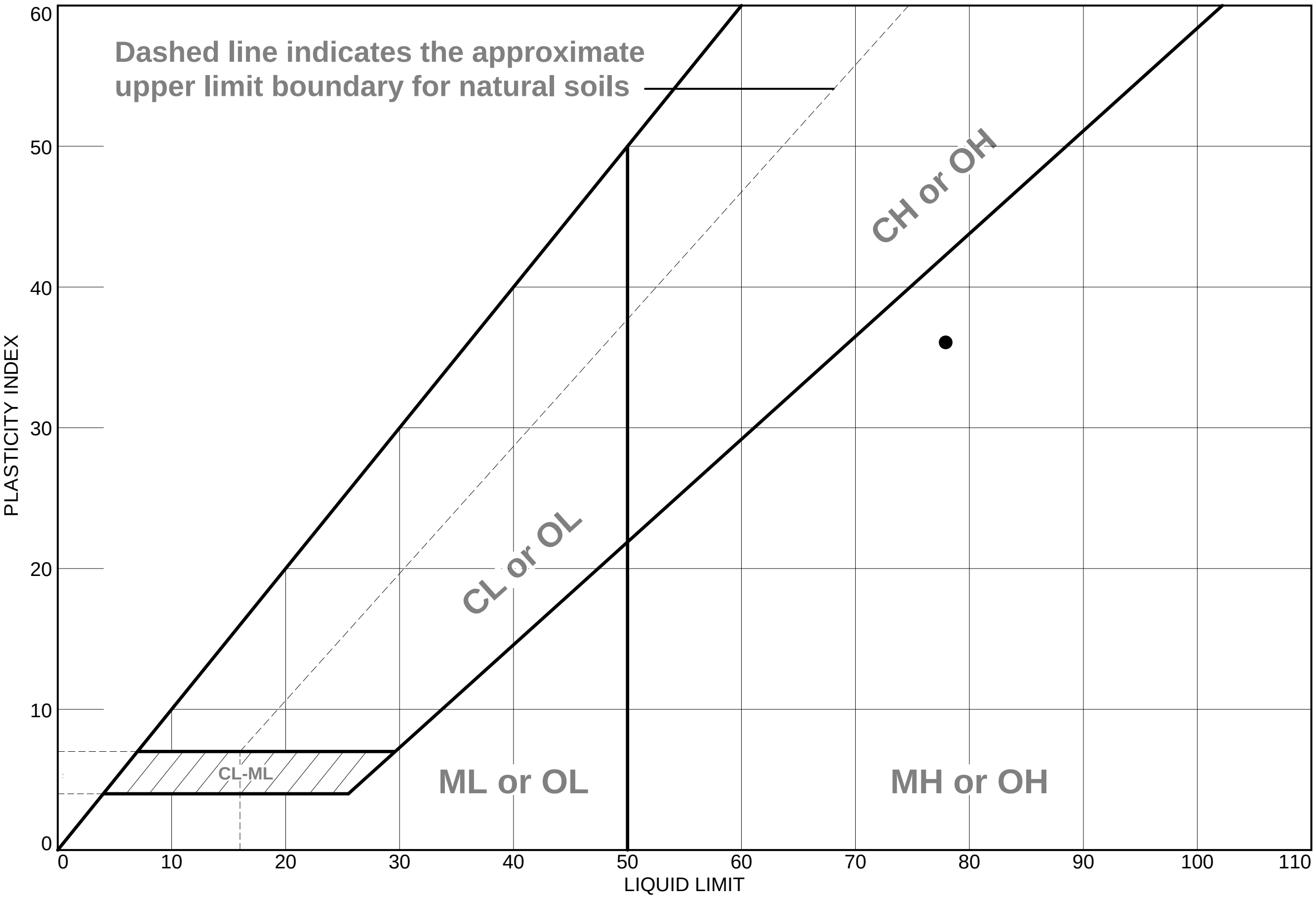
Figure B-4

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Elastic Silt	78	42	36	Not Tested	50.7	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-12 **Depth:** 7.5-9' **Sample Number:** S-3

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
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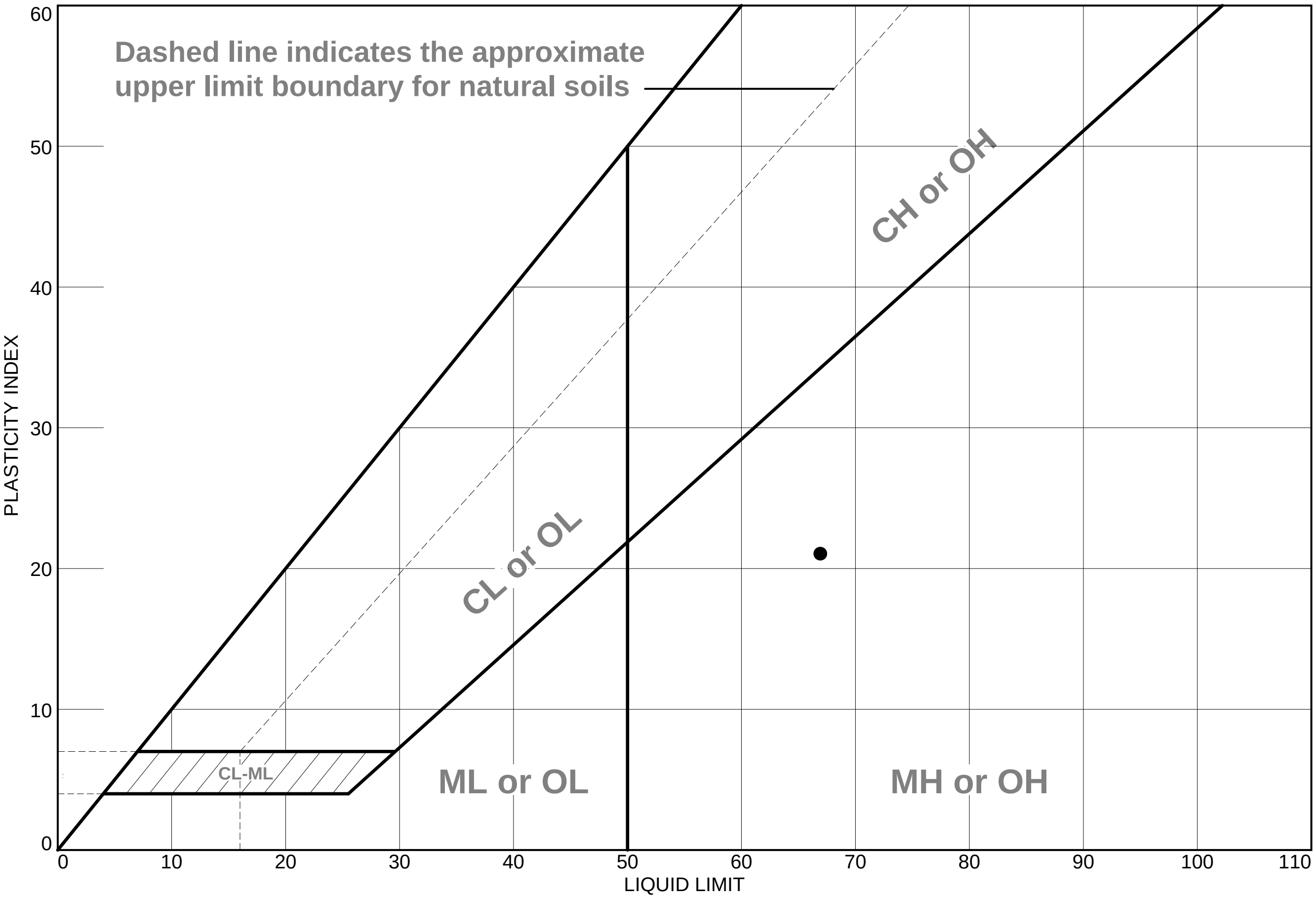
Figure B-5

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty Sand	67	46	21	Not Tested	48.2	SM

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-12 **Depth:** 30-31.5' **Sample Number:** S-9

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
Hand Rolled

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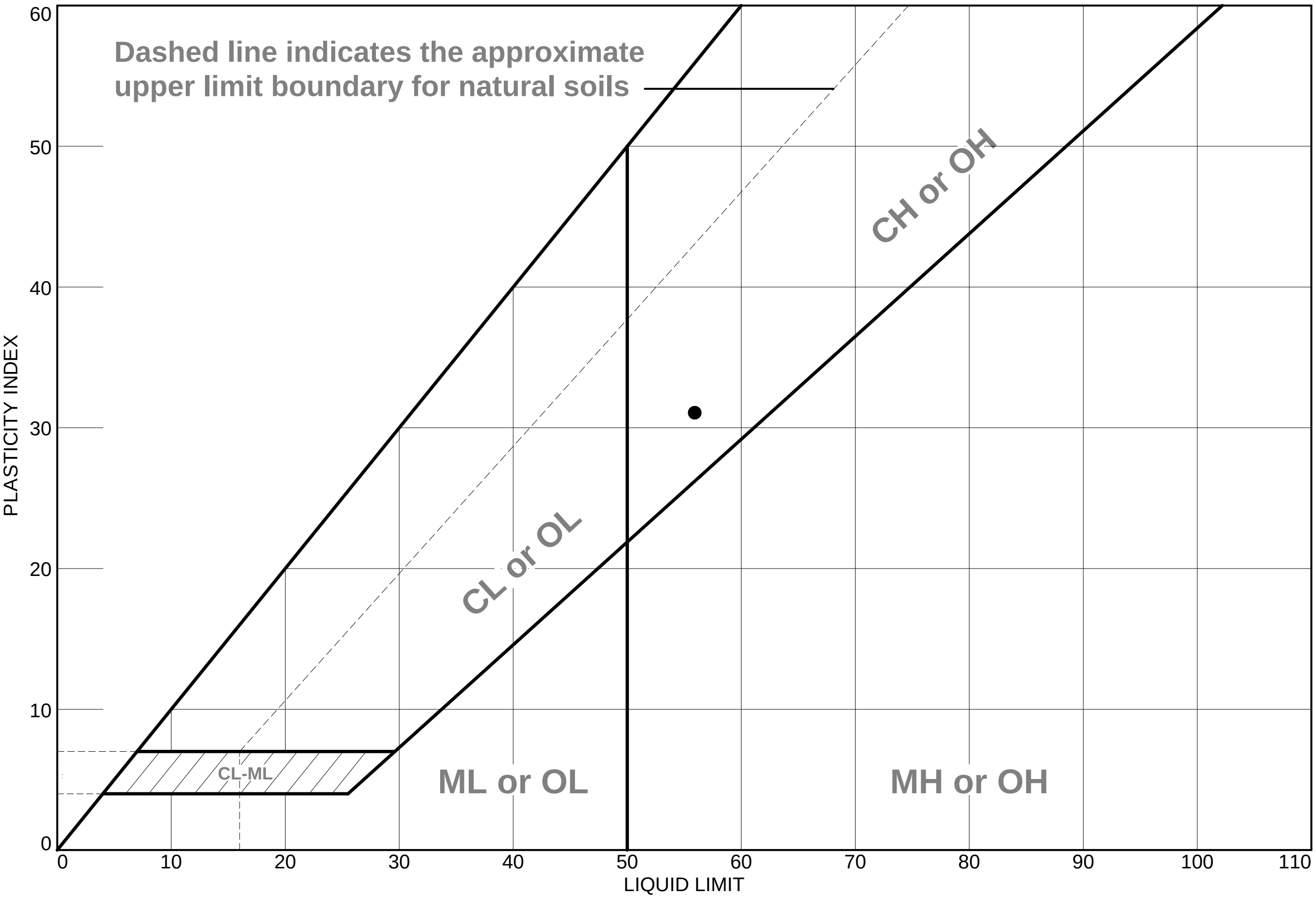
Figure B-6

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Fat Clay	56	25	31	Not Tested	77.8	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-14 **Depth:** 5-6.5' **Sample Number:** S-2

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
Hand Rolled

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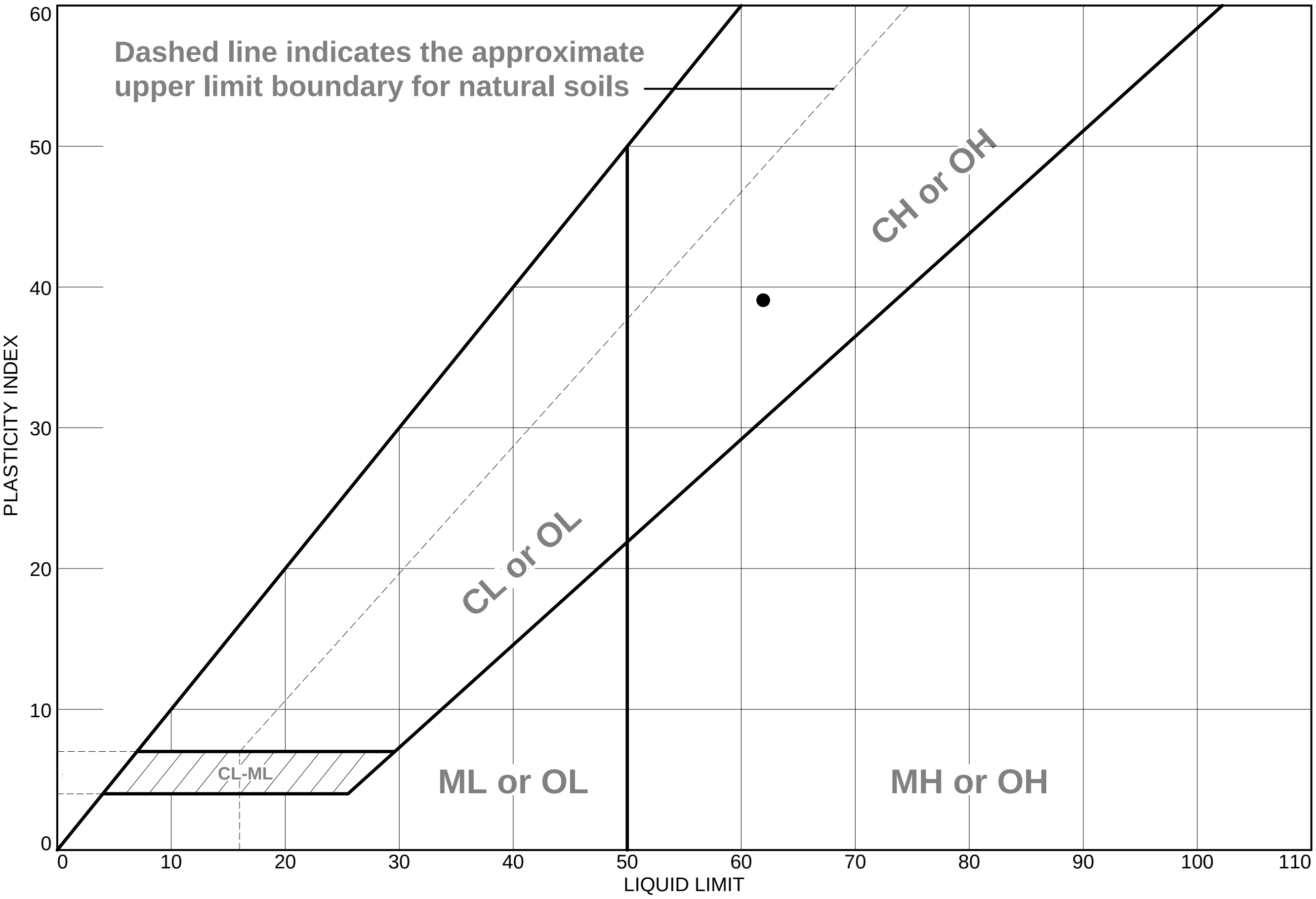
Figure B-7

Tested By: PJH **Checked By:** LMS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Fat Clay	62	23	39	Not Tested	62.2	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** BH-14 **Depth:** 15-16.5' **Sample Number:** S-4

Remarks:

●Sampled By: SMW
Sample Date: Week of 08-16-21
ASTM D4318 - Multipoint Method
Wet Prepped, Liquid Limit Device,
Hand Rolled

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Figure B-8

Tested By: PJH **Checked By:** LMS

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No. 200 Sieve Wash

(Material Finer than No. 200 Sieve)

ASTM C117 / D-1140

Client: Civil & Env. Consultants, Inc.
Project Coffin Butte Landfill
Location: Corvallis, OR
Sample Location: Borings
Date Sampled: 8/17/2021

Project Number: 21129 - 1
Lab Number: WGG0233
Technician: PJH
Date Received: 9/17/2021
Date Analyzed: 11/29/2021

Location	BH-01	BH-03	BH-11
Depth	7.5'	10'	15'
Wet Weight	340.6	510	360.1
Dry Weight	254.8	425	199.3
Moisture %	33.7%	20.0%	80.7%
Weight After Wash	170.0	369.1	67.9
Weight Passing #200	84.8	55.9	131.4
% Passing #200	33.3%	13.2%	65.9%

Location	BH-11	BH-12	BH-12
Depth	30'	7.5'	30'
Wet Weight	455.4	417.2	400.1
Dry Weight	264.4	259	240.6
Moisture %	72.2%	61.1%	66.3%
Weight After Wash	119.3	127.6	124.7
Weight Passing #200	145.1	131.4	115.9
% Passing #200	54.9%	50.7%	48.2%

REVIEWED BY: L. Splitter
DATE: 1/24/2022

Note: Data and results shown above include ASTM Test Methods C117 and D1140. This report pertains only to the material tested and/or inspected and is not to be reproduced without prior authorization of Wallace Group. If part of a larger document, this report is not to be removed or reproduced separately. This report is the property of the Client and shall not be distributed to other parties without Client's permission.

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No. 200 Sieve Wash

(Material Finer than No. 200 Sieve)

ASTM C117 / D-1140

Client: Civil & Env. Consultants, Inc.
Project Coffin Butte Landfill
Location: Corvallis, OR
Sample Location: Borings
Date Sampled: 8/17/2021

Project Number: 21129 - 1
Lab Number: WGG0233
Technician: PJH
Date Received: 9/17/2021
Date Analyzed: 11/29/2021

Location	BH-12	BH-13	BH-13
Depth	45'	25'	30'
Wet Weight	284.7	464.7	443.2
Dry Weight	197.4	314.6	353.9
Moisture %	44.2%	47.7%	25.2%
Weight After Wash	122.4	230.5	287.3
Weight Passing #200	75	85.1	66.6
% Passing #200	38.0%	27.1%	18.8%

Location	BH-14	BH-14	BH-14
Depth	5'	20'	15'
Wet Weight	452.7	664.6	443.5
Dry Weight	341.5	577.8	335
Moisture %	32.6%	15.0%	32.4%
Weight After Wash	75.8	456.3	126.5
Weight Passing #200	265.7	121.5	208.5
% Passing #200	77.8%	21.0%	62.2%

REVIEWED BY: L. Splitter
DATE: 1/24/2022

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Figure B-10

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No. 200 Sieve Wash

(Material Finer than No. 200 Sieve)

ASTM C117 / D-1140

Client: Civil & Env. Consultants, Inc.
Project Coffin Butte Landfill
Location: Corvallis, OR
Sample Location: Borings
Date Sampled: 8/17/2021

Project Number: 21129 - 1
Lab Number: WGG0233
Technician: PJH
Date Received: 9/17/2021
Date Analyzed: 11/30/2021

Location	BH-01	BH-04	BH-05
Depth	30'	2.5'	3'
Wet Weight	499.8	491.6	291.2
Dry Weight	359.3	359.1	212.2
Moisture %	39.1%	36.9%	37.2%
Weight After Wash	229.9	211.1	164.0
Weight Passing #200	129.4	148.0	48.2
% Passing #200	36.0%	41.2%	22.7%

Location	BH-08	BH-10	BH-10
Depth	20'	5'	20'
Wet Weight	510.6	389.5	104.6
Dry Weight	414.5	295	86.8
Moisture %	23.2%	32.0%	20.5%
Weight After Wash	326.4	74.8	63.4
Weight Passing #200	88.1	220.2	23.4
% Passing #200	21.3%	74.6%	27.0%

REVIEWED BY: L. Splitter
DATE: 1/24/2022

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No. 200 Sieve Wash

(Material Finer than No. 200 Sieve)

ASTM C117 / D-1140

Client: Civil & Env. Consultants, Inc.
Project Coffin Butte Landfill
Location: Corvallis, OR
Sample Location: Borings
Date Sampled: 8/17/2021

Project Number: 21129 - 1
Lab Number: WGG0233
Technician: PJH
Date Received: 9/17/2021
Date Analyzed: 11/30/2021

Location	BH-11	BH-14
Depth	5'	25'
Wet Weight	371.2	48.4
Dry Weight	247.9	46.5
Moisture %	49.7%	4.1%
Weight After Wash	164.9	38.1
Weight Passing #200	83	8.4
% Passing #200	33.5%	18.1%

REVIEWED BY: L. Splitter
DATE: 1/24/2022

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TECHNICAL REPORT

Report To: Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

Project No.: 3691.1.1

Report of: One-dimensional consolidation, direct shear, unconsolidated undrained triaxial compression and flexible wall permeability testing.

Sample Identification

As requested, NTI completed one-dimensional consolidation testing, direct shear testing, unconsolidated undrained triaxial compression testing and flexible wall permeability testing on samples delivered to our laboratory on 9/15/21 and 10/22/21. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized on the following table and page.

Laboratory Testing

Sample ID: BH-7 ST-1 @ 10.0-12.0 Ft.

One Dimensional Consolidation of Soil
(ASTM D2435)

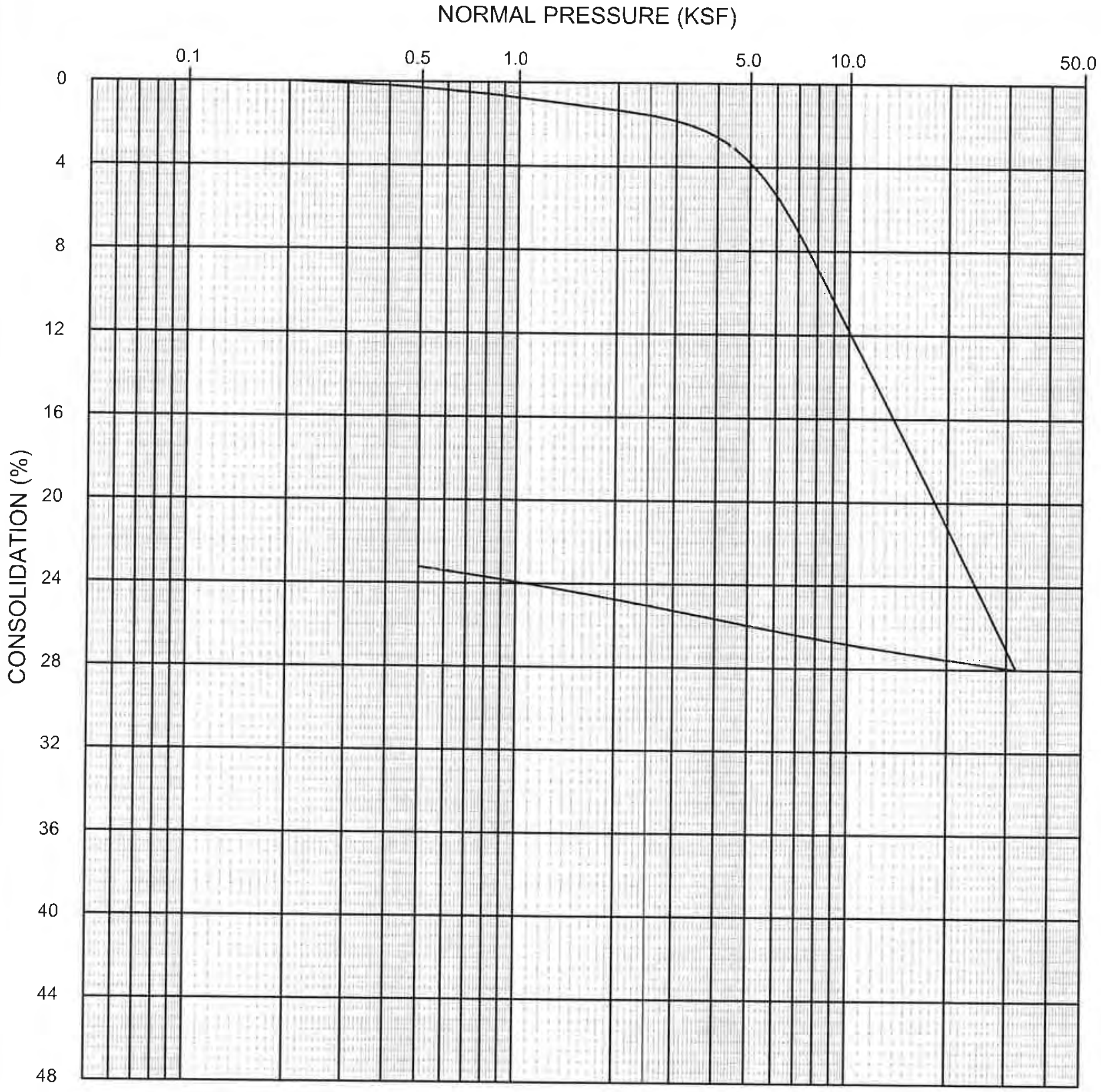
Test	Initial Conditions	Final Conditions
Moisture Content, (%)	65.0	56.9
Dry Unit Weight, (pcf)	54.4	70.3
Height of Specimen, (inches)	0.75	0.57

Load (ksf)	Dial Reading (inches)	Load (ksf)	Dial Reading (inches)
Initial	0.0006	16.0	0.1365
0.5	0.0032	32.0	0.2099
1.0	0.0056	8.0	0.1993
2.0	0.0095	2.0	0.1857
4.0	0.0192	0.5	0.1751
8.0	0.0662		

Attachments: Laboratory Test Results
Consolidation Test Results

Copies: (1) Addressee

REVIEWED BY: Michael A. Ginsbach



SYMBOL	SAMPLE LOCATION	NORMAL PRESSURE AT SATURATION (KSF)
———	BH-7 ST-1 @ 10.0 - 12.0 FT.	0.50

CONSOLIDATION TEST RESULTS - ASTM D2435

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

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TECHNICAL REPORT

Report To: Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

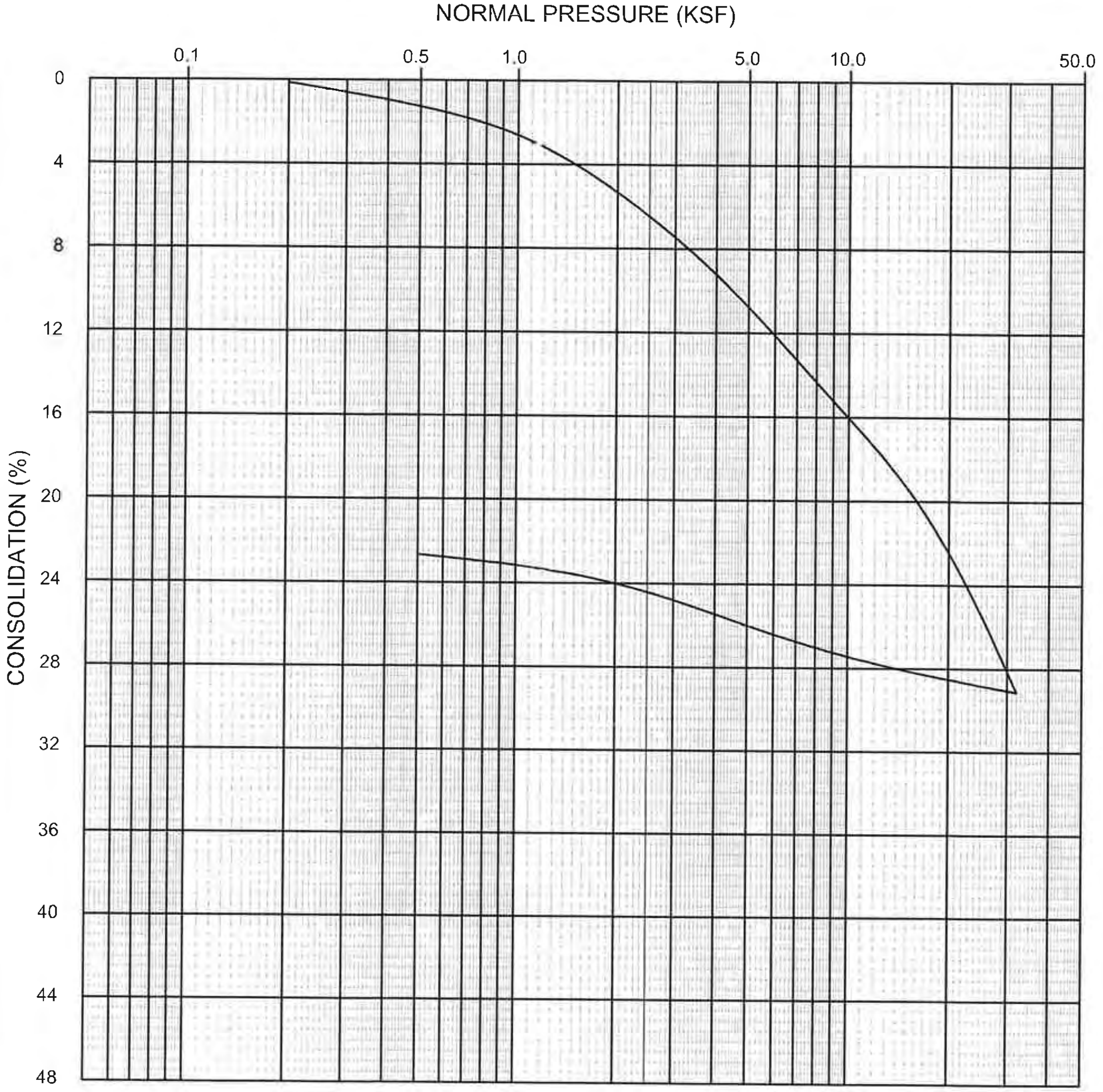
Project No.: 3691.1.1

Sample ID: BH-11 ST1-S6 @ 12.0-14.0 Ft.

One Dimensional Consolidation of Soil (ASTM D2435)

Test	Initial Conditions	Final Conditions
Moisture Content, (%)	75.6	60.1
Dry Unit Weight, (pcf)	52.3	65.7
Height of Specimen, (inches)	0.75	0.58

Load (ksf)	Dial Reading (inches)	Load (ksf)	Dial Reading (inches)
Initial	0.0008	16.0	0.1571
0.5	0.0094	32.0	0.2177
1.0	0.0199	8.0	0.2026
2.0	0.0401	2.0	0.1829
4.0	0.0694	0.5	0.1700
8.0	0.1076		



SYMBOL	SAMPLE LOCATION	NORMAL PRESSURE AT SATURATION (KSF)
▬	BH-11 ST-1 S-6 @ 12.0 - 14.0 FT.	0.50

CONSOLIDATION TEST RESULTS - ASTM D2435

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

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TECHNICAL REPORT

Report To: Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

Project No.: 3691.1.1

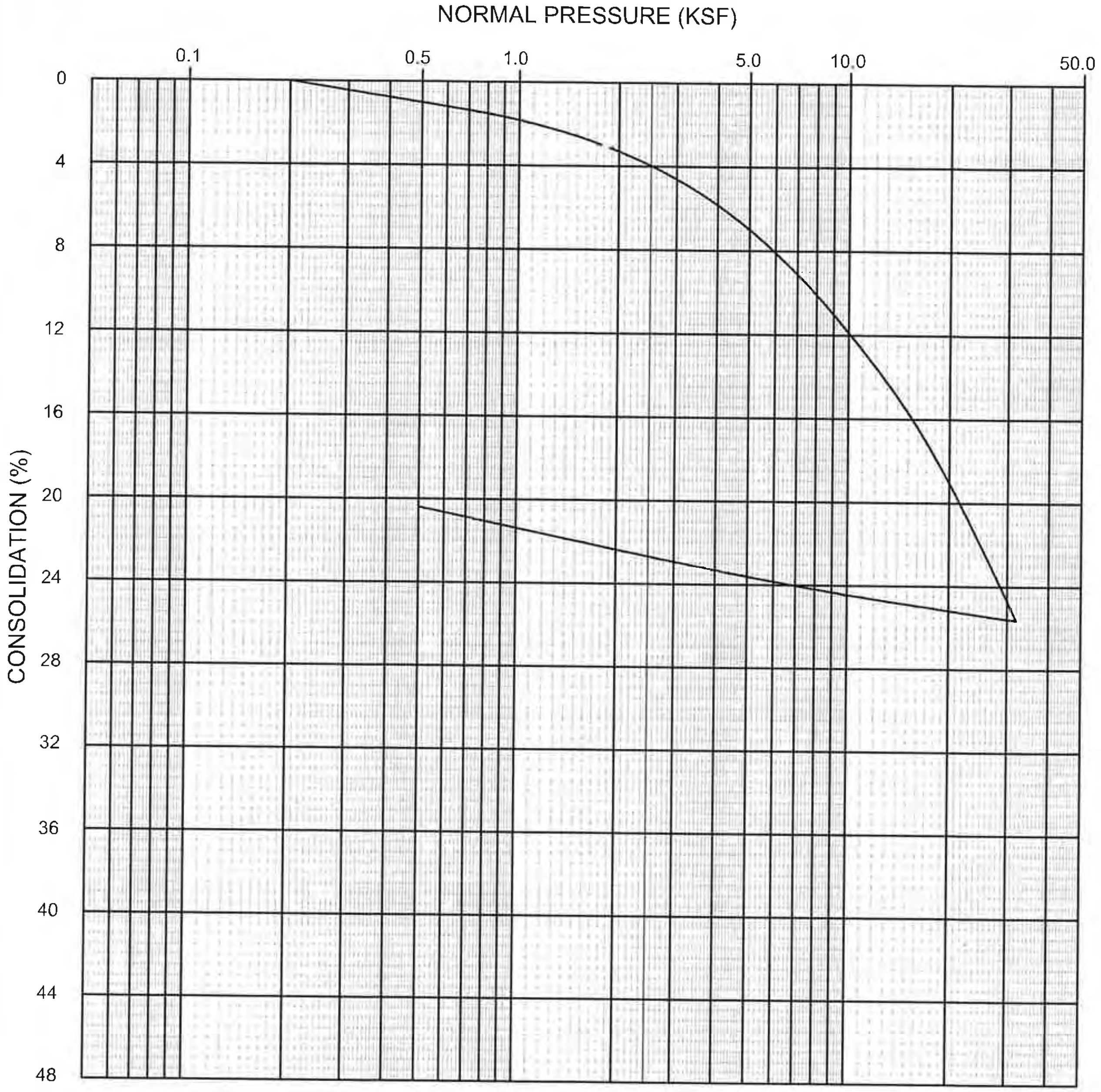
Sample ID: BH-12A ST-2 @ 10.0-12.0 Ft.

One Dimensional Consolidation of Soil (ASTM D2435)

Test	Initial Conditions	Final Conditions
Moisture Content, (%)	63.9	56.9
Dry Unit Weight, (pcf)	58.1	69.4
Height of Specimen, (inches)	0.75	0.60

Load (ksf)	Dial Reading (inches)	Load (ksf)	Dial Reading (inches)
Initial	0.0000	16.0	0.1235
0.5	0.0075	32.0	0.1920
1.0	0.0140	8.0	0.1815
2.0	0.0245	2.0	0.1680
4.0	0.0435	0.5	0.1535
8.0	0.0760		

REVIEWED BY: Michael A. Ginsbach



SYMBOL	SAMPLE LOCATION	NORMAL PRESSURE AT SATURATION (KSF)
▬▬	BH-12A ST-2 @ 10.0 - 12.0 FT.	0.50

CONSOLIDATION TEST RESULTS - ASTM D2435

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

TECHNICAL REPORT

Report To:
Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

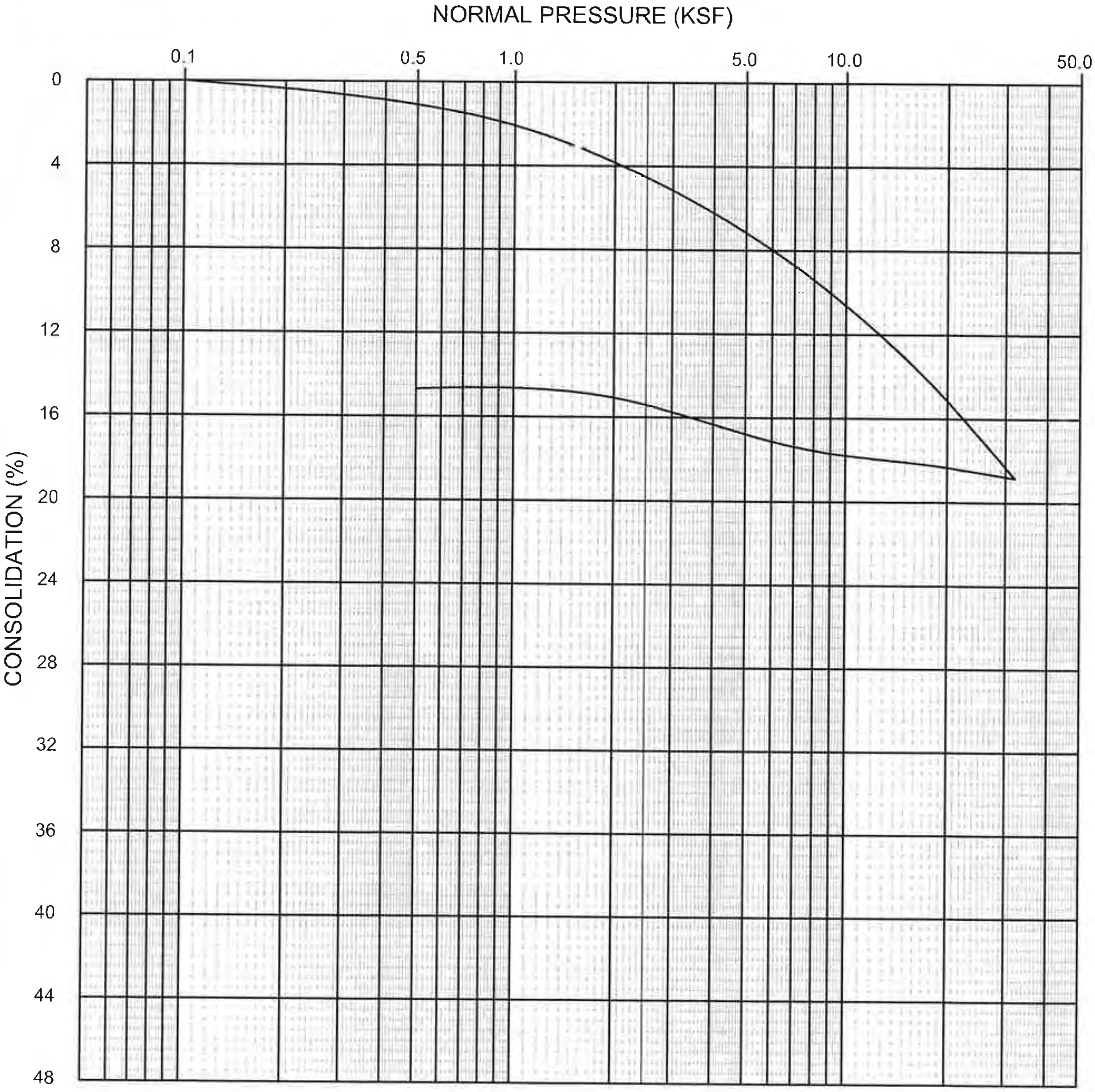
Project No.: 3691.1.1

Sample ID: BH-12A ST-3 @ 20.0-22.0 Ft.

One Dimensional Consolidation of Soil (ASTM D2435)

Test	Initial Conditions	Final Conditions
Moisture Content, (%)	64.9	47.7
Dry Unit Weight, (pcf)	62.5	74.9
Height of Specimen, (inches)	1.0	0.85

Load (ksf)	Dial Reading (inches)	Load (ksf)	Dial Reading (inches)
Initial	-0.0010	16.0	0.1354
0.5	0.0107	32.0	0.1880
1.0	0.0207	8.0	0.1753
2.0	0.0380	2.0	0.1509
4.0	0.0623	0.5	0.1464
8.0	0.0944		



SYMBOL	SAMPLE LOCATION	NORMAL PRESSURE AT SATURATION (KSF)
—	BH-12A ST-3 @ 20.0 - 22.0 FT.	0.50

CONSOLIDATION TEST RESULTS - ASTM D2435

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

TECHNICAL REPORT

Report To: Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

Project No.: 3691.1.1

Sample ID: BH-11 ST1-S6 @ 12.0-14.0 Ft.

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils – Sample Data (ASTM D2850)

Mass (grams)	Length (inches)	Diameter (inches)	Moisture Content (percent)	Dry Density (pcf)
993.4	6.103	2.846	69.8	57.4

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TECHNICAL REPORT

Report To:
Lisa Spliller, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

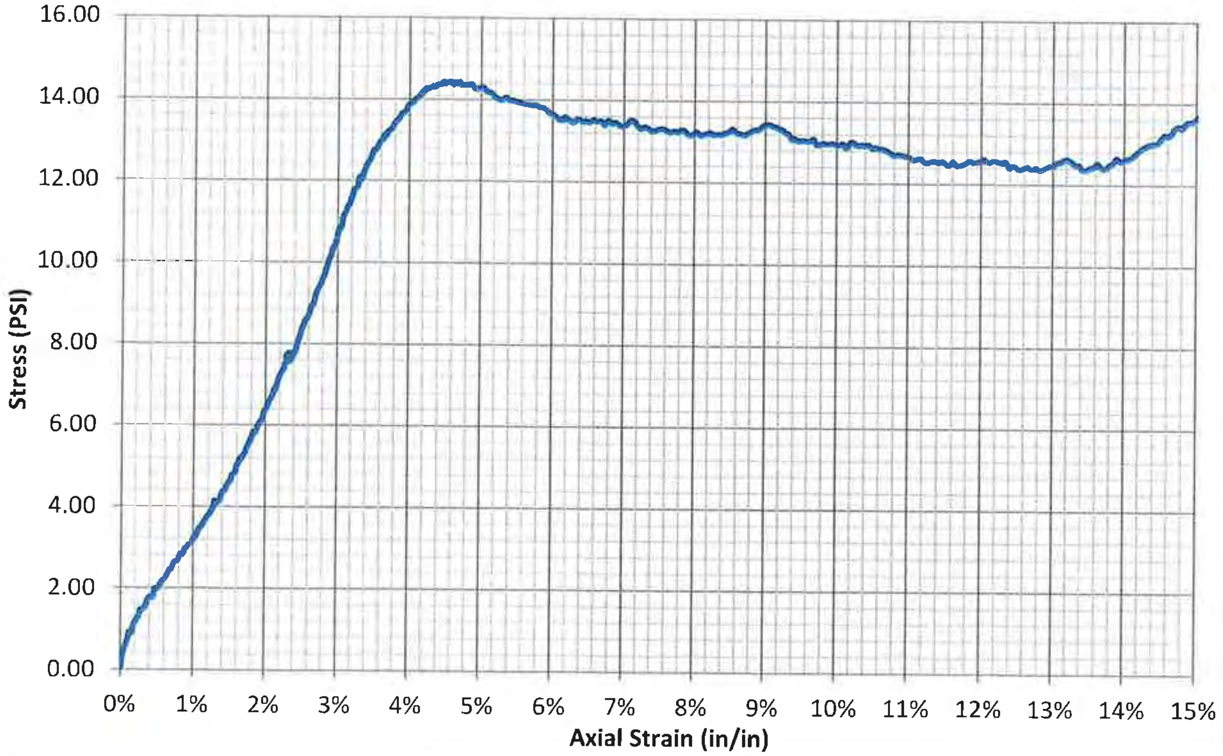
Project No.: 3691.1.1

Sample ID: BH-11 ST-1-S6 @ 13.5-14.0 Ft.

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils – Test Data (ASTM D2850)

Strain Rate (%/min)	Peak Strength (psi)	Confining Pressure (psf)	Notes
0.01831	14.435	880	Shear at base, blocky.

Stress Strain Figure



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REVIEWED BY: Michael A. Ginsbach

TECHNICAL REPORT

Report To:	Lisa Splitter, P.E., G.E. Wallace Group, Inc. 62915 NE 18th St, Ste. 1 Bend, Oregon 97701	**Date:** **Lab No.:**	12/16/2021 21-430
Project:	Coffin Butte (Project #21129-1)	**Project No.:**	3691.1.1

Sample ID: BH-12A ST-2 @ 10.0-12.0 Ft.

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils – Sample Data (ASTM D2850)

Mass (grams)	Length (inches)	Diameter (inches)	Moisture Content (percent)	Dry Density (pcf)
1031.1	6.110	2.853	56.8	64.2

TECHNICAL REPORT

Report To:

Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

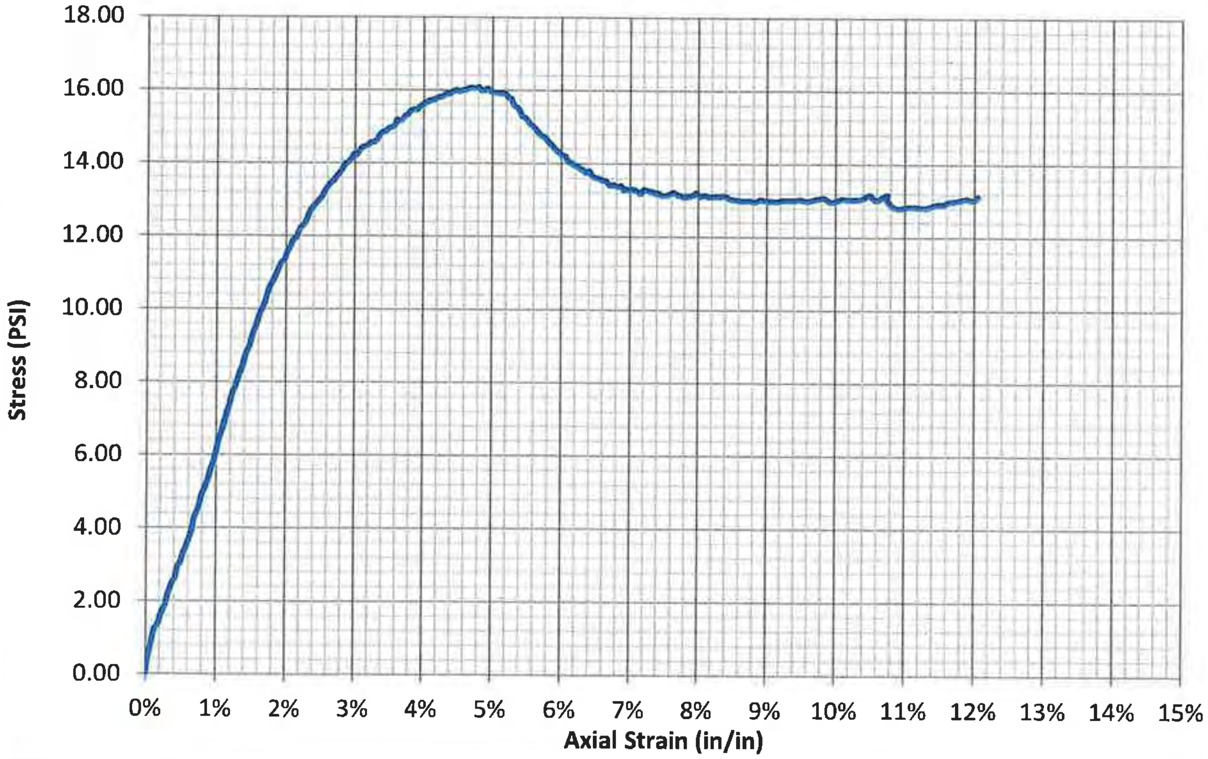
Project No.: 3691.1.1

Sample ID: BH-12A ST-2 @ 10.0-12.0 Ft.

Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils – Test Data (ASTM D2850)

Strain Rate (%/min)	Peak Strength (psi)	Confining Pressure (psf)	Notes
0.03055	16.093	770	Decomposed rock. Contains many small fractures.

Stress Strain Figure



TECHNICAL REPORT

Report To: Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

Project No.: 3691.1.1

Sample ID: BH-11 ST-S6@12.0-14.0 Ft.

Flexible Wall Permeability – Sample Data
(ASTM D5084 – Method C)

Mass (grams)	Length (inches)	Diameter (inches)	Area (sq. inches)	Moisture Content (percent)	Dry Density (pcf)
351.6	2.172	2.861	6.427	69.8	56.5

Flexible Wall Permeability – Test Data
(ASTM D5084 – Method C)

Sample Condition	Saturation at Time of Testing (percent)	Head (psi)	Hydraulic Gradient (in/in)
undisturbed	97	0.5	6.80

Flexible Wall Permeability – Test Results
(ASTM D5084 – Method C)

Test 1 k (cm/sec)	Test 2 k (cm/sec)	Test 3 k (cm/sec)	Test 4 k (cm/sec)	Average k (cm/sec)
4.17×10^{-6}	4.01×10^{-6}	4.11×10^{-6}	4.15×10^{-6}	4.11×10^{-6}

TECHNICAL REPORT

Report To:
Lisa Splitter, P.E., G.E.
Wallace Group, Inc.
62915 NE 18th St, Ste. 1
Bend, Oregon 97701

Date: 12/16/2021

Lab No.: 21-430

Project: Coffin Butte (Project #21129-1)

Project No.: 3691.1.1

Sample ID: BH-7 ST-1 @ 10.0-12.0 Ft.

Direct Shear Test of Soils Under Consolidated Drained Conditions – Sample Data (ASTM D3080)

Test	500psf Normal Load Initial Conditions	1500psf Normal Load Initial Conditions	2500psf Normal Load Initial Conditions
Moisture Content, (%)	53.8	57.3	61.8
Dry Unit Weight, (pcf)	62.1	58.7	55.9
Peak Shear Strength, (psf)	701	1497	2196

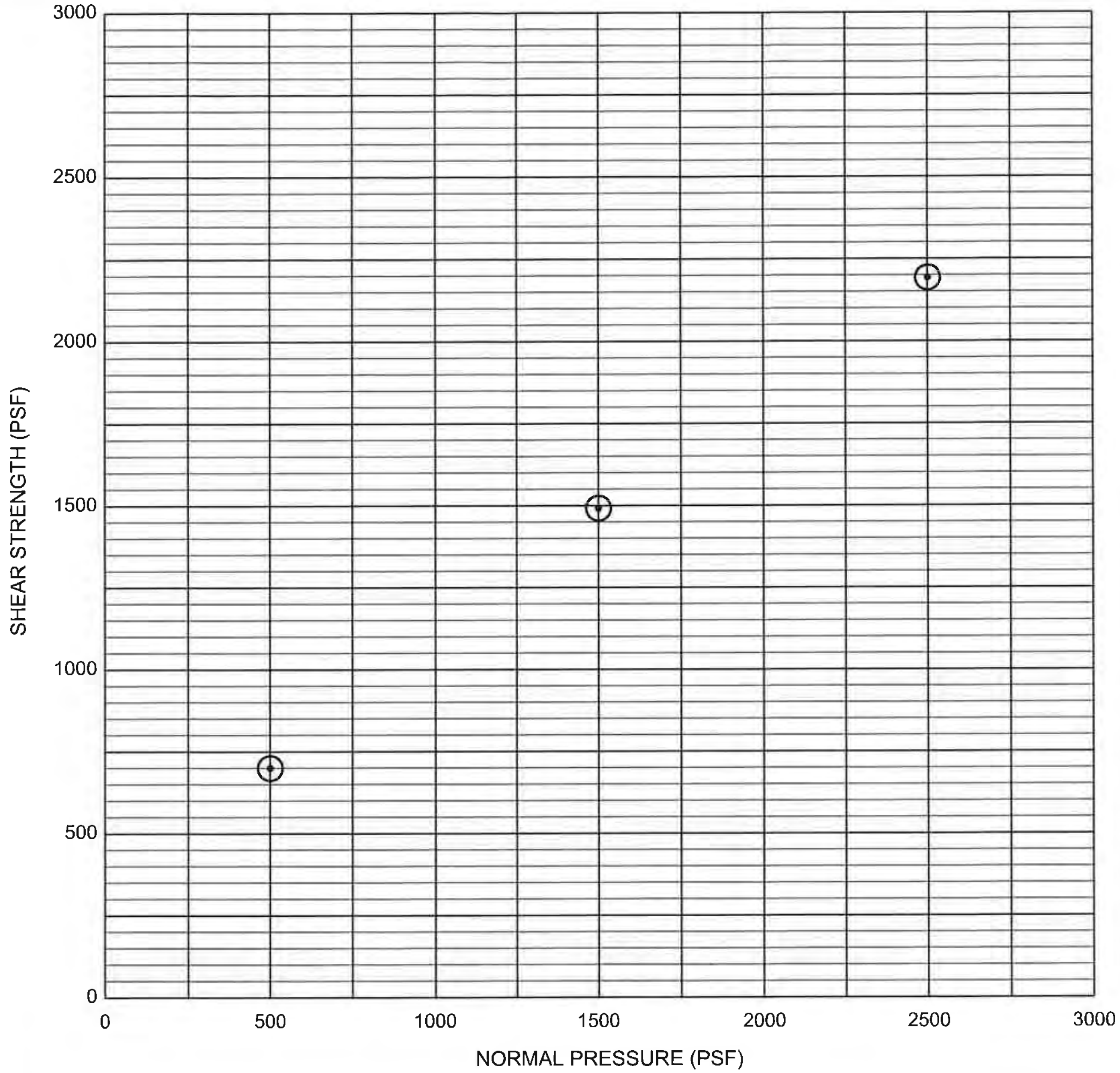
Note: Displacement rate used during testing, 0.00017 inches/minute

Sample ID: BH-12A ST-3 @ 20.0-22.0 Ft.

Direct Shear Test of Soils Under Consolidated Drained Conditions – Sample Data (ASTM D3080)

Test	500psf Normal Load Initial Conditions	1500psf Normal Load Initial Conditions	2500psf Normal Load Initial Conditions
Moisture Content, (%)	55.9	57.7	63.1
Dry Unit Weight, (pcf)	62.2	59.9	59.6
Peak Shear Strength, (psf)	567	1340	2164

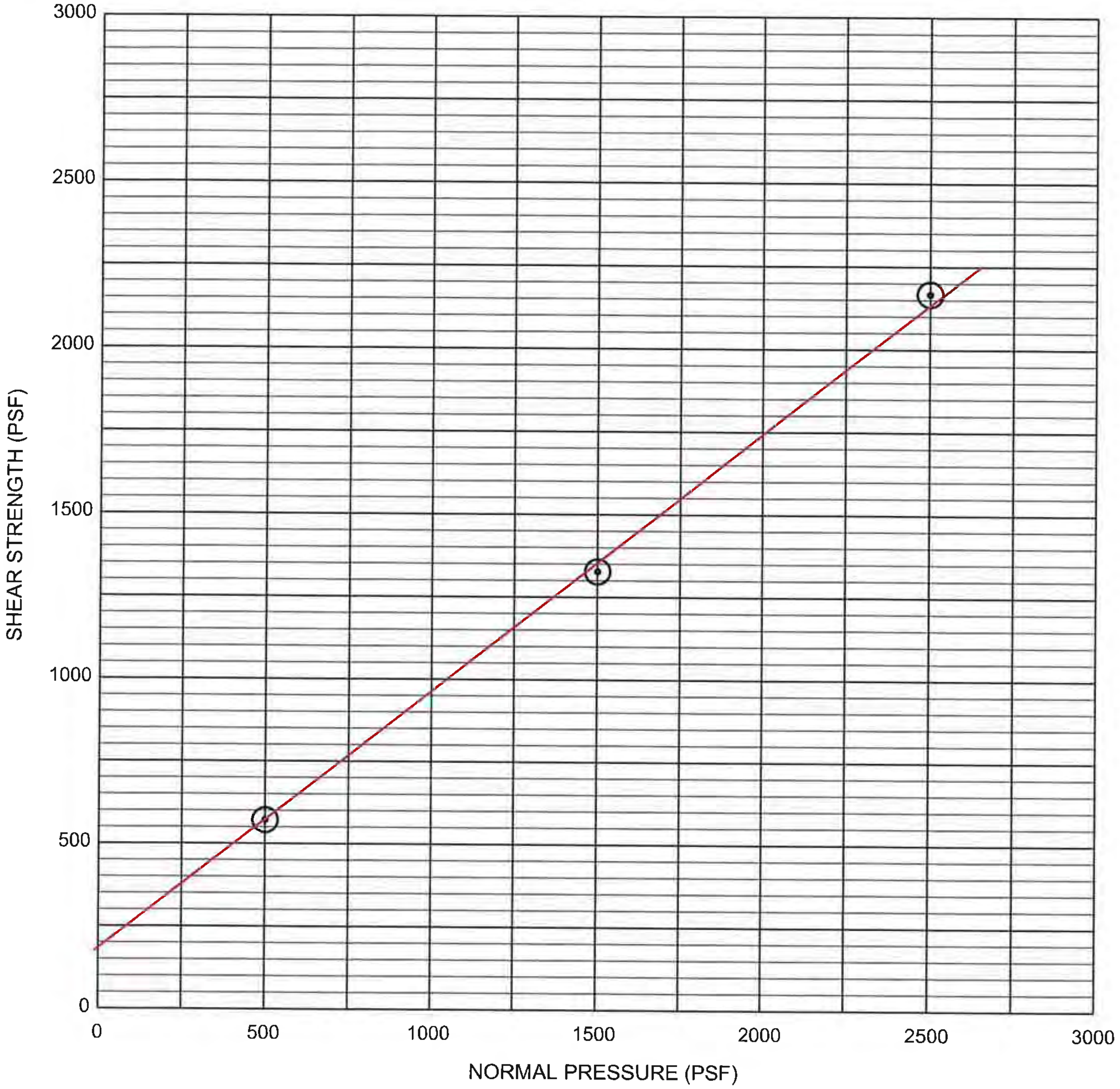
Note: Displacement rate used during testing, 0.00013 inches/minute



SYMBOL	SAMPLE LOCATION	COHESION (psf)	FRICTION ANGLE	REMARKS
⊙	BH-7, ST-1 @ 10.0 - 12.0 FT.	--		SATURATED; UNDISTURBED

DIRECT SHEAR TEST RESULTS - ASTM D3080

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

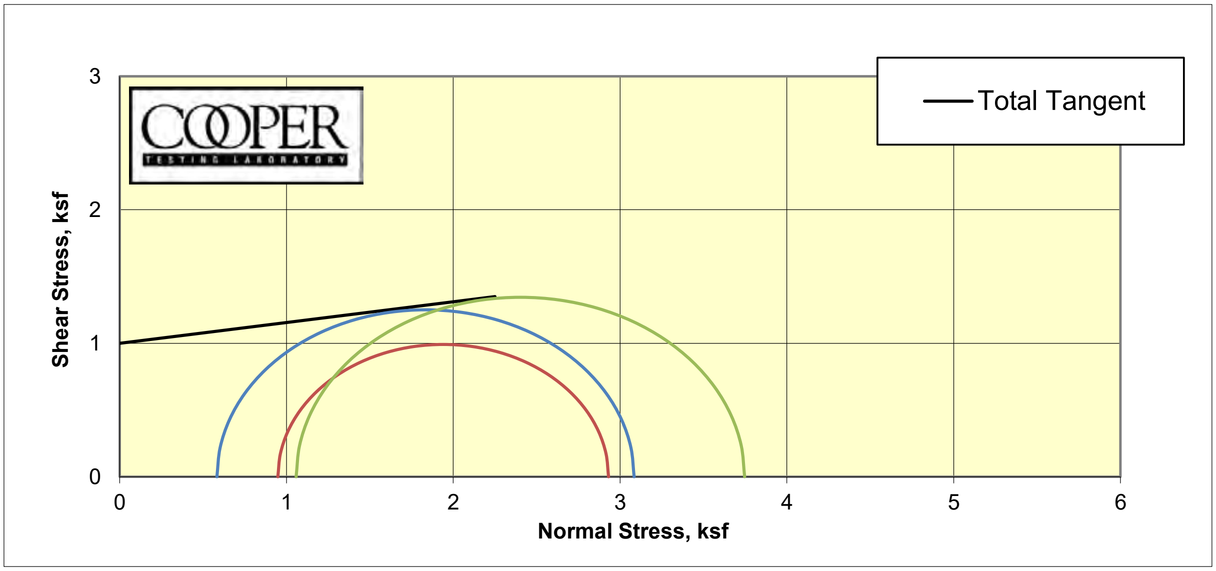


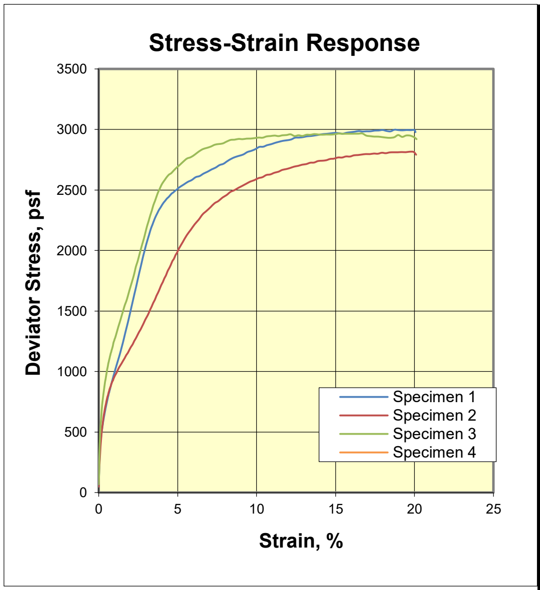
SYMBOL	SAMPLE LOCATION	COHESION (psf)	FRICTION ANGLE	REMARKS
⊙	BH-12A, ST-3 @ 20.0 - 22.0 FT.			SATURATED; UNDISTURBED

DIRECT SHEAR TEST RESULTS - ASTM D3080

PROJECT NO. 3691.1.1	WALLACE GROUP, INC. COFFIN BUTTE	LAB NO. 21-430

Consolidated Undrained Triaxial Compression
ASTM D4767m





CTL Number:	1152-001		
Client Name:	The Wallace Group		
Project Name:	Coffin Butte Landfill		
Project Number:	21129-1		
Date:	12/23/2021	By:	MD/DC

Total C	**1.000**	**ksf**
Total phi	**8.8**	**degrees**
Eff. C	**N/A**	**ksf**
Eff. Phi	**N/A**	**degrees**

©

Remarks: Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "Report" tab and in cells M18 through P19 enter end points for a line through the Mohr's circles. The points plotted can be changed on the "Shear Values" tab using cells B3, F3, and J3.

Specimen	**1**	**2**	**3**	**4**
Boring	BH-2	BH-2	BH-2	
Sample	ST-1	ST-1	ST-1	
Depth	13(Tip-13.5")	13(Tip-6.5")	13(Tip-1/2")	
Visual Description	Olive Brown CLAY	Olive Brown CLAY	Olive Brown CLAY	
MC (%)	36.1	35.7	36.3	
Dry Density (pcf)	85.6	83.4	85.3	
Saturation (%)	98.7	92.6	98.6	
Void Ratio	1.007	1.059	1.012	
Diameter (in)	2.87	2.87	2.87	
Height (in)	5.99	5.75	5.98	
		Final		
MC (%)	36.2	36.0	36.3	
Dry Density (pcf)	86.0	86.3	85.9	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.996	0.990	0.998	
Diameter (in)	2.87	2.83	2.87	
Height (in)	5.97	5.73	5.94	
Cell Pressure (psi)	63.6	66.4	67.6	
Back Pressure (psi)	59.6	59.8	60.3	
		Total Stresses At:		
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	2.501	1.983	2.689	
Excess PP (psi)				
Sigma 1 (ksf)	3.084	2.931	3.747	
Sigma 3 (ksf)	0.583	0.948	1.058	
P (ksf)	1.834	1.940	2.402	
Q (ksf)	1.251	0.991	1.345	
Stress Ratio	5.292	3.091	3.542	
Rate (in/min)	0.0300	0.0287	0.0299	

BENCHMARK
GEOTECHNICAL LABS

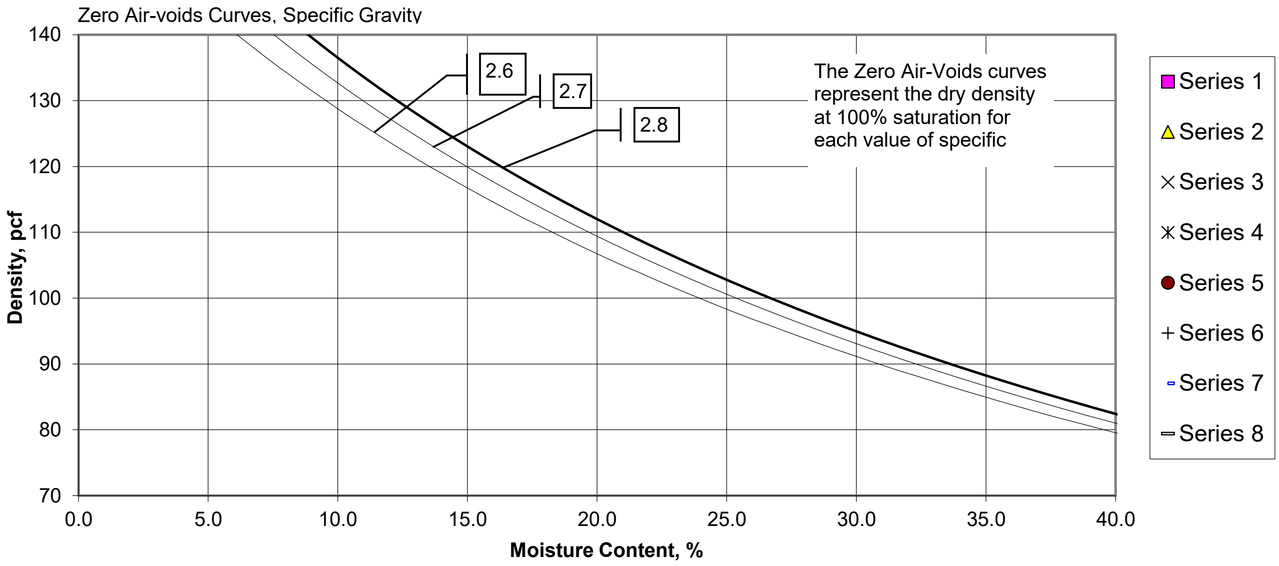
Moisture-Density-Porosity Report
(ASTM D7263b)

BGL Job No: 026-029 **Project No.** 21129 **By:** PJ
Client: The Wallace Group **Date:** 10/13/22
Project Name: Coffin Butte Landfill **Remarks:**

Boring:	GP-04	GP-04	GP-04	GP-04	GP-04	GP-04	GP-05	GP-05
Sample:	S-1	S-2	S-3	S-4	S-5	S-6	S-2	S-3
Depth, ft:	3	7	13.5	22	25	27	6.5-8	14-17
Visual Description:	Reddish Brown CLAY	Red CLAY	Red CLAY	Yellow & Brown SILT	Yellow & Brown SILT	Yellow & Brown SILT	Brown & Dark Brown SILT	Mottled Dark Grayish Brown Sandy SILT
Actual G_s								
Assumed G_s								
Moisture, %	22.6	37.3	40.1	75.6	69.7	70.3	42.6	45.1
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.pb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw,%								
Volumetric Air Cont., Θa,%								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered to be approximate.

Moisture-Density



BENCHMARK GEOTECHNICAL LABS

Moisture-Density-Porosity Report
(ASTM D7263b)

BGL Job No: 026-029 **Project No.** 21129 **By:** PJ

Client: The Wallace Group **Date:** 10/13/22

Project Name: Coffin Butte Landfill **Remarks:**

Boring:	GP-06	GP-06	GP-07					
Sample:	S-4	S-6	-					
Depth, ft:	18	27	12-14					
Visual Description:	Mottled Dark Brown & Yellow SILT	Brownish Yellow & Yellowish Brown SILT	Brown & Very Pale Brown SILT, trace Sand					
Actual G_s								
Assumed G_s								
Moisture, %	71.9	80.6	38.3					
Wet Unit wt, pcf								
Dry Unit wt, pcf								
Dry Bulk Dens.pb, (g/cc)								
Saturation, %								
Total Porosity, %								
Volumetric Water Cont,Θw,%								
Volumetric Air Cont., Θa,%								
Void Ratio								
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered to be approximate.

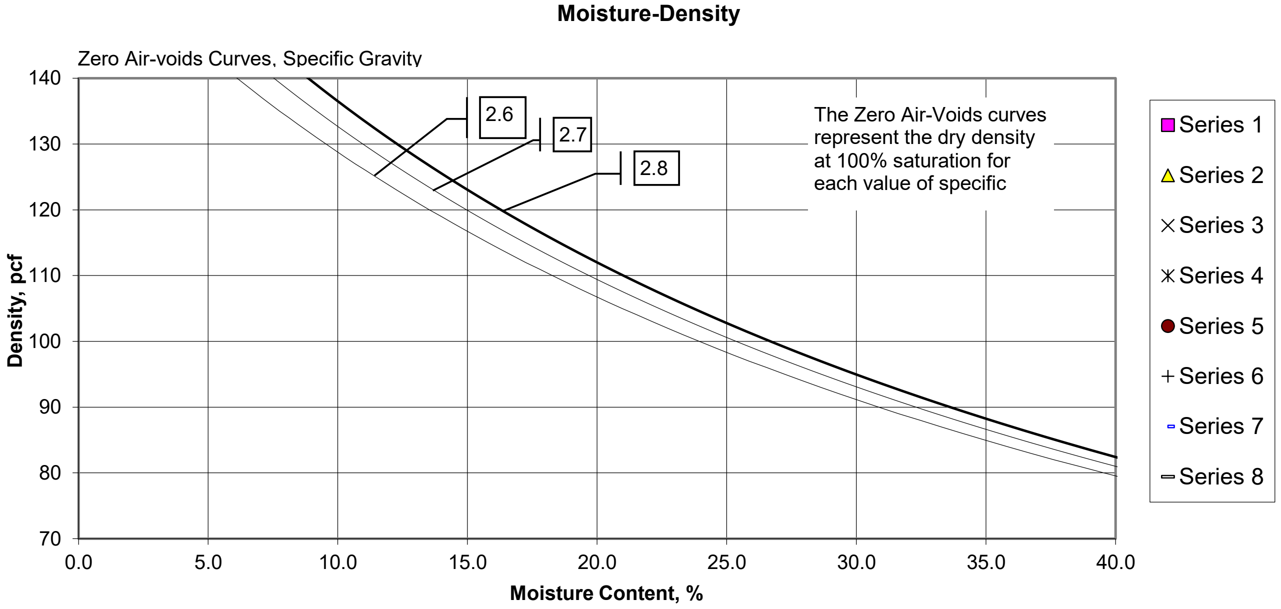

Moisture-Density

Fig B-31

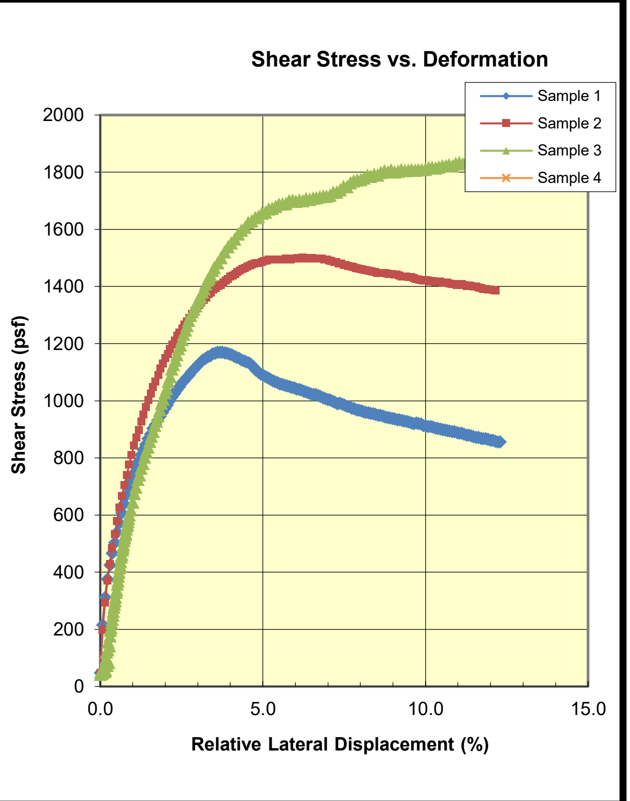
COOPER
TESTING LABORATORY

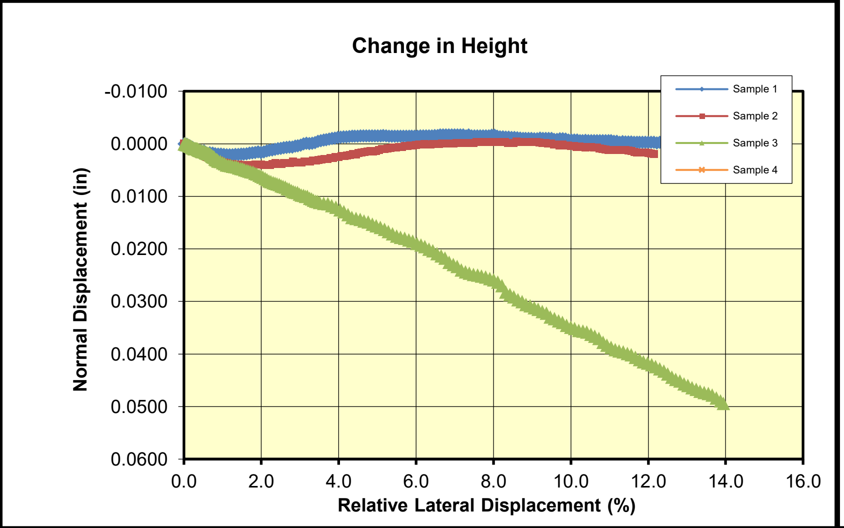
Consolidated Drained Direct Shear
(ASTM D3080)

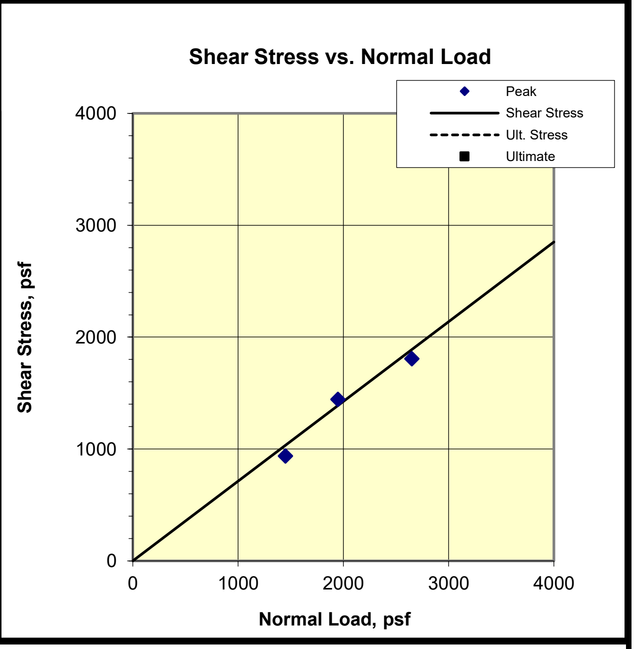
CTL Job #: 1152-002
Client: Wallace Group
Project Name: Coffin Butte Landfill Expansion
Project #: 21129-4
Date: 1/3/2023
Remolding Info:
By: MD
Checked: PJ

Specimen Data	1	2	3	4
Boring:	GP-4	GP-4	GP-4	
Sample:	ST-3	ST-3	ST-3	
Depth (ft):	28-30.5	28-30.5	28-30.5	
Visual Description:	Yellowish Brown CLAY w/ Sand	Yellowish Brown CLAY w/ Sand	Yellowish Brown CLAY w/ Sand	
Normal Load (psf)	1450	1950	2650	
Dry Mass of Specimen (g)	102.0	103.4	101.2	
Initial Height (in)	0.98	0.99	1.01	
Initial Diameter (in)	2.87	2.85	2.87	
Initial Void Ratio	1.851	1.788	1.962	
Initial Moisture (%)	65.4	62.9	69.6	
Initial Wet Density (pcf)	101.4	102.1	100.1	
Initial Dry Density (pcf)	61.3	62.7	59.0	
Initial Saturation (%)	99.0	98.5	99.3	
ΔHeight Consol (in)	0.0209	0.0340	0.0580	
At Test Void Ratio	1.790	1.692	1.792	
At Test Moisture (%)	63.5	59.9	63.7	
At Test Wet Density (pcf)	102.4	103.9	102.5	
At Test Dry Density (pcf)	62.6	64.9	62.6	
At Test Saturation (%)	99.3	99.2	99.6	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	9%	9%	9%	
Shear Stress (psf)	938	1442	1808	
ΔHeight (in) at 9%	-0.0010	0.0023	0.0308	
Ultimate Stress (psf)				

Phi (deg)	35.5	Ult. Phi (deg)	
Cohesion (psf)	0	Ult. Cohesion (psf)	



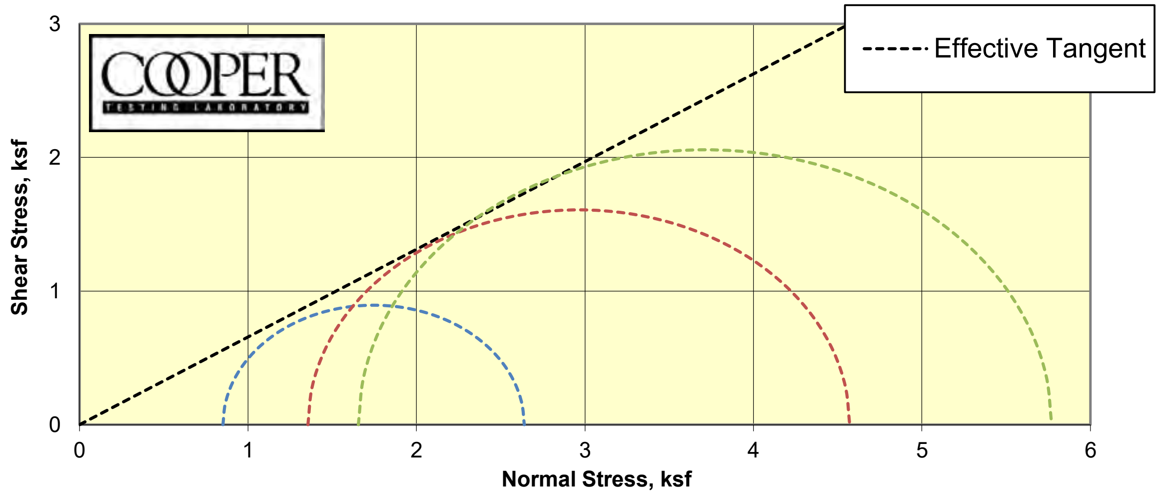


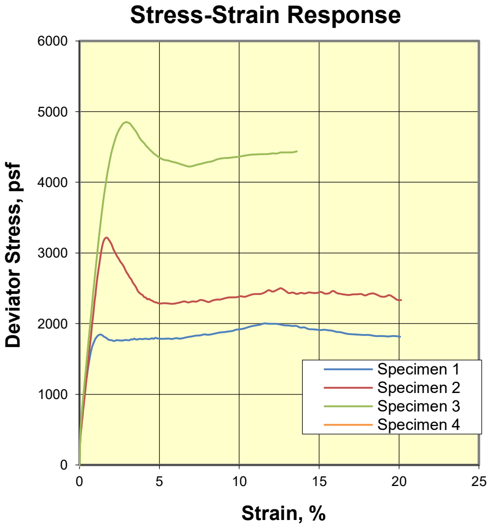


Remarks:

©

Consolidated Drained Triaxial Compression
ASTM D7181



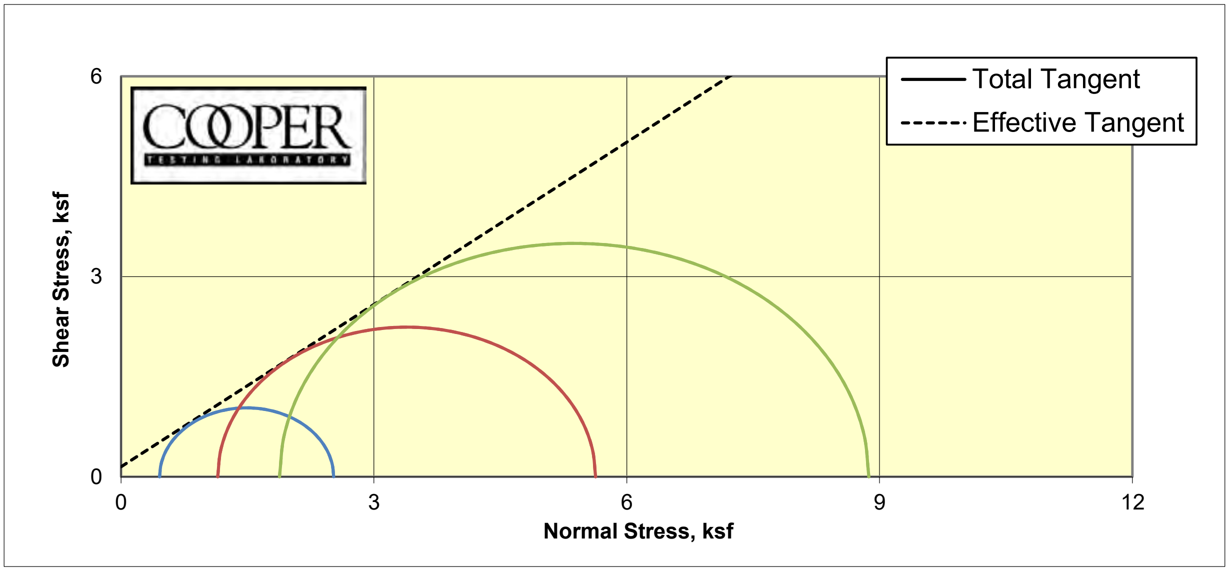


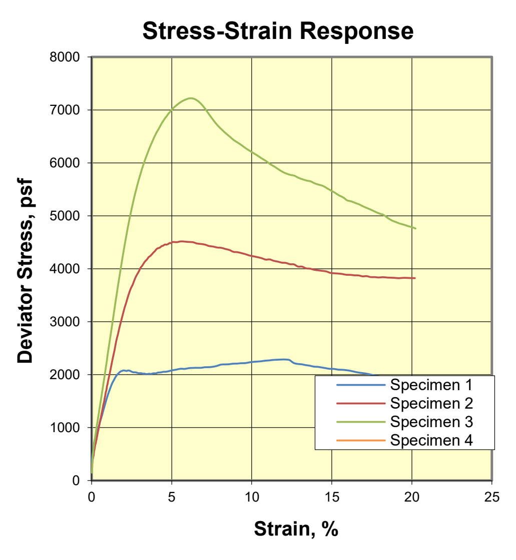
CTL Number:	1152-002		
Client Name:	The Wallace Group		
Project Name:	Coffin Butte Landfill Expansion		
Project Number:	21129-4		
Date:	12/13/2022	By:	MD/DC
Total C	**N/A**	**ksf**	
Total phi	**N/A**	**degrees**	
Eff. C	**0.000**	**ksf**	
Eff. Phi	**33.3**	**degrees**	©

Specimen	**1**	**2**	**3**	**4**
Boring	GP-4	GP-4	GP-4	
Sample	ST-2	ST-2	ST-2	
Depth	17.5(Tip-15")	18.5(Tip-7.5")	18.5(-1")	
Visual Description	Reddish Yellow CLAY w/ Sand (Silty)/ SILT w/ Sand (slightly plastic)	Reddish Yellow CLAY w/ Sand (Silty)/ SILT w/ Sand (slightly plastic)	Reddish Yellow CLAY w/ Sand (Silty)/ SILT w/ Sand (slightly plastic)	
MC (%)	65.7	69.8	69.0	
Dry Density (pcf)	62.6	58.9	59.8	
Saturation (%)	97.8	95.0	96.1	
Void Ratio	2.063	2.257	2.204	
Diameter (in)	2.87	2.87	2.87	
Height (in)	5.98	5.98	6.01	
	Final			
MC (%)	69.8	70.8	66.1	
Dry Density (pcf)	62.3	59.7	61.3	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	2.075	2.210	2.130	
Diameter (in)	2.88	2.86	2.85	
Height (in)	5.96	5.94	5.97	
Cell Pressure (psi)	105.5	110.0	112.3	
Back Pressure (psi)	99.7	100.6	100.8	
	Effective Stresses At:			
Strain (%)	1.7	1.7	1.7	
Deviator (ksf)	1.788	3.215	4.115	
Excess PP (psi)	-0.1	-0.1	-0.1	
Sigma 1 (ksf)	2.640	4.571	5.770	
Sigma 3 (ksf)	0.851	1.356	1.655	
P (ksf)	1.745	2.963	3.712	
Q (ksf)	0.894	1.608	2.058	
Stress Ratio	3.101	3.372	3.487	
Rate (in/min)	0.0004	0.0004	0.0004	

Fig B-33

Consolidated Drained Triaxial Compression
ASTM D7181





CTL Number:	1152-002		
Client Name:	The Wallace Group		
Project Name:	Coffin Butte Landfill Expansion		
Project Number:	21129-4		
Date:	12/20/2022	By:	MD/DC
Total C	**N/A**	**ksf**	
Total phi	**N/A**	**degrees**	
Eff. C	**0.150**	**ksf**	
Eff. Phi	**39.0**	**degrees**	©

Specimen	**1**	**2**	**3**	**4**
Boring	GP-5	GP-5	GP-5	
Sample	ST-1	ST-1	ST-1	
Depth	10(Tip-15")	10(Tip-7.5")	10(Tip-.5")	
Visual Description	Reddish Yellow Clayey SAND w/ Gravel	Dark Brown Mottled Yellow Silty SAND grading to Reddish Yellow Clayey SAND w/ Gravel	Dark Brown Mottled Yellow Silty SAND	
MC (%)	41.2	48.2	41.2	
Dry Density (pcf)	78.5	71.4	78.8	
Saturation (%)	95.5	94.4	96.1	
Void Ratio	1.186	1.405	1.179	
Diameter (in)	2.87	2.87	2.87	
Height (in)	5.98	5.98	5.99	
	Final			
MC (%)	49.3	50.8	40.0	
Dry Density (pcf)	78.6	72.1	78.8	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	1.185	1.382	1.177	
Diameter (in)	2.88	2.87	2.89	
Height (in)	5.94	5.92	5.92	
Cell Pressure (psi)	102.7	108.2	114.0	
Back Pressure (psi)	99.7	100.2	100.9	
	Effective Stresses At:			
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	2.065	4.484	6.993	
Excess PP (psi)	-0.2	0.0	0.0	
Sigma 1 (ksf)	2.523	5.630	8.873	
Sigma 3 (ksf)	0.457	1.147	1.880	
P (ksf)	1.490	3.389	5.376	
Q (ksf)	1.033	2.242	3.497	
Stress Ratio	5.517	4.910	4.721	
Rate (in/min)	0.0004	0.0004	0.0004	

Fig B-34

62915 NE 18th St, Ste 1
Bend, OR 97701
541.382.4707
www.wallacegroup-inc.com

OVEN DRY MOISTURE CONTENT

ASTM D-2216

Client:	CEC, Inc.	**Date Sampled:**	9/22/2022
Project Name:	Coffin Butte Landfill	**Project No. :**	21129 - 1
Technician:	PJH	**Lab No.:**	WGG0281
Reviewed By:	LMS	**Date Analyzed:**	10/14/2022

Location	GP-06		GP-06
Depth	7'		24'
Wt. Dish & Wet Soil	639.3		463.3
Wt Dish & Dry Soil	528.1		300.3
Wt of Dish	242.9		83.0
Wt of Water	111.2		163.0
Wt of Dry Soil	285.2		217.3
Percent Moisture	39.0		75.0

Note: Data and results shown above include ASTM Test Method D2216. This report pertains only to the material tested and/or inspected and is not to be reproduced without prior authorization of Wallace Group. If part of a larger document, this report is not to be removed or reproduced separately. This report is the property of the Client and shall not be distributed to other parties without Client's permission.

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NORTHWEST GEOSYSTEM EXPERTS

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Bend, OR 97701
541.382.4707 Tel.
www.wallacegroup-inc.com

No. 200 Sieve Wash

(Material Finer than No. 200 Sieve)

ASTM C117 / D-1140

Client: Civil & Environmental Consultants
Project Coffin Butte Landfill
Location: Corvallis, OR
Sample Location: GP-09 & GP-01
Date Sampled: 9/22/2022

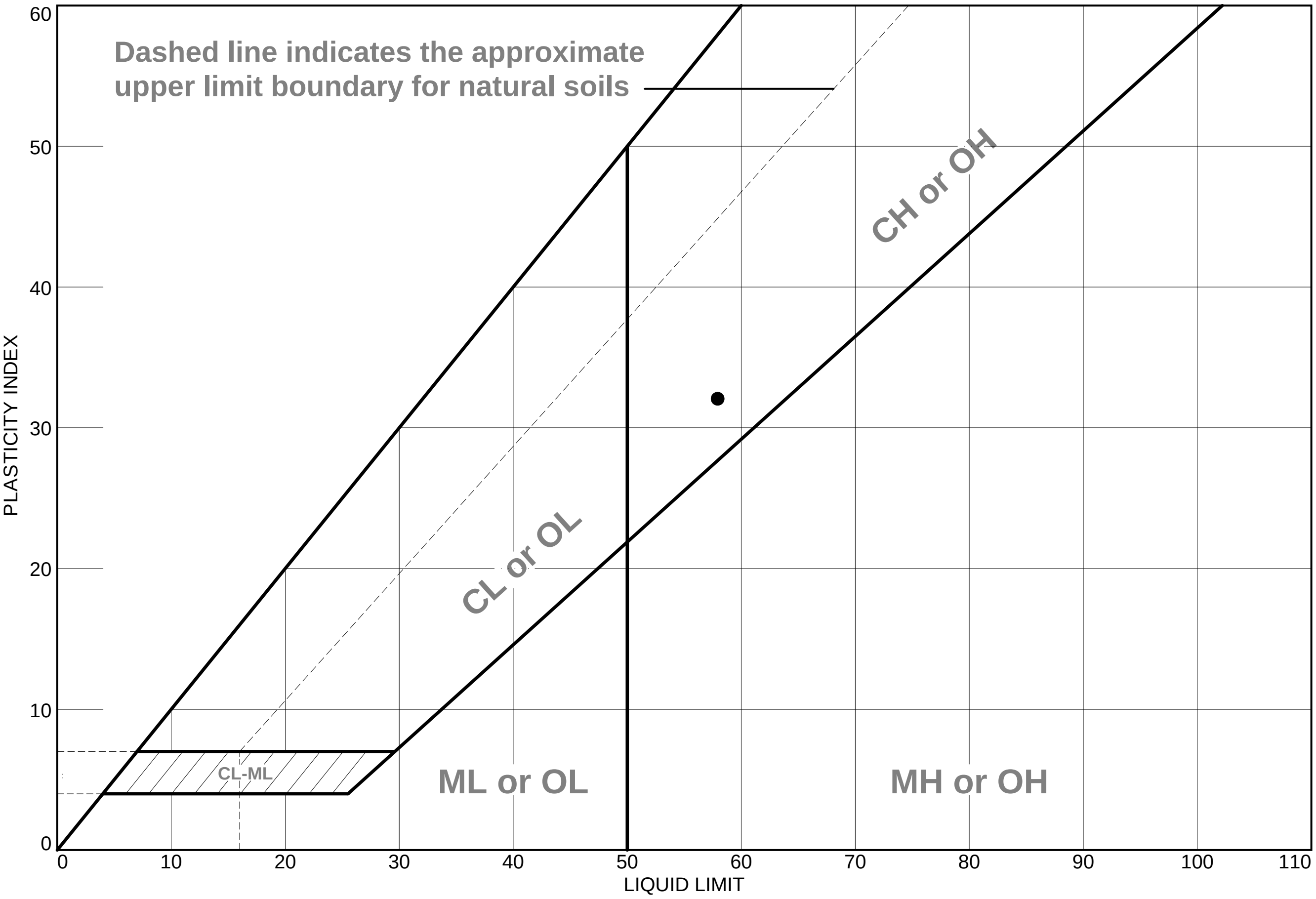
Project Number: 21129 - 1
Lab Number: WGG0281
Technician: PJH
Date Received: 9/25/2022
Date Analyzed: 10/17/2022

Location	GP-09	GP-01	GP-01
Depth	2 - 4'	3'	8.5'
Wet Weight	464.8	493.4	383.9
Dry Weight	362.3	379.7	283.1
Moisture %	28.3%	29.9%	35.6%
Weight After Wash	25.8	7.1	7.4
Weight Passing #200	336.5	372.6	275.7
% Passing #200	92.9%	98.1%	97.4%

REVIEWED BY: L. Splitter
DATE: 6/30/2023

Note: Data and results shown above include ASTM Test Methods C117 and C1140. This report pertains only to the material tested and/or inspected and is not to be reproduced without prior authorization of Wallace Group. If part of a larger document, this report is not to be removed or reproduced separately. This report is the property of the Client and shall not be distributed to other parties without Client's permission.

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay	58	26	32	99.2%	98.1%	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-01 **Depth:** 3' **Sample Number:** S-1

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

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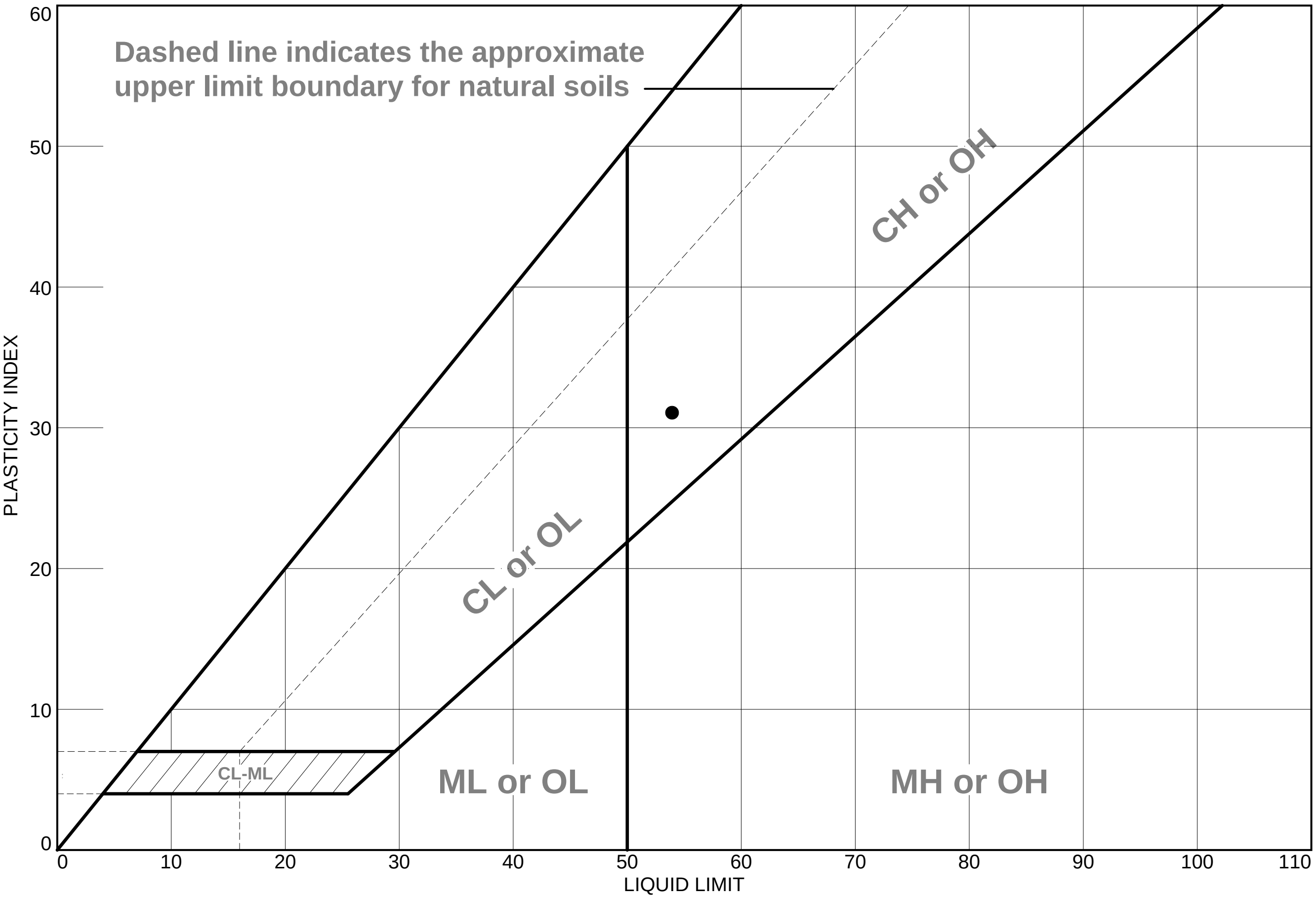
wallacegroup-inc.com
62915 NE 18th Street, St. 1
Bend, Oregon 97701

Figure B-37

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay	54	23	31	99.0%	97.4%	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-01 **Depth:** 8.5' **Sample Number:** S-2

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

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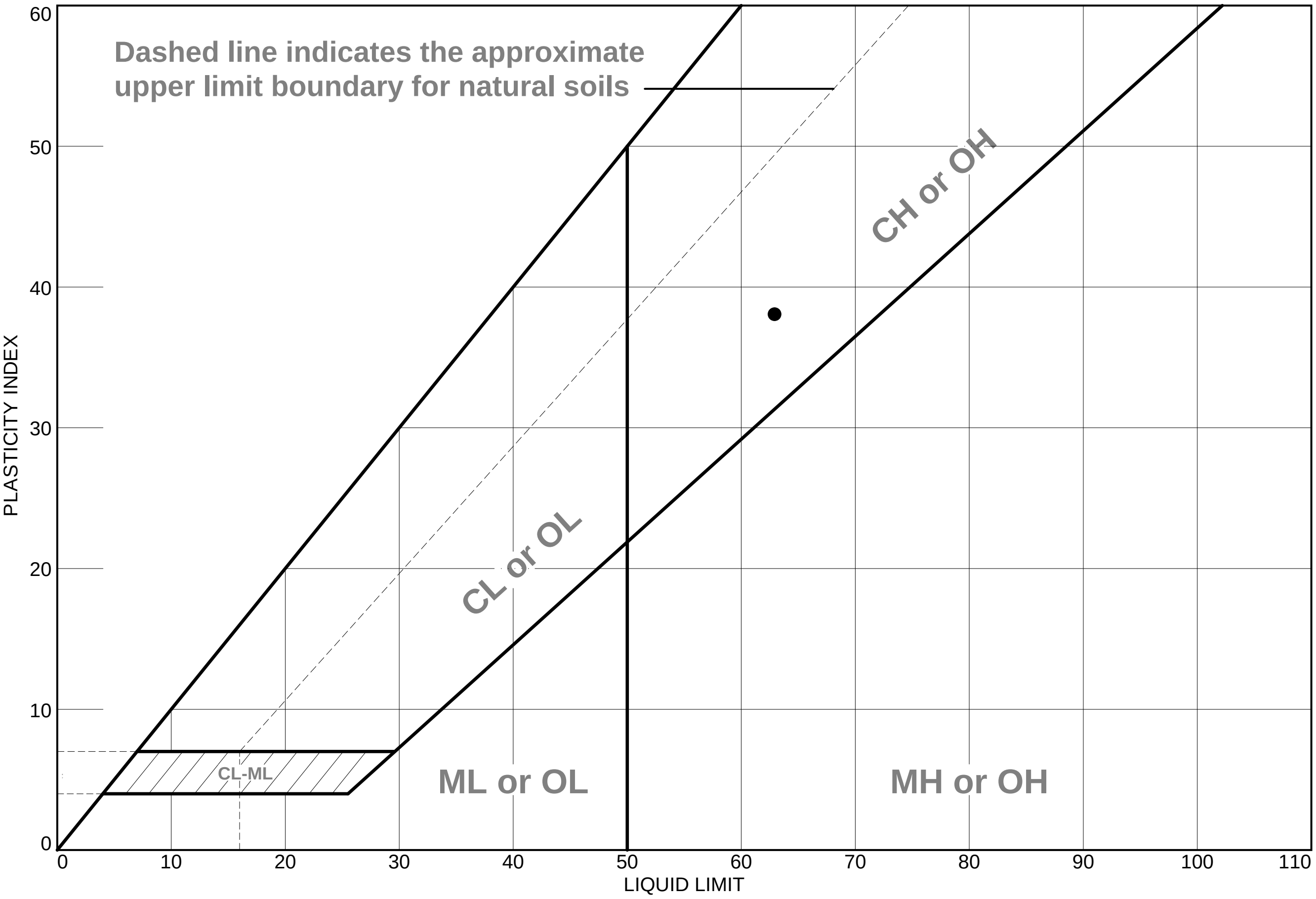
62915 NE 18th Street, St. 1
Bend, Oregon 97701

Figure B-38

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay	63	25	38	Not Tested	Not Tested	MH-CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-04 **Depth:** 3' **Sample Number:** S-1

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

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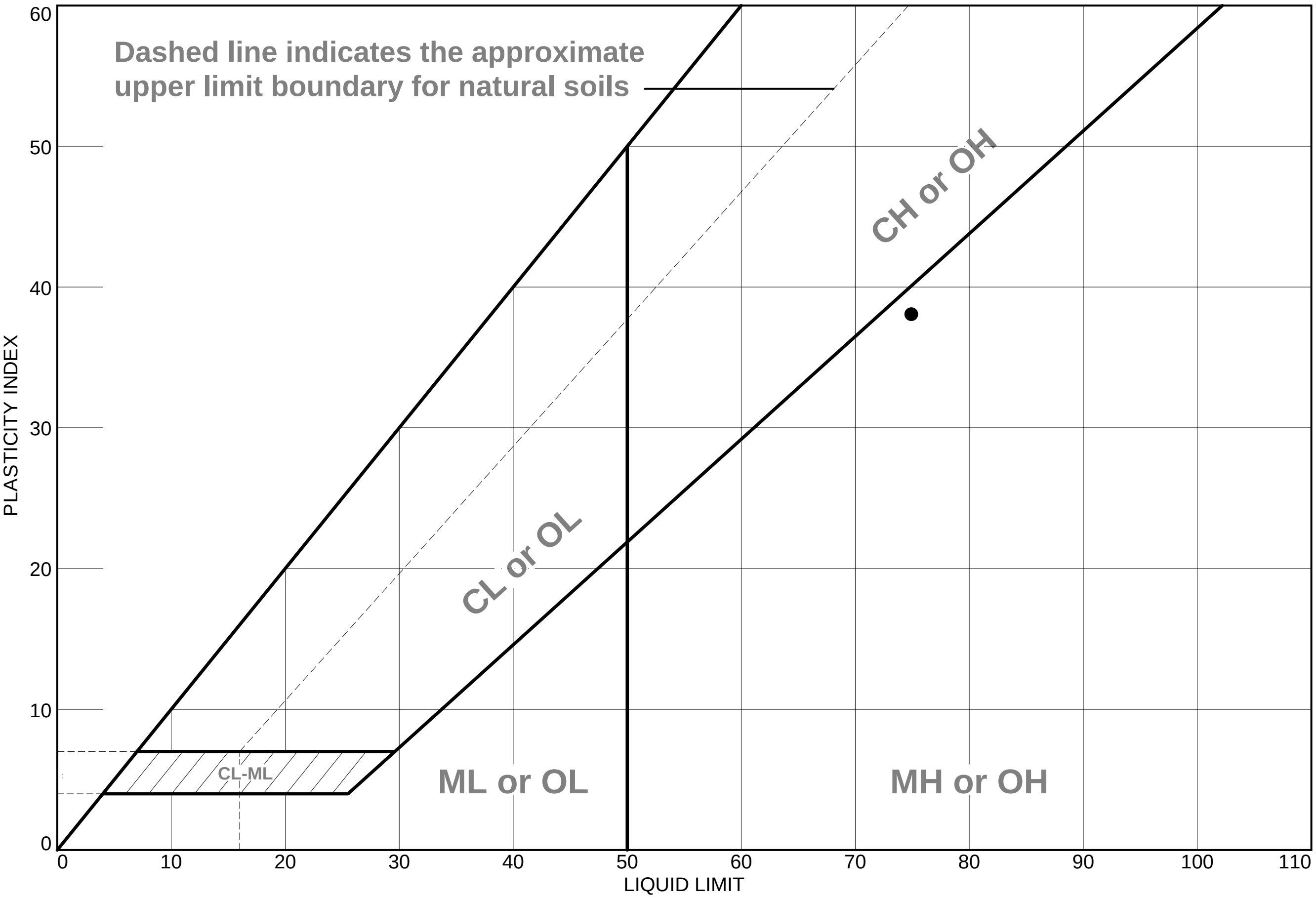
Bend, Oregon 97701

Figure B-39

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt with Sand	75	37	38	Not Tested	Not Tested	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-04 **Depth:** 17' **Sample Number:** S-3

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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62915 NE 18th Street, St. 1
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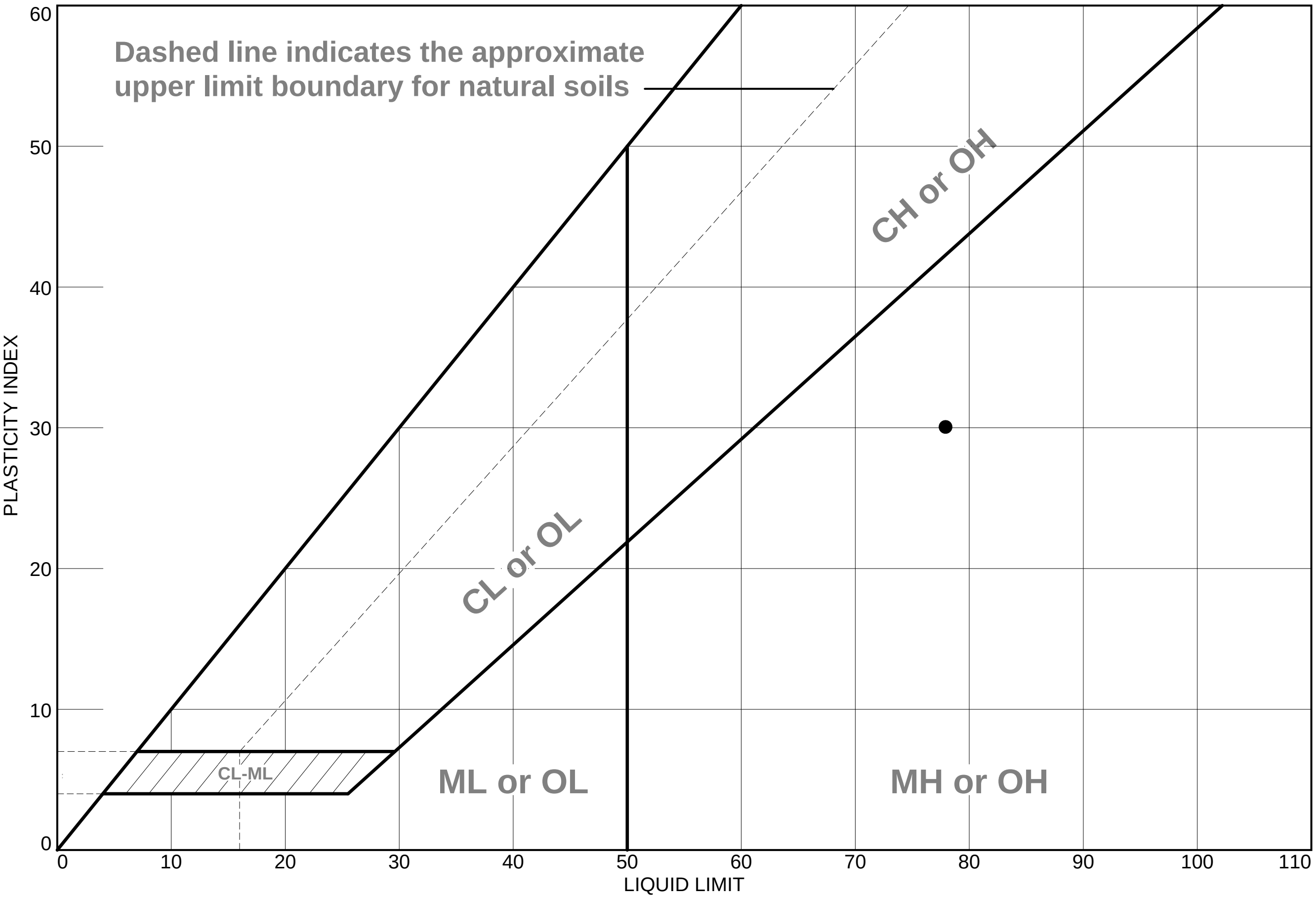
Figure B-40

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt with Sand	78	48	30	Not Tested	Not Tested	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-04 **Depth:** 25' **Sample Number:** S-5

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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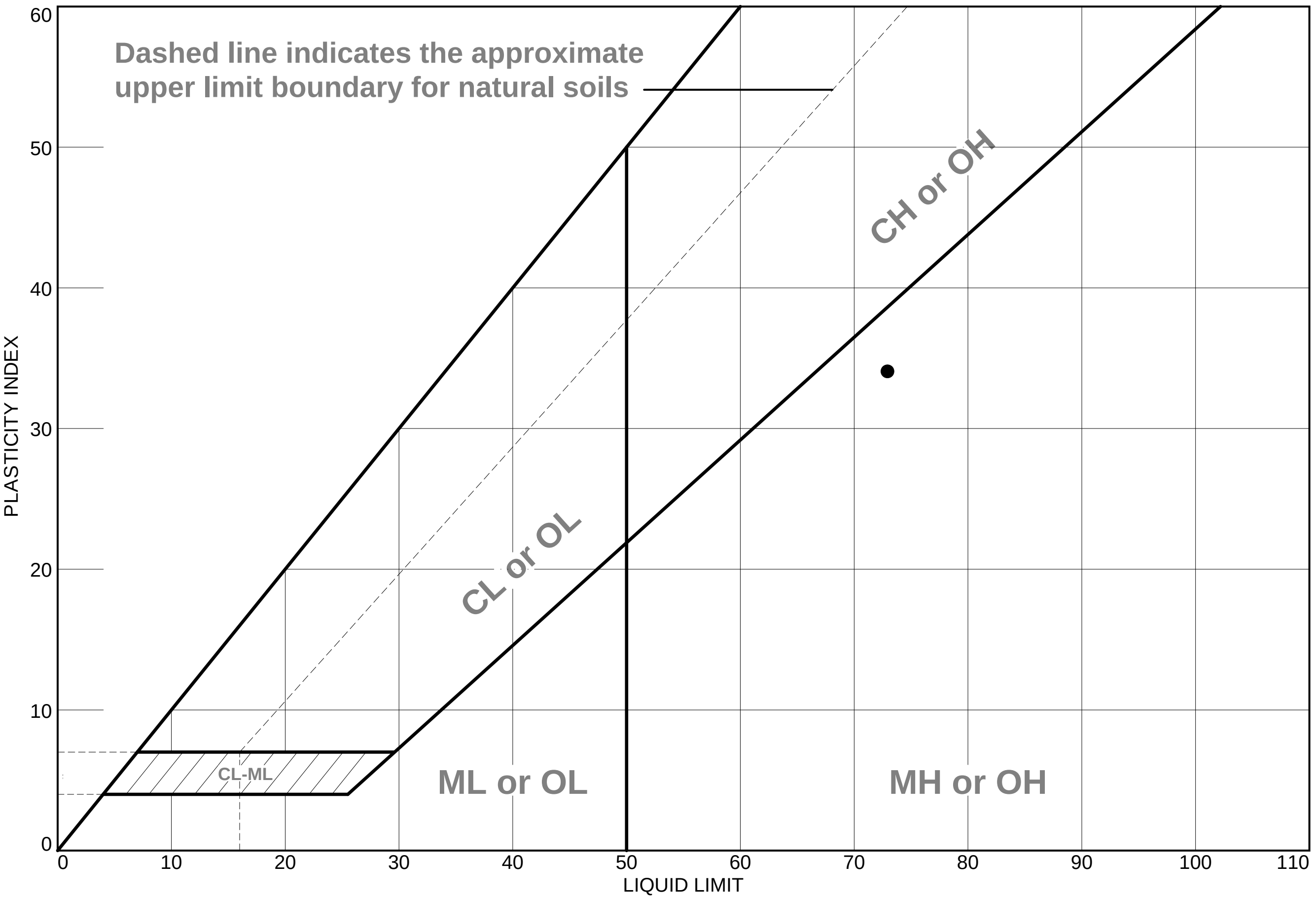
Figure B-41

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt with Sand	73	39	34	Not Tested	Not Tested	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-05 **Depth:** 6.5 - 8' **Sample Number:** S-2

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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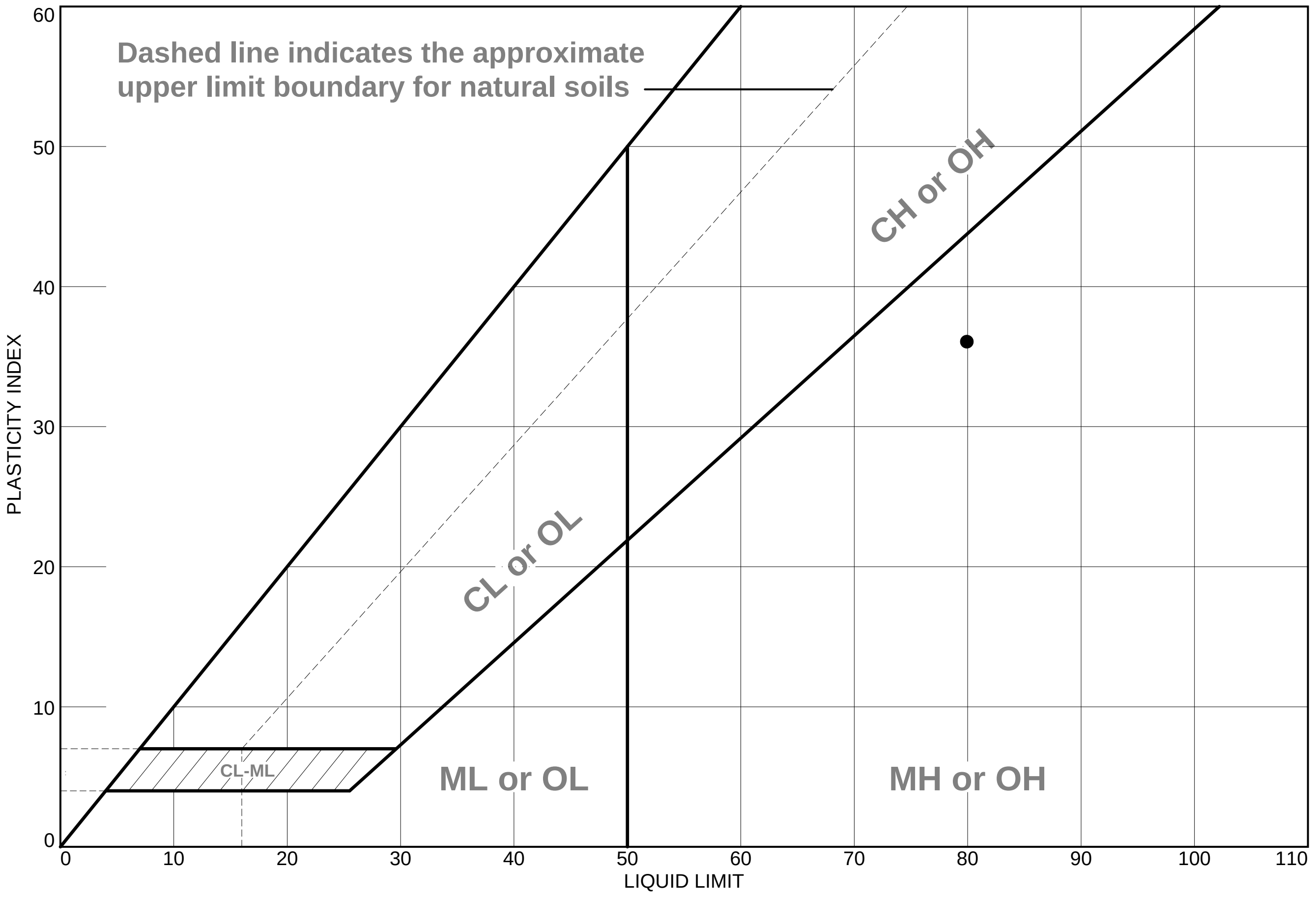
Figure B-42

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt	80	44	36	Not Tested	Not Tested	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-06 **Depth:** 7' **Sample Number:** S-2

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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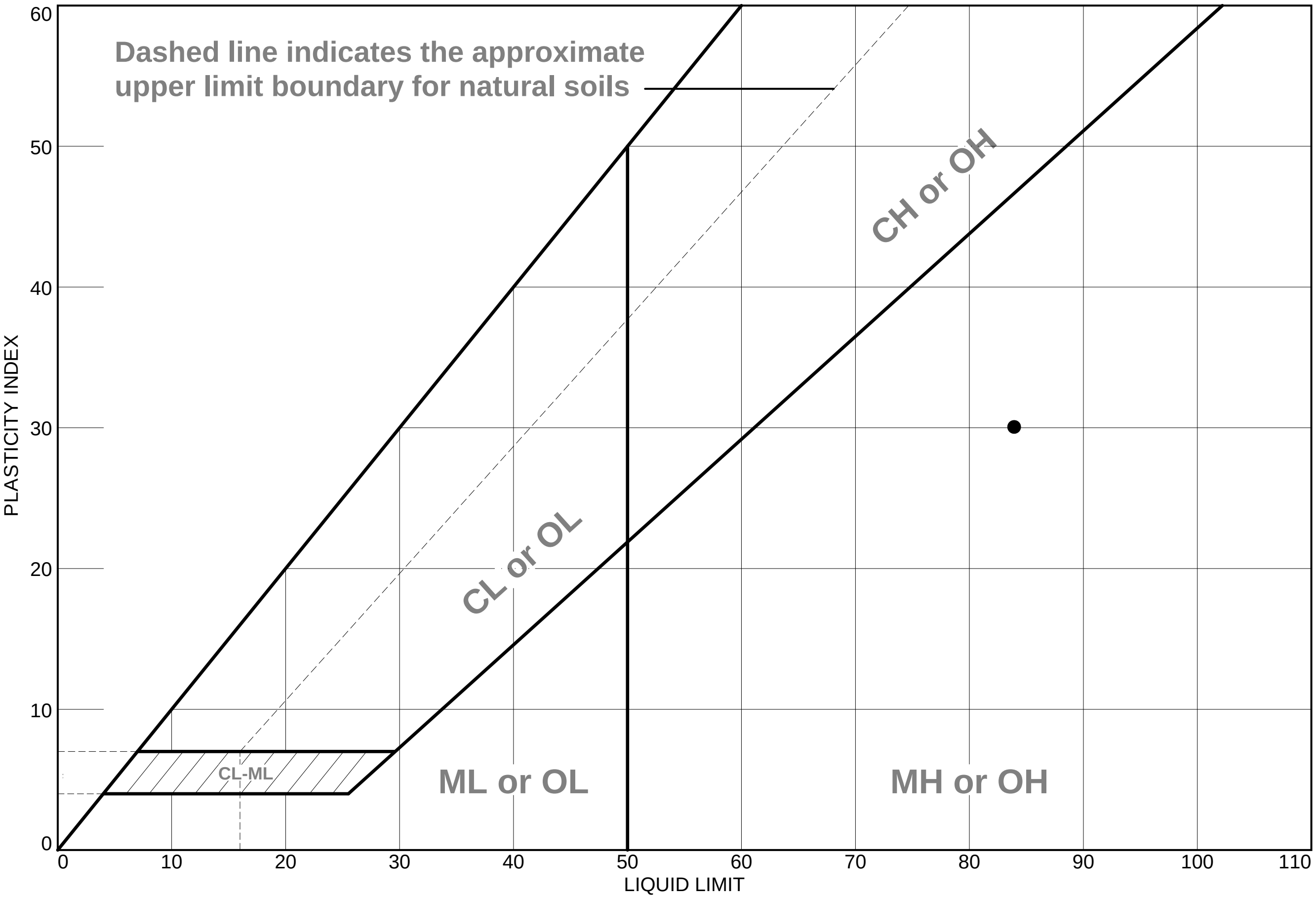
Figure B-43

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt	84	54	30	Not Tested	Not Tested	MH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-06 **Depth:** 24' **Sample Number:** S-5

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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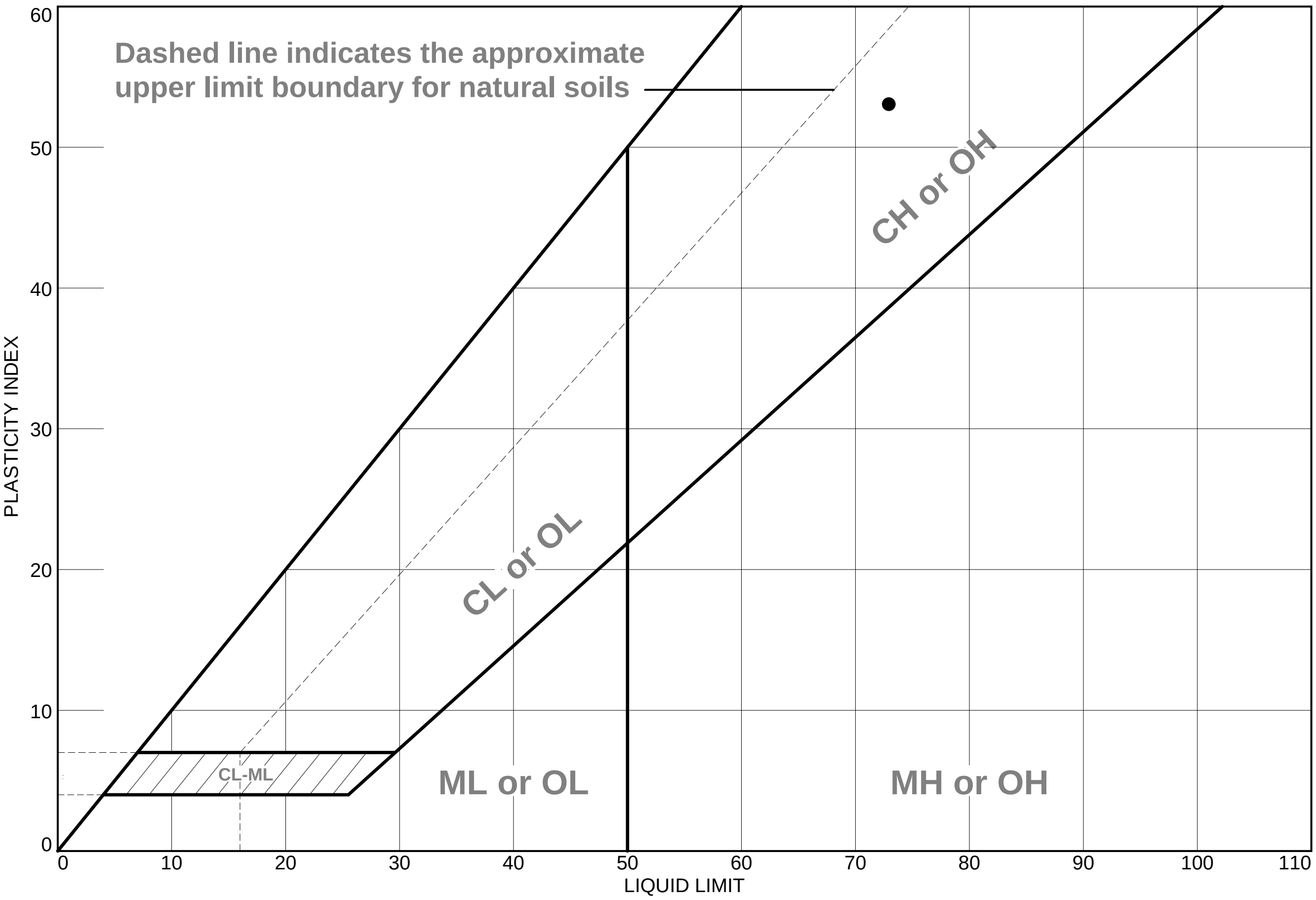
Figure B-44

Tested By: PJH **Checked By:** LMS

Plasticity Index of Soil (D4318)



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat Clay with Organics	73	20	53	97.3%	92.9%	CH

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

●**Source of Sample:** GP-09 **Depth:** 2 - 4' **Sample Number:** S-1

Remarks:

●Lab No.: WGG0281
Sampled By: SMW on 09-22-22
ASTM D4318 | Multipoint Method A
Wet Prepped, Manual Liquid
Limit Device & Hand Rolled

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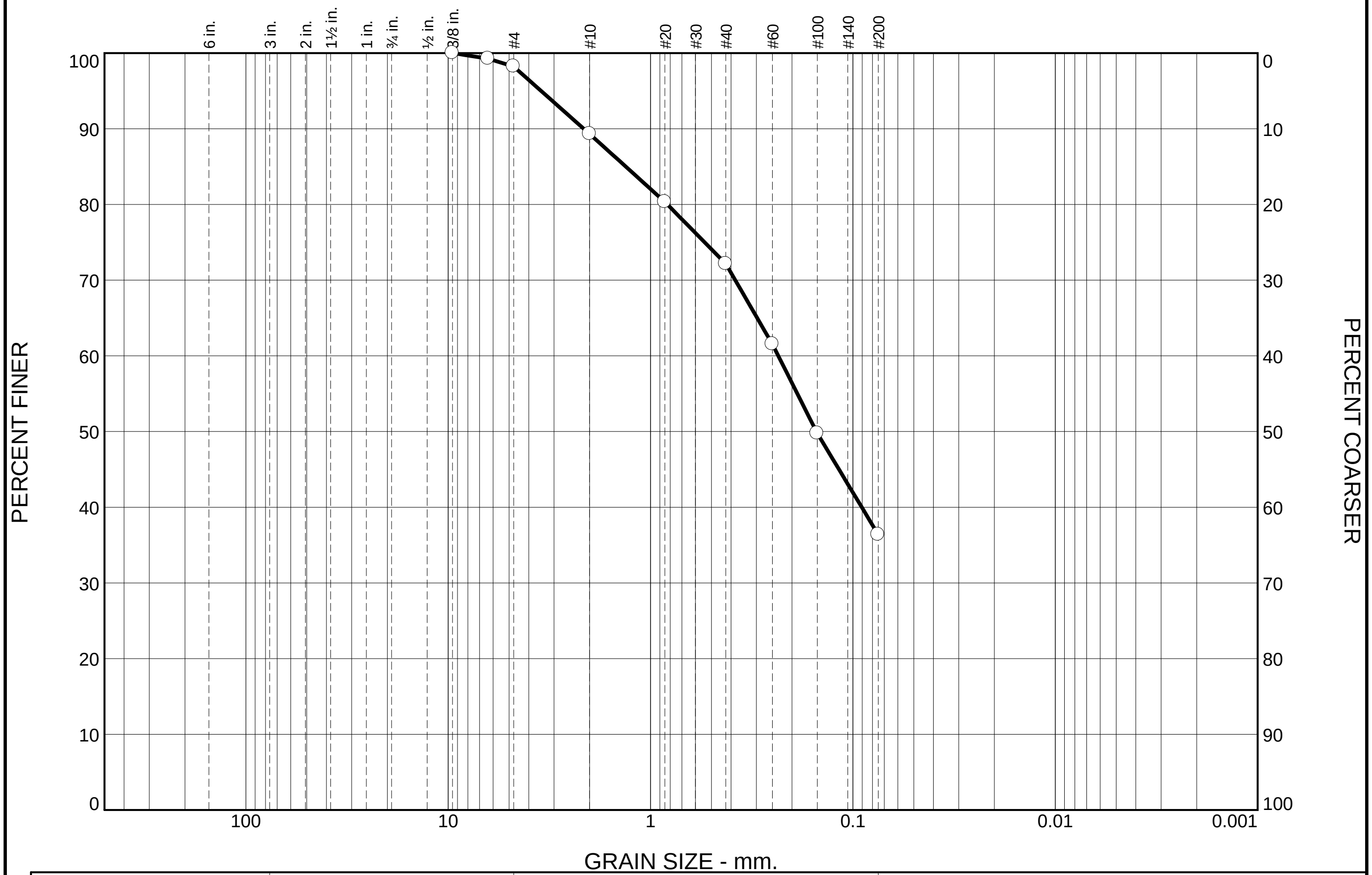
Figure B-45

Tested By: PJH **Checked By:** LMS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.8	8.9	17.1	35.8	36.4	

╳	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	Not Tested	Not Tested	1.3264	0.2338	0.1516					

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Silty, Clayey Sand	10-17-22	SC-SM	28.9%

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

○ **Source of Sample:** GP-05 **Depth:** 14' **Sample Number:** S-3

Remarks:

○Lab No.: WGG0281

Sampled By: SMW

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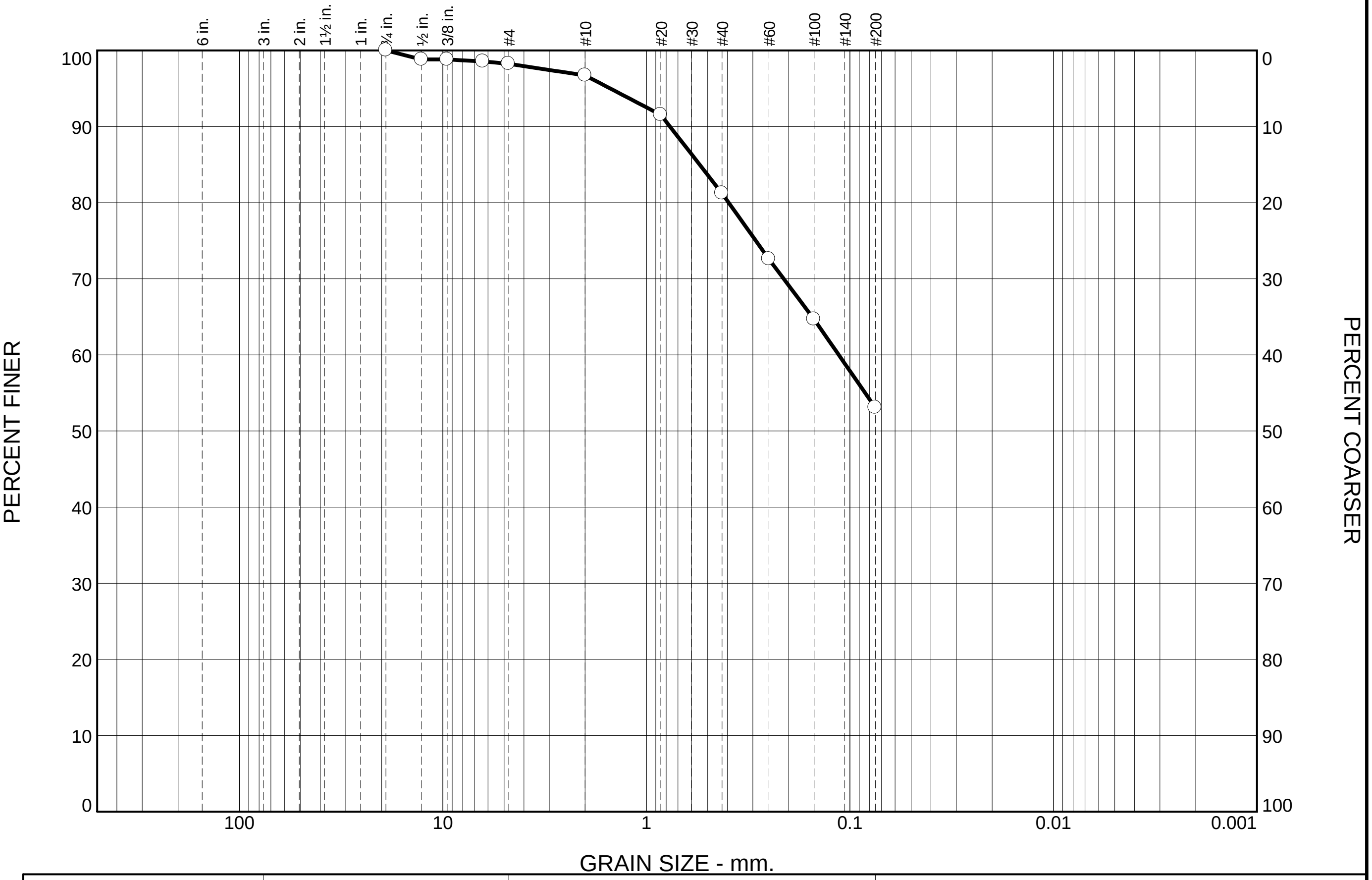
Figure B-46

Tested By: PJH **Checked By:** LMS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.8	1.5	15.5	28.1	53.1	

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	Not Tested	Not Tested	0.5479	0.1135						

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Sandy Clay	10-17-22	--	26.9%

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

○ **Source of Sample:** GP-07 **Depth:** 2 - 4' **Sample Number:** S-1

Remarks:

○Lab No.: WGG0281

Sampled By: SMW on 09-22-22

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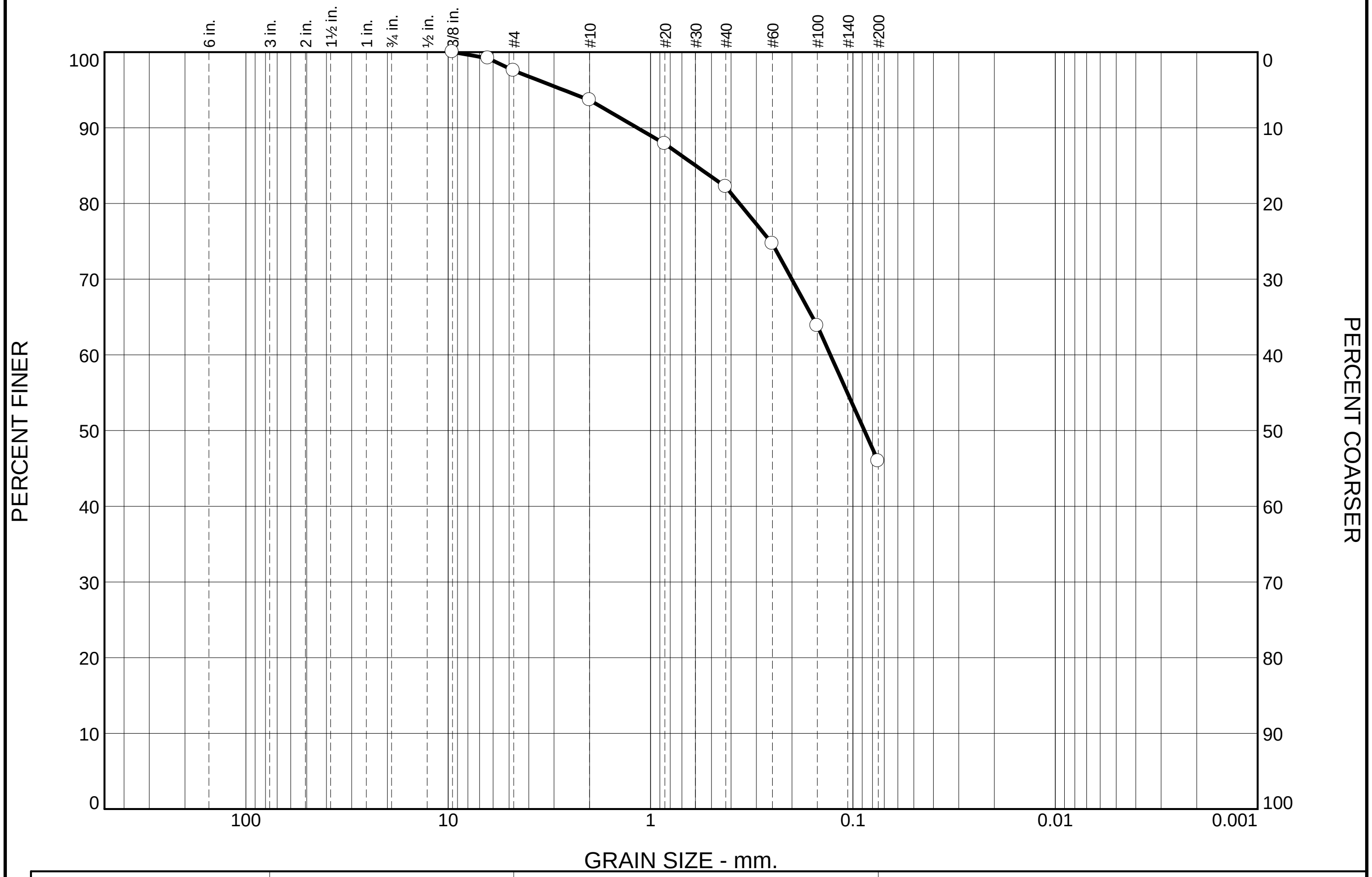
Figure B-47

Tested By: PJH **Checked By:** LMS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.4	4.0	11.4	36.3	45.9	

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	Not Tested	Not Tested	0.5986	0.1293	0.0878					

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Clayey Sand	10-17-22	SC-SM	25.5%

Project No. 21129 **Client:** Civil & Environmental Consultants, Inc.

Project: Coffin Butte Landfill

○ **Source of Sample:** GP-07 **Depth:** 16 - 18' **Sample Number:** S-3

Remarks:

○Lab No.: WGG0281
Sampled By: SMW on 09-22-22

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Figure B-48

Tested By: PJH **Checked By:** LMS

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APPENDIX C

ASCE Hazards Report

Address:
28972 Coffin Butte Rd
Corvallis, Oregon
97330

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 44.695572
Longitude: -123.233928
Elevation: 297.144000732361 ft (NAVD 88)

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

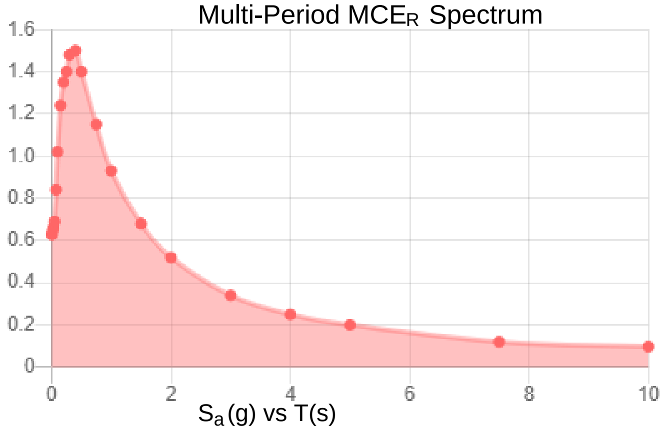
Seismic

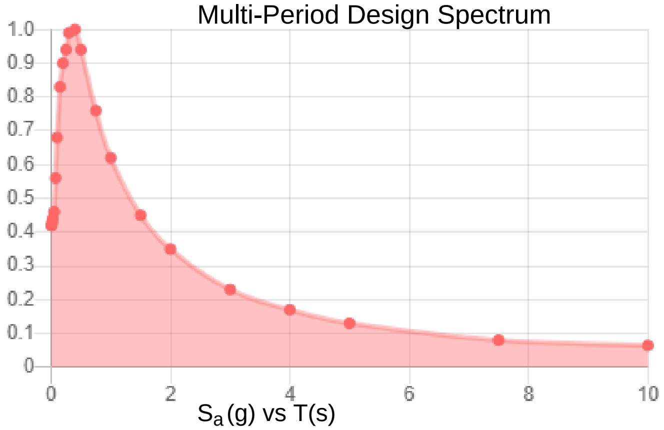
Site Soil Class: D - Stiff Soil

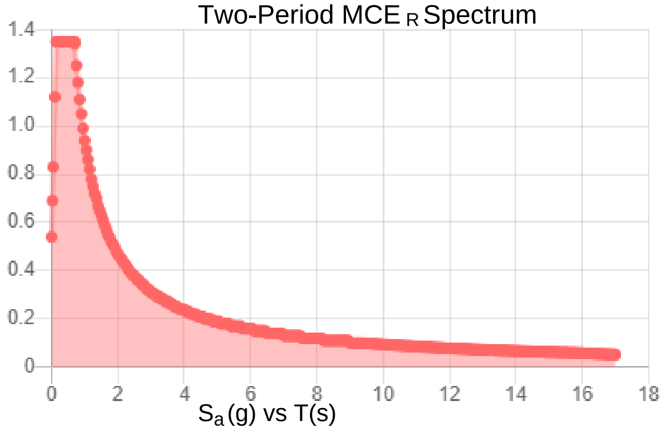
Results:

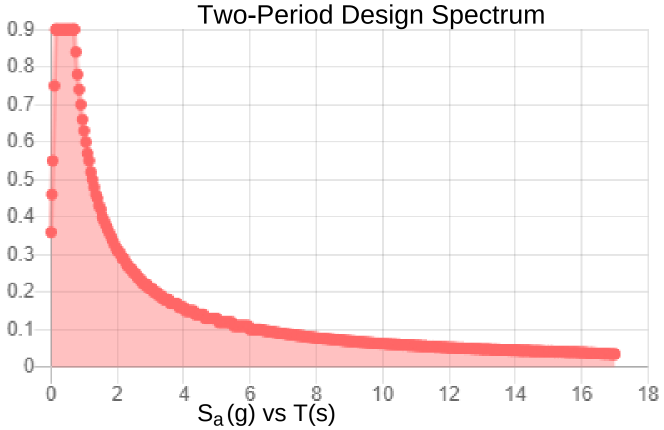
PGA_M :	0.61	T_L :	16
S_{MS} :	1.35	S_S :	1.05
S_{M1} :	0.94	S_1 :	0.44
S_{DS} :	0.9	V_{S30} :	260
S_{D1} :	0.63		

Seismic Design Category: D


Multi-Period MCE_R Spectrum


Multi-Period Design Spectrum


Two-Period MCE_R Spectrum


Two-Period Design Spectrum

MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Sun Jul 14 2024**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

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APPENDIX D

Existing conditions at BH-05 during the geotechnical exploration.

Drilling performed with track-mounted CME rig, operated by Western States Drilling, on February 16 through 18, 2021 and HazTech Drilling on November 8 through 16, 2022. Note the skid steer and cleared road required for site access.

Drilling was performed using hollow-stem auger, mud-rotary, and HQ wireline coring techniques.

Boring location B-13, which is typical of the dense onsite vegetation and restricted access.

Borings were backfilled using bentonite.

Areas near known landfill utilities were advanced using a vacuum truck.

Typical rock core, consisting of brecciated and altered basaltic rocks of the Siletz River Volcanics.

Initial exploration was performed using a CAT excavator.

Test pits were advanced to the limit of the machine's reach, or excavator refusal on competent bedrock.

Typical test pit profile, consisting of weathered in-place volcanic soils transitioning into bedrock.

Test pits were located to provide access to the proposed boring locations, and the excavator was used to clear and grade access to the borings.

The higher elevations of the site are characterized by dense vegetation, with shallower depth to rock.

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APPENDIX E

Final Draft Memorandum

To:	Lisa Splitter, PE, GE, The Wallace Group	Project:	Coffin Butte Slope Stability Analysis
From:	Jamie Schick, CEG, Delve Underground	cc:	
Prepared by:	Jamie Schick, CEG, Luke Ferguson, PE, Ethan Guzek, PG(WA), Delve Underground	Job No.:	6309.0
Date:	November 6, 2023		
Subject:	Coffin Butte Landfill Slope Stability Analysis		

1.0 Introduction and Background Information

1.1 General

This Technical Memorandum has been developed by Delve Underground (Delve) for the Coffin Butte Landfill Expansion (Project). Delve is performing this work for the Wallace Group, LLC in support of their geotechnical engineering efforts associated with the design of this facility. The Wallace Group is a subconsultant to Civil and Environmental Consultants, Inc., who is completing the landfill design for Republic Services, Inc. Figure 1 presents the site location. The project includes the relocation of Coffin Butte Road, which will require excavating two cuts in existing slopes south of the current roadway to make room for the landfill expansion. Sections of these cuts will be in excess of 100 feet in height. Delve is under contract to complete the geotechnical engineering associated with these cuts and provide cut slope recommendations.

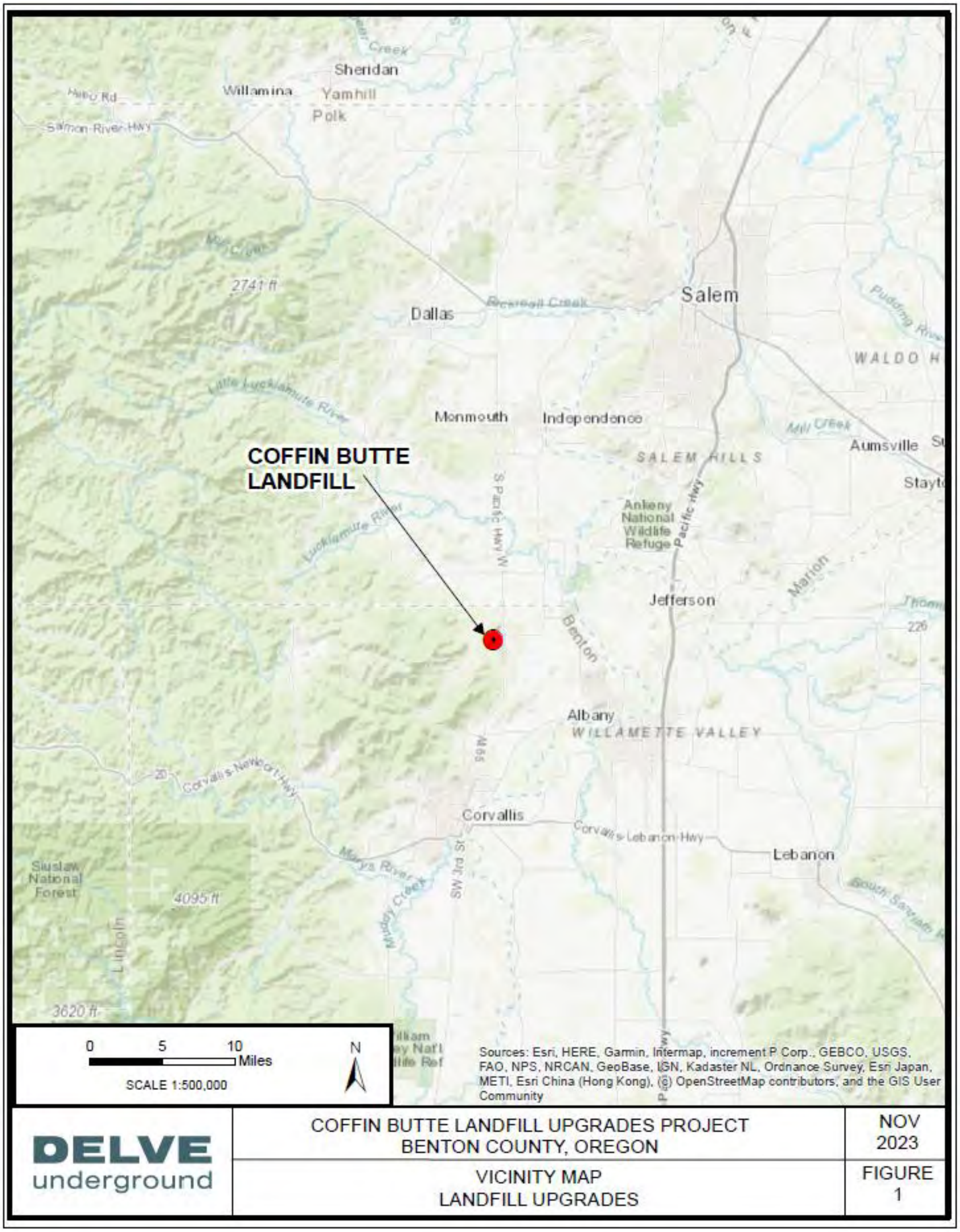

Figure 1. Vicinity map of project area.

1.2 Project Description

The Coffin Butte landfill is located in Oregon in the mid-Willamette Valley approximately 10 miles north of Corvallis, OR. Proposed upgrades to the landfill site include the construction of new landfill cells immediately south of the existing Coffin Butte Landfill. As part of the upgrade, the existing Coffin Butte Road is planned to be relocated to the south of the proposed landfill expansion area. From the intersection of Coffin Butte Road and NW Soap Creek Road, Coffin Butte Road is proposed to extend southeast, then east along the southern border of the expansion area before continuing northeast and north along the boundary of the expansion area to realign with the existing Coffin Butte Road. Construction of this reroute will include deep cuts into two separate bedrock knobs that will result in cut slopes in excess of 100-foot-high above the new road alignment. Locations of the proposed expansion area, preliminary grading plan, subsurface explorations, cross sections and Coffin Butte Road relocation provided by the Wallace Group are included in **Appendix A**.

The current cut slope geometry includes a 2 Horizontal to 1 Vertical (2H:1V) slope cut below the roadway and a 1.5H:1V cut slope above the proposed Coffin Butte Road. This memorandum summarizes our analysis, design, and recommendations regarding these proposed cuts as well as an evaluation of alternative cut angles to facilitate construction efforts and improve slope performance.

2.0 Geologic Setting

The site is located northwest of Albany, Oregon in the central portion of the Willamette Valley, an alluvial-filled structural basin located between the Oregon Coast Range and Cascade Range (Orr and Orr, 2012). Bedrock beneath the site consists of the Siletz River Volcanics, which are part of a chain of volcanic seamounts accreted to western North America during the Paleocene to early Eocene (approximately 60 million years ago) (Bela, 1979). The bedrock consists of a complex assemblage of pillow basalts with minor interbeds of tuffaceous claystone, siltstone and sandstone. The formation also includes flow breccias and coarse pyroclastic deposits. Both the east and west hillslopes at the site are underlain by this bedrock. A more complete discussion of the geologic setting and site history is contained in the project geotechnical engineering report completed by the Wallace Group (Wallace Group, 2023).

3.0 Site Exploration

3.1 Site Reconnaissance

A site reconnaissance was completed on September 29, 2021, by a senior engineering geologist from Delve Underground to inspect the project area and condition of exposed bedrock in the area. This included a reconnaissance of the existing rock quarry immediately west of the current Coffin Butte Landfill. Discontinuity mapping completed in the rock quarry was used to support the kinematic analysis for the proposed cut slope geometries.

In general, the discontinuities mapped were very persistent (greater than 30 feet in trace length) and typically filled with clay, sand, and gravel sized particles. The infilling was up to two inches in thickness. See Photographs 1 and 2 for typical exposures of mapped discontinuities. Conchoidal fractures associated with the basalt exposed in the rock quarry were not mapped.

Photograph 1. Typical steeply dipping joints in the existing Coffin Butte quarry.

Photograph 2. Steeply dipping joint trending subparallel to an existing cut face.

During the site reconnaissance, exposures of the existing soils on the eastern knob excavated for drill rig access were observed. These cuts generally consisted of silty to clayey gravels that were interpreted as shallow colluvium with decomposed bedrock near the base. Cuts were typically less than 5 foot high.

3.2 Field Exploration

A subsurface exploration program was completed in two phases due to changes in the landfill configuration during design. Wallace Group performed the subsurface exploration program for support of the project during the summer/fall of 2021 and 2022. The exploration program for the western hillslope included four borings (B-3, B-5, B-9 and B-15) which were advanced to depths of 111 feet, 131 feet, 70 feet and 165 feet and four test pits (TP-1, TP-12, TP-13 and TP-14). Four borings (B-7, BH-17, BH-18 and BH-19) and one CPT (GP/CPT-08) were drilled in the eastern hillslope. Borehole locations are shown on site plan in Appendix A.

Borings were advanced with mud rotary drilling techniques within soil material and HQ wireline, triple-tube rock coring techniques in rock materials in accordance with ASTM D 2113. Disturbed soil samples were collected in conjunction with Standard Penetration Testing (SPT) at selected intervals using a standard 2-inch diameter split-barrel sampler and automatic safety hammer system. In each test, the sampler was advanced 18 inches by dropping a 140-pound hammer, 30-inches for each strike in accordance with ASTM D1586. Details of the exploration program are presented in the Wallace Group geotechnical report (Wallace Group, 2023). Downhole imaging in explorations was not performed.

3.3 Lab Testing

Point load testing (PLT) was conducted on select samples from borings conducted during the 2021 investigation. Test results were used to estimate the approximate intact rock strength of the bedrock. PLT results are provided in **Appendix B**. The results of point load testing are discussed in greater detail below.

4.0 Site Conditions

4.1 Surface Conditions

The eastern and western hillslopes consist of two bedrock knobs located at the north end of a ridgeline in the Willamette Valley. The knobs extend over two hundred feet above the valley floor and are generally east, north and west facing. Slopes on these hillslopes vary between approximately 15 and 25 degrees with locally shallower sections. Indications of existing slope instabilities (scarps, pistol butt, or jack strawed trees) were not observed during the site reconnaissance. Signs of springs or seeps were not observed, however it was summer at the time of the site reconnaissance.

4.2 Subsurface Conditions

The materials encountered in the project explorations were grouped into three general stratigraphic units based on their geologic origin and stratigraphic position. General units include colluvial soil, weathered rock, and rock. Engineering properties of soil and rock appear to vary between the east and west half of the site based on relative density and composition (for soils) and rock type, weathering, and intact strength (for rock). Variations in subsurface conditions are likely to exist between borings. The following paragraphs describe the geotechnical unit characteristics in greater detail in context of cut slope considerations.

- **Colluvial Soil**: Colluvial soils mantle weathered rock and rock across the project area to depths of 5 to 25 feet with soils being thinner across the west slopes and thicker across the east slopes. Colluvial materials encountered included silty sands, clayey sands, and sandy silts. In the western hillslope, colluvial soils are present in the upper 5 to 10 feet of the subsurface and typically consist of reddish-brown, medium dense to very dense silty sands, clayey sands, and sandy silts. In the eastern hillslope, colluvial soils are present in the upper 20 to 25 feet of the subsurface and typically consist of very loose to medium dense clayey sand.

- **Weathered Rock**: Decomposed to highly weathered bedrock was encountered beneath the colluvial soils. This material was typically drilled and sampled with SPTs and often described as very dense gravels on logs. However, based on the observation that SPT tests generally encountered refusal, this material was interpreted as weathered bedrock. Typical unit thickness ranged between 3 and 7 feet.

Rock: Bedrock was encountered below the overlying soils and weathered bedrock in all borings. This unit consists primarily of fresh to highly weathered greenish gray basalt. The fresh basalt strength ranged from weak to strong. Highly weathered zones encountered were typically limited to isolated intervals only a few feet in extent. The basalt in the western hillslope was generally intensely brecciated with infilling of siltstone. The brecciation is interpreted as genetic, associated with the deposition of the basalt on seamount slopes where it often disaggregated into fragments surrounded by a silty matrix. For the purpose of this memorandum, this is referred to as a volcanic breccia. The basalt encountered in borings completed in the eastern hillslope was generally intact, with only isolated intervals of brecciation, and in general was composed predominantly of basalt with minor siltstone matrix. For the purpose of this memorandum, this is referred to as a basalt.

Point load tests (PLTs) on the basalt indicate an unconfined compressive strength (UCS) of generally 2,000 to 5,000 psi. PLT results from the siltstone matrix indicate UCS values ranging from approximately 200 to 1,000 psi.

Recovery and Rock Quality Designation (RQD) for borings BH-3, BH-5, BH-17, BH-18 and BH-19 are summarized in Table 1. RQD values indicate the rock quality is very poor to poor on the western hillslope and poor to fair on the eastern hillslope.

Table 1. Summary of Rock Core Recovery and RQD

Borehole	Recovery			RQD		
	Min	Max	Average	Min	Max	Average
Western Hillslope						
BH-3	48	100	87	0	75	47
BH-5	48	93	51	0	50	8
Eastern Hillslope						
BH-17	80	100	97	6	100	51
BH-18	95	100	100	30	80	60
BH-19	61	100	95	4	73	34

4.3 Groundwater

The project subsurface explorations did not encounter groundwater in the western hillslope except for BH-15 where groundwater was encountered at 5 feet below ground surface. In addition, information provided by Civil & Environmental Consultants (CEC) indicates groundwater in the vicinity of this area is relatively shallow, at least seasonally. Groundwater was encountered in eastern hillslope borings BH-17, BH-18 and BH-19 at depths of approximately 16, 25, and 18 feet below ground surface (bgs), respectively.

5.0 Kinematic Analysis

When the face of a rock mass is exposed in a rock cut confining pressure is relieved and the potential exists for blocks created by natural discontinuities in the rock mass to fall out of the slope. These block failures result in safety hazards and maintenance issues. A kinematic analysis compares mapped discontinuities in the rock mass with proposed cut slope orientations to determine the potential of blocks to fail out of the proposed slope.

Project specific discontinuity orientation data was used to perform a kinematic assessment of how potential blocks formed by joints and fractures in the rock will behave when the rock mass is disturbed by a slope cut, and whether the proposed cut slope will be stable or will result in blocks created by discontinuities sliding or falling out of the slope. In the majority of designed cut slopes, blocks predominantly fail by planar sliding or wedge sliding.

5.1 Joint Sets

The mapped rock discontinuity data (consisting of 45 joint orientations) were plotted on a stereonet in the RocScience software program Dips in order to visualize the rock mass discontinuities in two dimensions. Analysis of clustering of discontinuity data suggests two prominent joint set orientations with the following orientations (dip/dip direction):

- Joint Set 1: 76/226
- Joint Set 2: 65/336

The resulting stereonet is provided in **Appendix B**.

5.2 Markland Analysis

Delve utilized the Markland Analysis technique with mapped joint orientations and an estimated rock mass peak friction angle to study the kinematic stability of the overall rock mass with respect to the proposed cut slope orientation. Where the stability of a rock slope is controlled by the structure of the rock mass, Markland Analysis is a well-documented and widely accepted design tool used to evaluate the rock slope stability relative to a proposed cut inclination (Hoek and Bray, 1981 and FHWA, 1998). The RocScience computer program Dips was used for this analysis to analyze the potential for planar and wedge sliding failures. It should be noted that Markland Analysis is a tool for evaluating the potential for specific modes of failure but does not directly calculate factors of safety.

For analysis, peak friction angle of the basalt rock mass was assumed to be 33° based observations of joint conditions and previous experience in similar basalt material. Kinematic stability was analyzed at four different cut slope orientations, as shown in Table 1.

Table 1. Analyzed cut slope orientations.

Slope Orientation	Cut Slope Angle	Slope Cut Direction	Notes
#1	63°	010°	Approx. 1/2H:1V NNE facing slope
#2	63°	355°	Approx. 1/2H:1V NNW facing slope
#3	53°	010°	Approx. 3/4H:1V NNE facing slope
#4	53°	355°	Approx. 3/4H:1V NNW facing slope

5.2.1 Results

Stereonet outputs resulting from the Markland Analysis are provided in **Appendix C** and a summary of results is provided in this section.

Analysis suggests that the kinematic potential for planar sliding and wedge sliding is moderate at Slope Orientations #1 and #2 (cut slope angles of 63°) and low at Slope Orientations #3 and #4 (cut slope angles of 53°). Based on these results, we recommend that the slope is not cut steeper than 53° (approx. 0.75H:1V).

If the slope is cut at a steeper angle than 53° there exists the potential for planes and wedges formed by discontinuities in the rock mass to become unstable and slide out of the cut slope, resulting in potential failure during construction or ongoing rockfall which could impact operations below the cut slope. If cut at an inclination greater than 53 degrees, potentially unstable wedges and planes would likely need to be reinforced using rock anchors, increasing project cost. By cutting the slope at 53-degrees, the number of kinematically viable blocks created will be significantly reduced. Limited rock reinforcement, scaling, and rockfall mitigation (ditch or mesh) may be still required for a 53-degree cut slope and are discussed further in Section 7.0.

6.0 Limit Equilibrium Analysis

Kinematic analysis considers failure of blocks or masses of rock that have potential to fail along discontinuities in the rock mass but does not consider the global stability of the cut. To address the potential for larger scale shear failure through the rock mass, or failure through colluvial material at the brow of the slope, 2D limit equilibrium analysis was performed using the RocScience computer program SLIDE2. A limit equilibrium analysis considers all the forces driving a slope failure (mainly gravity) and the forces resisting a slope failure (mainly shear strength of the slope material) to assess the factor of safety of the slope. In addition to dry conditions, slope stability was analyzed under wet and seismic conditions where reduction of effective shear strength or external horizontal loading could potentially affect site conditions.

For limit equilibrium analysis, a factor of safety of 1.0 indicates that the forces driving a failure and the forces resisting a failure are equal, and the slope is near a state of failure. A factor of safety greater than 1.0 suggests the slope is stable, and a factor of safety less than 1.0 suggests the slope is prone to displacement or theoretically should have already failed. Generally, a factor of safety greater than 1.3 is considered allowable for permanent slopes affecting the general public (Oregon GDM, 2023). Transient groundwater and seismic loads were also considered and minimum factors of safety of 1.1 and 1.0, respectively, were considered acceptable. Assumptions and methods of limit equilibrium analysis are provided in the following sections.

6.1 Slope Geometry

Construction of 2D limit equilibrium model geometry was based on topographic and cross-section information provided by the Wallace Group (**Appendix C**). To evaluate the tallest cut sections among the provided data for cut slope analysis, Section B-B’ and D-D’ were chosen to represent the west and east slopes, respectively.

Configuration of ground surfaces for modelled sections B-B’ and D’-D’ (constructed to represent recommended cut slope inclinations) assumed the following:

- Slope of 2H:1V below the roadway.
- Slope of 0.75H:1V in rock and weathered rock above the roadway.
- Slope of 1.5H:1V to 2H:1V Slope inclinations at the brow of the slope where colluvium soil is encountered. Inclination varies between the east and west cuts depending on soil conditions anticipated based on results of exploration.

Representation of ground conditions at depth, particularly geologic unit boundaries, were constructed based upon lateral projection of adjacent borehole information for each cross section. Section B-B’ was influenced most by explorations BH-03, BH-05, and BH-15. Section D-D’ was influenced most by explorations BH-17 and BH-19. Geologic sections were constructed such that depths of unit transitions were consistent with observations in nearby explorations. Between and outside available borehole locations (along the profile) geologic interpretations were made assuming simple linear relationships across the project area, continuity of unit thicknesses or trends in thickness, and general tendency for the soil-weathered rock-rock profile to roughly parallel the existing surface topography. Model construction of the geologic profile at depth influenced the surface construction as material type and assumed unit-boundary locations influenced cut inclination transitions. In particular the interpreted boundary between soil and weathered rock dictated where the cut-slope transitions from 0.75H:1V to (1.5 - 2.0) H:1V inclination. Because of the assumptions made and variation in subsurface conditions, representation of subsurface geometry along the height of the cut should be considered approximate.

6.2 Material Strengths

Strength of soils was represented using Mohr-Coulomb criterion which includes modelling of soil strength using a frictional and cohesive component. Values selected for friction and cohesion for each unit were based on relative density of material encountered during exploration and lab tests regarding material composition. Strength of weathered rock and rock was represented using the Generalized Hoek-Brown criterion based on estimated values for unconfined compressive strength (UCS), geologic strength index (GSI) and assumed equation constants (such as the Hoek-Brown constant M_i) based on published values corresponding to rock type. For rock material strength estimates, UCS values were based on point-load testing performed on samples collected during exploration activities.

Material properties assumed for limit equilibrium analysis of Section B-B' (West Slopes) and D-D' (East Slopes) are summarized in Tables 2 and 3.

Table 2. Assumed material properties for geologic materials for Section B-B' (West Slopes).

Geologic Unit	Unit Weight	Strength Model	Friction Angle	Cohesion	UCS	GSI
Soil (Colluvium)	125 pcf	Mohr-Coulomb	34°	100 psf	-	-
Weathered Rock	165 pcf	Generalized Hoek-Brown	-	-	30,000 psf	30
Volcanic Breccia	170 pcf	Generalized Hoek-Brown	-	-	200,000 psf	45

Table 3. Assumed material properties for geologic materials for Section D-D' (East Slopes).

Geologic Unit	Unit Weight	Strength Model	Friction Angle	Cohesion	UCS	GSI
Soil (Colluvium)	125 pcf	Mohr-Coulomb	30°	150 psf	-	-
Weathered Rock	165 pcf	Generalized Hoek-Brown	-	-	30,000 psf	30
Basalt	175 pcf	Generalized Hoek-Brown	-	-	480,000 psf	55

6.3 Groundwater Conditions

Groundwater was assumed present in the bedrock based on the results of the subsurface investigation and information provided by CEC. In addition, a perched groundwater condition was evaluated to account for potential transient groundwater surcharge in colluvium and weathered rock related to high rainfall events. This was modeled as a perched groundwater condition atop the bedrock such that the weathered rock was fully saturated and the overlying colluvium was approximately 30-50% saturated in relation to unit thickness. Groundwater conditions within the bedrock were modeled by assuming saturated conditions in the bedrock and the perched groundwater condition. Dry conditions were also modeled.

6.4 Seismic Loading Parameters

Seismic loading criteria for the project were developed by the Wallace Group and include a peak ground acceleration of 0.55g at locations where rock cuts are anticipated. This was incorporated into the slope stability modeling as an external pseudo-static horizontal load condition equivalent to approximately half the PGA. This method of representing seismic forces imparted on a slope is industry standard for limit equilibrium stability modelling (Wyllie, 2018). The pseudo static horizontal load was modelled at 0.25g.

6.5 Results

Results of the limit equilibrium analysis suggest stable conditions at the following cut inclinations or shallower:

- Volcanic Breccia and Basalt: 0.75H:1V
- Weathered Rock: 0.75H:1V
- Colluvium soils (West): 1.5H:1V
- Colluvium Soils (East): 2H:1V

Calculated factors of safety for dry conditions, wet conditions, and seismic conditions are presented in Table 4. Printouts of the produced models can be found in **Appendix D**. The eastern hillslope colluvial soils were also modeled assuming a steeper 1.5H:1V slope however the resultant factors of safety did not meet the design criteria.

Table 4. Summary of Limit Equilibrium Modelling Results

Section	Dry Condition	Wet Condition	Seismic Scenario
B-B’	1.8 G	1.7 C	1.2 C
D-D’	1.8 C	1.6 C	1.1 C

*G (Global) indicates minimum factor of safety surface extended from the bottom to top of slope
**C (Colluvium) indicates minimum factor of safety surface was limited to soil and weathered rock. Factor of safety for failure through bedrock was higher.
***Wet condition was not included in the seismic scenario

As stated at the end of Section 5.0 and beginning of 6.0, this analysis considers global stability. Individual blocks of rock or raveling of colluvial material from the brow of the slope may still be a limited hazard at the proposed cut inclinations. Section 7.0 below discusses potential measures that can be taken to manage potential rockfall risks.

7.0 Rockfall Mitigation

As the cut slope is constructed, the fractured nature of the rock mass will lead to relatively small blocks being created in the exposed cut slope. Over the design life of the cut, these blocks will represent a continued source of potential rockfall from the cut face. This rockfall hazard can be mitigated through a combination of scaling, rock reinforcement, construction of a catchment ditch at the toe of the slope and installing a draped mesh over the slope.

7.1 Scaling

Scaling involves mechanically removing unstable blocks from the cut slope face either by hand or with equipment. Removing the blocks in a controlled construction environment reduces the amount of loose material on the slope and thereby reduces the rockfall hazard. This is usually the first step in rockfall mitigation and also serves to improve site safety. However, depending on the erosion and weathering rate of on-slope material, it is not typically effective as a long-term solution as a sole means and method for addressing rockfall.

7.2 Catchment Ditch

A catchment ditch constructed at the base of the cut slope serves as an area for any small falling rocks to collect in a safe area without impacting the roadway. A catchment ditch for rockfall purposes typically consists of a mono-sloped ditch, dipping away from the roadway towards the slope, constructed at a 6H:1V or 4H:1V inclination. Typical ditch construction is usually intended to capture approximately 90% of rockfall.

For an 80-foot-tall slope cut at a 0.75H:1V slope inclination, the ditch width required to catch 90% of rockfall (assume ditch inclination of 4H:1V) would be approximately 26 feet. For a 6H:1V ditch configuration the ditch would need to be approximately 31 feet wide (Pierson et al., 2001). Because slope heights across the east and west slopes are planned in excess of 90-100 feet at some locations, ditch widths greater than approximately 30 feet would likely be required to catch 90% of rockfall if using ditch catchment as the sole means of rockfall management. However, ditch widths on the order of 10 feet can be used if a drape mesh is applied to the slope to guide rockfall into the catchment ditch. Drape mesh application is discussed in the following section.

It should also be noted that depending on rockfall severity, the catchment ditch will require periodic maintenance visits to clear the ditch of fallen rocks and maintain its effectiveness. The frequency of required catchment ditch cleaning typically varies from annually at high volume rockfall slopes to every 5 or 10 years at low volume rockfall slopes.

7.3 Drape Mesh

Drape mesh installed over rock slopes guides ongoing rockfall from source areas on the slope into a catchment ditch, effectively reducing the impact of rockfall on roadway operations and reducing the required ditch width. Drape mesh is constructed by installing ground anchors across the brow of the slope and hanging the mesh on a top cable that spans the horizontal length of the brow of the slope. Typically mesh coverage extends 5-10 feet back from the brow and extends down to 5-10 feet above the bottom of ditch. In the case of cut slopes for this project, it would be recommended that mesh be hung 10 feet back from the brow to cover colluvium material near the edge of the 0.75H:1V slope and extend to approximately 10 feet above bottom of ditch to allow for easy ditch cleanout.

7.4 Rock Reinforcement

Depending on the type of material used, drape mesh can contain blocks measuring 2-5 feet in diameter. If there are blocks on the slope larger than what the mesh can contain and that cannot be scaled, rock reinforcement may be used to pin the blocks in place. This involves drilling 3–4-inch diameter holes through the blocks and into the stable backslope, inserting a steel bar, and grouting the bar in place to effectively hold the unstable block in place. Considering that the planned cut slopes of 0.75H:1V effectively cut away the potential for sliding on the steeper persistent joints noted in the rock mass, the quantity of rock reinforcement elements would likely be limited and the length of elements would likely be limited to 10-20 feet.

It is difficult to quantify how much slope reinforcement may be needed until blasting, excavation, and scaling have been completed. However, because reinforcement of individual blocks would be primarily for rockfall management, rather than global stability, reinforcement efforts would likely be limited and sporadic assuming limited overbreak or ground disturbance from controlled blasting operations.

8.0 Construction Considerations

8.1 Blasting

Blasting associated with rock excavation will require a detailed specification to support the project. Blasting considerations that should be evaluated include minimizing fly rock, blast vibrations, and air blast. Specifications should consider the requirement of a blasting consultant on the contractor team.

8.2 Inspection

Based on our kinematic analysis, the potential for failure of the rock slope due to planar or wedge failure is considered low. However, it is possible that localized, random unmapped joints and fractures in the rock mass can create unstable blocks. Therefore, we recommend that a qualified geotechnical engineer or engineering geologist be on site during bench excavation construction to observe the slope for persistent joints inclined at 0.75H:1V inclinations or less that have the potential to daylight the slope and lead to block failures during excavation. If instabilities are observed, mitigation options consisting of rock reinforcement or additional excavation can be explored to maintain a safe site.

8.3 Rockfall Management

It is recommended that scaling of the rockslope be performed periodically during construction to remove loose blocks from the slope. If cutting the slopes at a 0.75H:1V inclination, it is recommended that drape mesh be installed over the slope and a 10-foot-width ditch be constructed at the base of the slope. It is also recommended to maintain funds for limited amounts of steel bar rock reinforcement installation.

9.0 Closure

This report was prepared for the exclusive use of the Wallace Group, Inc. in conjunction with the Coffin Butte Landfill Upgrades Project. Our conclusions and recommendations are based on our interpretation of the information from the geotechnical exploration and analyses, as well as our professional experience and judgment.

In the performance of geotechnical work, specific information is obtained at specific locations at specific times, and geologic conditions can change over time. It should be acknowledged that variations in rock and soil conditions may exist between exploration and exposed locations and this report does not necessarily reflect variations between different explorations. The nature and extent of variation may not become evident until construction.

This report was completed within the limitations of the approved scope of work, schedule, and budget. The services rendered have been performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same area. Delve Underground is not responsible for the use of this report in connection with anything other than the project at the location described above.

DELVE UNDERGROUND

Jamie Schick

Jamie Schick, CEG, LEG, LHG
Senior Associate

Luke Ferguson, PE
Project Engineer

10.0 References

Bela, James, (1979). *Geologic Hazards of Eastern Benton County, Oregon, Oregon Department of Geology and Mineral Industries*, Bulletin 98.

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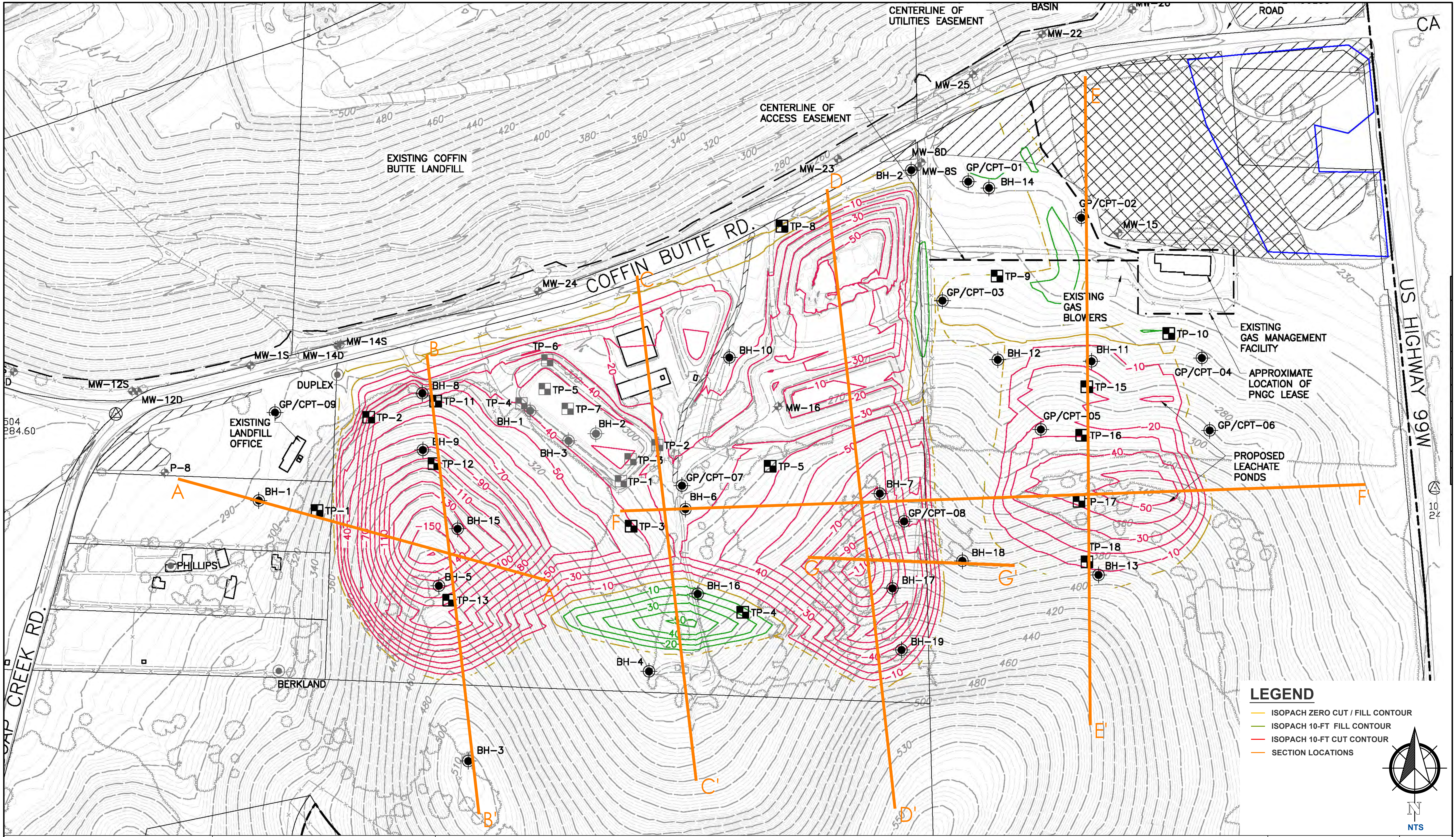
Wyllie, D.C., 2018. Rock Slope Engineering, Section 11.6.2, 306-307pp. CRC Press.

Appendix A: Site Grading Plan and Cross Sections Provided by the Wallace Group

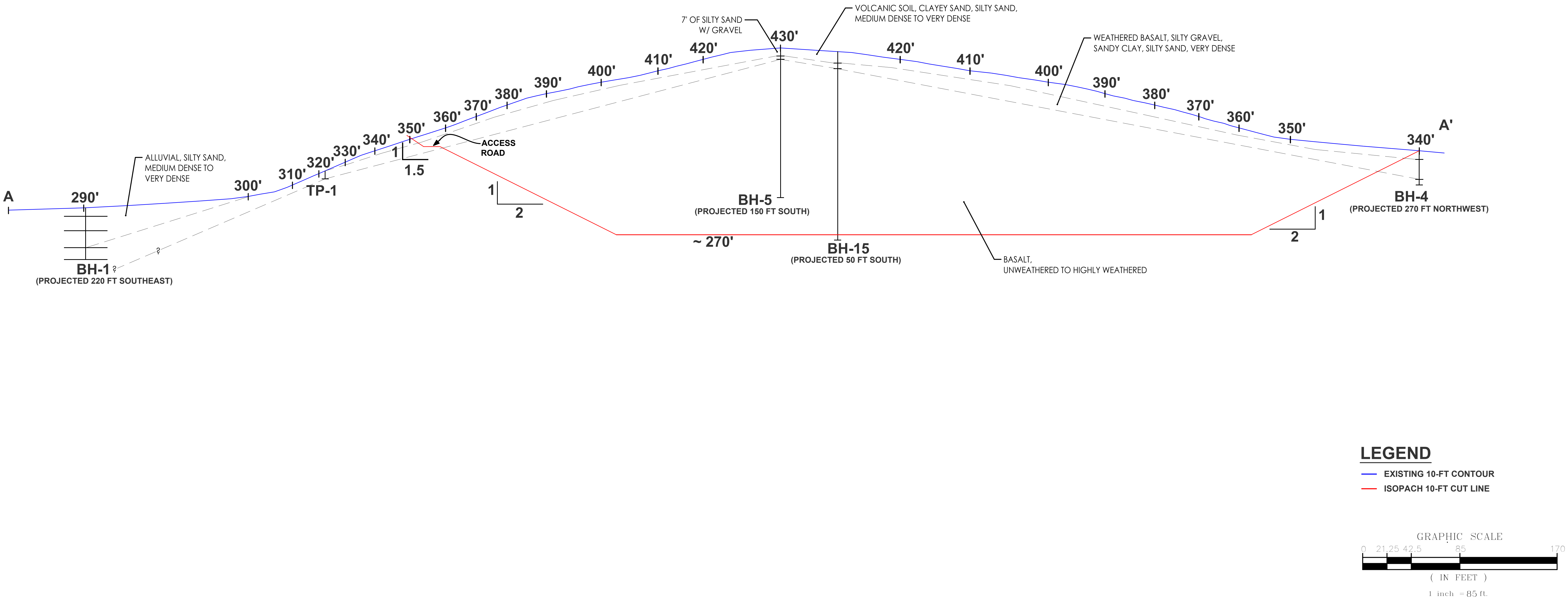


WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

SECTION LOCATION MAP
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: July 31, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_8.DWG

FIGURE
8

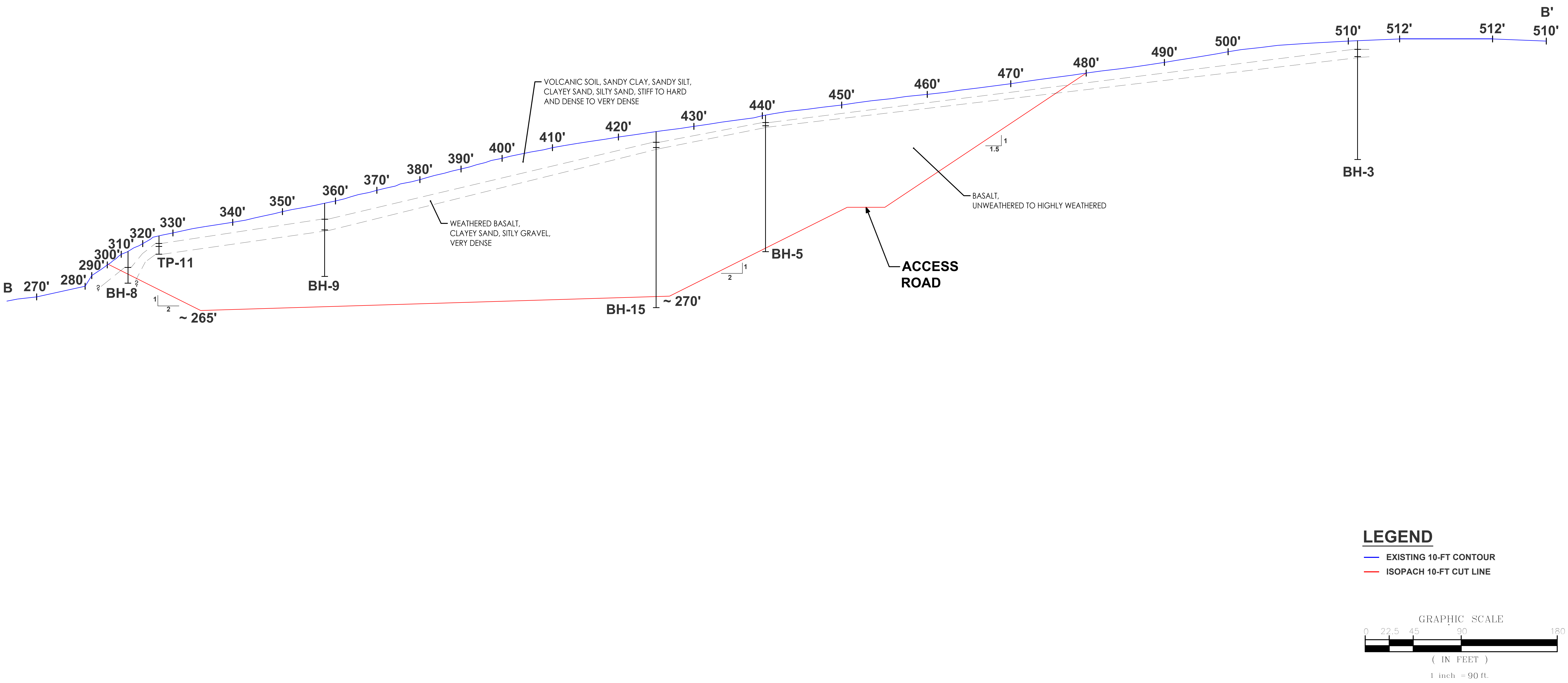


WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION A-A'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	April 1, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	23050 (1)_FIGURE_1.DWG

FIGURE
1

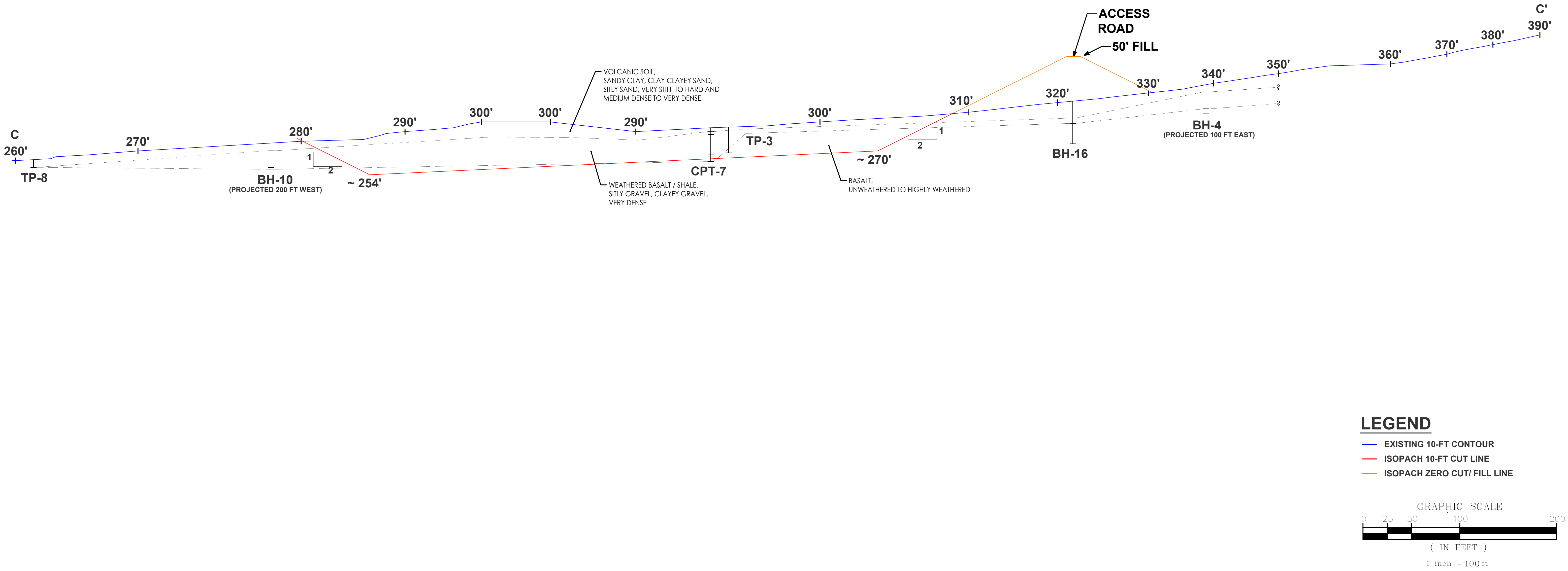


WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION B-B'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	April 1, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	
23050 (1)_FIGURE_2.DWG	

FIGURE
2

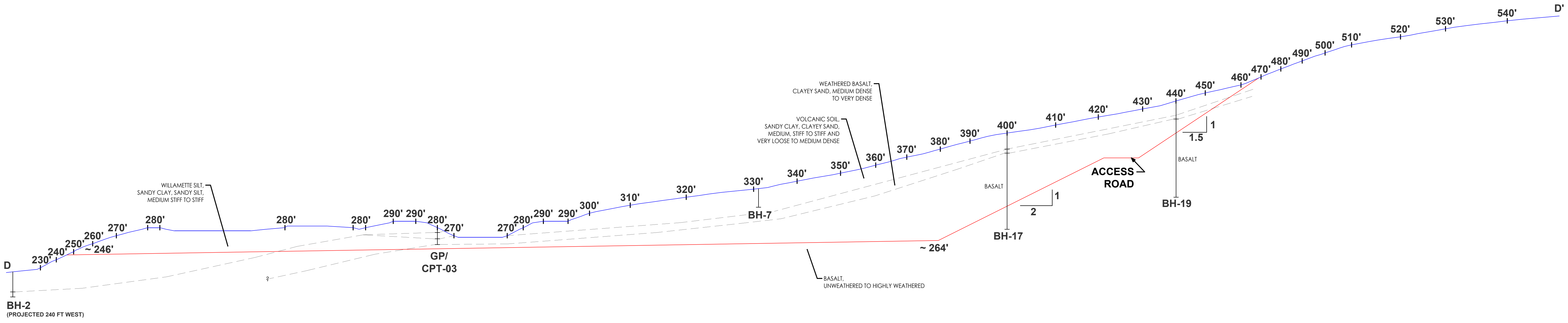


WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION C-C'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	April 1, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	23050 (1)_FIGURE_3.DWG

FIGURE
3



LEGEND

- EXISTING 10-FT CONTOUR
- ISOPACH 10-FT CUT LINE

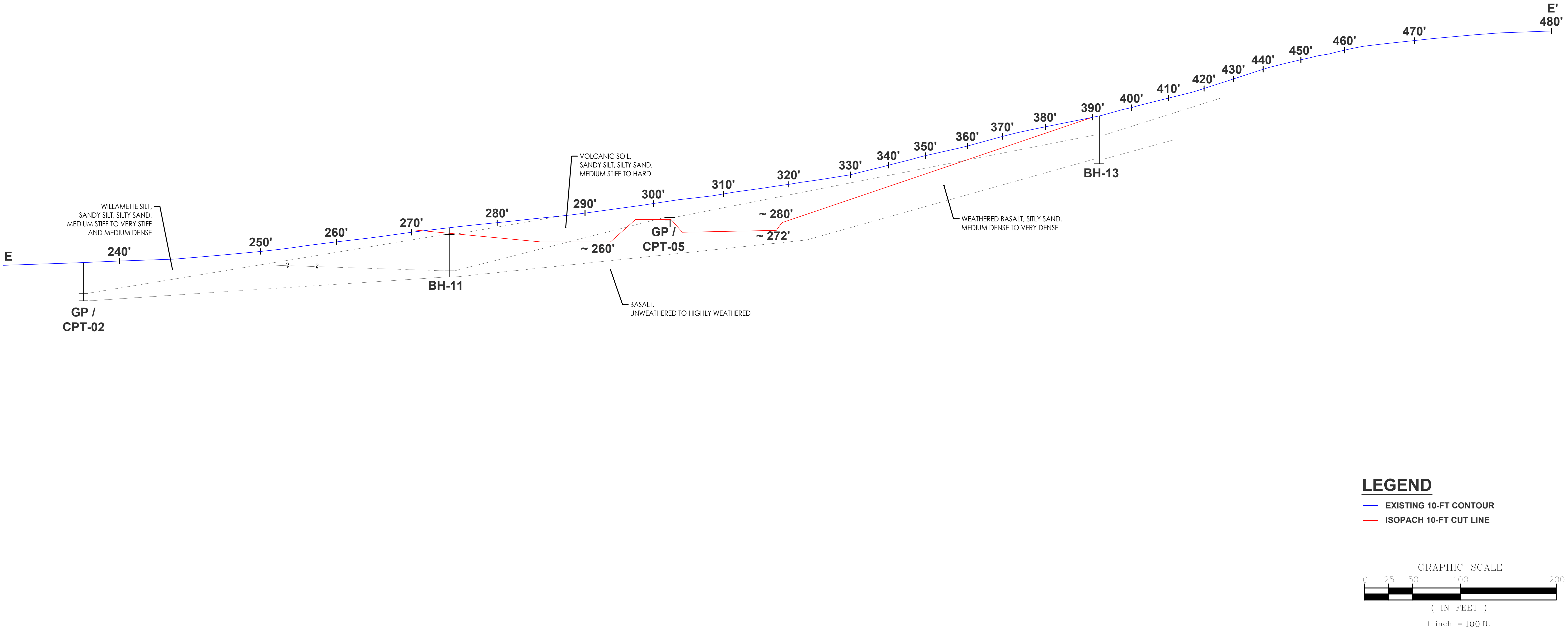
GRAPHIC SCALE
0 30 60 120 240
(IN FEET)
1 inch = 120 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION D-D'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.: 23050 (1)
DRAWN: June 5, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_4.DWG

FIGURE
4

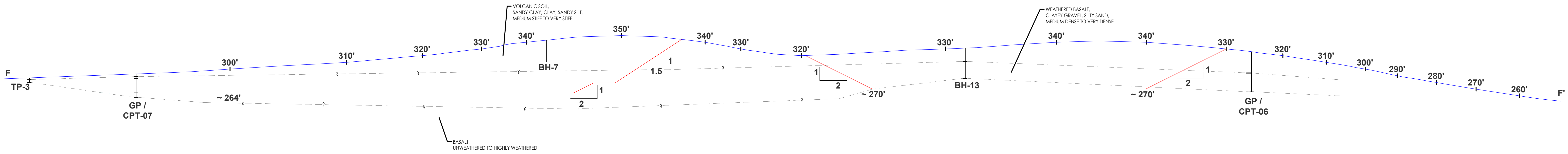


WALLACE GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION E-E'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

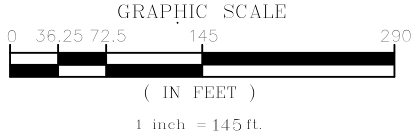
PROJECT No.: 23050 (1)
DRAWN: June 5, 2023
DRAWN BY: DTJ
CHECKED BY: LS
FILE NAME:
23050 (1)_FIGURE_5.DWG

FIGURE
5



LEGEND

- 🟦 EXISTING 10-FT CONTOUR
- 🟥 ISOPACH 10-FT CUT LINE

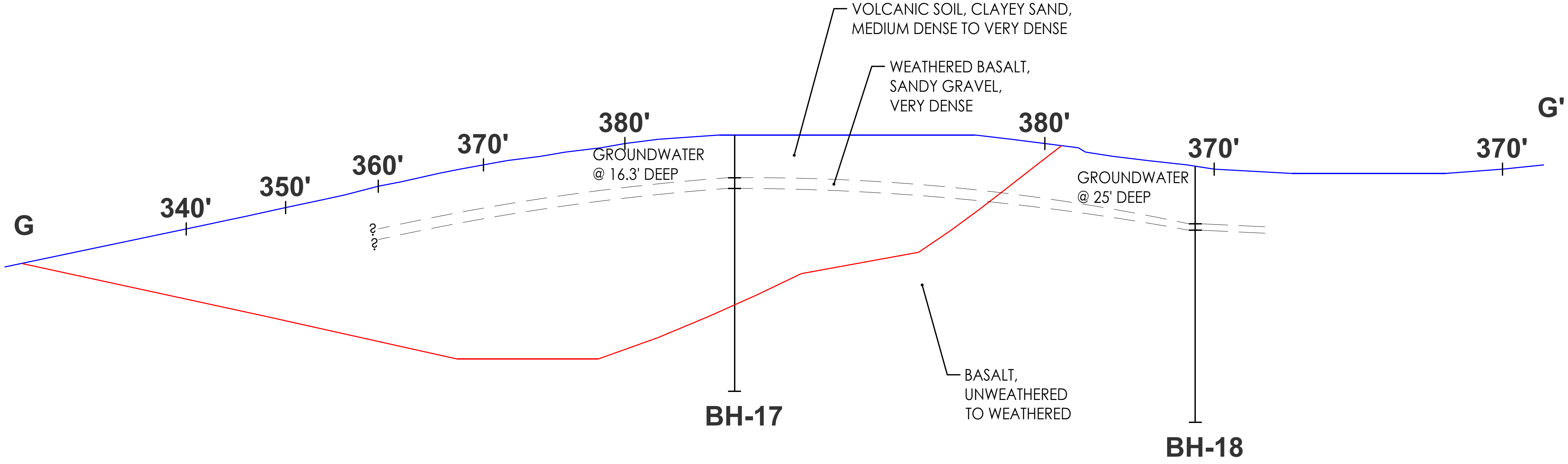


WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION F-F'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	April 1, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	23050 (1)_FIGURE_6.DWG

FIGURE
6



LEGEND

―	EXISTING 10-FT CONTOUR
―	ISOPACH 10-FT CUT LINE

GRAPHIC SCALE

0 15 30 60 120

(IN FEET)

1 inch = 60 ft.

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

CROSS-SECTION G-G'
VALLEY LANDFILL INC.
COFFIN BUTTE LANDFILL
CORVALLIS, OREGON

PROJECT No.:	23050 (1)
DRAWN:	July 10, 2023
DRAWN BY:	DTJ
CHECKED BY:	LS
FILE NAME:	23050 (1)_FIGURE_7.DWG

FIGURE
7

Appendix B: Point Load Testing Results

SUMMARY OF POINT LOAD TEST

PROJECT: Coffin Butte
PROJECT NO.: 6309.0
PROJECT LOCATION: Corvallis, Oregon
SAMPLED BY:
DATE SAMPLED:

LAB SAMPLE NO.: NA
SAMPLE NO.: NA
SAMPLE DESCRIP.: NA
DATE PLT TESTED: 11/15/2021
PLT TESTED BY: J. Siemens, J. Schick

TEST NOTES: All tests were diametral unless noted.
All samples were not moisture controlled.

Borehole ID	Depth (ft)	Test Number	Rock Type**	Depth or Diameter, D (mm)	D' (mm)	ΔD/D, penetration ratio (%)	Failure Load, P (kN)	Failure Load, P (N)	De^2 (mm^2)	Equivalent Diameter, De (mm)	Uncorrected Point Load Strength Index, I_s (Mpa)	Uncorrected Point Load Strength Index, I_s (PSI)	Size Correction Factor, F	Corrected Point Load Strength Index, $I_{s(50)}$ (Mpa)	Corrected Point Load Strength Index, $I_{s(50)}$ (PSI)	Estimated Uniaxial Compressive Strength, UCS (Mpa)*	Estimated Uniaxial Compressive Strength, UCS (PSI)*	Test Validation (Valid/Invalid)	Comments
9	57.0	1	Basalt	59.5	57.5	3	13.00	13000	3421	58.5	4	551	1.07	4.1	591	97.9	14194	Invalid	Followed Fractures on core axis
9	69.0	2	Breccia	59.5	56.0	6	0.95	950	3332	57.7	0	41	1.07	0.3	44	7.3	1059	Invalid	Fracture through matrix
9	43.5	3	Breccia	59.0	57.0	3	0.57	570	3363	58.0	0	25	1.07	0.2	26	4.3	631	Invalid	Fracture through matrix
9	45.5	4	Breccia	59.5	58.0	3	1.30	1300	3451	58.7	0	55	1.08	0.4	59	9.7	1410	Invalid	Fracture through matrix
9	35.0	5	Siltstone	58.5	55.0	6	0.42	420	3218	56.7	0	19	1.06	0.1	20	3.3	481	Valid	
9	26.0	6	Breccia	60.5	56.5	7	0.32	320	3418	58.5	0	14	1.07	0.1	15	2.4	350	Invalid	Followed Fractures on core axis
5	11.0	7	Breccia	59.0	57.0	3	0.84	840	3363	58.0	0	36	1.07	0.3	39	6.4	929	Invalid	Fracture through matrix
5	30.0	8	Breccia	59.5	57.0	4	0.93	930	3392	58.2	0	40	1.07	0.3	43	7.0	1022	Invalid	Fracture through matrix
5	47.0	9	Basalt	45.0	39.5	12	2.94	2940	1778	42.2	2	240	0.93	1.5	222	36.8	5332	Invalid	Clast, non-diametral
5	61.0	10	Breccia	59.5	57.0	4	0.30	295	3392	58.2	0	13	1.07	0.1	14	2.2	324	Invalid	Fracture through matrix
5	90.0	11	Basalt	59.5	57.5	3	16.50	16500	3421	58.5	5	699	1.07	5.2	751	124.2	18016	Valid	
5	105.0	12	Breccia	59.5	57.0	4	0.34	340	3392	58.2	0	15	1.07	0.1	16	2.6	374	Invalid	Fracture through matrix
5	119.5	13	Siltstone	59.5	57.5	3	0.97	970	3421	58.5	0	41	1.07	0.3	44	7.3	1059	Valid	
5	125.0	14	Breccia	59.5	58.0	3	1.41	1410	3451	58.7	0	59	1.08	0.4	64	10.5	1529	Valid	
5	127.0	15	Breccia	59.5	58.0	3	1.11	1110	3451	58.7	0	47	1.08	0.3	50	8.3	1204	Valid	
9	57.0	16	Basalt	38.0	35.5	7	3.40	3400	1349	36.7	3	366	0.87	2.2	318	52.6	7636	Invalid	Clast, non-diametral
3	21.5	17	Siltstone	59.0	56.5	4	0.56	560	3334	57.7	0	24	1.07	0.2	26	4.3	624	Valid	
3	28.5	18	Breccia	59.0	57.0	3	4.86	4860	3363	58.0	1	210	1.07	1.5	224	37.1	5377	Valid	Fracture through clast
3	32.5	19	Breccia	59.5	57.0	4	2.09	2090	3392	58.2	1	89	1.07	0.7	96	15.8	2297	Valid	Fracture through clast
3	36.5	20	Siltstone	59.5	55.5	7	0.24	235	3302	57.5	0	10	1.06	0.1	11	1.8	264	Invalid	
3	47.5	21	Siltstone	59.5	58.0	3	0.41	405	3451	58.7	0	17	1.08	0.1	18	3.0	439	Invalid	
3	60.0	22	Basalt	59.5	58.5	2	0.23	230	3481	59.0	0	10	1.08	0.1	10	1.7	248	Invalid	Followed Fractures on core axis
3	67.0	23	Breccia	59.5	52.5	12	2.10	2100	3124	55.9	1	98	1.05	0.7	103	17.0	2460	Invalid	Fracture through clast
3	73.0	24	Siltstone	59.0	57.5	3	0.43	430	3393	58.2	0	18	1.07	0.1	20	3.3	473	Valid	
3	85.0	25	Breccia	59.5	57.5	3	0.62	620	3421	58.5	0	26	1.07	0.2	28	4.7	677	Invalid	
3	79.0	26	Siltstone	59.0	57.5	3	0.43	430	3393	58.2	0	18	1.07	0.1	20	3.3	473	Valid	
3	87.0	27	Siltstone	59.0	52.5	11	0.83	830	3098	55.7	0	39	1.05	0.3	41	6.7	979	Valid	
3	105.0	28	Breccia	59.0	54.5	8	2.83	2830	3216	56.7	1	128	1.06	0.9	135	22.4	3242	Invalid	No fracture, penetration
3	105.0	29	Breccia	59.5	56.5	5	2.95	2950	3362	58.0	1	127	1.07	0.9	136	22.5	3265	Valid	
3	103.0	30	Siltstone	59.0	56.5	4	0.20	200	3334	57.7	0	9	1.07	0.1	9	1.5	223	Valid	
3	108.0	31	Breccia	59.5	58.0	3	0.59	590	3451	58.7	0	25	1.08	0.2	27	4.4	640	Valid	

Notes: * Estmated UCS was calculated using an estimated correlation factor (C) of 24

Assumed C* 24.0

Number of total breaks:	31
Number of basalt breaks	5
Number of breccia breaks	17
Number of siltstone breaks	9

CALCULATIONS (ASTM D5731)

Uncorrected Point Load Strength *

$I_s = P / De^2$

I_s = Point load strength index, Mpa

P = failure load, N

$De^2 = D^2$, for diametral core tests without platen penetration, mm^2

$De^2 = 4A/\pi$ for axial, block, and lump tests, mm^2

*For D = 50mm, if D is not equal to 50 mm, use size corrected point load index below.

D' = final separation of the loading points with significant platen penetration, mm

De = equivalent core diameter, mm

$De^2 = 4/\pi$ W x D' for block, and lump shapes with platen penetration, mm^2

$De^2 = D$ x D' for cores with platen penetration, mm^2

Where:

A = WD = minimum cross-sectional area of a plane through the platen contact points

Size Corrected Point Load Index

$I_{s(50)} = k_{PLT} \times I_s$

$k_{PLT} = (De / 50)^{0.45}$

$I_{s(50)}$ = size-corrected point load strength index

k_{PLT} = size correction factor

C Value

$\sigma_c = C \times I_{s(50)}$

σ_c = uniaxial compressive strength (UCS)

C = C-value, correlation value

The uniaxial compressive strength, σ_c, is related to the point load index, $_{s(50)}$, by what is commonly referred to as the C-Value, which is a site specific value

The C-Value relating to a site is found by plotting the LAB Unconfined Compressive strengths (UCS) vs. the corrected Point Load ($I_{s(50)}$) data.

If no correlation, a generalized C-value can be used, C = 24.

This procedure is only used to correct FIELD point load test data. Laboratory data will already provide UCS values. However, the lab UCS and PLT data is used to find the C-Value.

Reducing data

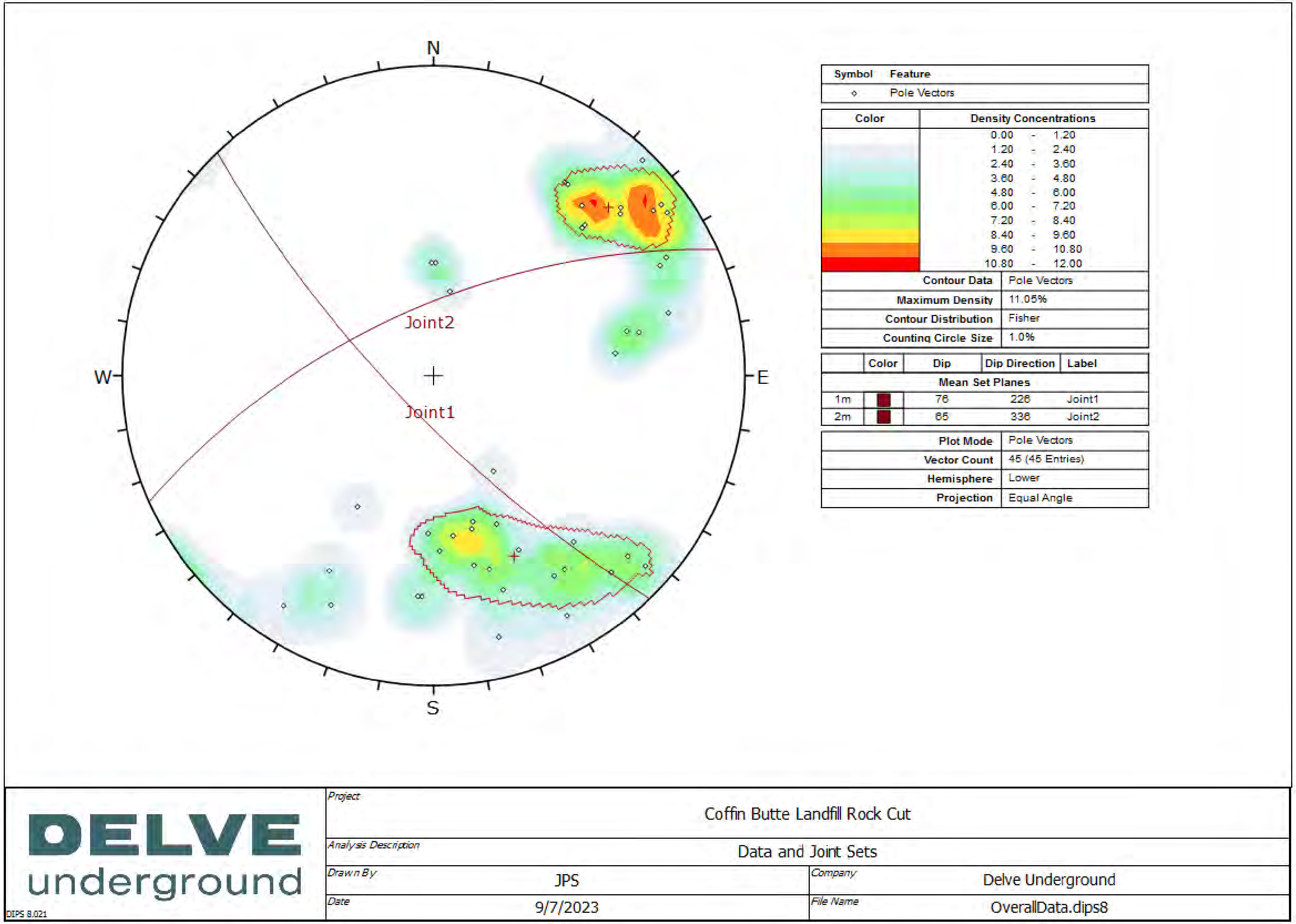
Find the minimum and maximum values and delete. ASTM calls for 2 lowest and 2 highest values to be deleted (data set choice).

Average the rest of the values for the set to get Is(50) and UCS.

Calculations further explained in FHWA-IF-02-034 and ISRM RTH 325-89.

Appendix C: Stereonet and Kinematic Results

Overall Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

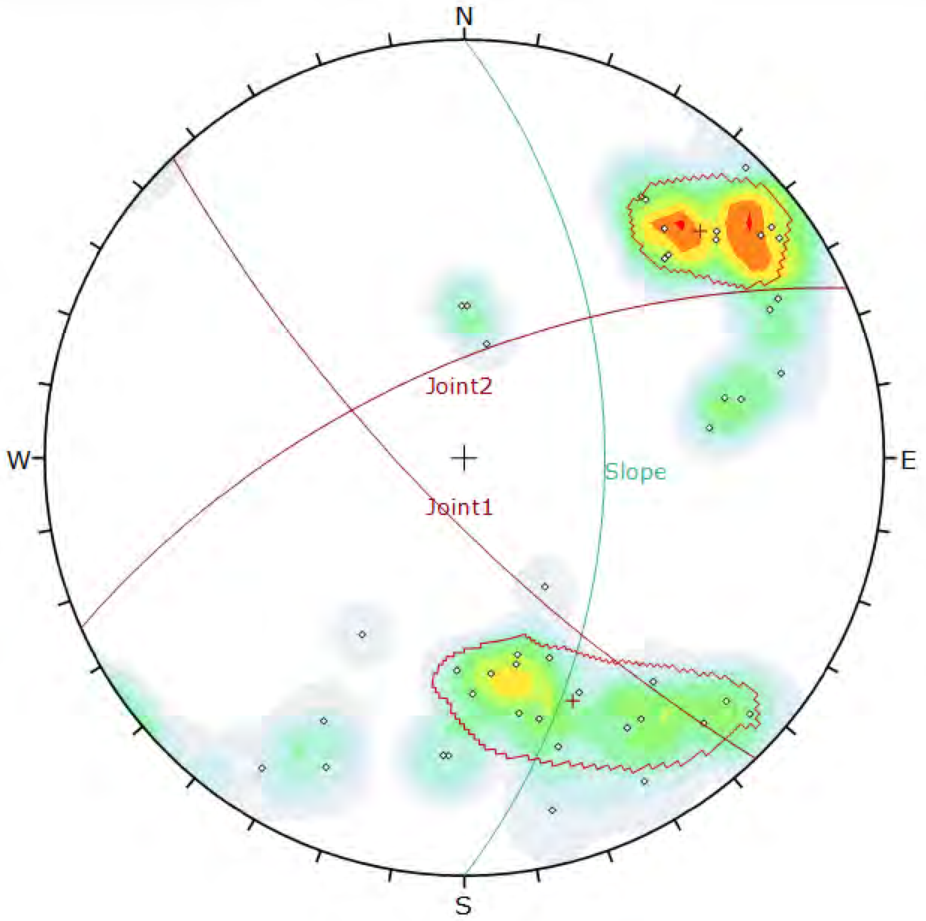
	Color	Dip	Dip Direction	Label
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Data and Joint Sets
Drawn By	JPS
Company	Delve Underground
Date	9/7/2023
File Name	OverallData.dips8

Slope: 53/090 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

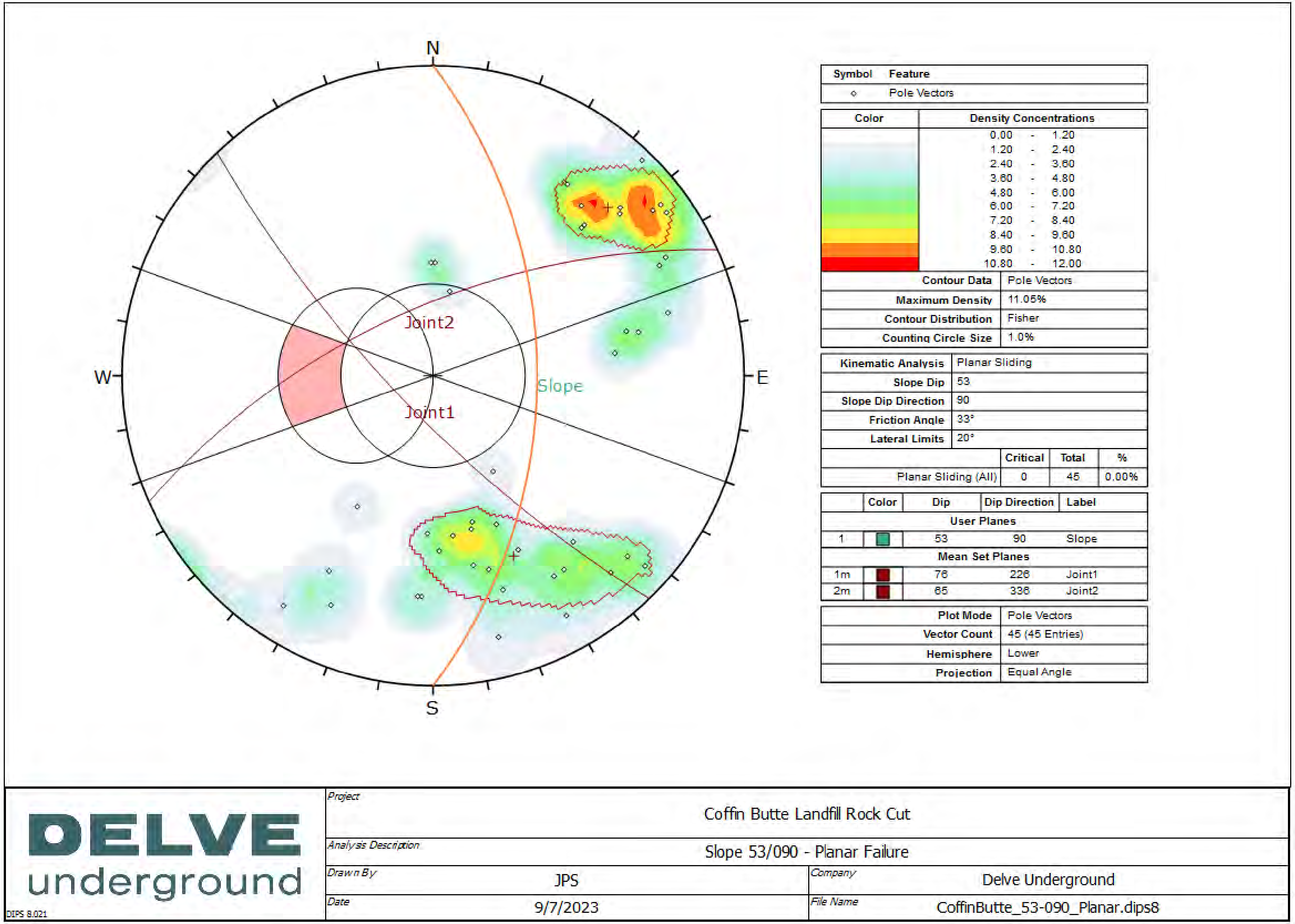
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/090		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-090.dips8

Slope: 53/090 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	53		
Slope Dip Direction	90		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

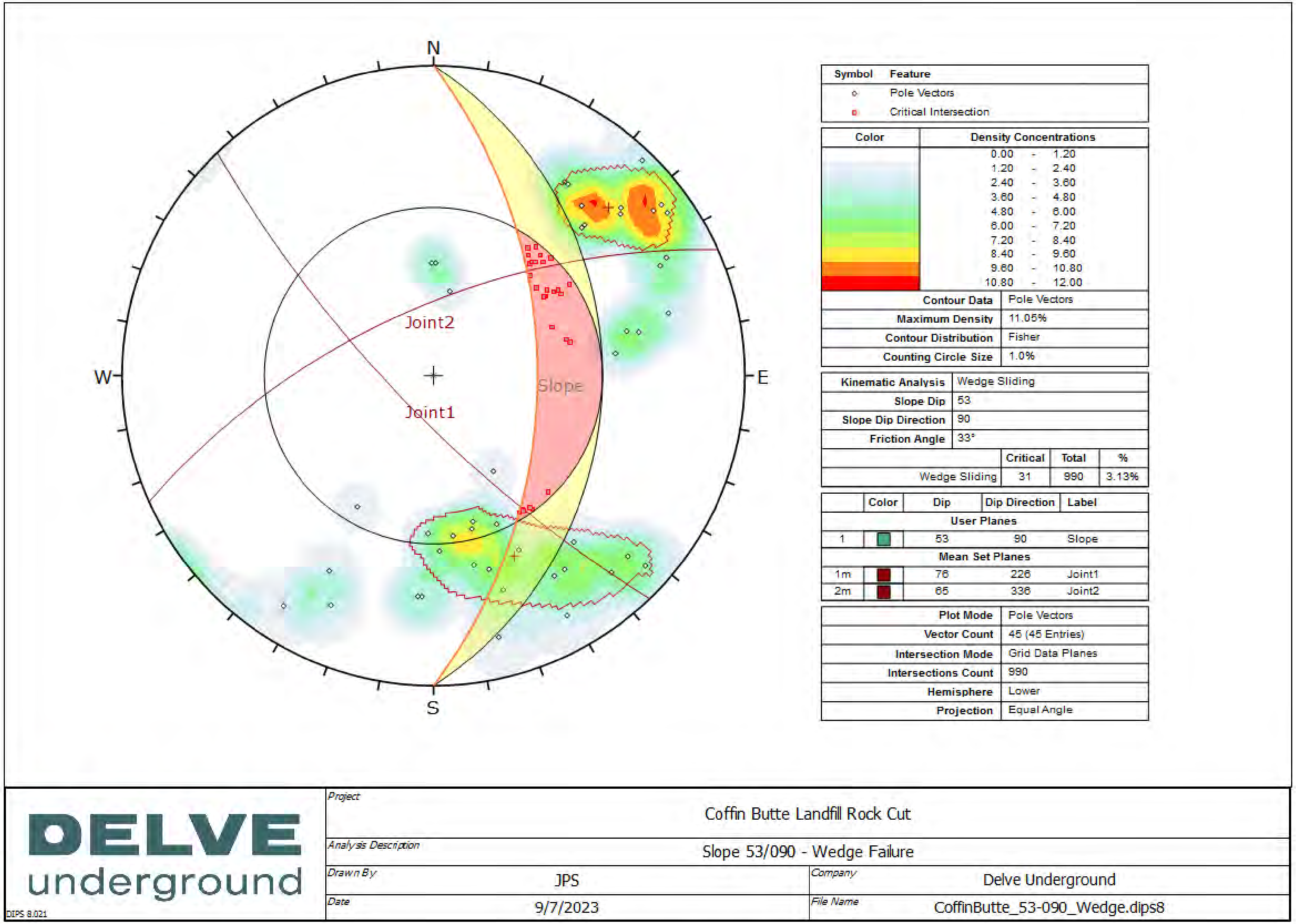
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/090 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-090_Planar.dips8

Slope: 53/090 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	90		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	31	990	3.13%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

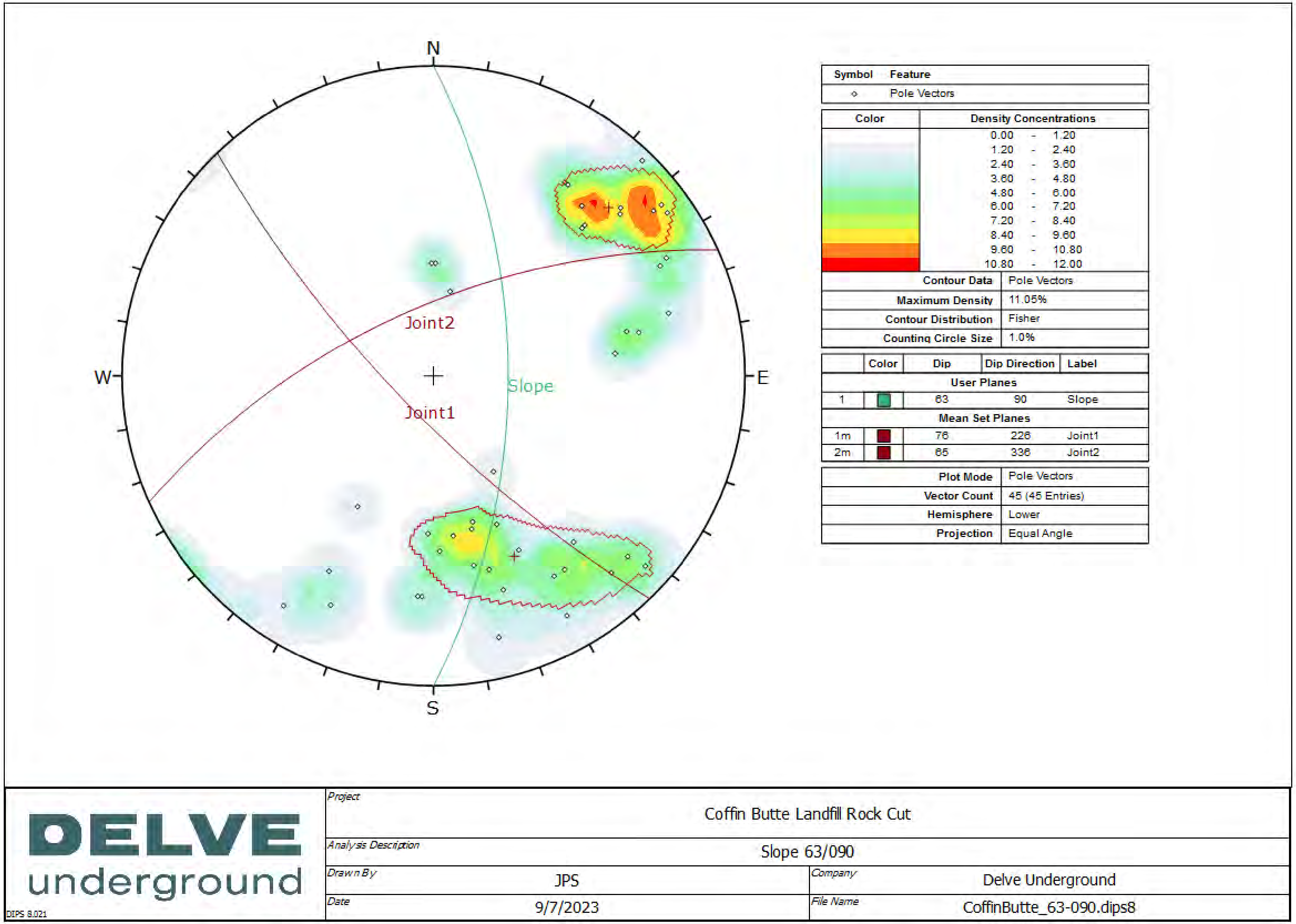
DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 53/090 - Wedge Failure

Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-090_Wedge.dips8

Slope: 63/090 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

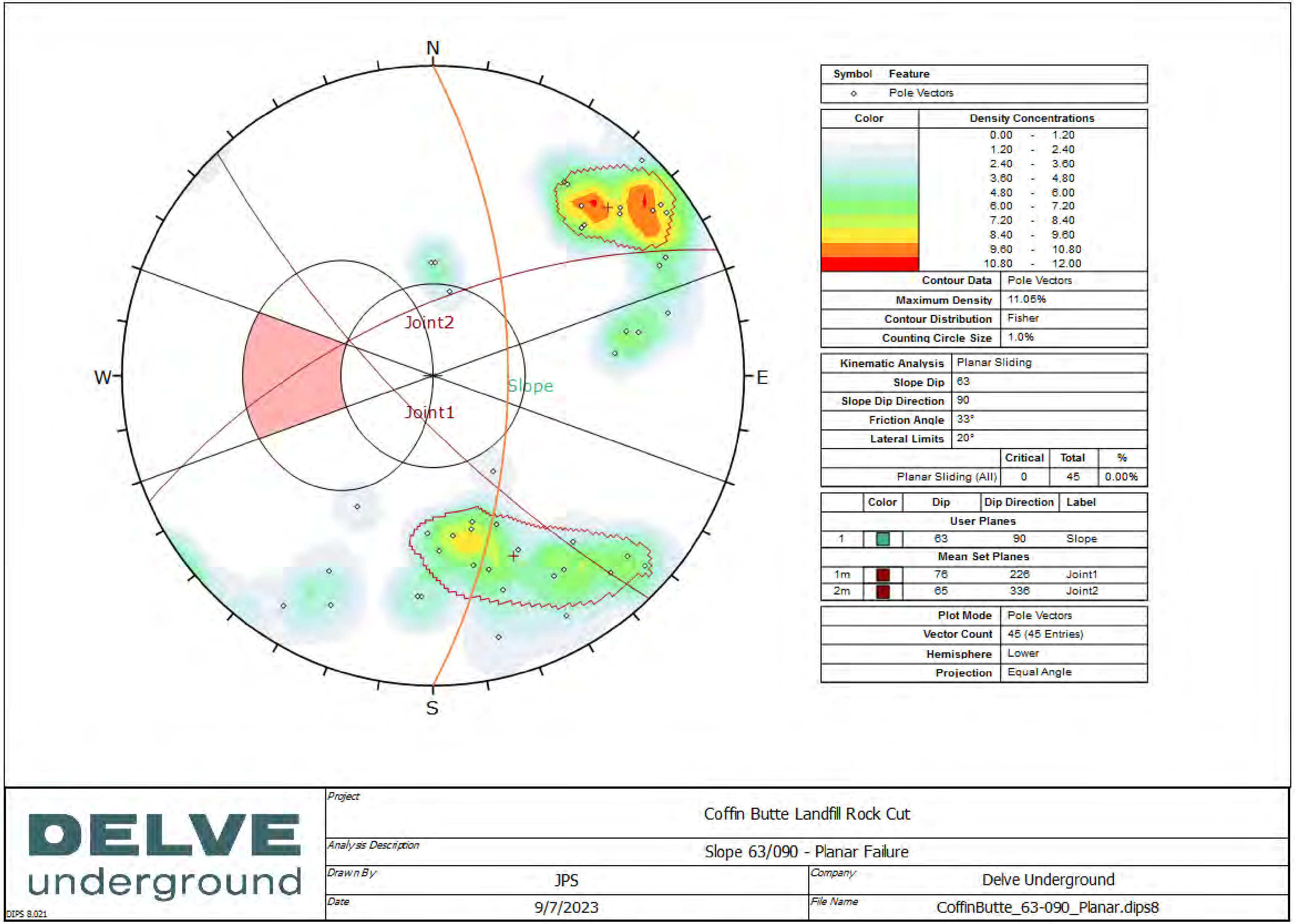
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/090		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-090.dips8

DELVE underground

DIPS 8.021

Slope: 63/090 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	63
Slope Dip Direction	90
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 63/090 - Planar Failure

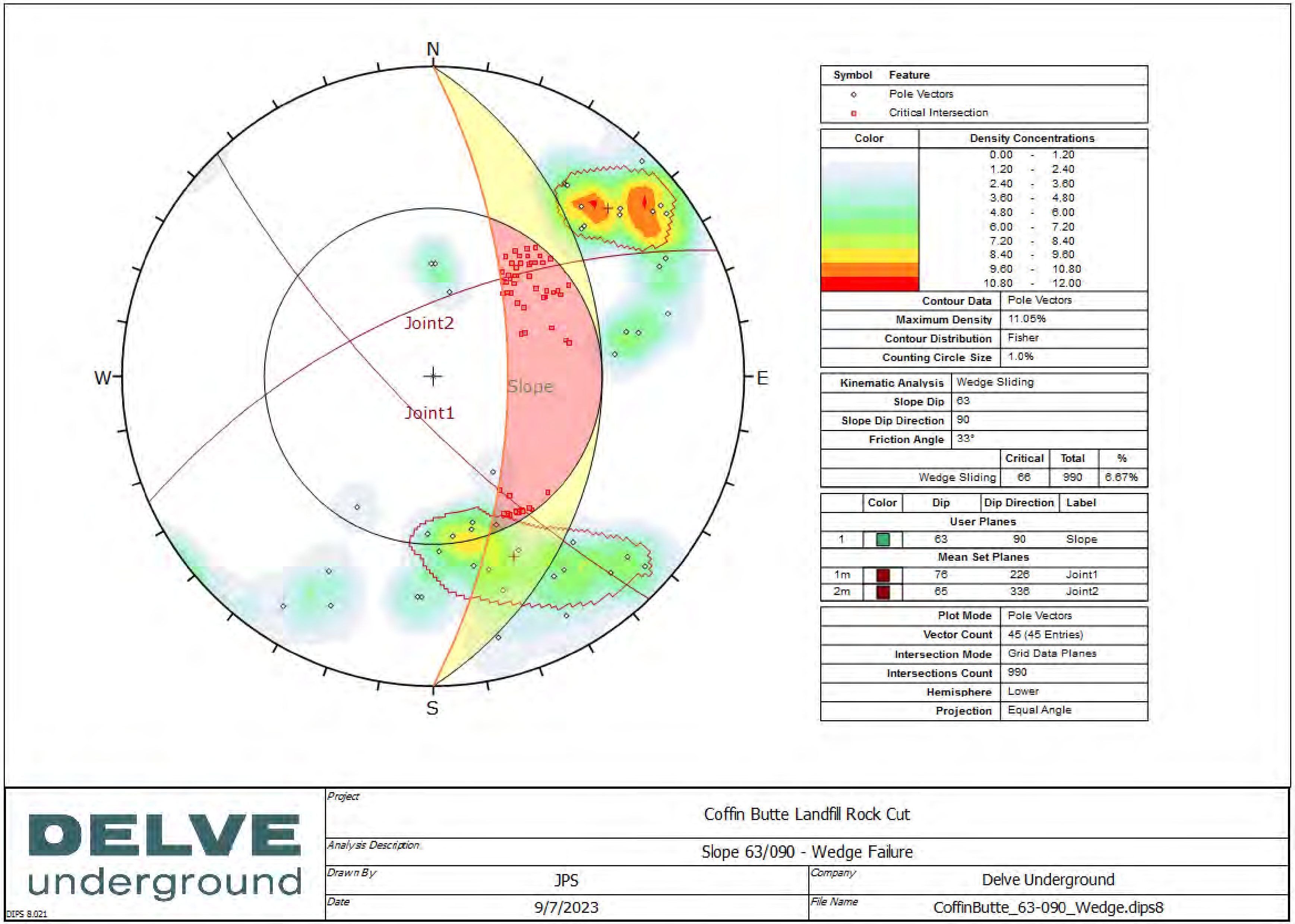
Drawn By JPS

Company Delve Underground

Date 9/7/2023

File Name CoffinButte_63-090_Planar.dips8

Slope: 63/090 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
◻	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	63
Slope Dip Direction	90
Friction Angle	33°

	Critical	Total	%
Wedge Sliding	66	990	6.67%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	90	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

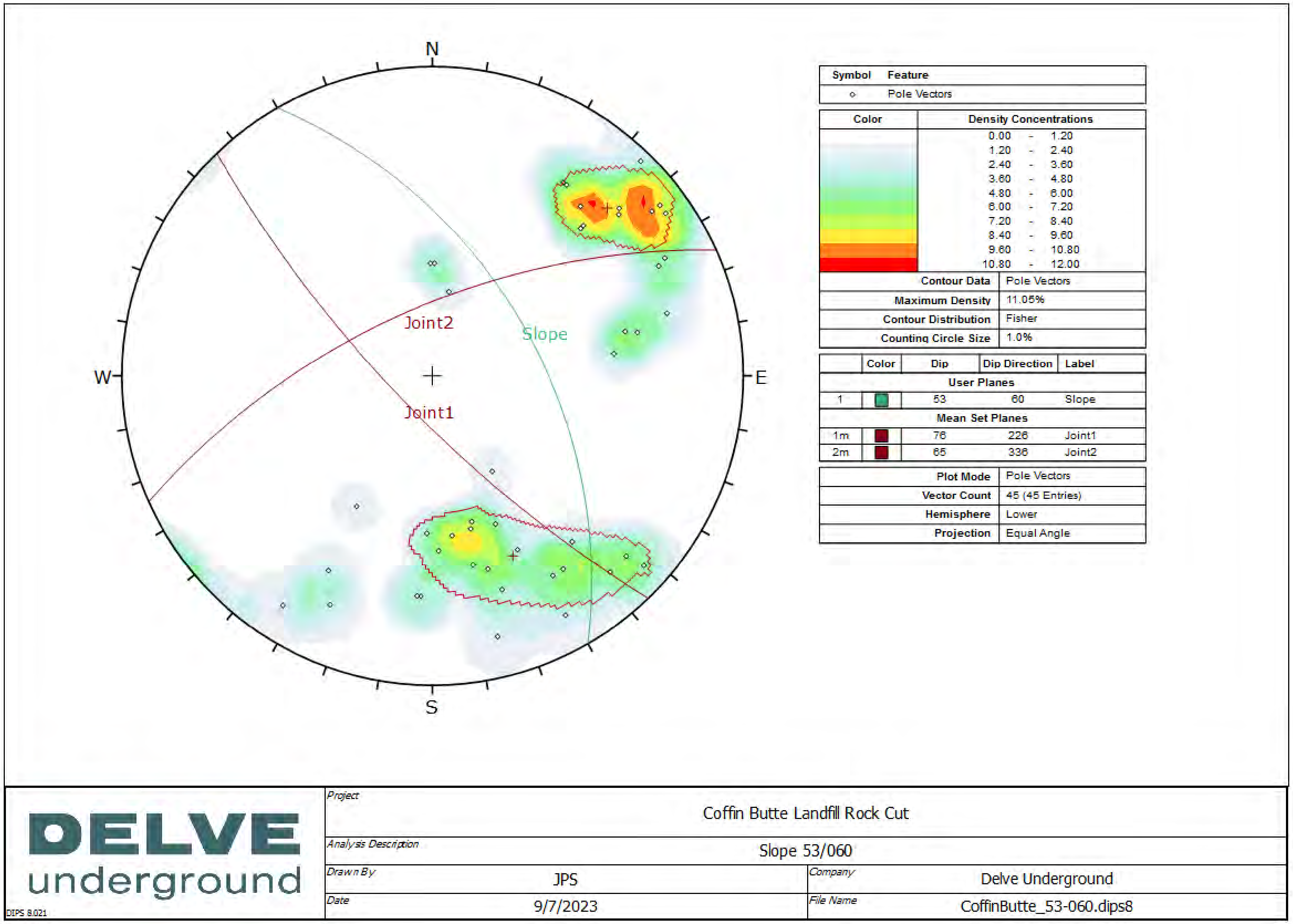
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 63/090 - Wedge Failure
Drawn By	JPS
Company	Delve Underground
Date	9/7/2023
File Name	CoffinButte_63-090_Wedge.dips8

Slope: 53/060 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

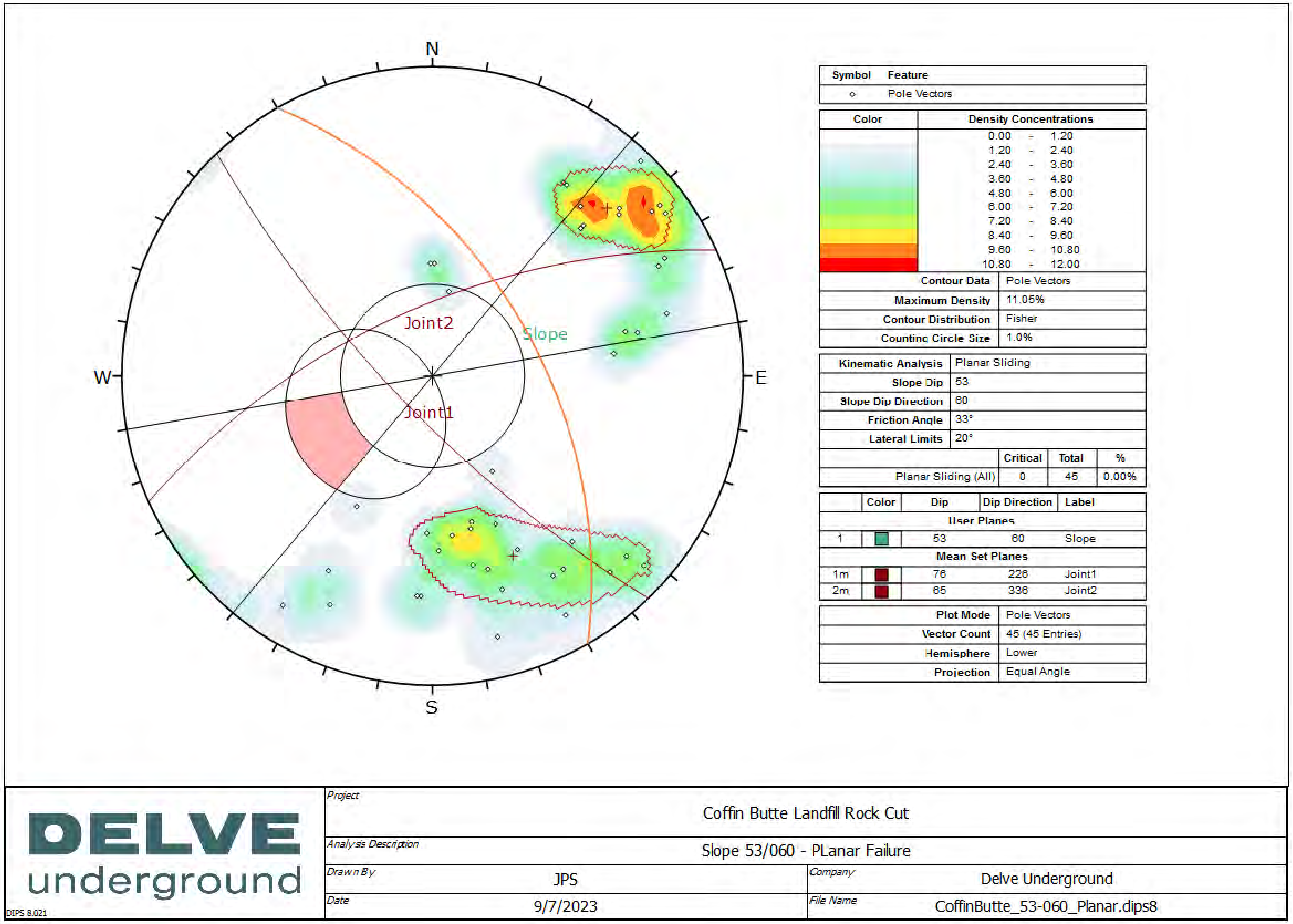
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/060		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-060.dips8

Slope: 53/060 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	53
Slope Dip Direction	60
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

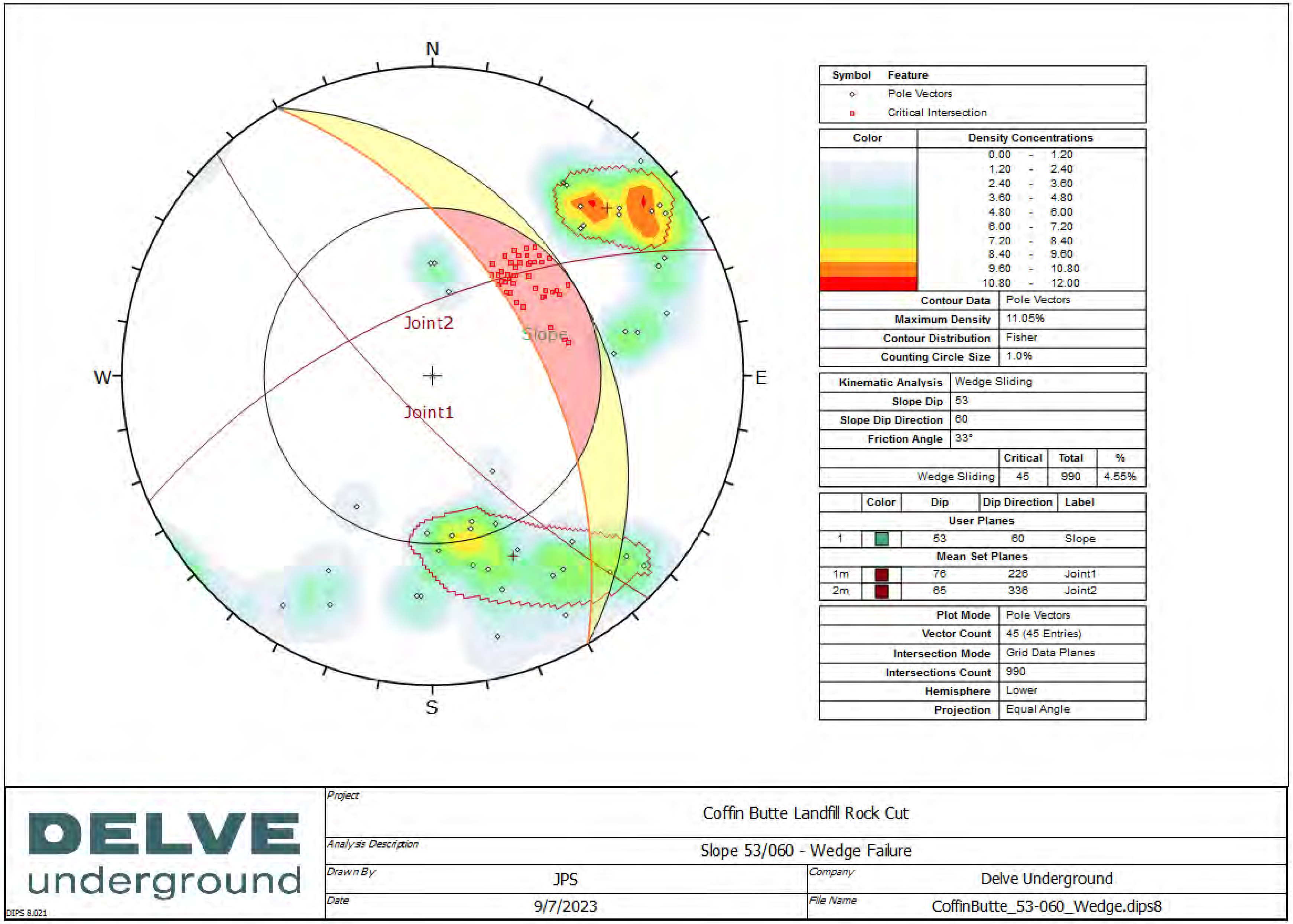
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/060 - PLanar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-060_Planar.dips8

Slope: 53/060 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
🟥	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	60		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	45	990	4.55%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 53/060 - Wedge Failure

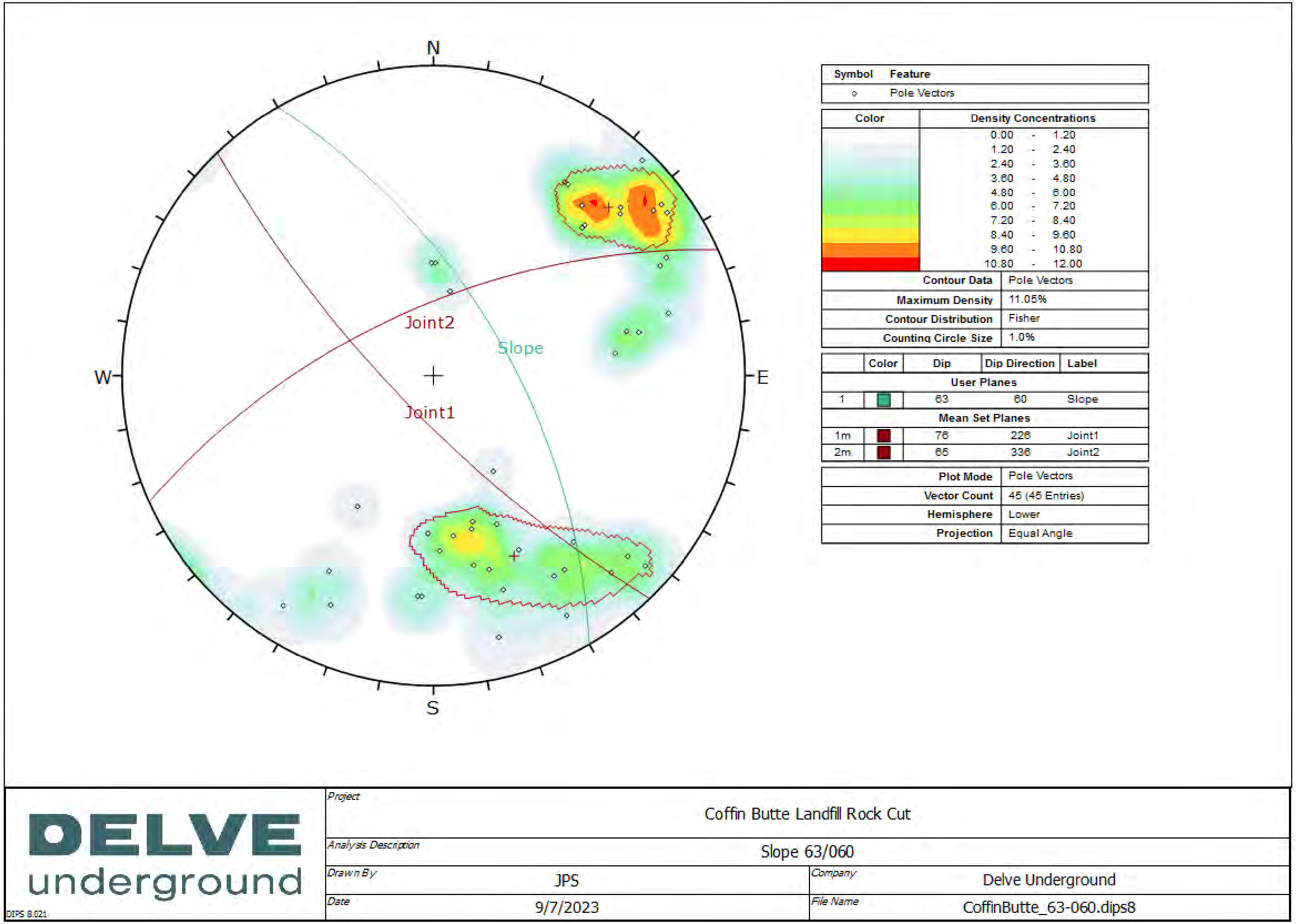
Drawn By JPS

Company Delve Underground

Date 9/7/2023

File Name CoffinButte_53-060_Wedge.dips8

Slope: 63/060 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 63/060

Drawn By JPS

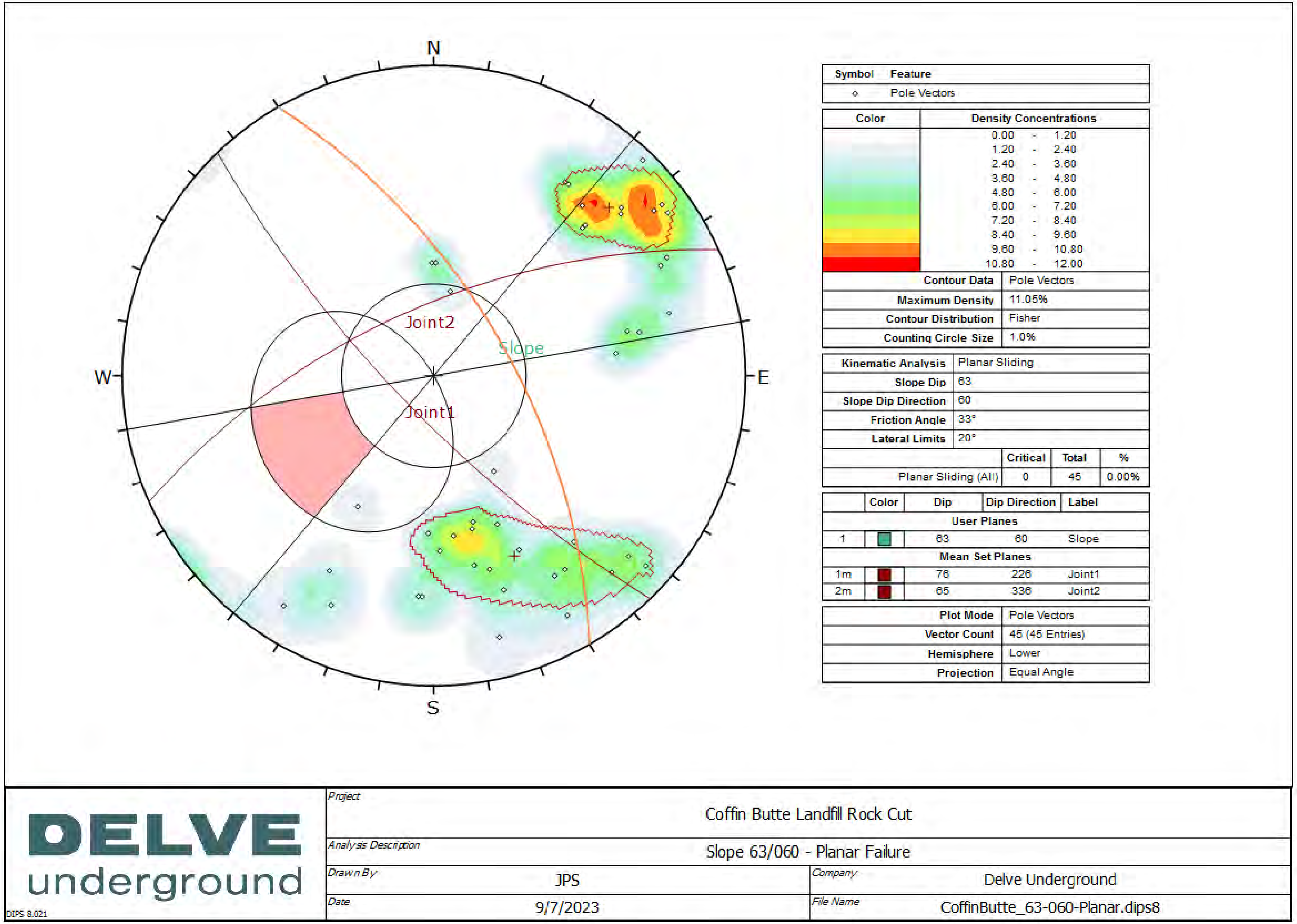
Company Delve Underground

Date 9/7/2023

File Name CoffinButte_63-060.dips8

DIPS 8.021

Slope: 63/060 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	63		
Slope Dip Direction	60		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

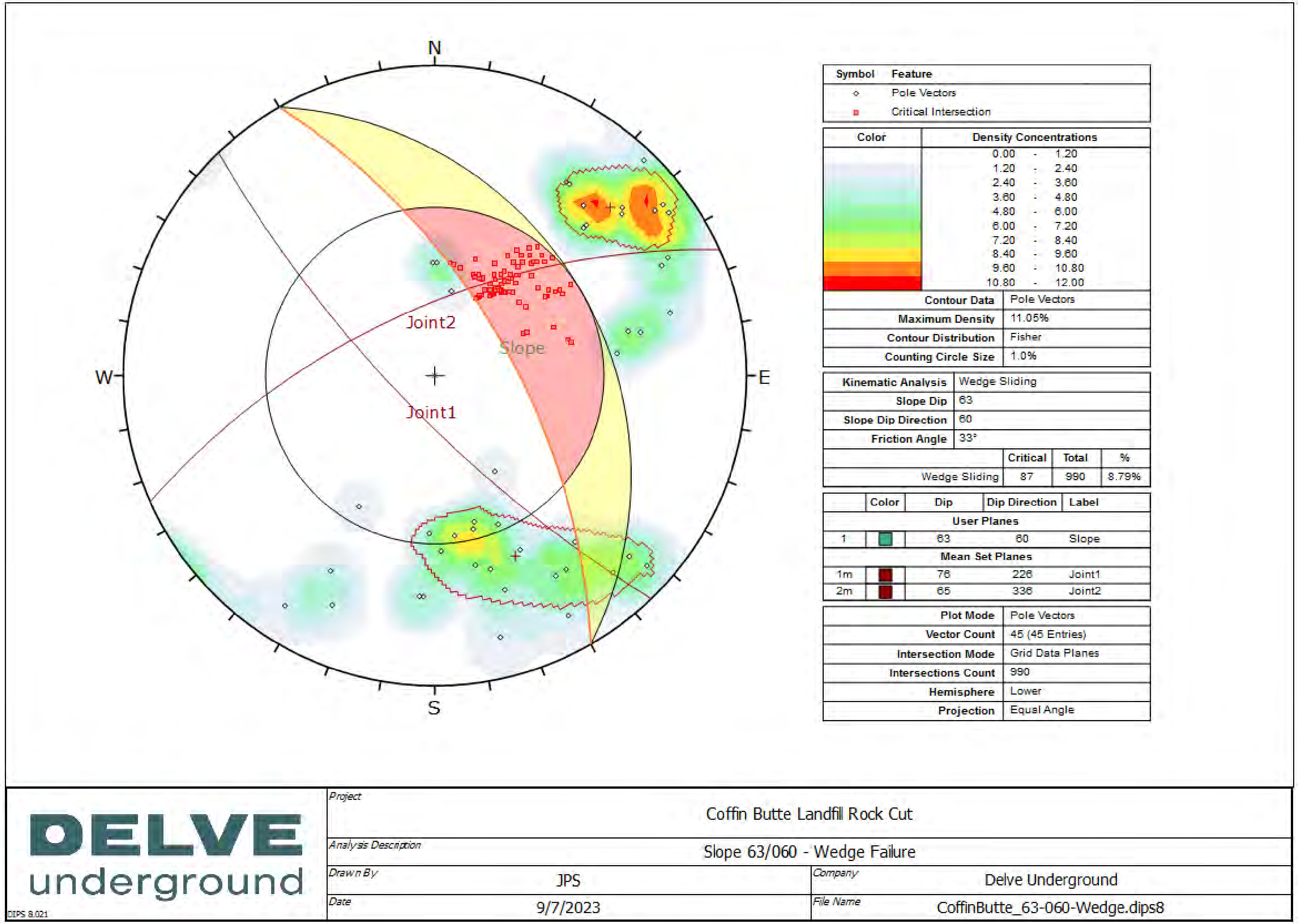
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/060 - Planar Failure		
Drawn By	JPS	Company	Delve Underground
Date	9/7/2023	File Name	CoffinButte_63-060-Planar.dips8

Slope: 63/060 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
🟥	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	63		
Slope Dip Direction	60		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	87	990	8.79%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	60	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

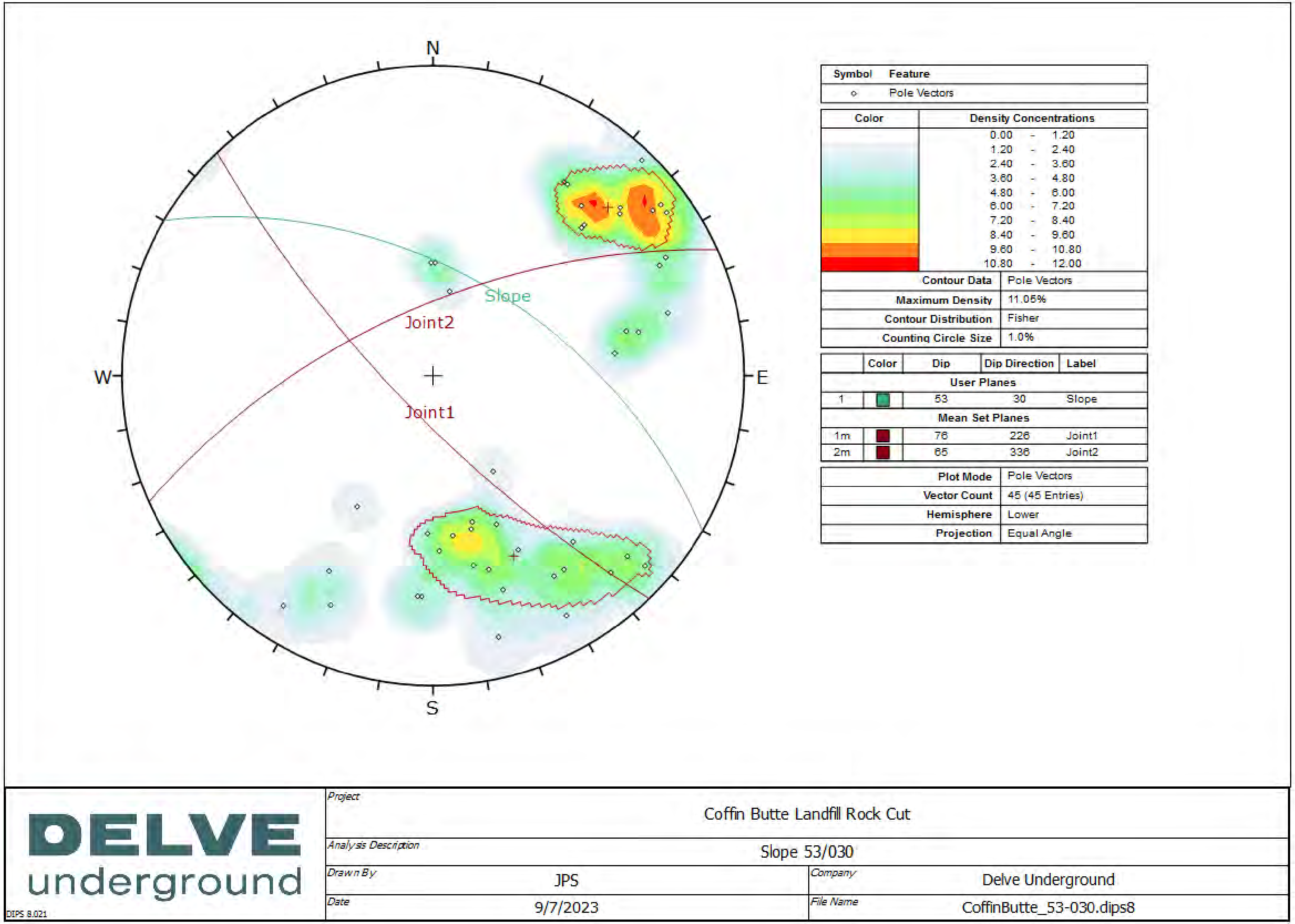
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/060 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-060-Wedge.dips8

Slope: 53/030 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
		User Planes		
1	🟩	53	30	Slope
		Mean Set Planes		
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 53/030

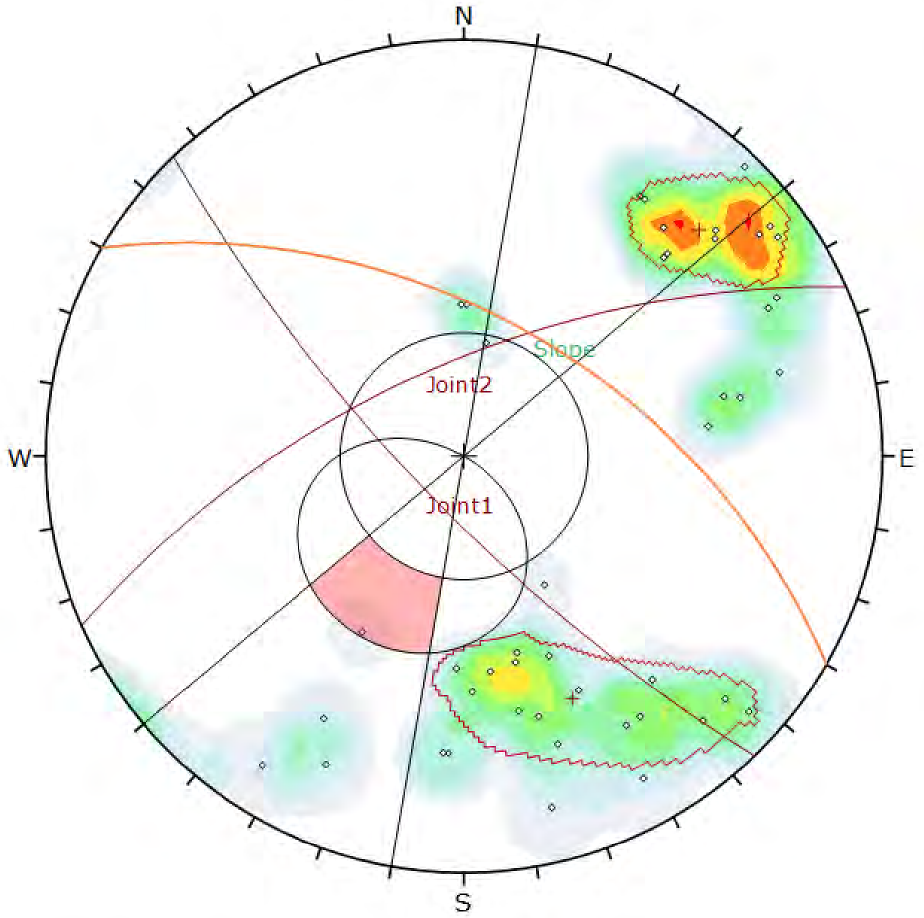
Drawn By JPS

Company Delve Underground

Date 9/7/2023

File Name CoffinButte_53-030.dips8

Slope: 53/030 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	53		
Slope Dip Direction	30		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	30	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

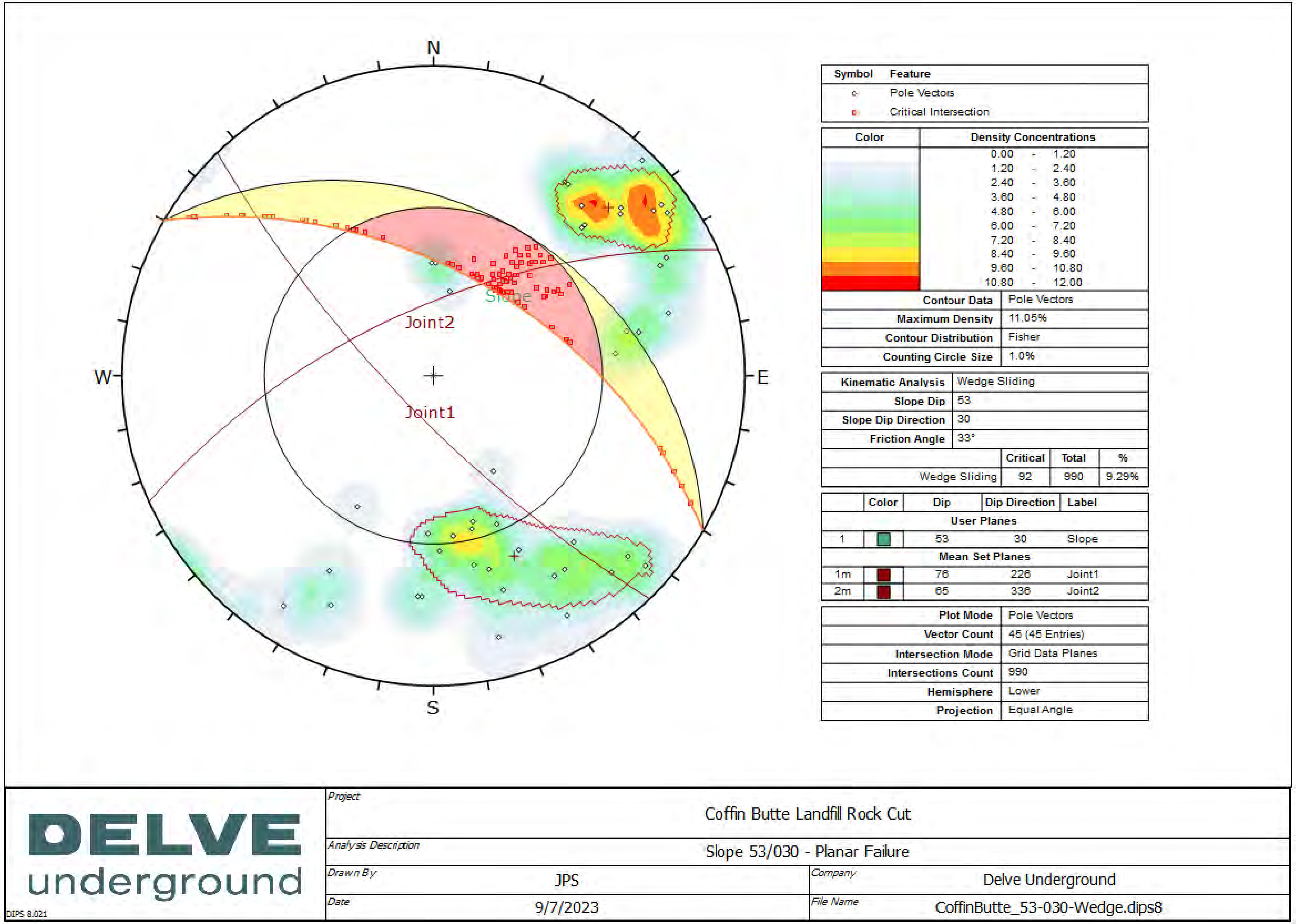
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/030 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-030-Planar.dips8

Slope: 53/030 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
🟥	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	30		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	92	990	9.29%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	30	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

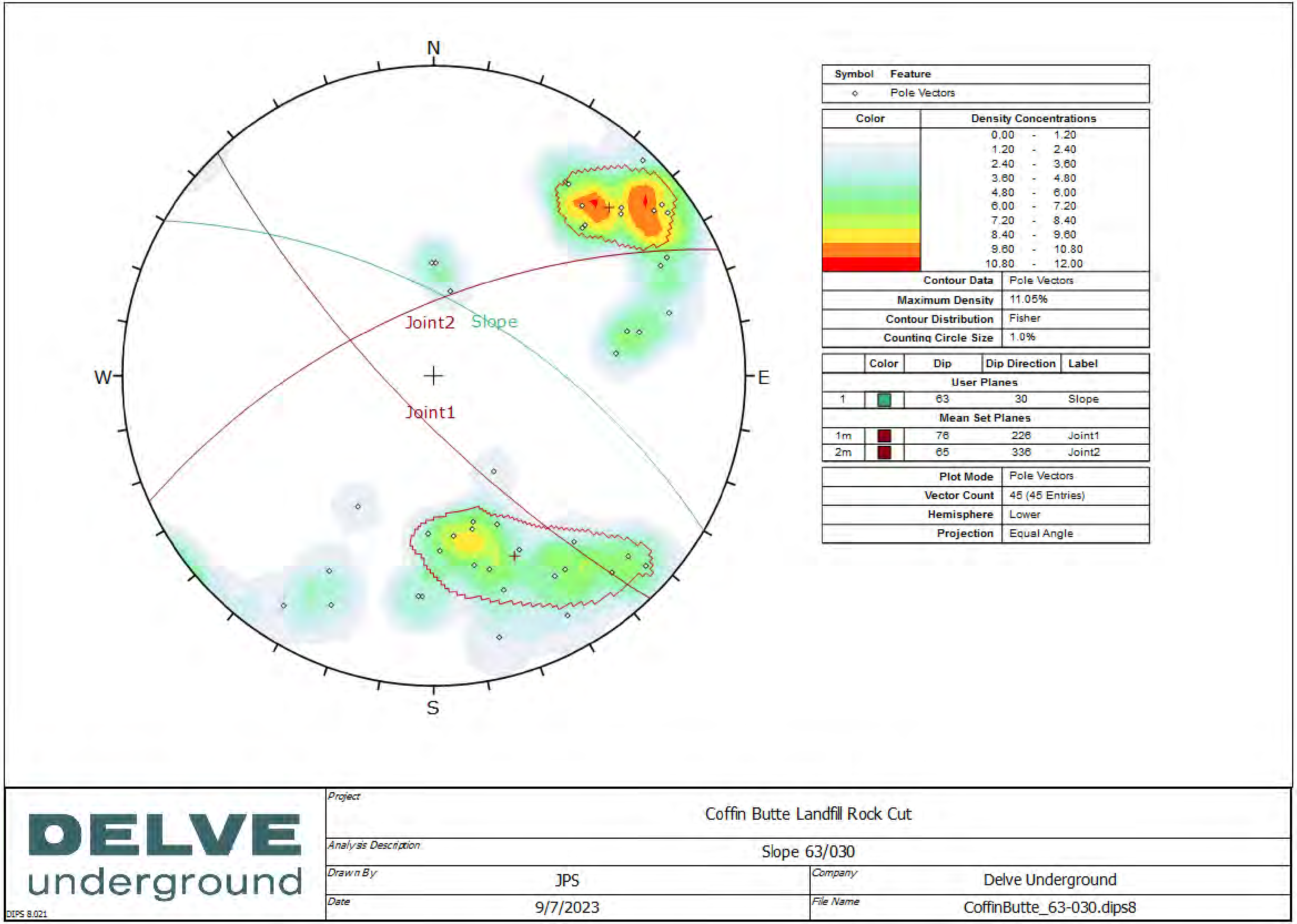
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/030 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-030-Wedge.dips8

Slope: 63/030 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
⬜	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	30	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

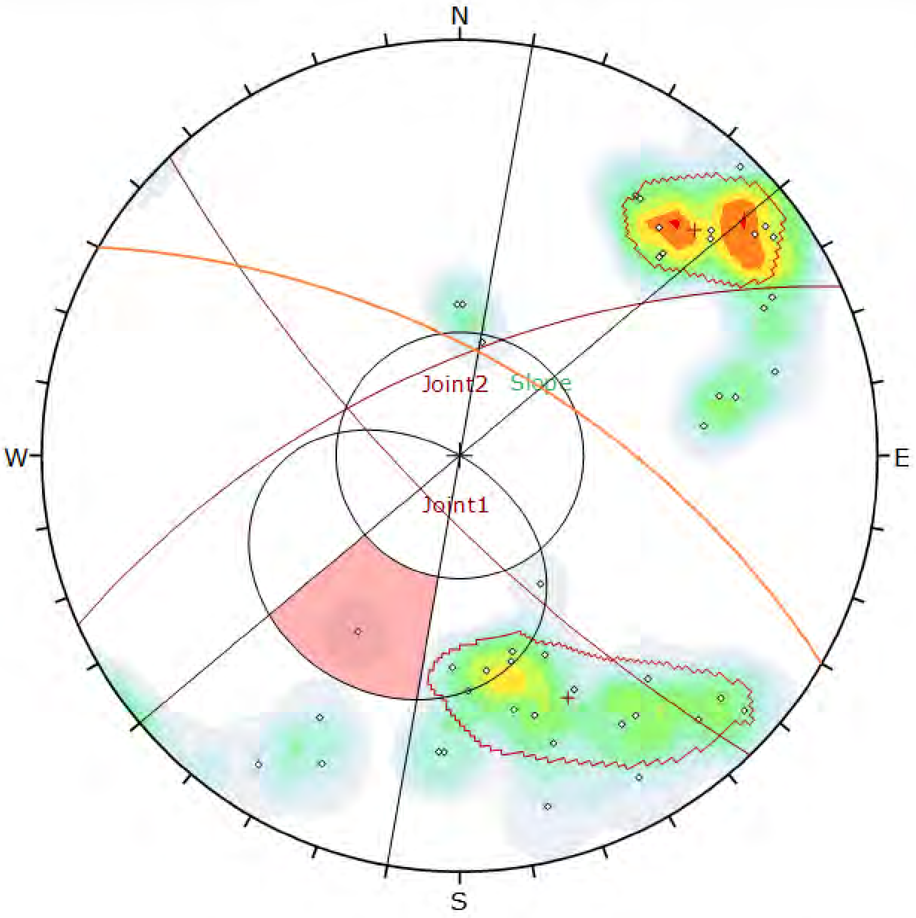
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 63/030
Drawn By	JPS
Company	Delve Underground
Date	9/7/2023
File Name	CoffinButte_63-030.dips8

Slope: 63/030 – Planar Failure



Symbol	Feature
○	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	63		
Slope Dip Direction	30		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	30	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

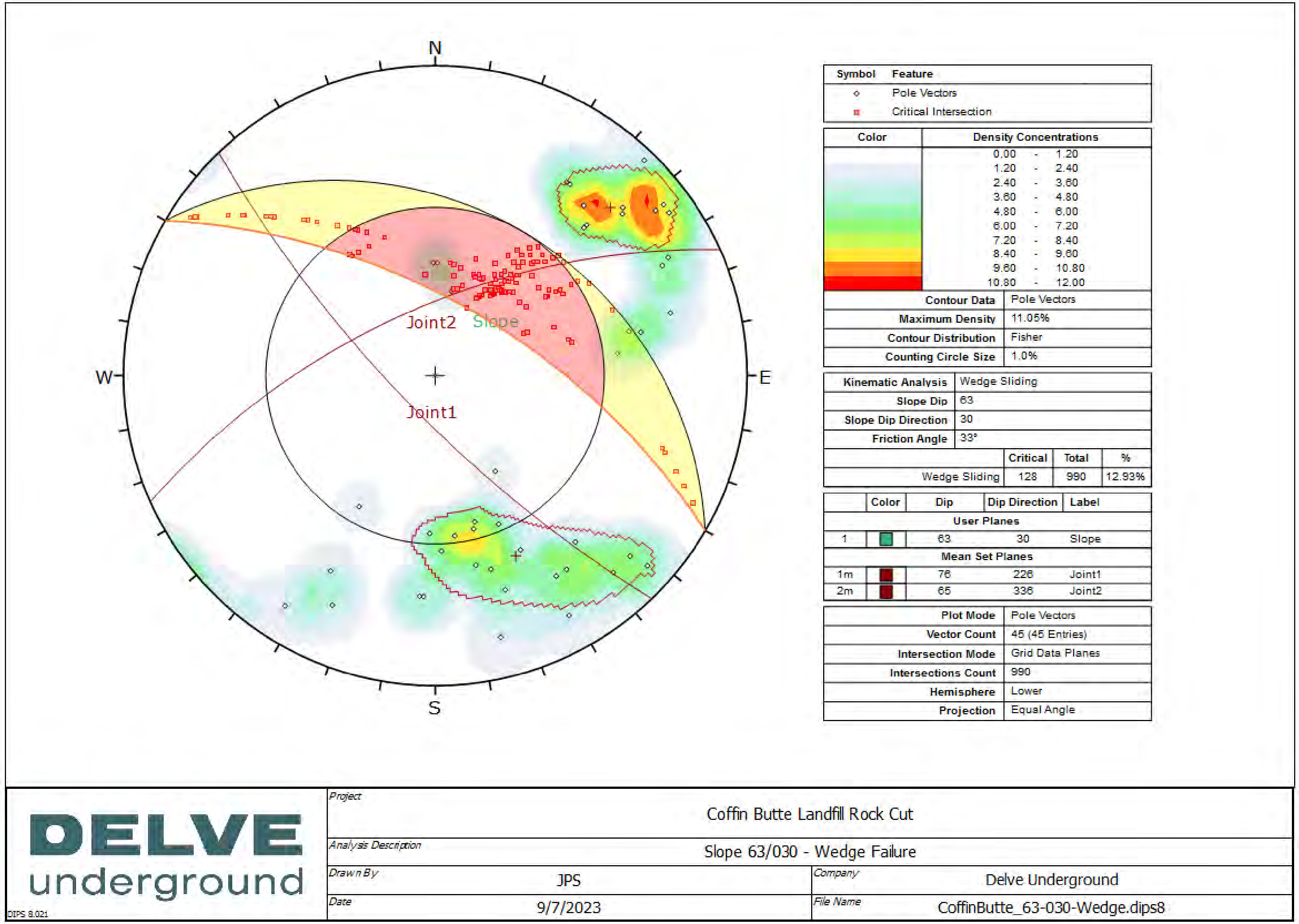
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/030 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-030-Planar.dips8

Slope: 63/030 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
▣	Critical Intersection

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	63
Slope Dip Direction	30
Friction Angle	33°

	Critical	Total	%
Wedge Sliding	128	990	12.93%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	30	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

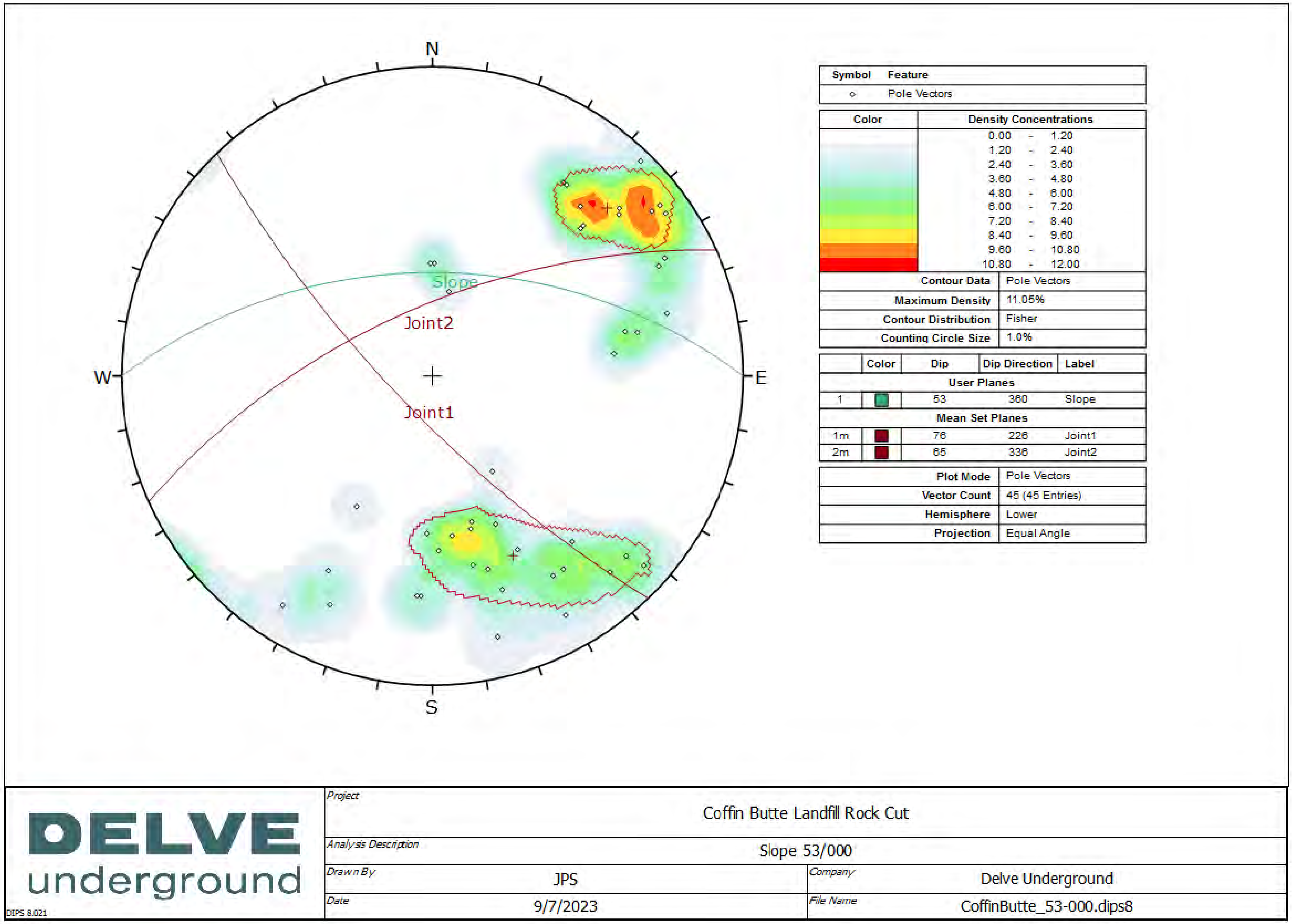
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 63/030 - Wedge Failure
Drawn By	JPS
Company	Delve Underground
Date	9/7/2023
File Name	CoffinButte_63-030-Wedge.dips8

Slope: 53/000 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	360	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

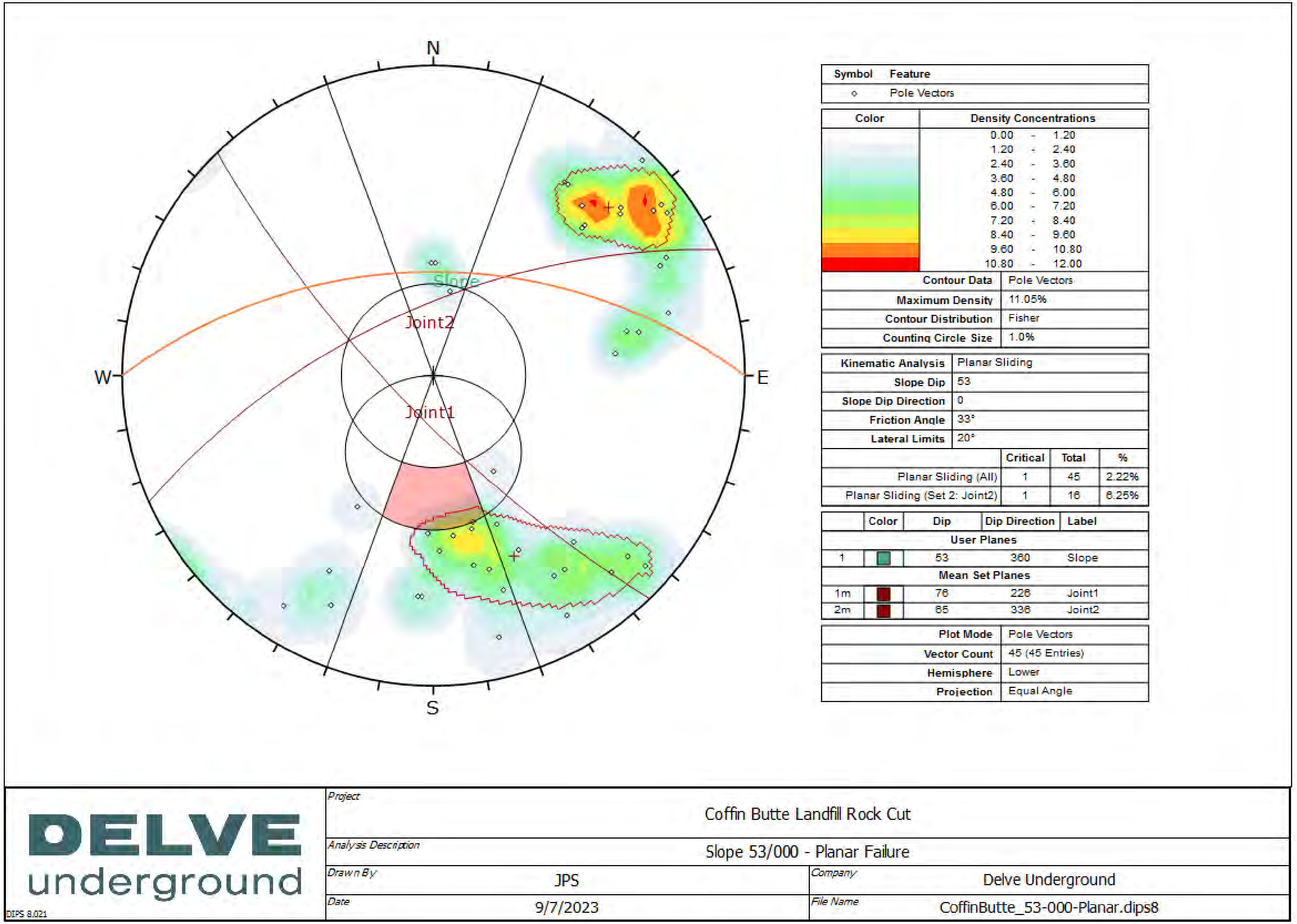
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/000		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-000.dips8

Slope: 53/000 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	53
Slope Dip Direction	0
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	1	45	2.22%
Planar Sliding (Set 2: Joint2)	1	16	6.25%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	360	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

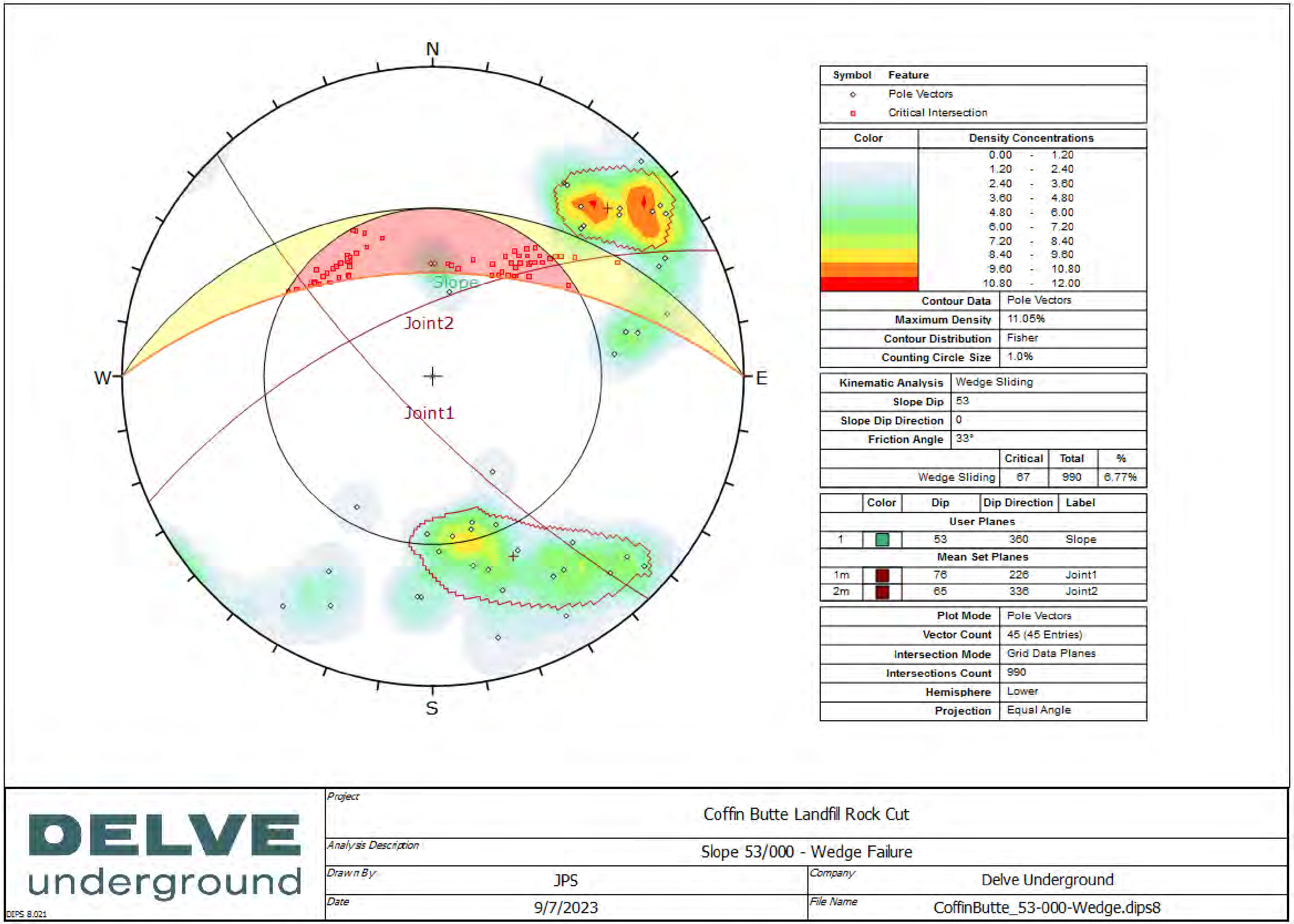
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/000 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-000-Planar.dips8

Slope: 53/000 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
▫	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	0		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	67	990	6.77%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	360	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

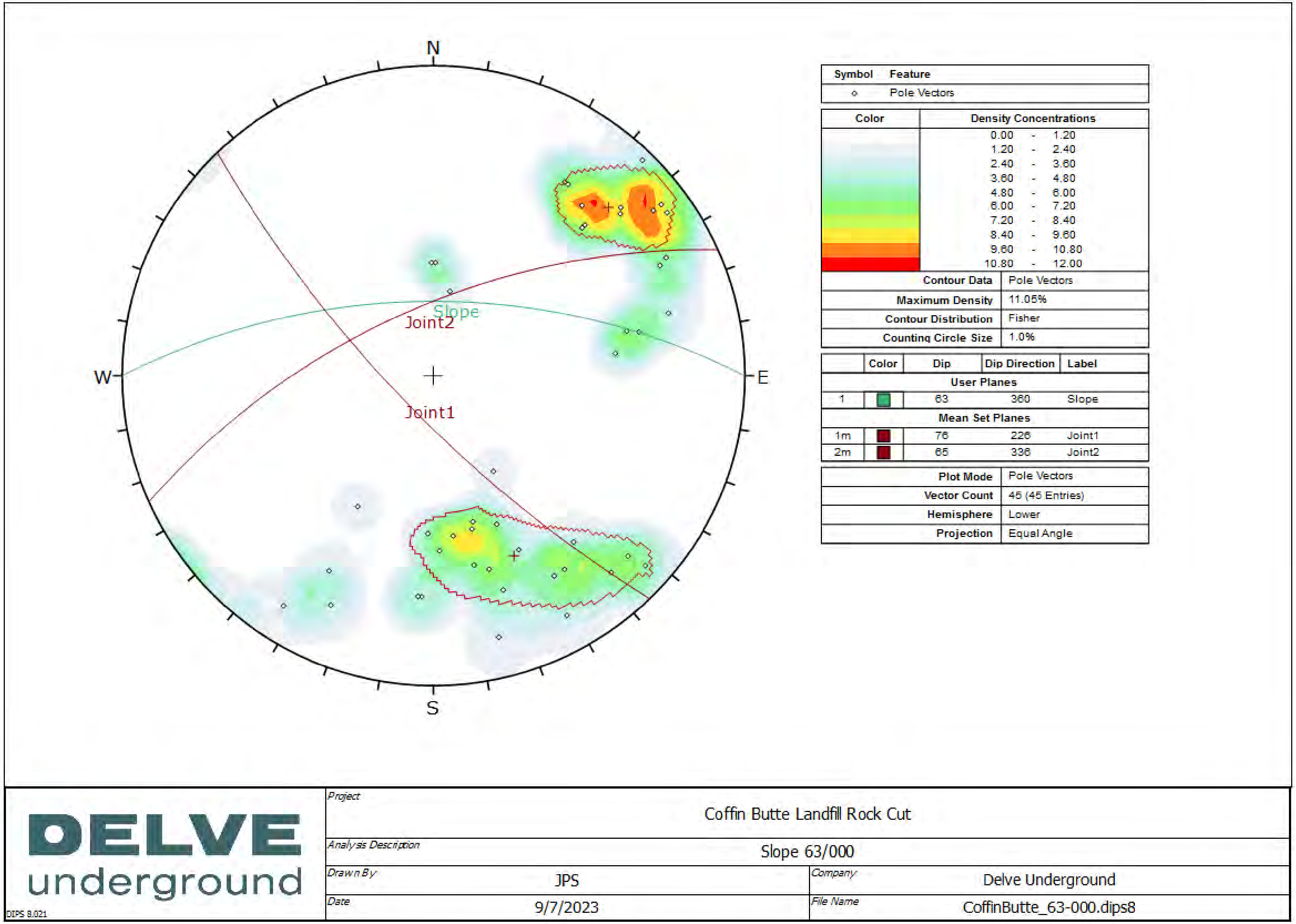
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/000 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-000-Wedge.dips8

Slope: 63/000 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	360	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

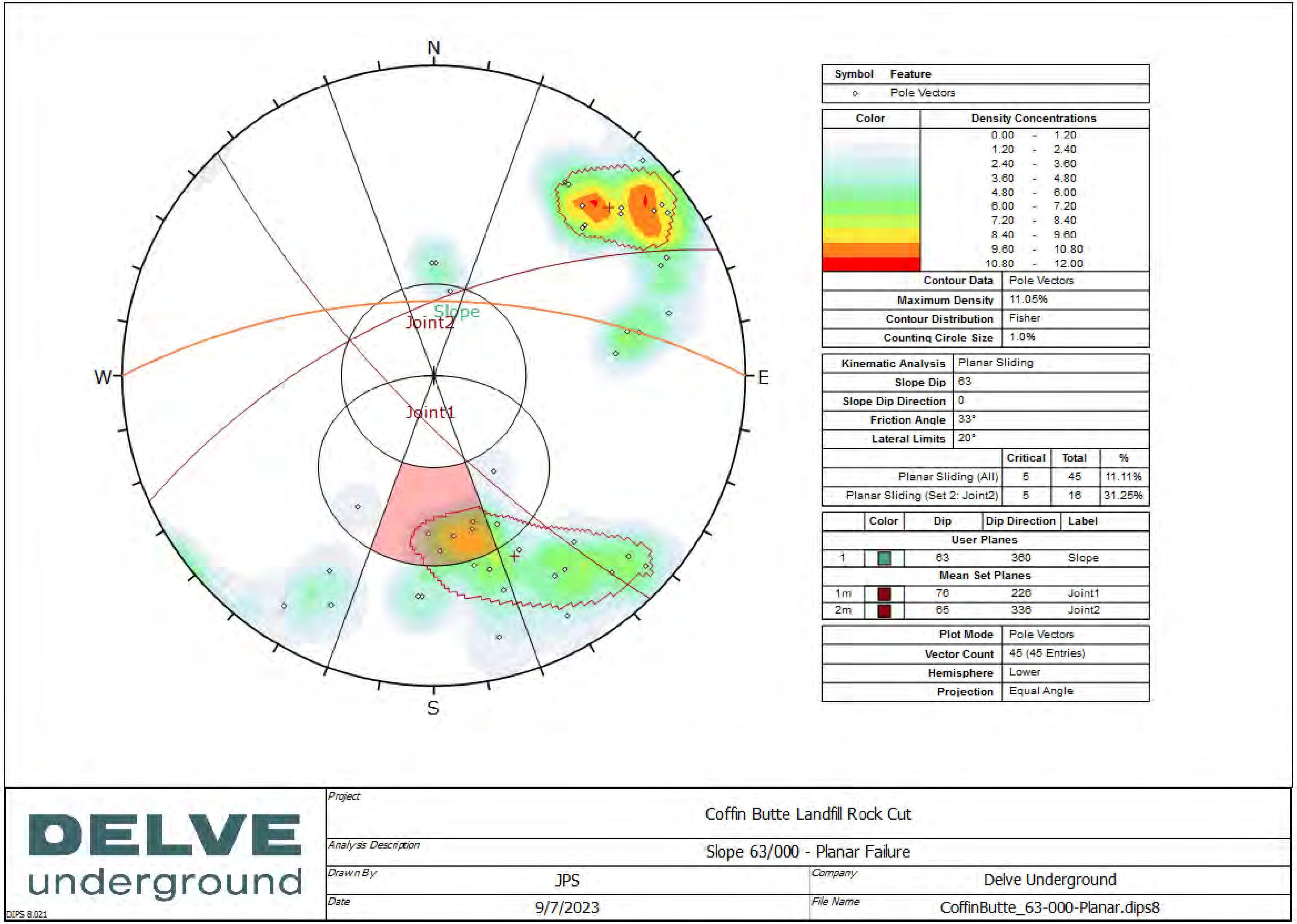
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/000		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-000.dips8

Slope: 63/000 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	63
Slope Dip Direction	0
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	5	45	11.11%
Planar Sliding (Set 2: Joint2)	5	16	31.25%

	Color	Dip	Dip Direction	Label
		User Planes		
1	🟩	63	360	Slope
		Mean Set Planes		
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

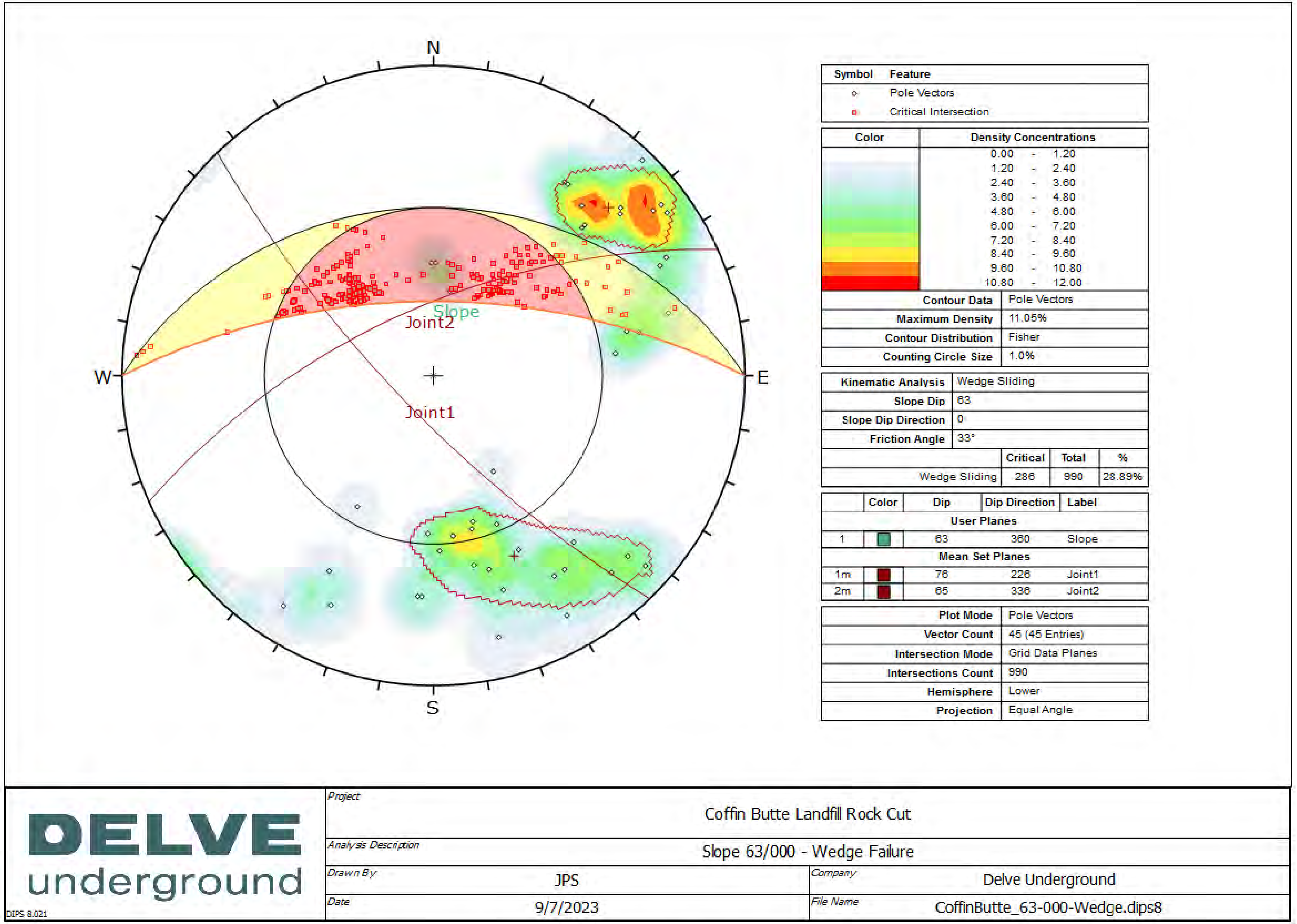
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/000 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-000-Planar.dips8

Slope: 63/000 – Wedge Failure



Symbol	Feature
○	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	63		
Slope Dip Direction	0		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	286	990	28.89%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	360	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	338	Joint2

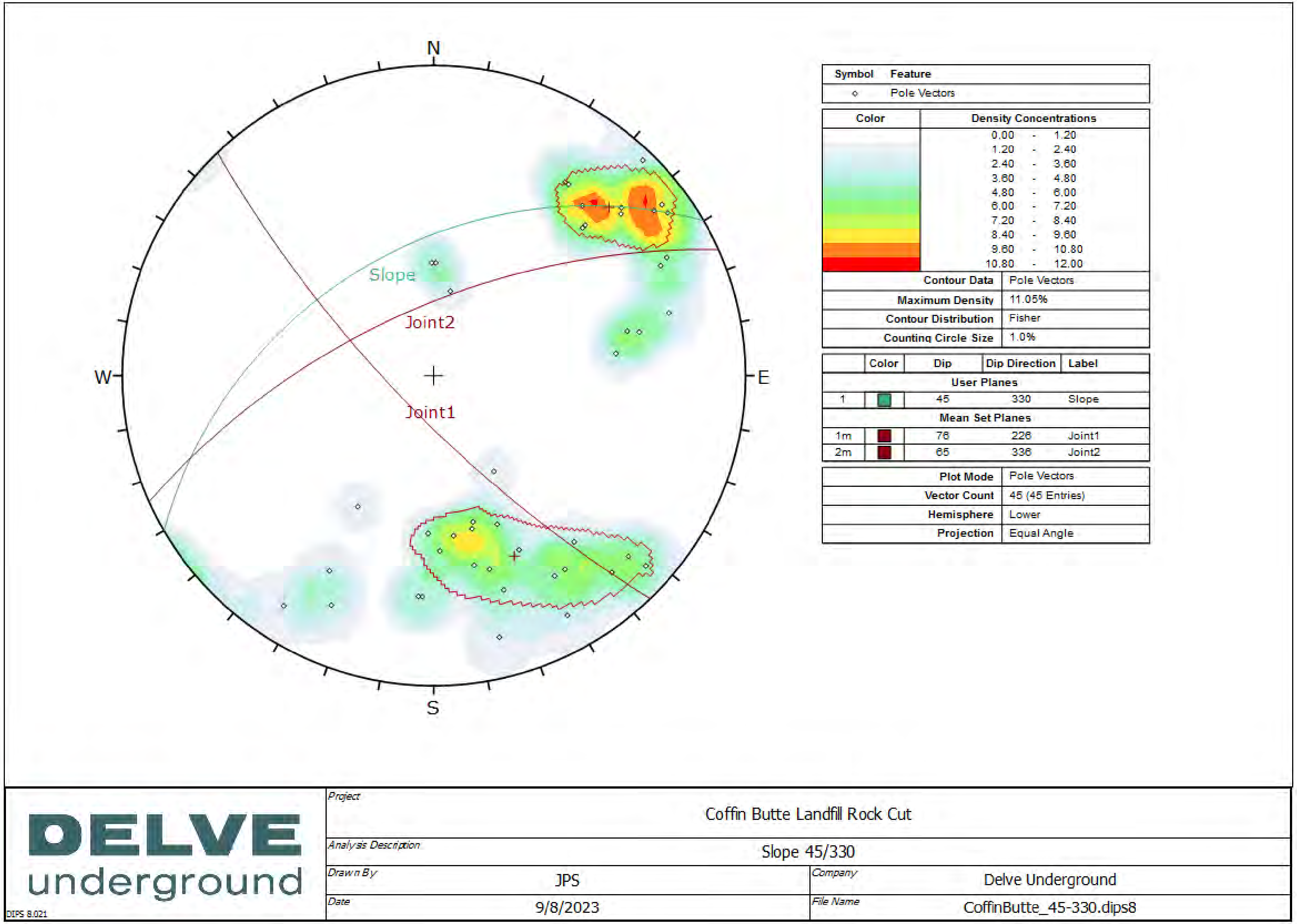
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/000 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-000-Wedge.dips8

Slope: 45/330 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

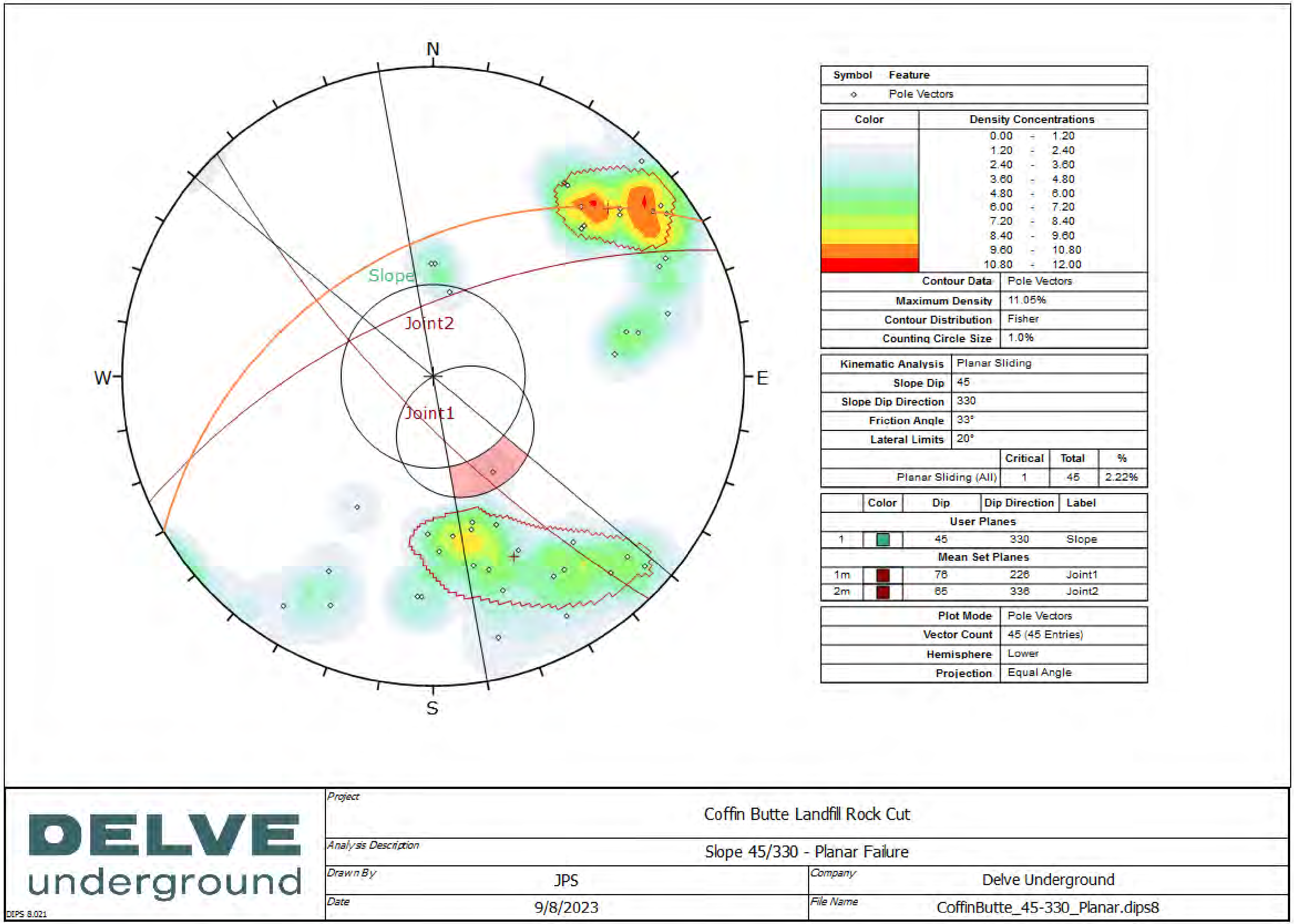
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/330		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-330.dips8

Slope: 45/330 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	330
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

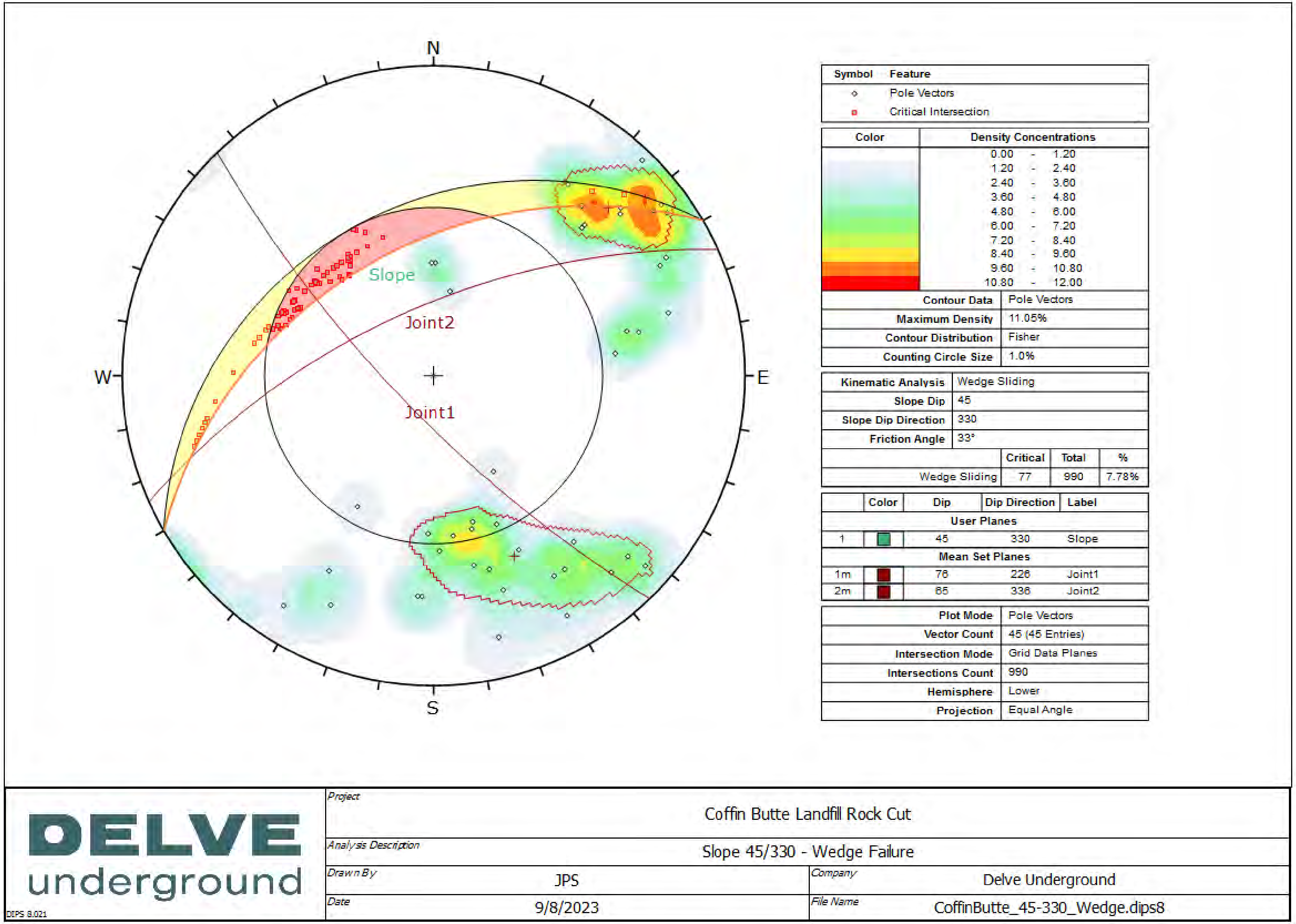
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/330 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-330_Planar.dips8

Slope: 45/330 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	330		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	77	990	7.78%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

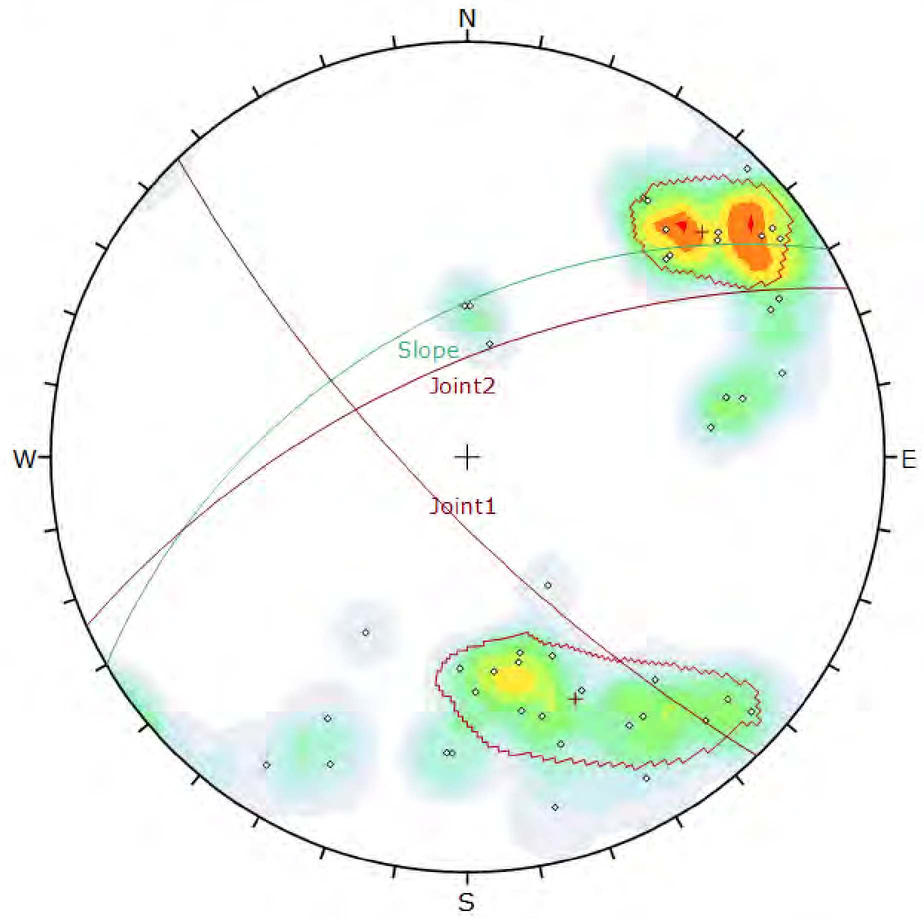
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/330 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-330_Wedge.dips8

Slope: 53/330 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
		User Planes		
1	🟩	53	330	Slope
		Mean Set Planes		
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

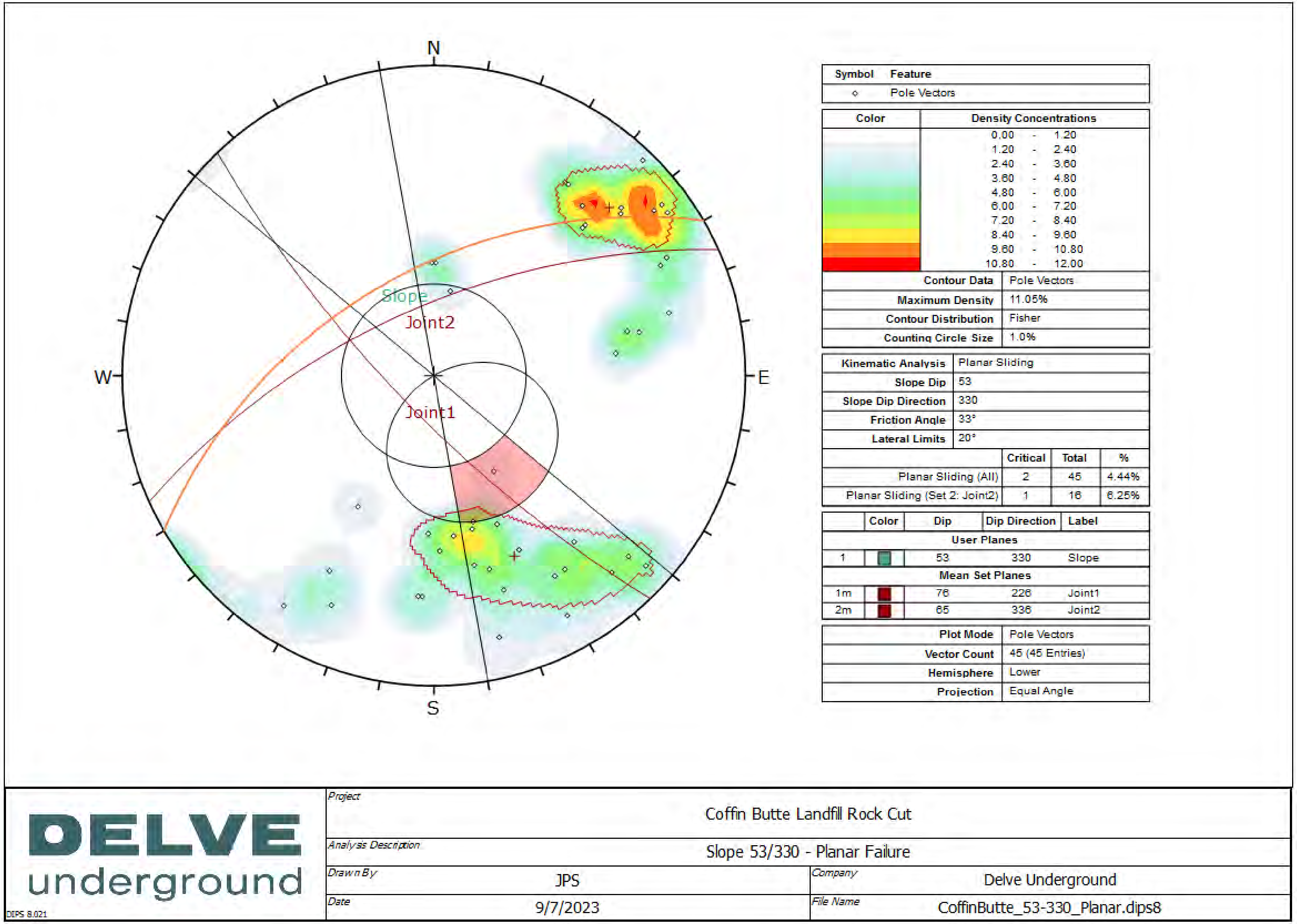
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/330		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-330.dips8

Slope: 53/330 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟨	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	53
Slope Dip Direction	330
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	2	45	4.44%
Planar Sliding (Set 2: Joint2)	1	16	6.25%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

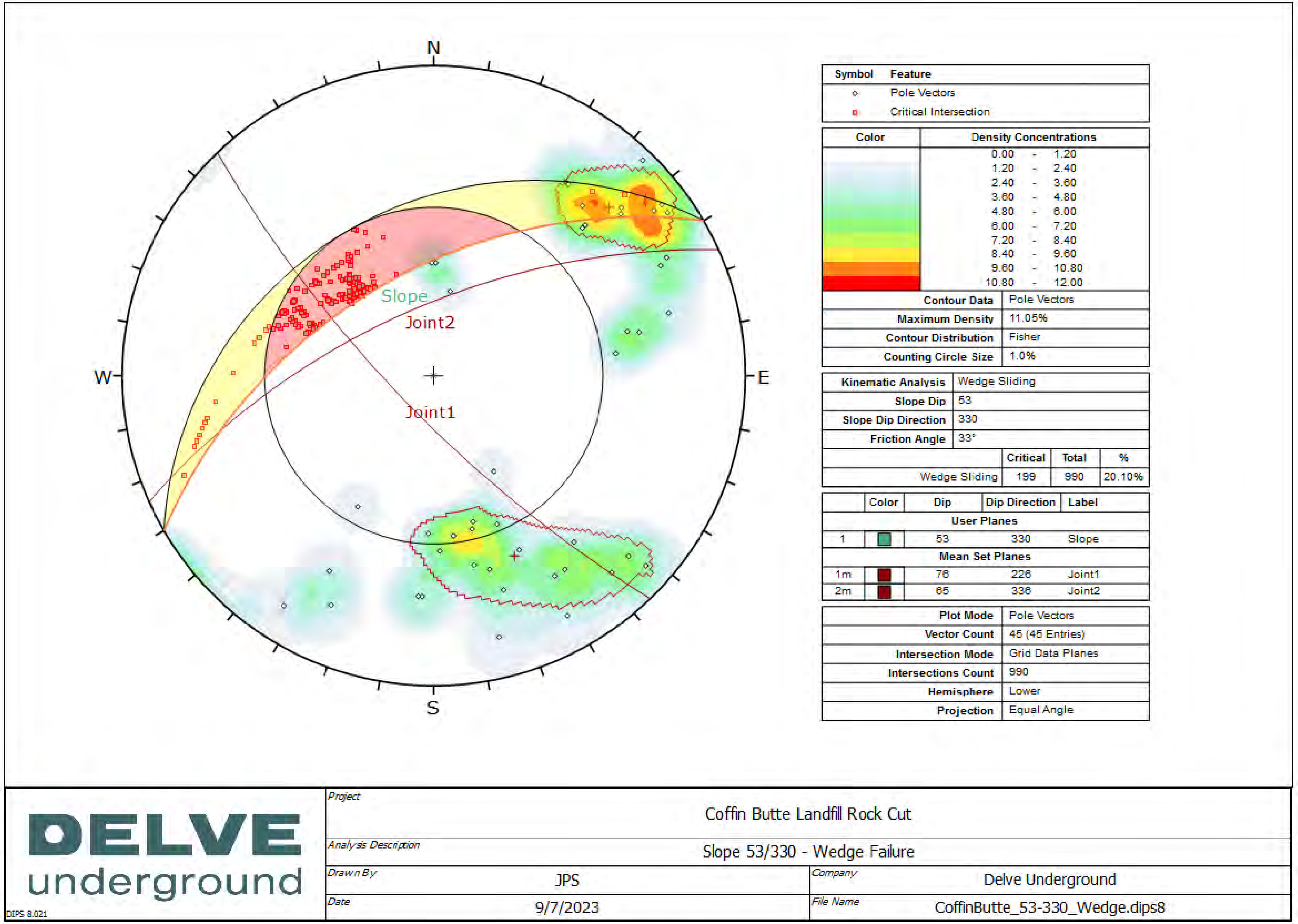
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/330 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-330_Planar.dips8

Slope: 53/330 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
🟥	Critical Intersection

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	330		
Friction Angle	33°		
	Critical	**Total**	**%**
Wedge Sliding	199	990	20.10%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

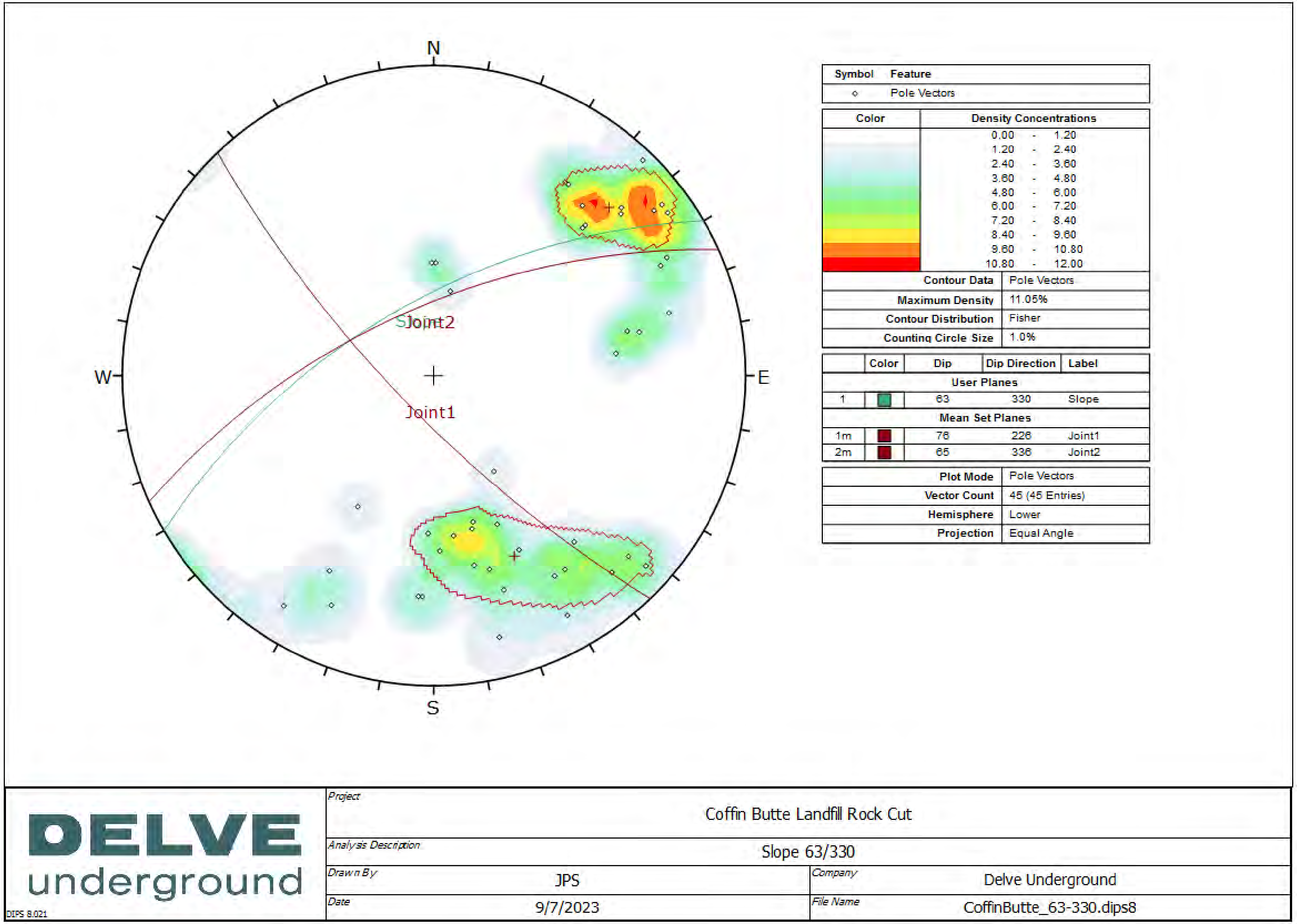
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/330 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-330_Wedge.dips8

Slope: 63/330 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

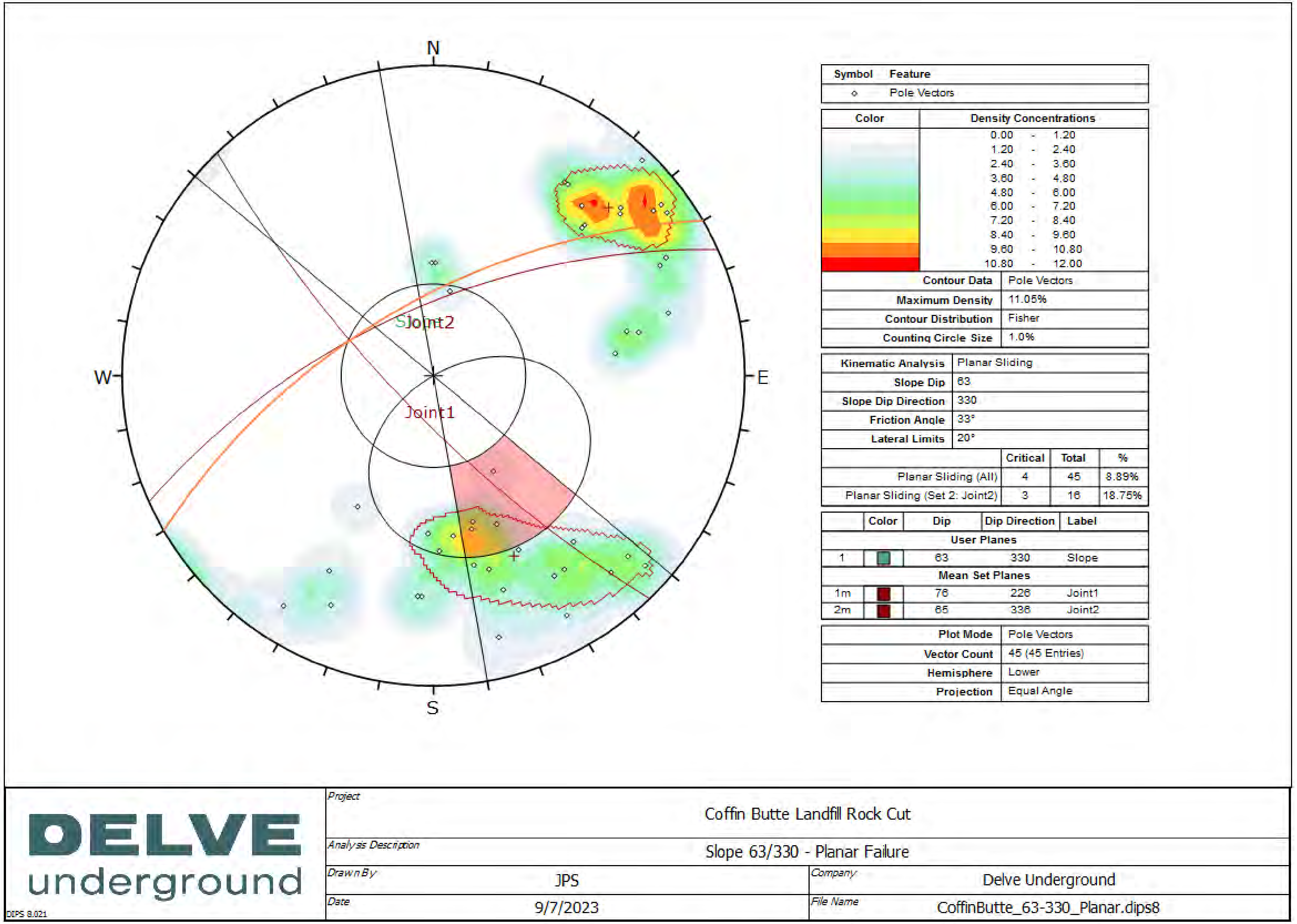
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/330		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-330.dips8

Slope: 63/330 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	63
Slope Dip Direction	330
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	4	45	8.89%
Planar Sliding (Set 2: Joint2)	3	16	18.75%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

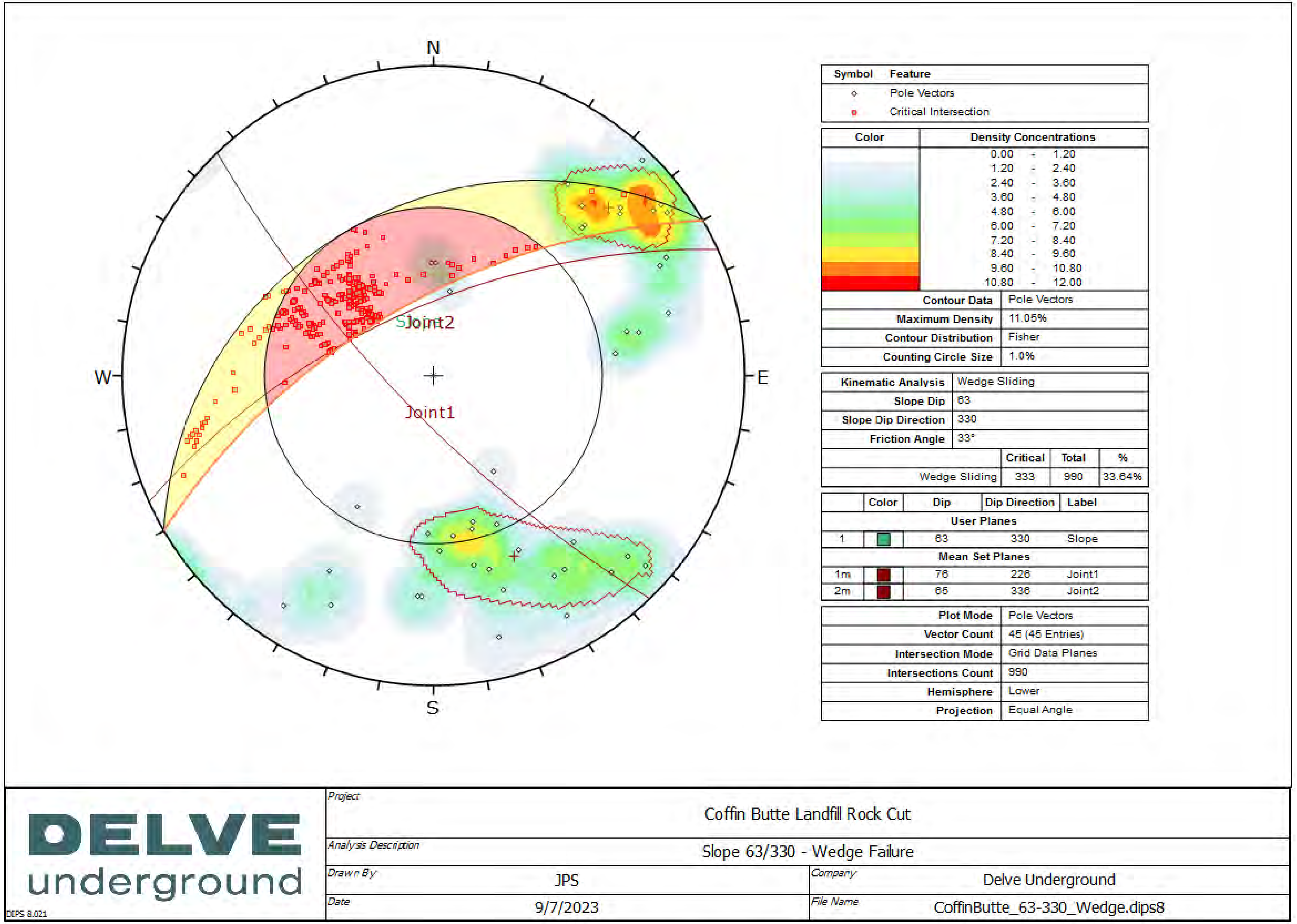
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 63/330 - Planar Failure
Drawn By	JPS
Company	Delve Underground
Date	9/7/2023
File Name	CoffinButte_63-330_Planar.dips8

Slope: 63/330 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	63		
Slope Dip Direction	330		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	333	990	33.64%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	330	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

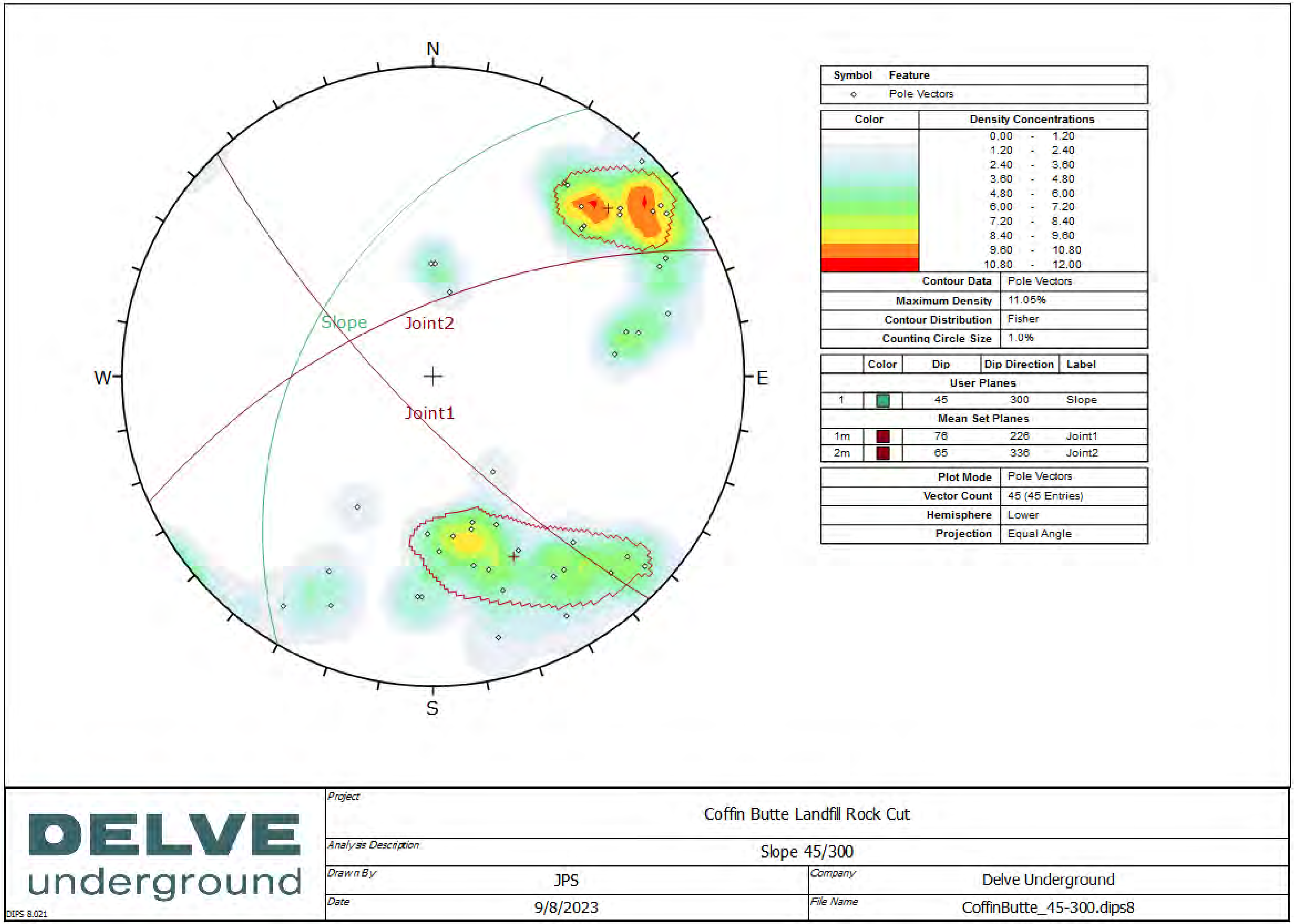
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/330 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-330_Wedge.dips8

Slope: 45/300 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
		User Planes		
1	🟩	45	300	Slope
		Mean Set Planes		
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

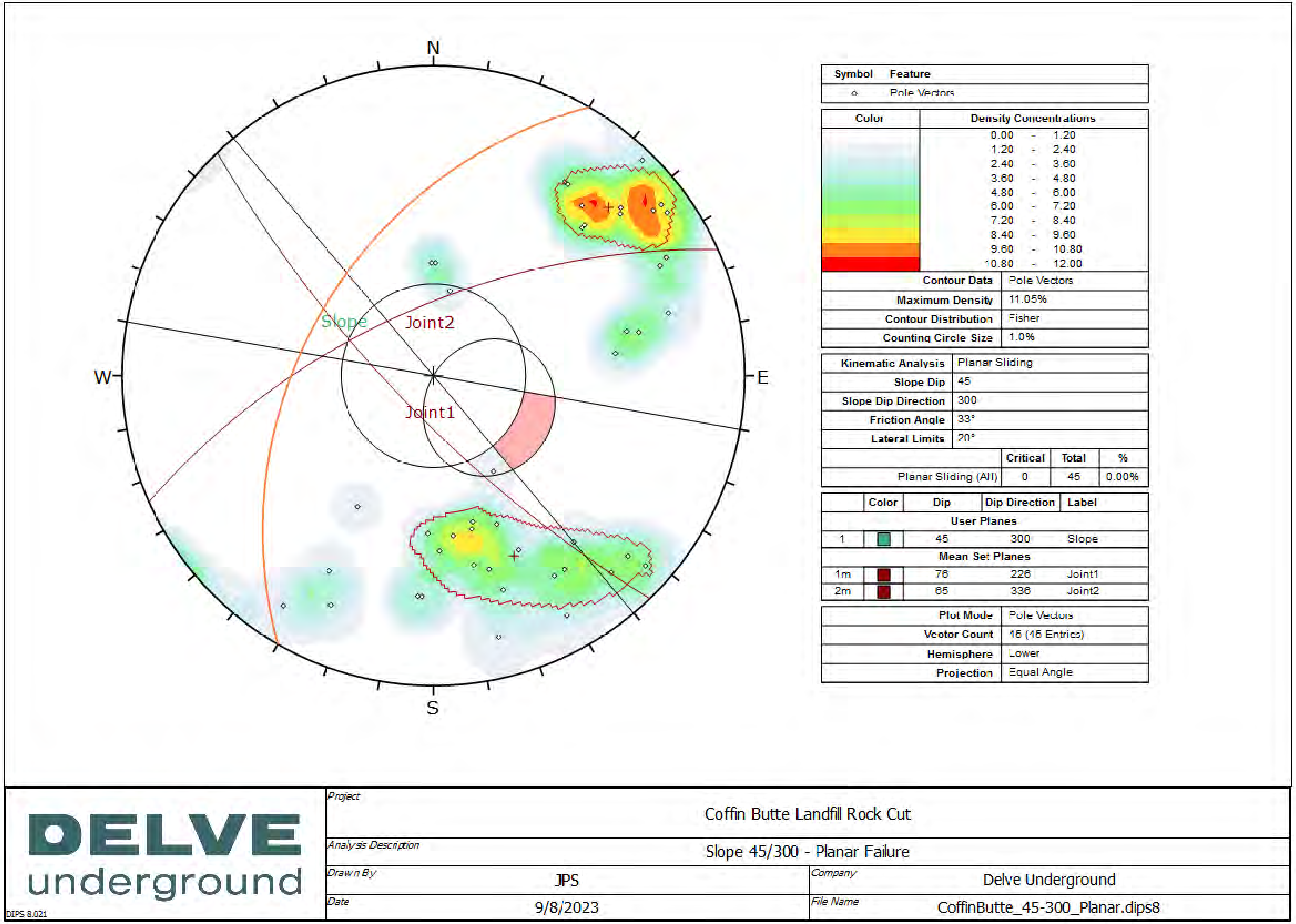
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/300		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-300.dips8

Slope: 45/300 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	45		
Slope Dip Direction	300		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	**Total**	**%**
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

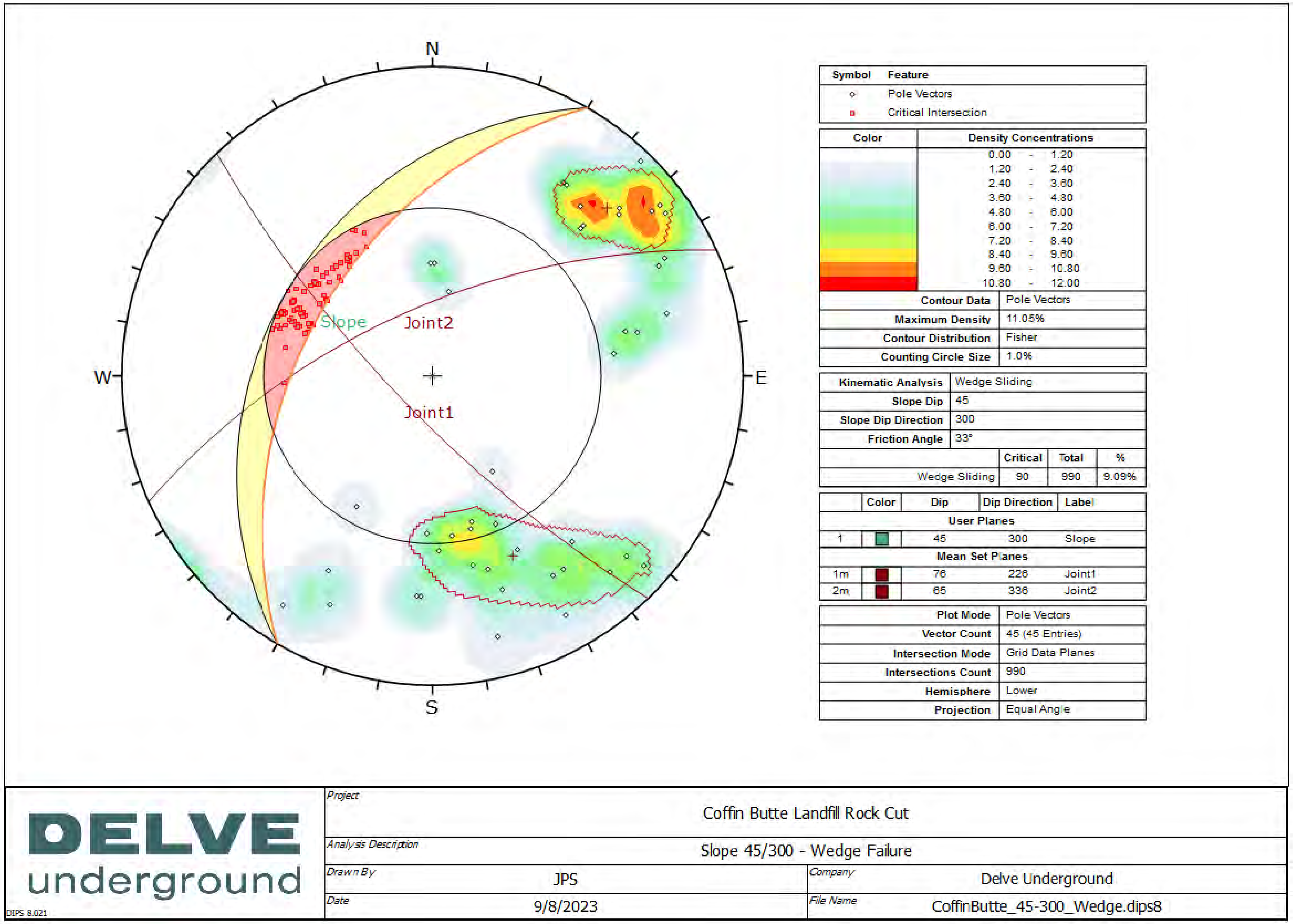
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/300 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-300_Planar.dips8

Slope: 45/300 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	45		
Slope Dip Direction	300		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	90	990	9.09%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 45/300 - Wedge Failure

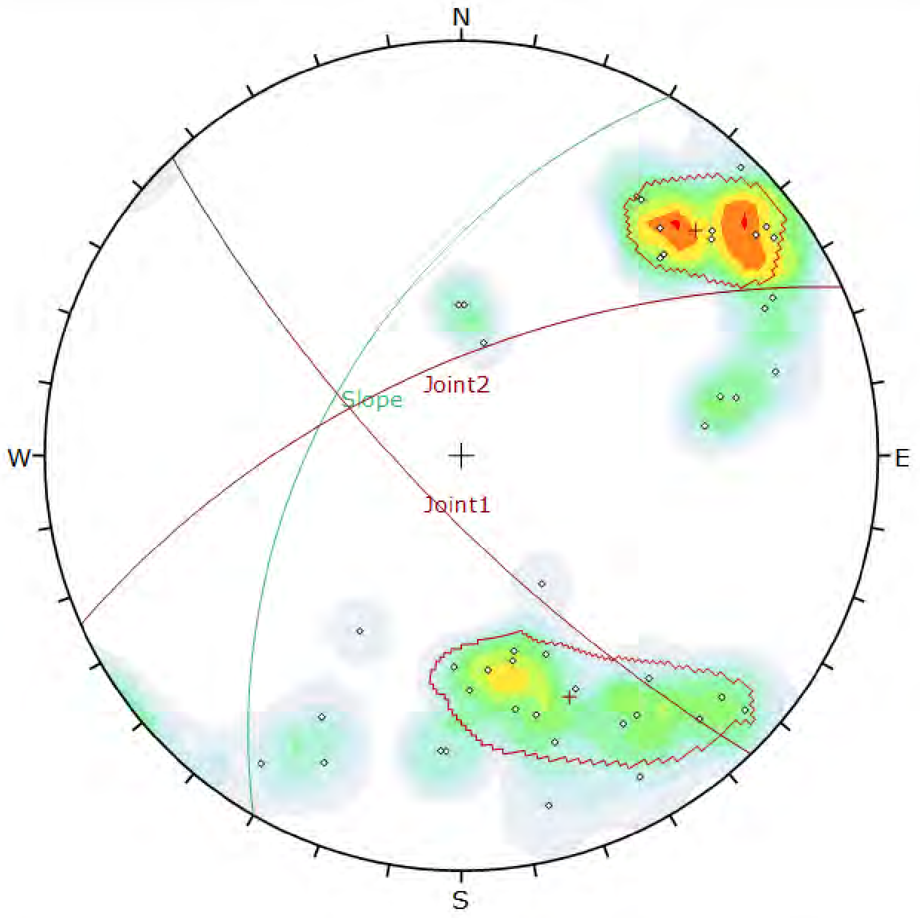
Drawn By JPS

Company Delve Underground

Date 9/8/2023

File Name CoffinButte_45-300_Wedge.dips8

Slope: 53/300 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

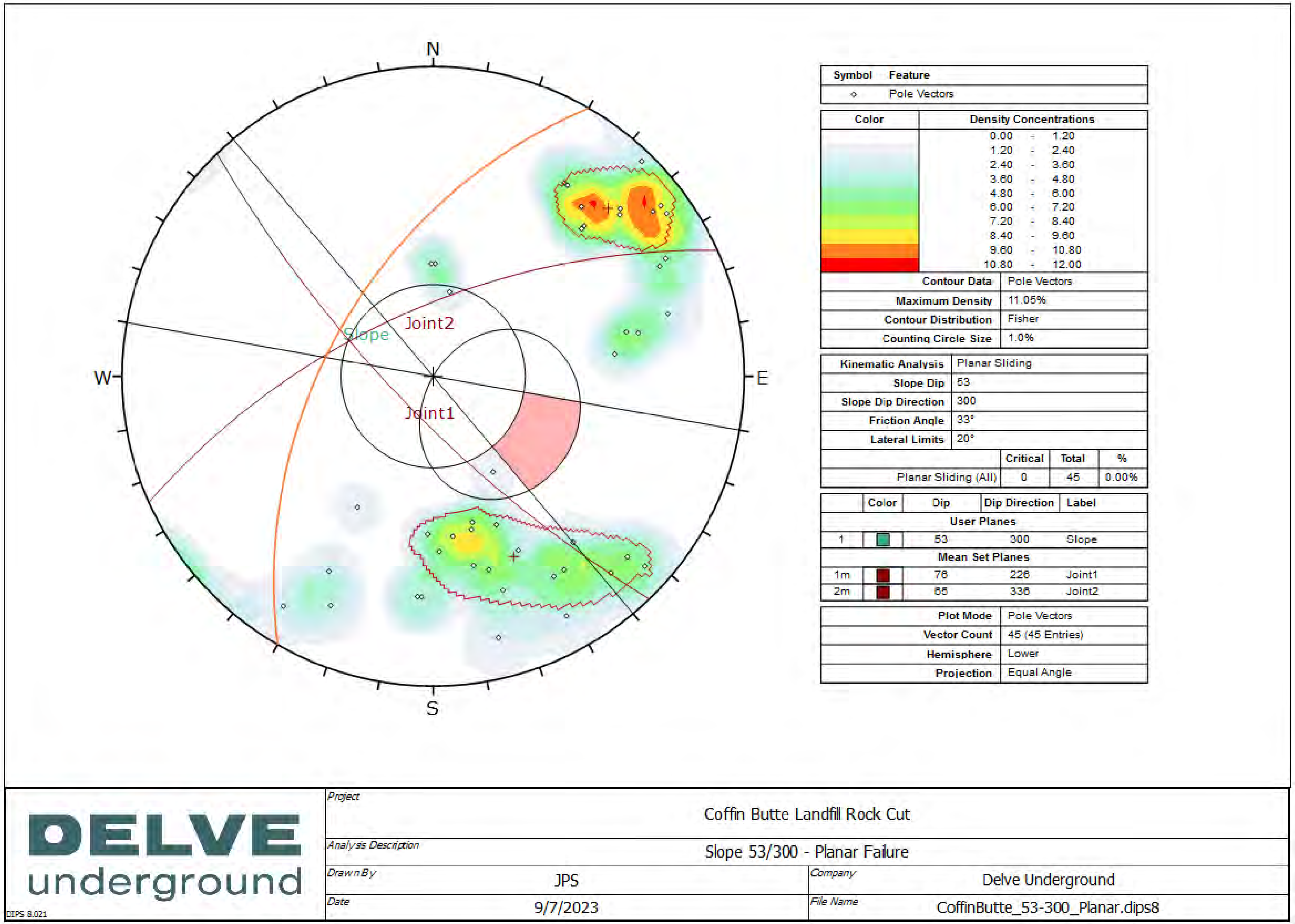
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground	*Project*	Coffin Butte Landfill Rock Cut	
	Analysis Description	Slope 53/300	
	Drawn By JPS	*Company*	Delve Underground
DIPS 8.021	*Date* 9/7/2023	*File Name*	CoffinButte_53-300.dips8

Slope: 53/300 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟩	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	53		
Slope Dip Direction	300		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

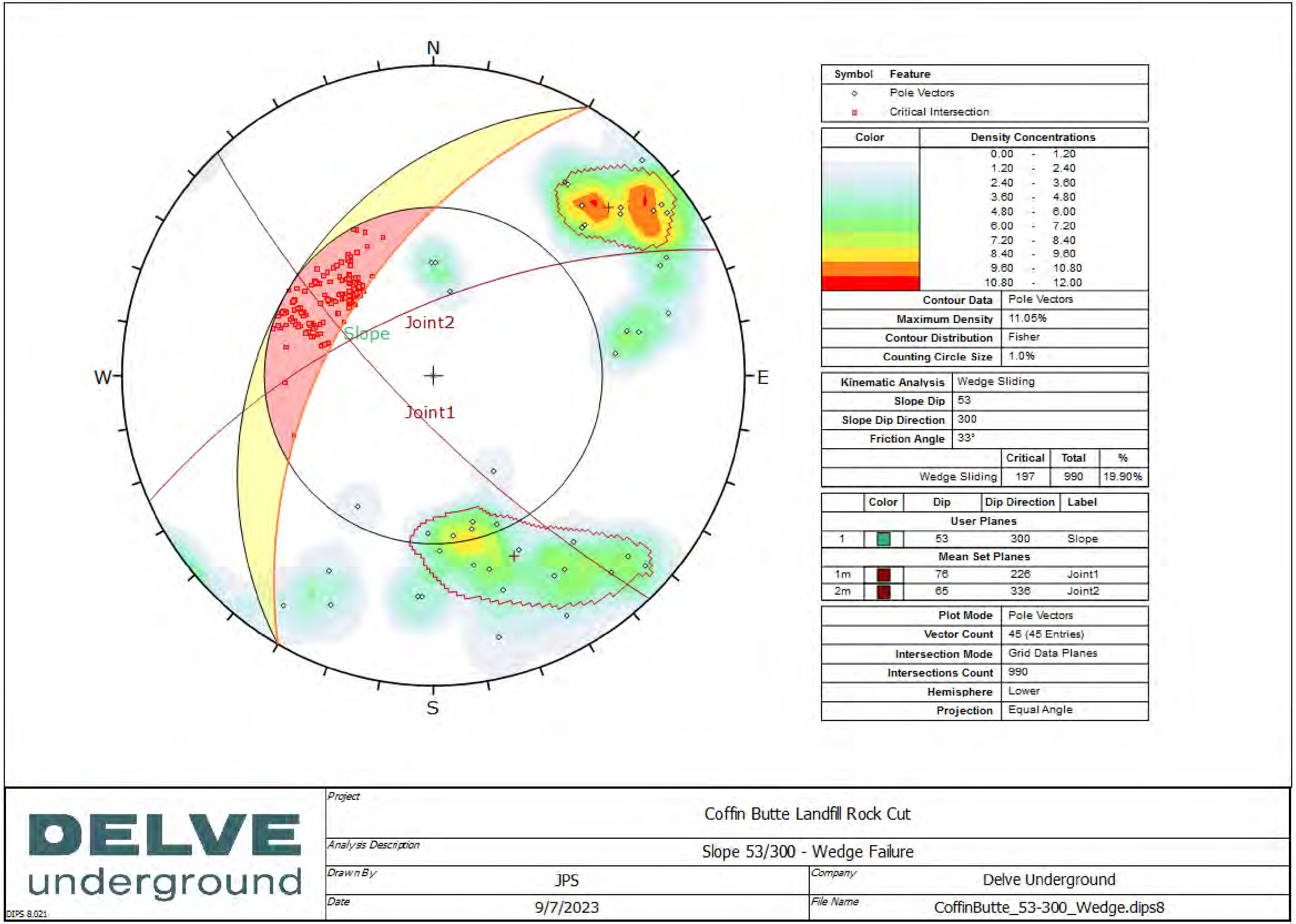
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/300 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-300_Planar.dips8

Slope: 53/300 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
▪	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	53		
Slope Dip Direction	300		
Friction Angle	33°		
	Critical	Total	%
Wedge Sliding	197	990	19.90%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

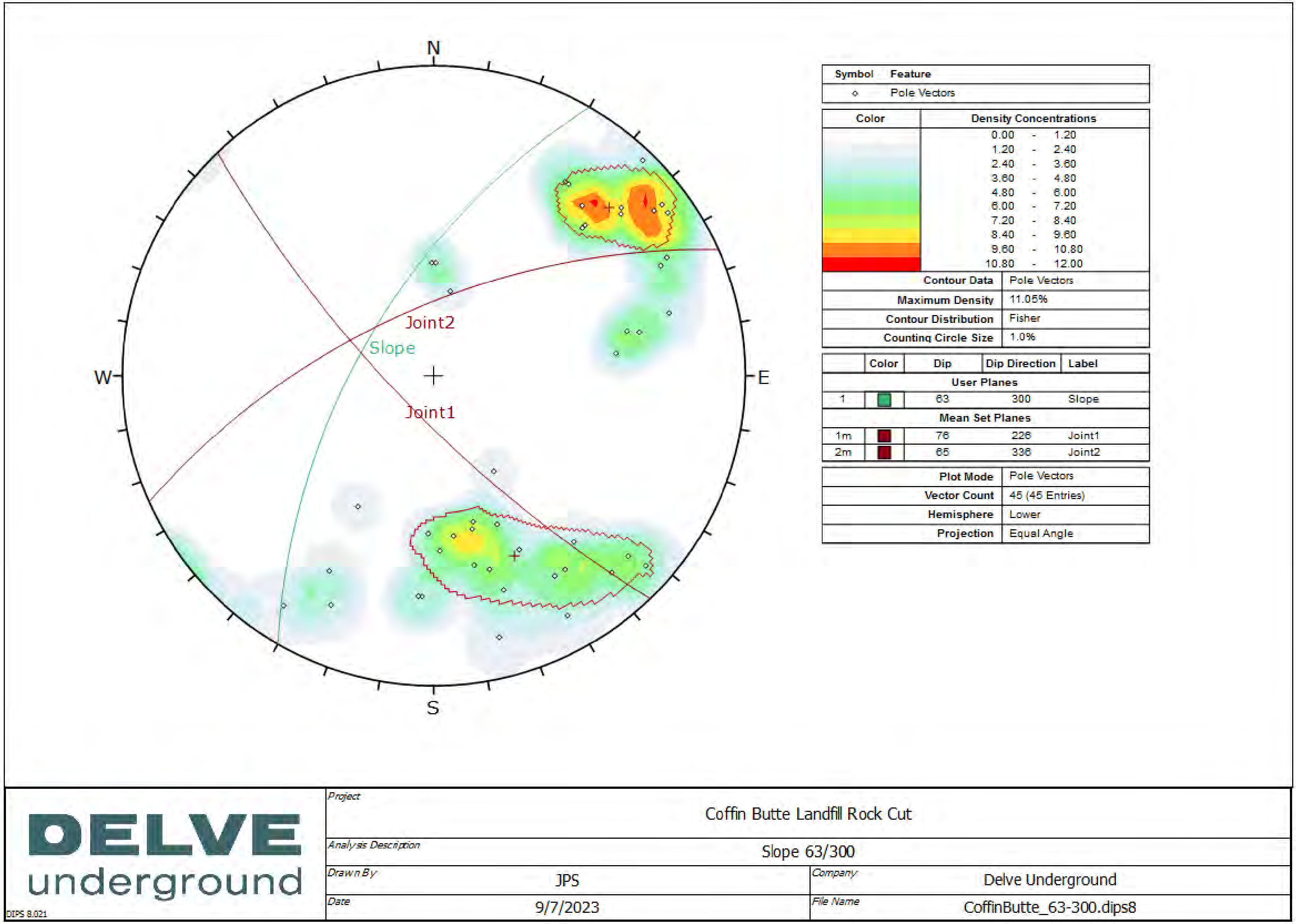
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/300 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_53-300_Wedge.dips8

Slope: 63/300 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

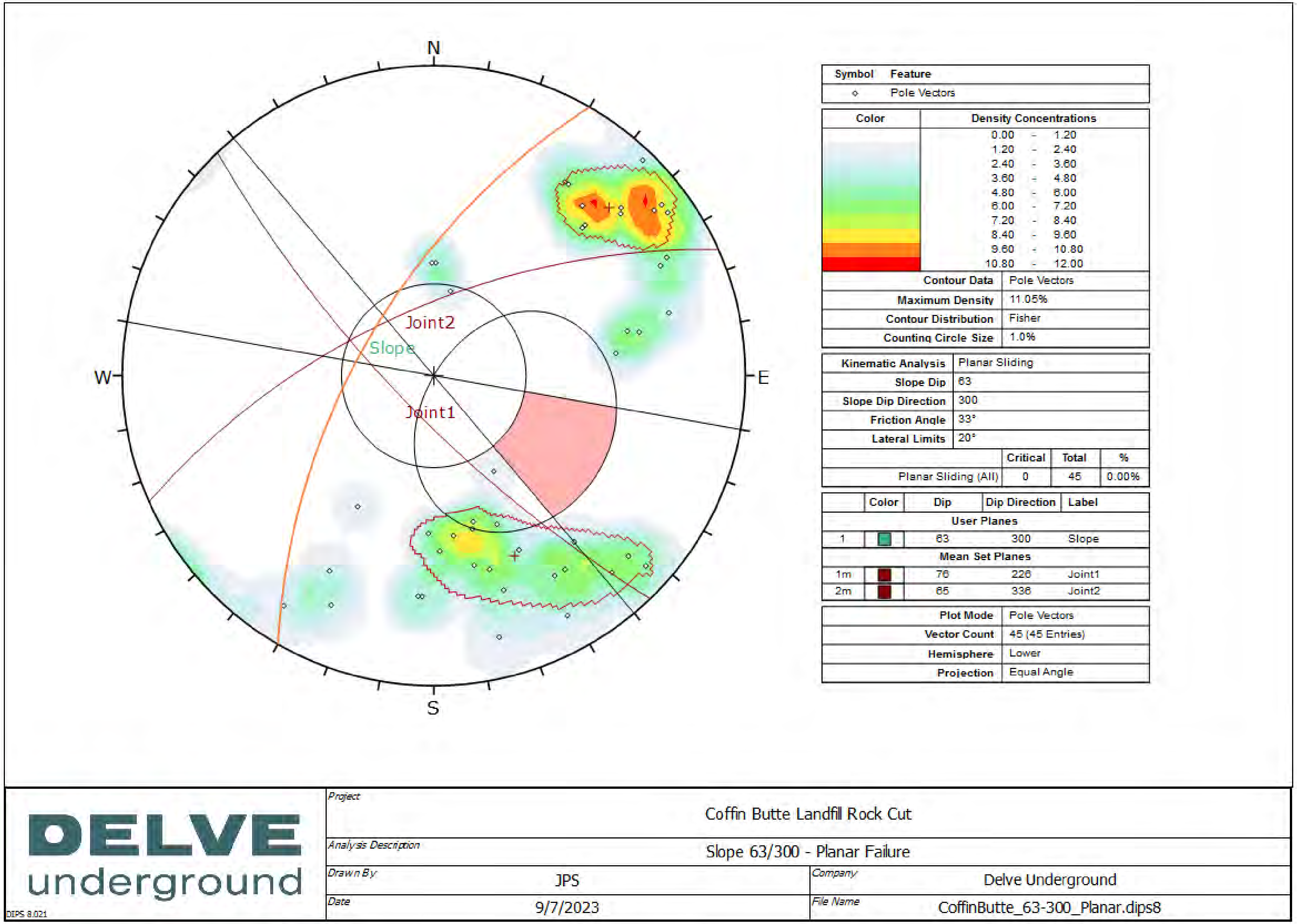
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/300		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-300.dips8

Slope: 63/300 – Planar Failure



Symbol	Feature
⋄	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00
Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	63		
Slope Dip Direction	300		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

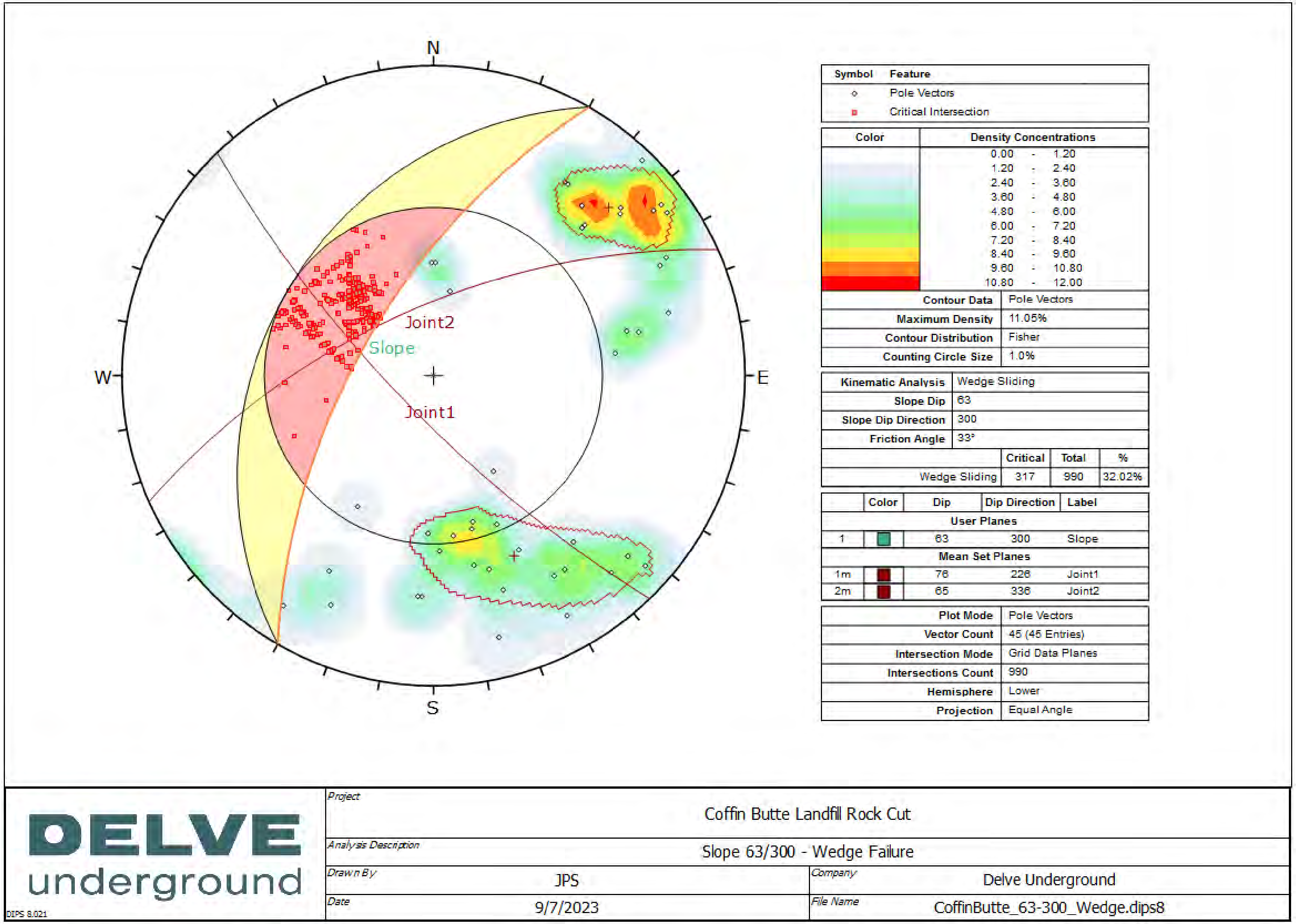
	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	300	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	338	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/300 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-300_Planar.dips8

DIPS 8.021

Slope: 63/300 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
🟥	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding		
Slope Dip	63		
Slope Dip Direction	300		
Friction Angle	33°		
	Critical	**Total**	**%**
Wedge Sliding	317	990	32.02%

	Color	Dip	Dip Direction	Label
	User Planes			
1	🟩	63	300	Slope
	Mean Set Planes			
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

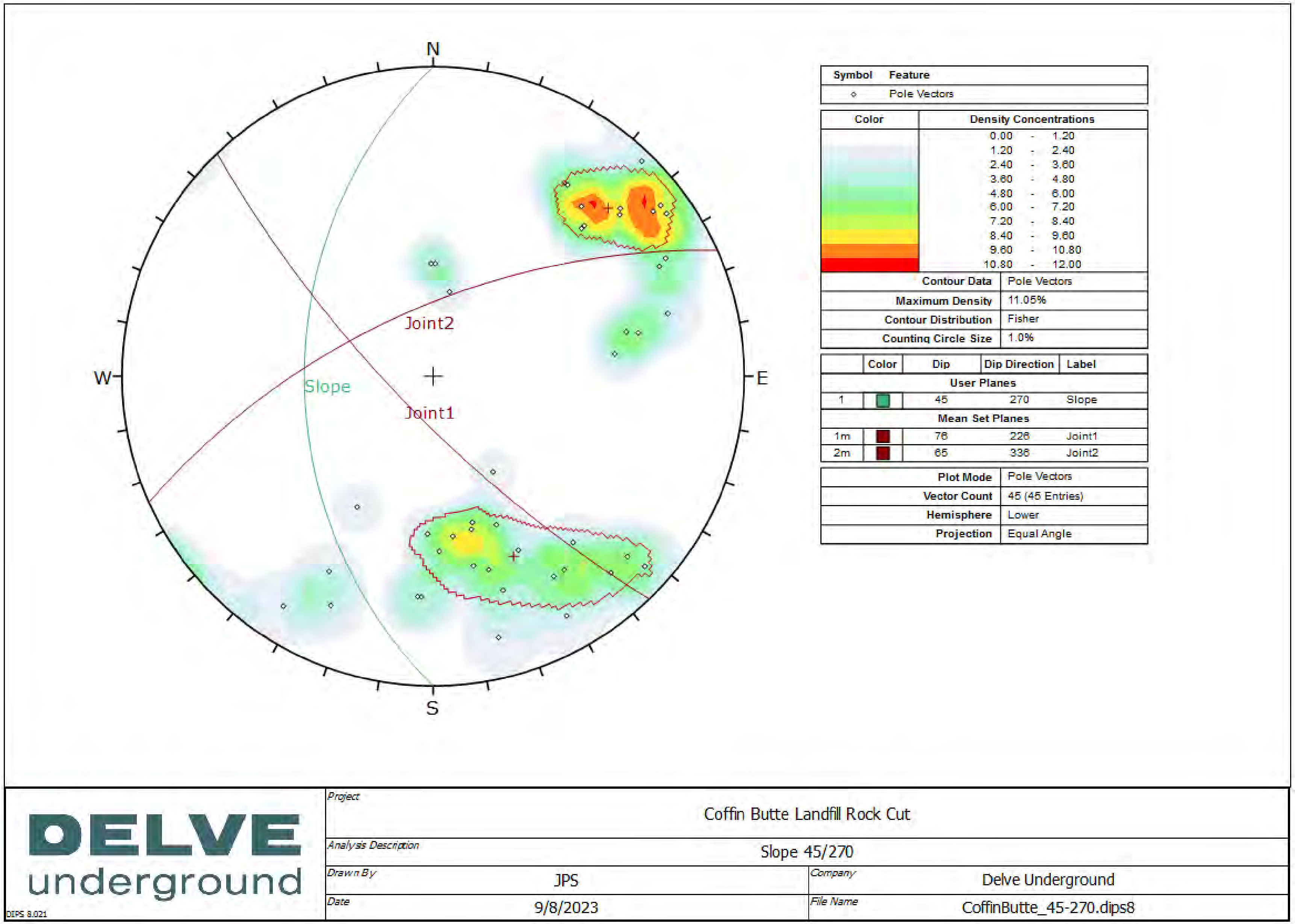
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/300 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/7/2023	*File Name*	CoffinButte_63-300_Wedge.dips8

Slope: 45/270 – Stereonet



Symbol	Feature
⋄	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
		User Planes		
1	🟩	45	270	Slope
		Mean Set Planes		
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

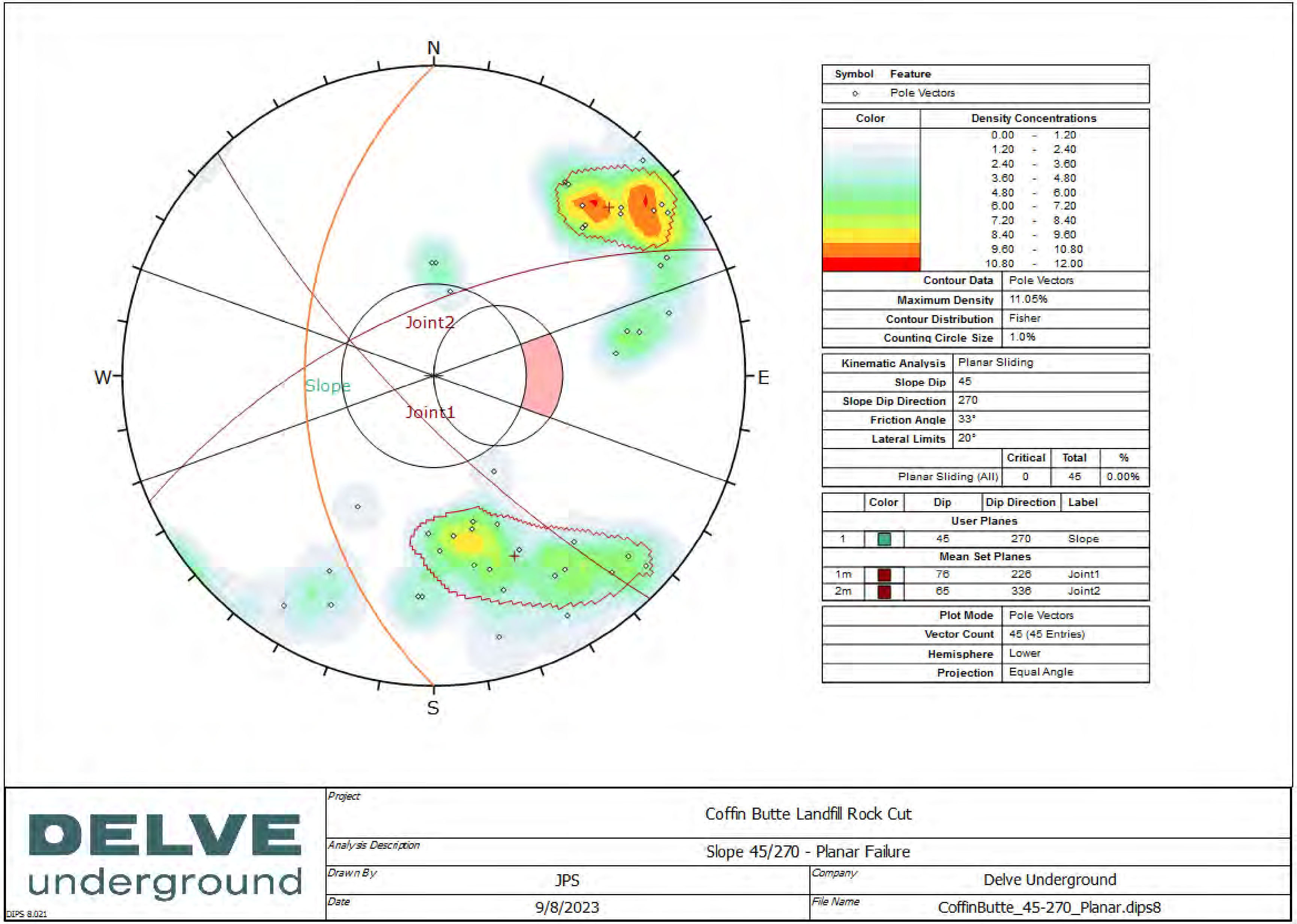
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/270		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-270.dips8

Slope: 45/270 – Planar Failure



Symbol	Feature
○	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding
Slope Dip	45
Slope Dip Direction	270
Friction Angle	33°
Lateral Limits	20°

	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

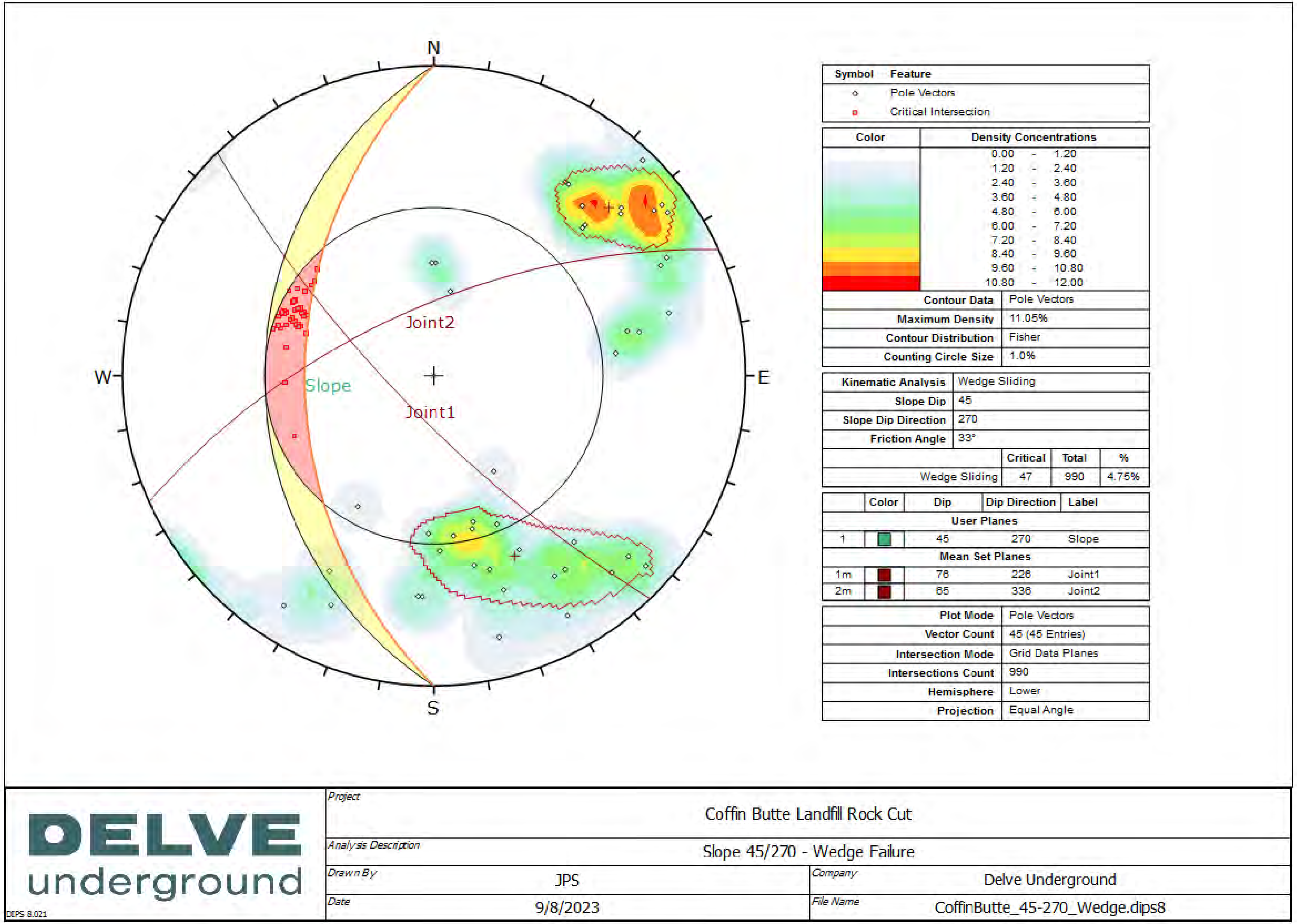
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 45/270 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-270_Planar.dips8

Slope: 45/270 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
□	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	45
Slope Dip Direction	270
Friction Angle	33°

	Critical	Total	%
Wedge Sliding	47	990	4.75%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	45	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

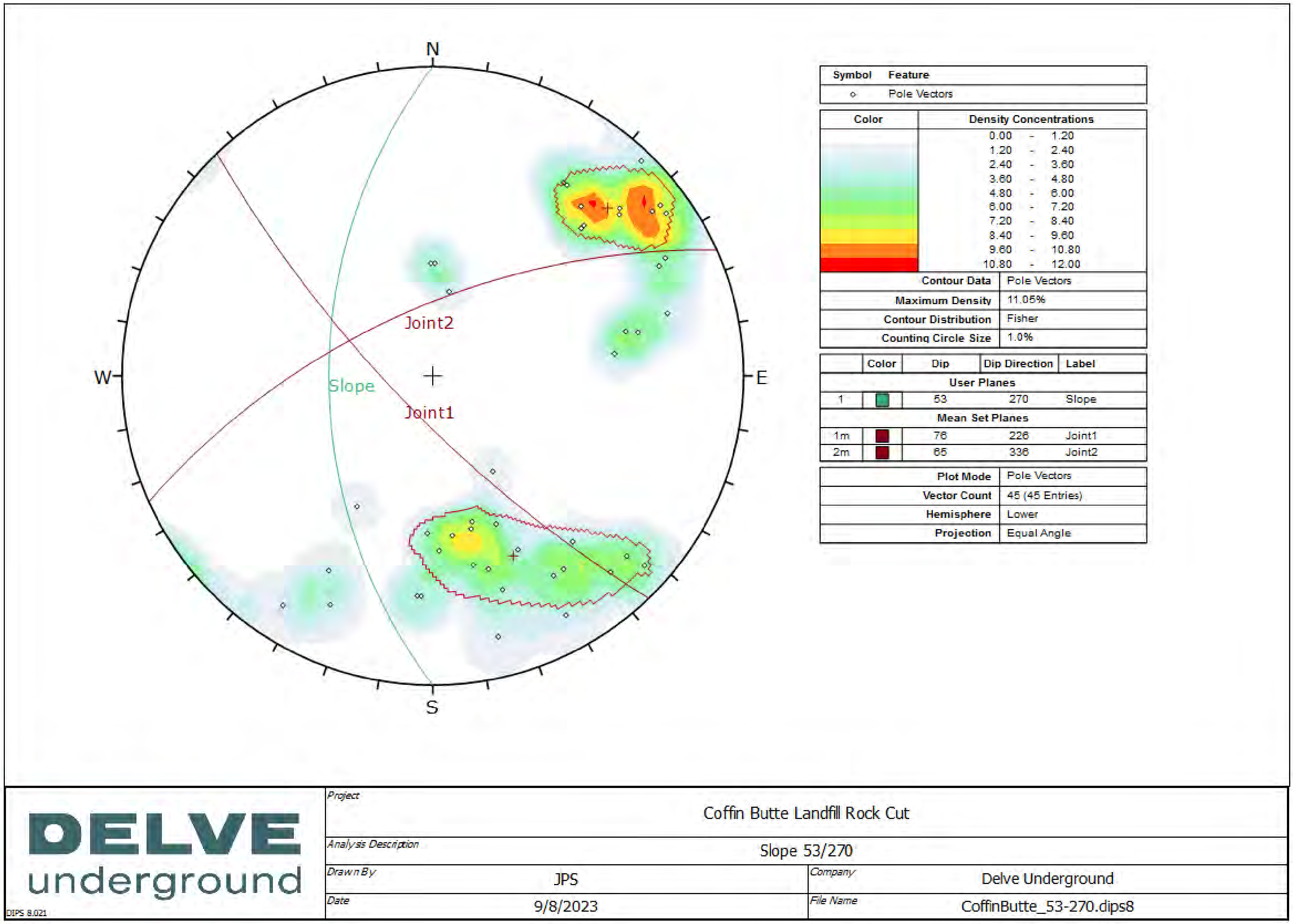
DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut
Analysis Description	Slope 45/270 - Wedge Failure

Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_45-270_Wedge.dips8

Slope: 53/270 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

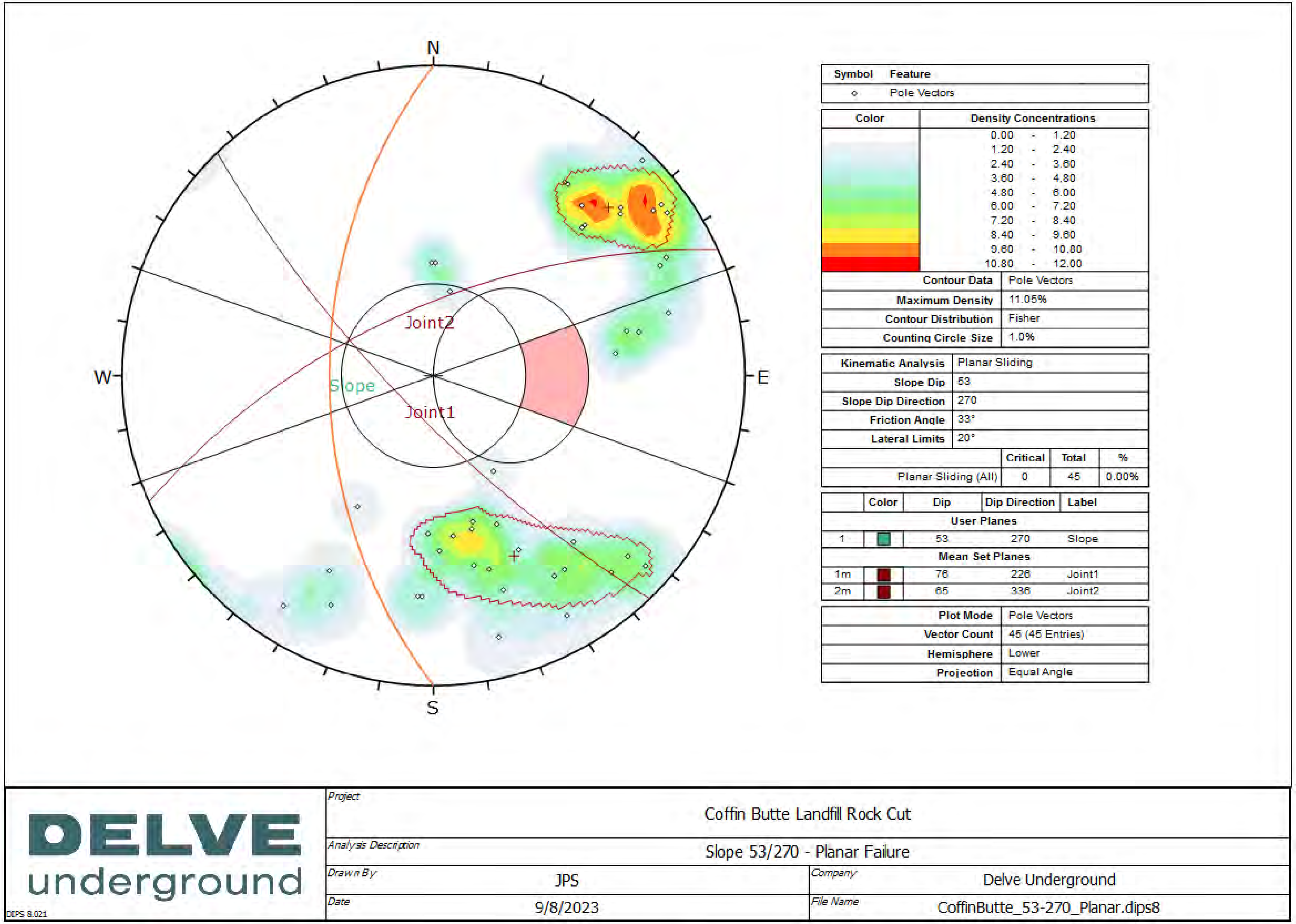
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/270		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_53-270.dips8

Slope: 53/270 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
🟦	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	53		
Slope Dip Direction	270		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	0	45	0.00%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

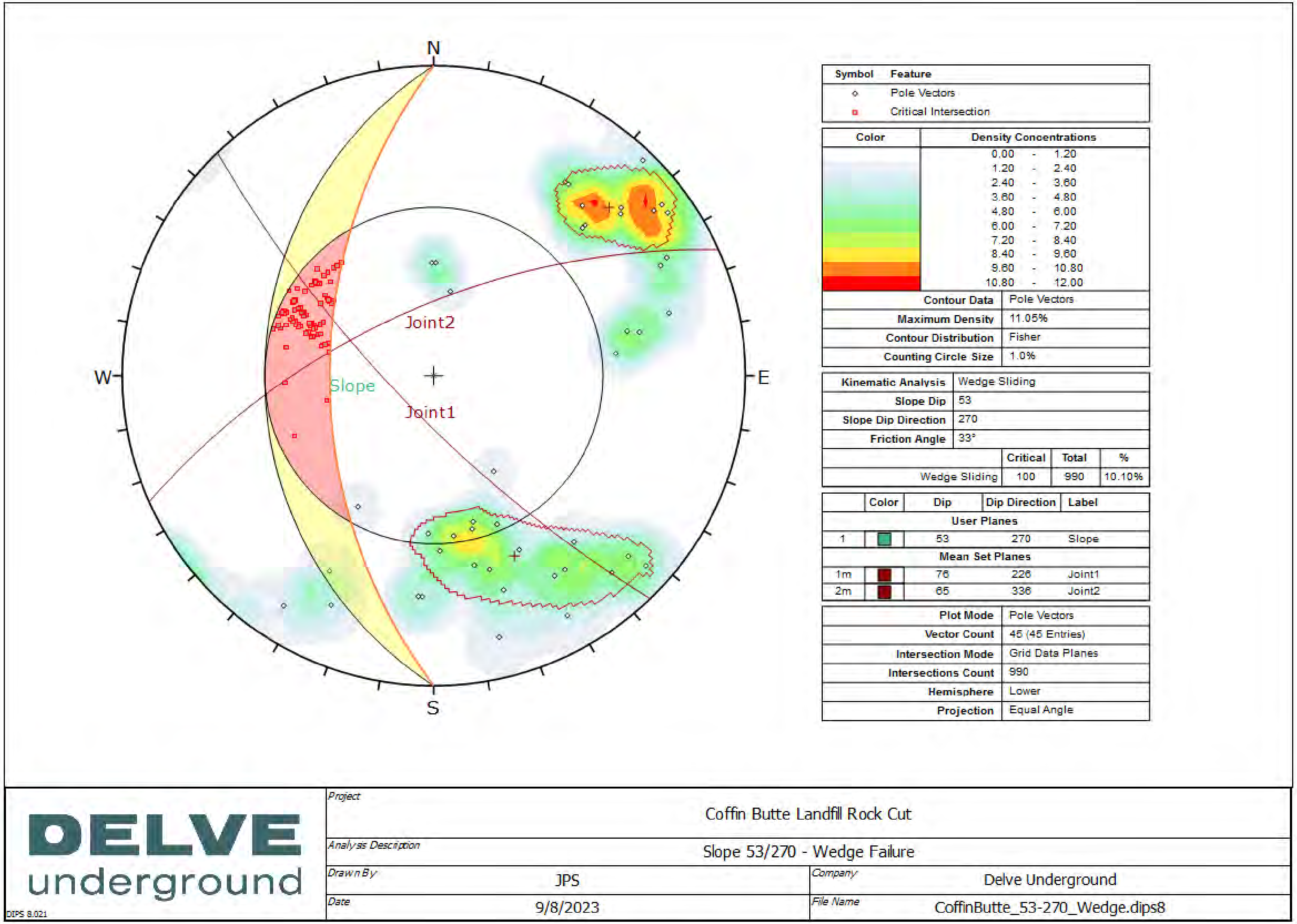
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/270 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_53-270_Planar.dips8

DIPS 8.021

Slope: 53/270 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
▫	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	53
Slope Dip Direction	270
Friction Angle	33°

	Critical	Total	%
Wedge Sliding	100	990	10.10%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	53	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

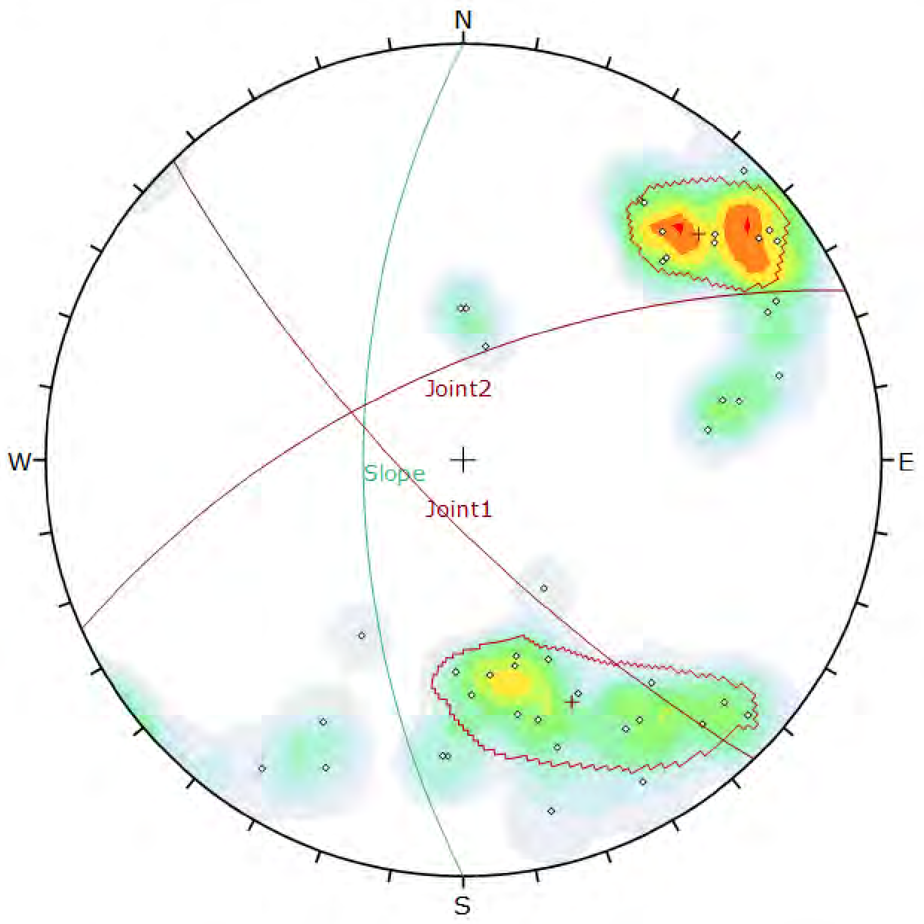
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 53/270 - Wedge Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_53-270_Wedge.dips8

Slope: 63/270 – Stereonet



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
⬜	0.00 - 1.20
⬜	1.20 - 2.40
🟦	2.40 - 3.60
🟦	3.60 - 4.80
🟩	4.80 - 6.00
🟩	6.00 - 7.20
🟩	7.20 - 8.40
🟨	8.40 - 9.60
🟧	9.60 - 10.80
🟥	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

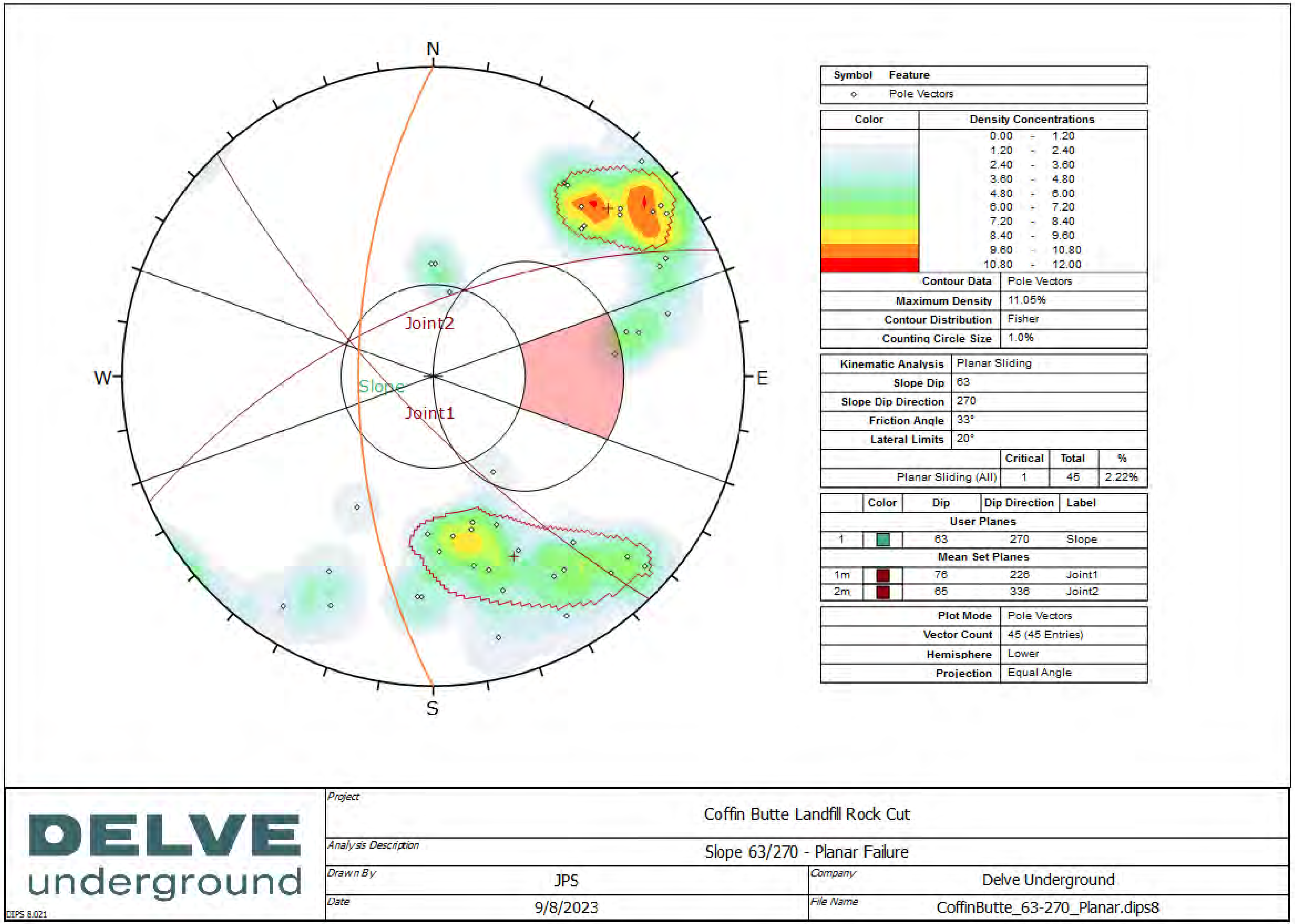
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/270		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_63-270.dips8

Slope: 63/270 – Planar Failure



Symbol	Feature
◇	Pole Vectors

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Planar Sliding		
Slope Dip	63		
Slope Dip Direction	270		
Friction Angle	33°		
Lateral Limits	20°		
	Critical	Total	%
Planar Sliding (All)	1	45	2.22%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	270	Slope
Mean Set Planes				
1m	🟥	76	228	Joint1
2m	🟥	65	336	Joint2

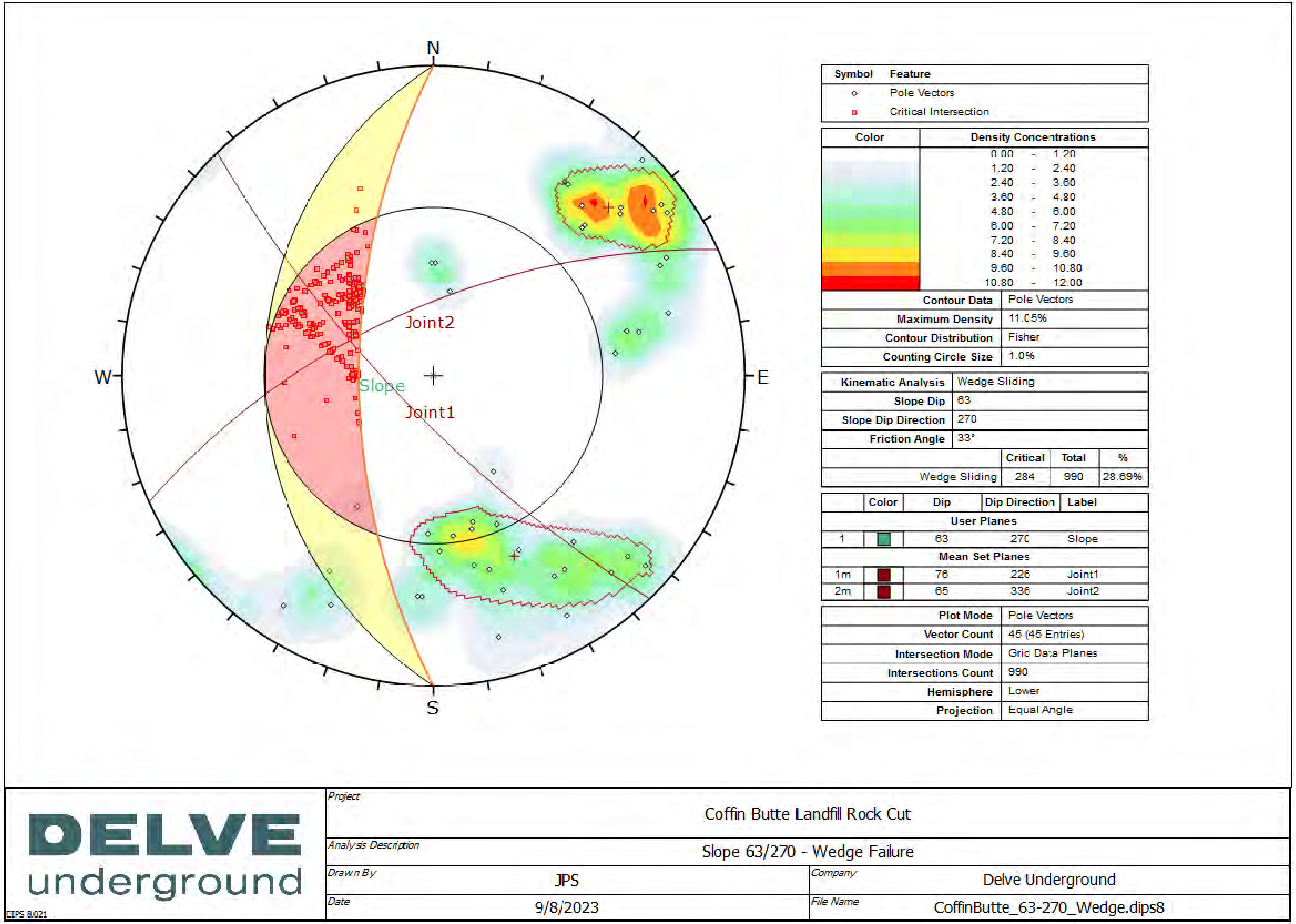
Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Hemisphere	Lower
Projection	Equal Angle

DELVE underground

DIPS 8.021

Project	Coffin Butte Landfill Rock Cut		
Analysis Description	Slope 63/270 - Planar Failure		
Drawn By	JPS	*Company*	Delve Underground
Date	9/8/2023	*File Name*	CoffinButte_63-270_Planar.dips8

Slope: 63/270 – Wedge Failure



Symbol	Feature
◇	Pole Vectors
▫	Critical Intersection

Color	Density Concentrations
	0.00 - 1.20
	1.20 - 2.40
	2.40 - 3.60
	3.60 - 4.80
	4.80 - 6.00
	6.00 - 7.20
	7.20 - 8.40
	8.40 - 9.60
	9.60 - 10.80
	10.80 - 12.00

Contour Data	Pole Vectors
Maximum Density	11.05%
Contour Distribution	Fisher
Counting Circle Size	1.0%

Kinematic Analysis	Wedge Sliding
Slope Dip	63
Slope Dip Direction	270
Friction Angle	33°

	Critical	Total	%
Wedge Sliding	284	990	28.69%

	Color	Dip	Dip Direction	Label
User Planes				
1	🟩	63	270	Slope
Mean Set Planes				
1m	🟥	76	226	Joint1
2m	🟥	65	336	Joint2

Plot Mode	Pole Vectors
Vector Count	45 (45 Entries)
Intersection Mode	Grid Data Planes
Intersections Count	990
Hemisphere	Lower
Projection	Equal Angle

DELVE
underground

DIPS 8.021

Project Coffin Butte Landfill Rock Cut

Analysis Description Slope 63/270 - Wedge Failure

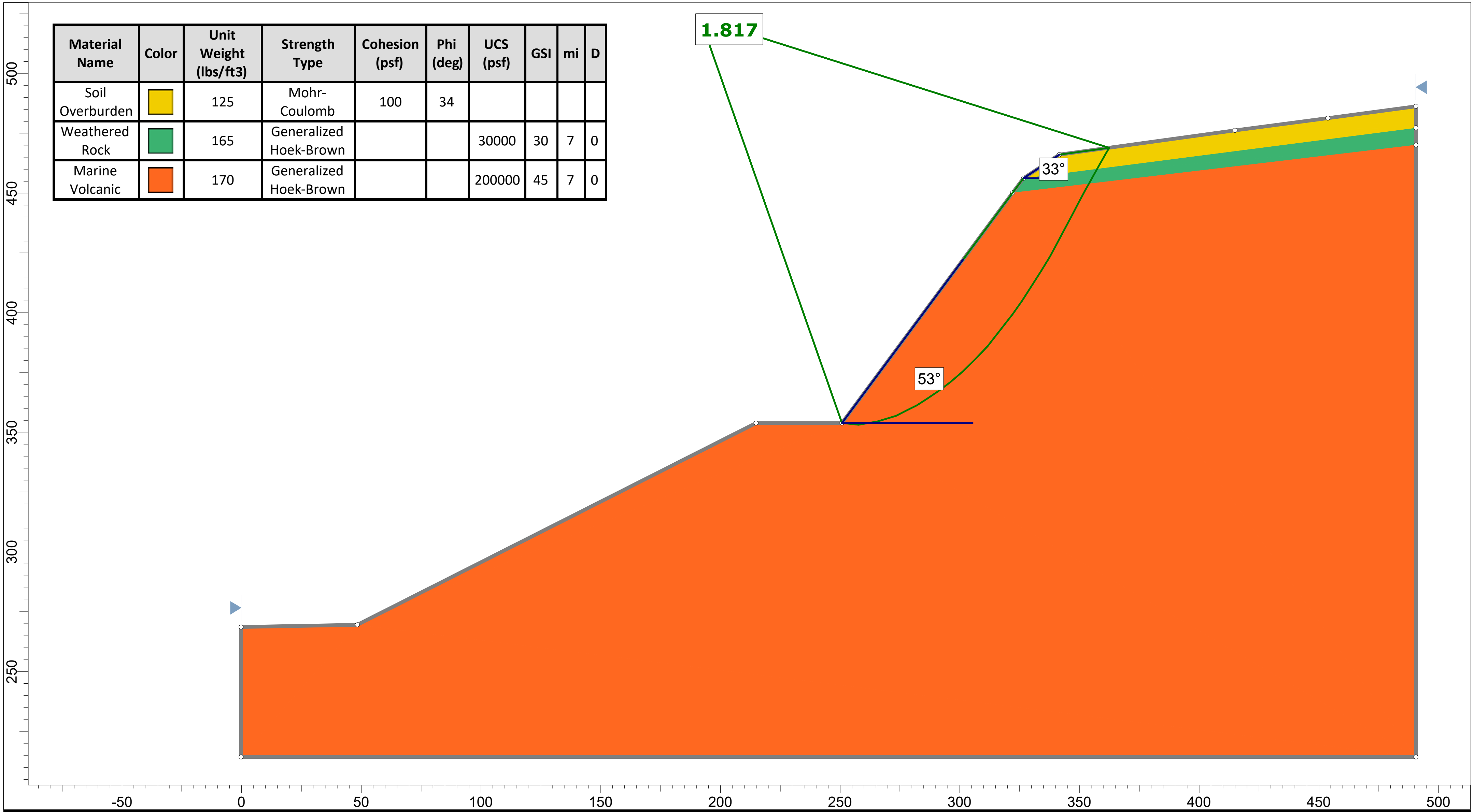
Drawn By JPS

Company Delve Underground

Date 9/8/2023

File Name CoffinButte_63-270_Wedge.dips8

Appendix D: Limit Equilibrium Stability Results

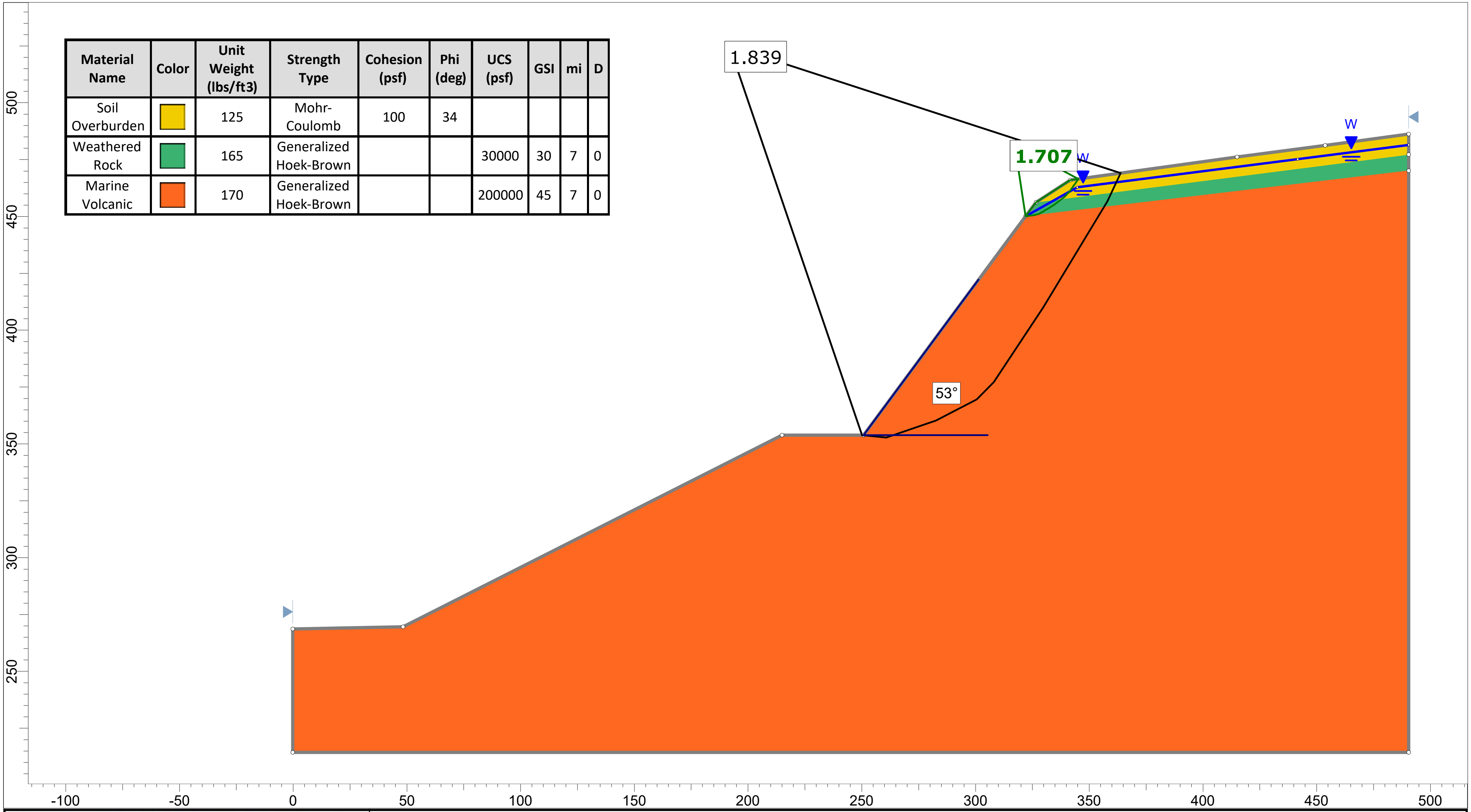


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	100	34				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Marine Volcanic	🟧	170	Generalized Hoek-Brown			200000	45	7	0

DELVE underground

SLIDEINTERPRET 9.027

Project	Coffin Butte Landfill		
Group	Section B - Dry - 0.75:1, 1.5:1	*Scenario*	Cuckoo
Drawn By	Guzek	*Company*	Delve Underground
Date	9/27/2023, 8:59:34 AM	*File Name*	09-2023_Section-B.slmd

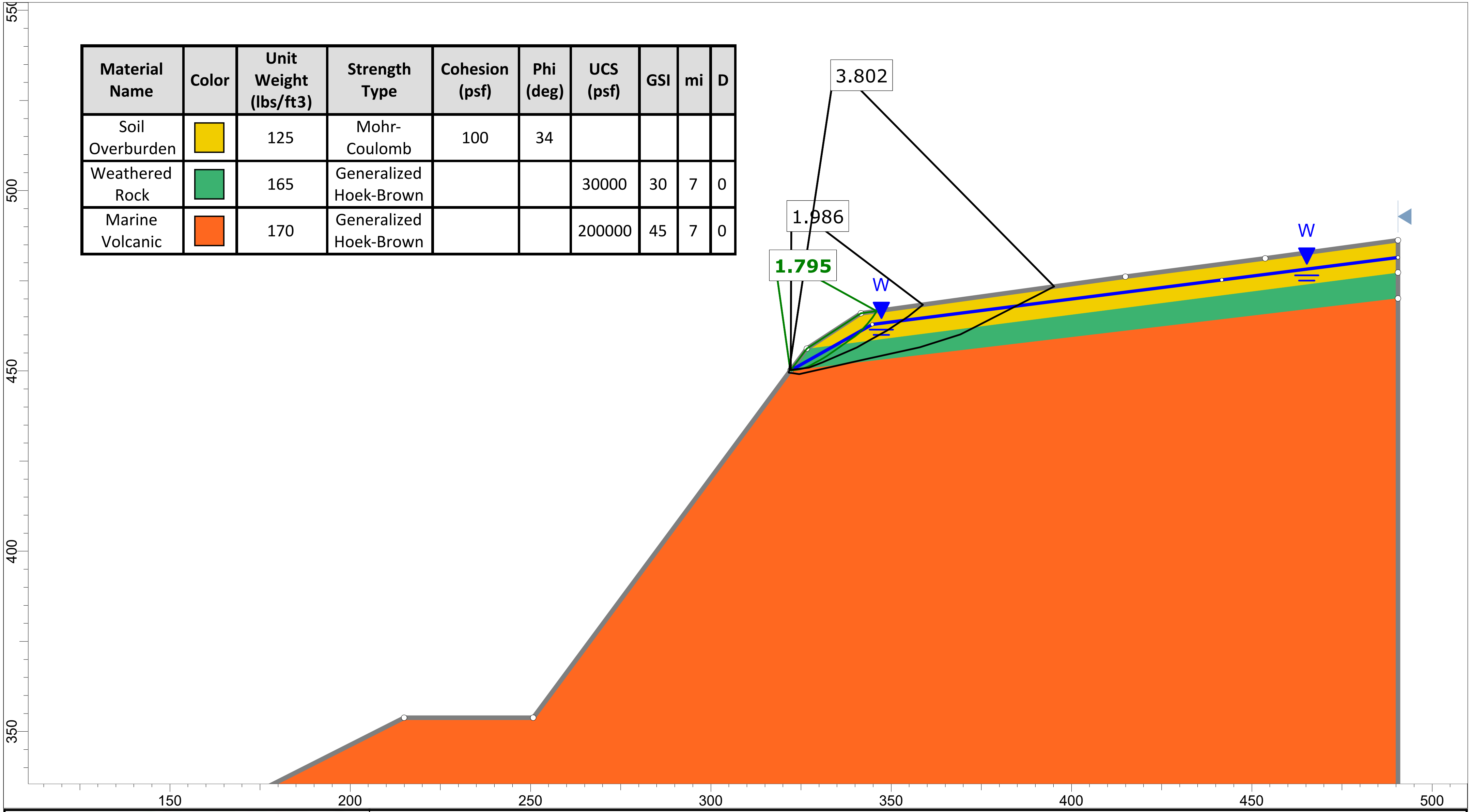


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	100	34				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Marine Volcanic	🟧	170	Generalized Hoek-Brown			200000	45	7	0

DELVE underground

SLIDEINTERPRET 9.027

Project	Coffin Butte Landfill		
Group	Section B - Wet - 0.75:1, 1.5:1	*Scenario*	Cuckoo
Drawn By	Guzek	*Company*	Delve Underground
Date	9/27/2023, 8:59:34 AM	*File Name*	09-2023_Section-B.slmd

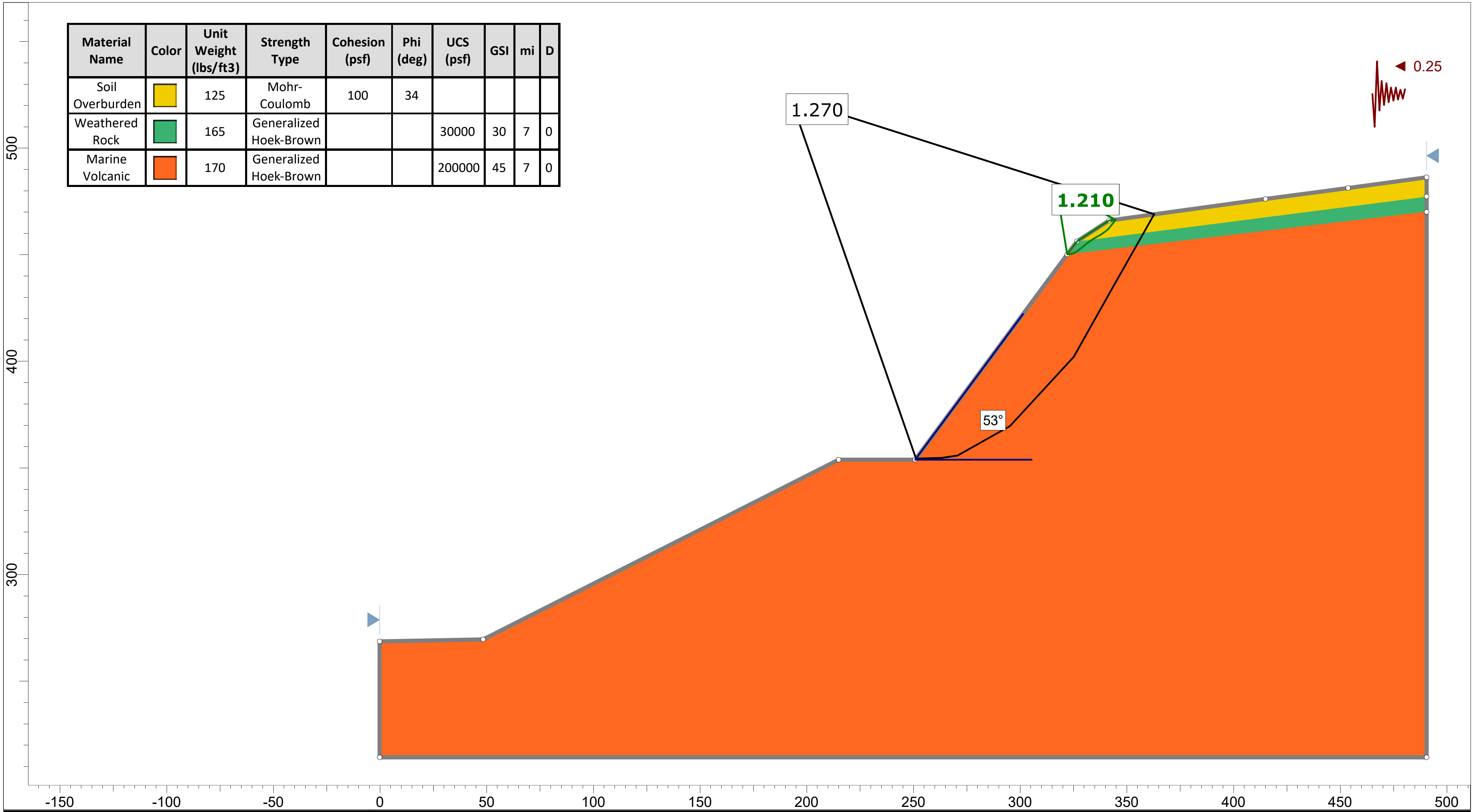


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	100	34				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Marine Volcanic	🟧	170	Generalized Hoek-Brown			200000	45	7	0

DELVE underground

SLIDEINTERPRET 9.027

Project	Coffin Butte Landfill
Group	Section B - Fully Saturated - 0.75:1, 1.5:1
Scenario	Cuckoo
Drawn By	Guzek
Company	Delve Underground
Date	9/27/2023, 8:59:34 AM
File Name	09-2023_Section-B.slmd

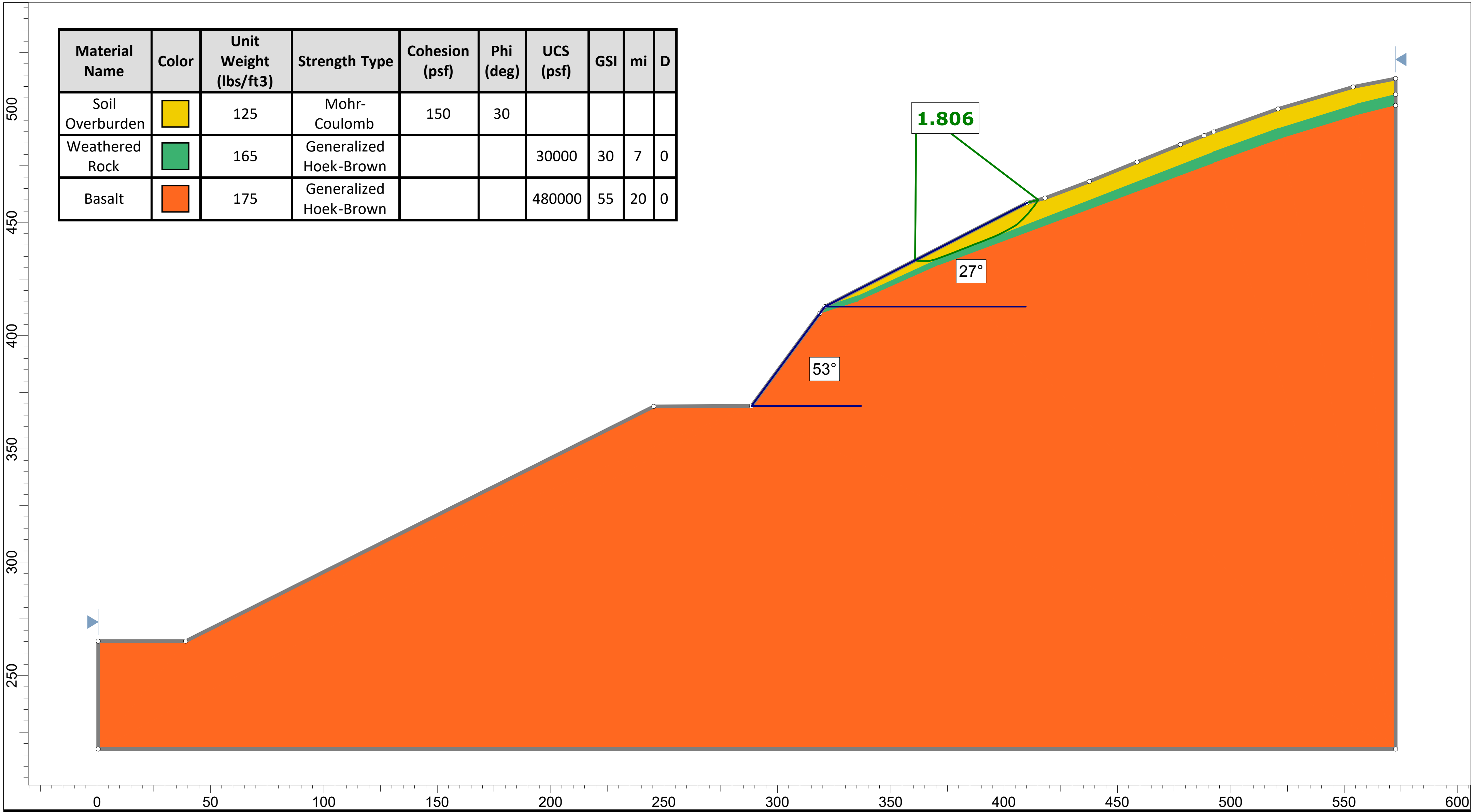


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	100	34				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Marine Volcanic	🟧	170	Generalized Hoek-Brown			200000	45	7	0

DELVE underground

SLIDEINTERPRET 9.027

Project	Coffin Butte Landfill
Group	Section B - Seismic - 0.75:1, 1.5:1
Scenario	Cuckoo
Drawn By	Guzek
Company	Delve Underground
Date	9/27/2023, 8:59:34 AM
File Name	09-2023_Section-B.slmd

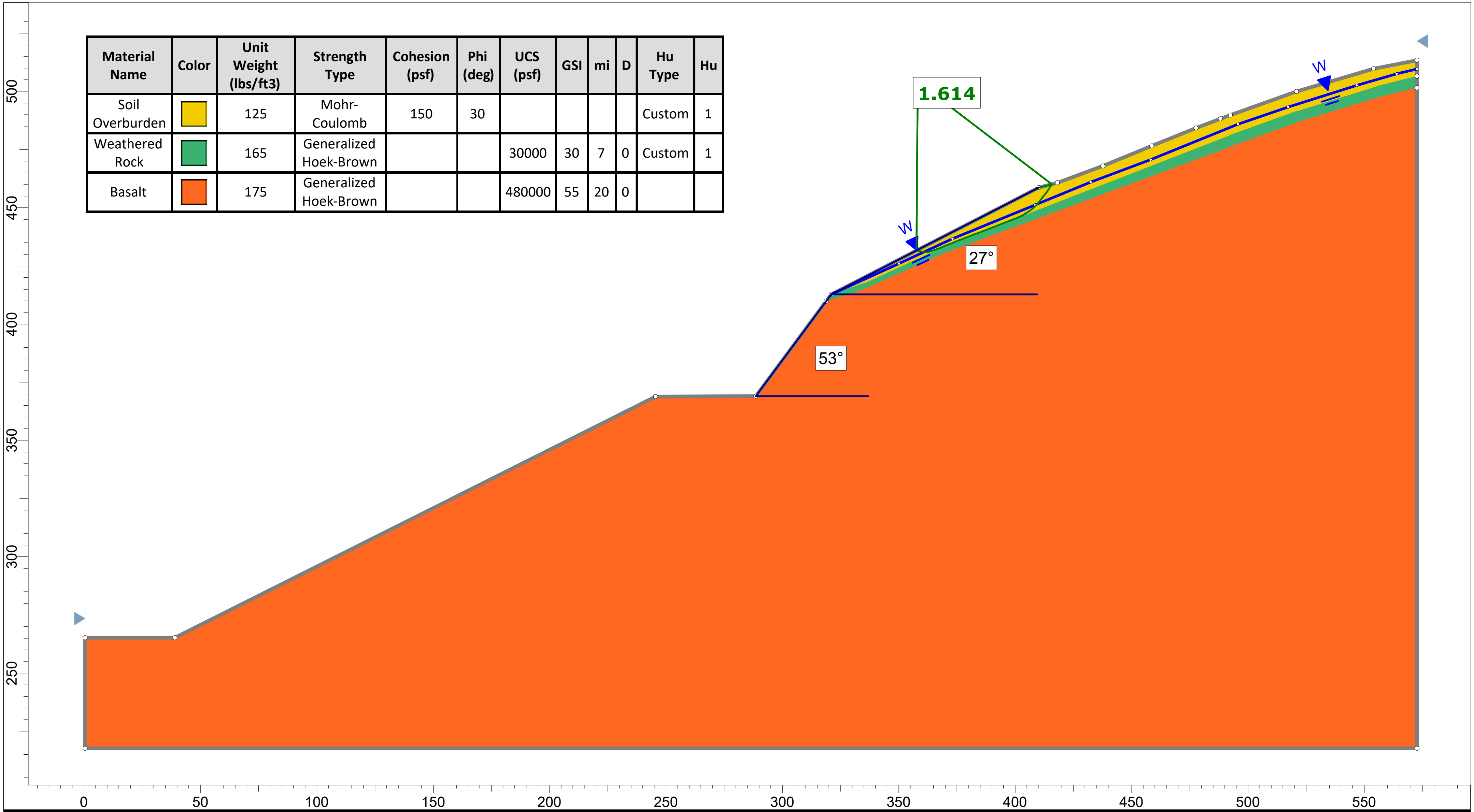


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	150	30				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Basalt	🟧	175	Generalized Hoek-Brown			480000	55	20	0

Project	Coffin Butte Landfill		
Group	Section D - Dry - 0.75:1, 2:1	*Scenario*	Cuckoo
Drawn By	Guzek	*Company*	Delve Underground
Date	9/27/2023, 8:59:34 AM	*File Name*	09-2023_Section-D.slmd

DELVE underground

SLIDEINTERPRET 9.027



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D	Hu Type	Hu
Soil Overburden	🟨	125	Mohr-Coulomb	150	30					Custom	1
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0	Custom	1
Basalt	🟧	175	Generalized Hoek-Brown			480000	55	20	0		

DELVE underground

SLIDEINTERPRET 9.027

Project Coffin Butte Landfill

Group Section D - Wet - 0.75:1, 2:1

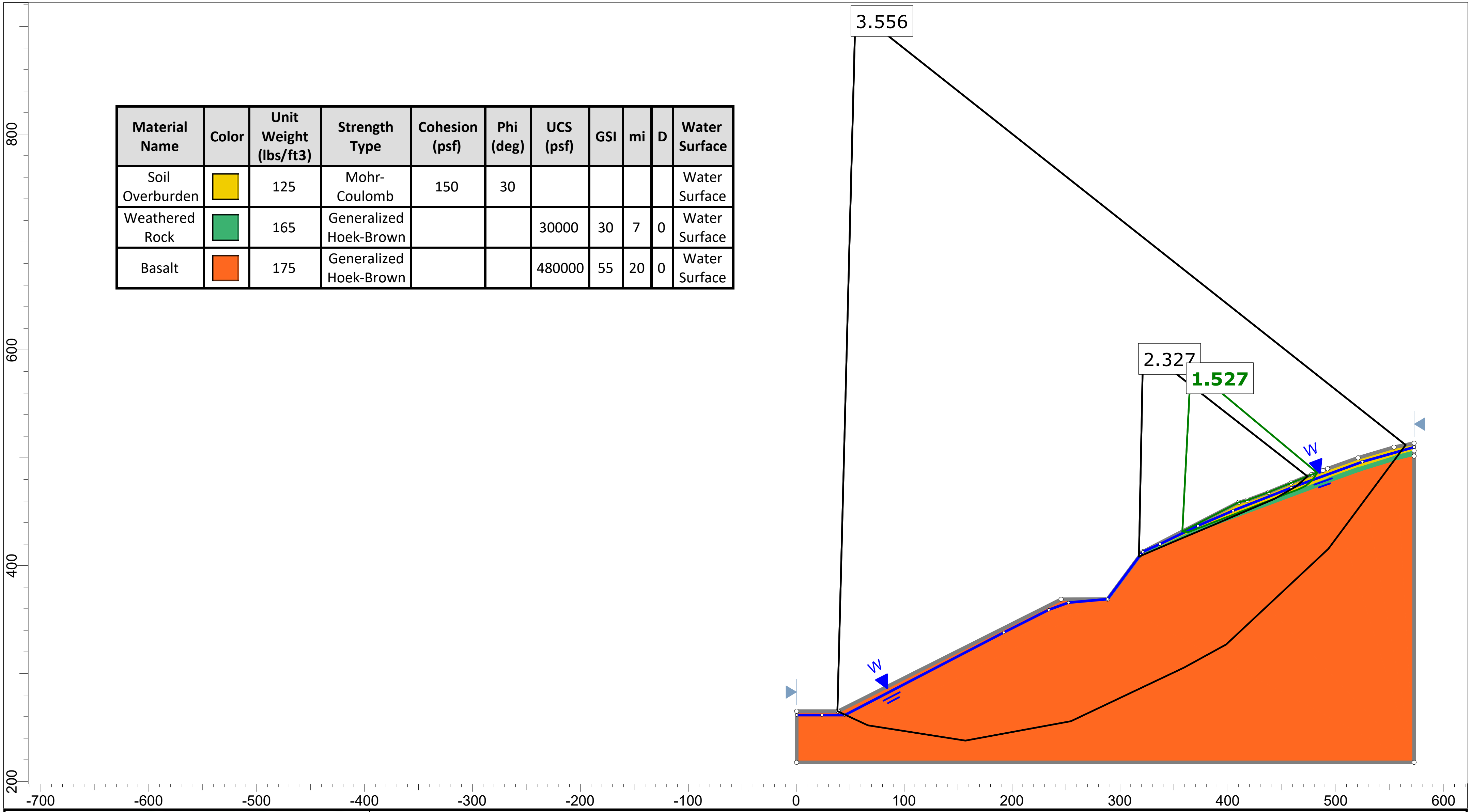
Scenario Cuckoo

Drawn By Guzek

Company Delve Underground

Date 9/27/2023, 8:59:34 AM

File Name 09-2023_Section-D.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D	Water Surface
Soil Overburden	🟨	125	Mohr-Coulomb	150	30					Water Surface
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0	Water Surface
Basalt	🟧	175	Generalized Hoek-Brown			480000	55	20	0	Water Surface

DELVE
underground

SLIDEINTERPRET 9.027

Project Coffin Butte Landfill

Group Section D - Fully Saturated - 0.75:1, 2:1

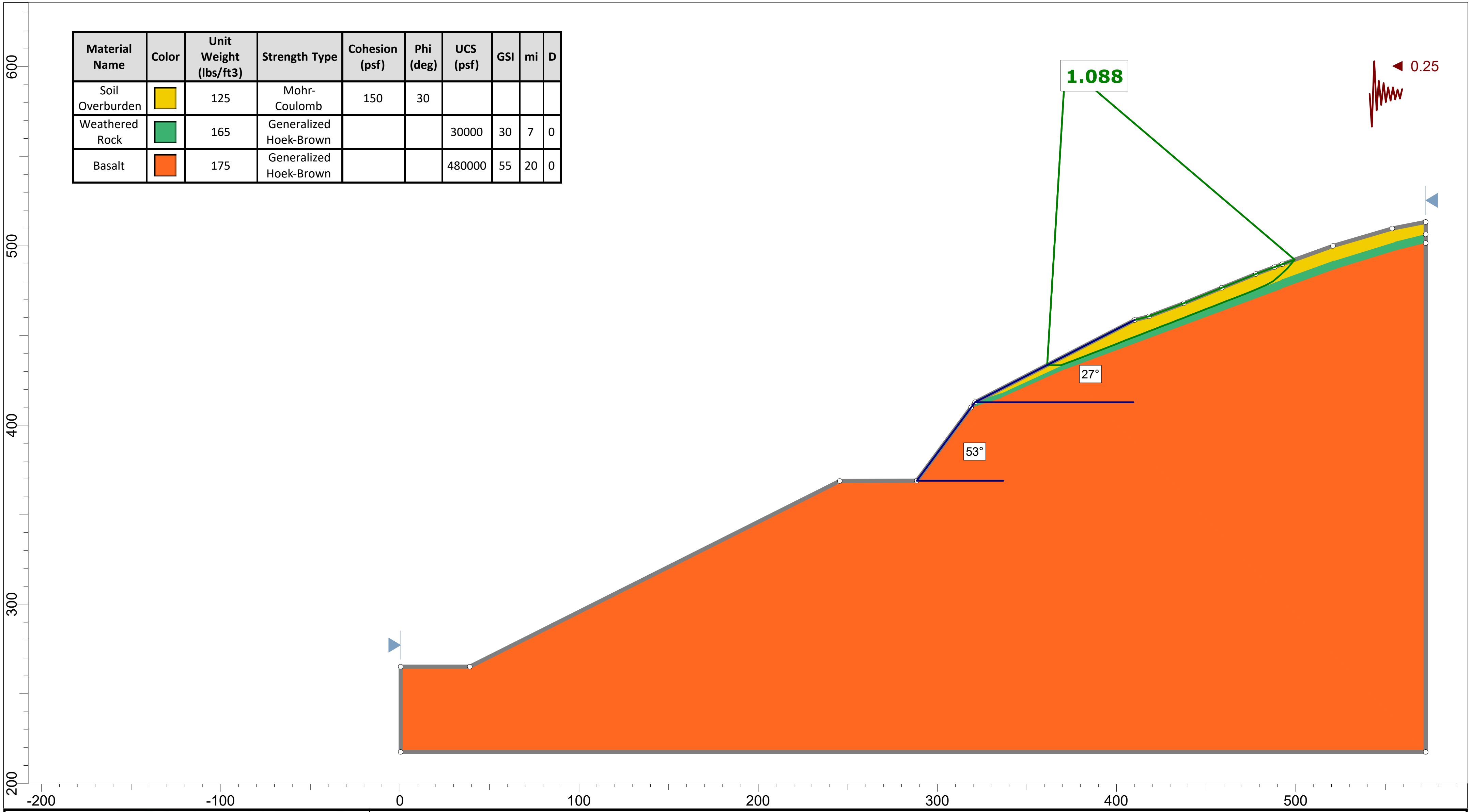
Scenario Cuckoo

Drawn By Guzek

Company Delve Underground

Date 9/27/2023, 8:59:34 AM

File Name 09-2023_Section-D.slmd



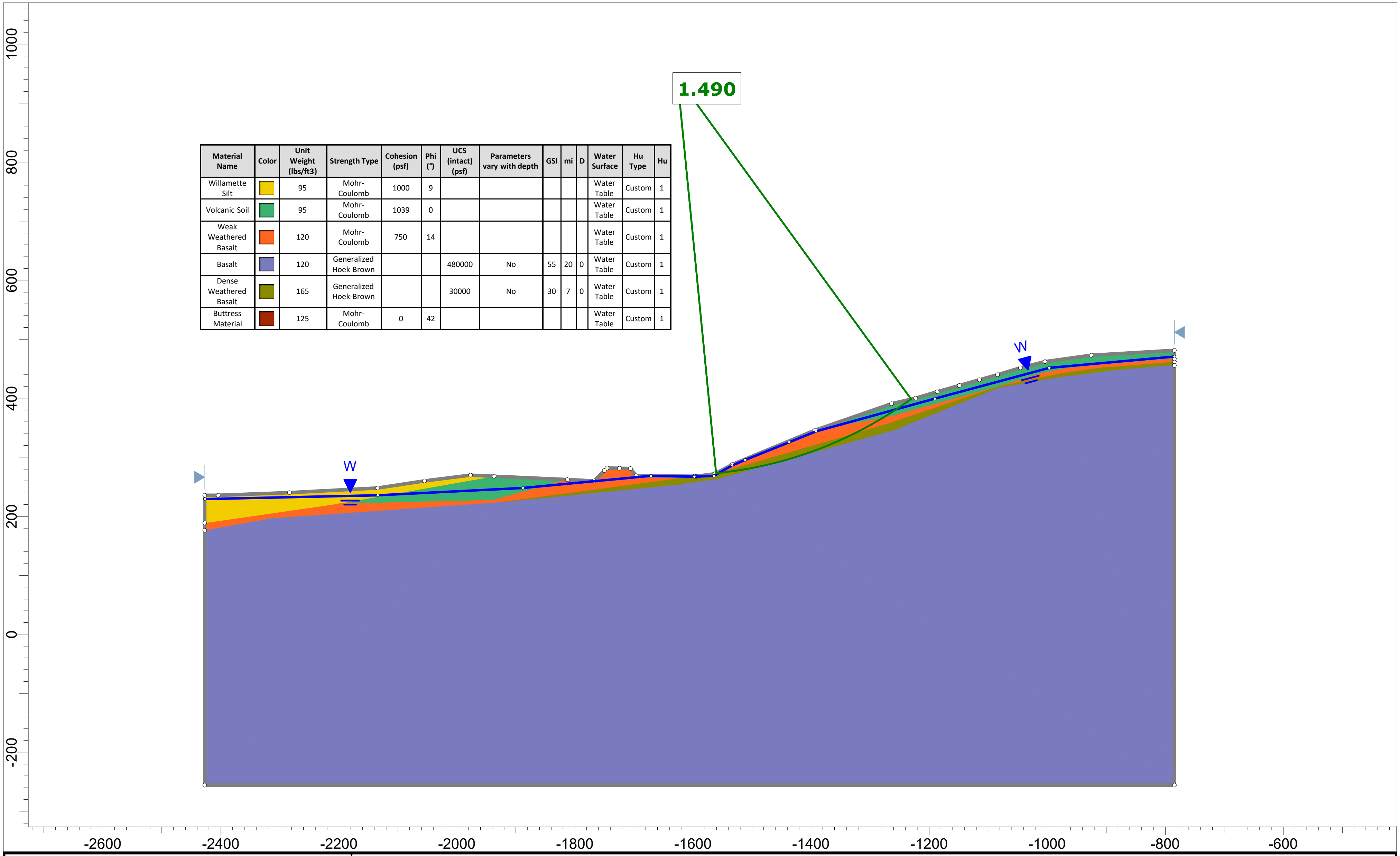
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	UCS (psf)	GSI	mi	D
Soil Overburden	🟨	125	Mohr-Coulomb	150	30				
Weathered Rock	🟩	165	Generalized Hoek-Brown			30000	30	7	0
Basalt	🟧	175	Generalized Hoek-Brown			480000	55	20	0

Project	Coffin Butte Landfill
Group	Section D - Seismic - 0.75:1, 2:1
Scenario	Cuckoo
Drawn By	Guzek
Company	Delve Underground
Date	9/27/2023, 8:59:34 AM
File Name	09-2023_Section-D.slmd

SLIDEINTERPRET 9.027

WALLACE
GROUP
NORTHWEST GEOSYSTEM EXPERTS

APPENDIX F

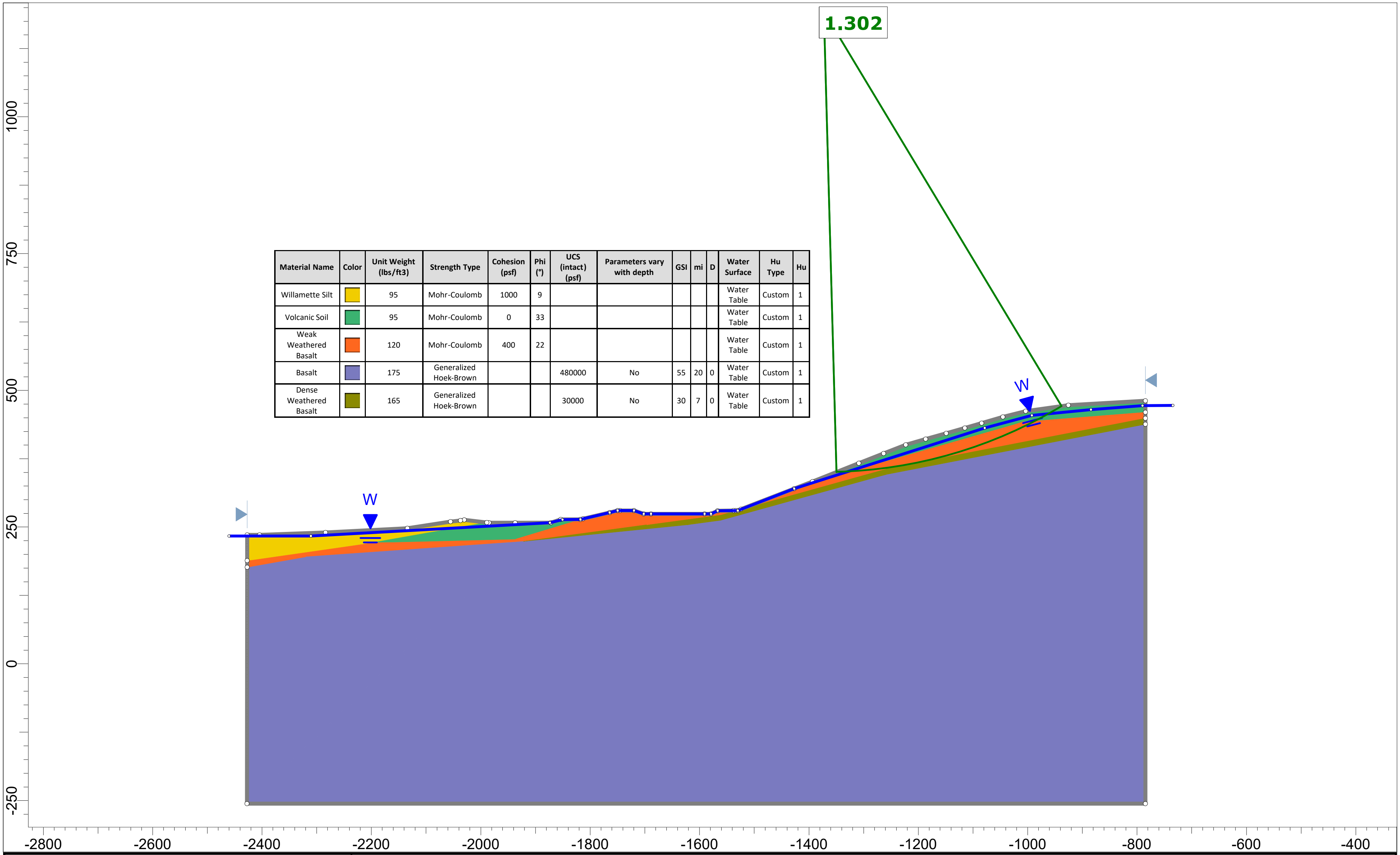


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	UCS (intact) (psf)	Parameters vary with depth	GSI	mi	D	Water Surface	Hu Type	Hu
Willamette Silt	🟨	95	Mohr-Coulomb	1000	9						Water Table	Custom	1
Volcanic Soil	🟩	95	Mohr-Coulomb	1039	0						Water Table	Custom	1
Weak Weathered Basalt	🟧	120	Mohr-Coulomb	750	14						Water Table	Custom	1
Basalt	🟪	120	Generalized Hoek-Brown			480000	No	55	20	0	Water Table	Custom	1
Dense Weathered Basalt	🟫	165	Generalized Hoek-Brown			30000	No	30	7	0	Water Table	Custom	1
Buttress Material	🟥	125	Mohr-Coulomb	0	42						Water Table	Custom	1

rocscience

SLIDEINTERPRET 9.028

Project	Coffin Butte Landfill Southern Expansion		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	L. Splitter	*Company*	Wallace Group
Date	10/25/2023, 3:34:10 PM	*File Name*	Section E_ Short Term Condition for buttress construction.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	UCS (intact) (psf)	Parameters vary with depth	GSI	mi	D	Water Surface	Hu Type	Hu
Willamette Silt	🟨	95	Mohr-Coulomb	1000	9						Water Table	Custom	1
Volcanic Soil	🟩	95	Mohr-Coulomb	0	33						Water Table	Custom	1
Weak Weathered Basalt	🟧	120	Mohr-Coulomb	400	22						Water Table	Custom	1
Basalt	🟪	175	Generalized Hoek-Brown			480000	No	55	20	0	Water Table	Custom	1
Dense Weathered Basalt	🟫	165	Generalized Hoek-Brown			30000	No	30	7	0	Water Table	Custom	1

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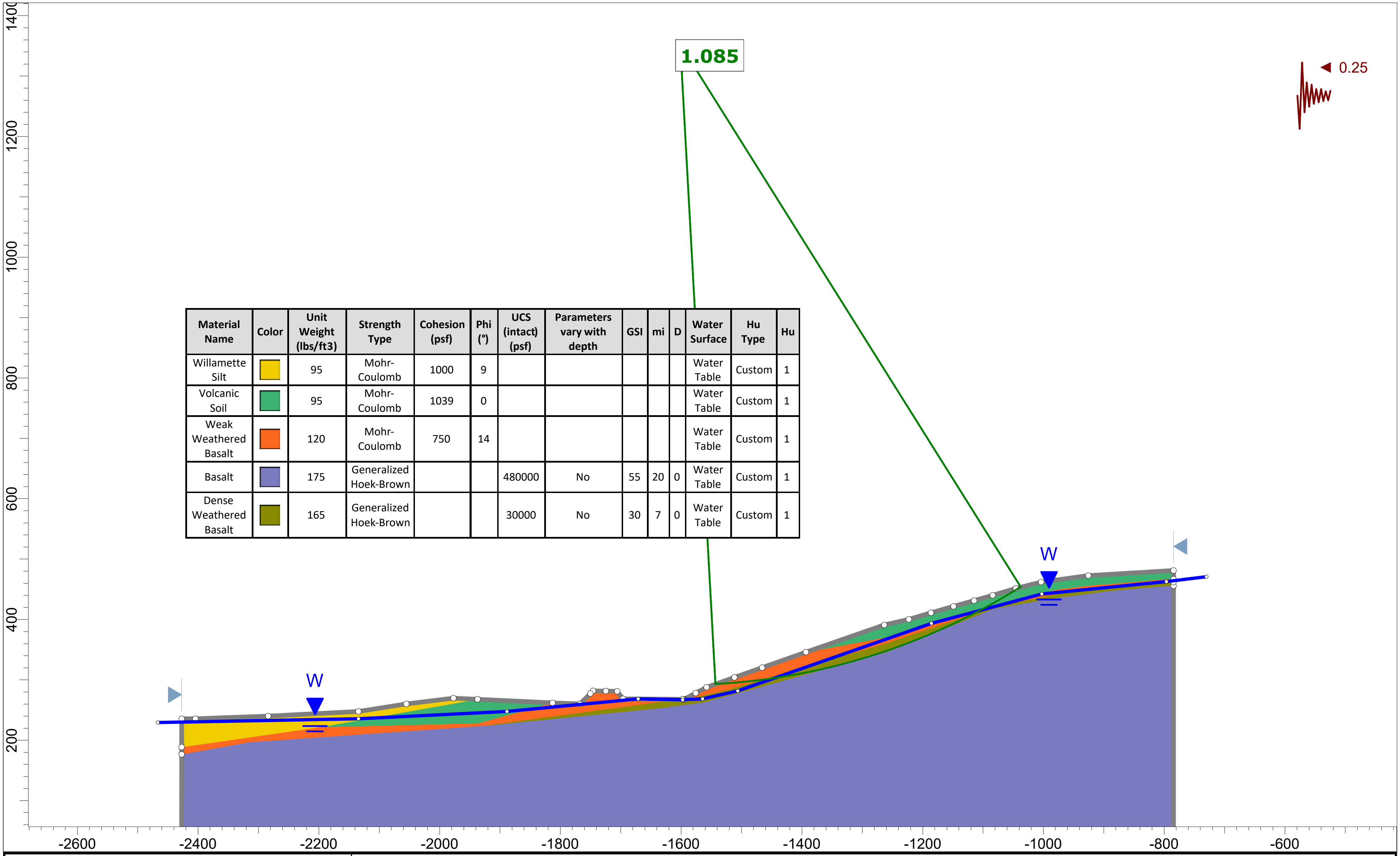
SLIDEINTERPRET 9.028

Project	Coffin Butte Landfill Southern Expansion		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	L. Splitter	*Company*	Wallace Group
Date	10/25/2023, 3:34:10 PM	*File Name*	Section E_ LongTerm Condition Static.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	UCS (intact) (psf)	Parameters vary with depth	GSI	mi	D	Water Surface	Hu Type	Hu
Willamette Silt	🟨	95	Mohr-Coulomb	1000	9						Water Table	Custom	1
Volcanic Soil	🟩	95	Mohr-Coulomb	1039	0						Water Table	Custom	1
Weak Weathered Basalt	🟧	120	Mohr-Coulomb	750	14						Water Table	Custom	1
Basalt	🟪	175	Generalized Hoek-Brown			480000	No	55	20	0	Water Table	Custom	1
Dense Weathered Basalt	🟫	165	Generalized Hoek-Brown			30000	No	30	7	0	Water Table	Custom	1

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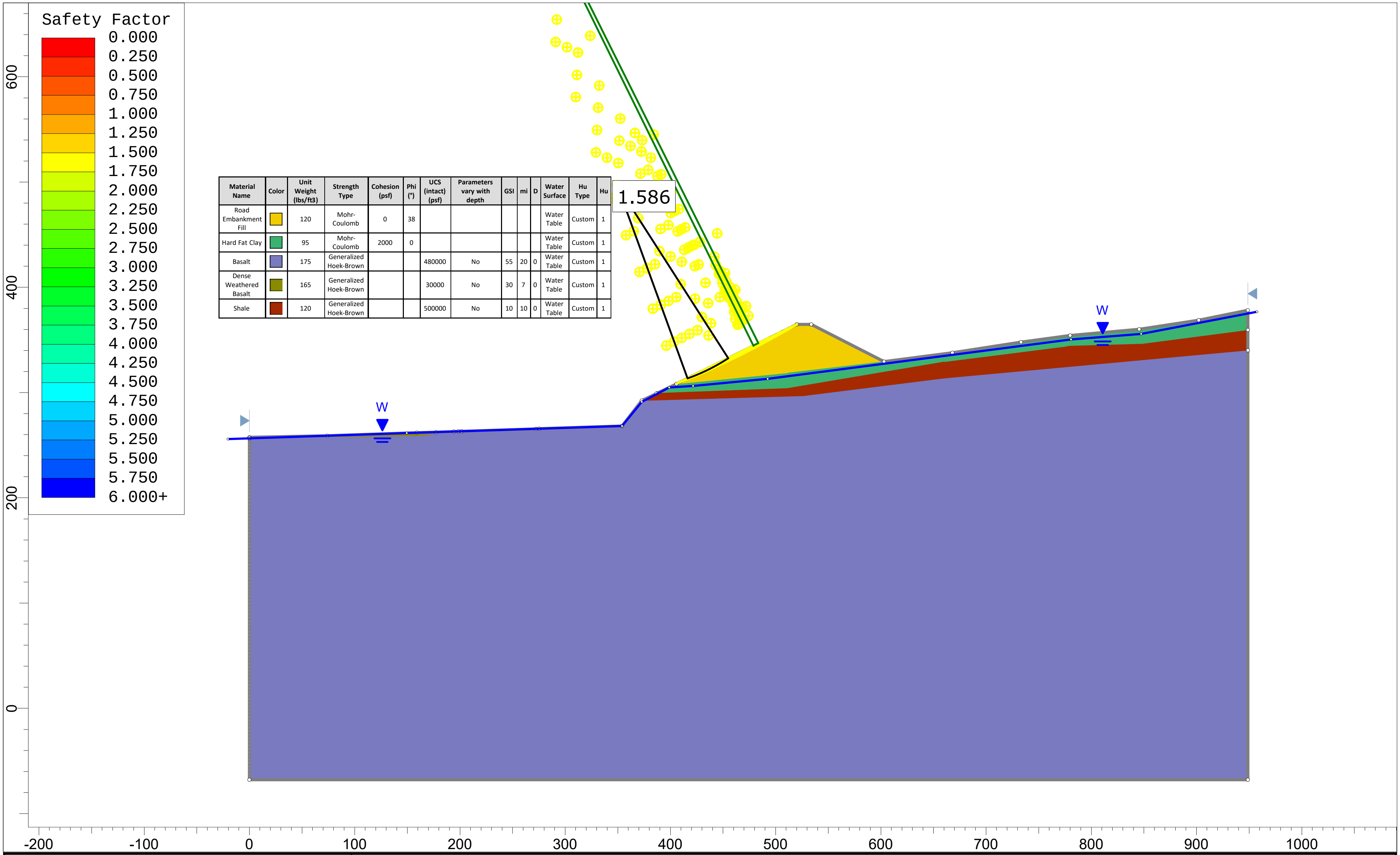
SLIDEINTERPRET 9.028

Project	Slide2 - An Interactive Slope Stability Program

Group	Group 1	*Scenario*	Master Scenario
Drawn By	L Splitter	*Company*	Wallace Group
Date	10/25/2023, 3:34:10 PM	*File Name*	Section E_ Short Term Condition Seismic no buttress.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)	UCS (intact) (psf)	Parameters vary with depth	GSI	mi	D	Water Surface	Hu Type	Hu
Road Embankment Fill	🟨	120	Mohr-Coulomb	0	38						Water Table	Custom	1
Hard Fat Clay	🟩	95	Mohr-Coulomb	2000	0						Water Table	Custom	1
Basalt	🟪	175	Generalized Hoek-Brown			480000	No	55	20	0	Water Table	Custom	1
Dense Weathered Basalt	🟫	165	Generalized Hoek-Brown			30000	No	30	7	0	Water Table	Custom	1
Shale	🟥	120	Generalized Hoek-Brown			500000	No	10	10	0	Water Table	Custom	1

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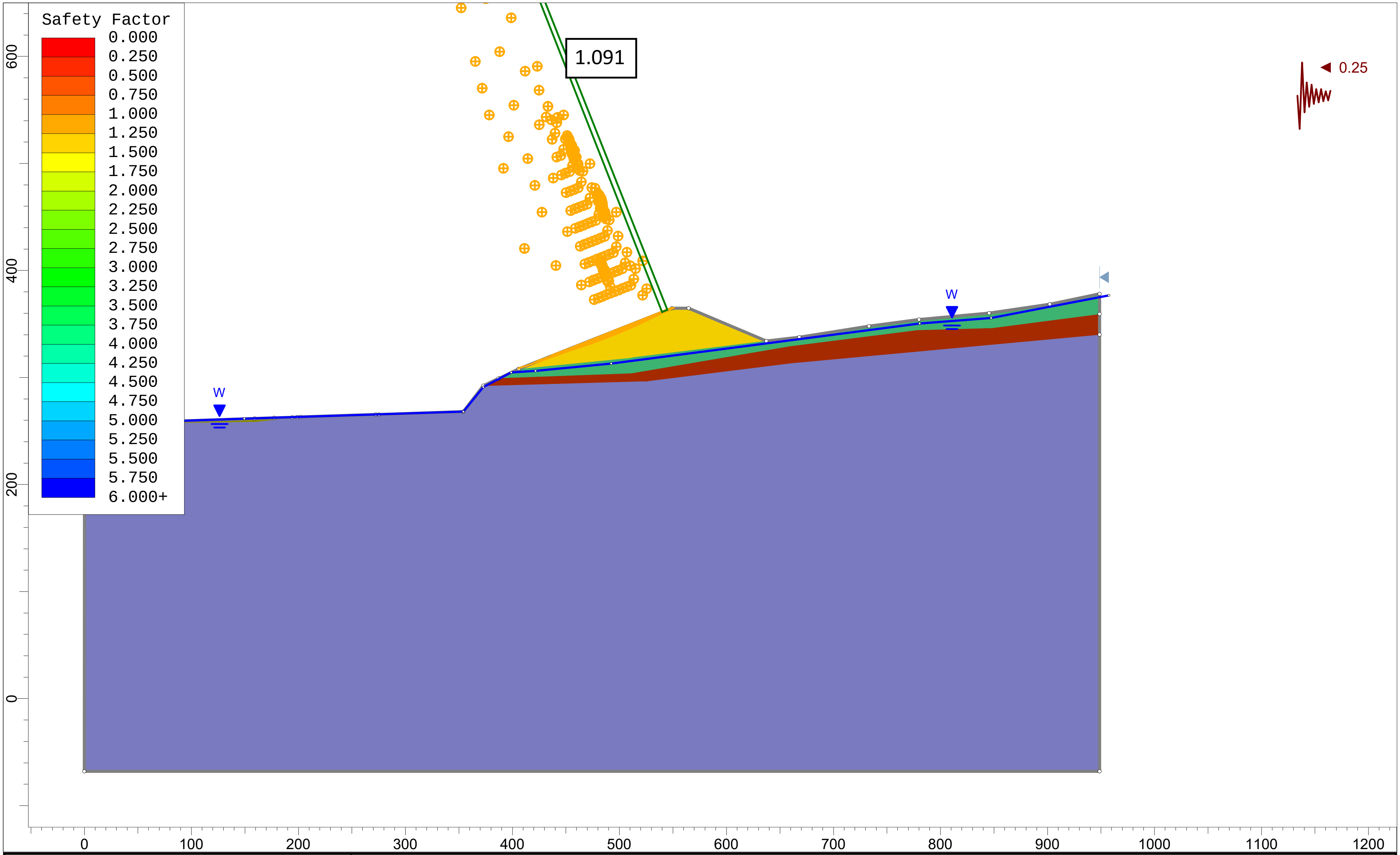
SLIDEINTERPRET 9.028

Project	Coffin Butte		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	L Splitter	*Company*	Wallace Group
Date	12/20/2023, 2:39:01 PM	*File Name*	Section C_long term.slmd



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SLIDEINTERPRET 9.034

Project	Coffin Butte		
Group	Group 1	*Scenario*	Master Scenario
Drawn By	L Splitter	*Company*	Wallace Group
Date	12/20/2023, 2:39:01 PM	*File Name*	Section C_seismic 2.5 to 1.slmd