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GEOTECHNICAL AND GEOLOGIC HAZARD INVESTIGATION (Rev. 2)
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

IGES Project No. 01628-027

February 12, 2019

Prepared for:

Summit Mountain Holding Group

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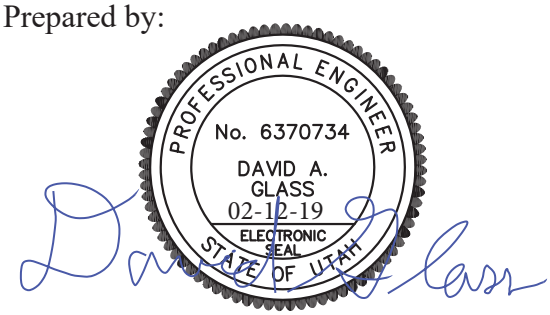

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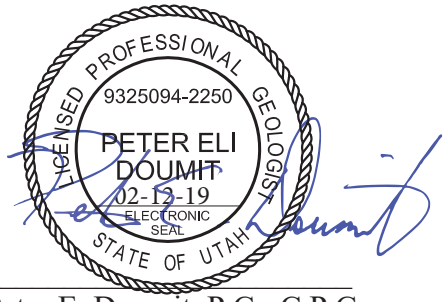

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical and geologic hazards investigation conducted for *The Overlook at Powder Mountain* development, part of the currently on-going expansion at the Powder Mountain Ski Resort in Weber County. The purpose of our investigation was to assess the nature and engineering properties of the subsurface soils at the project site and to provide recommendations for the design and construction of foundations, grading, and drainage. In addition, geologic hazards have been assessed for the property. The scope of work completed for this study included literature review, site reconnaissance, subsurface exploration, engineering analyses, and preparation of this report.

This report has been revised from our original report dated October 23, 2018 and a subsequent revision November 9, 2018; the main revision is the layout/site plan utilized for our geotechnical map. The overall site grading has been modified to be less intensive, as smaller cuts and fills are now proposed that do not require retaining walls or rockeries, and the skier bridges proposed in previous site plans have been eliminated. The road layout has changed slightly to reduce the sharp corner in Meridian Avenue. An additional lot has been added to make a total of 57 single-family residential lots, and the lot numbering has therefore been updated. The project is expected to be a phased project, but at this time the phasing has not been established, and in any event would not impact the geotechnical or geologic aspects of the project. Hence, there are no changes to our findings, conclusions, and recommendations.

Our services were performed in accordance with our proposal to Summit Mountain Holding Group (Client), dated February 7, 2018. The recommendations presented in this report are subject to the limitations presented in the "Limitations" section of this report (Section 6.1).

1.2 PROJECT DESCRIPTION

Our understanding of the project is based primarily on our previous involvement with the Summit Powder Mountain resort project, which included two geotechnical investigations for the greater 200-acre Powder Mountain Resort expansion project (IGES, 2012a and 2012b) and subsequent geotechnical consulting for a number of other aspects of the project.

The Summit Powder Mountain Resort expansion project is located southeast of SR-158 (Powder Mountain Road), north and east of previously developed portions of Powder Mountain Resort, in unincorporated Weber County, Utah. The Summit Powder Mountain project area is accessed by Powder Ridge Road. *The Overlook* development will be located northeast of and adjacent to the Phase 1C area of Summit Powder Mountain (see *Site Vicinity Map*, Figure A-1 in Appendix A).

Our understanding of the project is based on the 60-scale site plan titled "Overlook – Cut-Fill Plan", Sheet ET05, prepared by Talisman Civil Consultants, LLC, print date 12-05-2018, and other information provided by the Client. We understand that *The Overlook at Powder Mountain* development will include several assorted types of vacation homes, cabins and similar-type residential structures, and associated infrastructure including roadways and utilities over an approximately 25-acre site – a total of 57 residential lots are planned, along with several 'Neighborhood' cabin units with associated garages. The site is on a natural ridge, with sloping sides draining to the southeast and northeast at gradients ranging from about 2.5H:1V to 5H:1V. The project will include about 4,000 LF of new paved access road. Construction of the roadway is expected to require several moderate cuts and fills.

IGES previously completed a geotechnical and geologic hazard investigation for Phase I of *The Overlook* project last year (IGES, 2017); that investigation addressed approximately 2.5 acres of what was then defined as Phase I, which included the western portion of the property. Since that time, the layout of *The Overlook* has been heavily modified, and the Phase I nomenclature no longer applies. Data from the Phase I report (IGES, 2017) has been utilized for the current 25-acre *The Overlook at Powder Mountain* study.

2.0 METHODS OF STUDY

2.1 LITERATURE REVIEW

2.1.1 Geotechnical

The earliest geotechnical report for the area is by AMEC (2001), which was a reconnaissance-level geotechnical and geologic hazard study. IGES later completed a geotechnical investigation for the Powder Mountain Resort expansion in 2012 (2012a, 2012b). Our previous work included twenty-two test pits and one soil boring excavated at various locations across the 200-acre development; as a part of this current study, the logs from relevant nearby test pits and other data from our reports were reviewed. This includes the five test pits excavated at representative locations across *The Overlook Phase I* property (IGES, 2017).

2.1.2 Geological

Several pertinent publications were reviewed as part of this assessment. Sorensen and Crittenden, Jr. (1979) provides 1:24,000 scale geologic mapping of the Huntsville Quadrangle, and Crittenden, Jr. (1972) provides 1:24,000 scale geologic mapping of the Brown's Hole Quadrangle. Coogan and King (2001) provide more recent geologic mapping of the area, but at a 1:100,000 scale. An updated Coogan and King (2016) regional geologic map (1:62,500 scale) provides the most recent published geologic mapping that covers the project area. Western Geologic (2012) conducted a reconnaissance-level geologic hazard study for the greater 200-acre Powder Mountain expansion project, including *The Overlook* area. The Western Geologic (2012) study modified some of the potential landslide hazard boundaries that had previously been mapped at a regional scale (1:100,000) by Coogan and King (2001) and Elliott and Harty (2010). The corresponding United States Geological Survey (USGS) topographic maps for the Huntsville and Brown's Hole Quadrangles (2014) provide physiographic and hydrologic data for the project area. Regional-scale geologic hazard maps pertaining to landslides (Elliott and Harty, 2010; Colton, 1991), faults (Christenson and Shaw, 2008a; USGS and Utah Geological Survey (UGS), 2006), debris-flows (Christenson and Shaw, 2008b), and liquefaction (Christenson and Shaw, 2008c; Anderson et al., 1994) that cover the project area were also reviewed. The Quaternary Fault and Fold Database (USGS and UGS, 2006) was reviewed to identify the location of proximal faults that have had associated Quaternary-aged displacement.

Stereo-paired aerial imagery for the project site and recent and historic Google Earth imagery was also reviewed to assist in the identification of potential adverse geologic conditions. The aerial photographs reviewed are documented in the *References* section of this report.

2.2 FIELD INVESTIGATION

Site reconnaissance and site-specific geologic mapping was performed across the site prior to identifying the test pit locations, such that suspect geologic hazard areas could be appropriately

investigated with Subsurface soils were investigated by excavating 23 test pits at representative locations across the site. The approximate location of the test pits are illustrated on the *Geotechnical and Local Geology Map* (Figure A-2 in Appendix A). The soil types were visually logged at the time of our field work in general accordance with the *Unified Soil Classification System* (USCS). Soil classifications and descriptions are included on the test pit logs, Figures A-3 through A-25 in Appendix A. A key to USCS symbols and terminology is included as Figure A-26, and a key to physical rock properties is presented as Figure A-27.

2.3 LABORATORY TESTING

Samples retrieved during the subsurface investigation from this study were transported to the IGES laboratory for evaluation of engineering properties. In addition, previous laboratory results from our 2017 study for Phase I were also incorporated into our database for this project. Specific laboratory tests included:

- Grain-Size Distribution (ASTM D6913)
- Atterberg Limits (ASTM D4318)
- Fines Content (ASTM D1140)
- In situ Moisture Content & Dry Unit Weight (ASTM D7263, D2216)
- Direct Shear (ASTM D3080)
- Ring Shear Test
- Corrosion Suite (soluble sulfate, soluble chlorite, pH, and resistivity).

Results of the laboratory testing are discussed in this report and presented in Appendix B. Some test results, including moisture content and grain size distribution, have been incorporated into the test pit logs (Figures A-3 through A-30).

3.0 GEOLOGIC CONDITIONS

3.1 GENERAL GEOLOGIC SETTING

The Overlook at Powder Mountain property is situated in the western portion of the northern Wasatch Mountains, approximately 5 miles northeast of Ogden Valley. The Wasatch Mountains contain a broad depositional history of thick Precambrian and Paleozoic sediments that have been subsequently modified by various tectonic episodes that have included thrusting, folding, intrusion, and volcanics, as well as scouring by glacial and fluvial processes (Stokes, 1987). The uplift of the Wasatch Mountains occurred relatively recently during the Late Tertiary Period (Miocene Epoch) between 12 and 17 million years ago (Milligan, 2000). Since uplift, the Wasatch Front has seen substantial modification due to such occurrences as movement along the Wasatch Fault and associated spurs, the development of the numerous canyons that empty into the current Salt Lake Valley and Utah Valley and their associated alluvial fans, erosion and deposition from Lake Bonneville, and localized mass-movement events (Hintze, 1988).

The Wasatch Mountains, as part of the Middle Rocky Mountains Province (Milligan, 2000), were uplifted as a fault block along the Wasatch Fault (Hintze, 1988). Ogden Valley itself is a fault-bounded trough that was occupied by Lake Bonneville (Sorensen and Crittenden, Jr, 1979) before being cut through by the Ogden River and subsequently dammed to form the Pineview Reservoir.

The Wasatch Fault and its associated segments are part of an approximately 230-mile long zone of active normal faulting referred to as the Wasatch Fault Zone (WFZ), which has well-documented evidence of late Pleistocene and Holocene (though not historic) movement (Lund, 1990; Hintze, 1988). The faults associated with the WFZ are all normal faults, exhibiting block movement down to the west of the fault and up to the east. The WFZ is contained within a greater area of active seismic activity known as the Intermountain Seismic Belt (ISB), which runs approximately north-south from northwestern Montana, along the Wasatch Front of Utah, through southern Nevada, and into northern Arizona. In terms of earthquake risk and potential associated damage, the ISB ranks only second in North America to the San Andreas Fault Zone in California (Stokes, 1987).

The WFZ consists of a series of ten segments of the Wasatch Fault that each display different characteristics and past movement, and are believed to have movement independent of one another (UGS, 1996). The subject property is located approximately 10.4 miles to the northeast of the Weber Segment of the Wasatch Fault, which is the closest documented Holocene-aged (active) fault to the property and trends north-south along the Wasatch Front (USGS and UGS, 2006).

3.2 SURFICIAL GEOLOGY

According to Crittenden, Jr. (1972), the property is entirely underlain by the undivided Tertiary/Cretaceous Wasatch and Evanston Formations (TKwe), described as “unconsolidated

pale-red to greenish-red pebble, cobble, and boulder conglomerate. Forms boulder-covered slopes but does not crop out anywhere. Clasts are mainly Precambrian quartzite and are tan, gray, or purple; matrix is mainly poorly consolidated sand and silt." A generalized bedding attitude shows this unit striking due north and dipping 10 degrees to the east; this map forms the basemap for the *Regional Geology Map 1* (Figure A-28). Coogan and King (2001) produced a regional-scale geologic map that covered the property; this map shows the property to be entirely underlain by the Wasatch Formation. Western Geologic (2012) identified a number of landslide deposits contained within the Powder Mountain Resort expansion area, though none of these were shown underlying the *The Overlook at Powder Mountain* area (Figure A-29). A large Pleistocene landslide lobe is mapped approximately 330 feet northeast of the northern margin of the property. Finally, Coogan and King (2016) updated their 2001 map, which shows the property to be situated entirely upon Wasatch Formation bedrock (unit Tw), though the property is within 500 feet of mapped landslide deposits (unit Qms) and undivided mass-movement and glacial deposits (unit Qmg) (Figure A-30). Wasatch Formation bedrock in the area is shown to be striking approximately to the north-northeast, and dipping between 3 and 6 degrees to the east-southeast; additionally, according to this map, the property straddles a north-south trending concealed syncline[1].

3.3 HYDROLOGY

The USGS topographic maps for the Huntsville and Brown's Hole Quadrangles (2017) show that *The Overlook* project area is situated partially on a ridge top and partially on a slope, with the topographic gradient down to the southeast towards Lefty's Canyon (see Figure A-1). An ephemeral stream drainage that was actively flowing was observed in the northernmost portion of the property (associated with map unit Qac on Figure A-2), and several small, dry gullies were observed on the property during the site reconnaissance. No springs are known to occur on the property, though it is possible that springs may occur on various parts of the property during peak runoff.

Baseline groundwater depths for the subject property are currently unknown but are anticipated to fluctuate both seasonally and annually. Groundwater was not encountered in the 23 test pits excavated in this investigation, nor in the 5 test pits excavated for Phase I (IGES, 2017).

3.4 GEOLOGIC HAZARDS FROM LITERATURE

Based upon the available geologic literature, regional-scale geologic hazard maps that cover *The Overlook* project area have been produced for landslide, fault, debris-flow, and liquefaction hazards. The following is a summary of the data presented in these regional geologic hazard maps.

[1] Syncline: A fold of which the core contains the stratigraphically younger rocks; it is generally concave upward. (AGI, 2005)

3.4.1 Landslides

Two regional-scale landslide hazard maps have been produced that cover the project area. Colton (1991) does not show the property to be underlain by or adjacent to landslide deposits, though landslides are mapped near the northeastern and southern margins of the property. Consistent with Colton (1991), Elliott and Harty (2010) shows deposits mapped as "Landslide and/or landslide undifferentiated from talus, colluvial, rock-fall, glacial, and soil-creep deposits" near the northeastern and southeastern margins of the property. Most recently and more site-specific, Western Geologic (2012) used the Elliott and Harty (2010) map as a base map, which shows Pleistocene landslide deposits northeast of the property, though the landslide deposits shown to the southeast of the property on Elliott and Harty (2010) are not present (see Figure A-29).

3.4.2 Faults

Neither Christenson and Shaw (2008a) nor the Quaternary Fault and Fold Database of the United States (USGS and UGS, 2006) show any Quaternary-aged (~2.6 million years ago to the present) faults to be present on or projecting towards the subject property. The Weber County Natural Hazards Overlay Districts defines an active fault to be "a fault displaying evidence of greater than four inches of displacement along one or more of its traces during Holocene time (about 11,000 years ago to the present)" (Weber County, 2015). The closest active fault to the property is the Weber Segment of the Wasatch Fault Zone, located approximately 10.4 miles southwest of the property (USGS and UGS, 2006).

3.4.3 Debris Flows

Christenson and Shaw (2008b) do not show the project area to be located within a debris-flow hazard special study area, and no alluvial fan deposits are mapped on the property (Coogan and King, 2016).

3.4.4 Liquefaction

Anderson, et al. (1994) and Christenson and Shaw (2008c) both show the project area to be located in an area with very low potential for liquefaction.

3.5 REVIEW OF AERIAL IMAGERY

A series of aerial photographs that cover project area were taken from the UGS Aerial Imagery Collection (UGS, 2018) and analyzed stereoscopically for the presence of adverse geologic conditions across *The Overlook at Powder Mountain* property. This included a review of photos collected from the years 1946, 1952, and 1963. A table displaying the details of the aerial photographs reviewed can be found in the *References* section at the end of this report.

No geologic lineaments, fault scarps, landslide headscarps, or landslide deposits were observed in the aerial photography on the subject property.

Google Earth imagery of the property from between the years of 1993 and 2017 was also reviewed. The property was observed to contain some surficial gravel, cobbles, and boulders, and a small northeast-trending ephemeral drainage was observed in the northernmost portion of the property. Immediately west of the property is an area where multiple north-south trending gullies and an abundance of surficial gravel, cobbles, and boulders are found. Most of the project area was found to be covered in various forms of vegetation, predominantly low-lying shrubs and bushes; no bedrock exposures were observed on the property. Much of the north-central part of the property is densely covered in aspen and some pine trees, and dense tree patches are also found along the southern margin of the property.

A few suspicious features potentially related to landsliding were observed in the northwest portion of the property and adjacent to the property. A scar in the hillside was observed approximately 250 feet to the northwest of the northwestern corner of the property that appeared to be a small landslide headscarp. Along the northern margin of the property, a distinct break in slope down to the north coincided with bowl-shaped geomorphology, conspicuously less tree vegetation, and possibly hummocky surface topography. Each of these suspicious areas were later assessed first-hand during the site reconnaissance.

At the time of this report, no LiDAR data for the project area was available to be reviewed.

3.6 SEISMICITY

Following the criteria outlined in the 2015 International Building Code (IBC, 2015), spectral response at the site was evaluated for the *Maximum Considered Earthquake* (MCE) which equates to a probabilistic seismic event having a two percent probability of exceedance in 50 years (2PE50). Spectral accelerations were determined based on the location of the site using the *U.S. Seismic "DesignMaps" Web Application* (USGS, 2012/15); this software incorporates seismic hazard maps depicting probabilistic ground motions and spectral response data developed for the United States by the U. S. Geological Survey as part of NEHRP/NSHMP (Frankel et al., 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (IBC) (International Code Council, 2015).

To account for site effects, site coefficients that vary with the magnitude of spectral acceleration and *Site Class* are used. Site Class is a parameter that accounts for site amplification effects of soft soils and is based on the average shear wave velocity of the upper 100 feet; based on our field exploration and our understanding of the geology in this area, the subject site is appropriately classified as Site Class C (*very dense soil/soft rock*). Based on IBC criteria, the short-period (F_a) coefficient is 1.076 and the long-period (F_v) site coefficient is 1.532. Based on the design spectral response accelerations for a *Building Risk Category* of I, II or III, the site's *Seismic Design Category* is D. The short- and long-period *Design Spectral Response Accelerations* are presented

in Table 3.6; a summary of the *Design Maps* analysis is presented in Appendix B. The *peak ground acceleration* (PGA) may be taken as $0.4*S_{MS}$.

Table 3.6
Short- and Long-Period Spectral Accelerations for MCE

Parameter	Short Period (0.2 sec)	Long Period (1.0 sec)
MCE Spectral Response Acceleration (g)	$S_S = 0.810$	$S_1 = 0.268$
MCE Spectral Response Acceleration Site Class C (g)	$S_{MS} = S_sF_a = 0.871$	$S_{M1} = S_1F_v = 0.411$
Design Spectral Response Acceleration (g)	$S_{DS} = S_{MS}*^2/_3 = 0.581$	$S_{D1} = S_{M1}*^2/_3 = 0.274$

3.7 GEOLOGIC HAZARD ASSESSMENT

Geologic hazard assessments are necessary to determine the potential risk associated with particular geologic hazards that are capable of adversely affecting a proposed development area. As such, they are essential in evaluating the suitability of an area for development and provide critical data in both the planning and design stages of a proposed development. The geologic hazard assessment discussion below is based upon a qualitative assessment of the risk associated with a particular geologic hazard, based upon the data reviewed and collected as part of this investigation.

A "low" hazard rating is an indication that the hazard is either absent, is present in such a remote possibility so as to pose limited or little risk or is not anticipated to impact the project in an adverse way. Areas with a low-risk determination for a particular geologic hazard do not require additional site-specific studies or associated mitigation practices with regard to the geologic hazard in question. A "moderate" hazard rating is an indication that the hazard has the capability of adversely affecting the project at least in part, and that the conditions necessary for the geologic hazard are present in a significant, though not abundant, manner. Areas with a moderate-risk determination for a particular geologic hazard may require additional site-specific studies, depending on location and construction specifics, as well as associated mitigation practices in the areas that have been identified as the most prone to susceptibility to the particular geologic hazard. A "high" hazard rating is an indication that the hazard is very capable of or currently does adversely affect the project, that the geologic conditions pertaining to the particular hazard are present in abundance, and/or that there is geologic evidence of the hazard having occurred at the area in the historic or geologic past. Areas with a high-risk determination always require additional site-specific hazard investigations and associated mitigation practices where the location and construction specifics are

directly impacted by the hazard. For areas with a high-risk geologic hazard, simple avoidance is often considered.

The following is a summary of the geologic hazards assessment for *The Overlook at Powder Mountain* property.

3.7.1 Landslides/Mass-Movement/Slope Stability

The property is situated on Wasatch Formation bedrock, according to the most recent geologic map covering the property (Coogan and King, 2016). The property is near several deposits mapped as landslide or colluvial deposits to the northeast, southwest, and southeast of the property (Western Geologic (2012); Elliott and Harty (2010)). Potential landslide deposits and headscarps were observed in the aerial imagery evaluation in the northernmost portion of the property, and these areas were confirmed to be potential areas of landsliding during the site reconnaissance and subsequent subsurface investigation (see Figure A-2). However, most of the property was found to be underlain by Wasatch Formation bedrock, as shear planes, slickensides, and other evidence indicative or potentially indicative of landsliding was only observed in TP-3, TP-7, and TP-23 of the 23 test pits excavated on the property in this investigation (and none of the five test pits excavated in IGES (2017) for Phase I).

Landslide deposits were found to be associated with highly weathered Calls Fort Shale bedrock, and these were most conspicuous in TP-3, observed to be a highly heterogeneous mixture of sandy fat clay with gravel containing clasts of quartzite, sandstone, and chert. This unit appeared to consist of Wasatch Formation cobbles and sand in a matrix of weathered Calls Fort Shale clay that was commonly slickensided. In general, the landslide deposits were observed to be shallow (less than 8 feet thick) and the product of both translational and rotational failures relating to the highly weathered fat clay derived from the highly weathered Calls Fort Shale. Definitive evidence of landsliding was restricted to the northernmost portion of the property, and is likely only to potentially adversely affect the northwestern lots north of Meridian Avenue (see Figure A-2).

TP-3 and TP-23 were spotted in an area that was observed during the site reconnaissance to have irregular, hummocky topography, though the irregular topography is possibly due to multiple small drainages/gullies passing through the property in this area. Highly weathered Calls Fort Shale was observed at a shallow depth in TP-23, though no definitive slide plane was observed in this test pit and the overlying materials (possible landslide deposits) were limited in thickness (approximately 1.5 feet thick). No surficial evidence of landsliding was observed around TP-7, though subsurface conditions exhibited a highly irregular character with several different contorted units and a chaotic appearance. Slickensides were observed in potential slide plane clay overlying the Wasatch Formation weathered bedrock, which was observed at the bottom of the test pit. The absence of surficial morphology indicative of recent sliding in the TP-7 area, combined with the lack of

landslide evidence in the nearest test pits (TP-6, TP-18, and TP-19) indicate that these potential landslide deposits are older (at least Pleistocene-aged) and limited in area.

Given that the majority of the property is underlain by Wasatch Formation bedrock on slopes that average approximately 4:1 H:V (horizontal:vertical), the landslide and slope instability hazard risk is considered to be low for all parts of the property south of the northern part of Meridian Avenue (Lots 1 through 21 and 35 through 57). This is supported by the slope stability analysis, which shows that the slopes which grade downslope to the south and are outside of mapped landslide areas are stable (see Section 4.3.1). Landslide hazard risk is considered to be high for the lots in the northwestern portion of the property north of Meridian Avenue within the mapped Qls or Qls? deposits on Figure A-2 (Lots 27 through 33), moderate for a portion of the road northwest of the curve in Meridian Avenue and the future development cabins and garages near TP-7, and low for the remaining lots north of Meridian Avenue not located within mapped landslide deposits (Lots 22 through 26 and 34).

3.7.2 Rockfall

The central part of the property is at the top of the ridge, and though the remaining northern and southern portions of the property are on a slope, no bedrock outcrops are exposed upslope of the property. As such, the rockfall hazard associated with the property is considered to be low.

3.7.3 Surface-Fault Rupture and Earthquake-Related Hazards

No faults are known to be present on or project across the property, and the closest active fault to the property is the Weber Segment of the Wasatch Fault Zone, located approximately 10.4 miles to the southwest of the property (USGS and UGS, 2006). Given this information, the risk associated with surface-fault-rupture on the property is considered low.

The entire property is subject to earthquake-related ground shaking from a large earthquake generated along the active Wasatch Fault. Given the distance from the Wasatch Fault, the hazard associated with ground shaking is considered to be moderate. Proper building design according to appropriate building code and design parameters can assist in mitigating the hazard associated with earthquake ground shaking.

3.7.4 Liquefaction

The site is underlain by Wasatch Formation, a poorly consolidated sedimentary rock unit (conglomerate) and clays of the weathered Calls Fort Shale. Rock units such as these are not considered susceptible to liquefaction; as such, the potential for liquefaction occurring at the site is considered low.

3.7.5 Debris-Flows and Flooding Hazards

The property contains a small ephemeral drainage that trends west to east in the northernmost portion of the property (associated with map unit Qac in Figure A-2) that was observed to have flowing water during site reconnaissance in the spring but was dry during the subsurface investigation in August. This drainage is strictly the product of snowmelt, as snow is known to accumulate in this area and remain present for longer into the spring than other areas around Powder Mountain. It is anticipated that development and grading will preclude the continued annual heavy accumulation of snow in this area, which is expected to greatly reduce the impact of this drainage on the proposed development. There are no debris-flow source areas upslope of the property, and the property is on and near the top of a ridge. Given these conditions, the debris-flow and flooding hazard associated with the property is considered to be low.

3.7.6 Shallow Groundwater

Groundwater was not encountered in any of the 23 test pits excavated as part of this investigation, nor in any of the 5 test pits excavated for Phase I (IGES, 2017). The test pits were excavated in mid-August, and the groundwater level was likely to be on its way down towards its seasonal low. No springs were observed on the property, and no plants indicative of shallow groundwater conditions were observed on the property. It should be noted, however, that groundwater seeps are known to emanate from the road cut along Powder Ridge Road during the spring.

Given the existing data, it is expected that groundwater levels will fluctuate both seasonally and annually, and the risk associated with shallow groundwater hazards is considered to be low. Spring thaw and runoff are likely to significantly contribute to elevated groundwater conditions. However, shallow groundwater issues (if encountered) can be mitigated through appropriate grading measures and/or the avoidance of the construction of basement levels or constructing basements with foundation drains.

4.0 GENERALIZED SITE CONDITIONS

4.1 SITE RECONNAISSANCE

Mr. Bill Bragdon, P.G., of IGES conducted reconnaissance of the entire *The Overlook at Powder Mountain* site and the immediate adjacent properties on May 22, 2018. The site reconnaissance was conducted with the intent to assess the general geologic conditions present across the property, with specific interest in those areas identified in the geologic literature and aerial imagery reviews as potential geologic hazard areas. Additionally, the site reconnaissance provided the opportunity to geologically map the surficial geology of the area. Figure A-2 is a site-specific geologic map of *The Overlook at Powder Mountain* property and adjacent areas.

At the time of the site reconnaissance, *The Overlook at Powder Mountain* property was observed to be located on a topographic high with consistent slopes downhill to the north-northeast and south-southwest, with little irregular topography. Patchy low-lying vegetation, including shrubs and bushes and some grasses, were most common across the property, though a highly dense patch of aspen trees was present in the north-central part of the property. The aspens displayed evidence of low to moderate shallow soil creep to the northeast. Along the southeastern margin of the property, additional dense patches of aspens and pine trees were observed to exhibit moderate to strong shallow soil creep to the south.

Variously-sized boulders and cobbles were found scattered across the property, as part of a surficial geologic unit considered to be either weathered Wasatch Formation or colluvial deposits derived from weathered Wasatch Formation. These were typically subrounded and were found to be as large as 7 feet in diameter. The rock clasts[2] were found to be comprised of quartzite and conglomerate.

An ephemeral drainage containing actively flowing water and standing ponded water was observed in the northwesternmost portion of property at the time of the site visit. This drainage originates in Lot 31 and flows to the east through Lots 29 and 30 before heading downslope to the northeast (see Figure A-2). The drainage appears to be strictly related to and developed from a large localized accumulation of snow that forms annually in the north-facing flat area west of Lot 31. This snow pile was present at the time of the site reconnaissance, and snowmelt was observed to be flowing into the head of the drainage, located adjacent to the snow pile. Notably, TP-23 was subsequently excavated immediately adjacent to the ephemeral drainage in early August of 2018, and no groundwater was encountered in the test pit. This indicates that the drainage is strictly associated with snowmelt and not a spring.

[2] Clast: An individual constituent, grain, or fragment of a sediment or rock, produced by the mechanical or chemical disintegration or a larger rock mass. (AGI, 2005)

In the same vicinity as the head of the drainage, hummocky topography was observed, which may correspond to shallow landslide deposits derived from a small landslide headscarp observed northwest of the property (see unit Qls? on Figure A-2). The larger possible landslide deposit mapped to the northeast of the property was observed to be less apparent as a landslide. The slope was found to be steep, but largely consistent, and most of the slope did not exhibit irregular topography. Some hummocky topography was observed approximately one-third of the way downslope into the adjacent drainage, but this was not common.

Aside from shallow soil creep and hummocky topography caused by possible landsliding on the northern portion of the property, no evidence of other geologic hazards was observed on the property.

Immediately west of the property, a series of small gullies as much as 2 feet deep and 2 feet wide were observed to have carved through the underlying Wasatch Formation bedrock, causing a mix of alluvial and colluvial deposits to be exposed at the surface and much sparser vegetation than seen on the property (see Figure A-2).

4.2 SUBSURFACE CONDITIONS

Between August 8 and 13, 2018, 23 exploration test pits were excavated at representative locations across *The Overlook at Powder Mountain* property (Figure A-2). The test pits were excavated to depths ranging between 7 and 12½ feet below existing grade with the aid of a Caterpillar 320 tracked excavator. Detailed logs for the test pits are displayed in Figures A-3 through A-25. In addition, five test pits were excavated within the project site in 2017 as a part of an earlier study (IGES, 2017); these logs are presented as Figures A-26 through A-30. Five distinct geologic units were encountered in the subsurface. The soil and moisture conditions encountered during our investigation are discussed in the following paragraphs.

4.2.1 Earth Materials

A/B Soil Horizon: This topsoil unit was found in all 28 test pits, being between approximately 6 inches and 3½ feet thick. In general, the unit was a light brown to pale yellowish brown, loose to medium stiff, dry to slightly moist, sandy lean CLAY with gravel (CL), with gravel and larger-sized quartzite clasts comprising between approximately 10 and 25% of the unit. The topsoil was largely found to be forming upon the underlying colluvial or weathered Wasatch Formation unit.

Colluvium: This unit was encountered in 19 of the test pits, found to be between approximately 6 inches and 2½ feet thick. In general, the unit consisted of a pale yellowish brown to light brown, loose to medium stiff, dry to slightly moist, sandy fat CLAY with gravel (CH) with a topsoil matrix. Gravel and larger-sized subrounded to subangular quartzite clasts comprised approximately 20-40% of the unit, with individual clasts up to 4 feet in diameter, though the mode clast size was approximately 2 to 5 inches in diameter.

Wasatch Formation: This unit was observed in all but TP-3 and TP-23 and was found to be more than 10½ feet thick. The unit consisted of moderate reddish brown to moderate reddish orange, medium dense to dense, slightly moist to moist, clayey SAND with gravel (SC) and sandy lean CLAY with gravel (CL). Gravel and larger-sized subrounded to subangular quartzite and sandstone clasts comprised between approximately 20% and 40% of the unit, with individual clasts up to 4 feet in diameter though most commonly between 2 and 3 inches in diameter. The sand component was commonly fine- to medium-grained, and the unit exhibited pinhole voids in places.

Shallow Landslide: This unit was found in TP-3, TP-7, and TP-23, being as much as 8 feet thick. The unit consisted of mottled moderate reddish brown to light gray, medium stiff to stiff, moist, sandy fat CLAY with gravel (CH). Gravel and larger-sized subrounded to subangular quartzite, sandstone and chert comprised approximately 5-10% of the unit, with individual clasts up to 8 inches in diameter. Slickensides observed within this unit could be as much as 18 inches long. The unit appeared to consist of Wasatch Formation sand and cobbles in a Calls Fort Shale clay matrix. Irregular sandy fat clay seams and sand pockets were also found in association with this unit.

Weathered Calls Fort Shale?: This unit was encountered in TP-3, TP-5, and TP-23, being greater than 10½ feet thick. In general, the unit consisted of mottled moderate reddish orange to light gray, medium stiff to stiff, moist, gravelly lean CLAY (CL) grading to fat CLAY (CH). Gravel and larger-sized subangular to angular highly weathered shale comprised approximately 5-40% of the unit, with individual clasts up to 2 inches in diameter. The shale clasts were typically soft and easily disintegrated. Mechanically-induced slickensides were commonly observed, and the clay commonly cracked and exhibited a blocky appearance when dried out.

4.2.2 Groundwater

Groundwater was not encountered in any of the 23 test pits excavated for this project, nor was groundwater encountered in any of the previous 5 test pits excavated in 2017.

4.2.3 Strength of Earth Materials

As a part of our initial geotechnical investigation, a direct shear test was completed under consolidated drained conditions on a remolded sample obtained from the Wasatch Formation deposits observed in TP-2-17 obtained from a depth of approximately 3½ feet. The test results indicate a friction angle of 29 degrees and cohesion of 180 psf (ultimate values).

For our current study, a second direct shear test was completed under consolidated drained conditions on an undisturbed tube sample obtained from the Calls Fort Shale deposits observed in TP-3 obtained from a depth of approximately 12 feet. The test results indicate a friction angle of 28 degrees and cohesion of 335 psf (ultimate values).

To assess the residual strength of clay soils observed within the shear zone of the landslides, two torsional ring shear tests were performed on samples of fat clay obtained from the shear zone of the basal shear of the landslides (TP-23 at a depth of 10 feet and TP-3 at a depth of 8 feet). The test results indicated a residual shear strength equivalent to secant friction angle of10.2 degrees and 6.0 degrees, respectively. The test results indicate a relatively low strength along existing landslide basal shear zones.

Detailed test results are presented in Appendix B.

4.3 SLOPE STABILITY

4.3.1 Gross Stability of Natural & Engineered Slopes

The stability of the proposed and existing natural slopes have been assessed in accordance with methodologies set forth in Blake et al. 2002 and AASHTO LRFD for Bridge Design Specifications with respect to four representative cross-sections, illustrated on Figure D-1 in Appendix D (the sections are identified in plan-view on Figure A-2). The sections analyzed represent the following conditions:

Section A-A' – possible landslide deposits downslope of Lots 30 and 31
Section B-B' – steep slopes and possible landslide deposits northeast of Lots 26 and 27
Section C-C' – cut slope below Lots 5 and 6
Section D-D' – possible landslide deposits across and downslope of Meridian Avenue

The stability of the slopes was modeled using SLIDE, a computer application incorporating (among others) Spencer's Method of analysis. Calculations for stability were developed by searching for the minimum factor of safety for a circular-type failure, or a translational-type failure, as appropriate, occurring through surficial soils (alluvium, colluvium, landslide deposits) and the underlying conglomerate bedrock. Homogeneous earth materials and arcuate failure surfaces were assumed. Analysis was performed for both static and seismic (pseudo-static) cases.

Groundwater, e.g. a piezometric groundwater surface, was not encountered during our subsurface investigation. Accordingly, groundwater was not modeled in our limit-equilibrium analysis. Saturated parallel seepage, which could occur during spring run-off, has been modeled in a separate analysis (see Section 4.3.2).

Soil strength parameters were selected based on soil types observed, local experience, correlation with index properties (Atterberg Limits, clay content), strength testing for this project, and comparisons with soil strength laboratory data from a nearby site (IGES, 2018). Based on this assessment, the following soil strength parameters were selected for this analysis:

Table 4.3.1a
Soil Strength Parameters

Earth Materials	Friction angle (degrees)	Cohesion (psf)	Unit Weight (pcf)
Colluvium (Qac)	32	150	125
Bedrock (Tw)	40	100	135
Bedrock (Cbc)	22	3,000	145
Engineered Fill (Afc)	29	180	125
Landslide (Qls) mass	28	300	120
Landslide (Qls) *residual*	Φr=6°		120

Pseudo-static (seismic screening) analysis of the proposed slope was performed in general conformance with Blake et al. 2002, ASCE 7-10 and AASHTO LRFD for Bridge Design Specifications. The design seismic event was taken as the ground motion with a 2 percent probability of exceedance in 50 years (2PE50). Based on information provided on the USGS website ground motion calculator, the Peak Ground Acceleration (PGA) associated with a 2PE50 event is estimated to be 0.35g. Half of the PGA, (~0.17g), was taken as the horizontal seismic coefficient (k_h) (Hynes and Franklin, 1984), and used in the pseudo-static seismic screen analysis. The results of the analyses have been summarized in Table 4.3.1b.

Table 4.3.1b
Results of Slope Stability Analyses

Section	Static Factor of Safety	Pseudo-Static Factor of Safety
A-A' (landslide)	0.92	0.60
B-B' (cut slope)	2.84	1.79
B-B' (landslide)	1.08	0.68
C-C' (cut slope)	2.09	1.46
D-D'	2.95	1.86

The results of the analysis indicated the proposed critical cut slopes for Sections B-B' and C-C' meet the minimum required factors-of-safety of 1.5 and 1.0 for both the static and seismic (pseudo-static) case, respectively. For Sections A-A' and B-B', the landslide deposits are shown to be marginally stable under static conditions and unstable under seismic conditions. Therefore, within the landslide areas, remedial grading to remove the basal shear of the landslide is anticipated in order to maintain suitable safety factors for residential development. A summary of the slope stability analysis is presented in Appendix D.

4.3.2 Surficial Stability

Our subsurface investigation indicates that the near-surface soils generally consist of sandy clay with gravel (CL). Material identified as 'topsoil' (A/B Horizon) generally ranges in thickness from 1.5 to 2 feet; the topsoil has developed on the prevailing colluvial cover, and therefore consists largely of gravelly clay, but with a higher organic component (abundant roots).

IGES assessed the potential for the upper three feet to become mobilized under saturated parallel seepage conditions. Our assessment assumes three feet of clayey colluvium or topsoil, fully saturated, and a 3H:1V slope (this would be a transient condition that could occur during primary spring run-off and snowmelt). Our model assumes an estimated effective friction angle of 29 degrees and a cohesion of 150 psf, and a saturated unit weight of 135 pcf. Based on this model, a factor-of-safety of 1.82 results. Sample calculations are presented in Appendix D.

Our calculations do not take into account the beneficial effects of plant roots, which were commonly observed throughout the topsoil units. Many of the existing natural slopes are thickly vegetated, which is expected to reduce the likelihood of shallow surficial slope instability. This will not, however, be applicable to engineered cut slopes, at least until natural vegetation can be established.

Based on our infinite slope model, and the foregoing discussion, IGES considers the potential for surficial slope instability on this site to be low.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL CONCLUSIONS

Based on the results of the field observations, literature review, and previously completed geotechnical investigation (IGES, 2017), **the subsurface conditions are considered suitable for the proposed development, provided that the recommendations presented in this report are incorporated into the design and construction of the project.**

Supporting data upon which the following conclusions and recommendations are based have been presented in the previous sections of this report. The recommendations presented herein are governed by the physical properties of the earth materials encountered in the subsurface explorations. If subsurface conditions other than those described herein are encountered in conjunction with construction, and/or if design and layout changes are initiated, IGES must be informed so that our recommendations can be reviewed and revised as deemed necessary.

5.2 GEOLOGIC CONCLUSIONS AND RECOMMENDATIONS

Based upon the data collected and reviewed as part of the geologic hazard assessment, IGES makes the following conclusions regarding the geological hazards present at *The Overlook at Powder Mountain* project area:

- ***The Overlook at Powder Mountain*** **project area does not appear to have geological hazards that would adversely affect significant parts of the development as currently proposed.** However, landslide hazards are present for the northwestern lots north of Meridian Avenue that are anticipated to require remedial grading in order to reduce the landslide hazard risk to an acceptable level.

- Landslide hazard risk is considered to be high for all structures within the mapped landslide deposits in the northwestern part of the property (unit Qls or Qls? in Figure A-2). This includes Lots 27 through 33. Landslide hazard risk is considered to be moderate for the roadway and possible future development east of Meridian Avenue near TP-7, and low for all other lots or proposed structures on the property.

- Earthquake ground shaking is the only other identified hazard that may potentially affect all parts of the project area and is considered to pose a moderate risk.

- Shallow groundwater conditions were not observed in any of the 28 test pits, though some ponded water was observed adjacent to the ephemeral stream drainage in the northwesternmost portion of the property. As such, shallow groundwater hazards are considered to be low to moderate for this part of the property, and low for all other parts of the property.

- Rockfall, surface-fault-rupture, liquefaction, debris-flow, and flooding hazards are considered to be low for the property.

Given the conclusions listed above, IGES makes the following recommendations:

- Foundations and roadways should be placed on competent bedrock (Wasatch Formation or Calls Fort Shale), or structural fill extending to competent bedrock. This will require over-excavating within the building envelope or roadway to below the base of the shallow landslide deposits and shear plane (only in areas where such landslide deposits are present). Based upon our subsurface investigation, this only applies to residential Lots 27 through 33 and may apply to some of the future development east of the curve in Meridian Avenue. A small portion of Meridian Avenue immediately northwest of the curve may necessitate this over-excavation if landslide deposits are observed to be present in this area. While it is not anticipated, if landslide deposits are observed to be underlying Meridian Avenue in the northwestern portion of the property, the same over-excavation is recommended to be applied. The conditions necessitating these mitigation efforts should be field-verified and only implemented in those areas that meet the mitigation conditions specified above.

- An IGES geologist or geotechnical engineer should observe the foundation and roadway excavations to assess that the excavations have been taken to an appropriate depth, to further evaluate for adverse geologic conditions, and to assess whether the foundation subgrade has been prepared in accordance with our recommendations.

5.3 EARTHWORK

5.3.1 General Site Preparation and Grading

Below proposed structures, fills, and man-made improvements, all vegetation, topsoil, debris and undocumented fill (if any) should be removed. Any existing utilities should be re-routed or protected in place. The exposed native soils should then be proof-rolled with heavy rubber-tired equipment such as a scraper or loader*. Any soft/loose areas identified during proof-rolling should be removed and replaced with structural fill. All excavation bottoms should be observed by an IGES representative during proof-rolling or otherwise prior to placement of engineered fill to evaluate whether soft, loose, or otherwise deleterious earth materials have been removed, and to assess compliance with the recommendations presented in this report.

*not required where bedrock is exposed in the foundation subgrade

5.3.2 Excavations

Soft, loose, or otherwise unsuitable soils beneath structural elements, hardscape or pavements may need to be over-excavated and replaced with structural fill. If over-excavation is required, the

excavations should extend ½ foot laterally for every foot of depth of over-excavation. Excavations should extend laterally at least two feet beyond flatwork, pavements, and slabs-on-grade. Structural fill should consist of granular materials and should be placed and compacted in accordance with the recommendations presented in this report.

Prior to placing structural fill, all excavation bottoms should be scarified to at least 6 inches, moisture conditioned as necessary at or slightly above optimum moisture content (OMC), and compacted to at least 90 percent of the maximum dry density (MDD) as determined by ASTM D-1557 (Modified Proctor). Scarification is not required where hard bedrock is exposed.

5.3.3 Excavation Stability

The contractor is responsible for site safety, including all temporary trenches excavated at the site and the design of any required temporary shoring. The contractor is responsible for providing the "competent person" required by Occupational Safety and Health (OSHA) standards to evaluate soil conditions. For planning purposes, Soil Type C is expected to predominate at the site (sands and gravels). Close coordination between the competent person and IGES should be maintained to facilitate construction while providing safe excavations.

Based on OSHA guidelines for excavation safety, trenches with vertical walls up to 5 feet in depth may be occupied. Where very moist soil conditions or groundwater is encountered, or when the trench is deeper than 5 feet, we recommend a trench-shield or shoring be used as a protective system to workers in the trench. As an alternative to shoring or shielding, trench walls may be laid back at one and one half horizontal to one vertical (1½H:1V) (34 degrees) in accordance with OSHA Type C soils. Trench walls may need to be laid back at a steeper grade pending evaluation of soil conditions by the geotechnical engineer; steeper excavations may be particularly feasible where hard, cemented Wasatch Formation (conglomerate bedrock) is exposed. Soil conditions should be evaluated in the field on a case-by-case basis. Large rocks exposed on excavation walls should be removed (scaled) to minimize rock fall hazards.

5.3.4 Structural Fill and Compaction

All fill placed for the support of structures, flatwork or pavements should consist of structural fill. Structural fill should consist of granular native soils, which may be defined as soils with less than 25% fines, 10-60% sand, and contain no rock larger than 4 inches in nominal size (6 inches in greatest dimension). Structural fill should also be free of vegetation and debris. All structural fill should be 1 inch minus material when within 1 foot of any base coarse material. Soils not meeting these criteria may be suitable for use as structural fill; however, such soils should be evaluated on a case by case basis and should be approved by IGES prior to use.

All structural fill should be placed in maximum 4-inch loose lifts if compacted by small hand-operated compaction equipment, maximum 6-inch loose lifts if compacted by light-duty rollers,

and maximum 8-inch loose lifts if compacted by heavy duty compaction equipment that is capable of efficiently compacting the entire thickness of the lift. Additional lift thickness may be allowed by IGES provided the Contractor can demonstrate sufficient compaction can be achieved with a given lift thickness with the equipment in use. We recommend that all structural fill be compacted on a horizontal plane, unless otherwise approved by IGES. Structural fill underlying all shallow footings and pavements should be compacted to at least 95 percent of the MDD as determined by ASTM D-1557. **The moisture content should be at, or slightly above, the OMC for all structural fill**. Any imported fill materials should be approved prior to importing. Also, prior to placing any fill, the excavations should be observed by IGES to confirm that unsuitable materials have been removed. In addition, proper grading should precede placement of fill, as described in the General Site Preparation and Grading subsection of this report.

Specifications from governing authorities such as Weber County and/or special service districts having their own precedence for backfill and compaction should be followed where more stringent.

5.3.5 Oversize Material

Based on our observations, there is a significant potential for the presence of oversize materials (larger than 6 inches in greatest dimension). Large rocks, particularly boulders (up to 2 feet), may require special handling, such as segregation from structural fill, and disposal.

5.3.6 Utility Trench Backfill

Utility trenches should be backfilled with structural fill in accordance with Section 5.3.4 of this report. Utility trenches can be backfilled with the onsite soils free of debris, organic and oversized material. Prior to backfilling the trench, pipes should be bedded in and shaded with a uniform granular material that has a Sand Equivalent (SE) of 30 or greater. Pipe bedding may be water-densified in-place (jetting). Alternatively, pipe bedding and shading may consist of clean ¾-inch gravel, which generally does not require densification. Native earth materials can be used as backfill over the pipe bedding zone. All utility trenches backfilled below pavement sections, curb and gutter, and hardscape, should be backfilled with structural fill compacted to at least 95 percent of the MDD as determined by ASTM D-1557. All other trenches should be backfilled and compacted to approximately 90 percent of the MDD (ASTM D-1557). However, in all cases the pipe bedding and shading should meet the design criteria of the pipe manufacturer. Specifications from governing authorities having their own precedence for backfill and compaction should be followed where they are more stringent.

5.4 FOUNDATION RECOMMENDATIONS

Based on our field observations and considering the presence of relatively competent native earth materials, we recommend that the footings for proposed single-family homes and smaller cabin-type structures be founded either *entirely* on competent Wasatch Formation or *entirely* on a minimum of 2 feet of structural fill extending to competent Wasatch Formation. Native/fill

transition zones are not allowed. The foundation subgrade should be prepared in accordance with the recommendations presented in Section 5.3.2.

Where landslide deposits are encountered, the entire building envelope (not just the footings) must be over-excavated to below the landslide shear plane and into competent bedrock (Wasatch Formation or Calls Fort Shale). This applies to Lots 27 through 33 and may apply to future development east of the curve in Meridian Avenue. A geologist or geotechnical engineer from IGES should observe the over-excavation to assess compliance with this recommendation. Once a sufficient over-excavation has been completed, the excavation may be brought back up to foundation subgrade elevation with structural fill as defined in Section 5.3.4 of this report.

Shallow spread or continuous wall footings constructed entirely on structural fill, or entirely on competent, uniform native earth materials (Wasatch Formation conglomerate) may be proportioned utilizing a maximum net allowable bearing pressure of **2,800 pounds per square foot (psf)** for dead load plus live load conditions. The net allowable bearing values presented above are for dead load plus live load conditions. The allowable bearing capacity may be increased by one-third for short-term loading (wind and seismic). The minimum recommended footing width is 20 inches for continuous wall footings and 30 inches for isolated spread footings.

All conventional foundations exposed to the full effects of frost should be established at a minimum depth of 42 inches below the lowest adjacent final grade. Interior footings, not subjected to the full effects of frost (i.e., *a continuously heated structure*), may be established at higher elevations, however, a minimum depth of embedment of 12 inches is recommended for confinement purposes.

Foundation drains should be installed around below-ground foundations (e.g., basement walls) to minimize the potential for flooding from shallow groundwater or seepage, which may be present at various times during the year, particularly spring run-off.

5.5 SETTLEMENT

5.5.1 Static Settlement

Static settlements of properly designed and constructed conventional foundations, founded as described in Section 5.4, are anticipated to be on the order of 1 inch or less. Differential settlement is expected to be half of total settlement over a distance of 30 feet.

5.5.2 Dynamic Settlement

Dynamic settlement (or seismically-induced settlement) consists of dry dynamic settlement of unsaturated soils (above groundwater) and liquefaction-induced settlement (below groundwater). During a strong seismic event, seismically-induced settlement can occur within loose to moderately dense sandy soil due to reduction in volume during, and shortly after, an earthquake

event. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

Based on the subsurface conditions encountered, dynamic settlement arising from a MCE seismic event is expected to be low; for design purposes, settlement on the order of ½ inch over 40 feet may be assumed.

5.6 EARTH PRESSURES AND LATERAL RESISTANCE

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footing and the supporting soils. In determining the frictional resistance against concrete, a coefficient of friction of 0.50 for sandy/gravelly native soils or structural fill should be used.

Ultimate lateral earth pressures from *granular* backfill acting against retaining walls, temporary shoring, or buried structures may be computed from the lateral pressure coefficients or equivalent fluid densities presented in Table 5.6. These lateral pressures should be assumed even if the backfill is placed in a relatively narrow gap between a vertical bedrock cut and the foundation wall. These coefficients and densities assume no buildup of hydrostatic pressures. The force of water should be added to the presented values if hydrostatic pressures are anticipated.

Table 5.6
Lateral Earth Pressure Coefficients

Condition	Level Backfill		2H:1V Backfill	
	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)	Lateral Pressure Coefficient	Equivalent Fluid Density (pcf)
Active (Ka)	0.33	35	0.53	56
At-rest (Ko)	0.50	55	0.80	85
Passive (Kp)	3.0	320	—	—

Clayey soils drain poorly and may swell upon wetting, thereby greatly increasing lateral pressures acting on earth retaining structures; therefore, clayey soils should not be used as retaining wall backfill. Backfill should consist of native granular soil with an Expansion Index (EI) less than 20.

Walls and structures allowed to rotate slightly should use the active condition. If the element is to be constrained against rotation (i.e., a basement wall), the at-rest condition should be used. These values should be used with an appropriate factor of safety against overturning and sliding. A value of 1.5 is typically used. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be reduced by ½.

5.7 SLOPE GRADING RECOMMENDATIONS

5.7.1 General Specifications

The following generalized recommendations are for engineered slopes (cut slopes and fill slopes). Recommendations for grading of engineered slopes are intended to minimize the potential for future surficial failures. For purposes of this report, surficial failure includes excessive erosion, sloughing, slumping, mass wasting, rockfall, and similar relatively shallow failures.

Engineered slopes should be no steeper than 2H:1V; steeper slopes (as steep as 1.5H:1V) may be allowed provided a reinforcement system that incorporates a HPTRM is utilized. Any slope reinforcement system should be designed by a qualified civil engineer (e.g. Western Excelsior *Extreme Armoring System*).

All fill slopes taller than about 10 feet should incorporate a *keyway* into the design, with a minimum depth of 2 feet and a minimum width of 8 feet.

5.7.2 Benching

Where fills are to be placed on ground with slopes steeper than 5H:1V, the ground should be stepped or benched. At a minimum, benches should be constructed every four (4) vertical feet. Benches shall be excavated a minimum lateral depth of four (4) feet into competent material or as otherwise recommended by IGES. However, the *lowest* bench should be excavated a minimum lateral depth of 8 feet into competent material (this measurement may include the keyway width for a fill slope).

5.7.3 Slope Protection

Slope planting and other measures should be provided immediately following construction. Slope protection polymers, straw waddles, and/or jute mesh should also be considered to limit the amount of erosion on slopes subject to erosion until landscaping and other permanent erosion protection measures are fully in place.

5.7.4 Earthwork Recommendations

In addition to the normal compaction procedures for structural fill specified in Section 5.3.4, compaction of fill slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to IGES. As an alternative to slope compaction, slopes may be constructed 2 to 3 feet 'fat' and trimmed back using a bulldozer with a slope board or similar equipment. Upon completion of grading, relative compaction of the fill out to the slope face shall be at least 90 percent of the maximum dry density per ASTM D 1557 (modified Proctor).

5.8 CONCRETE SLAB-ON-GRADE CONSTRUCTION

To minimize settlement and cracking of slabs, and to aid in drainage beneath the concrete floor slabs, all concrete slabs should be founded on a minimum 4-inch layer of compacted gravel overlying properly prepared subgrade. The gravel should consist of free-draining gravel or road base with a 3/4-inch maximum particle size and no more than 5 percent passing the No. 200 mesh sieve. The layer should be compacted to at least 95 percent of the MDD as determined by ASTM D-1557.

All concrete slabs should be designed to minimize cracking as a result of shrinkage. Consideration should be given to reinforcing the slab with a welded wire fabric, re-bar, or fibermesh. Slab reinforcement should be designed by the structural engineer; however, as a minimum, slab reinforcement should consist of 4''×4'' W4.0×W4.0 welded wire mesh within the middle third of the slab. We recommend that concrete be tested to assess that the slump and/or air content is in compliance with the plans and specifications. We recommend that concrete be placed in general accordance with the requirements of the American Concrete Institute (ACI). A Modulus of Subgrade Reaction of **250 psi/inch** may be used for design. It should be noted that the Modulus of Subgrade Reaction is not a function of soil properties alone but is also influenced by other factors, including the width of the loaded area, the shape of the loaded area, and the specific location under the slab. As such, the structural engineer should exercise care and engineering judgment when using the above stated value for design.

A moisture barrier (vapor retarder) consisting of 10-mil thick Visqueen (or equivalent) plastic sheeting should be placed below slabs-on-grade where moisture-sensitive floor coverings or equipment is planned. Prior to placing this moisture barrier, any objects that could puncture it, such as protruding gravel or rocks, should be removed from the building pad. Alternatively, the subgrade may be covered with 2 inches of clean sand**.**

5.9 MOISTURE PROTECTION AND SURFACE DRAINAGE

Surface moisture should not be allowed to infiltrate into the soils in the vicinity of the foundations. As such, design strategies to minimize ponding and infiltration near the structures should be implemented.

We recommend roof runoff devices be installed to direct all runoff a minimum of 10 feet away from foundations. If a basement level is planned, the builder should be responsible for compacting the exterior backfill soils around the foundation. Additionally, the ground surface within 10 feet of the structures should be constructed so as to slope a minimum of **five** percent away from the structure. Pavement sections should be constructed to divert surface water off the pavement into storm drains, curb/gutter, or another suitable location.

Where basements are planned, IGES recommends a perimeter foundation drain be constructed in accordance with the International Residential Code (IRC).

5.10 PAVEMENT

5.10.1 Pavement Design

The near-surface soils generally contained a significant clay fraction, grading from sandy/gravelly clay (CL) to clayey sand (SC). Accordingly, based on our observations, for pavement design we have modeled a CBR of 3. Anticipated traffic volumes were not available at the time this report was prepared; however, based on our understanding of the project development we assume traffic on the roadways would consist primarily of passenger cars with occasional heavy vehicles associated with construction, municipal waste collection, public transportation, fire trucks, and similar. The following pavement designs have been developed for a 20-year design life assuming a 0 percent annual growth rate, and our assumed equivalent single axle load (ESAL) of 200,000 ESALs for interior roadways. Based on the information obtained and the assumptions listed above, recommended pavement section alternatives are presented in Table 5.10.

Table 5.10
Pavement Design CBR 3.0 – Soft Surficial Soils, Clay

Material Type	Option 1	Option 2	Option 3
Asphalt Concrete Pavement (inches)	3.5	3.5	3.5
Untreated Road Base (inches)	16	12	10
Subbase	None	None	14
***Stabilization Fabric**	None	Mirafi RS380i	None

*Stabilization fabric is placed between the subgrade and the road base.

The pavement section thicknesses presented in Table 5.10 assume that there is no mixing over time between the road base and the clayey subgrade. In order to minimize mixing or fines migration, and thereby prolong the life of the pavement section, we recommend that the owner give consideration to placing a filter fabric between the native soils and the road base, such as the **Mirafi 140N** or an IGES-approved equivalent.

During construction, a significant amount of heavy construction traffic occurs. Some distress may manifest on pavement sections during this initial construction time period. Maintenance may need to be performed after completion of construction.

As a minimum, the upper 4 inches of the fine-grained soils beneath all pavement sections should be reworked in-place and compacted to at least 93% of the MDD with the moisture content at or slightly above the OMC as determined by ASTM D-1557 (highly organic earth materials that appear to be topsoil should not be left in-place or be allowed to be mixed-in with the reworked soil). Asphalt has been assumed to be a high stability plant mix and base course material composed of crushed stone with a minimum CBR of 70. Road base should be compacted to a minimum density of 95 percent as determined by ASTM D-1557 (Modified Proctor). Asphalt should be compacted to a minimum of 96 percent of the Marshall maximum density. Asphalt and aggregate base material should conform to local requirements. Subbase should be a coarse, granular pit-run material with a minimum CBR of 30.

Where Portland Cement Concrete (PCC) pavements are planned, such as near trash enclosures or other areas expected to support heavy truck traffic, the pavement is recommended to be a minimum of 5 inches in thickness. Concrete pavement should be underlain by a minimum 6 inches of aggregate base course.

If conditions vary significantly from our stated assumptions, IGES should be contacted so we can modify our pavement design parameters accordingly.

5.10.2 Pavement Construction

The preceding pavement design options meet AASHTO design guidelines; however, where particularly soft, pumping subgrade is encountered, difficulty may be encountered during construction, particularly with respect to stabilization of the pavement subgrade. If soft, pumping soils or mobility problems arise during construction, one of the following options may be implemented:

A. Where soft subgrade is encountered, Mirafi RS380i reinforcement or an engineer-approved equivalent can be placed between the soft subgrade and the subbase. *The subbase should be compacted in two lifts*; some pumping/deflection may be noticed during compaction of the first lift, however upon placement of the final lift the 12 inches of subbase over RS380i is expected to stabilize the subgrade.

B. Stabilization of soft or pumping subgrade can also be accomplished by using a clean, coarse angular material worked into the soft subgrade. We recommend the material be greater than 3 inches in nominal diameter, but less than 6 inches. Alternately, a locally available pit-run gravel may be suitable but should contain a high percentage of particles larger than 3 inches diameter and have less than 5 percent fines (material passing the No. 200 Sieve). A pit-run gravel may not be as effective as a coarse, angular material in stabilizing the soft soils and will likely require more material be placed. The stabilization material should be worked (pushed) into the soft subgrade soils until a relatively firm and unyielding surface is established. Once

a relatively firm and unyielding surface is achieved, the area may be brought to final design grade using structural fill. Other earth materials not meeting aforementioned criteria may also be suitable; however, such material should be evaluated on a case-by-case basis and should be approved by IGES prior to use.

C. Where soft soils are encountered, the Contractor should consider compaction using static methods (e.g., wheel-rolling with heavy earth-moving equipment such as a loader or scraper). Compaction over soft soils using vibratory methods often proves to be marginally effective.

5.10.3 Frost Heave

The pavement designs presented in Table 5.10 do not take into account the deleterious effects of frost heave (positive volumetric strain of frozen soils). The prevailing near-surface soils generally contain a significant clay fraction; such soils often have a high moisture content and can be particularly susceptible to frost heave. Because the soils may be particularly susceptible to frost heave, the Owner may wish to consider placing a relatively frost-free material below the pavement section, e.g. a coarse subbase material with less than 20 percent fines content. Within the Summit Powder Mountain area, the frost depth is generally taken as 42 inches for design; however, the actual frost depth could be less, or more, depending on location and whether snow removal is maintained throughout the winter since snow often acts to insulate the ground from very cold air. In roadways, frost depth can exceed this value, particularly in shady areas that receive little sun, since snow insulation is negligible due to snow removal.

The thickness of frost-free material added to the pavement section will be dependent upon the degree of risk of frost heave that is acceptable to the Owner – as a minimum, a distance of 24" from finish grade to the frost-susceptible soils would be prudent (total pavement section thickness of 24", which would include asphalt, roadbase, and subbase combined). It should be noted that Option 3 from Table 5.10 would achieve this minimum. This would reduce, *but not eliminate* the risk associated with frost heave; the Owner may wish to consider additional thickness of frost-free material to further reduce the risk of reduced pavement life arising from frost heave.

5.11 SOIL CORROSION POTENTIAL

To evaluate the corrosion potential of concrete in contact with onsite native soil, two representative soil samples were tested in our soils laboratory for soluble sulfate content. Laboratory test results indicate that the samples tested had sulfate contents of 49 and 386 ppm. Based on this result, the onsite native soils are expected to exhibit a low potential for sulfate attack to concrete. Conventional Type I/II cement may be used for all concrete in contact with site soils.

To evaluate the corrosion potential of ferrous metal in contact with onsite native soil, two representative soil samples were tested in our soils laboratory for soil resistivity (AASHTO T288), chloride content, and pH. The tests indicated that the onsite soil tested has a minimum soil

resistivity ranging from 435 (clay) to 18,197 OHM-cm (granular), chloride contents ranging from 5.2 to 38.5 ppm, and pH values ranging from 5.9 to 6.1. Based on these results, the onsite native soil is considered *severely corrosive* to ferrous metal. The corrosion potential is particularly high where clay soils are present.

5.12 CONSTRUCTION CONSIDERATIONS

5.12.1 Over-Size Material

Large boulders (up to 24 inches in diameter) were observed on the surface and within the test pits; as such, excavation of the basement may generate an abundance of over-size material that may require special handling, processing, or disposal.

5.12.2 Excavation Difficulty

In the five test pits excavated in 2017 during our initial work for Phase I, the excavator met with early refusal on hard stratum (bedrock consisting of Wasatch Formation, or conglomerate). The excavations were completed with a Caterpillar 313F tracked excavator. For equipment of this size or smaller, excavation for some foundations may be challenging, and excavations for basements or utilities may be very difficult. The Contractor should consider this information when determining the appropriate earth-moving equipment for this site.

6.0 CLOSURE

6.1 LIMITATIONS

The concept of risk is a significant consideration of geotechnical analyses. The analytical means and methods used in performing geotechnical analyses and development of resulting recommendations do not constitute an exact science. Analytical tools used by geotechnical engineers are based on limited data, empirical correlations, engineering judgment and experience. As such the solutions and resulting recommendations presented in this report cannot be considered risk-free and constitute IGES's best professional opinions and recommendations based on the available data and other design information available at the time they were developed. IGES has developed the preceding analyses, recommendations and designs, at a minimum, in accordance with generally accepted professional geotechnical engineering practices and care being exercised in the project area at the time our services were performed. No warrantees, guarantees or other representations are made.

The information contained in this report is based on limited field testing and understanding of the project. The subsurface data used in the preparation of this report were obtained largely from the explorations made for *The Outlook at Powder Mountain* project. It is very likely that variations in the soil, rock, and groundwater conditions exist between and beyond the points explored. The nature and extent of the variations may not be evident until construction occurs and additional explorations are completed. If any conditions are encountered at this site that are different from those described in this report, IGES must be immediately notified so that we may make any necessary revisions to recommendations presented in this report. In addition, if the scope of the proposed construction or grading changes from those described in this report, our firm must also be notified.

This report was prepared for our client's exclusive use on the project identified in the foregoing. Use of the data, recommendations or design information contained herein for any other project or development of the site not as specifically described in this report is at the user's sole risk and without the approval of IGES, Inc. It is the client's responsibility to see that all parties to the project including the designer, contractor, subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

We recommend that IGES be retained to review the final design plans, grading plans and specifications to determine if our engineering recommendations have been properly incorporated in the project development documents. We also recommend that IGES be retained to evaluate construction performance and other geotechnical aspects of the project as construction initiates and progresses through its completion.

6.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction. IGES staff or other qualified personnel should be on site to verify compliance with these recommendations. These tests and observations should include at a minimum the following:

- Observations and testing during site preparation, earthwork and structural fill placement.
- Consultation as may be required during construction.
- Quality control on concrete placement to verify slump, air content, and strength.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience at (801) 748-4044.

7.0 REFERENCES

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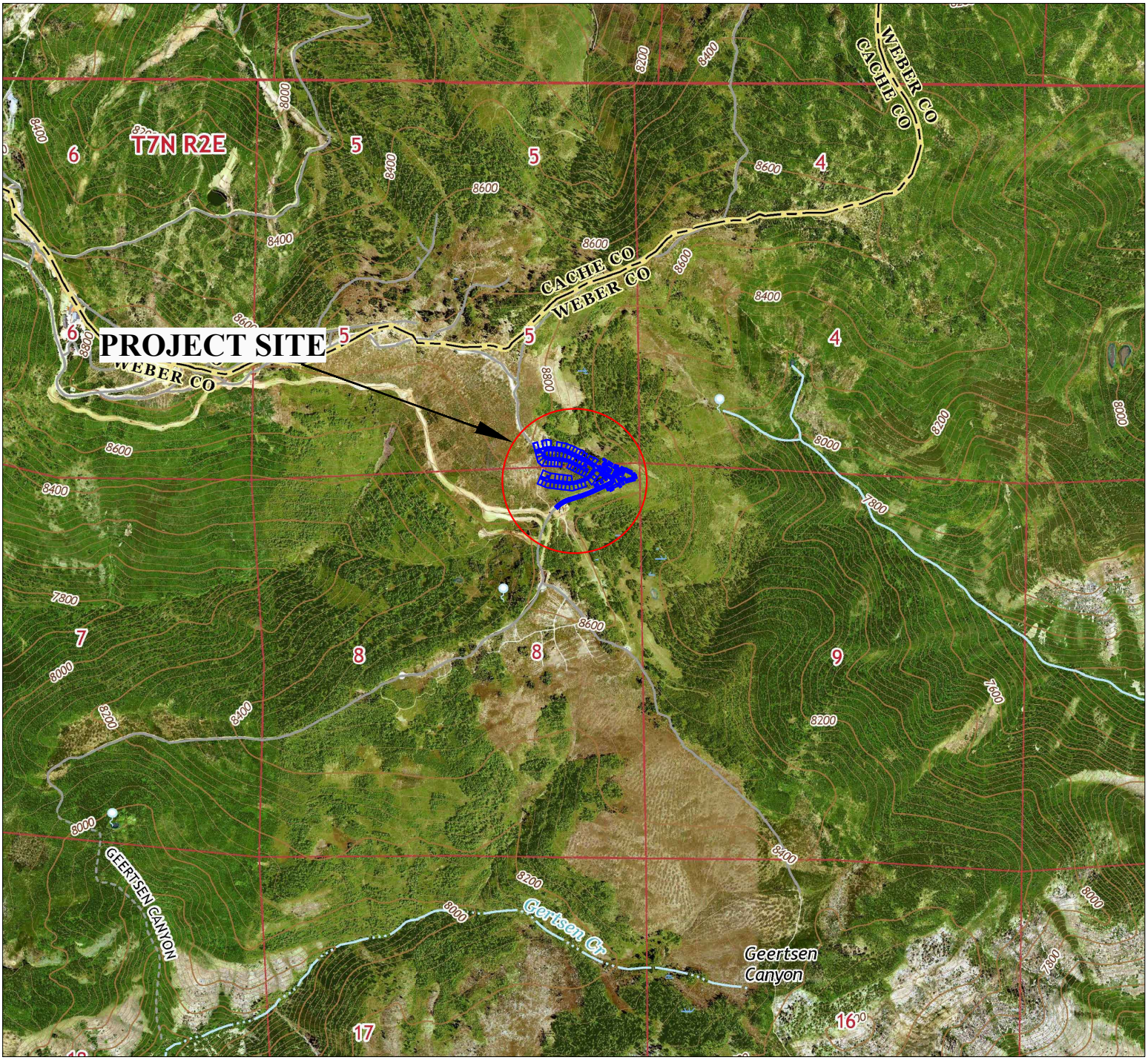
AERIAL PHOTOGRAPHS

Data Set	Date	Flight	Photographs	Scale
1947 AAJ	August 10, 1946	AAJ_1B	88, 89, 90	1:20,000
1953 AAI	September 14, 1952	AAI_4K	34, 35, 36	1:20,000
1963 ELK	June 25, 1963	ELK_3	57, 58, 59	1:15,840

*https://geodata.geology.utah.gov/imagery/

APPENDIX A



Base Maps:

-USGS *Brown's Hole, Huntsville, James Peak* and *Sharp Mountain* 7.5-Minute Quadrangles (2017)

N

0 1000 2000
FEET

1" = 2000'

UTAH

QUADRANGLE LOCATION

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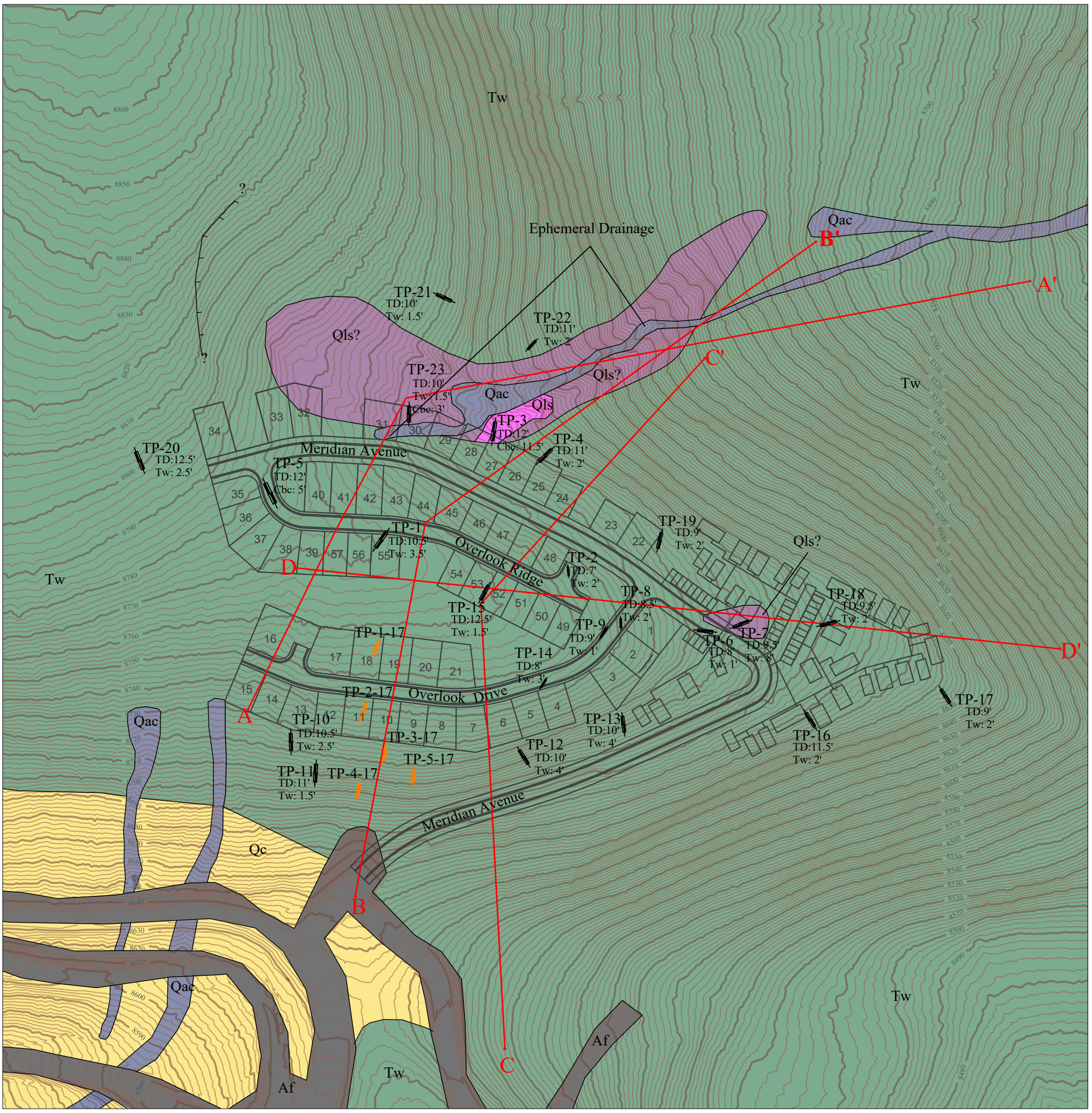
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

Site Vicinity Map

Figure

A-1



LEGEND

Af	Artificial Fill (Human Disturbed)
Qac	Alluvium and Colluvium
Qc	Colluvium
Qls	Landslide Deposits
Qls?	Possible Landslide Deposits
Tw	Wasatch Formation

Project Boundary

Cross-Section

Possible Landslide Headscarp

Test Pit Locations (This Study)

Test Pit Locations (IGES, 2017)

TD = Total depth
Tw = Depth to Wasatch Fm
Cbc = Depth to Calls Fort Shale

N

0 100 200
FEET

1" = 200'

Topo Data From:

Talisman Civil Consultants (2018)

Contour Interval: 2'

*All Geologic Contacts Approximate

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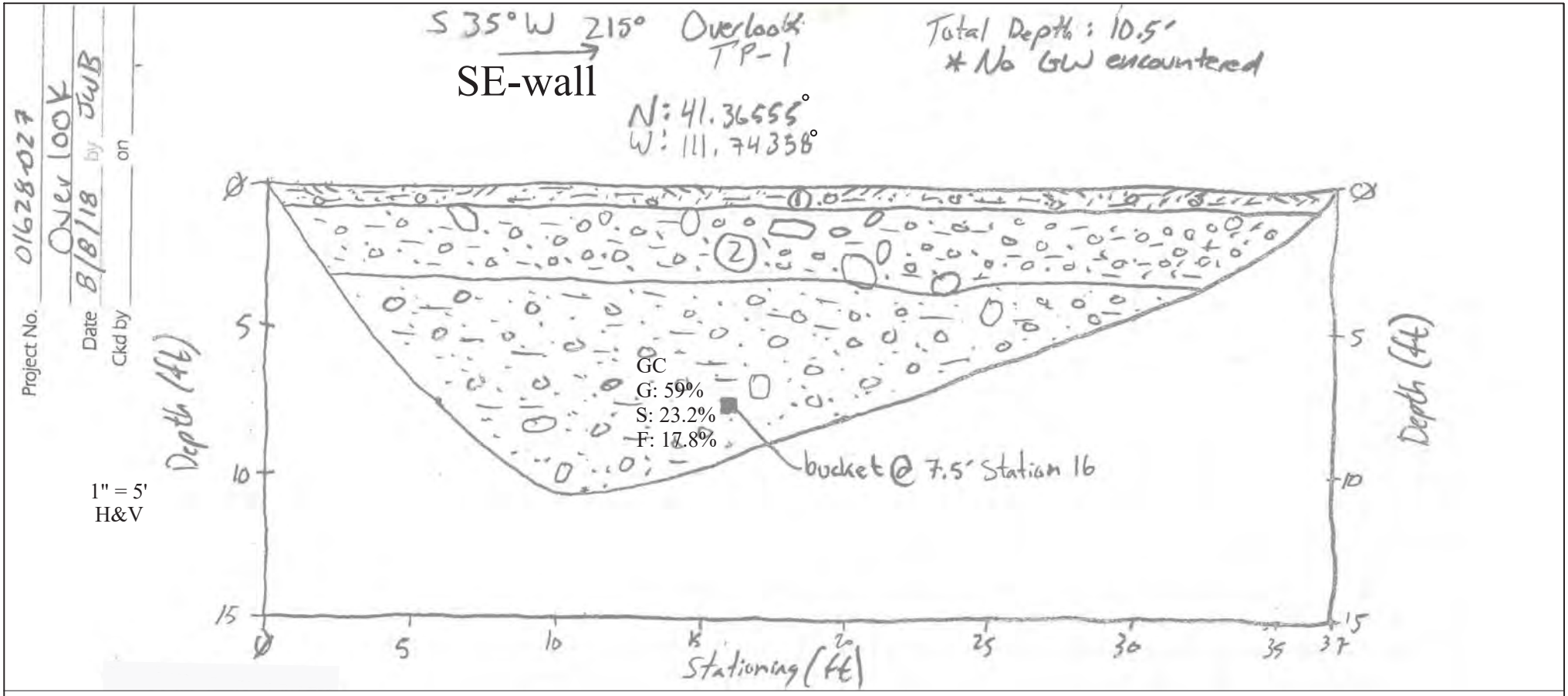
Geotechnical and Geologic Hazards Assessment
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

Geotechnical and Local Geology Map

Figure

A-2



LITHOLOGIC UNIT DESCRIPTIONS

1. **A/B Soil Horizon:** ~6"-1' thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular light gray (N7) and moderate reddish brown (10R $\frac{4}{6}$) quartzite up to 2' in diameter at surface, though mode clast size is <0.5"; common plant roots; gradational, irregular basal contact.

2. **Colluvium:** ~2-3' thick; light brown (5YR $\frac{6}{4}$) to brownish gray (5YR $\frac{4}{1}$) clayey GRAVEL with sand (GC) gradational to sandy lean CLAY with gravel (CL), medium dense, dry to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~40-50% of the unit; clasts are subangular to subrounded quartzite as above up to 3' in diameter, though mode clast size is ~4"; topsoil matrix; common to occasional plant roots; gradational, irregular basal contact.

3. **Wasatch Formation (Tw):** >7' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey GRAVEL with sand (GC) gradational to clayey SAND with gravel (SC), dense, slightly moist to moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~50% of the unit; clasts are subrounded quartzite as above and moderate yellowish brown (10YR $\frac{5}{4}$) fine-grained sandstone up to 2' in diameter, though mode clast size is ~3"; typical Wasatch Fm.

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TP-1 Log

Figure

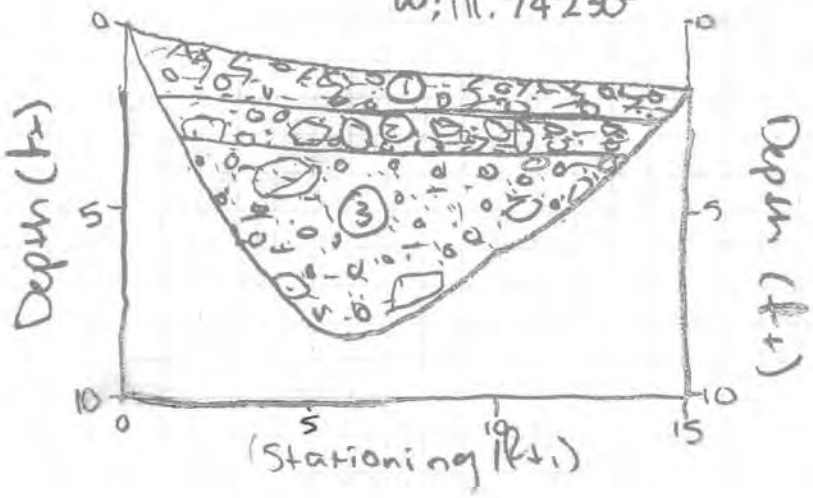
A-3

Project No. 01628-027
Overlook
Date 8/9/18 by KLA
Ckd by ____ on ____

359° (N6°W)
W-Wall

Overlook
TP-2
N: 41.36536°
W; 111.74230°

* Total Depth: 7'
* No GW encountered



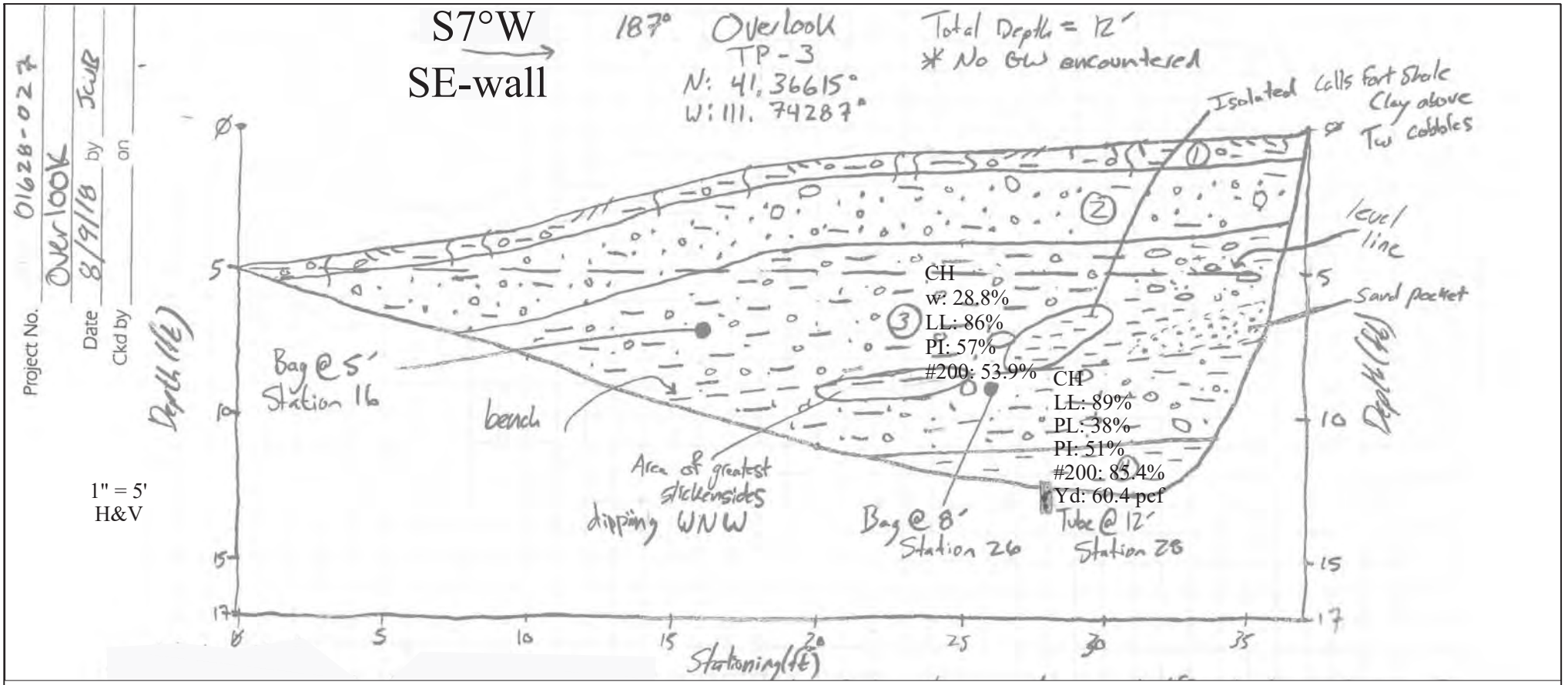
1" = 5'
H&V

LITHOLOGIC UNIT DESCRIPTIONS

1. **A/B Soil Horizon:** ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 3" in diameter, though mode clast size is ~$\frac{1}{2}$-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. **Colluvium:** ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~20-25% of the unit; clasts are subrounded to subangular quartzite as above up to 2.5' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant and tree roots; sharp, planar basal contact.

3. **Wasatch Formation (Tw):** >5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, dry, low plasticity fines, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded quartzite as above up to 2' in diameter, though mode clast size is ~3"; occasional tree roots; sand is fine-grained to medium-grained.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; light brown (5YR $\frac{5}{6}$) to moderate brown (5YR $\frac{4}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular light gray (N7) and moderate reddish brown (10R $\frac{4}{6}$) quartzite up to 4' in diameter, though mode clast size is ~0.5"; abundant plant roots; possible discontinuous thin colluvial unit at base; gradational, irregular basal contact.

2. Young Landslide (Qlsy): ~2-2.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, slightly moist to moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~20% of the unit; clasts are subrounded to subangular quartzite as above and subrounded pale yellowish orange (10YR $\frac{8}{6}$) fine-grained sandstone; clasts are up to 2.5' in diameter, though mode clast size is ~2"; few plant roots; sharp, irregular basal contact.

3. Slide Plane: 7-8' thick; mottled moderate reddish brown (10R $\frac{4}{6}$), white (N9) and light gray (N7) sandy fat CLAY with gravel (CH), medium stiff to stiff, moist, medium to high plasticity, massive; gravel and larger sized clasts comprise ~5-10% of the unit; clasts are subangular to subrounded quartzite and sandstone as above, plus angular black (N1) chert; clasts up to 6-8" in diameter, though mode clast size is 1"; highly heterogeneous unit; slickensides and possible slickenlines observed in clayey areas; these features are continuous for 6-18"; isolated unit 4 material found within this unit; unit in places can be described as Tw cobbles and sand in a Calls Fort Shale clay matrix; sharp, irregular basal contact.

4. Highly Weathered Calls Fort Shale: >1.5' thick; mottled moderate reddish brown (10R $\frac{4}{6}$) and light gray (N7) fat CLAY (CH), stiff, moist, medium to high plasticity, massive; rare (<5%) highly weathered small (<0.5") shale clasts in unit.

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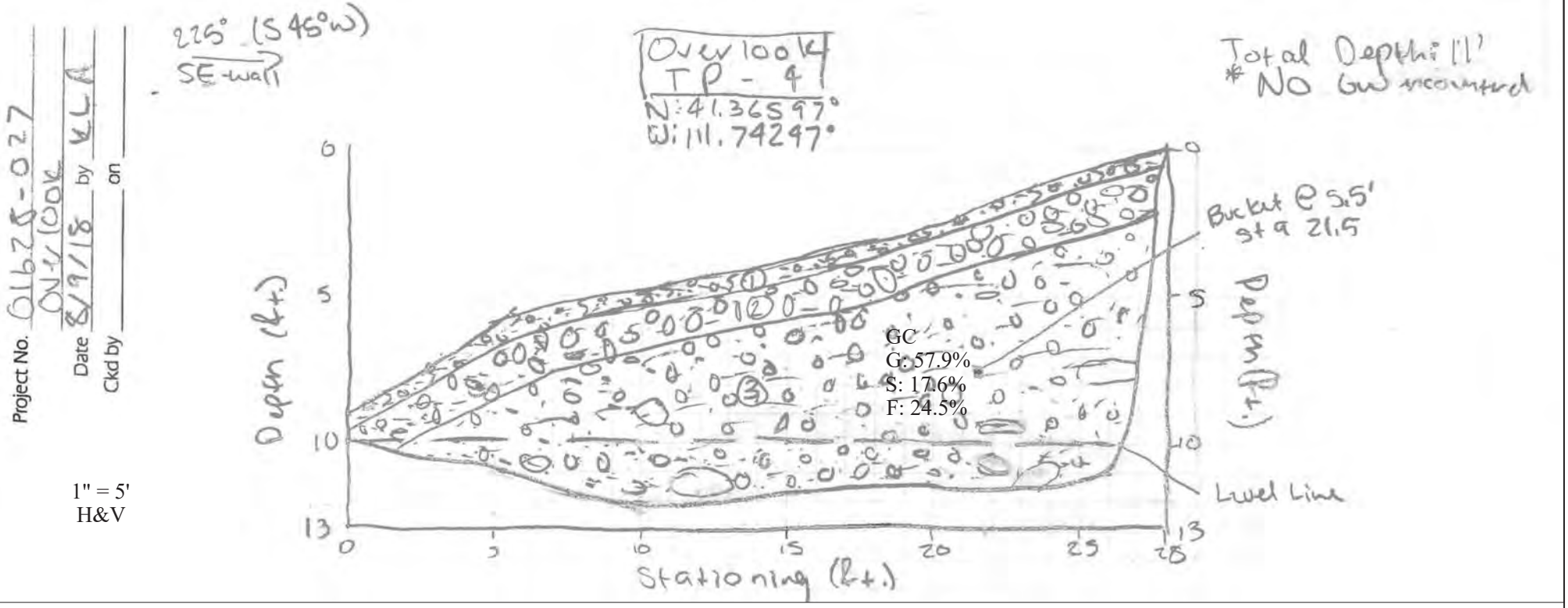
Summit Powder Mountain Resort
Weber County, Utah

TP-3 Log

Figure

A-5

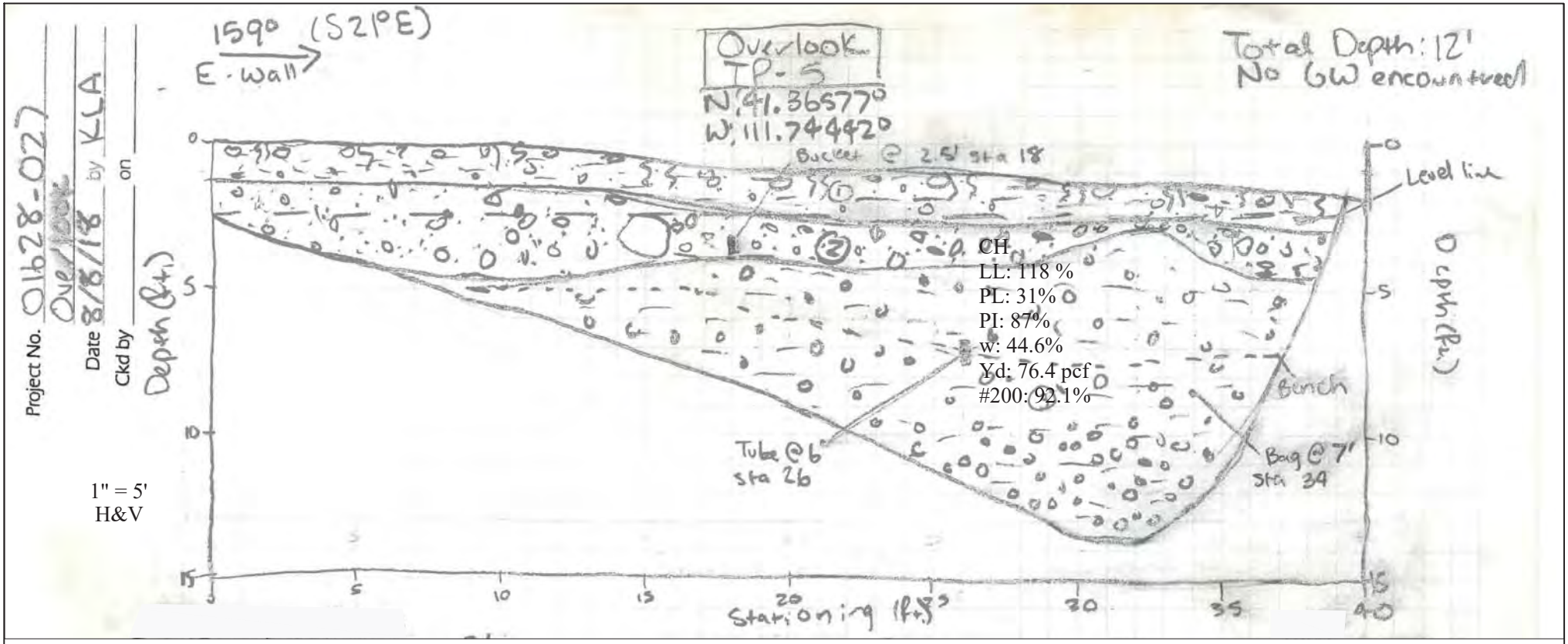


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 1' in diameter, though mode clast size is ~$\frac{1}{2}$-1"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium: ~1.5' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 3' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant roots; sharp, planar basal contact.

3. Wasatch Formation (Tw): >10' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey GRAVEL with sand (GC) gradational to well-graded SAND with gravel (SC), medium dense, moist, low to moderate plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above and moderate yellow (5Y $\frac{7}{6}$) sandstone; clasts are up to 3' in diameter, though mode clast size is ~2-3"; occasional plant roots; abundant 1-2 mm pinhole voids; sandy lean CLAY (CL) in middle of unit; well-graded SAND (SW) below sandy CLAY (CL); sand is fine to medium grained.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1.5' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{5}{6}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to ~2' in diameter, though mode clast size ~0.5-1"; abundant plant and tree roots; sharp, planar basal contact.

2. Wasatch Formation (Tw): ~3.5' thick; moderate reddish orange (10R $\frac{6}{6}$) clayey SAND with gravel (SC) gradational to sandy lean CLAY with gravel (CL), medium dense, dry to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular moderate orange pink (10R $\frac{7}{4}$) to medium gray (N5) quartzite up to 13" in diameter, though the mode clast size is ~2-3"; occasional plant roots; basal light gray coloring; sharp, irregular basal contact.

3. Weathered Calls Fort Shale: >10.5' thick; moderate reddish orange (10R $\frac{6}{6}$) mottled with grayish orange pink (10R $\frac{8}{2}$) gravelly fat CLAY (CH), medium stiff to stiff, slightly moist, medium plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subangular to angular moderate reddish orange (10R $\frac{6}{6}$) shale up to 2" in diameter, though mode clast size is ~0.5-1"; clasts are soft and fall apart easily; clasts increase in occurrence with depth; occasional short and discontinuous slickensides (mechanically induced); cracked and blocky when dried out; occasional plant roots.

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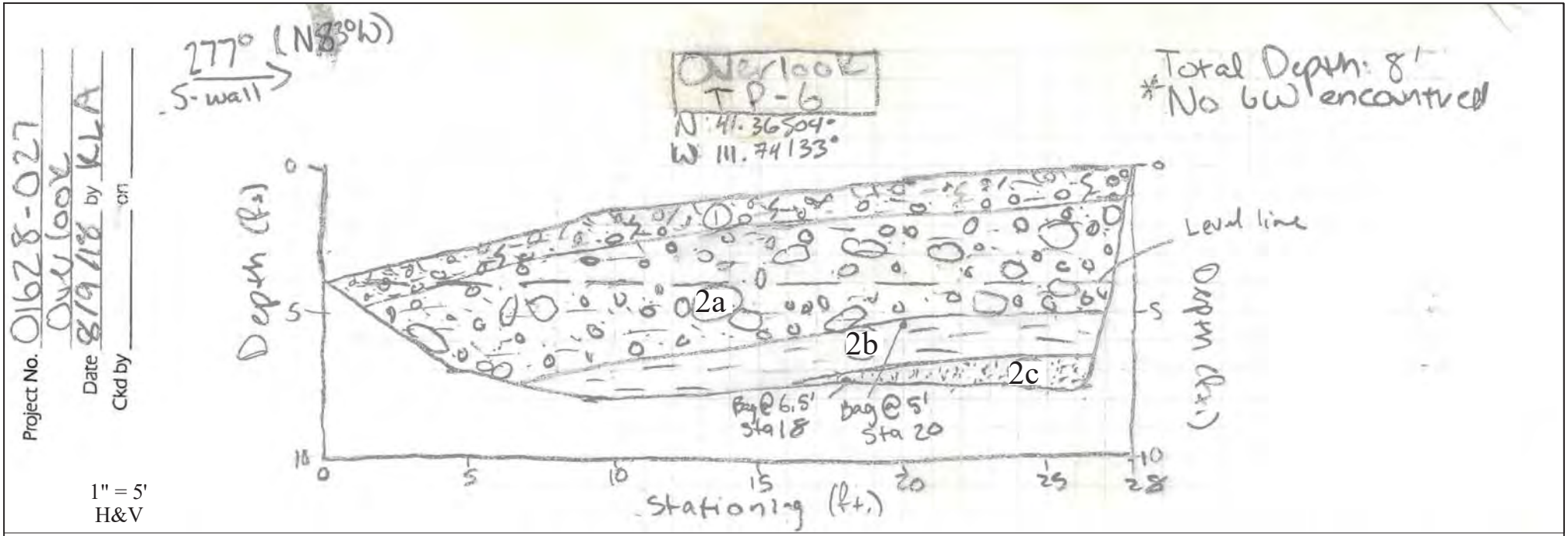
Geotechnical and Geologic Hazards Assessment
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

TP-5 Log

Figure

A-7



1" = 5'
H&V

LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~20-25% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) to medium gray (N5) quartzite up to 3" in diameter, though mode clast size is ~$\frac{1}{2}$-1"; abundant plant roots; gradational, planar basal contact.

2. Wasatch Formation (Tw): >6' thick; 3 sub-units; **2a):** ~4' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC) gradational to sandy lean CLAY with gravel (CL) , medium dense, dry, low to moderate plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the subunit; clasts are subrounded to subangular quartzite as above and medium gray (N5) quartzite; clasts are up to 1.5' in diameter, though mode clast size is ~2-3"; occasional plant roots; abundant 1-2 mm pinhole voids; sand is fine-grained to medium-grained; sharp, planar basal contact; **2b):**~1.5' thick; moderate reddish brown (10R $\frac{4}{6}$) mottled with grayish red (5R $\frac{4}{2}$) fat CLAY (CH); stiff, moist, medium plasticity, massive; devoid of clasts; common plant roots; gradational, planar basal contact; **2c):** >0.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND (SC); medium dense, moist, medium plasticity fines, massive; devoid of clasts; common plant roots.

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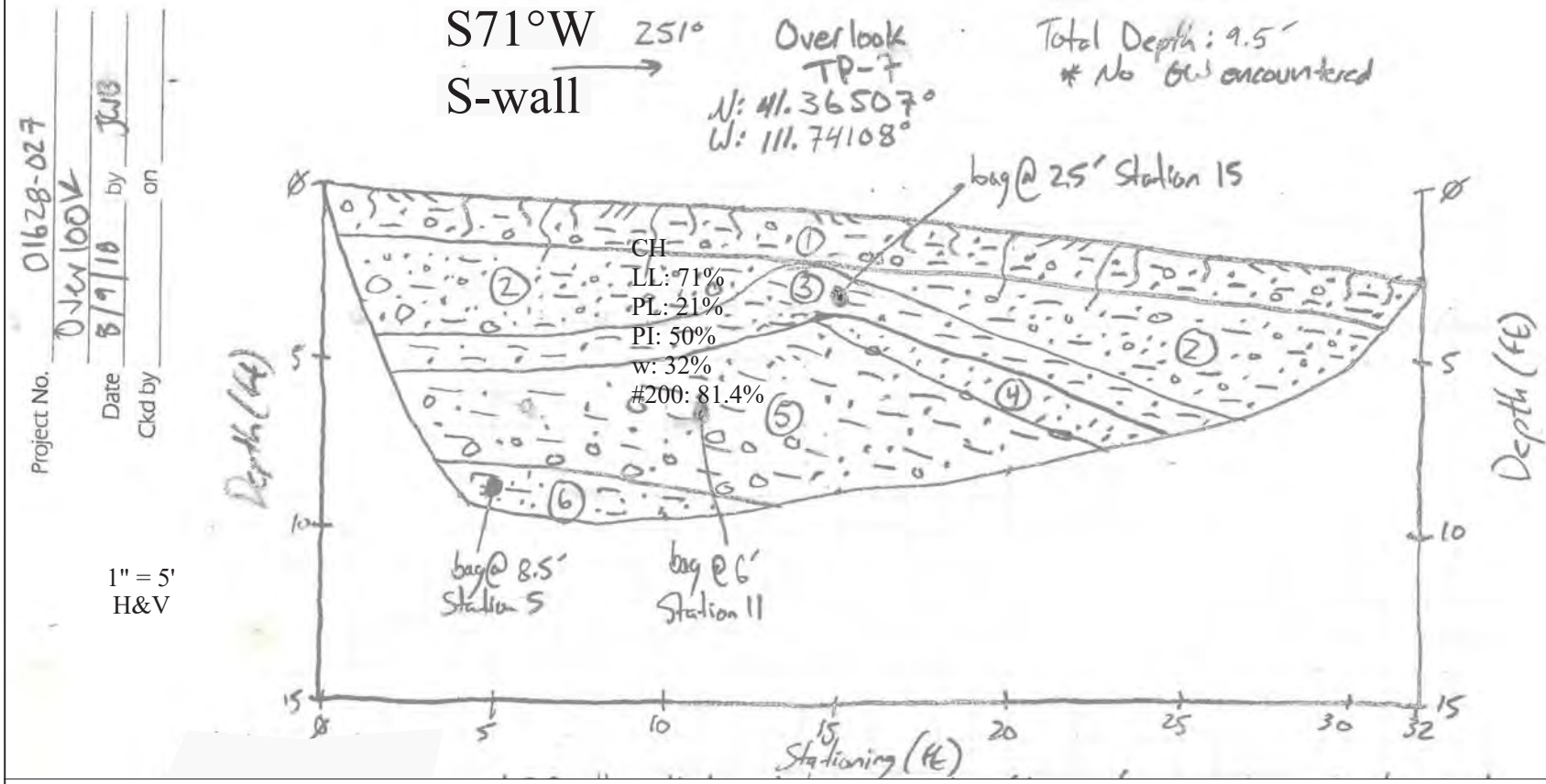
TP-6 Log

Figure

A-8



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1.5-2' thick; light brown (5YR $\frac{6}{4}$) to moderate brown (5YR $\frac{4}{4}$) sandy lean CLAY with gravel (CL), loose, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~10-15% of the unit; clasts are subrounded to subangular light gray (N7) to moderate yellowish brown (10YR $\frac{5}{4}$) quartzite up to ~1' in diameter, though mode clast size is ~0.5-1"; possible thin, discontinuous colluvial unit at base; abundant plant roots; sharp, irregular basal contact.

2. Shallow Landslide (Qlsy): ~0-3' thick; pale reddish brown (10R $\frac{5}{4}$) to moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC) gradational to sandy lean CLAY with gravel (CL), medium dense, moist to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~30% of the unit; clasts are subangular to subrounded quartzite as above up to 4" in diameter, with a mode clast size of ~0.5-1"; not present in center of test pit; common plant roots; sharp, irregular basal contact.

3. Clay Seam 1: ~1.5-2' thick; moderate reddish brown (10R $\frac{4}{6}$) to dark reddish brown (10R $\frac{3}{4}$) sandy lean CLAY (CL); medium stiff to loose, moist to slightly moist, medium plasticity, massive; devoid of clasts; small mechanically induced slickensides; blocky drying pattern similar to TP-20 unit 3a; sharp, wavy basal contact.

4. Sand Pocket: ~0.5-1' thick; light gray (N7) to white (N9) silty SAND (SM); dense to medium dense, slightly moist to dry, low plasticity fines, massive; devoid of clasts; sand is poorly sorted and ranges from very fine to coarse grained; sharp, planar basal contact.

5. Clay Seam 2: ~2.5-5' thick; intercollated moderate reddish brown (10R $\frac{4}{6}$) and light gray (N7) to medium gray (N5) sandy fat CLAY with gravel (CH); stiff, moist, moderate to high plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular quartzite as above; clasts are up to 4" in diameter, though mode clast size is ~3-4"; slickensides up to 5-6" long observed; clasts possibly concentrated at base of unit; gray clay component resembles weathered Calls Fort Shale; few plant roots; possible shear plane; sharp, planar basal contact.

6. Wasatch Formation (Tw): >1.5' thick; moderate reddish brown (10R $\frac{4}{6}$) to pale reddish brown (10R $\frac{5}{4}$) clayey SAND (SC); dense, moist, low plasticity fines, massive; devoid of clasts; few plant roots.

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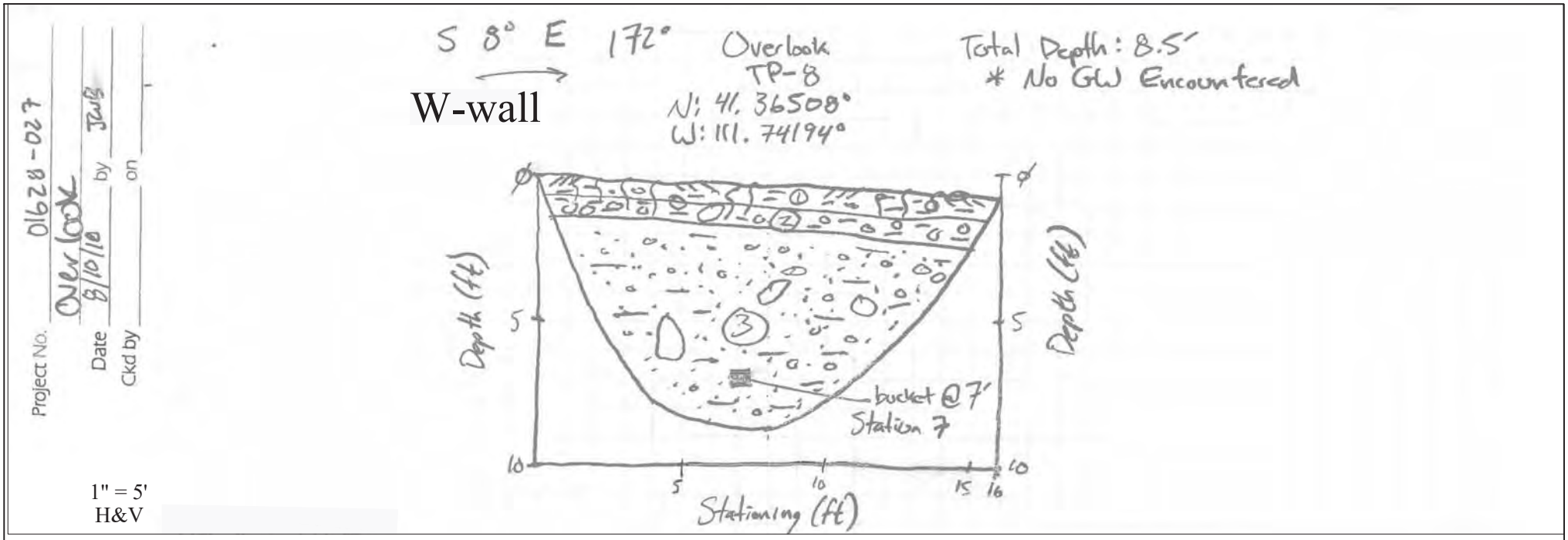
TP-7 Log

Figure

A-9

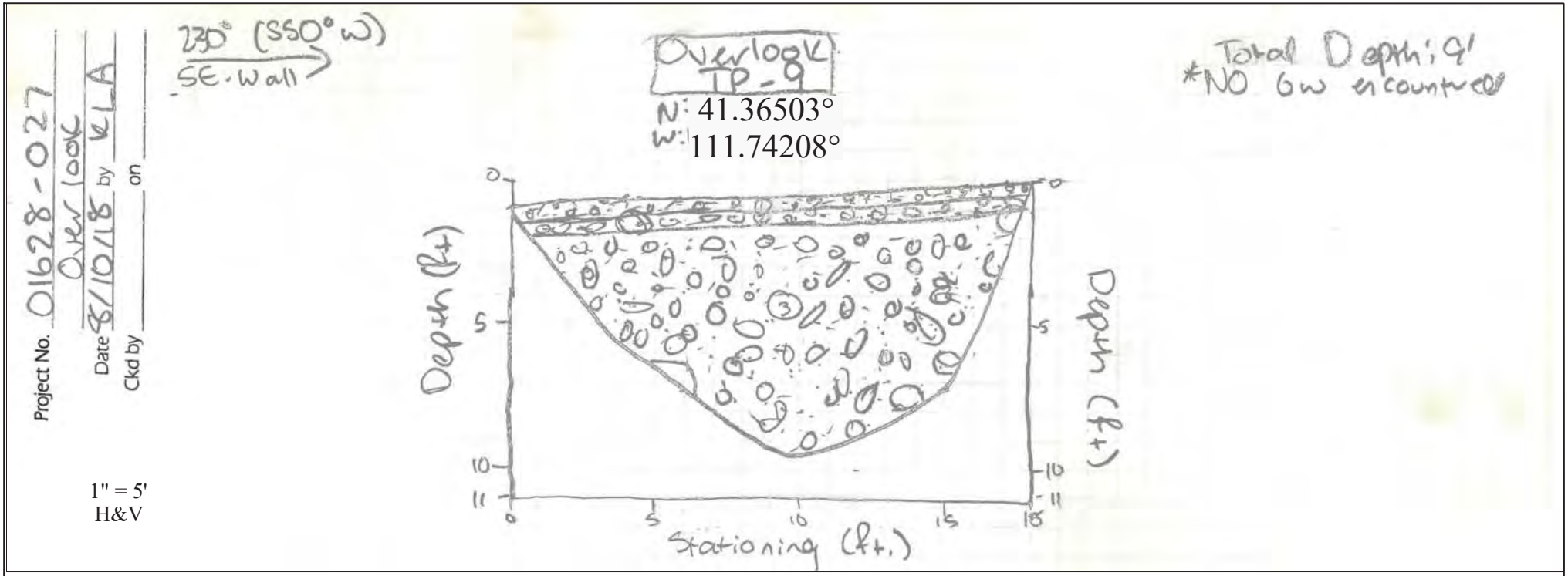


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6-12" thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~5-10% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to ~3" in diameter, though mode clast size ~0.5-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. Colluvium: ~6"-1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above up to 1' in diameter, though mode clast size is ~4-5"; abundant plant and tree roots; topsoil matrix; sharp, planar basal contact.

3. Wasatch Formation (Tw): >7' thick; moderate reddish brown (10R $\frac{4}{6}$) well graded SAND with clay (SW), medium dense, moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~20-30% of the unit; clasts are subrounded to subangular quartzite as above, medium gray (N5) quartzite and moderate reddish orange (10R $\frac{6}{6}$) sandstone up to 2.5' in diameter, though the mode clast size is ~2-4"; sand is fine to medium grained; occasional plant and tree roots.

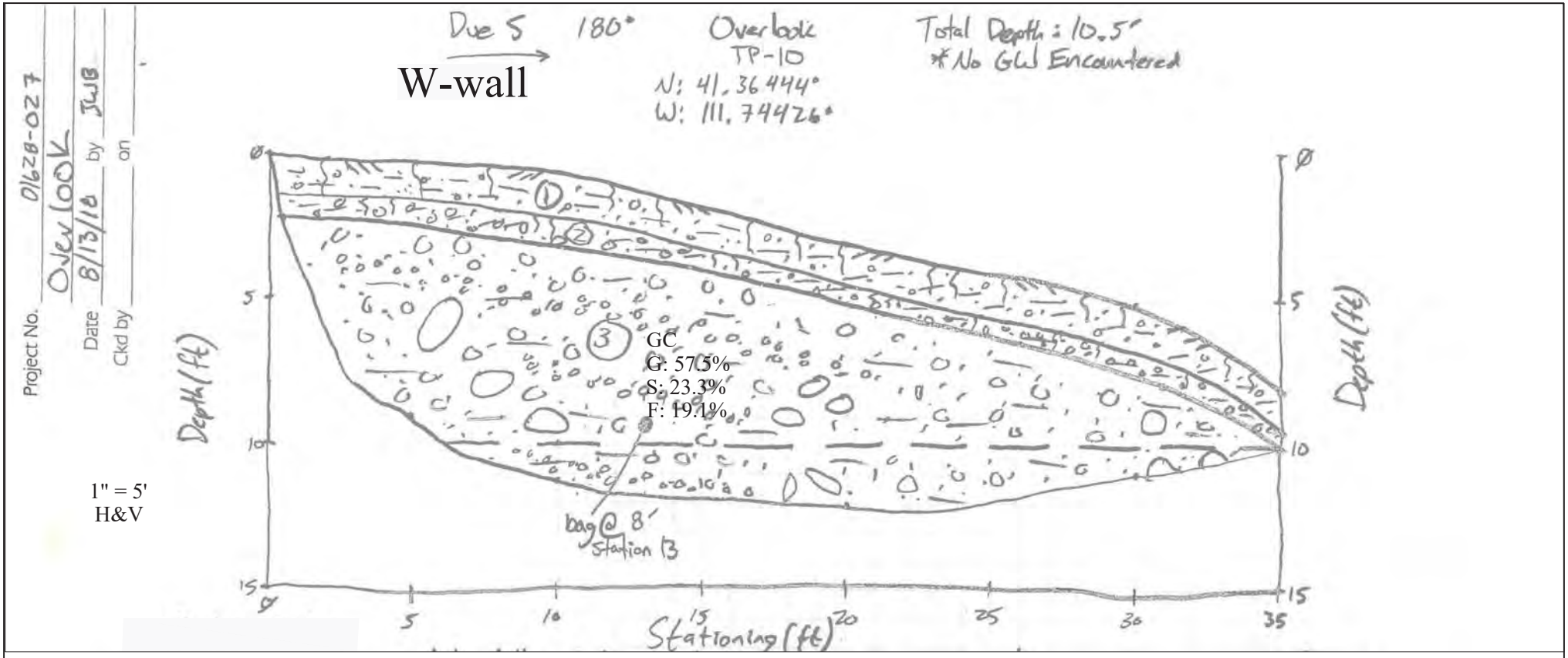


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6" thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to ~3" in diameter, though mode clast size ~0.5-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. Colluvium: ~6" thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above up to 1' in diameter, though mode clast size is ~2-3"; abundant plant and tree roots; topsoil matrix; sharp, planar basal contact.

3. Wasatch Formation (Tw): >8' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~20-30% of the unit; clasts are subrounded to subangular quartzite as above, medium gray (N5) quartzite and moderate reddish orange (10R $\frac{6}{6}$) sandstone up to 1-1.5' in diameter, though the mode clast size is ~2-4"; sand is fine to medium grained; occasional plant and tree roots.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1-1.5' thick; light brown (5YR $\frac{6}{4}$) to pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~15-20% of the unit; clasts are subrounded to subangular medium light gray (N6) to moderate yellowish brown (10YR $\frac{5}{4}$) quartzite up to ~3" in diameter, though mode clast size is ~1"; common to abundant plant roots; sharp, irregular basal contact.

2. Colluvium: ~6"-1' thick; light brown (5YR $\frac{6}{4}$) to pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 1.5-2' in diameter, though mode clast size is ~2-3"; common plant roots; topsoil matrix; sharp, irregular basal contact.

3. Wasatch Formation (Tw): >8' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, moist, low plasticity fines, massive to possible poorly defined beds; gravel and larger sized clasts comprise ~40% of the unit; clasts are subrounded to subangular quartzite as above plus subangular to subrounded dark yellowish orange (10YR $\frac{6}{6}$) fined grained highly weathered sandstone, clasts are up to 3' in diameter, though mode clast size is 1" and 3-4" in a bi-modal distribution; bi-modal distribution correlates with vague bedding; few plant roots; sand is fine grained primarily.

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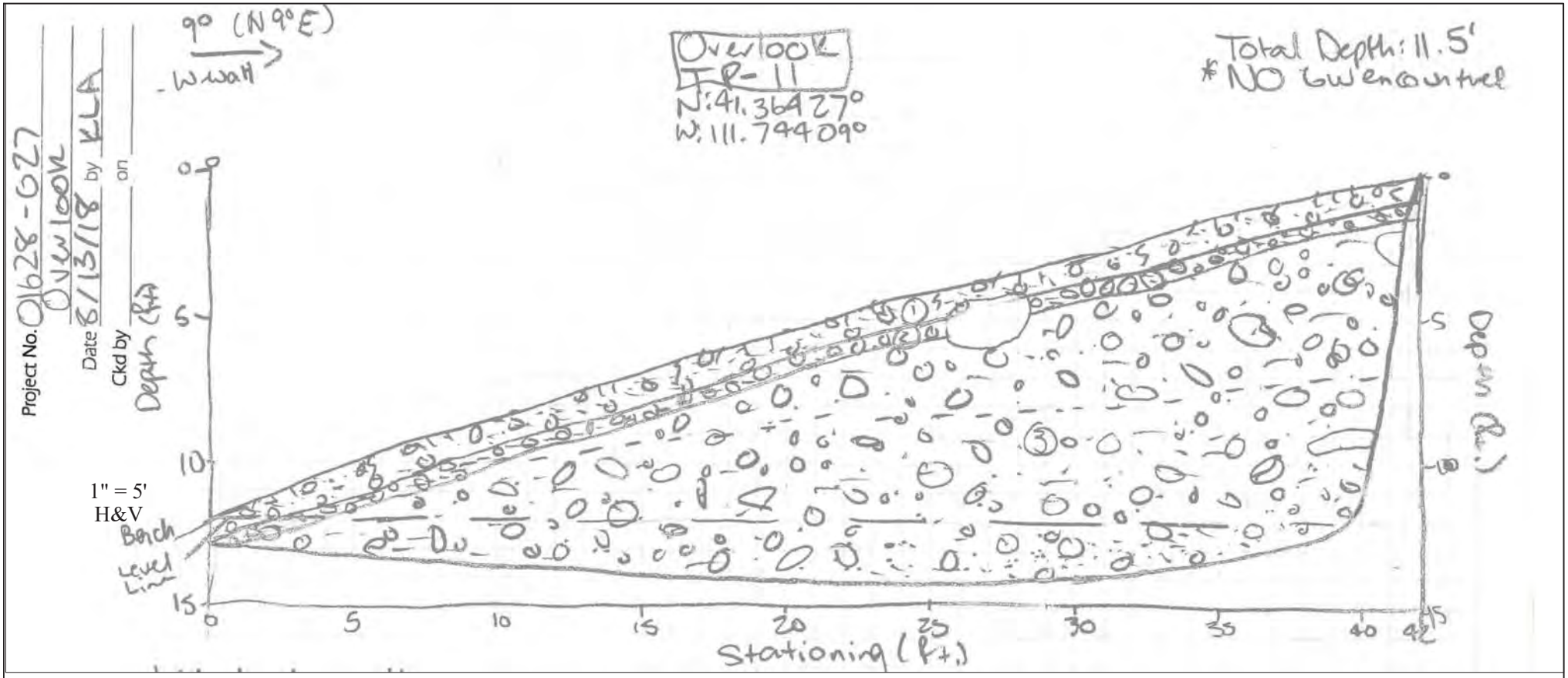
TP-10 Log

Figure

A-12



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~20-25% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to medium gray (N5) quartzite up to ~3" in diameter, though mode clast size is ~0.5-1"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium: ~6" thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 2' in diameter, though mode clast size is ~2-3"; abundant plant roots; topsoil matrix; sharp, planar basal contact.

3. Wasatch Formation (Tw): >10' thick; moderate reddish brown (10R $\frac{4}{6}$) sandy lean CLAY with gravel (CL) gradational to clayey SAND with gravel (SC), medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above plus moderate reddish orange (10R $\frac{6}{6}$) sandstone; clasts are up to 3.5' in diameter, though mode clast size is ~2-3"; occasional plant roots; sand is fine to medium grained, sandier with depth.

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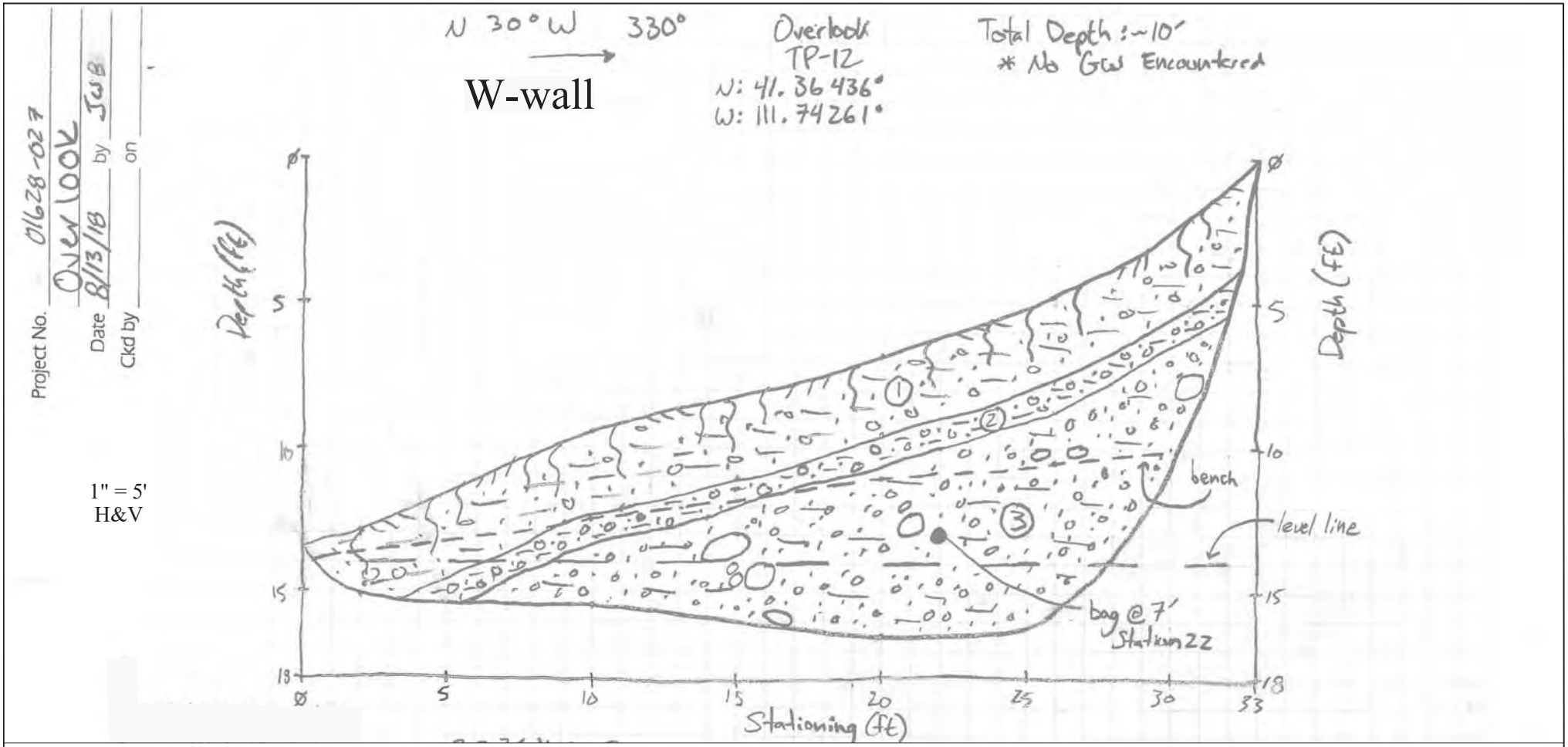
TP-11 Log

Figure

A-13



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~2.5-3' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~20-25% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to medium gray (N5) quartzite up to ~3" in diameter, though mode clast size is ~0.5-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. Colluvium: ~6"-1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 7" in diameter, though mode clast size is ~2-3"; abundant plant and tree roots; topsoil matrix; sharp, planar basal contact.

3. Wasatch Formation (Tw): >7' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, slightly moist to moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~35-40% of the unit; clasts are subrounded to subangular medium light gray (N6) and pale reddish brown (10R $\frac{5}{4}$) quartzite plus highly weathered moderate reddish brown and dark yellowish orange (10YR $\frac{6}{6}$) fine grained sandstone, up to 16" in diameter, though mode clast size is ~1-2"; few to occasional plant roots; gravel component is well graded, sand is mostly fine grained.

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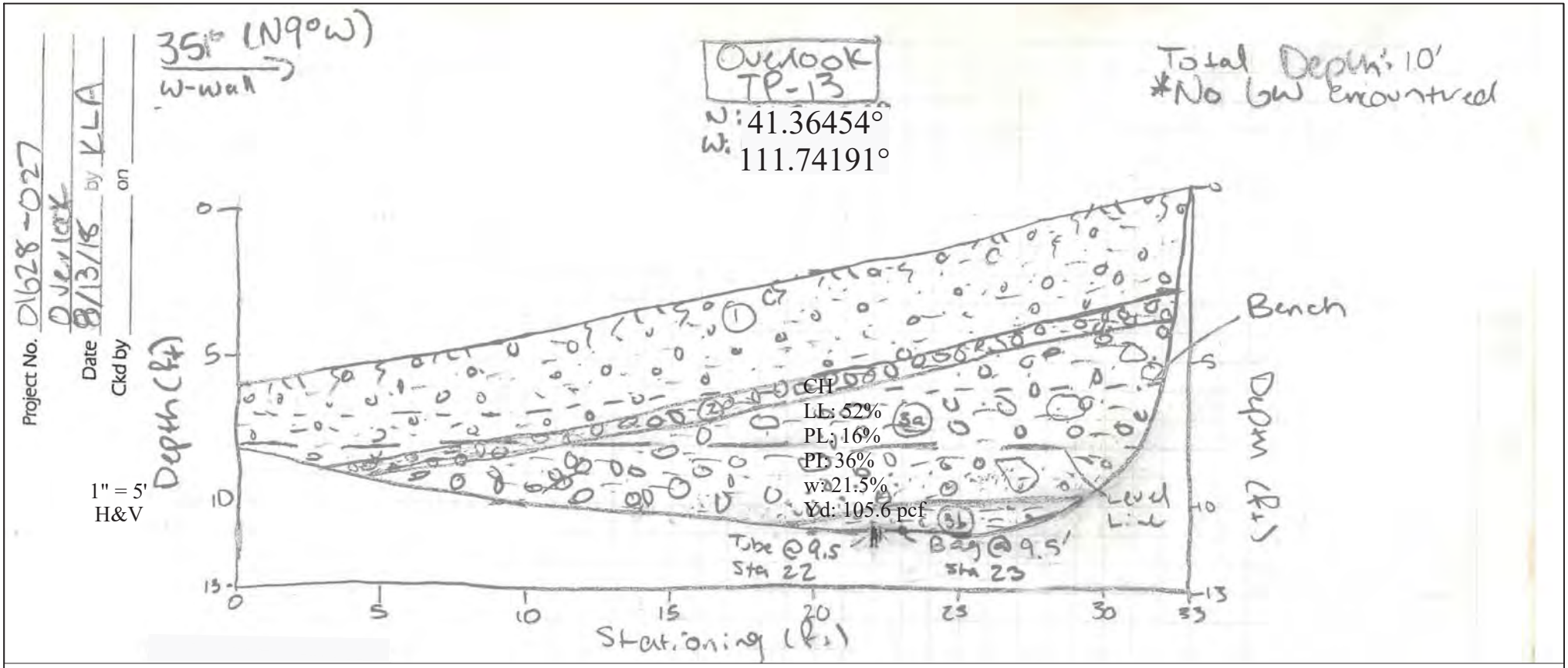
TP-12 Log

Figure

A-14



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~3.5' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~20-25% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to medium gray (N5) quartzite up to ~3" in diameter, though mode clast size is ~0.5-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. Colluvium: ~6" thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 1' in diameter, though mode clast size is ~2-3"; abundant plant and tree roots; topsoil matrix; sharp, planar basal contact.

3. Wasatch Formation (Tw): >6' thick; 2 subunits; **3a):** ~5' thick; moderate reddish brown (10R $\frac{4}{6}$) sandy lean CLAY with gravel (CL) gradational to clayey well-graded SAND with gravel (SC), medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above plus moderate reddish orange (10R $\frac{6}{6}$) sandstone; clasts are up to 2' in diameter, though mode clast size is ~2-3"; occasional plant and tree roots; sand is fine to medium grained, sandier with depth; sharp, planar basal contact; **3b):** >1' thick; moderate reddish brown (10R $\frac{4}{6}$) mottled with black (N1) and light gray (N7) sandy fat CLAY with gravel (CH), medium stiff, moist, moderate plasticity, massive; gravel and larger sized clasts comprise ~5-10% of the unit; clasts are quartzite as above up to 1" in diameter, though mode clast size is ~0.5"; sand is fine grained.

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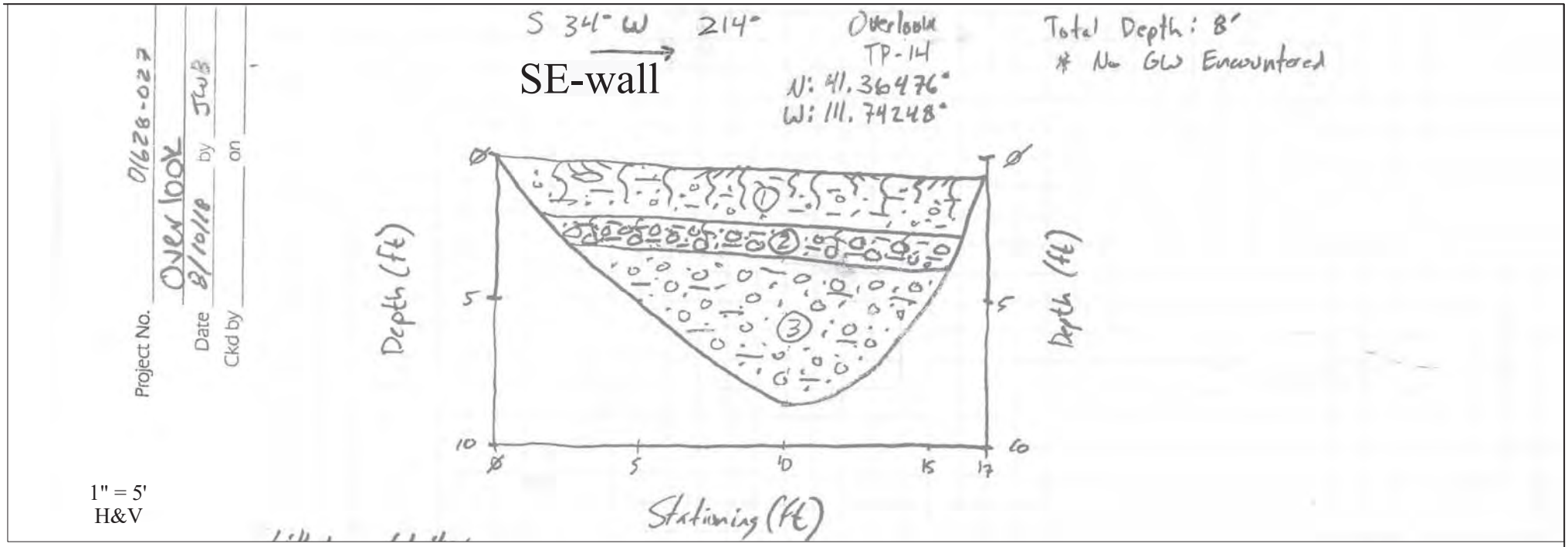
Figure

A-15

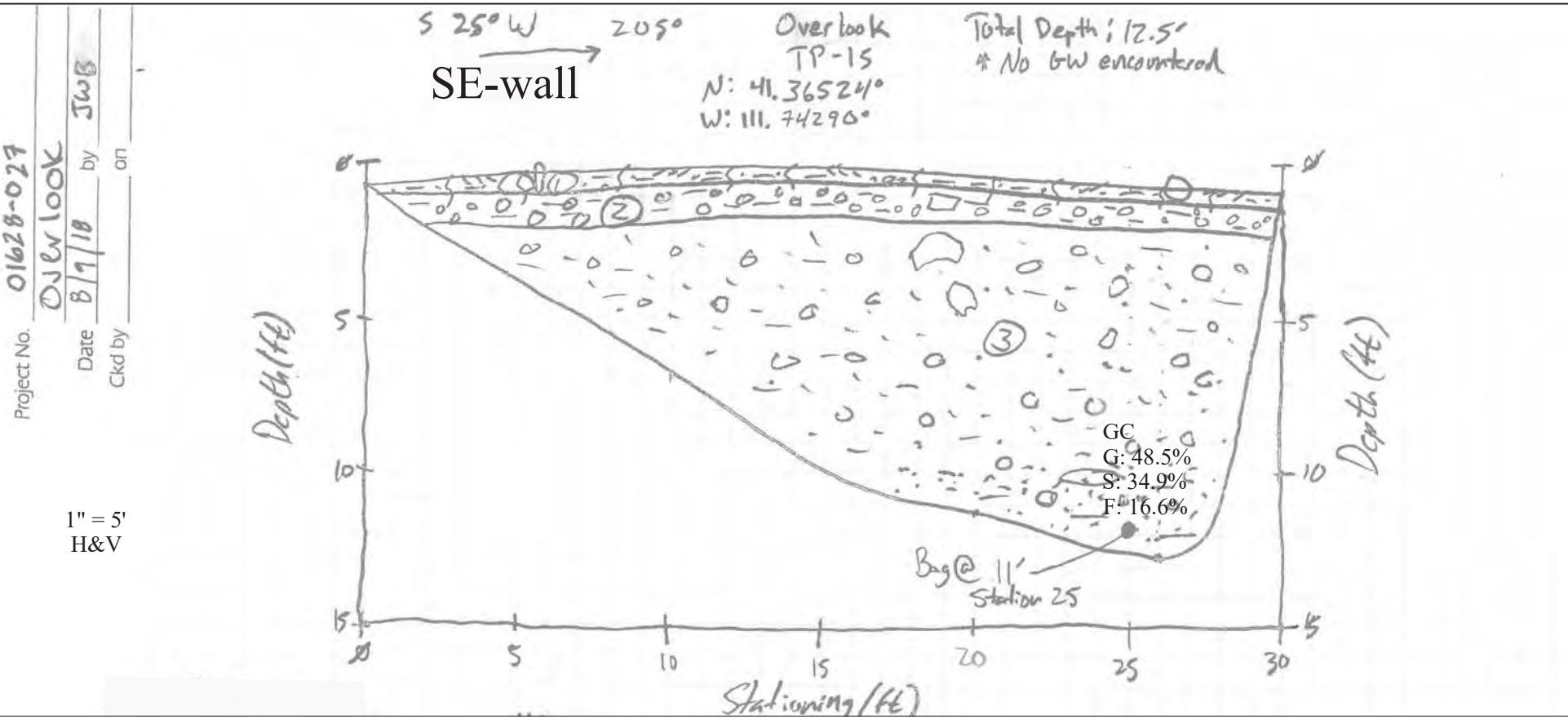


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~2' thick; light brown (5YR $\frac{6}{4}$) to moderate brown (5YR $\frac{3}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, slightly moist to dry, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded light gray (N7) to pale yellowish orange (10YR $\frac{8}{6}$) quartzite up to ~6" in diameter, though mode clast size is ~0.5-1"; abundant plant and tree roots; sharp, irregular basal contact.

2. Colluvium: ~1' thick; moderate brown (5YR $\frac{3}{4}$) sandy lean CLAY with gravel (CL), medium stiff, slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 1.5' in diameter, though mode clast size is ~3"; common plant and tree roots; topsoil matrix; sharp, irregular basal contact.

3. Wasatch Formation (Tw): >5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense to dense, slightly moist to moist, low to medium plasticity fines, massive; gravel and larger sized clasts comprise ~40% of the unit; clasts are subangular to subrounded quartzite as above, clasts are up to 2' in diameter, though mode clast size is 1-2"; classic Tw.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6" thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular light gray (N7) and moderate reddish brown (10R $\frac{4}{6}$) quartzite up to ~3-4" in diameter, though mode clast size is ~1"; common plant roots; gradational, irregular basal contact.

2. Colluvium: ~1' thick; light brown (5YR $\frac{6}{4}$) to brownish grey (5YR $\frac{4}{1}$) clayey GRAVEL with sand (GC) gradational to sandy lean CLAY with gravel (CL), medium dense, dry to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~40-50% of the unit; clasts are subangular to subrounded quartzite as above up to 3' in diameter, though mode clast size is ~4"; topsoil matrix; common to occasional plant roots; gradational, irregular basal contact.

3. Wasatch Formation (Tw): >10.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey GRAVEL with sand (GC), dense to medium dense, slightly moist to moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~30% of the unit, clasts are subrounded quartzite as above up to 2' in diameter, though mode clast size is ~3"; possibly sandier with depth; typical Wasatch Fm.

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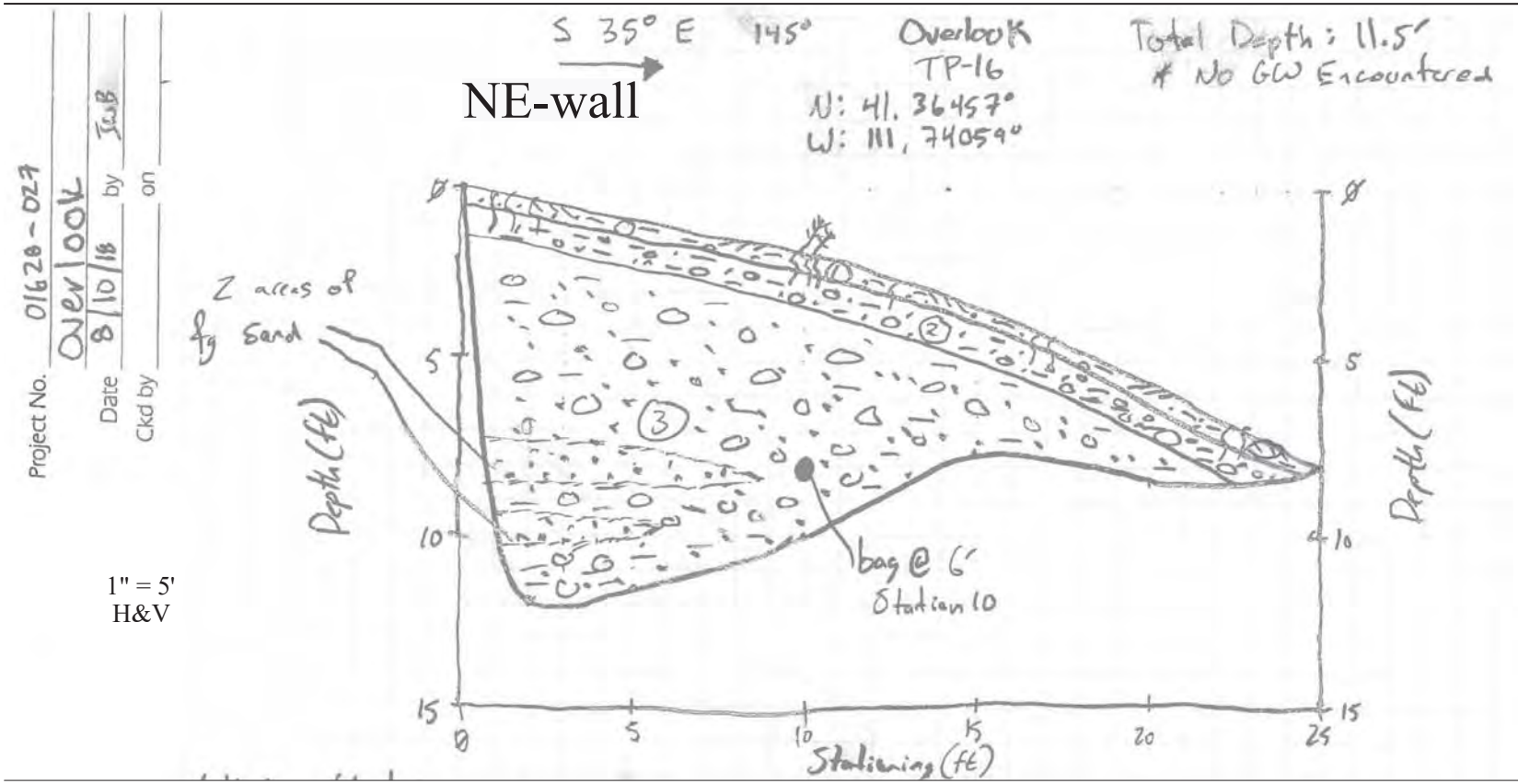
TP-15 Log

Figure

A-17

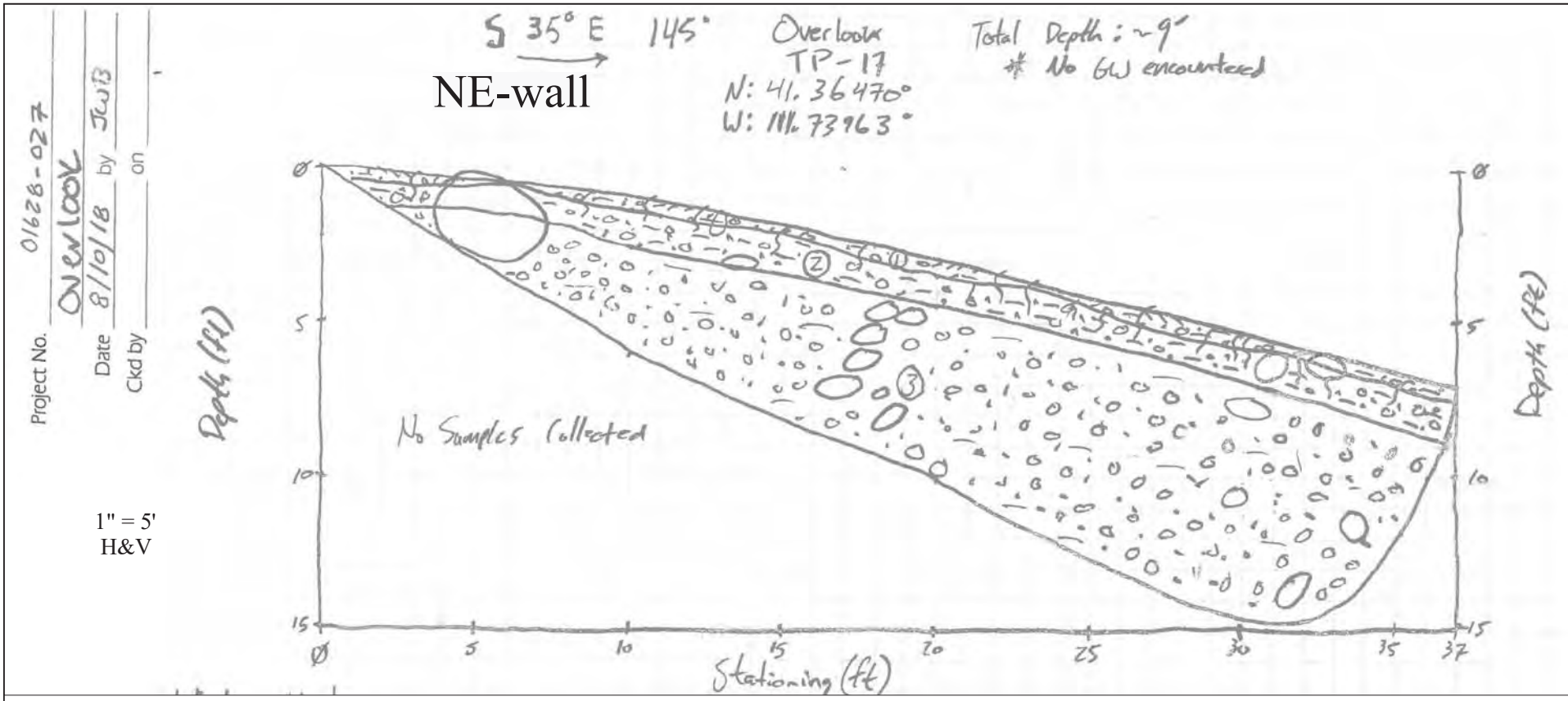


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6"-1' thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose, dry, low plasticity, massive; gravel and larger sized clasts comprise ~20% of the unit; clasts are subrounded to subangular light gray (N7) to moderate reddish brown (10R $\frac{4}{6}$) quartzite up to ~1-2' in diameter, though mode clast size ~2-3"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium: ~1' thick; grayish brown (5Y $\frac{3}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 1-2' in diameter, though mode clast size is ~2-3"; topsoil matrix; common to abundant plant roots; sharp, irregular basal contact.

3. Wasatch Formation (Tw): >10' thick; moderate pink (5R $\frac{7}{4}$) to pale reddish brown (10R $\frac{5}{4}$) clayey SAND with gravel (SC); medium dense, slightly moist to moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~40% of the unit; clasts are subrounded to subangular quartzite as above and moderate reddish brown (10R $\frac{4}{6}$) to pale yellowish brown (10YR $\frac{6}{2}$) fine grained sandstone clasts, clasts are up to 3.5' in diameter, though the mode clast size is ~1-2"; few plant roots; darker color (moderate reddish brown) when wetted.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~0-6" thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose, dry, low plasticity, massive; gravel and larger sized clasts comprise ~20% of the unit; clasts are subrounded to subangular light gray (N7) to moderate reddish brown (10R $\frac{4}{6}$) quartzite up to ~3-4 in diameter, though mode clast size ~2-3"; abundant plant roots; very thin to absent in places; gradational, irregular basal contact.

2. Colluvium: ~1-1.5' thick; grayish brown (5Y $\frac{3}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 3-4' in diameter, though mode clast size is ~4"; topsoil matrix; common to abundant plant roots; sharp, irregular basal contact.

3. Wasatch Formation (Tw): >8' thick; moderate pink (5R $\frac{7}{4}$) to pale reddish brown (10R $\frac{5}{4}$) clayey GRAVEL with sand (GC); medium dense, slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~60% of the unit; clasts are subrounded to subangular quartzite as above, clasts are up to 3-4' in diameter, though the mode clast size is ~3-4"; few plant roots; darker color (moderate reddish brown) when wetted.

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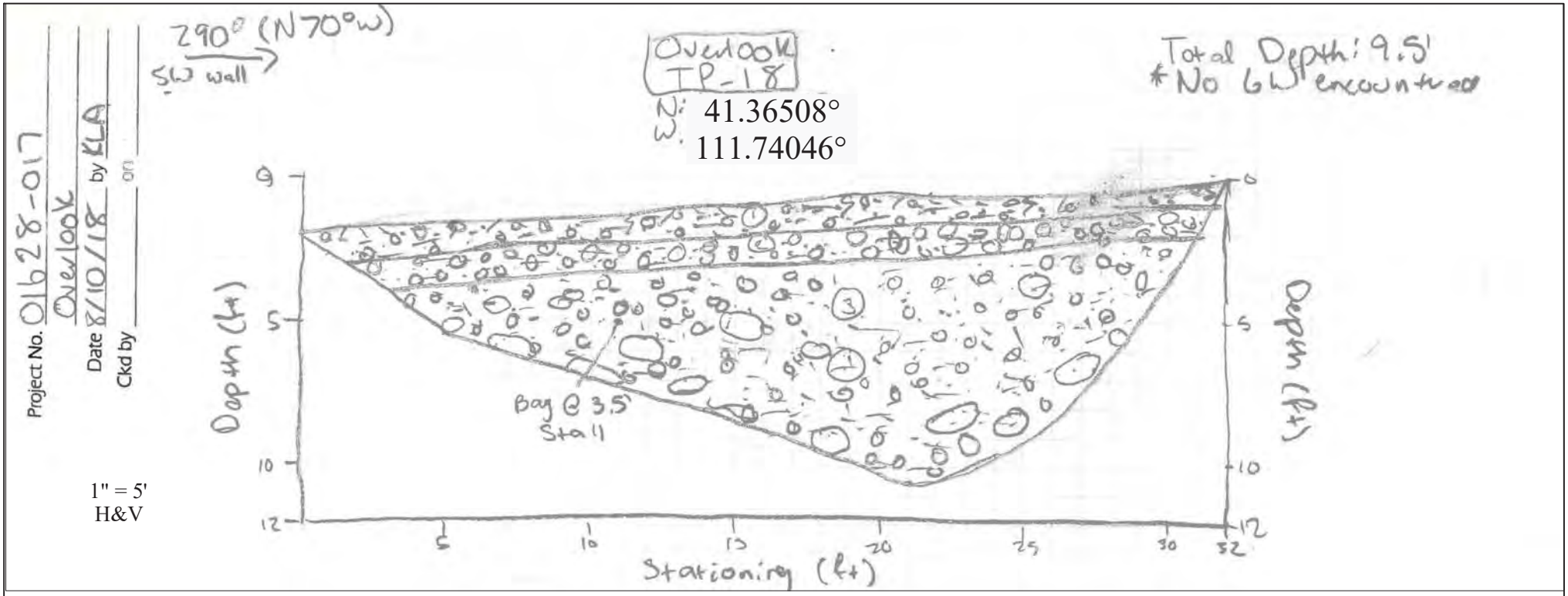
Figure

A-19

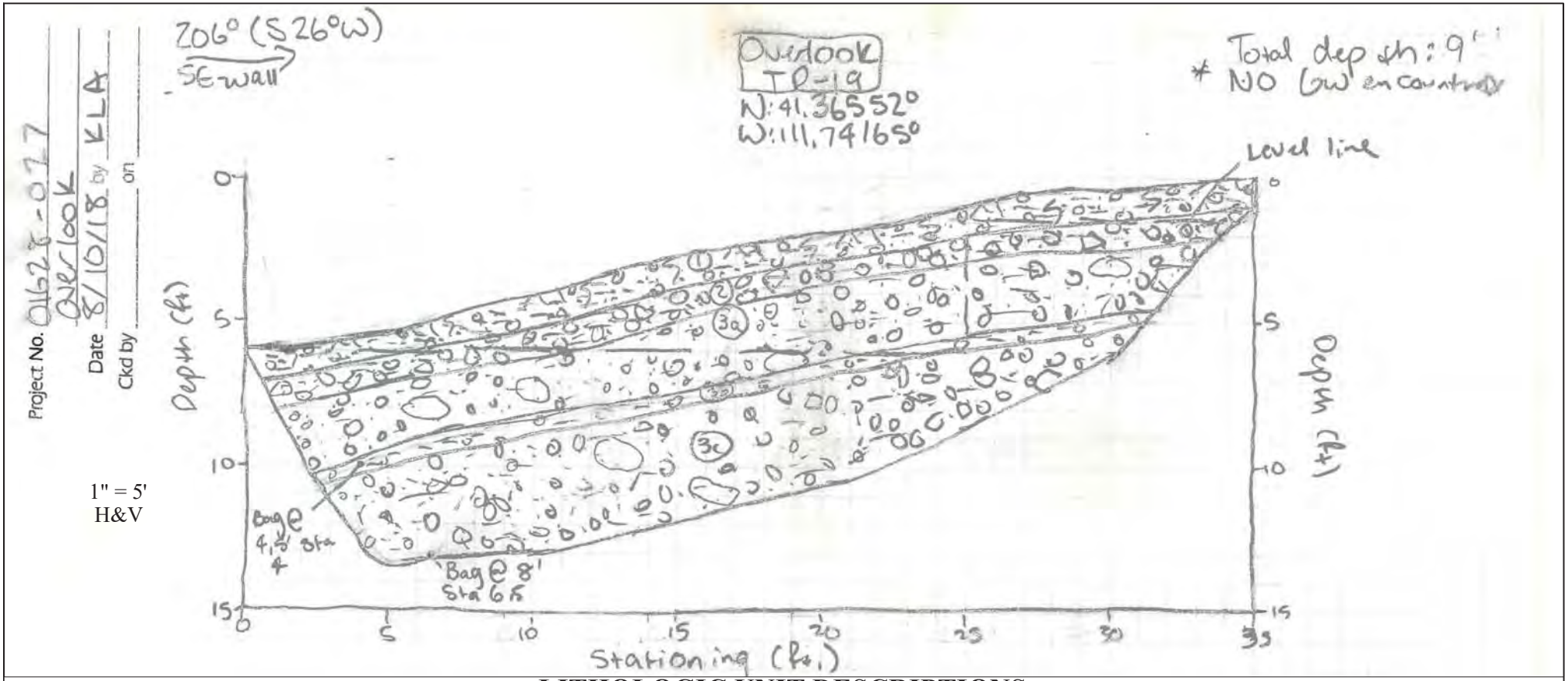


LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR 6/4) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 3" in diameter, though mode clast size is ~1/2-1"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 1' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant roots; sharp, planar basal contact.

3. Wasatch Formation (Tw): >7.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey GRAVEL with sand (GC) gradational to sandy lean CLAY with gravel (CL), medium dense to dense, slightly moist to moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~50% of the unit; clasts are subrounded quartzite as above up to 2' in diameter, though mode clast size is ~2-3"; occasional plant roots; where clayier, unit is blocky where clayey due to drying; abundant 1-2mm pinhole voids; sand is fine-grained to medium-grained.



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 3" in diameter, though mode clast size is ~$\frac{1}{2}$-1"; abundant plant and tree roots; gradational, irregular basal contact.

2. Colluvium: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 2' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant and tree roots; sharp, planar basal contact.

3. Wasatch Formation (Tw): >7' thick; 3 sub-units; **3a)**: ~2.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC) gradational to sandy lean CLAY with gravel (CL) loose to medium dense; slightly moist to moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~50% of the unit, clasts are subrounded quartzite as above up to 3' in diameter, though mode clast size is ~3"; abundant 1-2 mm pinhole voids; typical Wasatch Fm. **3b):** ~6" thick; moderate reddish brown (10R $\frac{4}{6}$) lean CLAY with gravel (CL); medium stiff, moist, medium plasticity, massive; gravel and larger sized clasts comprise ~5-10% of the unit; clasts are subrounded to subangular medium grey (N5) to light brown (5YR $\frac{6}{4}$) quartzite as above, clasts are up to 0.5" in diameter, the mode clast size is ~0.5"; abundant tree roots; sharp, planar basal contact. **3c):** >4' thick; moderate reddish brown (10R $\frac{4}{6}$) mottled with very pale orange (10YR $\frac{8}{2}$) clayey SAND with gravel (SC); medium dense, moist, low to medium plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular quartzite as above plus dark yellowish orange (10YR $\frac{6}{6}$) sandstone, clasts are up to 1.5' in diameter, though the mode clast size is ~2-3"; occasional plant roots; sand is fine to medium grained.

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The Overlook at Powder Mountain
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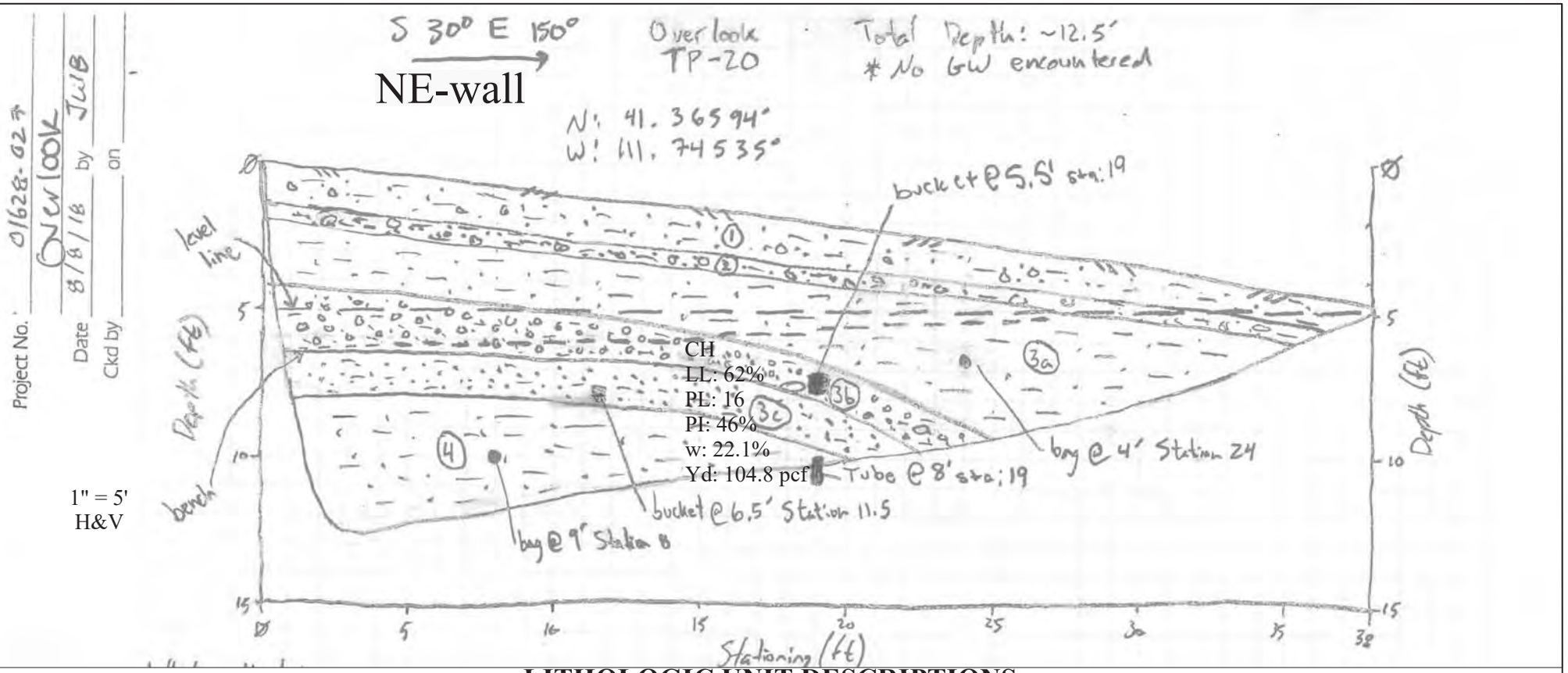
Weber County, Utah

TP-19 Log

Figure

A-21



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1-2' thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-15% of the unit; clasts are subrounded to subangular light gray (N7) to moderate reddish brown (10R $\frac{4}{6}$) quartzite up to ~7' in diameter at the surface, though mode clast size ~0.5-1"; common plant roots; gradational, irregular basal contact.

2. Colluvium: ~6" thick; moderate reddish brown (10R $\frac{4}{6}$) sandy lean CLAY with gravel (CL), medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~30% of the unit; clasts are subrounded to subangular quartzite as above up to 18" in diameter, though mode clast size is ~3-4"; occasional plant roots; gradational, irregular basal contact.

3. Wasatch Formation (Tw): ~6' thick; 3 subunits; **3a):** ~2.5-3.5' thick; moderate reddish brown (10R $\frac{4}{6}$) to dark reddish brown (10R $\frac{3}{4}$) sandy lean CLAY (CL); medium stiff, dry to slightly moist, low to medium plasticity, massive; devoid of clasts; common plant roots; blocky fracture pattern (due to drying out?); possible pinhole voids but likely root traces; gradational, irregular basal contact. **3b):** ~1.5-2' thick; moderate reddish brown to dark reddish brown clayey GRAVEL with sand (GC) dense to very dense, moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~50% of the unit, clasts are subrounded to subangular quartzite as above plus dark reddish brown (10R $\frac{3}{4}$) fine grained sandstone, up to 8" in diameter, mode <0.5"; sharp, planar basal contact. **3c):** ~1.5-2 thick; dark reddish brown (10R $\frac{3}{4}$) clayey SAND (SC); medium dense, moist, medium plasticity, possible planar bedding observed; devoid of clasts; common plant roots; blocky fracture pattern (due to drying out?); black (N1) MnO2? layers along bedding; few plant roots; sharp, planar basal contact.

4. Clay Seam: >4.5' thick; moderate reddish brown (10R $\frac{4}{6}$) sandy fat CLAY with gravel (CH), stiff to very stiff, moist, moderate to high plasticity, massive; devoid of clasts.

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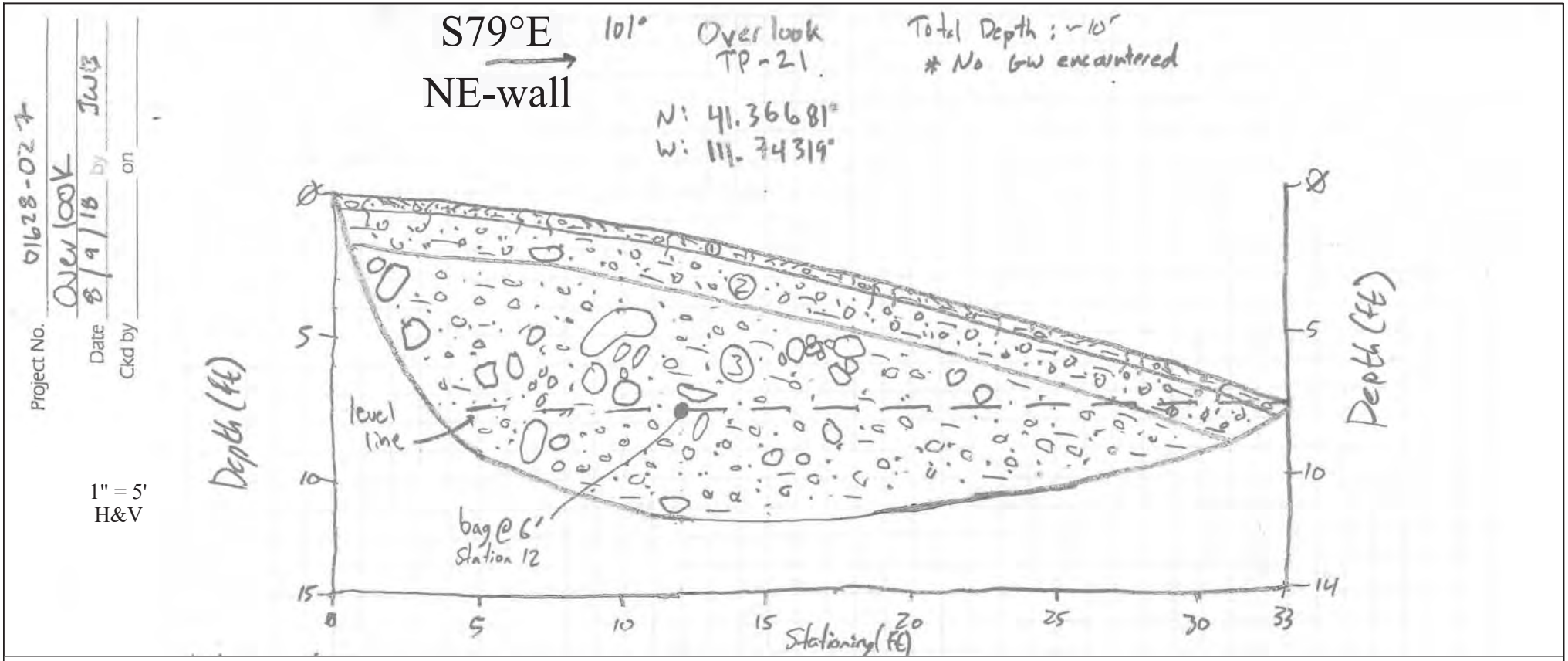
TP-20 Log

Figure

A-22



LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~6-8" thick; light brown (5YR $\frac{6}{4}$) sandy lean CLAY with gravel (CL), loose, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular light gray (N7) and moderate reddish brown (10R $\frac{4}{6}$) quartzite up to 4-5' in diameter, though mode clast size is <0.5"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium: ~1-2' thick; light brown (5YR 6/4) to brownish grey (5YR $\frac{4}{1}$) clayey GRAVEL with sand (GC) gradational to sandy lean CLAY with gravel (CL), medium dense, dry to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~40-50% of the unit; clasts are subangular to subrounded quartzite as above up to 3' in diameter, though mode clast size is ~4"; topsoil matrix; common to common plant roots; gradational, irregular basal contact.

3. Wasatch Formation (Tw): >8' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey GRAVEL with sand (GC) gradational to clayey SAND with gravel (SC), dense, slightly moist to moist, medium plasticity fines, massive; gravel and larger sized clasts comprise ~50% of the unit, clasts are subrounded quartzite as above up to 3' in diameter, though mode clast size is a bi-modal distribution of ~1-3' and 2-3"; typical Wasatch Fm.

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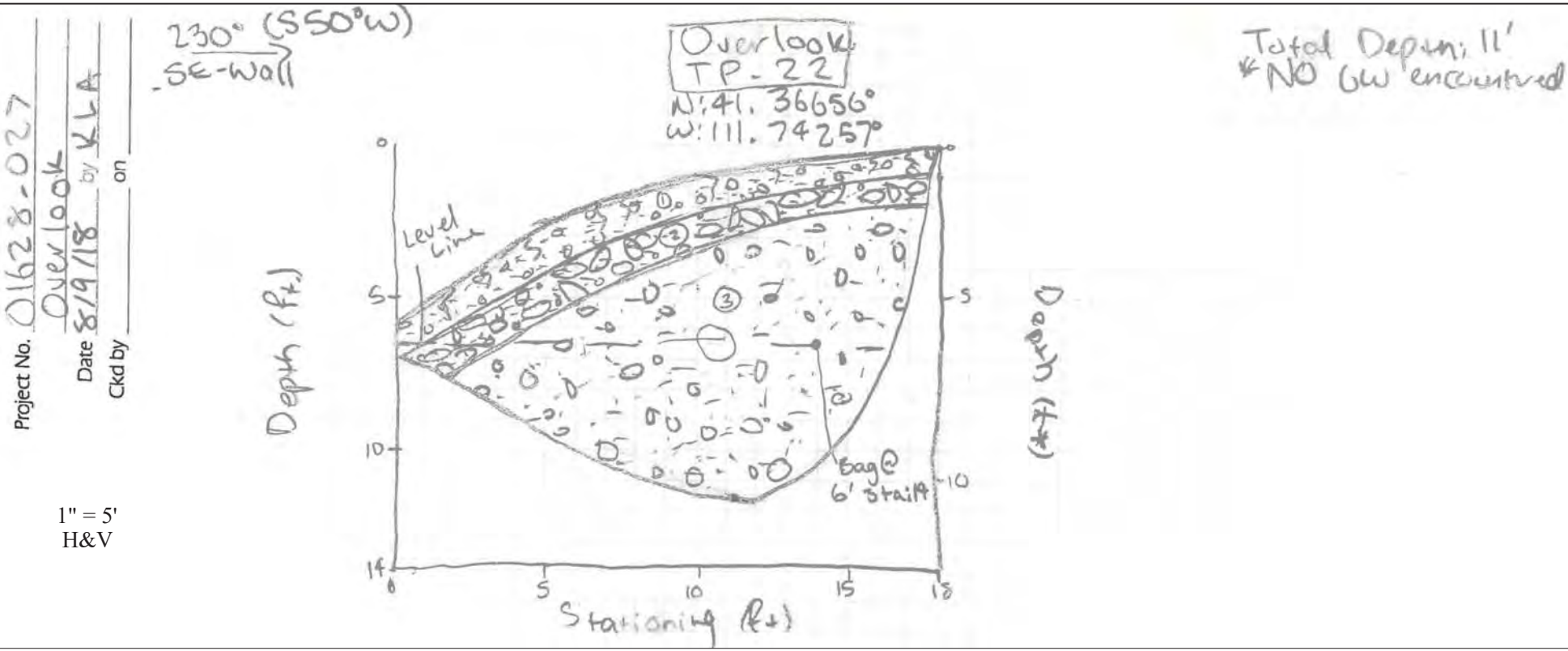
TP-21 Log

Figure

A-23



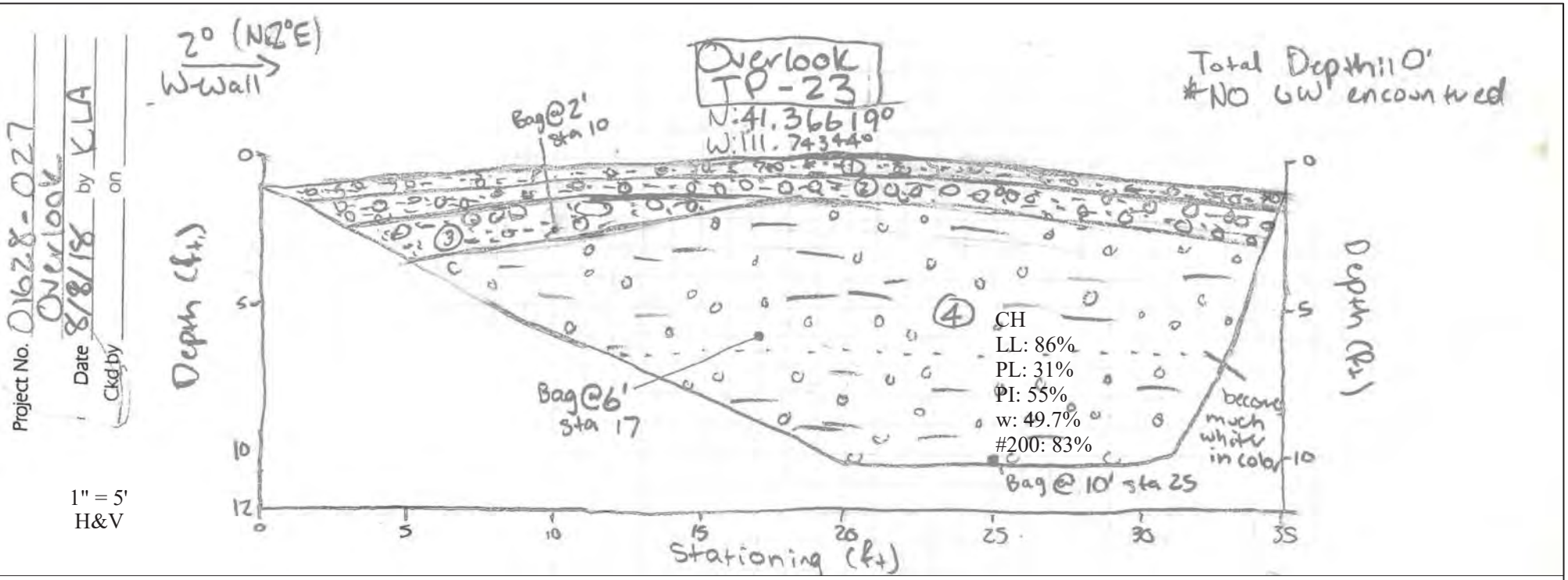
1" = 5'
H&V

LITHOLOGIC UNIT DESCRIPTIONS

1. A/B Soil Horizon: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~10-20% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 3" in diameter, though mode clast size is ~$\frac{1}{2}$-1"; abundant plant roots; gradational, irregular basal contact.

2. Colluvium:~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subrounded to subangular quartzite as above up to 3' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant roots; sharp, planar basal contact.

3. Wasatch Formation (Tw): >8.5' thick; moderate reddish brown (10R $\frac{4}{6}$) clayey SAND with gravel (SC), medium dense, moist, low to moderate plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the subunit; clasts are subrounded to subangular quartzite as above, clasts are up to 1.5' in diameter, though mode clast size is ~2-3"; occasional plant roots; abundant 1-2 mm pinhole voids, sand is fine-grained to medium-grained.



LITHOLOGIC UNIT DESCRIPTIONS

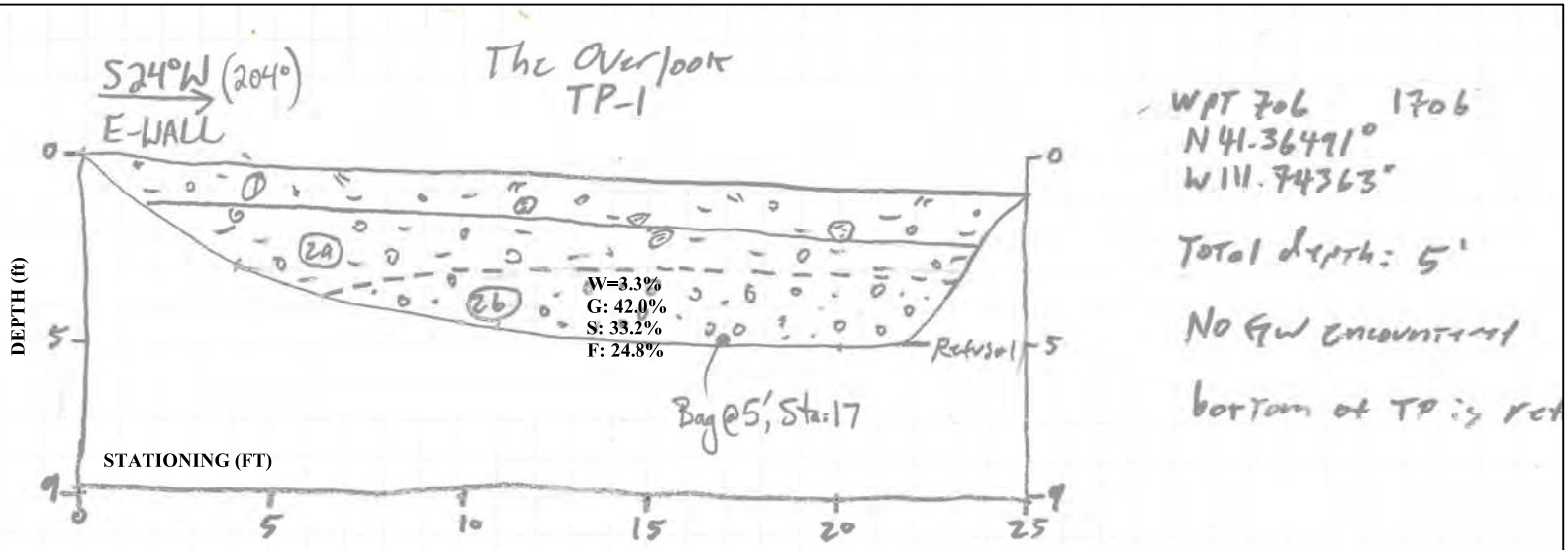
1. A/B Soil Horizon: ~6" thick; moderate brown (5YR $\frac{4}{4}$) sandy lean CLAY with gravel (CL), loose to medium stiff, moist, low plasticity, massive; gravel and larger sized clasts comprise ~10% of the unit; clasts are subrounded to subangular light brown (5YR $\frac{6}{4}$) to moderate orange pink (10R $\frac{7}{4}$) quartzite up to 2" in diameter, though mode clast size is ~0.5-1"; abundant plant roots; gradational, planar basal contact.

2. Colluvium: ~1' thick; pale yellowish brown (10YR $\frac{6}{2}$) sandy lean CLAY with gravel (CL), loose to medium stiff, dry, low plasticity, massive; gravel and larger sized clasts comprise ~20-30% of the unit; clasts are subrounded to subangular quartzite as above up to 1.5' in diameter, though mode clast size is ~2-3"; topsoil matrix; abundant plant and tree roots; sharp, planar basal contact.

3. Landslide Deposit? (Qls?): ~1.5' thick; moderate reddish orange (10R $\frac{6}{6}$) clayey SAND with gravel (SC), medium dense, dry to slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise ~30-35% of the unit; clasts are subrounded to subangular moderate orange pink (10R $\frac{7}{4}$) to medium gray (N5) moderate reddish orange (10R $\frac{6}{6}$) sandstone and quartzite as above up to 6" in diameter, though the mode clast size is ~2-3"; common plant roots; basal light gray coloring; sharp, angular basal contact.

4. Highly Weathered Calls Fort Shale: >9' thick; moderate reddish orange (10R $\frac{6}{6}$) mottled with greyish orange pink (10R $\frac{8}{2}$) gravely fat CLAY (CH), medium stiff to stiff, slightly moist, medium plasticity, massive; gravel and larger sized clasts comprise ~30-40% of the unit; clasts are subangular to angular moderate reddish orange (10R $\frac{6}{6}$) shale up to 2" in diameter, though mode clast size is ~0.5-1"; occasional plant roots; clasts are soft and fall apart easily, clasts increase in occurrence with depth; short and discontinuous slickensides (mechanically induced), cracked and blocky when dried out; gradational to white (N9) to light grey (N7) in color with depth; clasts in white (N9) clay at depth are light grey (N7), clasts are similar in size and sorting throughout unit; mechanically induced slickensides about 6" long; becomes crumbly when drier; mottled with moderate reddish orange (10R $\frac{6}{6}$) spots in whiter clay.

Project No. 01628-020
Date 11/10/16 by ET
Ckd by ____ on ____



LITHOLOGIC UNIT DESCRIPTIONS:

1) **A/B Soil Horizon:** ~1' thick; dark yellowish brown (10YR 4/2) sandy lean CLAY with gravel (CL), loose, moist, low to moderate plasticity, massive; gravel and larger sized clasts comprise ~15-20% of unit; clasts entirely subangular quartzite up to 10" in diameter, though mode size 1-2"; abundant plant and tree roots; gradational, irregular basal contact.

2) **Wasatch Formation:** At least ~4' thick; contains 2 subunits:
   2a: Highly Weathered Wasatch Formation: ~1-2' thick; dark reddish brown (10R ¾) to grayish brown (5Y 3/2) sandy fat CLAY with gravel (CH), medium-stiff, moist, moderate to high plasticity, massive; gravel and larger sized clasts comprise ~20% of subunit; clasts include ~70% subangular to subrounded quartzite and ~30% subangular to subrounded sandstone up to 7" in diameter, though mode size ~1-2"; occasional plant and tree roots; sharp, irregular basal contact.

   2b: Competent Bedrock: At least ~2' thick; conglomerate bedrock disaggregated to moderate reddish brown (10R 4/6) to dark reddish brown (10R ¾) to pale reddish brown (10R 5/4) clayey GRAVEL with sand (GC) gradational to clayey SAND with gravel (SC), very dense, slightly moist, low plasticity fines, massive; gravel and larger sized clasts comprise 42% of subunit; clasts entirely subangular quartzite up to 5" in diameter, though mode size ~1"; subunit produced trackhoe refusal.

SCALE: 1"=5' H&V

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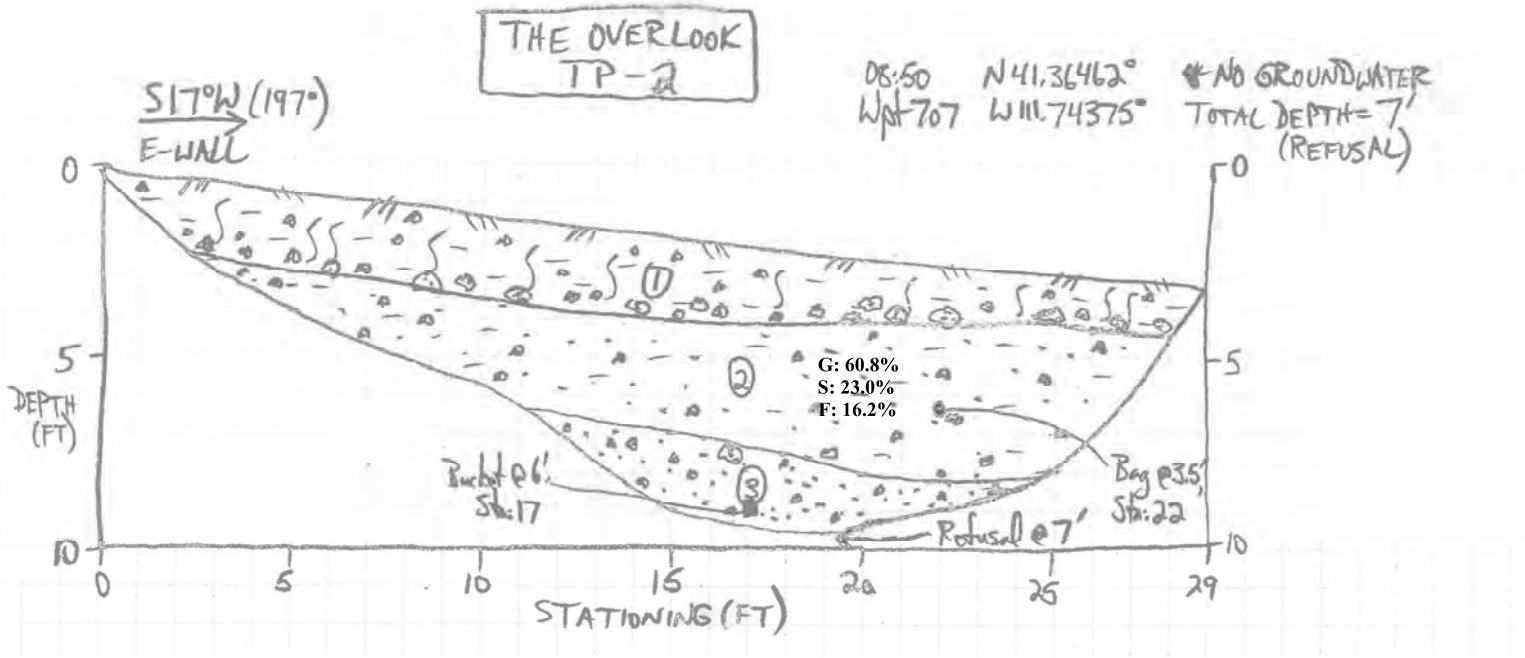
The Overlook - Phase I
Summit Powder Mountain Resort
Weber County, Utah
TEST PIT LOG TP-1-17

Figure
A-26

Project No. 01628-021
Date 11-11-16 by PED
Ckd by ____ on ____



LITHOLOGIC UNIT DESCRIPTIONS:

1) **A/B Soil Horizon:** ~1.5-2' thick; grayish brown (5Y 3/2) to dark yellowish brown (10YR 4/2) lean CLAY with gravel (CL), loose to medium-stiff, moist, low plasticity, massive; gravel and larger sized clasts comprise ~15-20% of unit; clasts entirely medium gray (N5) subrounded to subangular quartzite up to 7" in diameter, though mode size ~2-4"; basal ~6" is highly cobbly and may represent a thin, loose colluvium unit with topsoil matrix; abundant plant and tree roots; sharp, planar basal contact.

2) **Weathered Wasatch Formation:** ~3-4' thick; brownish gray (5YR 4/1) to moderate reddish brown (10R 4/6) clayey GRAVEL with sand (GC), medium-dense, moist, low plasticity, massive; gravel and larger sized clasts comprise ~61% of unit; clasts entirely subrounded to subangular medium gray (N5) to pale yellowish orange (10YR 8/6) quartzite up to 6" in diameter, though mode size ~2-4"; common plant and tree roots; becomes redder and more competent with depth; sharp, irregular basal contact.

3) **Wasatch Formation:** At least ~2' thick; competent conglomerate bedrock, partially disaggregated to light gray (N7) to pale reddish brown (10R 5/4) gravelly SAND (SW) gradational to sandy GRAVEL (GW), very dense to dense, slightly moist to dry, massive to weakly bedded; gravel and larger sized clasts comprise ~40-50% of unit; clasts entirely quartzite as above up to 5" in diameter, though mode size <1"; well-cemented, and close to original conglomerate bedrock; unit caused trackhoe refusal.

SCALE: 1"=5' H&V

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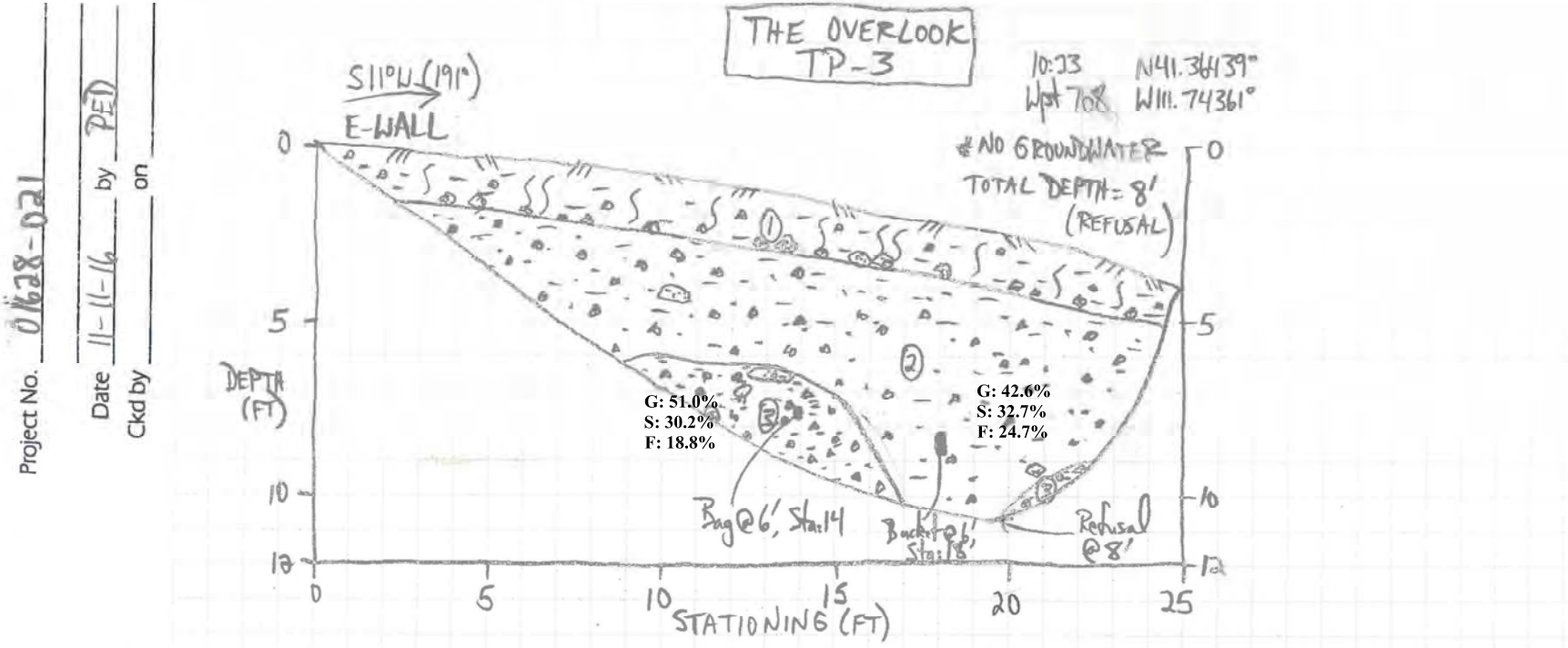
Weber County, Utah

TEST PIT LOG TP-2-17

Figure

A-27



LITHOLOGIC UNIT DESCRIPTIONS:

1) **A/B Soil Horizon:** ~1.5-2' thick; grayish brown (5Y 3/2) to dark yellowish brown (10YR 4/2) lean CLAY with gravel (CL), loose to medium-stiff, moist, low plasticity, massive; gravel and larger sized clasts comprise ~15-20% of unit; clasts entirely medium gray (N5) subrounded to subangular quartzite up to 10" in diameter, though mode size ~2-4"; basal ~6" is highly cobbly and may represent a thin, loose colluvium unit with topsoil matrix; cobbles within thin colluvial horizon comprise ~30-35% of basal 6"; abundant plant and tree roots; sharp, largely planar basal contact.

2) **Weathered Wasatch Formation:** ~2.5-4.5' thick; moderate reddish brown (10R 4/6) to brownish gray (5YR 4/1) to dark reddish brown (10R ¾) clayey GRAVEL with sand (GC), medium-dense to dense, moist, low plasticity, massive; gravel and larger sized clasts comprise ~43% of unit; clasts entirely subrounded to subangular medium gray (N5) to purple quartzite up to 1' in diameter, though mode size ~2-3"; sand is medium-grained; becomes denser and coarser with depth; uppermost ~1' is brownish gray, and unit increases in red color with depth which may reflect transition from partially weathered to largely unaltered bedrock; occasional to common plant roots; sharp, wavy basal contact may simply reflect moisture content, as irregular shape is not seen on west wall of test pit but simply a planar contact.

3) **Wasatch Formation:** At least ~2.5' thick; competent conglomerate bedrock, partially disaggregated to pale reddish brown (10R 5/4) to moderate reddish brown (10R 4/6) to light gray (N7) clayey GRAVEL with sand (GC), very dense, slightly moist to dry, low plasticity, massive; gravel and larger sized clasts comprise 51% of unit; clasts entirely quartzite as above up to 9" in diameter, though mode size <1"; well-cemented, and close to original conglomerate bedrock; sand is fine-grained; gradational between matrix-supported and clast-supported; unit caused trackhoe refusal.

SCALE: 1"=5' H&V

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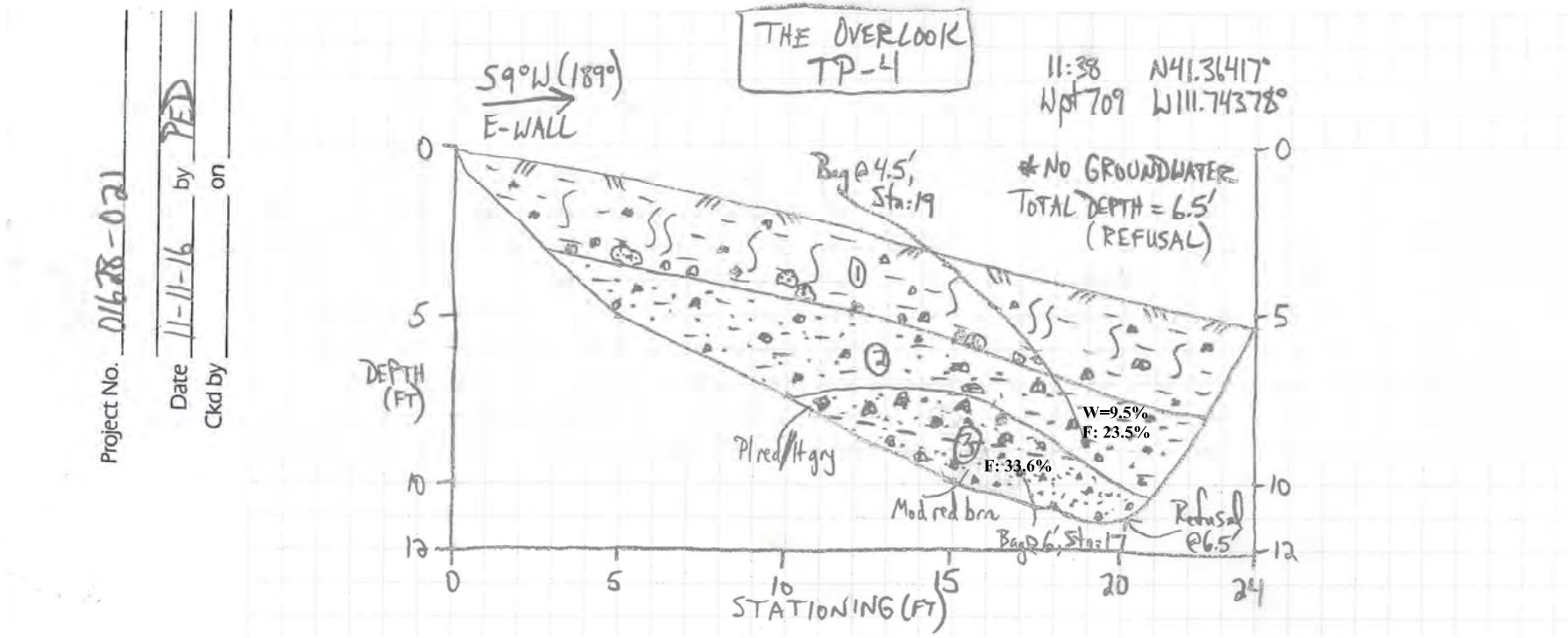
Summit Powder Mountain Resort
Weber County, Utah

TEST PIT LOG TP-3-17

Figure

A-28



LITHOLOGIC UNIT DESCRIPTIONS:

1) **A/B Soil Horizon:** ~2.5-3' thick; grayish brown (5Y 3/2) to dark yellowish brown (10YR 4/2) lean CLAY with gravel (CL), loose to medium-stiff, moist, low plasticity, massive; gravel and larger sized clasts comprise ~10-15% of unit; clasts entirely medium gray (N5) to pale yellowish orange (10YR 8/6) subrounded to subangular quartzite up to 10" in diameter, though mode size ~2-4"; basal ~6"-1' is a possible thin, loose colluvium unit with topsoil matrix; cobbles within thin colluvial horizon comprise ~25% of basal 6"-1' of unit; abundant plant and tree roots; gradational, planar basal contact.

2) **Weathered Wasatch Formation:** ~2' thick; moderate reddish brown (10R 4/6) to brownish gray (5YR 4/1) clayey GRAVEL with sand (GC), medium-dense to dense, moist, low plasticity, massive; gravel and larger sized clasts comprise ~40% of unit; clasts entirely quartzite as above up to 5" in diameter, though mode size <1"; becomes denser and coarser with depth; grades with depth to largely unaltered Wasatch Formation; common plant and tree roots; sharp, irregular basal contact.

3) **Wasatch Formation:** At least ~3' thick; competent conglomerate bedrock, partially disaggregated to pale reddish brown (10R 5/4) to moderate reddish brown (10R 4/6) to light gray (N7) clayey GRAVEL with sand (GC), very dense, slightly moist to dry, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of unit; clasts entirely quartzite as above up to 7" in diameter, though mode size <1"; occasional pinholes (1 mm diameter); generally well-cemented, and close to original conglomerate bedrock; some clasts appear imbricated downslope and unit may have faint bedding downslope; occasional plant roots; unit caused trackhoe refusal.

SCALE: 1"=5' H&V

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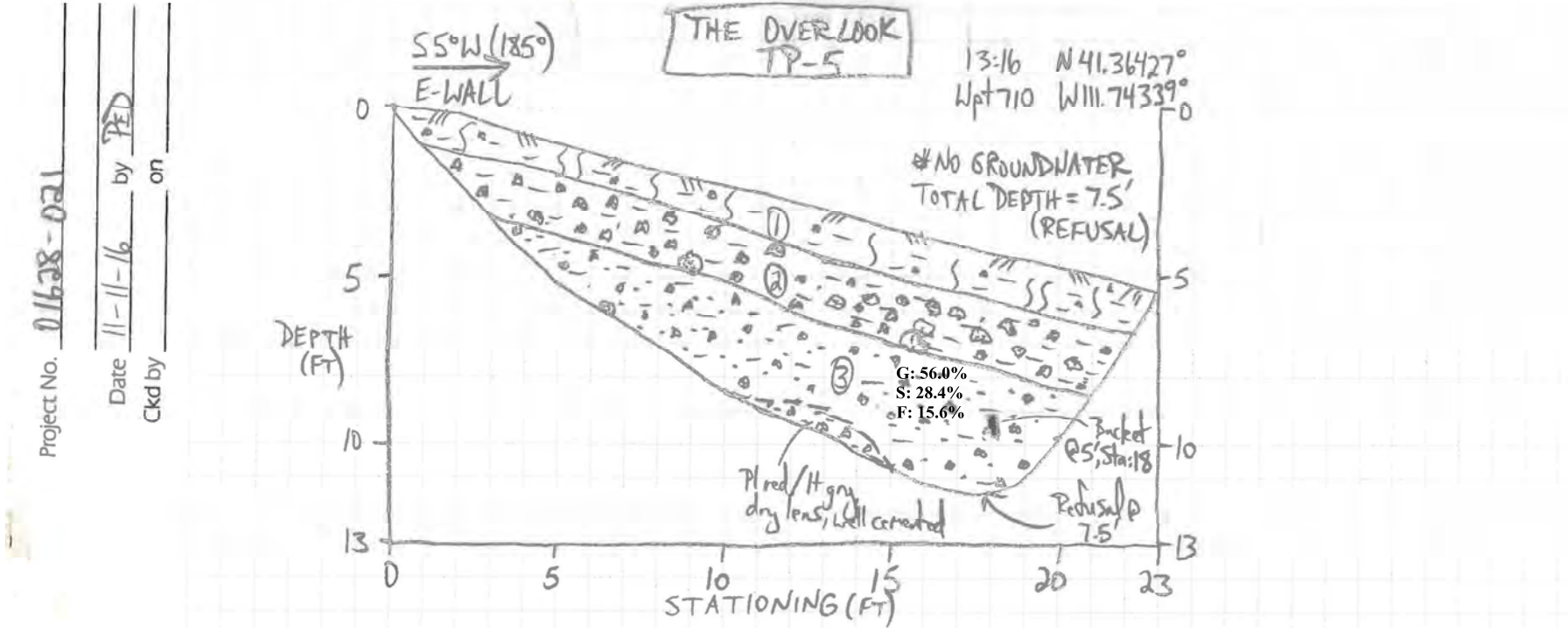
TEST PIT LOG TP-4-17

Figure

A-29



LITHOLOGIC UNIT DESCRIPTIONS:

1) **A/B Soil Horizon:** ~1-1.5' thick; grayish brown (5Y 3/2) lean CLAY with gravel (CL), loose to medium-stiff, moist, low plasticity, massive; gravel and larger sized clasts comprise ~10% of unit; clasts entirely medium gray (N5) to pale yellowish orange (10YR 8/6) subrounded to subangular quartzite up to 4" in diameter, though mode size ~1"; abundant plant and tree roots; largely gradational, planar basal contact.

2) **Loose Colluvium:** ~2-2.5' thick; grayish brown (5Y 3/2) gravelly lean CLAY with sand (CL), medium-stiff to loose, moist, low plasticity, massive; gravel and larger sized clasts comprise ~30-40% of unit; clasts entirely quartzite as above up to 8" in diameter, though mode size ~4-6"; topsoil matrix; abundant plant and tree roots; sharp, irregular basal contact.

3) **Wasatch Formation:** At least ~3.5' thick; competent conglomerate bedrock, partially disaggregated to moderate reddish brown (10R 4/6) to dark reddish brown (10R ¾) clayey GRAVEL with sand (GC), very dense to dense, moist to slightly moist, low plasticity, massive; gravel and larger sized clasts comprise 56% of unit; clasts entirely quartzite as above up to 6" in diameter, though mode size ~2-4"; loamy; largely well-cemented, very hard, and close to original conglomerate bedrock; sand is fine-grained to medium-grained; occasional plant roots; unit caused trackhoe refusal.

SCALE: 1"=5' H&V

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The Overlook - Phase I
Summit Powder Mountain Resort
Weber County, Utah

TEST PIT LOG TP-5-17

Figure

A-30

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

LOG KEY SYMBOLS

BORING SAMPLE LOCATION

TEST-PIT SAMPLE LOCATION

WATER LEVEL (level after completion)

WATER LEVEL (level where first encountered)

CEMENTATION

DESCRIPTION	DESCRIPTION
WEAKELY	CRUMBLES OR BREAKS WITH HANDLING OR SLIGHT FINGER PRESSURE
MODERATELY	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE
STRONGLY	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE

OTHER TESTS KEY

C	CONSOLIDATION	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	DS	DIRECT SHEAR
UC	UNCONFINED COMPRESSION	T	TRIAXIAL
S	SOLUBILITY	R	RESISTIVITY
O	ORGANIC CONTENT	RV	R-VALUE
CBR	CALIFORNIA BEARING RATIO	SU	SOLUBLE SULFATES
COMP	MOISTURE/DENSITY RELATIONSHIP	PM	PERMEABILITY
CI	CALIFORNIA IMPACT	-200	% FINER THAN #200
COL	COLLAPSE POTENTIAL	Gs	SPECIFIC GRAVITY
SS	SHRINK SWELL	SL	SWELL LOAD

MODIFIERS

DESCRIPTION	%
TRACE	<5
SOME	5 - 12
WITH	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL BELOW WATER TABLE

STRATIFICATION

DESCRIPTION	THICKNESS	DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2"	OCCASIONAL	ONE OR LESS PER FOOT OF THICKNESS
LAYER	1/2 - 12"	FREQUENT	MORE THAN ONE PER FOOT OF THICKNESS

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil conditions between individual sample locations.
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT (blows/ft)	MODIFIED CA. SAMPLER (blows/ft)	CALIFORNIA SAMPLER (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
VERY LOOSE	<4	<4	<5	0 - 15	EASILY PENETRATED WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
LOOSE	4 - 10	5 - 12	5 - 15	15 - 35	DIFFICULT TO PENETRATE WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
MEDIUM DENSE	10 - 30	12 - 35	15 - 40	35 - 65	EASILY PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
DENSE	30 - 50	35 - 60	40 - 70	65 - 85	DIFFICULT TO PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
VERY DENSE	>50	>60	>70	85 - 100	PENETRATED ONLY A FEW INCHES WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER

CONSISTENCY - FINE-GRAINED SOIL		TORVANE	POCKET PENETROMETER	FIELD TEST
CONSISTENCY	SPT (blows/ft)	UNTRAINED SHEAR STRENGTH (tsf)	UNCONFINED COMPRESSIVE STRENGTH (tsf)	
VERY SOFT	<2	<0.125	<0.25	EASILY PENETRATED SEVERAL INCHES BY THUMB. EXUDES BETWEEN THUMB AND FINGERS WHEN SQUEEZED BY HAND.
SOFT	2 - 4	0.125 - 0.25	0.25 - 0.5	EASILY PENETRATED ONE INCH BY THUMB. MOLDED BY LIGHT FINGER PRESSURE.
MEDIUM STIFF	4 - 8	0.25 - 0.5	0.5 - 1.0	PENETRATED OVER 1/2 INCH BY THUMB WITH MODERATE EFFORT. MOLDED BY STRONG FINGER PRESSURE.
STIFF	8 - 15	0.5 - 1.0	1.0 - 2.0	INDENTED ABOUT 1/2 INCH BY THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	15 - 30	1.0 - 2.0	2.0 - 4.0	READILY INDENTED BY THUMBNAIL.
HARD	>30	>2.0	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

KEY TO SOIL SYMBOLS AND TERMINOLOGY

Project No. **01628-027**
Engr. **DAG**
Drafted By **DAG**
Date **October 2018**

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Intermountain Geo-Environmental Services, Inc.

Figure A-31

Rock Classification Should Include:
1. Rock name (or classification) 2. Color 3. Weathering 4. Fracturing 5. Competency 6. Additional comments indicating rock characteristics which might affect engineering properties

Weathering

Weathering	Field Test
Fresh	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures, otherwise similar to Fresh.
Moderately Weathered	Discoloration throughout. Weaker minerals such as feldspar are decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with a knife. Texture preserved.
Highly Weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with a knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil but fabric and structure preserved. Specimens easily crumble or penetrated.

Fracturing

Spacing	Description
>6 ft	Very Widely
2-6 ft	Widely
8-24 in	Moderately
2 ½-8 in	Closely
¾-2 ½ in	Very Closely

Bedding of Sedimentary Rocks

Splitting Property	Thickness	Stratification
Massive	>4.0 ft	Very thick bedded
Blocky	2.0-4.0 ft	Thick-bedded
Slabby	2 ½-24 in	Thin-bedded
Flaggy	½-2 ½ in	Very thin-bedded
Shaly or platy	⅛ – ½ in	Laminated
Papery	< ⅛ in	Thinly laminated

RQD

RQD (%)	Rock Quality
90-100	Excellent
75-90	Good
50-75	Fair
25-50	Poor
0-25	Very Poor

Competency

Class	Strength	Field Test	Approximate Range of Unconfined Compressive Strength (tsf)
I	Extremely Strong	Many blows with geologic hammer required to break intact specimen.	>2000
II	Very Strong	Hand-held specimen breaks with pick end of hammer under more than one blow.	2000-1000
III	Strong	Cannot by scraped or peeled with knife, hand-held specimen can be broken with single moderate blow with pick end of hammer	1000-500
IV	Moderately Strong	Can just be scraped or peeled with knife. Indentations 1-3 mm show in specimen with moderate blow with pick end of hammer.	500-250
V	Weak	Material crumbles under moderate blow with pick end of hammer and can be peeled with a knife, but is hard to hand-trim for triaxial test specimen.	250-10
VI	Friable	Material crumbles in hand.	N/A

KEY TO PHYSICAL ROCK PROPERTIES

Project No. 01628-027
Engr. DAG
Drafted By DAG
Date October 2018

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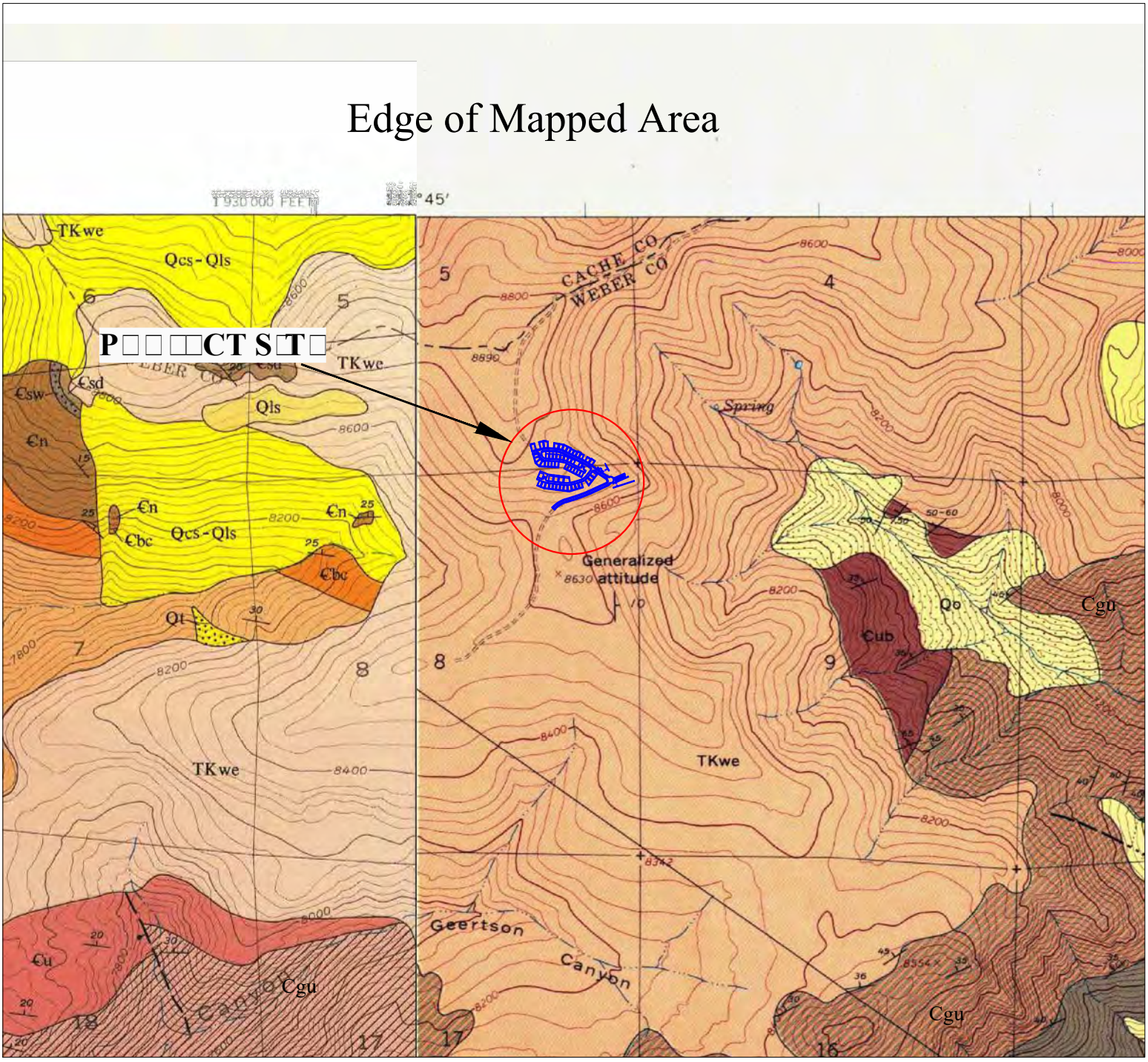
Figure A-32



Base Ma□s□

-USGS *Huntsville □uadran□le,* 1:24,000 scale, map GQ-1503, Sorensen and Crittenden (1979)

-USGS *Brown's Hole □uadran□le,* 1:24,000 scale, map GQ-968, Crittenden (1979)

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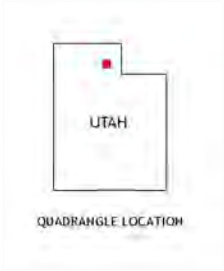
1" = 2000'



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Project No: 01628-027

Geotechnical and Geologic Hazards Assessment
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

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A-□□a

MAP LEGEND

Qal — ALLUVIAL DEPOSITS, UNDIFFERENTIATED (Holocene) – Unconsolidated gravel, sand, and silt deposits in presently active stream channels and floodplains; thickness 0-6 m

Qcs — COLLUVIUM AND SLOPEWASH (Holocene) – Bouldery colluvium and slopewash chiefly along eastern margin of Ogden Valley; in part, lag from Tertiary units; thickness 0-30 m

Qf — ALLUVIAL FAN DEPOSITS (Holocene) – Alluvial fan deposits; postdate, at least in part, time of highest stand of former Lake Bonneville; thickness 0-30 m

Qls — LANDSLIDE DEPOSITS (Holocene) – thickness 0-6 m

Qt — TALUS DEPOSITS (Holocene) – thickness 0-6 m

TKwe — WASATCH AND EVANSTON(?) FORMATIONS, UNDIVIDED (Eocene, Paleocene, and Upper Cretaceous?) – Unconsolidated pale-reddish-brown pebble, cobble, and boulder conglomerate; forms boulder-covered slopes. Clasts are mainly Precambrian quartzite and are tan, gray, or purple; matrix is mainly poorly consolidated sand and silt; thickness 0-150 m

St. Charles Limestone (Upper Cambrian) Includes:

€sd — Dolomite member – See above

€sw — Worm Creek Quartzite Member – See above

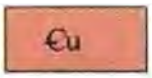
€n — NOUNAN DOLOMITE – See above

€bc — CALLS FORT SHALE MEMBER OF BLOOMINGTON FORMATION – See above

€lu — CAMBRIAN LIMESTONES, UNDIVIDED (Middle Cambrian) – Includes limestone and Hodges Shale Members of Bloomington Formation, and Blacksmith and Ute Limestones

€b — BLACKSMITH LIMESTONE (Middle Cambrian)) – Medium- to thin-bedded, light-gray to dark-blue-gray limestone; thin-bedded, flaggy-weathering, gray to tan silty limestone and interbedded siltstone; light- to dark-gray dolomite, with some reddish siliceous partings; thickness 400? m

MAP LEGEND



UTE LIMESTONE (Middle Cambrian) – Medium- to thin-bedded, finely crystalline, light- to dark-gray silty limestone with irregular wavy partings, mottled and streaked surfaces, worm tracks, and twiggy structures common throughout unit; oolites and *Girvanella* in many beds; olive-drab fissile shale interbedded throughout unit. Includes thin-bedded, gray-weathering, pale-tan to brown dolomite exposed at base of unit, 18-24 m at head of Geertsen Canyon and 0-3 m elsewhere; thickness 245? m

BRIGHAM GROUP (Crittenden and others, 1971) – Includes:

GEERTSEN CANYON QUARTZITE (Lower Cambrian) – Includes:

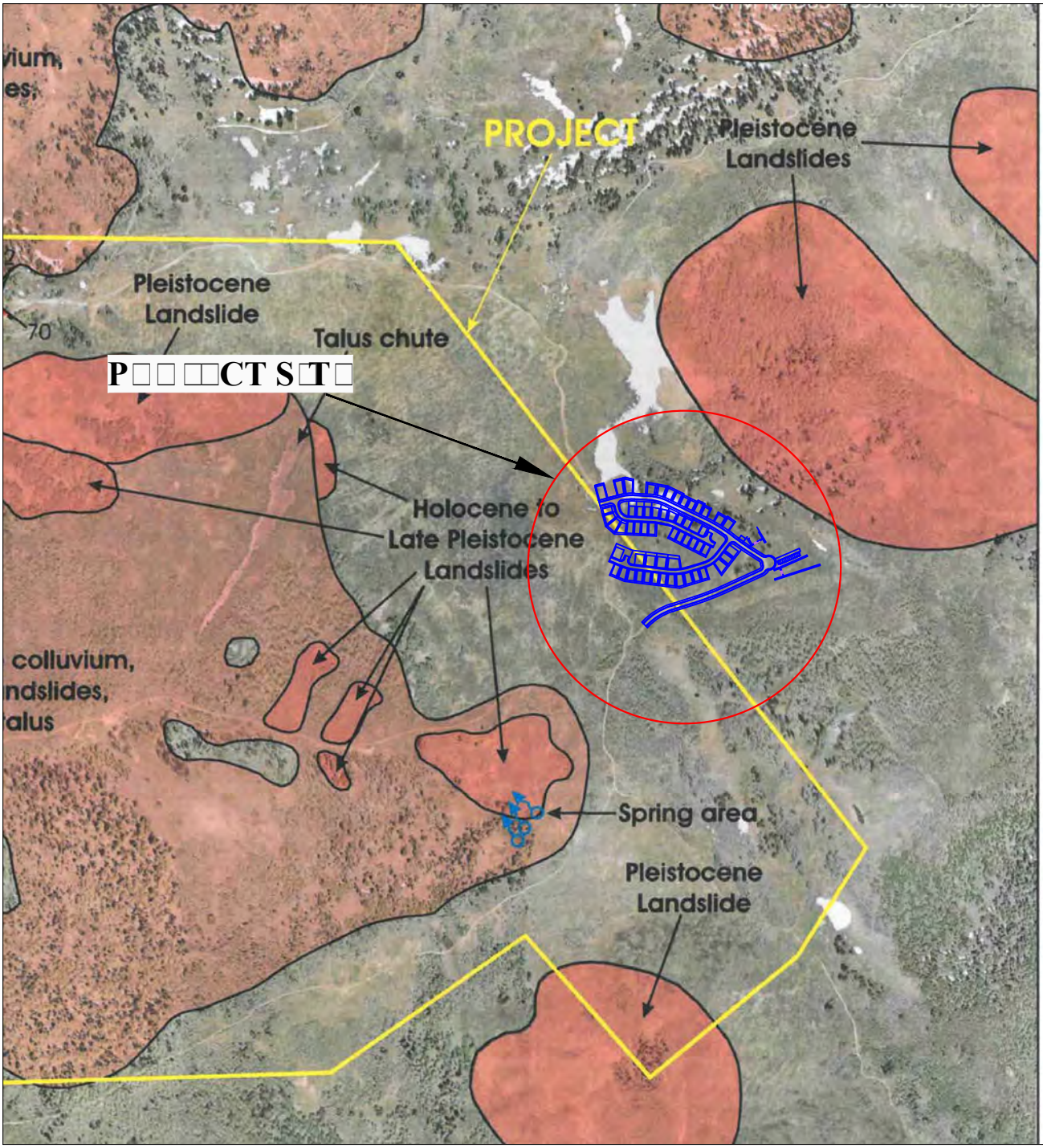
Upper member – Pale-buff to white or flesh-pink quartzite, locally streaked with pale red or purple. Coarse-grained; small pebbles occur throughout unit and increase in abundance downward. Base marked by zone 30-60 m thick of cobble conglomerate in beds 30 cm to 2 m thick; clasts, 5-10 cm in diameter, are mainly reddish vein quartz or quartzite, sparse gray quartzite, or red jasper; thickness 730-820 m

Lower member – Pale-buff to white and tan quartzite with irregular streaks and lenses of cobble conglomerate decreasing in abundance downward. Lower 90-120 m strongly arkosic, streaked greenish or pinkish. Feldspar clasts increase in size to 0.6-1.3 cm in lower part of unit; thickness 490-520 m

Recently active normal fault – Dashed where inferred. Ticks on downthrown side

Pre-Tertiary normal fault – Dotted where concealed
Bar and ball on downthrown side

Thrust fault – Dashed where inferred
Sawteeth on upper plate



Edge of Mapped Area

Base Ma□□

-Western Geologic (2012) Geologic Hazards Reconnaissance Report, Figure 3

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UTAH
QUADRANGLE LOCATION

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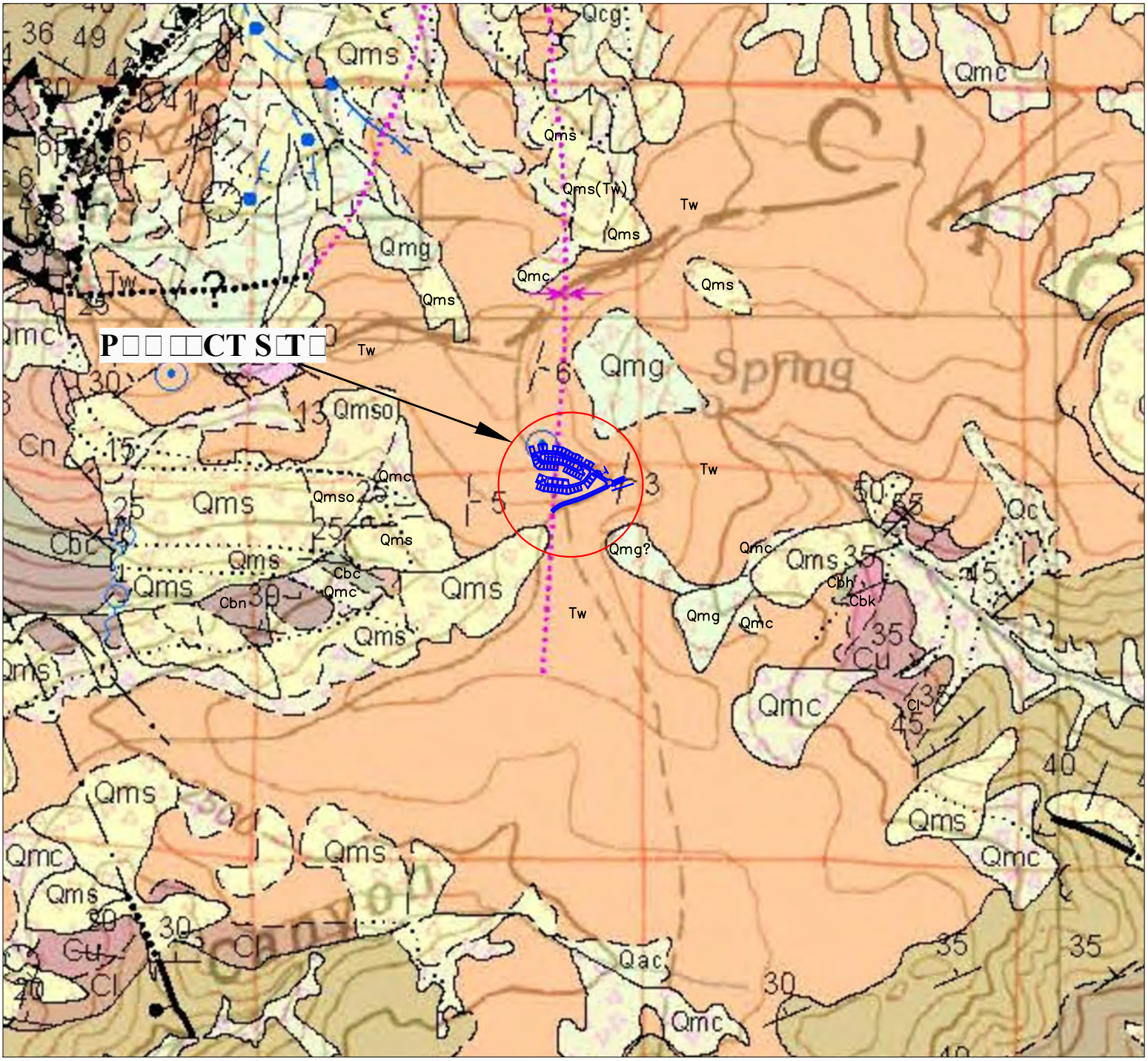

Base Ma□□

-UGS □□*den* □□ □□□ □*eolo□*□□*uadran□le*, 1:62,500 scale, map OFR-635DM, Coogan and □ing (2016)

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1" = 2000'

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MAP LEGEND

Qms, Qms?, Qmsy, Qmsy?, Qmso, Qmso?

Landslide deposits (Holocene and upper and middle? Pleistocene) – Poorly sorted clay- to boulder-sized material; includes slides, slumps, and locally flows and floods; generally characterized by hummocky topography, main and internal scarps, and chaotic bedding in displaced blocks; composition depends on local sources; morphology becomes more subdued with time and amount of water in material during emplacement; Qms may be in contact with Qms when landslides are different/distinct; thickness highly variable, up to about 20 to 30 feet (6-9 m) for small slides, and 80 to 100 feet (25-30 m) thick for larger landslides. Qmsy and Qmso queried where relative age uncertain; Qms queried where classification uncertain. Numerous landslides are too small to show at map scale and more detailed maps shown in the index to geologic mapping should be examined.

Qms without a suffix is mapped where the age is uncertain (though likely Holocene and/or late Pleistocene), where portions of slide complexes have different ages but cannot be shown separately at map scale, or where boundaries between slides of different ages are not distinct. Estimated time of emplacement is indicated by relative-age letter suffixes with: Qmsy mapped where landslides deflect streams or failures are in Lake Bonneville deposits, and scarps are variably vegetated; Qmso typically mapped where deposits are "perched" above present drainages, rumpled morphology typical of mass movements has been diminished, and/or younger surficial deposits cover or cut Qmso. Lower perched Qmso deposits are at Qao heights above drainages (95 ka and older) and the higher perched deposits may correlate with high level alluvium (QTa_) (likely older than 780 ka) (see table 1). Suffixes y and o indicate probable Holocene and Pleistocene ages, respectively, with all Qmso likely emplaced before Lake Bonneville transgression. These older deposits are as unstable as other slides, and are easily reactivated with the addition of water, be it irrigation or septic tank drain fields.

Qmso?(Qafoe), Qmso?(QTcg?), Qmso?(Ts), Qmso?(Tcg), Qmso?(Tn), Qmso?(Tf), Qmso?(Xfc)

Block landslide and possible block landslide deposits (Holocene and upper and middle? Pleistocene) – Mapped where nearly intact block is visible in landslide (mostly block slide) with stratal strikes and dips that are different from nearby in-place bedrock; unit involved in landslide shown in parentheses, for example Qms(Tw) and composition depends bedrock unit; rx shown where bedrock unit in block not known or multiple units are in the block, with Zrx shown where the units are Neoproterozoic; see surficial deposits or rock unit in parentheses for descriptions of blocks; thickness highly variable, up to about 20 to 30 feet (6-9 m) for small slides, and cross sections show larger blocks are about 150 feet (45 m) thick. Relative ages are like those for other landslide deposits (Qms, Qmso).

Qms and Qmso queried (Qms?, Qmso?) where bedrock block may be in place, that is stratal strikes and dips in queried block are about the same as nearby in-place bedrock.

Qmc **Landslide and colluvial deposits, undivided (Holocene and Pleistocene)** – Poorly sorted to unsorted clay- to boulder-sized material; mapped where landslide deposits are difficult to distinguish from colluvium (slopewash and soil creep) and where mapping separate, small, intermingled areas of landslide and colluvial deposits is not possible at map scale; locally includes talus and debris flow and flood deposits; typically mapped where landslides are thin ("shallow"); also mapped where the blocky or rumpled morphology that is characteristic of landslides has been diminished ("smoothed") by slopewash and soil creep; composition depends on local sources; 6 to 40 feet (2-12 m) thick. These deposits are as unstable as other landslide units (Qms, Qmsy, Qmso).

Qmg, Qmg?

Mass-movement and glacial deposits, undivided (Holocene and Pleistocene) – Unsorted and unstratified clay, silt, sand, and gravel; mapped where glacial deposits lack typical moraine morphology, and appear to have failed or moved down slope; also mapped in upper Strawberry Bowl (Snow Basin quadrangle) where glacial deposits have lost their distinct morphology and the contacts between them and colluvium and talus in the cirques cannot be mapped; likely less than 30 feet (9 m) thick, but may be thicker in Mantua, James Peak, North Ogden, Huntsville, and Peterson quadrangles.

MAP LEGEND

Tw, Tw?

Wasatch Formation (Eocene and upper Paleocene) – Typically red to brownish-red sandstone, siltstone, mudstone, and conglomerate with minor gray limestone and marlstone locally (see Twl); lighter shades of red, yellow, tan, and light gray present locally and more common in uppermost part, complicating mapping of contacts with overlying similarly colored Norwood and Fowkes Formations; clasts typically rounded Neoproterozoic and Paleozoic sedimentary rocks, mainly Neoproterozoic and Cambrian quartzite; basal conglomerate more gray and less likely to be red, and containing more locally derived angular clasts of limestone, dolomite and sandstone, typically from Paleozoic strata, for example in northern Causey Dam quadrangle; sinkholes indicate karstification of limestone beds; thicknesses on Willard thrust sheet likely up to about 400 to 600 feet (120-180 m) in Sharp Mountain, Dairy Ridge, and Horse Ridge quadrangles (Coogan, 2006a-b), about 1300 feet (400 m) in Monte Cristo Peak quadrangle, about 1100 feet (335 m) in northeast Browns Hole quadrangle, about 2200 feet (670 m) in southwest Causey Dam quadrangle, about 2600 feet (800 m) at Herd Mountain in Bybee Knoll quadrangle, and about 1300 feet (400 m) in northwest Lost Creek Dam quadrangle, estimated by elevation differences between pre-Wasatch rocks exposed in drainages and the crests of gently dipping Wasatch Formation on adjacent ridges (King); thickness varies locally due to considerable relief on basal erosional surface, for example along Right Fork South Fork Ogden River, and along leading edge of Willard thrust; much thicker, about 5000 to 6000 feet (1500-1800 m), south of Willard thrust sheet near Morgan. Wasatch Formation is queried (Tw?) where poor exposures may actually be surficial deposits. The Wasatch Formation is prone to slope failures. Other information on the Wasatch Formation is in Tw descriptions under the heading “Sub-Willard Thrust - Ogden Canyon Area” since Tw strata are extensive near Morgan Valley and cover the Willard thrust, Ogden Canyon, and Durst Mountain areas.

- Contact, approximately located
- Contact, concealed
- Contact, well located
- Older moraine crest, symmetry unknown
- Thrust fault, concealed
- Syncline, upright, concealed
- Bedding, strike & dip, upright
- Water well
- Select spring

APPENDIX B

Water Content and Unit Weight of Soil

(In General Accordance with ASTM D7263 Method B and D2216)

Project: **Summit-The Overlook**
No: **01628-021**
Location: Powder Mountain, UT
Date: 12/20/2016
By: NB/BSS

Sample Info.	Boring No.	TP-1-17	TP-4-17						
	Sample								
	Depth	5.0'	4.5'						
	Split	Yes	Yes						
	Split sieve	3/8"	3/8"						
	Total sample (g)	4297.06	4474.74						
	Moist coarse fraction (g)	1534.66	1423.14						
	Moist split fraction (g)	2762.40	3051.60						
	Sample height, H (in)								
	Sample diameter, D (in)								
	Mass rings + wet soil (g)								
	Mass rings/tare (g)								
	Moist unit wt., γ_m (pcf)								
Coarse Fraction	Wet soil + tare (g)	2246.20	1733.54						
	Dry soil + tare (g)	2229.71	1699.53						
	Tare (g)	711.55	310.40						
	Water content (%)	1.1	2.4						
Split Fraction	Wet soil + tare (g)	737.91	956.70						
	Dry soil + tare (g)	711.71	893.13						
	Tare (g)	128.88	409.81						
	Water content (%)	4.5	13.2						
	Water Content, w (%)	**3.3**	**9.5**						
	Dry Unit Wt., γ_d (pcf)								

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

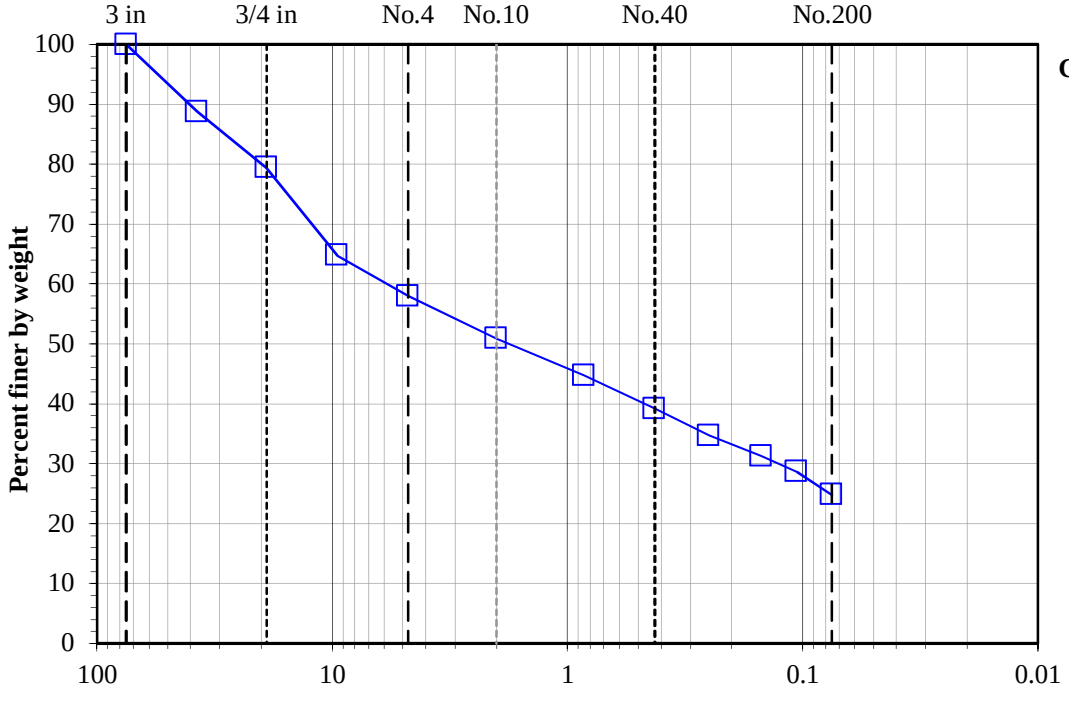
Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/20/2016
By: NB

Boring No.: TP-1-17
Sample:
Depth: 5.0'
Description: Reddish brown clayey gravel with sand

	Moist	Dry
Split:	Yes	
Split sieve:	3/8"	
Total sample wt. (g):	4297.06	4160.02
+3/8" Coarse fraction (g):	1481.93	1466.00
-3/8" Split fraction (g):	609.03	582.83
Split fraction:	0.648	

Water content data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	2246.21	737.91
Dry soil + tare (g):	2229.71	711.71
Tare (g):	711.55	128.88
Water content (%):	1.1	4.5

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	467.60	37.5	88.8	
3/4"	856.80	19	79.4	
3/8"	1466.00	9.5	64.8	←Split
No.4	60.97	4.75	58.0	
No.10	124.69	2	50.9	
No.20	180.40	0.85	44.7	
No.40	230.37	0.425	39.2	
No.60	270.40	0.25	34.7	
No.100	301.56	0.15	31.3	
No.140	324.82	0.106	28.7	
No.200	359.63	0.075	24.8	



Gravel (%): 42.0
Sand (%): 33.2
Fines (%): 24.8

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

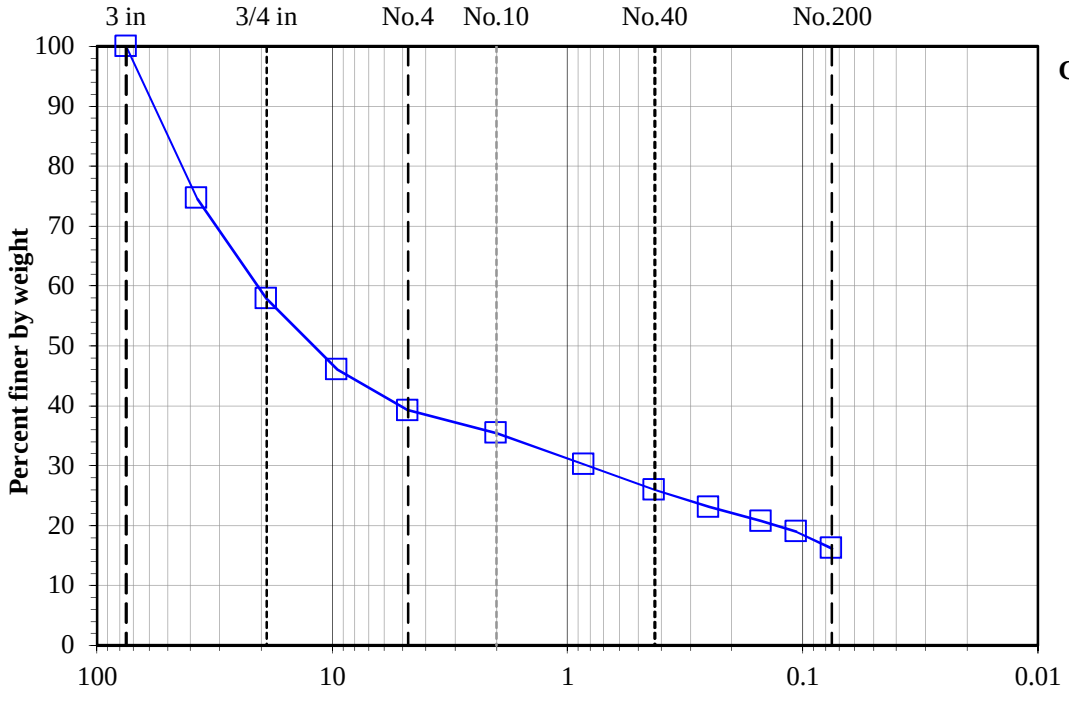
Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/21/2016
By: BSS

Boring No.: TP-2-17
Sample:
Depth: 3.5'
Description: Red clayey gravel with sand

Split:	Yes	
Split sieve:	#4	
	Moist	Dry
Total sample wt. (g):	5406.58	5088.86
+#4 Coarse fraction (g):	3181.58	3094.53
-#4 Split fraction (g):	360.27	322.92
Split fraction:	0.392	

Water content data	C.F.(+#4)	S.F.(-#4)
Moist soil + tare (g):	3492.10	768.21
Dry soil + tare (g):	3405.05	730.86
Tare (g):	310.52	407.94
Water content (%):	2.8	11.6

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	1291.28	37.5	74.6	
3/4"	2142.82	19	57.9	
3/8"	2748.00	9.5	46.0	
No.4	3094.53	4.75	39.2	←Split
No.10	31.43	2	35.4	
No.20	73.81	0.85	30.2	
No.40	109.13	0.425	25.9	
No.60	133.07	0.25	23.0	
No.100	152.15	0.15	20.7	
No.140	167.02	0.106	18.9	
No.200	189.74	0.075	16.2	



Gravel (%): 60.8
Sand (%): 23.0
Fines (%): 16.2

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

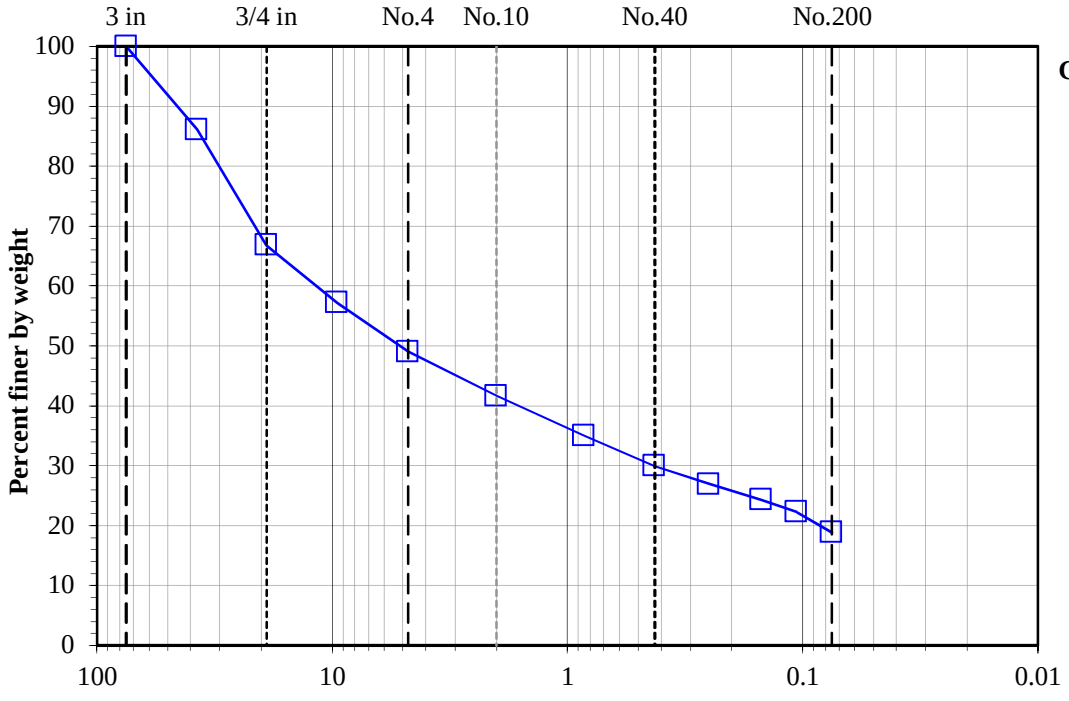
Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/21/2016
By: BSS

Boring No.: TP-3-17
Sample: Sta. 14
Depth: 6.0'
Description: Reddish brown clayey gravel with sand

Split:	Yes	
Split sieve:	3/4"	
	Moist	Dry
Total sample wt. (g):	5210.58	5068.15
+3/4" Coarse fraction (g):	1693.68	1682.47
-3/4" Split fraction (g):	657.99	633.44
Split fraction:	0.668	

Water content data	C.F.(+3/4")	S.F.(-3/4")
Moist soil + tare (g):	2004.70	968.63
Dry soil + tare (g):	1993.49	944.08
Tare (g):	311.02	310.64
Water content (%):	0.7	3.9

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	704.73	37.5	86.1	
3/4"	1682.47	19	66.8	←Split
3/8"	91.44	9.5	57.2	
No.4	168.58	4.75	49.0	
No.10	238.71	2	41.6	
No.20	301.62	0.85	35.0	
No.40	349.38	0.425	30.0	
No.60	378.54	0.25	26.9	
No.100	403.31	0.15	24.3	
No.140	422.72	0.106	22.2	
No.200	454.90	0.075	18.8	



Gravel (%): 51.0
Sand (%): 30.2
Fines (%): 18.8

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

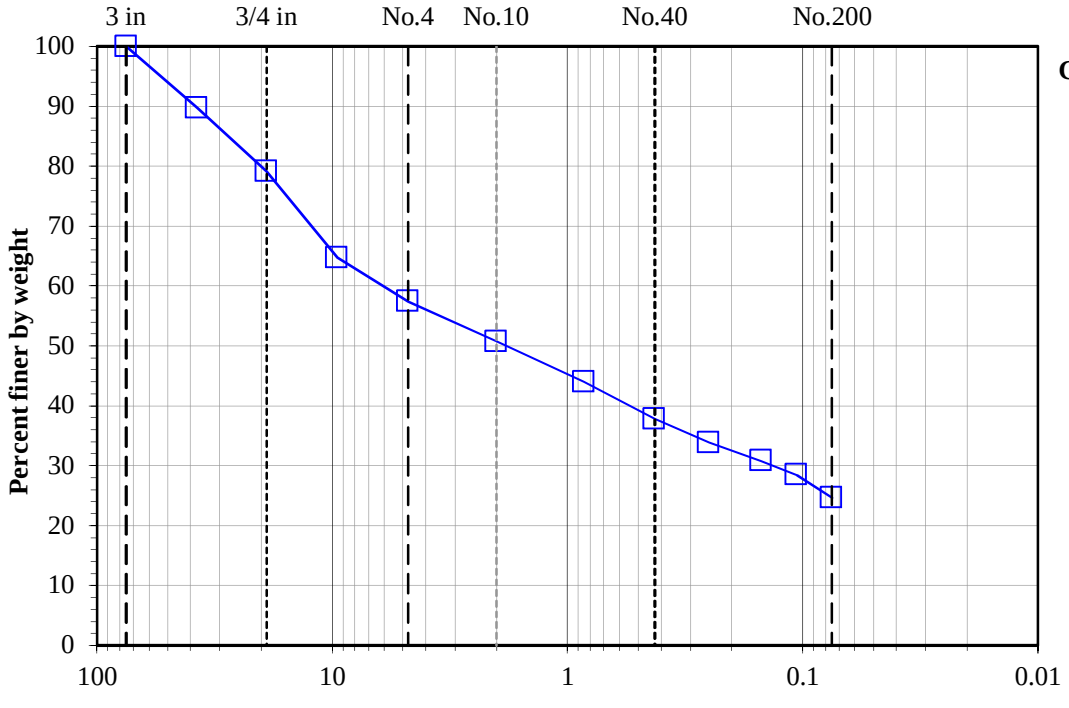
Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/21/2016
By: BSS

Boring No.: TP-3-17
Sample: Sta. 18
Depth: 6.0'
Description: Reddish brown clayey gravel with sand

Split:	Yes	
Split sieve:	3/4"	
	Moist	Dry
Total sample wt. (g):	24876.20	23078.04
+3/4" Coarse fraction (g):	4956.20	4815.11
-3/4" Split fraction (g):	754.57	691.80
Split fraction:	0.791	

Water content data	C.F.(+3/4")	S.F.(-3/4")
Moist soil + tare (g):	2798.82	1165.00
Dry soil + tare (g):	2728.05	1102.23
Tare (g):	312.83	410.43
Water content (%):	2.9	9.1

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	2377.57	37.5	89.7	
3/4"	4815.11	19	79.1	←Split
3/8"	126.17	9.5	64.7	
No.4	189.90	4.75	57.4	
No.10	248.60	2	50.7	
No.20	307.38	0.85	44.0	
No.40	361.31	0.425	37.8	
No.60	396.12	0.25	33.8	
No.100	422.75	0.15	30.8	
No.140	443.25	0.106	28.4	
No.200	476.10	0.075	24.7	



Gravel (%): 42.6
Sand (%): 32.7
Fines (%): 24.7

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

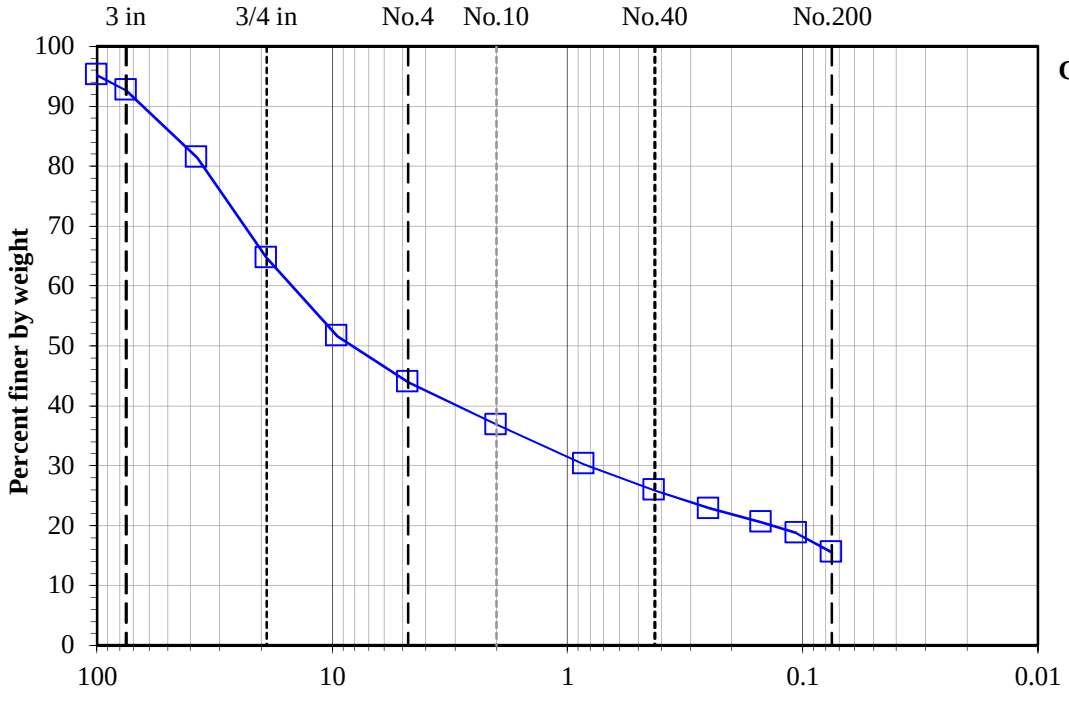
Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/22/2016
By: BSS

Boring No.: TP-5-17
Sample:
Depth: 5.0'
Description: Brown clayey gravel with sand

	Moist	Dry
Split:	Yes	
Split sieve:	3/4"	
Total sample wt. (g):	25928.60	25020.57
+3/4" Coarse fraction (g):	8996.00	8833.21
-3/4" Split fraction (g):	631.87	604.06
Split fraction:	0.647	

Water content data	C.F.(+3/4")	S.F.(-3/4")
Moist soil + tare (g):	3487.46	960.15
Dry soil + tare (g):	3431.75	932.34
Tare (g):	408.88	328.28
Water content (%):	1.8	4.6

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	100.0	
4"	1190.75	100	95.2	
3"	1841.07	75	92.6	
1.5"	4642.54	37.5	81.4	
3/4"	8833.21	19	64.7	←Split
3/8"	122.24	9.5	51.6	
No.4	193.66	4.75	44.0	
No.10	260.03	2	36.8	
No.20	321.75	0.85	30.2	
No.40	362.45	0.425	25.9	
No.60	390.74	0.25	22.8	
No.100	412.52	0.15	20.5	
No.140	429.30	0.106	18.7	
No.200	458.83	0.075	15.6	



Gravel (%): 56.0
Sand (%): 28.4
Fines (%): 15.6

Entered by:_____
Reviewed:_____

Amount of Material in Soil Finer than the No. 200 (75µm) Sieve

(ASTM D1140)

Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/21/2016
By: BSS

Sample Info.	Boring No.	TP-4-17	TP-4-17						
	Sample								
	Depth	4.5'	6.0'						
	Split	Yes	Yes						
	Split Sieve*	3/8"	3/8"						
	Method	B	B						
Specimen soak time (min)		390	370						
Moist total sample wt. (g)		4474.74	4649.66						
Moist coarse fraction (g)		1423.14	921.36						
Moist split fraction + tare (g)		956.70	1053.17						
Split fraction tare (g)		409.81	316.57						
Dry split fraction (g)		483.32	701.10						
Dry retained No. 200 + tare (g)		721.36	721.36						
Wash tare (g)		409.81	316.57						
No. 200 Dry wt. retained (g)		311.55	404.79						
Split sieve* Dry wt. retained (g)		1389.13	913.61						
Dry total sample wt. (g)		4086.01	4462.23						
Coarse Fraction	Moist soil + tare (g)	1733.54	1230.82						
	Dry soil + tare (g)	1699.53	1223.07						
	Tare (g)	310.40	309.46						
	Water content (%)	2.45	0.85						
Split Fraction	Moist soil + tare (g)	956.70	1053.17						
	Dry soil + tare (g)	893.13	1017.67						
	Tare (g)	409.81	316.57						
	Water content (%)	13.15	5.06						
Percent passing split sieve* (%)		**66.0**	**79.5**						
Percent passing No. 200 sieve (%)		**23.5**	**33.6**						

Entered by:_____
Reviewed:_____

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT
Date: 12/27/2016
By: JDF

Boring No.: TP-2-17
Sample:
Depth: 3.5'
Sample Description: Brown clayey sand
Sample type: Arbitrary remold

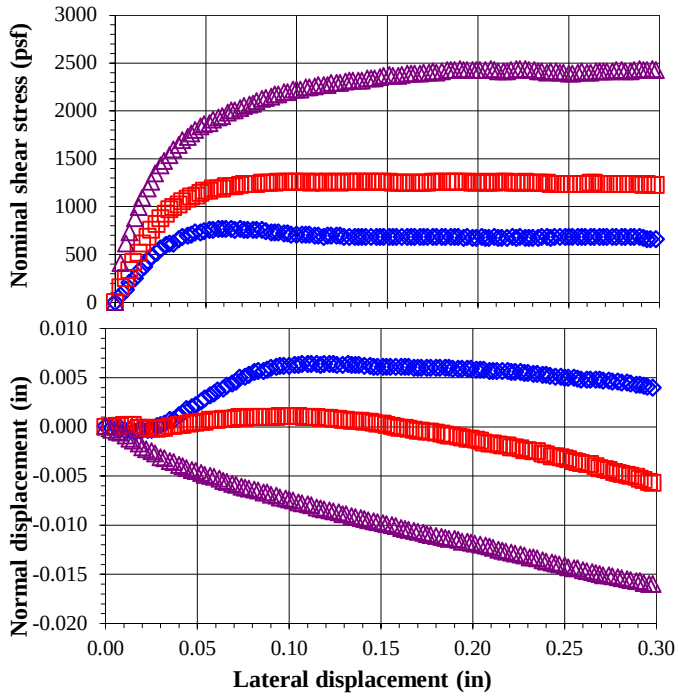
Test type: Inundated
Lateral displacement (in.): 0.3
Shear rate (in./min): 0.0172
Specific gravity, Gs: 2.65 Assumed

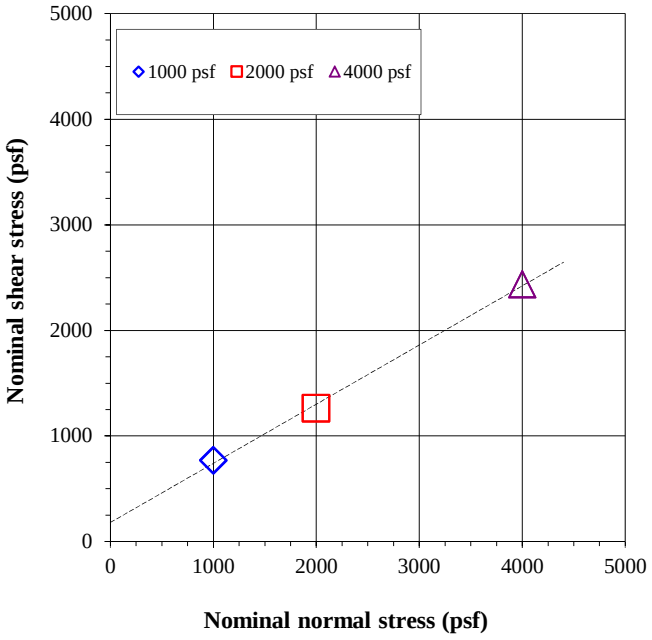
	Sample 1		Sample 2		Sample 3	
Nominal normal stress (psf)	1000		2000		4000	
Peak shear stress (psf)	768		1260		2436	
Lateral displacement at peak (in)	0.057		0.090		0.190	
Load Duration (min)	183		213		82	
	Initial	Pre-shear	Initial	Pre-shear	Initial	Pre-shear
Sample height (in)	1.0000	0.9230	1.0000	0.9867	1.0000	0.9835
Sample diameter (in)	2.416	2.416	2.416	2.416	2.416	2.416
Wt. rings + wet soil (g)	197.71	198.40	197.19	202.66	199.25	204.48
Wt. rings (g)	43.12	43.12	42.60	42.60	44.66	44.66
Wet soil + tare (g)	365.67		365.67		365.67	
Dry soil + tare (g)	339.75		339.75		339.75	
Tare (g)	123.74		123.74		123.74	
Water content (%)	12.0	12.5	12.0	16.0	12.0	15.8
Dry unit weight (pcf)	114.7	124.2	114.7	116.2	114.7	116.6
Void ratio, e, for assumed Gs	0.44	0.33	0.44	0.42	0.44	0.42
Saturation (%)*	71.9	100.0	71.9	100.0	71.9	100.0

ϕ' (deg)	29
c' (psf)	180

Average of 3 samples	Initial	Pre-shear
Water content (%)	12.0	14.8
Dry unit weight (pcf)	114.7	119.0

*Pre-shear saturation set to 100% for phase calculations





Entered by:_____
Reviewed:_____

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Summit - The Overlook **Boring No.:** TP-2-17

No: 01628-021 **Sample:**

Location: Powder Mountain, UT **Depth:** 3.5'

Nominal normal stress = 1000 psf			Nominal normal stress = 2000 psf			Nominal normal stress = 4000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.000	0	0.000	0.000	0	0.000	0.000	0	0.000
0.003	72	0.000	0.003	156	0.000	0.003	408	0.000
0.006	132	0.000	0.006	252	0.000	0.006	612	-0.001
0.008	204	0.000	0.008	336	0.000	0.008	732	-0.001
0.011	252	0.000	0.010	420	0.000	0.011	876	-0.001
0.013	324	0.000	0.013	516	0.000	0.013	996	-0.001
0.016	372	-0.001	0.015	612	0.000	0.015	1092	-0.001
0.018	432	0.000	0.018	684	0.000	0.018	1188	-0.002
0.020	480	0.000	0.020	756	0.000	0.020	1260	-0.002
0.023	516	0.000	0.023	816	0.000	0.022	1344	-0.002
0.025	564	0.000	0.025	876	0.000	0.025	1428	-0.003
0.028	600	0.000	0.028	924	0.000	0.027	1476	-0.003
0.030	612	0.000	0.030	972	0.000	0.030	1536	-0.003
0.032	612	0.000	0.032	996	0.000	0.032	1596	-0.003
0.035	660	0.001	0.035	1020	0.000	0.035	1644	-0.004
0.037	684	0.001	0.037	1056	0.000	0.037	1692	-0.004
0.040	696	0.001	0.040	1080	0.000	0.040	1728	-0.004
0.042	708	0.001	0.042	1104	0.000	0.042	1764	-0.004
0.044	732	0.002	0.045	1116	0.000	0.044	1800	-0.004
0.047	732	0.002	0.047	1140	0.000	0.047	1836	-0.004
0.049	744	0.002	0.049	1164	0.000	0.049	1860	-0.005
0.052	756	0.003	0.052	1164	0.001	0.052	1872	-0.005
0.054	756	0.003	0.054	1188	0.001	0.054	1908	-0.005
0.057	768	0.003	0.057	1188	0.001	0.057	1932	-0.005
0.059	768	0.003	0.059	1188	0.001	0.059	1944	-0.005
0.061	768	0.004	0.061	1212	0.001	0.062	1980	-0.005
0.064	768	0.004	0.064	1212	0.001	0.064	2004	-0.006
0.066	756	0.004	0.066	1212	0.001	0.066	2004	-0.006
0.069	768	0.004	0.069	1224	0.001	0.069	2028	-0.006
0.071	756	0.005	0.071	1236	0.001	0.071	2052	-0.006
0.073	756	0.005	0.073	1236	0.001	0.074	2064	-0.006
0.076	756	0.005	0.076	1236	0.001	0.076	2076	-0.006
0.078	756	0.005	0.078	1236	0.001	0.078	2100	-0.006
0.081	756	0.006	0.081	1248	0.001	0.081	2124	-0.006
0.083	744	0.006	0.083	1248	0.001	0.083	2136	-0.007
0.086	732	0.006	0.085	1248	0.001	0.086	2148	-0.007
0.088	732	0.006	0.088	1248	0.001	0.088	2172	-0.007
0.090	732	0.006	0.090	1260	0.001	0.090	2172	-0.007
0.093	720	0.006	0.093	1260	0.001	0.093	2196	-0.007
0.095	720	0.006	0.095	1260	0.001	0.095	2196	-0.007
0.097	708	0.006	0.098	1260	0.001	0.098	2220	-0.007
0.100	708	0.006	0.100	1260	0.001	0.100	2220	-0.007
0.103	708	0.006	0.102	1260	0.001	0.102	2220	-0.008
0.105	708	0.006	0.105	1260	0.001	0.105	2244	-0.008
0.107	708	0.006	0.108	1248	0.001	0.107	2244	-0.008
0.110	696	0.006	0.110	1260	0.001	0.110	2256	-0.008
0.112	696	0.006	0.112	1260	0.001	0.112	2268	-0.008
0.115	684	0.006	0.115	1248	0.001	0.115	2268	-0.008
0.117	696	0.006	0.117	1260	0.001	0.117	2268	-0.008
0.119	696	0.006	0.120	1260	0.001	0.119	2292	-0.008
0.122	696	0.006	0.122	1260	0.001	0.122	2292	-0.009
0.124	696	0.006	0.124	1248	0.001	0.124	2292	-0.009
0.126	684	0.006	0.127	1260	0.001	0.127	2304	-0.009
0.129	684	0.006	0.129	1260	0.001	0.129	2316	-0.009
0.132	684	0.006	0.131	1260	0.001	0.131	2316	-0.009
0.134	684	0.006	0.134	1260	0.001	0.134	2316	-0.009
0.136	684	0.006	0.136	1260	0.001	0.136	2316	-0.009
0.138	684	0.006	0.139	1260	0.001	0.139	2340	-0.009
0.141	684	0.006	0.141	1260	0.001	0.141	2340	-0.009
0.144	684	0.006	0.144	1260	0.001	0.143	2340	-0.010
0.146	684	0.006	0.146	1260	0.000	0.146	2352	-0.010
0.148	684	0.006	0.148	1260	0.000	0.148	2364	-0.010
0.151	684	0.006	0.151	1260	0.000	0.151	2376	-0.010
0.153	684	0.006	0.153	1248	0.000	0.153	2364	-0.010
0.155	684	0.006	0.156	1248	0.000	0.156	2364	-0.010

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Summit - The Overlook **Boring No.:** TP-2-17

No: 01628-021 **Sample:**

Location: Powder Mountain, UT **Depth:** 3.5'

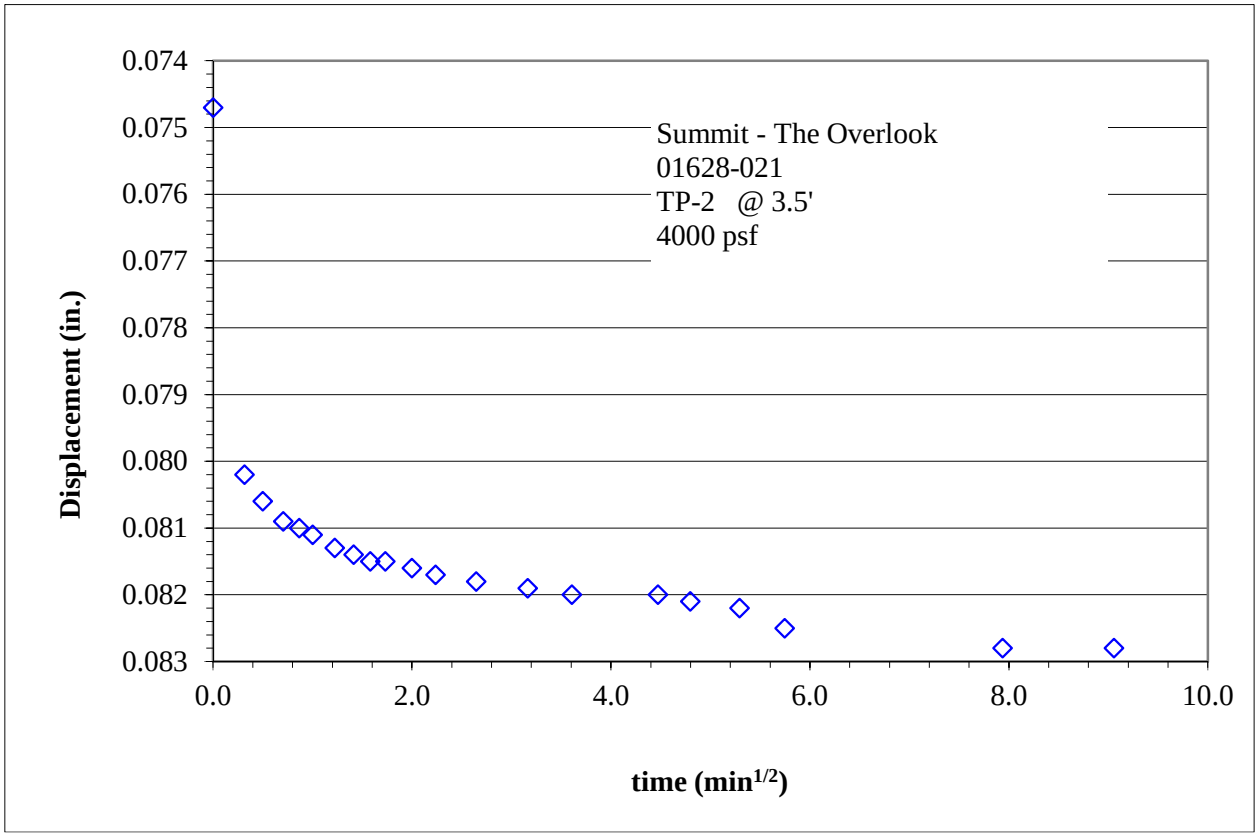
Nominal normal stress = 1000 psf			Nominal normal stress = 2000 psf			Nominal normal stress = 4000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.158	684	0.006	0.158	1248	0.000	0.158	2376	-0.010
0.161	684	0.006	0.160	1248	0.000	0.161	2388	-0.010
0.163	684	0.006	0.163	1248	0.000	0.163	2388	-0.010
0.165	684	0.006	0.165	1248	0.000	0.165	2388	-0.011
0.168	684	0.006	0.168	1248	0.000	0.168	2388	-0.011
0.170	684	0.006	0.170	1248	0.000	0.170	2400	-0.011
0.172	684	0.006	0.172	1248	0.000	0.173	2400	-0.011
0.175	684	0.006	0.175	1260	-0.001	0.175	2412	-0.011
0.177	684	0.006	0.177	1260	-0.001	0.177	2400	-0.011
0.180	684	0.006	0.180	1260	-0.001	0.180	2412	-0.011
0.182	684	0.006	0.183	1260	-0.001	0.183	2424	-0.011
0.185	684	0.006	0.185	1260	-0.001	0.185	2424	-0.011
0.187	684	0.006	0.187	1260	-0.001	0.187	2424	-0.011
0.189	684	0.006	0.189	1260	-0.001	0.190	2436	-0.011
0.192	672	0.006	0.192	1260	-0.001	0.192	2424	-0.012
0.194	684	0.006	0.194	1260	-0.001	0.194	2424	-0.012
0.197	672	0.006	0.197	1248	-0.001	0.197	2424	-0.012
0.199	672	0.006	0.199	1248	-0.001	0.199	2424	-0.012
0.202	684	0.006	0.202	1260	-0.001	0.201	2424	-0.012
0.204	672	0.006	0.204	1248	-0.001	0.204	2424	-0.012
0.206	672	0.006	0.206	1248	-0.002	0.207	2436	-0.012
0.209	684	0.006	0.209	1248	-0.002	0.209	2424	-0.012
0.211	672	0.006	0.211	1260	-0.002	0.211	2412	-0.012
0.213	672	0.006	0.214	1260	-0.002	0.214	2412	-0.013
0.216	672	0.006	0.216	1260	-0.002	0.216	2412	-0.013
0.219	684	0.006	0.219	1248	-0.002	0.218	2424	-0.013
0.221	672	0.006	0.221	1248	-0.002	0.221	2436	-0.013
0.223	684	0.006	0.223	1248	-0.002	0.223	2436	-0.013
0.226	672	0.006	0.226	1260	-0.002	0.226	2436	-0.013
0.228	672	0.006	0.228	1248	-0.002	0.228	2424	-0.013
0.230	672	0.006	0.230	1248	-0.002	0.231	2424	-0.013
0.233	672	0.005	0.233	1248	-0.003	0.233	2412	-0.013
0.235	684	0.005	0.235	1248	-0.003	0.235	2412	-0.013
0.238	684	0.005	0.238	1248	-0.003	0.238	2400	-0.014
0.240	672	0.005	0.240	1236	-0.003	0.240	2412	-0.014
0.242	684	0.005	0.243	1236	-0.003	0.243	2412	-0.014
0.245	684	0.005	0.245	1236	-0.003	0.245	2400	-0.014
0.248	684	0.005	0.248	1236	-0.003	0.247	2400	-0.014
0.250	684	0.005	0.250	1236	-0.003	0.250	2388	-0.014
0.252	684	0.005	0.252	1236	-0.003	0.252	2388	-0.014
0.255	684	0.005	0.255	1236	-0.004	0.255	2400	-0.014
0.257	684	0.005	0.257	1236	-0.004	0.257	2412	-0.014
0.259	684	0.005	0.259	1236	-0.004	0.260	2400	-0.015
0.262	684	0.005	0.262	1248	-0.004	0.262	2400	-0.015
0.264	684	0.005	0.264	1248	-0.004	0.265	2412	-0.015
0.267	684	0.005	0.267	1236	-0.004	0.267	2412	-0.015
0.269	684	0.005	0.269	1236	-0.004	0.269	2412	-0.015
0.271	684	0.005	0.272	1236	-0.004	0.271	2412	-0.015
0.274	684	0.005	0.274	1236	-0.004	0.274	2412	-0.015
0.276	684	0.005	0.277	1236	-0.005	0.276	2424	-0.015
0.279	684	0.005	0.279	1236	-0.005	0.279	2424	-0.015
0.281	684	0.005	0.281	1236	-0.005	0.281	2412	-0.015
0.284	684	0.005	0.284	1236	-0.005	0.284	2412	-0.016
0.286	684	0.004	0.286	1236	-0.005	0.286	2424	-0.016
0.289	684	0.004	0.289	1236	-0.005	0.289	2436	-0.016
0.291	672	0.004	0.291	1224	-0.005	0.291	2424	-0.016
0.293	660	0.004	0.293	1236	-0.005	0.293	2424	-0.016
0.295	660	0.004	0.296	1224	-0.006	0.296	2436	-0.016
0.298	660	0.004	0.298	1224	-0.006	0.298	2424	-0.016
0.301	660	0.004	0.301	1224	-0.006	0.301	2244	-0.017
0.301	660	0.004	0.301	1224	-0.006	0.302	2316	-0.017

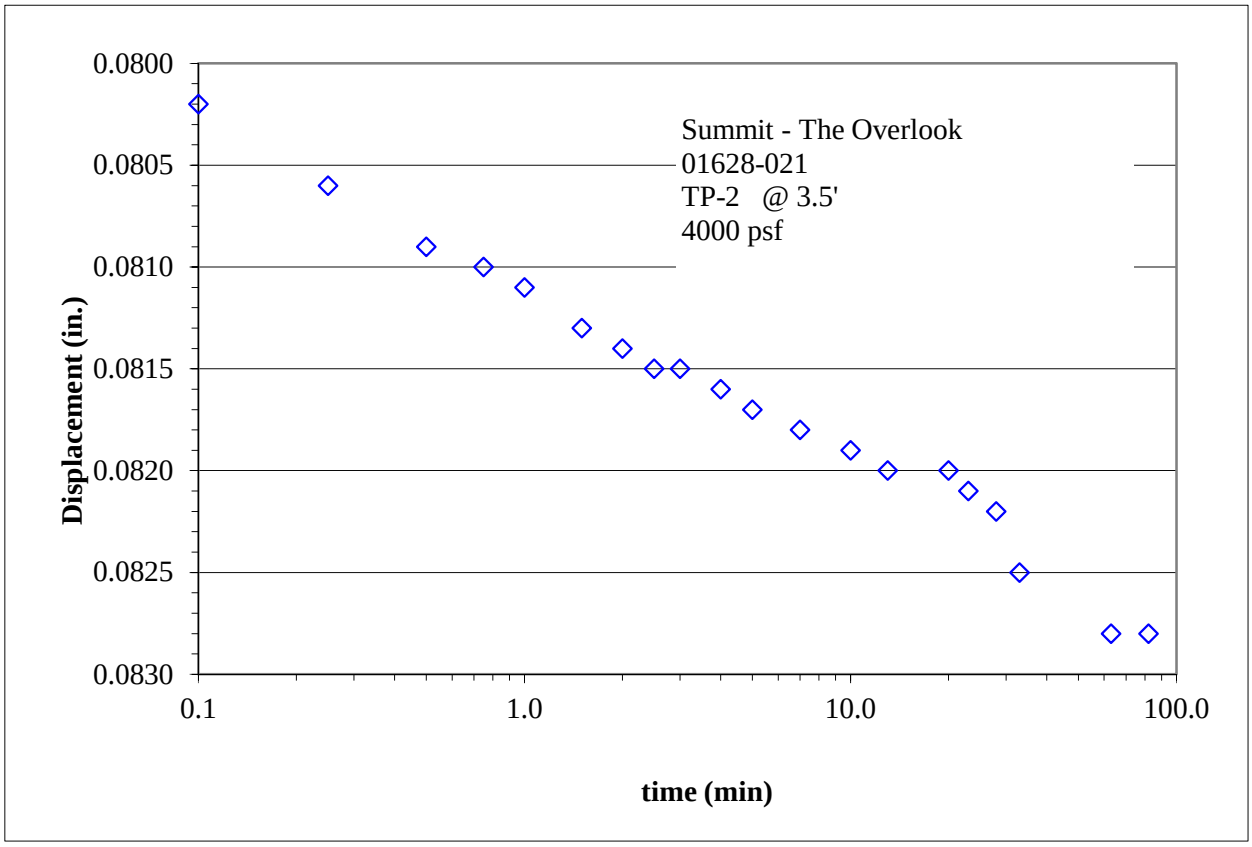
Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Summit - The Overlook
No: 01628-021
Location: Powder Mountain, UT

Boring No.: TP-2-17
Sample:
Depth: 3.5'





Minimum Laboratory Soil Resistivity, pH of Soil for Use in Corrosion Testing, and Ions in Water by Chemically Suppressed Ion Chromatography *(AASHTO T 288, T 289, ASTM D4327, and C1580)*

Project: **Summit - The Overlook**
No: **01628-021**
Location: Powder Mountain, UT
Date: 12/22/2016
By: DKS

Sample info.	Boring No.	TP-1-17							
	Sample								
	Depth	5.0'							
Water content data	Wet soil + tare (g)	117.03							
	Dry soil + tare (g)	109.48							
	Tare (g)	37.28							
	Water content (%)	10.5							
Chem. data	pH	6.13							
	Soluble chloride* (ppm)	<5.21							
	Soluble sulfate** (ppm)	49.3							
Resistivity data	Pin method	2							
	Soil box	Miller Small							
		Approximate Soil condition (%)	Resistance Reading (Ω)	Soil Box Multiplier (cm)	Resistivity (Ω-cm)	Approximate Soil condition (%)	Resistance Reading (Ω)	Soil Box Multiplier (cm)	Resistivity (Ω-cm)
		As Is	66960	0.67	44863				
		+3	37110	0.67	24864				
		+6	27160	0.67	18197				
		+9	27370	0.67	18338				
	Minimum resistivity (Ω-cm)	**18197**							

* Performed by AWAL using EPA 300.0

** Performed by AWAL using ASTM C1580

Entered by:_____

Reviewed:_____

Water Content and Unit Weight of Soil

(In General Accordance with ASTM D7263 Method B and D2216)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/25/2018
By: JWB/BRR

Sample Info.	Boring No.	TP-3	TP-5	TP-7	TP-13	TP-20	TP-23		
	Sample:	26	26	11	22	19	25		
	Depth:	8.0'	6.0'	6.0'	9.5'	8.0'	10.0'		
Unit Weight Info.	Sample height, H (in)		2.395		4.515	5.280			
	Sample diameter, D (in)		2.420		2.418	2.427			
	Sample volume, V (ft^3)		0.0064		0.0120	0.0141			
	Mass rings + wet soil (g)		319.31		1452.64	820.67			
	Mass rings/tare (g)		0.00		754.52	0.00			
	Moist soil, Ws (g)		319.31		698.12	820.67			
	Moist unit wt., γ_m (pcf)		110.42		128.28	127.99			
Water Content	Wet soil + tare (g)	2090.44	459.54	436.03	433.87	559.17	1800.89		
	Dry soil + tare (g)	1697.32	361.16	361.56	379.88	485.11	1358.26		
	Tare (g)	330.79	140.55	128.49	128.52	150.73	467.87		
Water Content, w (%)		**28.8**	**44.6**	**32.0**	**21.5**	**22.1**	**49.7**		
Dry Unit Wt., γ_d (pcf)			**76.4**		**105.6**	**104.8**			

Entered by:_____

Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/27/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-3
Station: 26
Depth: 8.0'
Description: Reddish brown fat clay

Preparation method: Wet
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Wet sieved
Approximate maximum grain size: 1-1/2"
Estimated percent retained on No.40: Not requested
As-received water content (%): 28.8

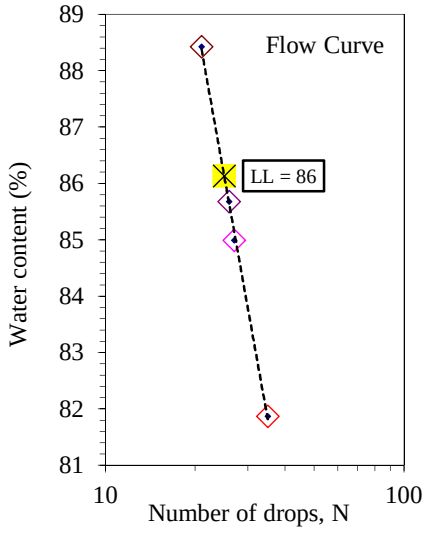
Plastic Limit

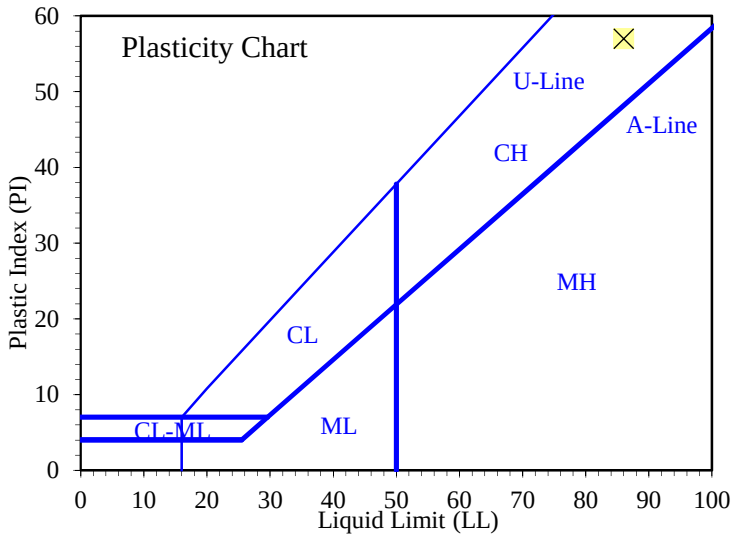
Determination No	1	2				
Wet Soil + Tare (g)	13.42	13.98				
Dry Soil + Tare (g)	11.98	12.46				
Water Loss (g)	1.44	1.52				
Tare (g)	7.06	7.30				
Dry Soil (g)	4.92	5.16				
Water Content, w (%)	29.27	29.46				

Liquid Limit

Determination No	1	2	3	4		
Number of Drops, N	35	27	26	21		
Wet Soil + Tare (g)	14.13	14.00	13.85	12.93		
Dry Soil + Tare (g)	10.97	10.83	10.74	10.18		
Water Loss (g)	3.16	3.17	3.11	2.75		
Tare (g)	7.11	7.10	7.11	7.07		
Dry Soil (g)	3.86	3.73	3.63	3.11		
Water Content, w (%)	81.87	84.99	85.67	88.42		
One-Point LL (%)		86	86	87		

Liquid Limit, LL (%)	**86**
Plastic Limit, PL (%)	**29**
Plasticity Index, PI (%)	**57**





Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/28/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-3
Station: 28
Depth: 12.0'
Description: Reddish brown fat clay

Preparation method: Air Dry
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Dry sieved
Approximate maximum grain size: No.10
Estimated percent retained on No.40: Not requested
As-received water content (%): Not requested

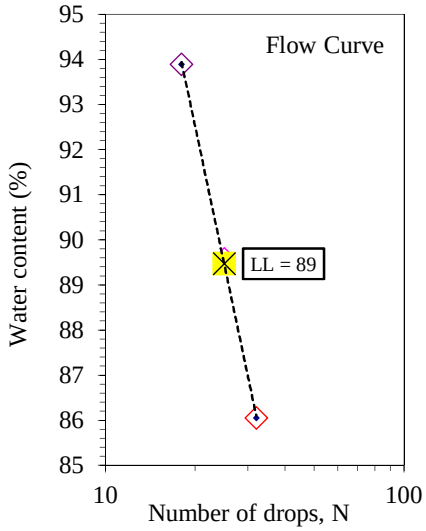
Plastic Limit

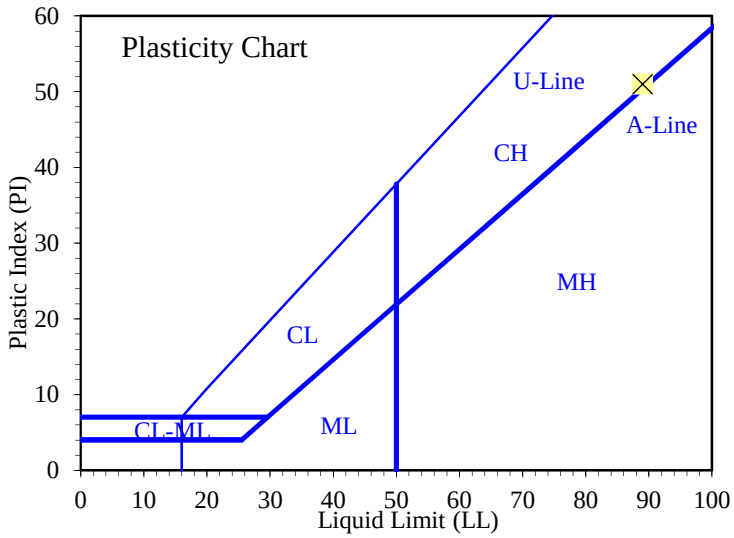
Determination No	1	2				
Wet Soil + Tare (g)	14.23	13.62				
Dry Soil + Tare (g)	12.28	11.82				
Water Loss (g)	1.95	1.80				
Tare (g)	7.10	7.06				
Dry Soil (g)	5.18	4.76				
Water Content, w (%)	37.64	37.82				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	32	25	18			
Wet Soil + Tare (g)	13.46	13.27	13.09			
Dry Soil + Tare (g)	10.50	10.35	10.17			
Water Loss (g)	2.96	2.92	2.92			
Tare (g)	7.06	7.09	7.06			
Dry Soil (g)	3.44	3.26	3.11			
Water Content, w (%)	86.05	89.57	93.89			
One-Point LL (%)		90				

Liquid Limit, LL (%)	**89**
Plastic Limit, PL (%)	**38**
Plasticity Index, PI (%)	**51**





Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/27/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-5
Station: 26
Depth: 6.0'
Description: Reddish brown fat clay

Preparation method: Wet
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Dry sieved
Approximate maximum grain size: No.10
Estimated percent retained on No.40: Not requested
As-received water content (%): 44.6

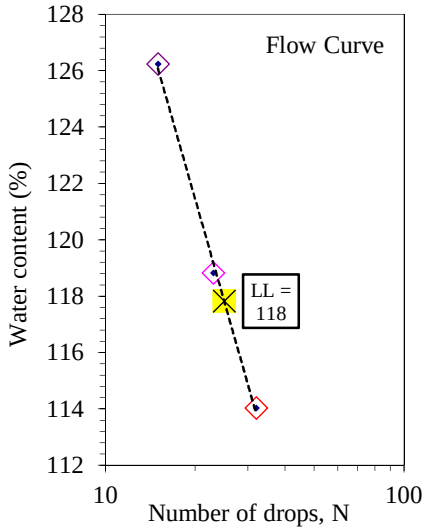
Plastic Limit

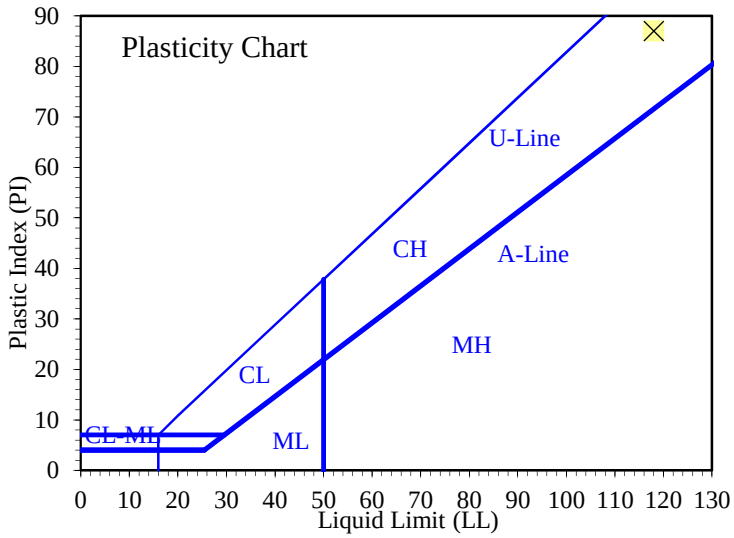
Determination No	1	2				
Wet Soil + Tare (g)	13.03	13.90				
Dry Soil + Tare (g)	11.48	12.28				
Water Loss (g)	1.55	1.62				
Tare (g)	6.42	7.00				
Dry Soil (g)	5.06	5.28				
Water Content, w (%)	30.63	30.68				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	32	23	15			
Wet Soil + Tare (g)	12.97	13.34	14.26			
Dry Soil + Tare (g)	9.80	9.93	10.41			
Water Loss (g)	3.17	3.41	3.85			
Tare (g)	7.02	7.06	7.36			
Dry Soil (g)	2.78	2.87	3.05			
Water Content, w (%)	114.03	118.82	126.23			
One-Point LL (%)		118				

Liquid Limit, LL (%)	**118**
Plastic Limit, PL (%)	**31**
Plasticity Index, PI (%)	**87**





Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/28/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-7
Station: 11
Depth: 6.0'
Description: Reddish brown fat clay

Preparation method: Air Dry
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Dry sieved
Approximate maximum grain size: No.10
Estimated percent retained on No.40: Not requested
As-received water content (%): 32.0

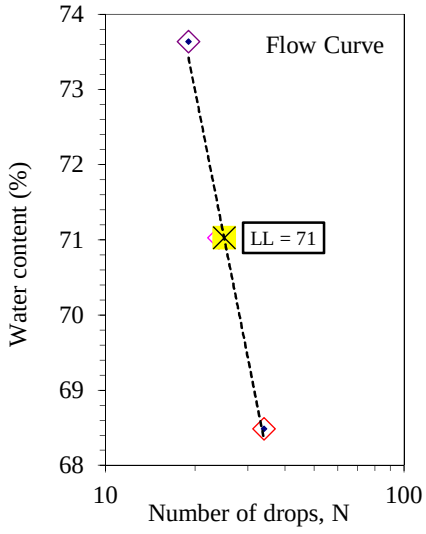
Plastic Limit

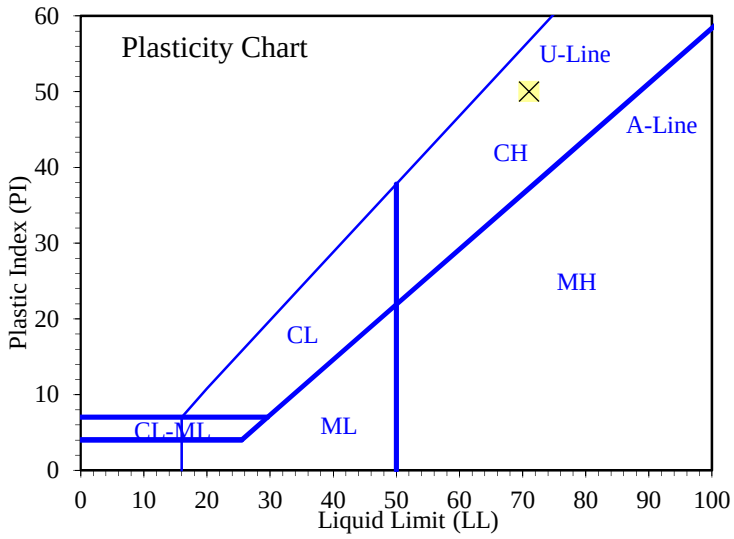
Determination No	1	2				
Wet Soil + Tare (g)	13.49	13.33				
Dry Soil + Tare (g)	12.36	12.24				
Water Loss (g)	1.13	1.09				
Tare (g)	7.06	7.10				
Dry Soil (g)	5.30	5.14				
Water Content, w (%)	21.32	21.21				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	34	24	19			
Wet Soil + Tare (g)	14.18	13.74	12.44			
Dry Soil + Tare (g)	11.29	10.97	10.15			
Water Loss (g)	2.89	2.77	2.29			
Tare (g)	7.07	7.07	7.04			
Dry Soil (g)	4.22	3.90	3.11			
Water Content, w (%)	68.48	71.03	73.63			
One-Point LL (%)		71				

Liquid Limit, LL (%)	**71**
Plastic Limit, PL (%)	**21**
Plasticity Index, PI (%)	**50**





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Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/27/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-13
Station: 22
Depth: 9.5'
Description: Reddish brown fat clay

Preparation method: Air Dry
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Dry sieved
Approximate maximum grain size: No.10
Estimated percent retained on No.40: Not requested
As-received water content (%): 21.5

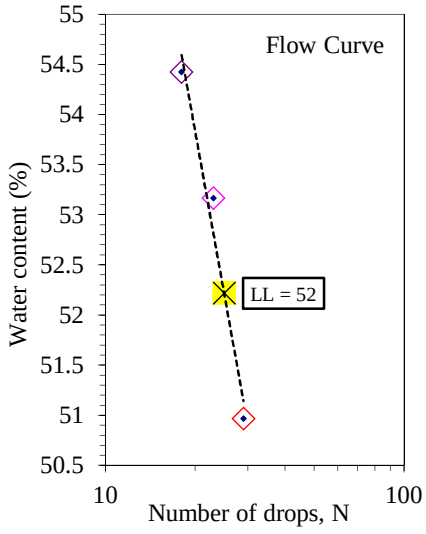
Plastic Limit

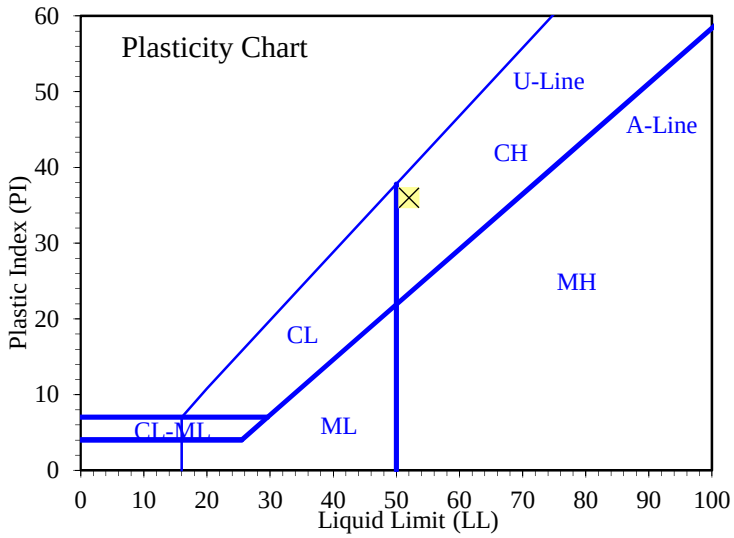
Determination No	1	2				
Wet Soil + Tare (g)	12.64	13.63				
Dry Soil + Tare (g)	11.76	12.70				
Water Loss (g)	0.88	0.93				
Tare (g)	6.42	6.99				
Dry Soil (g)	5.34	5.71				
Water Content, w (%)	16.48	16.29				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	29	23	18			
Wet Soil + Tare (g)	14.16	14.58	15.14			
Dry Soil + Tare (g)	11.78	12.06	12.31			
Water Loss (g)	2.38	2.52	2.83			
Tare (g)	7.11	7.32	7.11			
Dry Soil (g)	4.67	4.74	5.20			
Water Content, w (%)	50.96	53.16	54.42			
One-Point LL (%)	52	53				

Liquid Limit, LL (%)	**52**
Plastic Limit, PL (%)	**16**
Plasticity Index, PI (%)	**36**





Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/27/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-20
Station: 19
Depth: 8.0'
Description: Reddish brown fat clay

Preparation method: Air Dry
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Dry sieved
Approximate maximum grain size: No.10
Estimated percent retained on No.40: Not requested
As-received water content (%): Not requested

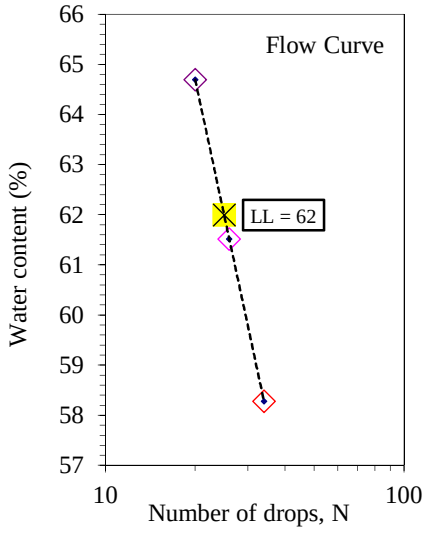
Plastic Limit

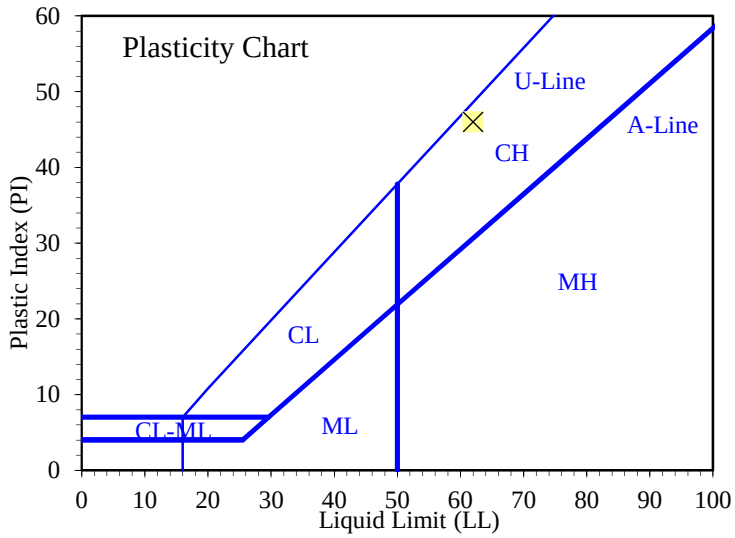
Determination No	1	2				
Wet Soil + Tare (g)	13.82	13.53				
Dry Soil + Tare (g)	12.88	12.64				
Water Loss (g)	0.94	0.89				
Tare (g)	7.05	7.08				
Dry Soil (g)	5.83	5.56				
Water Content, w (%)	16.12	16.01				

Liquid Limit

Determination No	1	2	3			
Number of Drops, N	34	26	20			
Wet Soil + Tare (g)	13.83	12.01	13.14			
Dry Soil + Tare (g)	11.33	10.14	10.74			
Water Loss (g)	2.50	1.87	2.40			
Tare (g)	7.04	7.10	7.03			
Dry Soil (g)	4.29	3.04	3.71			
Water Content, w (%)	58.28	61.51	64.69			
One-Point LL (%)		62	63			

Liquid Limit, LL (%)	**62**
Plastic Limit, PL (%)	**16**
Plasticity Index, PI (%)	**46**





Entered by:_____
Reviewed:_____

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

(ASTM D4318)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/26/2018
By: BRR
Grooving tool type: Plastic
Liquid limit device: Mechanical
Rolling method: Hand

Boring No.: TP-23
Station: 25
Depth: 10.0'
Description: Light brown fat clay

Preparation method: Wet
Liquid limit test method: Multipoint
Screened over No.40: Yes
Larger particles removed: Wet sieved
Approximate maximum grain size: 3/8"
Estimated percent retained on No.40: Not requested
As-received water content (%): 49.7

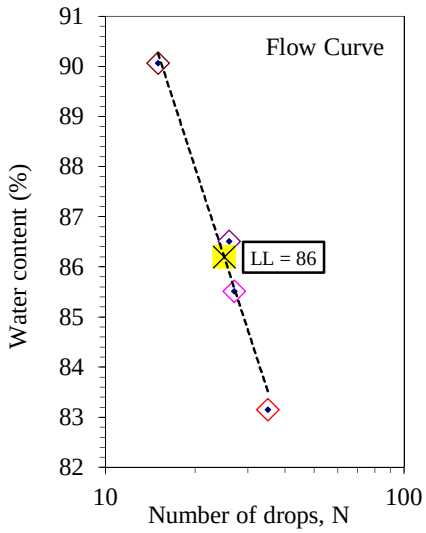
Plastic Limit

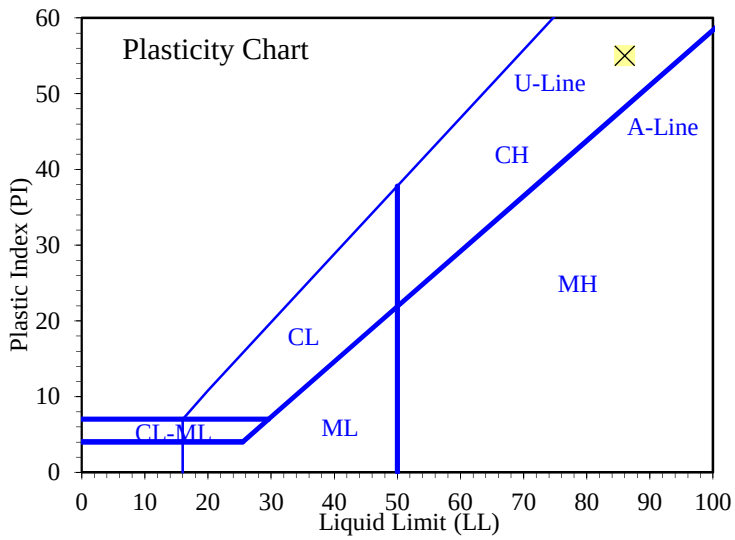
Determination No	1	2				
Wet Soil + Tare (g)	13.10	13.37				
Dry Soil + Tare (g)	11.66	11.87				
Water Loss (g)	1.44	1.50				
Tare (g)	7.07	7.08				
Dry Soil (g)	4.59	4.79				
Water Content, w (%)	31.37	31.32				

Liquid Limit

Determination No	1	2	3	4		
Number of Drops, N	35	27	26	15		
Wet Soil + Tare (g)	12.21	12.59	12.46	13.18		
Dry Soil + Tare (g)	9.99	10.17	9.96	10.28		
Water Loss (g)	2.22	2.42	2.50	2.90		
Tare (g)	7.32	7.34	7.07	7.06		
Dry Soil (g)	2.67	2.83	2.89	3.22		
Water Content, w (%)	83.15	85.51	86.51	90.06		
One-Point LL (%)		86	87			

Liquid Limit, LL (%)	**86**
Plastic Limit, PL (%)	**31**
Plasticity Index, PI (%)	**55**





Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

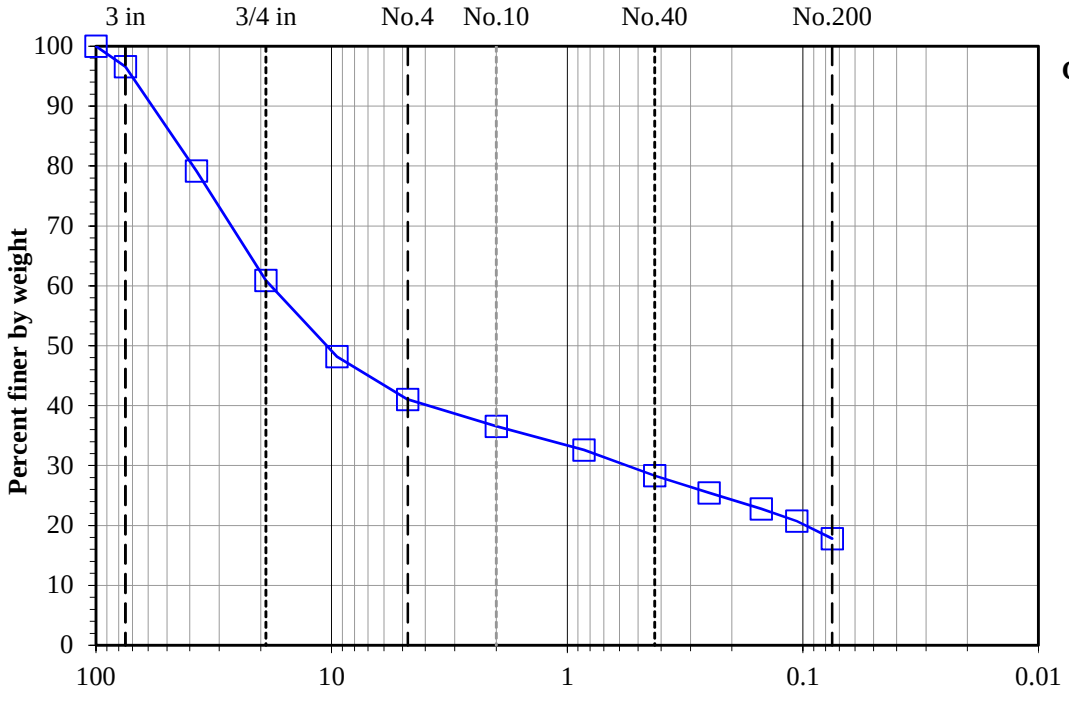
Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/20/2018
By: JWB

Boring No.: TP-1
Station: 16
Depth: 7.5'
Description: Red clayey gravel with sand

Split:	Yes	
Split sieve:	3/8"	
	Moist	Dry
Total sample wt. (g):	25028.20	24302.75
+3/8" Coarse fraction (g):	12711.80	12586.81
-3/8" Split fraction (g):	394.64	375.40
Split fraction:	0.482	

Water content data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	2859.95	566.82
Dry soil + tare (g):	2834.88	547.58
Tare (g):	310.19	172.18
Water content (%):	1.0	5.1

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	100.0	
3"	836.69	75	96.6	
1.5"	5061.94	37.5	79.2	
3/4"	9502.34	19	60.9	
3/8"	12586.81	9.5	48.2	←Split
No.4	55.82	4.75	41.0	
No.10	90.95	2	36.5	
No.20	121.79	0.85	32.6	
No.40	154.98	0.425	28.3	
No.60	177.20	0.25	25.5	
No.100	198.03	0.15	22.8	
No.140	213.81	0.106	20.8	
No.200	236.78	0.075	17.8	



Gravel (%): 59.0
Sand (%): 23.2
Fines (%): 17.8

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

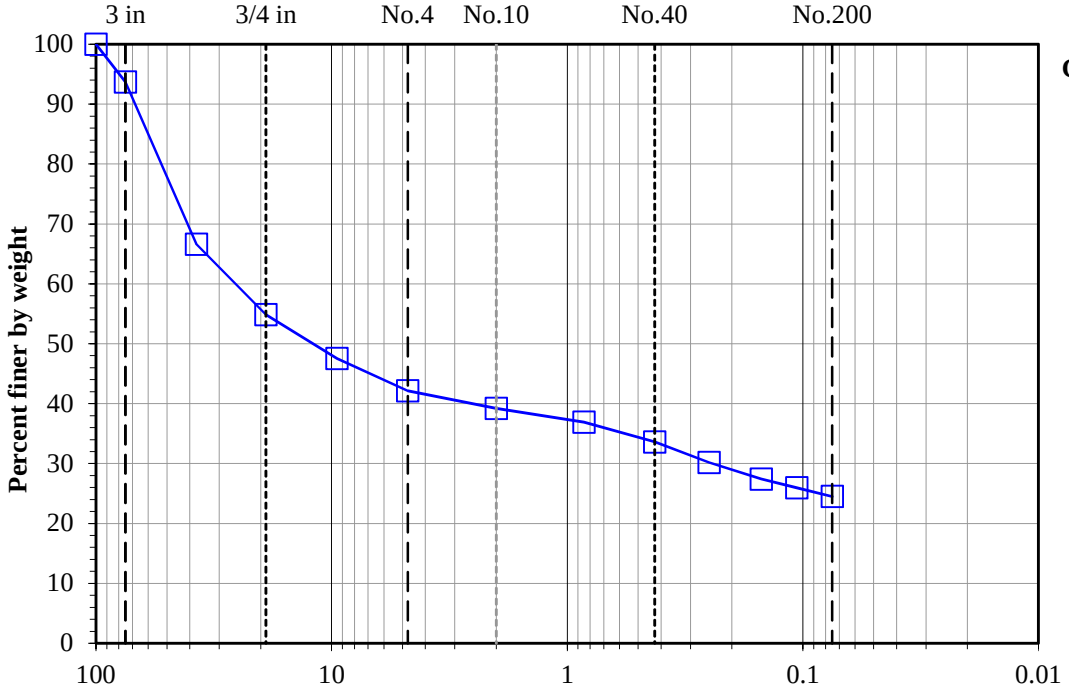
Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/20/2018
By: JWB

Boring No.: TP-4
Station: 21.5
Depth: 5.5'
Description: Brown clayey gravel with sand

	Moist	Dry
Split:	Yes	
Split sieve:	3/8"	
Total sample wt. (g):	22972.50	21775.36
+3/8" Coarse fraction (g):	11473.30	11425.82
-3/8" Split fraction (g):	359.08	323.18
Split fraction:	0.475	

Water content data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	3318.20	585.69
Dry soil + tare (g):	3306.16	549.79
Tare (g):	408.54	226.61
Water content (%):	0.4	11.1

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	100.0	
3"	1377.68	75	93.7	
1.5"	7265.81	37.5	66.6	
3/4"	9832.74	19	54.8	
3/8"	11425.82	9.5	47.5	←Split
No.4	36.69	4.75	42.1	
No.10	56.55	2	39.2	
No.20	72.26	0.85	36.9	
No.40	94.80	0.425	33.6	
No.60	117.98	0.25	30.2	
No.100	136.90	0.15	27.4	
No.140	146.55	0.106	26.0	
No.200	156.62	0.075	24.5	



Gravel (%): 57.9
Sand (%): 17.6
Fines (%): 24.5

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

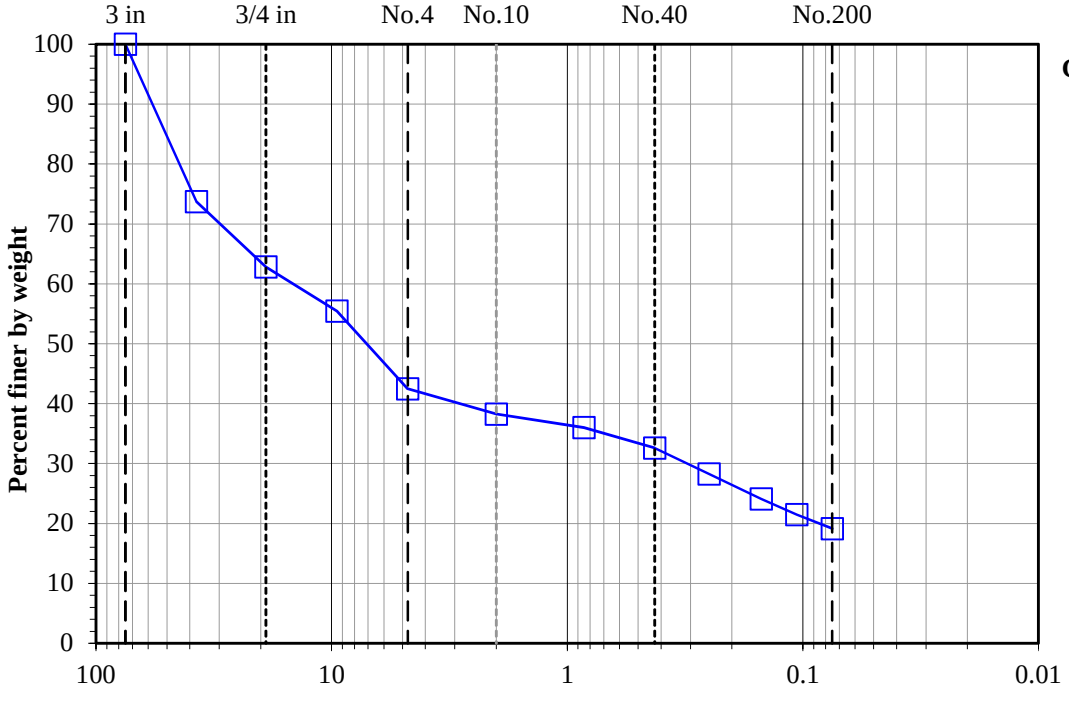
Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/20/2018
By: JWB

Boring No.: TP-10
Station: 13
Depth: 8.0'
Description: Red clayey gravel with sand

Split:	Yes	
Split sieve:	3/8"	
	Moist	Dry
Total sample wt. (g):	4617.92	4358.46
+3/8" Coarse fraction (g):	1977.17	1941.14
-3/8" Split fraction (g):	257.30	235.53
Split fraction:	0.555	

Water content data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	2596.35	475.79
Dry soil + tare (g):	2556.47	454.02
Tare (g):	407.89	218.49
Water content (%):	1.9	9.2

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	1144.69	37.5	73.7	
3/4"	1620.67	19	62.8	
3/8"	1941.14	9.5	55.5	←Split
No.4	55.22	4.75	42.5	
No.10	73.00	2	38.3	
No.20	82.66	0.85	36.0	
No.40	97.11	0.425	32.6	
No.60	115.54	0.25	28.3	
No.100	133.31	0.15	24.1	
No.140	144.28	0.106	21.5	
No.200	154.28	0.075	19.1	



Gravel (%): 57.5
Sand (%): 23.3
Fines (%): 19.1

Entered by:_____
Reviewed:_____

Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

(ASTM D6913)

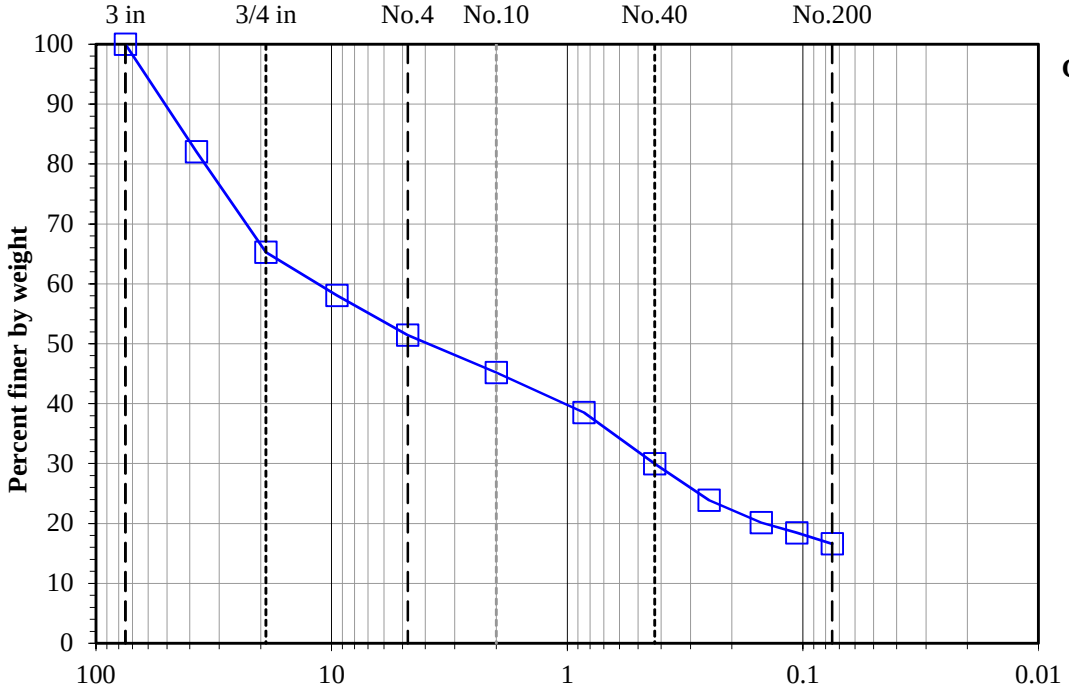
Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/21/2018
By: JWB

Boring No.: TP-15
Station: 25
Depth: 11.0'
Description: Red clayey gravel with sand

Split:	Yes	
Split sieve:	3/8"	
	Moist	Dry
Total sample wt. (g):	4332.46	4042.43
+3/8" Coarse fraction (g):	1754.98	1695.09
-3/8" Split fraction (g):	269.01	244.99
Split fraction:	0.581	

Water content data	C.F.(+3/8")	S.F.(-3/8")
Moist soil + tare (g):	2133.78	392.33
Dry soil + tare (g):	2072.25	368.31
Tare (g):	330.72	123.32
Water content (%):	3.5	9.8

Sieve	Accum. Wt. Ret. (g)	Grain Size (mm)	Percent Finer	
8"	-	200	-	
6"	-	150	-	
4"	-	100	-	
3"	-	75	100.0	
1.5"	725.48	37.5	82.1	
3/4"	1403.88	19	65.3	
3/8"	1695.09	9.5	58.1	←Split
No.4	27.85	4.75	51.5	
No.10	54.38	2	45.2	
No.20	82.59	0.85	38.5	
No.40	118.56	0.425	30.0	
No.60	144.33	0.25	23.9	
No.100	160.06	0.15	20.1	
No.140	167.33	0.106	18.4	
No.200	174.97	0.075	16.6	



Gravel (%): 48.5
Sand (%): 34.9
Fines (%): 16.6

Entered by:_____
Reviewed:_____

Amount of Material in Soil Finer than the No. 200 (75µm) Sieve

(ASTM D1140)

Project: **Overlook**
No: **01628-027**
Location: Powder Mountain
Date: 9/26/2018
By: JWB/BRR/EH

Sample Info.	Boring No.	TP-3	TP-3	TP-5	TP-7	TP-23			
	Station	26	28	26	11	25			
	Depth	8.0'	12.0'	6.0'	6.0'	10.0'			
	Split	Yes	No	No	No	No			
	Split Sieve*	3/8"							
	Method	B	B	B	B	B			
Specimen soak time (min)		360	310	320	310	360			
Moist total sample wt. (g)		1342.00	184.74	318.99	307.54	153.11			
Moist coarse fraction (g)		308.27							
Moist split fraction + tare (g)		319.66							
Split fraction tare (g)		128.56							
Dry split fraction (g)		144.32							
Dry retained No. 200 + tare (g)		165.38	143.75	157.99	171.83	144.29			
Wash tare (g)		128.56	126.92	140.55	128.49	126.70			
No. 200 Dry wt. retained (g)		36.82	16.83	17.44	43.34	17.59			
Split sieve* Dry wt. retained (g)		297.44							
Dry total sample wt. (g)		1078.12	115.04	220.69	233.07	103.49			
Coarse Fraction	Moist soil + tare (g)	473.63							
	Dry soil + tare (g)	462.80							
	Tare (g)	165.36							
	Water content (%)	3.64							
Split Fraction	Moist soil + tare (g)	319.66	311.66	459.54	436.03	279.81			
	Dry soil + tare (g)	272.88	241.96	361.24	361.56	230.19			
	Tare (g)	128.56	126.92	140.55	128.49	126.70			
	Water content (%)	32.41	60.59	44.54	31.95	47.95			
Percent passing split sieve* (%)		**72.4**							
Percent passing No. 200 sieve (%)		**53.9**	**85.4**	**92.1**	**81.4**	**83.0**			

Entered by:_____
Reviewed:_____

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 9/26/2018
By: EH

Boring No.: TP-3
Station: 28
Depth: 12.0'
Sample Description: Reddish brown fat clay
Sample type: Undisturbed-trimmed from thin-wall

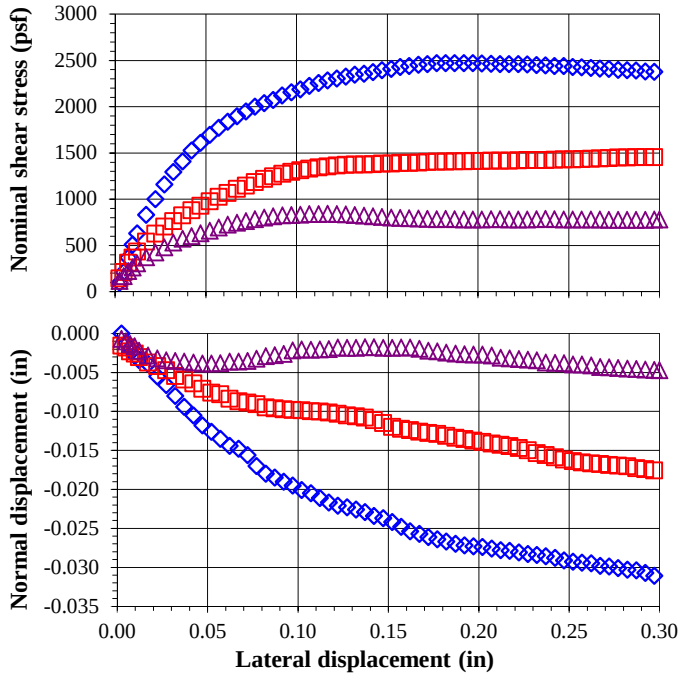
Test type: Inundated
Lateral displacement (in.): 0.3
Shear rate (in./min): 0.0010
Specific gravity, Gs: 2.70 Assumed

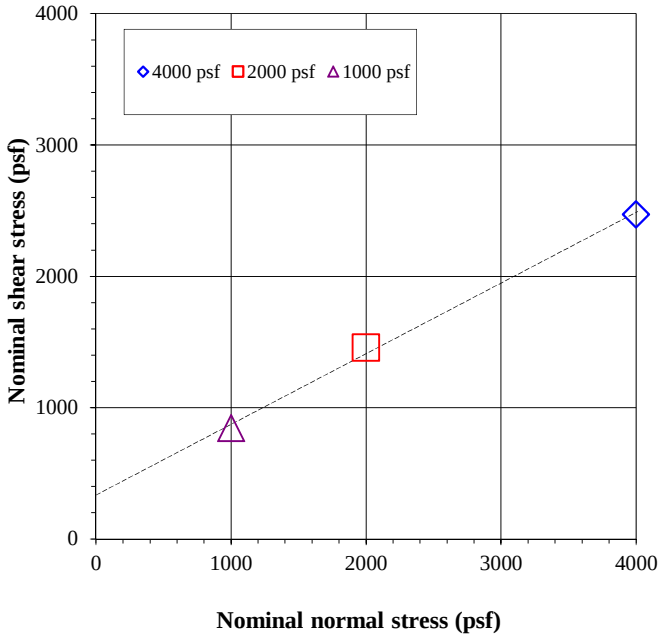
	Sample 1		Sample 2		Sample 3	
Nominal normal stress (psf)	4000		2000		1000	
Peak shear stress (psf)	2472		1455		843	
Lateral displacement at peak (in)	0.177		0.292		0.117	
Load Duration (min)	255		260		273	
	Initial	Pre-shear	Initial	Pre-shear	Initial	Pre-shear
Sample height (in)	1.000	0.892	0.996	0.956	1.000	0.977
Sample diameter (in)	2.414	2.414	2.414	2.414	2.413	2.413
Wt. rings + wet soil (g)	158.10	156.75	162.76	163.01	164.96	165.71
Wt. rings (g)	45.79	45.79	45.22	45.22	45.76	45.76
Wet soil + tare (g)	311.66		311.66		311.66	
Dry soil + tare (g)	241.96		241.96		241.96	
Tare (g)	126.92		126.92		126.92	
Water content (%)	60.6	58.7	60.6	60.9	60.6	61.6
Dry unit weight (pcf)	58.2	65.2	61.2	63.7	61.8	63.3
Void ratio, e, for assumed Gs	1.90	1.58	1.76	1.65	1.73	1.66
Saturation (%)*	86.3	100.0	93.2	100.0	94.8	100.0

ϕ' (deg)	28
c' (psf)	335

Average of 3 samples	Initial	Pre-shear
Water content (%)	60.6	60.4
Dry unit weight (pcf)	60.4	64.1

*Pre-shear saturation set to 100% for phase calculations





Entered by:_____
Reviewed:_____

Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Overlook **Boring No.:** TP-3

No: 01628-027 **Station:** 28

Location: Powder Mountain **Depth:** 12.0'

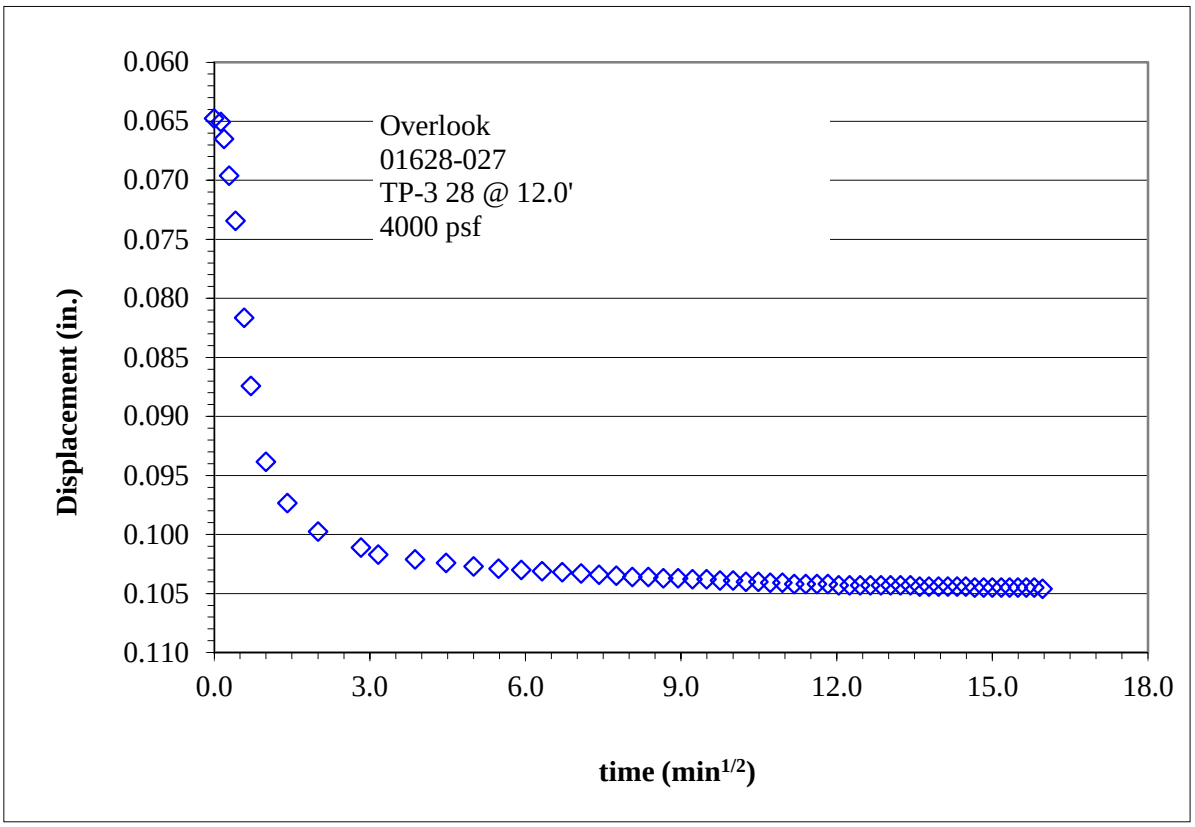
Nominal normal stress = 4000 psf			Nominal normal stress = 2000 psf			Nominal normal stress = 1000 psf		
Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)	Lateral Displacement (in.)	Nominal Shear Stress (psf)	Normal Displacement (in.)
0.002	98	0.000	0.002	143	-0.002	0.002	117	-0.001
0.005	212	-0.001	0.005	214	-0.002	0.005	166	-0.001
0.007	367	-0.002	0.007	311	-0.002	0.007	223	-0.001
0.010	509	-0.003	0.010	369	-0.003	0.010	259	-0.002
0.012	631	-0.003	0.012	435	-0.003	0.012	307	-0.002
0.017	833	-0.004	0.017	541	-0.004	0.017	372	-0.003
0.022	1001	-0.006	0.022	626	-0.004	0.022	424	-0.003
0.027	1161	-0.007	0.027	702	-0.005	0.027	479	-0.003
0.032	1293	-0.008	0.032	761	-0.005	0.032	530	-0.004
0.037	1409	-0.009	0.037	823	-0.006	0.037	572	-0.004
0.042	1525	-0.011	0.042	881	-0.006	0.042	601	-0.004
0.047	1611	-0.012	0.047	929	-0.007	0.047	632	-0.004
0.052	1696	-0.013	0.052	978	-0.008	0.052	657	-0.004
0.057	1771	-0.014	0.057	1024	-0.008	0.057	693	-0.004
0.062	1836	-0.014	0.062	1065	-0.008	0.062	723	-0.004
0.067	1895	-0.015	0.067	1111	-0.009	0.067	744	-0.004
0.072	1950	-0.016	0.072	1145	-0.009	0.072	763	-0.004
0.077	2001	-0.017	0.077	1184	-0.009	0.077	783	-0.003
0.082	2040	-0.018	0.082	1218	-0.010	0.082	800	-0.003
0.087	2074	-0.019	0.087	1247	-0.010	0.087	813	-0.003
0.092	2120	-0.019	0.092	1274	-0.010	0.092	823	-0.003
0.097	2156	-0.020	0.097	1296	-0.010	0.097	827	-0.002
0.102	2187	-0.020	0.102	1313	-0.010	0.102	831	-0.002
0.107	2226	-0.021	0.107	1330	-0.010	0.107	836	-0.002
0.112	2255	-0.021	0.112	1344	-0.010	0.112	840	-0.002
0.117	2283	-0.022	0.117	1354	-0.010	0.117	843	-0.002
0.122	2306	-0.022	0.122	1364	-0.010	0.122	838	-0.002
0.127	2327	-0.022	0.127	1370	-0.011	0.127	834	-0.002
0.132	2345	-0.023	0.132	1373	-0.011	0.132	828	-0.002
0.137	2358	-0.023	0.137	1375	-0.011	0.137	821	-0.002
0.142	2374	-0.023	0.142	1379	-0.011	0.142	815	-0.002
0.147	2394	-0.024	0.147	1383	-0.012	0.147	808	-0.002
0.152	2410	-0.024	0.152	1385	-0.012	0.152	800	-0.002
0.157	2430	-0.025	0.157	1390	-0.012	0.157	796	-0.002
0.162	2441	-0.025	0.162	1393	-0.012	0.162	792	-0.002
0.167	2454	-0.026	0.167	1396	-0.013	0.167	789	-0.002
0.172	2461	-0.026	0.172	1401	-0.013	0.172	787	-0.002
0.177	2472	-0.026	0.177	1406	-0.013	0.177	784	-0.002
0.182	2469	-0.027	0.182	1406	-0.013	0.182	785	-0.002
0.187	2472	-0.027	0.187	1409	-0.013	0.187	784	-0.003
0.192	2469	-0.027	0.192	1410	-0.014	0.192	779	-0.003
0.197	2469	-0.027	0.197	1412	-0.014	0.197	780	-0.003
0.202	2467	-0.027	0.202	1412	-0.014	0.202	778	-0.003
0.207	2464	-0.028	0.207	1414	-0.014	0.207	782	-0.003
0.212	2461	-0.028	0.212	1415	-0.014	0.212	783	-0.003
0.217	2461	-0.028	0.217	1417	-0.014	0.217	781	-0.003
0.222	2459	-0.028	0.222	1420	-0.015	0.222	779	-0.003
0.227	2456	-0.028	0.227	1421	-0.015	0.227	780	-0.003
0.232	2449	-0.028	0.232	1423	-0.015	0.232	783	-0.003
0.237	2446	-0.029	0.237	1424	-0.016	0.237	786	-0.004
0.242	2441	-0.029	0.242	1426	-0.016	0.242	783	-0.004
0.247	2438	-0.029	0.247	1428	-0.016	0.247	780	-0.004
0.252	2430	-0.029	0.252	1431	-0.016	0.252	781	-0.004
0.257	2425	-0.029	0.257	1433	-0.017	0.257	778	-0.004
0.262	2418	-0.030	0.262	1435	-0.017	0.262	778	-0.004
0.267	2412	-0.030	0.267	1440	-0.017	0.267	778	-0.004
0.272	2407	-0.030	0.272	1445	-0.017	0.272	776	-0.004
0.277	2399	-0.030	0.277	1449	-0.017	0.277	775	-0.004
0.282	2394	-0.030	0.282	1449	-0.017	0.282	777	-0.005
0.287	2392	-0.030	0.287	1452	-0.017	0.287	776	-0.005
0.292	2381	-0.031	0.292	1455	-0.017	0.292	777	-0.005
0.297	2376	-0.031	0.297	1455	-0.018	0.297	779	-0.005
0.302	2371	-0.031	0.300	1455	-0.018	0.300	780	-0.005

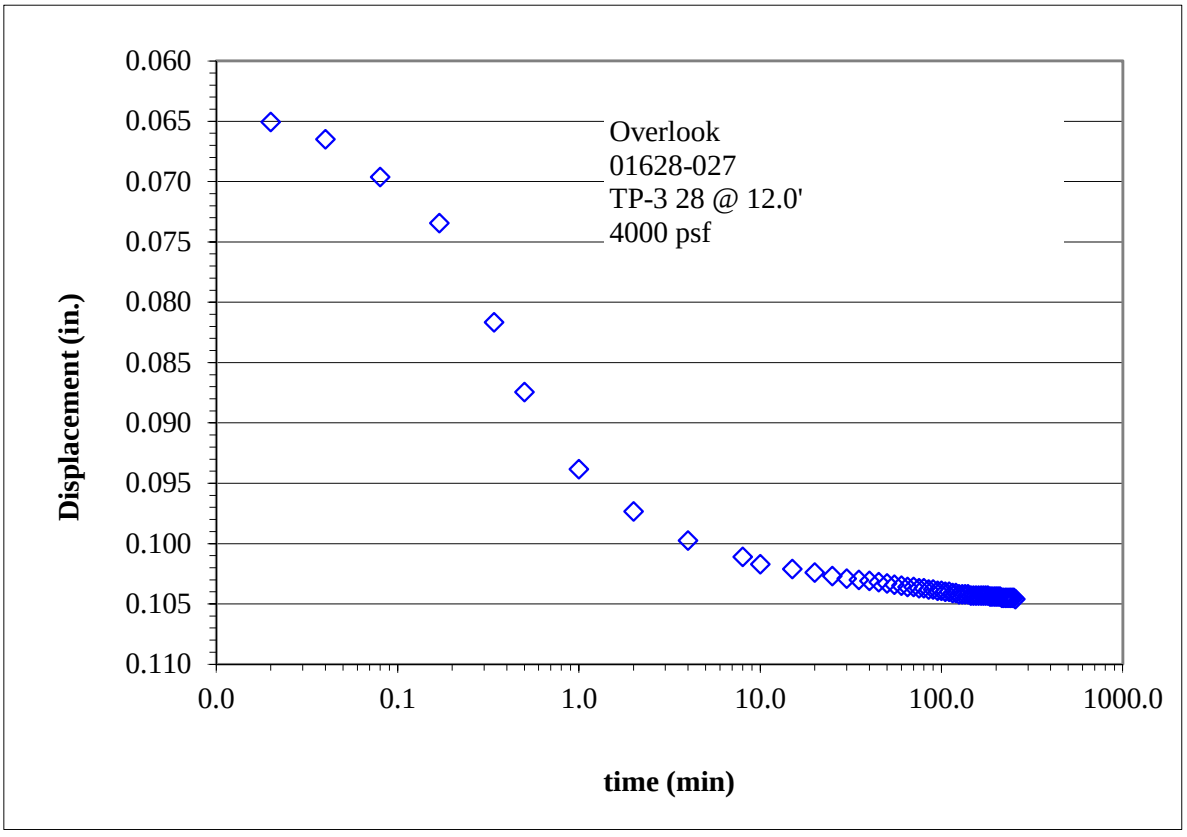
Direct Shear Test for Soils Under Drained Conditions

(ASTM D3080)

Project: Overlook
No: 01628-027
Location: Powder Mountain

Boring No.: TP-3
Station: 28
Depth: 12.0'





Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils (*ASTM 6467*)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 10/10/2018
By: NB/JDF

Boring No.: TP-3
Station: 26
Depth: 8.0'
Sample Description: Reddish brown fat clay with sand
Engineering Classification: Not requested

Sample preparation: Screened over No.40 / remolded near liquid limit
Test type: Residual with multi-staged sample
Ring friction remarks: Modified upper platen
Ring shear device: Bromhead type, WF 25850 #2
Sample presheared: Yes
Failure surface location: Near top

inner/outter/avg. dia. (mm)	70	100	85
inner/outter/avg. radii (mm)	35	50	42.5
Thickness (mm)/area (cm^2):	5	40.1	

LL (%):	86	CF [a] (%):	N/A
PL (%):	29	Gs assum.:	2.8
% Finer No. 200 (tested sample):			82.8

LL, PL = liquid and plastic limits, respectively
[a]CF = %<0.002 mm and passing No. 10

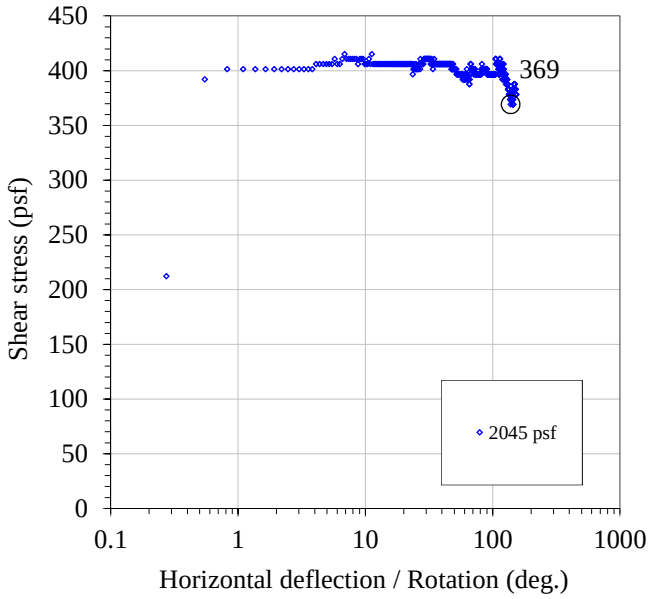
	τ stress	σ stress	Horz. def	Vert. def
Units:	(psf)	(psf)	(deg.)	(in)
Conversion:	20885.434	2048.2	1	3.94E-05

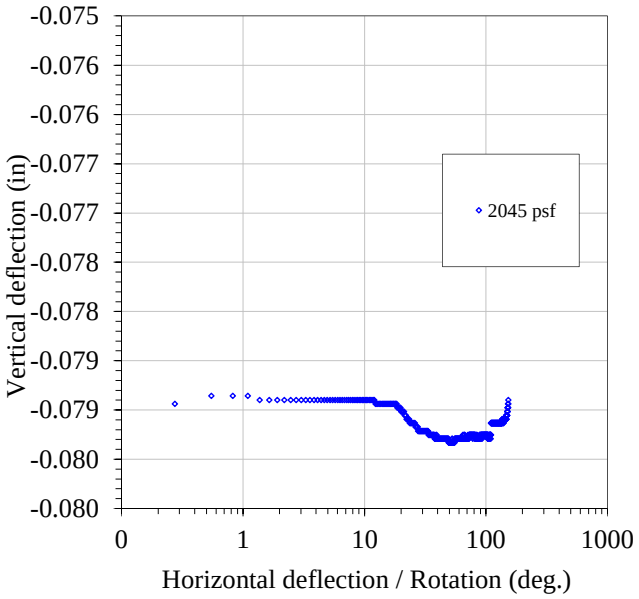
	Sample 1 Initial	Final
Sample thickness (mm)	5.00	3.00
Wt. container + wet soil (g)	626.66	
Wt. container (g)	594.92	
Wet soil + tare (g)	34.04	32.30
Dry soil + tare (g)	29.21	25.82
Tare (g)	23.41	12.71
Water content (%)	83.3	49.4
Dry density (g/cm^3)	0.86	1.44
Saturation (%)	1.0	1.5

	Sample 1
Normal load on lever arm (kg)	4
Conversion factor (kg/cm^2) to (psf):	2048.1614
Residual deformation (deg.)	138.644
Normal stress (psf)	2045
Residual shear stress (psf)	369
Peak shear stress (psf)	415
Secant residual friction angle (deg)	10.2
Secant peak friction angle (deg)	11.5

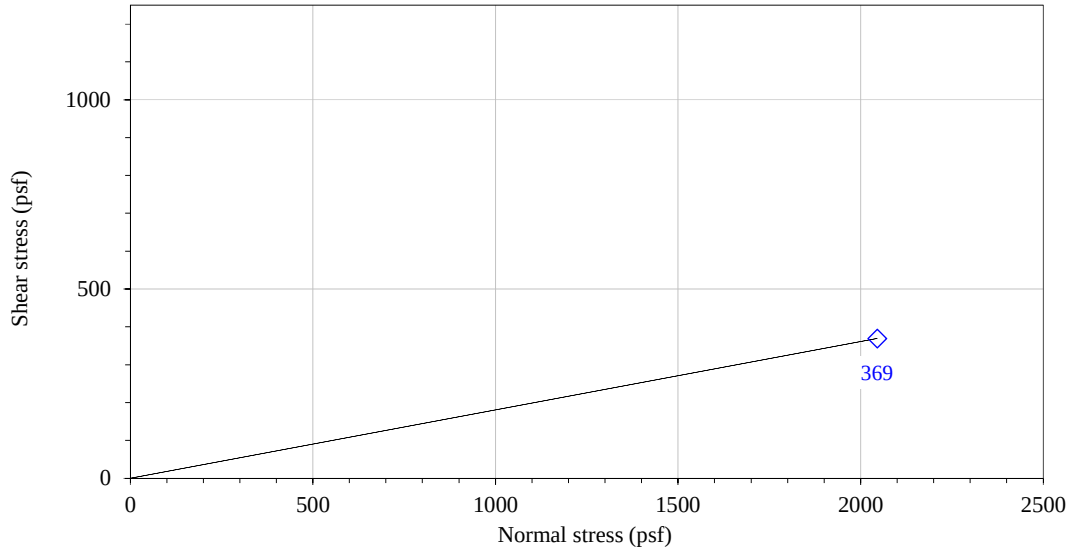
Entered by:_____
Reviewed:_____

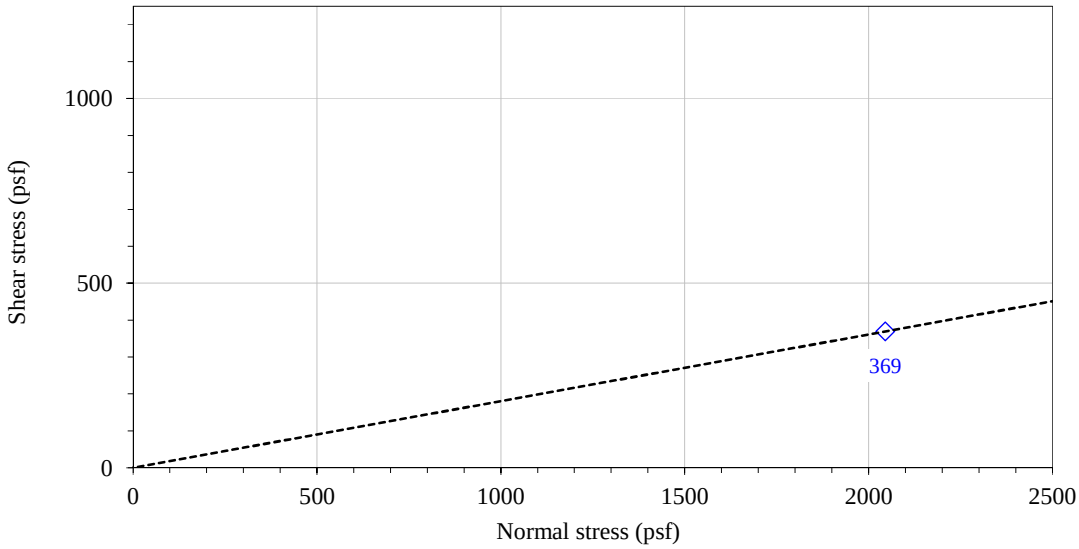
Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils (*ASTM 6467*)





*Horizontal deflection (in) = Degrees rotation * 0.0292*





Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils (*ASTM 6467*)

Project: Overlook
No: 01628-027
Location: Powder Mountain
Date: 10/10/2018
By: NB/JDF

Boring No.: TP-23
Station: 25
Depth: 10.0'
Sample Description: Light grey fat clay
Engineering Classification: Not requested

Sample preparation: Screened over No.40 / remolded near liquid limit
Test type: Residual with multi-staged sample
Ring friction remarks: Modified upper platen
Ring shear device: Bromhead type, WF 25850 #3
Sample presheared: Yes
Failure surface location: Near top

inner/outter/avg. dia. (mm)	70	100	85
inner/outter/avg. radii (mm)	35	50	42.5
Thickness (mm)/area (cm^2):	5	40.1	

LL (%):	86	CF [a] (%):	N/A	
PL (%):	31	Gs assum.:	2.85	
% Finer No. 200 (tested sample):			89.1	

LL, PL = liquid and plastic limits, respectively
[a]CF = %<0.002 mm and passing No. 10

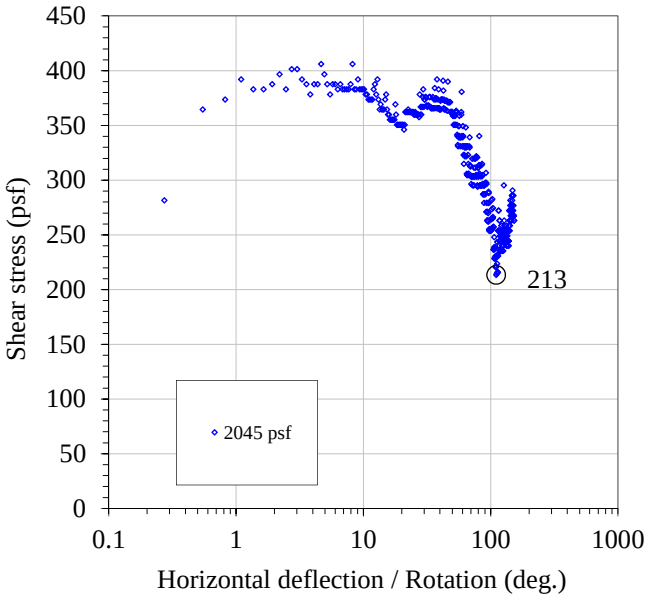
	τ stress	σ stress	Horz. def	Vert. def
Units:	(psf)	(psf)	(deg.)	(in)
Conversion:	20885.434	2048.2	1	3.94E-05

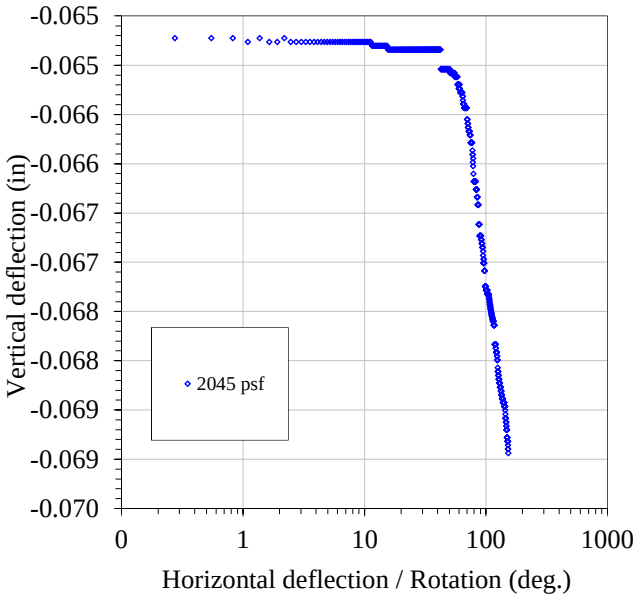
	Sample 1 Initial	Final
Sample thickness (mm)	5.00	3.25
Wt. container + wet soil (g)	627.67	
Wt. container (g)	594.63	
Wet soil + tare (g)	26.90	27.68
Dry soil + tare (g)	20.30	22.08
Tare (g)	12.48	12.45
Water content (%)	84.4	58.2
Dry density (g/cm^3)	0.89	1.38
Saturation (%)	1.1	1.5

	Sample 1
Normal load on lever arm (kg)	4
Conversion factor (kg/cm^2) to (psf):	2048.1614
Residual deformation (deg.)	110.422
Normal stress (psf)	2045
Residual shear stress (psf)	213
Peak shear stress (psf)	406
Secant residual friction angle (deg)	6.0
Secant peak friction angle (deg)	11.2

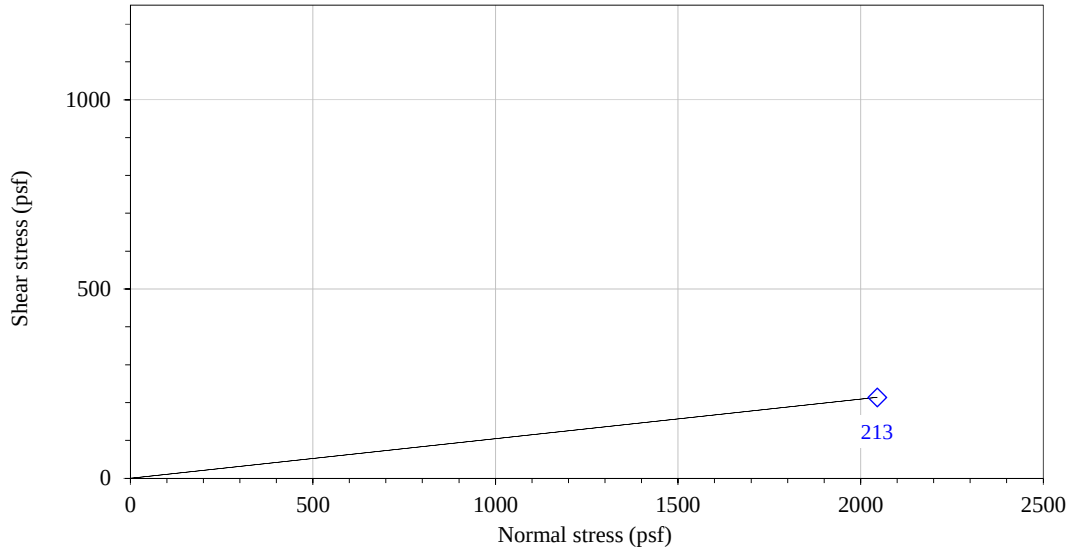
Entered by:_____
Reviewed:_____

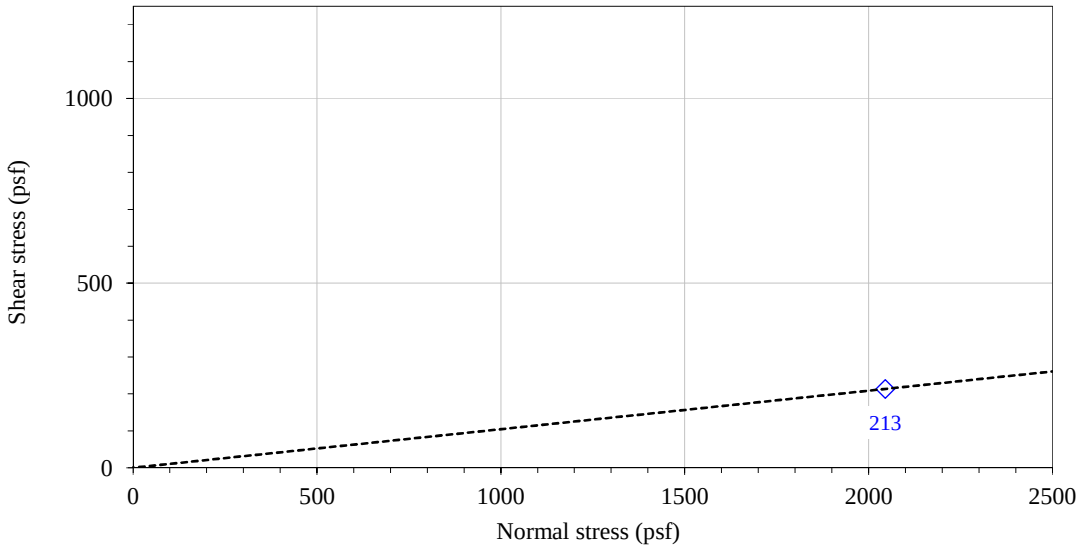
Torsional Ring Shear Test to Determine Drained Residual Shear Strength of Cohesive Soils (*ASTM 6467*)





*Horizontal deflection (in) = Degrees rotation * 0.0292*





Minimum Laboratory Soil Resistivity, pH of Soil for Use in Corrosion Testing, and Ions in Water by Chemically Suppressed Ion Chromatography *(AASHTO T 288, T 289, ASTM D4327, and C1580)*

Project: **Overlook**
No: **01628-027**
Location: Powder Mountain
Date: 9/25/2018
By: JWB

Sample info.	Boring No.	TP-5							
	Station	34							
	Depth	7.0'							
Water content data	Wet soil + tare (g)	126.42							
	Dry soil + tare (g)	108.14							
	Tare (g)	37.58							
	Water content (%)	25.9							
Chem. data	pH*	5.86							
	Soluble chloride* (ppm)	38.5							
	Soluble sulfate** (ppm)	386							
Resistivity data	Pin method	2							
	Soil box	Miller Small							
		Approximate Soil condition (%)	Resistance Reading (Ω)	Soil Box Multiplier (cm)	Resistivity (Ω-cm)	Approximate Soil condition (%)	Resistance Reading (Ω)	Soil Box Multiplier (cm)	Resistivity (Ω-cm)
		As Is	2666	0.67	1786				
		+3	1453	0.67	974				
		+6	1008	0.67	675				
		+9	865	0.67	580				
		+12	853	0.67	572				
		+15	799	0.67	535				
		+18	841	0.67	563				
	Minimum resistivity (Ω-cm)	**535**							

* Performed by AWAL using EPA 300.0

** Performed by AWAL using ASTM C1580

Entered by:_____
Reviewed:_____

APPENDIX C

USGS Design Maps Summary Report

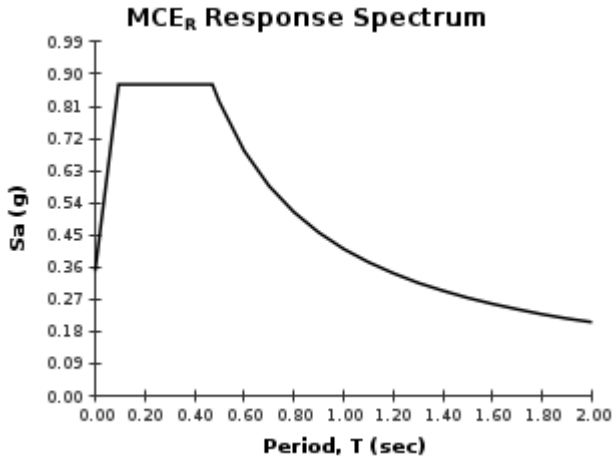
User–Specified Input

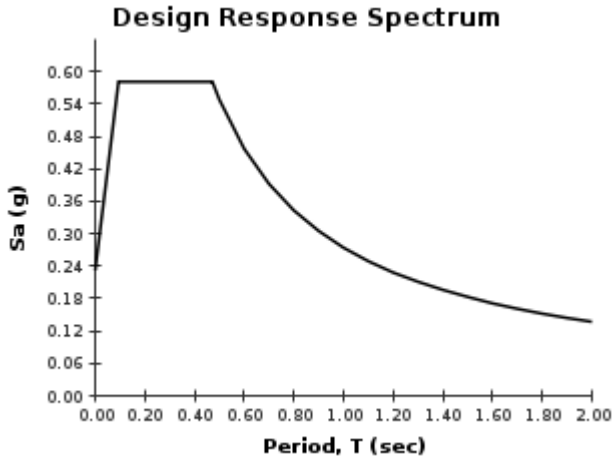
Report Title	The Overlook Fri January 27, 2017 18:56:30 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	41.3645°N, 111.7436°W
Site Soil Classification	Site Class C – “Very Dense Soil and Soft Rock”
Risk Category	I/II/III

USGS–Provided Output

S_S =	0.810 g	S_{MS} =	0.871 g	S_{DS} =	0.581 g
S_1 =	0.268 g	S_{M1} =	0.411 g	S_{D1} =	0.274 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.





USGS Design Maps Detailed Report

2012/2015 International Building Code (41.3645°N, 111.7436°W)

Site Class C – “Very Dense Soil and Soft Rock”, Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1] $S_S = 0.810$ g

From Figure 1613.3.1(2) [2] $S_1 = 0.268$ g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\overline{v}_s$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = C and S_S = 0.810 g, F_a = 1.076

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1–s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.268 g, F_v = 1.532

Equation (16-37): $S_{MS} = F_a S_S = 1.076 \times 0.810 = 0.871$ g

Equation (16-38): $S_{M1} = F_v S_1 = 1.532 \times 0.268 = 0.411$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 0.871 = 0.581$ g

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.411 = 0.274$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.581 g, Seismic Design Category = D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.274 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

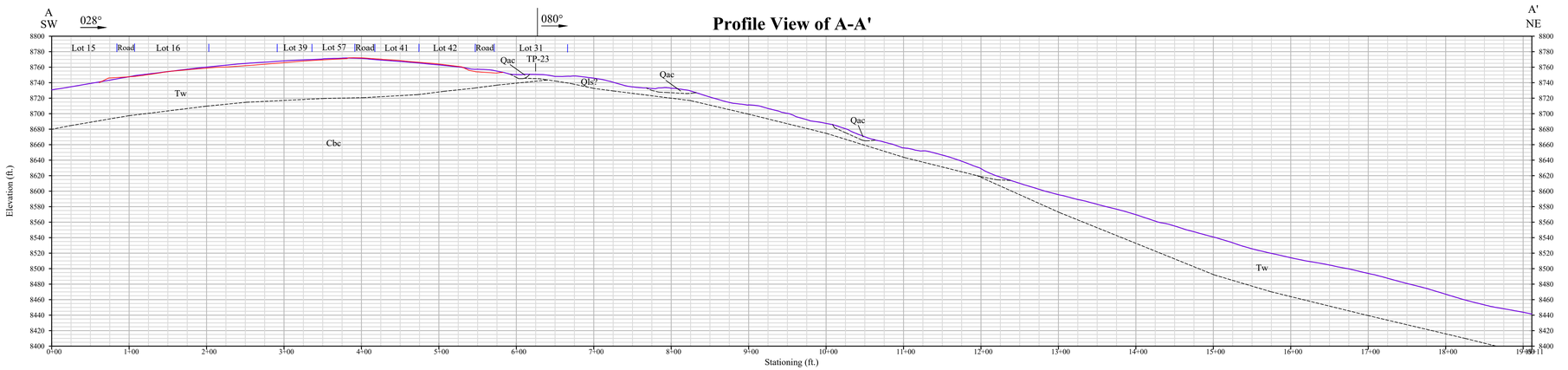
Seismic Design Category ≡ “the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)” = D

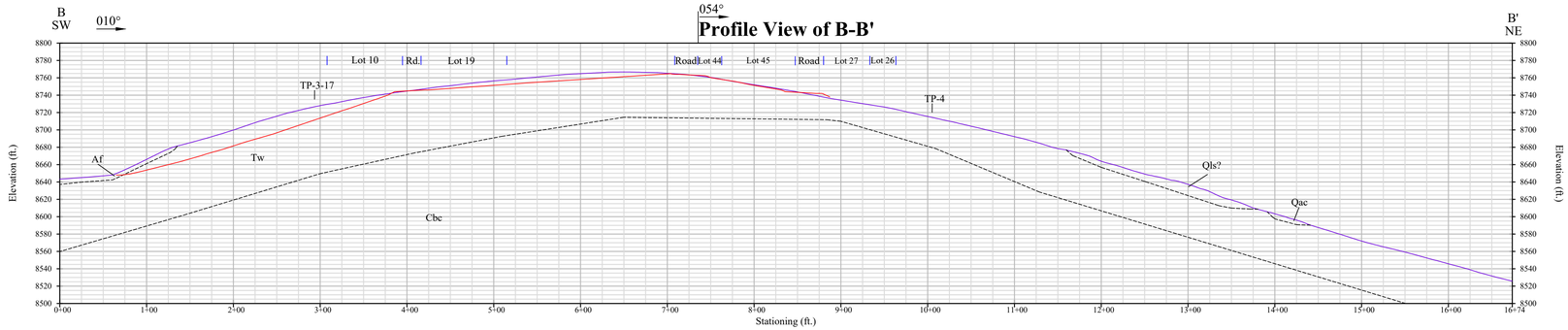
Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

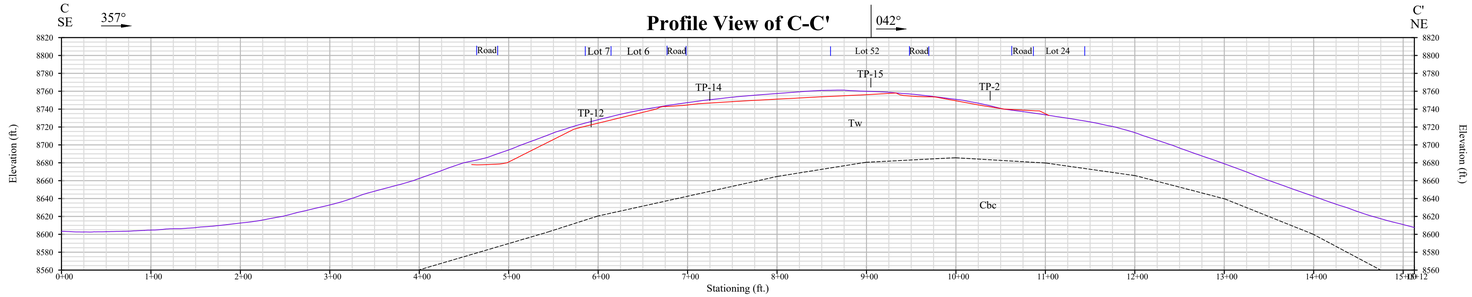
References

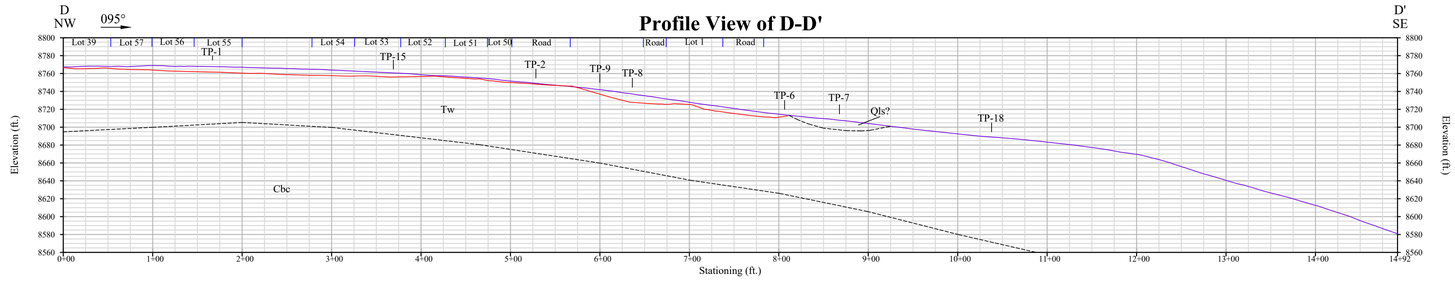
1. *Figure 1613.3.1(1)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

APPENDIX D









LEGEND

Qac: Alluvium and Colluvium

Qls: Landslide deposits (queried where uncertian)

Tw: Wasatch Formation

Cbc: Calls Fort Shale

Existing Grade

Planned Final Grade

*All Geologic Contacts Approximate

No Vertical Exaggeration

0 80 160

FEET

1"=80'

IGES®

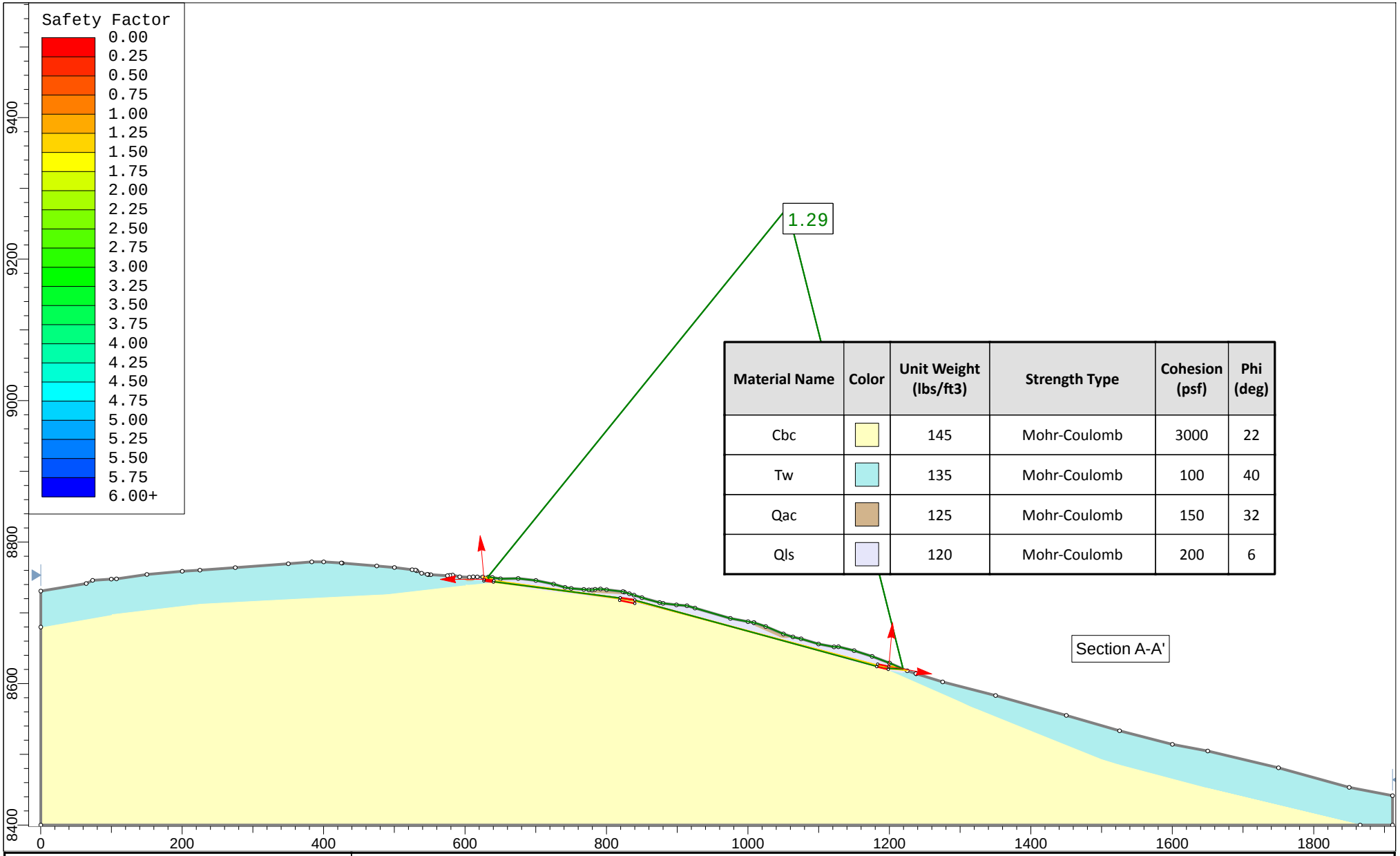
Project No: 01628-027

Geotechnical and Geologic Hazards Assessment
The Overlook at Powder Mountain
Summit Powder Mountain Resort
Weber County, Utah

Geologic Cross-Sections

Plate

D-1



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2250	*Company* IGES, Inc.
Date	12-27-2018	*File Name*	Section AA.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	95
Left Projection Angle (End Angle) [°]:	180
Right Projection Angle (Start Angle) [°]:	-10
Right Projection Angle (End Angle) [°]:	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Qac	Qls
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120
Cohesion [psf]	3000	100	150	200
Friction Angle [°]	22	40	32	6
Water Surface	None	None	None	None
Ru Value	0	0	0	0

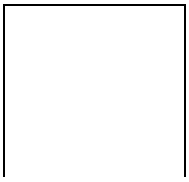
Global Minimums

Method: spencer

FS	1.294320
Axis Location:	1055.666, 9272.779
Left Slip Surface Endpoint:	632.215, 8750.530
Right Slip Surface Endpoint:	1219.394, 8620.669
Resisting Moment:	1.11773e+08 lb-ft
Driving Moment:	8.63563e+07 lb-ft
Resisting Horizontal Force:	183708 lb
Driving Horizontal Force:	141934 lb
Total Slice Area:	5496.47 ft2
Surface Horizontal Width:	587.18 ft
Surface Average Height:	9.3608 ft

Global Minimum Coordinates

Method: spencer



X	Y
632.215	8750.53
635.342	8744.72
837.881	8718.48
1191.76	8621.74
1219.39	8620.67

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3755
Number of Invalid Surfaces: 1245

Error Codes:

Error Code -108 reported for 349 surfaces
Error Code -111 reported for 239 surfaces
Error Code -112 reported for 657 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

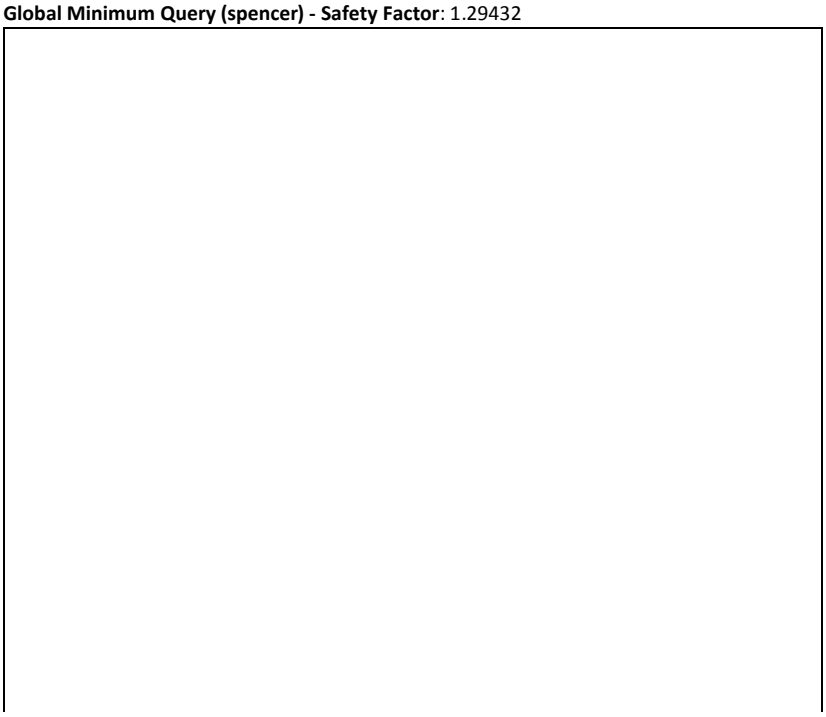
Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.29432

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.12761	1056.89	-61.7192	Qls	200	6.00001	158.825	205.57	52.9972	0	52.9972	348.204	348.204
2	20.2539	13572	-7.3818	Qls	200	6.00001	208.724	270.156	667.489	0	667.489	694.53	694.53
3	20.2539	18561.2	-7.3818	Qls	200	6.00001	228.332	295.534	908.945	0	908.945	938.527	938.527
4	20.2539	22505.9	-7.3818	Qls	200	6.00001	243.834	315.599	1099.86	0	1099.86	1131.45	1131.45
5	20.2539	21837.4	-7.3818	Qls	200	6.00001	241.207	312.199	1067.5	0	1067.5	1098.75	1098.75
6	20.2539	17356.3	-7.3818	Qls	200	6.00001	223.597	289.406	850.634	0	850.634	879.602	879.602
7	20.2539	12116.2	-7.3818	Qls	200	6.00001	203.003	262.751	597.034	0	597.034	623.334	623.334
8	20.2539	13572.3	-7.3818	Qls	200	6.00001	208.726	270.158	667.503	0	667.503	694.545	694.545
9	20.2539	20272.9	-7.3818	Qls	200	6.00001	235.059	304.241	991.783	0	991.783	1022.24	1022.24
10	20.2539	23445.5	-7.3818	Qls	200	6.00001	247.527	320.379	1145.32	0	1145.32	1177.39	1177.39
11	20.2539	21111.5	-7.3818	Qls	200	6.00001	238.355	308.507	1032.37	0	1032.37	1063.25	1063.25
12	19.6598	15342	-15.2898	Qls	200	6.00001	213.398	276.206	725.047	0	725.047	783.385	783.385
13	19.6598	14786.7	-15.2898	Qls	200	6.00001	211.236	273.407	698.419	0	698.419	756.166	756.166
14	19.6598	17855.5	-15.2898	Qls	200	6.00001	223.187	288.875	845.594	0	845.594	906.609	906.609
15	19.6598	25621.9	-15.2898	Qls	200	6.00001	253.433	328.024	1218.07	0	1218.07	1287.35	1287.35
16	19.6598	28451.5	-15.2898	Qls	200	6.00001	264.453	342.287	1353.77	0	1353.77	1426.07	1426.07
17	19.6598	27734.8	-15.2898	Qls	200	6.00001	261.662	338.675	1319.4	0	1319.4	1390.94	1390.94
18	19.6598	27030.1	-15.2898	Qls	200	6.00001	258.917	335.122	1285.6	0	1285.6	1356.39	1356.39
19	19.6598	28613.9	-15.2898	Qls	200	6.00001	265.086	343.106	1361.56	0	1361.56	1434.03	1434.03
20	19.6598	32453.4	-15.2898	Qls	200	6.00001	280.039	362.46	1545.7	0	1545.7	1622.26	1622.26
21	19.6598	31463.2	-15.2898	Qls	200	6.00001	276.183	357.469	1498.22	0	1498.22	1573.72	1573.72
22	19.6598	25621.3	-15.2898	Qls	200	6.00001	253.431	328.021	1218.04	0	1218.04	1287.32	1287.32
23	19.6598	22365.9	-15.2898	Qls	200	6.00001	240.753	311.611	1061.91	0	1061.91	1127.73	1127.73
24	19.6598	22399.6	-15.2898	Qls	200	6.00001	240.884	311.781	1063.53	0	1063.53	1129.38	1129.38
25	19.6598	22337.9	-15.2898	Qls	200	6.00001	240.644	311.47	1060.57	0	1060.57	1126.35	1126.35
26	19.6598	27318.3	-15.2898	Qls	200	6.00001	260.04	336.575	1299.43	0	1299.43	1370.51	1370.51
27	19.6598	31357.2	-15.2898	Qls	200	6.00001	275.77	356.934	1493.13	0	1493.13	1568.52	1568.52
28	19.6598	30594.7	-15.2898	Qls	200	6.00001	272.8	353.091	1456.56	0	1456.56	1531.14	1531.14
29	19.6598	27417.7	-15.2898	Qls	200	6.00001	260.427	337.076	1304.19	0	1304.19	1375.39	1375.39
30	27.6378	17957.7	-2.20934	Qls	200	6.00001	209.627	271.324	678.604	0	678.604	686.691	686.691

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.29432



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	632.215	8750.53	0	0	0
2	635.342	8744.72	-188.701	-37.7402	11.3099
3	655.596	8742.09	-2665.08	-533.016	11.3099
4	675.85	8739.47	-4905.05	-981.009	11.3099
5	696.104	8736.84	-6958.09	-1391.62	11.3099
6	716.358	8734.22	-9042.81	-1808.56	11.3099
7	736.612	8731.6	-11339.9	-2267.97	11.3099
8	756.865	8728.97	-13885.2	-2777.05	11.31
9	777.119	8726.35	-16361.6	-3272.32	11.3099
10	797.373	8723.72	-18520.5	-3704.09	11.3099
11	817.627	8721.1	-20529	-4105.79	11.3099
12	837.881	8718.48	-22648.1	-4529.62	11.3099
13	857.541	8713.1	-22947	-4589.41	11.31
14	877.2	8707.73	-23346.6	-4669.32	11.3099
15	896.86	8702.35	-23190.1	-4638.03	11.31
16	916.52	8696.98	-21626.5	-4325.3	11.3099
17	936.18	8691.6	-19550.2	-3910.03	11.3099
18	955.839	8686.23	-17603.7	-3520.73	11.3099
19	975.499	8680.86	-15784.9	-3156.98	11.3099
20	995.159	8675.48	-13679.1	-2735.82	11.3099
21	1014.82	8670.11	-10877.7	-2175.54	11.3099
22	1034.48	8664.73	-8255.67	-1651.13	11.3099
23	1054.14	8659.36	-6692.14	-1338.43	11.3099
24	1073.8	8653.98	-5718.45	-1143.69	11.3099
25	1093.46	8648.61	-4738.65	-947.73	11.3099
26	1113.12	8643.23	-3770.03	-754.005	11.3099
27	1132.78	8637.86	-1899.01	-379.802	11.3099
28	1152.44	8632.48	703.795	140.759	11.3099
29	1172.1	8627.11	3168.46	633.692	11.3099
30	1191.76	8621.74	5057.48	1011.5	11.31
31	1219.39	8620.67	0	0	0

Entity Information

Block Search Window

X	Y
626.606	8745.22
640.202	8743.45
640.9	8745.77
626.898	8747.3

Block Search Window

X	Y
818.621	8717.68
840.054	8713.3
840.054	8718.3
819.393	8721.34

Block Search Window

X	Y
1198.42	8619.95
1199.19	8624.21
1183.47	8627.5
1182	8623.89

External Boundary

X	Y
0.182319	8730.8
0.182319	8679.86
0.182319	8400
1865.67	8400
1911.5	8400
1911.5	8441.5
1850.18	8453.25
1750.18	8480.89
1650.18	8504.68
1600.18	8514.08
1525.48	8533.27
1450.18	8555
1350.24	8583.06
1275.32	8602.38
1238.01	8613.88
1237.58	8614.03
1225.18	8618.15
1200.26	8628.99
1175.6	8638.51
1150.18	8646.63
1128.09	8652.01
1121.82	8651.84
1099.93	8655.89
1075.18	8663.34
1063.61	8666
1050.16	8670.22
1025.18	8680.55
1008.7	8686.05
1008.31	8686.12
1000.18	8687.43
975.182	8692.25
925.182	8706.68
913.79	8710
899.02	8711.17
879.994	8713.42
875.182	8714.5
850.182	8721.47
838.945	8725
832.394	8727.07
825.182	8729.33
823.211	8730
800.182	8732.7
791.564	8733.71
783.902	8733.24
779.679	8732.3
775.22	8732.52
768.044	8733.14
750.213	8734.55
741.397	8735.97
725.182	8740.55
700.182	8745.84
675.182	8748.62
650.182	8748.09
638.672	8750
633.056	8750.51
625.182	8750.67
617.391	8750.82

611.663	8750.93
606.201	8750.28
592.599	8750.88
582.624	8753.5
578.685	8752.98
575.182	8752.53
551.543	8753.92
547.964	8754
546.533	8754.43
538.7	8756
531.611	8759.56
529.815	8760.43
525.182	8761.01
500.182	8764.01
475.182	8766.23
426.337	8770.33
425.182	8770.42
400.182	8772
383.404	8772
350.182	8769.4
275.182	8763.83
225.182	8760.28
200.182	8758.79
150.207	8754.24
107.251	8748
99.8346	8747.58
73.5517	8746
64.3563	8741.41

Material Boundary

X	Y
350.182	8769.4
381.606	8771.13
383.404	8772

Material Boundary

X	Y
0.182319	8679.86
100.182	8697.42
225.918	8712.23
375.182	8720
475.182	8725
600.182	8739.37
640.202	8743.45
675.182	8737.94
699.589	8732.73
724.919	8729.38
775.182	8723.11
825.182	8716.87
975.182	8680.87
1051.13	8658.96
1135.09	8635
1195.22	8620.02
1195.3	8620
1219.25	8615
1237.58	8614.03

Material Boundary

X	Y
1195.22	8620.02
1325.18	8562.9
1400.18	8532.7
1500.18	8492.43
1525.18	8484.89
1650.18	8451.69
1865.41	8400.07
1865.67	8400

Material Boundary

X	Y
592.599	8750.88
603.176	8745.26
608.468	8745.26
611.364	8745.86
614.759	8747.95
617.391	8750.82

Material Boundary

X	Y
611.364	8745.86
625.182	8745.3
630.625	8745
640.202	8743.45

Material Boundary

X	Y
768.044	8733.14
768.138	8733.1
774.927	8730.07
784.193	8727.8
820.864	8725.98
832.359	8727.07
832.394	8727.07

Material Boundary

X	Y
1008.31	8686.12
1011.14	8681.66
1046.28	8666.03
1050.18	8665.05
1054.79	8665.07
1060.47	8665.43
1063.61	8666

Material Boundary

X	Y
426.337	8770.33
427.82	8770
475.182	8766.23

Material Boundary

X	Y
551.543	8753.92
573.51	8752.48
575.182	8752.53

Material Boundary

X	Y
578.685	8752.98
581.801	8753.05
582.624	8753.5

Material Boundary

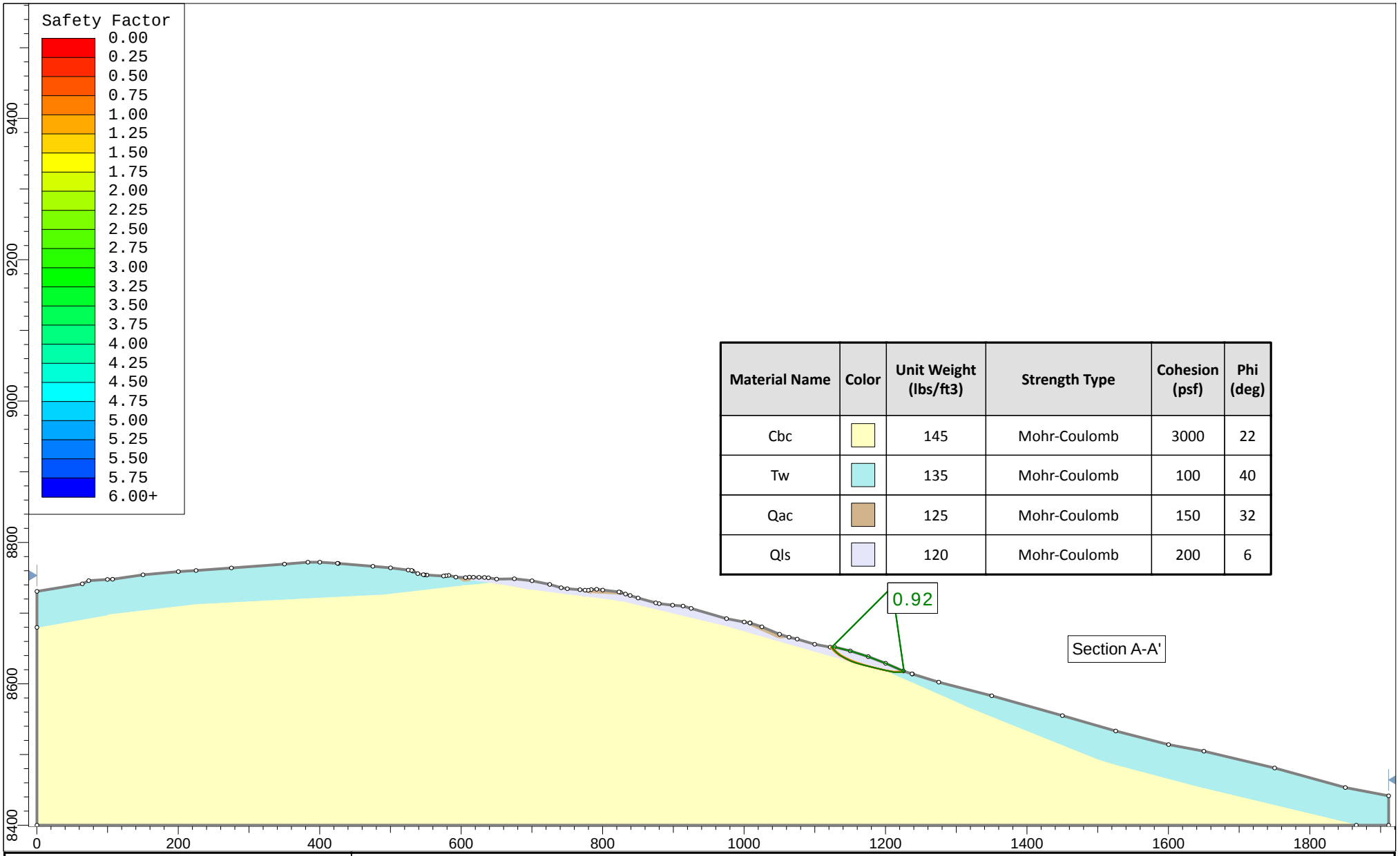
X	Y
750.213	8734.55
768.138	8733.1
775.22	8732.52

Material Boundary

X	Y
825.182	8729.33
832.359	8727.07
838.945	8725

Material Boundary

X	Y
1050.16	8670.22
1063.46	8666.03
1063.61	8666



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2250	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section AA.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Qac	Qls
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120
Cohesion [psf]	3000	100	150	200
Friction Angle [°]	22	40	32	6
Water Surface	None	None	None	None
Ru Value	0	0	0	0

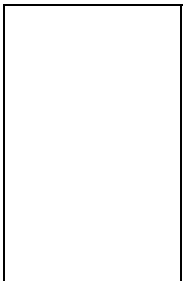
Global Minimums

Method: spencer

FS	0.920597
Axis Location:	1209.148, 8736.804
Left Slip Surface Endpoint:	1124.142, 8651.901
Right Slip Surface Endpoint:	1226.067, 8617.857
Resisting Moment:	4.14201e+06 lb-ft
Driving Moment:	4.49927e+06 lb-ft
Resisting Horizontal Force:	32487 lb
Driving Horizontal Force:	35289 lb
Total Slice Area:	1054.73 ft2
Surface Horizontal Width:	101.925 ft
Surface Average Height:	10.348 ft

Global Minimum Coordinates

Method: spencer



X	Y
1124.14	8651.9
1125.8	8649.63
1127.46	8647.65
1131.16	8644.1
1136.03	8640.2
1144.83	8635.1
1152.22	8631.7
1158.08	8629.68
1166.04	8627.34
1174.1	8625.28
1184.77	8622.62
1193.97	8620.43
1200.81	8618.85
1206.71	8617.62
1212.59	8616.4
1221.96	8616.56
1226.07	8617.86

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3836
Number of Invalid Surfaces: 676

Error Codes:

Error Code -105 reported for 215 surfaces
Error Code -106 reported for 360 surfaces
Error Code -108 reported for 92 surfaces
Error Code -111 reported for 9 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

Global Minimum Query (spencer) - Safety Factor: 0.920597

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.66085	230.822	-53.8105	Qls	200	6.00001	209.5	192.865	-67.8851	0	-67.8851	218.471	218.471
2	1.66052	663.34	-50.0037	Qls	200	6.00001	233.149	214.636	139.254	0	139.254	417.146	417.146
3	3.69899	2584.75	-43.8359	Qls	200	6.00001	264.156	243.181	410.844	0	410.844	664.478	664.478
4	4.87054	4978.33	-38.6645	Qls	200	6.00001	298.53	274.826	711.923	0	711.923	950.787	950.787
5	4.40117	5605.16	-30.1179	Qls	200	6.00001	332.944	306.507	1013.34	0	1013.34	1206.48	1206.48
6	4.40117	6387.05	-30.1179	Qls	200	6.00001	350.004	322.213	1162.78	0	1162.78	1365.81	1365.81
7	3.69144	5862.31	-24.7316	Qls	200	6.00001	371.49	341.993	1350.97	0	1350.97	1522.08	1522.08
8	3.69144	6198.14	-24.7316	Qls	200	6.00001	380.572	350.353	1430.51	0	1430.51	1605.81	1605.81
9	2.93142	5036.08	-18.9754	Qls	200	6.00001	393.788	362.52	1546.28	0	1546.28	1681.68	1681.68
10	2.93142	5061.16	-18.9754	Qls	200	6.00001	394.676	363.338	1554.06	0	1554.06	1689.76	1689.76
11	3.97788	6860.94	-16.3964	Qls	200	6.00001	398.701	367.043	1589.31	0	1589.31	1706.63	1706.63
12	3.97788	6812.95	-16.3964	Qls	200	6.00001	397.427	365.87	1578.15	0	1578.15	1695.09	1695.09
13	4.03118	6816.77	-14.2926	Qls	200	6.00001	398.54	366.895	1587.9	0	1587.9	1689.43	1689.43
14	4.03118	6690.48	-14.2926	Qls	200	6.00001	395.186	363.807	1558.52	0	1558.52	1659.19	1659.19
15	2.76468	4506.82	-14.0247	Qls	200	6.00001	392.446	361.285	1534.52	0	1534.52	1632.55	1632.55
16	2.76468	4391.06	-14.0247	Qls	200	6.00001	387.955	357.15	1495.18	0	1495.18	1592.08	1592.08
17	5.14612	7841.73	-14.0247	Qls	200	6.00001	381.04	350.784	1434.61	0	1434.61	1529.79	1529.79
18	0.292927	433.311	-13.3544	Qls	200	6.00001	377.25	347.295	1401.42	0	1401.42	1490.98	1490.98
19	4.45328	6399.25	-13.3544	Qls	200	6.00001	372.695	343.102	1361.52	0	1361.52	1450	1450
20	4.45328	6046.34	-13.3544	Qls	200	6.00001	364.156	335.241	1286.73	0	1286.73	1373.18	1373.18
21	3.41905	4398.68	-13.0467	Qls	200	6.00001	356.898	328.559	1223.15	0	1223.15	1305.86	1305.86
22	3.41905	4181.81	-13.0467	Qls	200	6.00001	350.049	322.254	1163.17	0	1163.17	1244.28	1244.28
23	2.94737	3384.91	-11.7818	Qls	200	6.00001	343.576	316.295	1106.47	0	1106.47	1178.13	1178.13
24	2.94737	3148.79	-11.7818	Qls	200	6.00001	334.853	308.265	1030.08	0	1030.08	1099.92	1099.92
25	2.94129	2906.71	-11.7604	Qls	200	6.00001	326.158	300.26	953.911	0	953.911	1021.81	1021.81
26	2.94129	2671.17	-11.7604	Qls	200	6.00001	317.438	292.233	877.536	0	877.536	943.623	943.623
27	3.12472	2447.32	1.02005	Qls	200	6.00001	317.317	292.121	876.477	0	876.477	870.827	870.827
28	3.12472	1916.69	1.02005	Qls	200	6.00001	297.189	273.592	700.179	0	700.179	694.887	694.887
29	3.12472	1386.05	1.02005	Qls	200	6.00001	277.061	255.062	523.877	0	523.877	518.944	518.944
30	4.10354	718.424	17.5024	Qls	200	6.00001	257.6	237.146	353.423	0	353.423	272.19	272.19

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 0.920597

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1124.14	8651.9	0	0	0
2	1125.8	8649.63	-502.06	-132.126	14.7441
3	1127.46	8647.65	-613.601	-161.48	14.7441
4	1131.16	8644.1	-131.544	-34.6181	14.7441
5	1136.03	8640.2	1188.86	312.87	14.7441
6	1140.43	8637.65	2310.68	608.096	14.7441
7	1144.83	8635.1	3738.93	983.965	14.7441
8	1148.53	8633.4	4664.7	1227.6	14.7441
9	1152.22	8631.7	5692.18	1498	14.7441
10	1155.15	8630.69	6096.4	1604.37	14.744
11	1158.08	8629.68	6505.86	1712.13	14.7441
12	1162.06	8628.51	6780.13	1784.31	14.7441
13	1166.04	8627.34	7046.4	1854.38	14.7441
14	1170.07	8626.31	7070.55	1860.74	14.7441
15	1174.1	8625.28	7078.04	1862.71	14.7441
16	1176.86	8624.59	7052.75	1856.05	14.744
17	1179.63	8623.9	7012.71	1845.52	14.7441
18	1184.77	8622.62	6895.91	1814.78	14.7441
19	1185.07	8622.55	6882.85	1811.34	14.7441
20	1189.52	8621.49	6662.49	1753.35	14.7441
21	1193.97	8620.43	6401.09	1684.56	14.7441
22	1197.39	8619.64	6149.92	1618.46	14.7441
23	1200.81	8618.85	5874.63	1546.01	14.7441
24	1203.76	8618.24	5542.19	1458.52	14.744
25	1206.71	8617.62	5188.5	1365.44	14.744
26	1209.65	8617.01	4813.29	1266.7	14.7441
27	1212.59	8616.4	4416.96	1162.4	14.7441
28	1215.71	8616.45	3376.66	888.627	14.7441
29	1218.84	8616.51	2409.07	633.987	14.744
30	1221.96	8616.56	1514.17	398.481	14.7441
31	1226.07	8617.86	0	0	0

Entity Information

External Boundary

X	Y
0.182319	8730.8
0.182319	8679.86
0.182319	8400
1865.67	8400
1911.5	8400
1911.5	8441.5
1850.18	8453.25
1750.18	8480.89
1650.18	8504.68
1600.18	8514.08
1525.48	8533.27
1450.18	8555
1350.24	8583.06
1275.32	8602.38
1238.01	8613.88
1237.58	8614.03
1225.18	8618.15
1200.26	8628.99
1175.6	8638.51
1150.18	8646.63
1128.09	8652.01

1121.82	8651.84
1099.93	8655.89
1075.18	8663.34
1063.61	8666
1050.16	8670.22
1025.18	8680.55
1008.7	8686.05
1008.31	8686.12
1000.18	8687.43
975.182	8692.25
925.182	8706.68
913.79	8710
899.02	8711.17
879.994	8713.42
875.182	8714.5
850.182	8721.47
838.945	8725
832.394	8727.07
825.182	8729.33
823.211	8730
800.182	8732.7
791.564	8733.71
783.902	8733.24
779.679	8732.3
775.22	8732.52
768.044	8733.14
750.213	8734.55
741.397	8735.97
725.182	8740.55
700.182	8745.84
675.182	8748.62
650.182	8748.09
638.672	8750
633.056	8750.51
625.182	8750.67
617.391	8750.82
611.663	8750.93
606.201	8750.28
592.599	8750.88
582.624	8753.5
578.685	8752.98
575.182	8752.53
551.543	8753.92
547.964	8754
546.533	8754.43
538.7	8756
531.611	8759.56
529.815	8760.43
525.182	8761.01
500.182	8764.01
475.182	8766.23
426.337	8770.33
425.182	8770.42
400.182	8772
383.404	8772
350.182	8769.4
275.182	8763.83
225.182	8760.28
200.182	8758.79
150.207	8754.24
107.251	8748
99.8346	8747.58

73.5517	8746
64.3563	8741.41

Material Boundary

X	Y
350.182	8769.4
381.606	8771.13
383.404	8772

Material Boundary

X	Y
0.182319	8679.86
100.182	8697.42
225.918	8712.23
375.182	8720
475.182	8725
600.182	8739.37
640.202	8743.45
675.182	8737.94
699.589	8732.73
724.919	8729.38
775.182	8723.11
825.182	8716.87
975.182	8680.87
1051.13	8658.96
1135.09	8635
1195.22	8620.02
1195.3	8620
1219.25	8615
1237.58	8614.03

Material Boundary

X	Y
1195.22	8620.02
1325.18	8562.9
1400.18	8532.7
1500.18	8492.43
1525.18	8484.89
1650.18	8451.69
1865.41	8400.07
1865.67	8400

Material Boundary

X	Y
592.599	8750.88
603.176	8745.26
608.468	8745.26
611.364	8745.86
614.759	8747.95
617.391	8750.82

Material Boundary

X	Y
611.364	8745.86
625.182	8745.3
630.625	8745
640.202	8743.45

Material Boundary

X	Y
768.044	8733.14
768.138	8733.1
774.927	8730.07
784.193	8727.8
820.864	8725.98
832.359	8727.07
832.394	8727.07

Material Boundary

X	Y
1008.31	8686.12
1011.14	8681.66
1046.28	8666.03
1050.18	8665.05
1054.79	8665.07
1060.47	8665.43
1063.61	8666

Material Boundary

X	Y
426.337	8770.33
427.82	8770
475.182	8766.23

Material Boundary

X	Y
551.543	8753.92
573.51	8752.48
575.182	8752.53

Material Boundary

X	Y
578.685	8752.98
581.801	8753.05
582.624	8753.5

Material Boundary

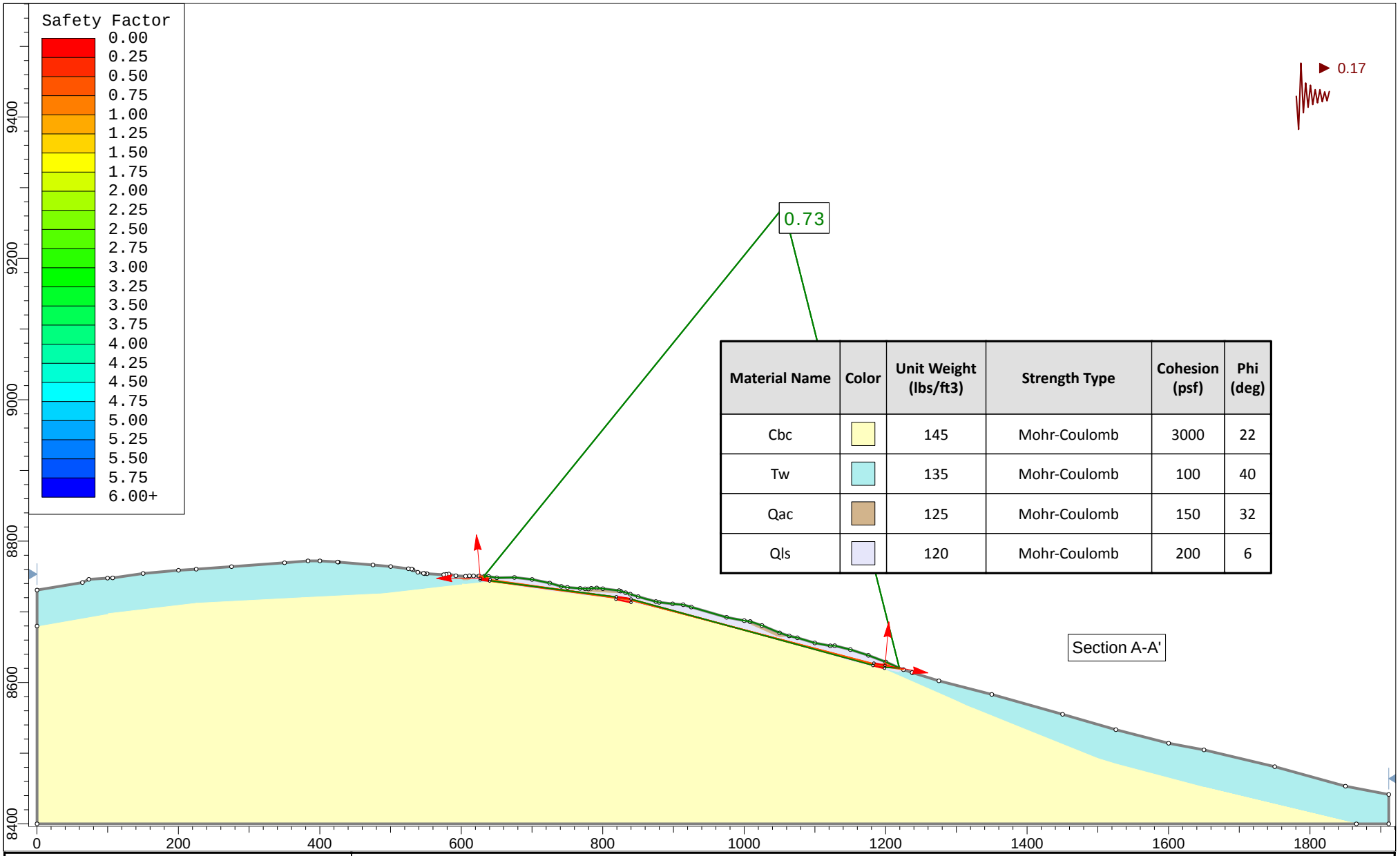
X	Y
750.213	8734.55
768.138	8733.1
775.22	8732.52

Material Boundary

X	Y
825.182	8729.33
832.359	8727.07
838.945	8725

Material Boundary

X	Y
1050.16	8670.22
1063.46	8666.03
1063.61	8666



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SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2250	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section AA.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	95
Left Projection Angle (End Angle) [°]:	180
Right Projection Angle (Start Angle) [°]:	-10
Right Projection Angle (End Angle) [°]:	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Qac	Qls
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120
Cohesion [psf]	3000	100	150	200
Friction Angle [°]	22	40	32	6
Water Surface	None	None	None	None
Ru Value	0	0	0	0

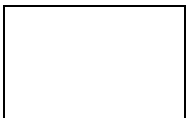
Global Minimums

Method: spencer

FS	0.730827
Axis Location:	1055.666, 9272.779
Left Slip Surface Endpoint:	632.215, 8750.530
Right Slip Surface Endpoint:	1219.394, 8620.669
Resisting Moment:	1.0974e+08 lb-ft
Driving Moment:	1.50159e+08 lb-ft
Resisting Horizontal Force:	181231 lb
Driving Horizontal Force:	247980 lb
Total Slice Area:	5496.47 ft2
Surface Horizontal Width:	587.18 ft
Surface Average Height:	9.3608 ft

Global Minimum Coordinates

Method: spencer



X	Y
632.215	8750.53
635.342	8744.72
837.881	8718.48
1191.76	8621.74
1219.39	8620.67

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4159
Number of Invalid Surfaces: 841

Error Codes:

Error Code -108 reported for 56 surfaces
Error Code -111 reported for 88 surfaces
Error Code -112 reported for 697 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

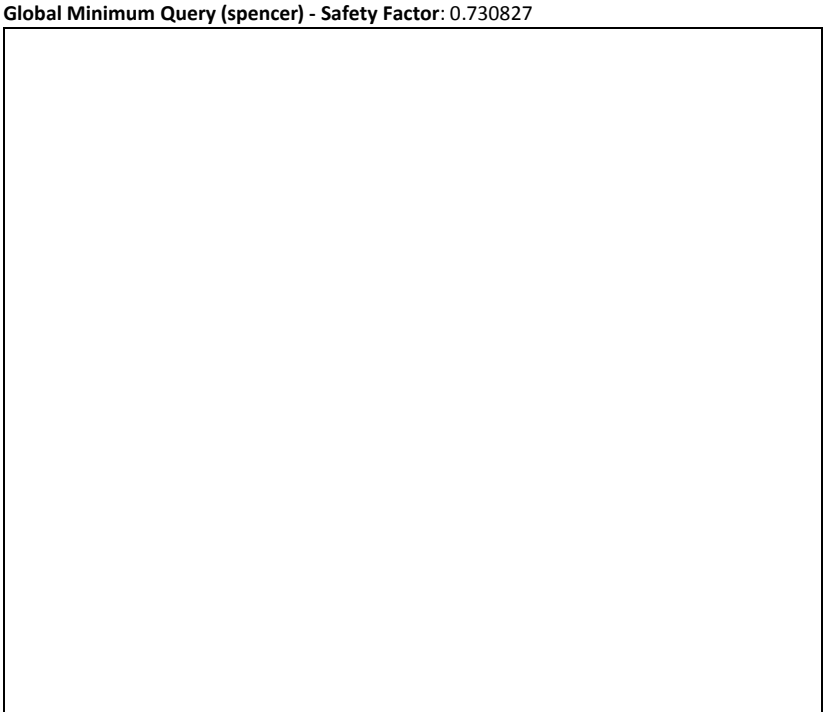
Slice Data

Global Minimum Query (spencer) - Safety Factor: 0.730827

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.12761	1056.89	-61.7192	Qls	200	6.00001	264.338	193.186	-64.8355	0	-64.8355	426.488	426.488
2	20.2539	13572	-7.3818	Qls	200	6.00001	368.035	268.97	656.207	0	656.207	703.888	703.888
3	20.2539	18561.2	-7.3818	Qls	200	6.00001	401.729	293.595	890.496	0	890.496	942.541	942.541
4	20.2539	22505.9	-7.3818	Qls	200	6.00001	428.37	313.064	1075.74	0	1075.74	1131.23	1131.23
5	20.2539	21837.4	-7.3818	Qls	200	6.00001	423.855	309.765	1044.34	0	1044.34	1099.25	1099.25
6	20.2539	17356.3	-7.3818	Qls	200	6.00001	393.592	287.648	833.913	0	833.913	884.904	884.904
7	20.2539	12116.2	-7.3818	Qls	200	6.00001	358.204	261.785	587.844	0	587.844	634.25	634.25
8	20.2539	13572.3	-7.3818	Qls	200	6.00001	368.037	268.972	656.222	0	656.222	703.903	703.903
9	20.2539	20272.9	-7.3818	Qls	200	6.00001	413.289	302.043	970.875	0	970.875	1024.42	1024.42
10	20.2539	23445.5	-7.3818	Qls	200	6.00001	434.716	317.702	1119.86	0	1119.86	1176.18	1176.18
11	20.2539	21111.5	-7.3818	Qls	200	6.00001	418.953	306.182	1010.26	0	1010.26	1064.53	1064.53
12	19.6598	15342	-15.2898	Qls	200	6.00001	372.752	272.418	689.009	0	689.009	790.911	790.911
13	19.6598	14786.7	-15.2898	Qls	200	6.00001	369.075	269.73	663.436	0	663.436	764.333	764.333
14	19.6598	17855.5	-15.2898	Qls	200	6.00001	389.401	284.585	804.768	0	804.768	911.221	911.221
15	19.6598	25621.9	-15.2898	Qls	200	6.00001	440.842	322.179	1162.46	0	1162.46	1282.97	1282.97
16	19.6598	28451.5	-15.2898	Qls	200	6.00001	459.583	335.876	1292.78	0	1292.78	1418.42	1418.42
17	19.6598	27734.8	-15.2898	Qls	200	6.00001	454.837	332.407	1259.77	0	1259.77	1384.11	1384.11
18	19.6598	27030.1	-15.2898	Qls	200	6.00001	450.169	328.996	1227.31	0	1227.31	1350.38	1350.38
19	19.6598	28613.9	-15.2898	Qls	200	6.00001	460.659	336.662	1300.25	0	1300.25	1426.19	1426.19
20	19.6598	32453.4	-15.2898	Qls	200	6.00001	486.09	355.248	1477.09	0	1477.09	1609.98	1609.98
21	19.6598	31463.2	-15.2898	Qls	200	6.00001	479.532	350.455	1431.48	0	1431.48	1562.58	1562.58
22	19.6598	25621.3	-15.2898	Qls	200	6.00001	440.838	322.176	1162.43	0	1162.43	1282.94	1282.94
23	19.6598	22365.9	-15.2898	Qls	200	6.00001	419.276	306.418	1012.5	0	1012.5	1127.12	1127.12
24	19.6598	22399.6	-15.2898	Qls	200	6.00001	419.499	306.581	1014.05	0	1014.05	1128.73	1128.73
25	19.6598	22337.9	-15.2898	Qls	200	6.00001	419.09	306.282	1011.21	0	1011.21	1125.78	1125.78
26	19.6598	27318.3	-15.2898	Qls	200	6.00001	452.078	330.391	1240.59	0	1240.59	1364.17	1364.17
27	19.6598	31357.2	-15.2898	Qls	200	6.00001	478.83	349.942	1426.6	0	1426.6	1557.5	1557.5
28	19.6598	30594.7	-15.2898	Qls	200	6.00001	473.78	346.251	1391.49	0	1391.49	1521.01	1521.01
29	19.6598	27417.7	-15.2898	Qls	200	6.00001	452.736	330.872	1245.16	0	1245.16	1368.93	1368.93
30	27.6378	17957.7	-2.20934	Qls	200	6.00001	371.702	271.65	681.699	0	681.699	696.039	696.039

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 0.730827



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	632.215	8750.53	0	0	0
2	635.342	8744.72	-1026.29	-205.258	11.3099
3	655.596	8742.09	-4472.1	-894.42	11.3099
4	675.85	8739.47	-7139.32	-1427.86	11.3099
5	696.104	8736.84	-9190.96	-1838.19	11.3099
6	716.358	8734.22	-11346.9	-2269.38	11.3099
7	736.612	8731.6	-14202.2	-2840.43	11.3099
8	756.865	8728.97	-17875.1	-3575.03	11.31
9	777.119	8726.35	-21320.9	-4264.18	11.3099
10	797.373	8723.72	-23721	-4744.2	11.3099
11	817.627	8721.1	-25626	-5125.2	11.3099
12	837.881	8718.48	-27895.3	-5579.05	11.3099
13	857.541	8713.1	-28932.7	-5786.54	11.3099
14	877.2	8707.73	-30129.5	-6025.89	11.3099
15	896.86	8702.35	-30445.6	-6089.13	11.31
16	916.52	8696.98	-28533.3	-5706.66	11.3099
17	936.18	8691.6	-25809	-5161.79	11.3099
18	955.839	8686.23	-23290.3	-4658.06	11.3099
19	975.499	8680.86	-20973.8	-4194.77	11.31
20	995.159	8675.48	-18202.9	-3640.59	11.31
21	1014.82	8670.11	-14330.3	-2866.06	11.3099
22	1034.48	8664.73	-10741.8	-2148.35	11.3099
23	1054.14	8659.36	-8829.57	-1765.91	11.3099
24	1073.8	8653.98	-7851.5	-1570.3	11.3099
25	1093.46	8648.61	-6863.78	-1372.76	11.31
26	1113.12	8643.23	-5893.75	-1178.75	11.3099
27	1132.78	8637.86	-3494.6	-698.919	11.3099
28	1152.44	8632.48	63.4946	12.6989	11.3099
29	1172.1	8627.11	3402.81	680.562	11.3099
30	1191.76	8621.74	5830.48	1166.1	11.31
31	1219.39	8620.67	0	0	0

Entity Information

Block Search Window

X	Y
626.606	8745.22
640.202	8743.45
640.9	8745.77
626.898	8747.3

Block Search Window

X	Y
818.621	8717.68
840.054	8713.3
840.054	8718.3
819.393	8721.34

Block Search Window

X	Y
1198.42	8619.95
1199.19	8624.21
1183.47	8627.5
1182	8623.89

External Boundary

X	Y
0.182319	8730.8
0.182319	8679.86
0.182319	8400
1865.67	8400
1911.5	8400
1911.5	8441.5
1850.18	8453.25
1750.18	8480.89
1650.18	8504.68
1600.18	8514.08
1525.48	8533.27
1450.18	8555
1350.24	8583.06
1275.32	8602.38
1238.01	8613.88
1237.58	8614.03
1225.18	8618.15
1200.26	8628.99
1175.6	8638.51
1150.18	8646.63
1128.09	8652.01
1121.82	8651.84
1099.93	8655.89
1075.18	8663.34
1063.61	8666
1050.16	8670.22
1025.18	8680.55
1008.7	8686.05
1008.31	8686.12
1000.18	8687.43
975.182	8692.25
925.182	8706.68
913.79	8710
899.02	8711.17
879.994	8713.42
875.182	8714.5
850.182	8721.47
838.945	8725
832.394	8727.07
825.182	8729.33
823.211	8730
800.182	8732.7
791.564	8733.71
783.902	8733.24
779.679	8732.3
775.22	8732.52
768.044	8733.14
750.213	8734.55
741.397	8735.97
725.182	8740.55
700.182	8745.84
675.182	8748.62
650.182	8748.09
638.672	8750
633.056	8750.51
625.182	8750.67
617.391	8750.82

611.663	8750.93
606.201	8750.28
592.599	8750.88
582.624	8753.5
578.685	8752.98
575.182	8752.53
551.543	8753.92
547.964	8754
546.533	8754.43
538.7	8756
531.611	8759.56
529.815	8760.43
525.182	8761.01
500.182	8764.01
475.182	8766.23
426.337	8770.33
425.182	8770.42
400.182	8772
383.404	8772
350.182	8769.4
275.182	8763.83
225.182	8760.28
200.182	8758.79
150.207	8754.24
107.251	8748
99.8346	8747.58
73.5517	8746
64.3563	8741.41

Material Boundary

X	Y
350.182	8769.4
381.606	8771.13
383.404	8772

Material Boundary

X	Y
0.182319	8679.86
100.182	8697.42
225.918	8712.23
375.182	8720
475.182	8725
600.182	8739.37
640.202	8743.45
675.182	8737.94
699.589	8732.73
724.919	8729.38
775.182	8723.11
825.182	8716.87
975.182	8680.87
1051.13	8658.96
1135.09	8635
1195.22	8620.02
1195.3	8620
1219.25	8615
1237.58	8614.03

Material Boundary

X	Y
1195.22	8620.02
1325.18	8562.9
1400.18	8532.7
1500.18	8492.43
1525.18	8484.89
1650.18	8451.69
1865.41	8400.07
1865.67	8400

Material Boundary

X	Y
592.599	8750.88
603.176	8745.26
608.468	8745.26
611.364	8745.86
614.759	8747.95
617.391	8750.82

Material Boundary

X	Y
611.364	8745.86
625.182	8745.3
630.625	8745
640.202	8743.45

Material Boundary

X	Y
768.044	8733.14
768.138	8733.1
774.927	8730.07
784.193	8727.8
820.864	8725.98
832.359	8727.07
832.394	8727.07

Material Boundary

X	Y
1008.31	8686.12
1011.14	8681.66
1046.28	8666.03
1050.18	8665.05
1054.79	8665.07
1060.47	8665.43
1063.61	8666

Material Boundary

X	Y
426.337	8770.33
427.82	8770
475.182	8766.23

Material Boundary

X	Y
551.543	8753.92
573.51	8752.48
575.182	8752.53

Material Boundary

X	Y
578.685	8752.98
581.801	8753.05
582.624	8753.5

Material Boundary

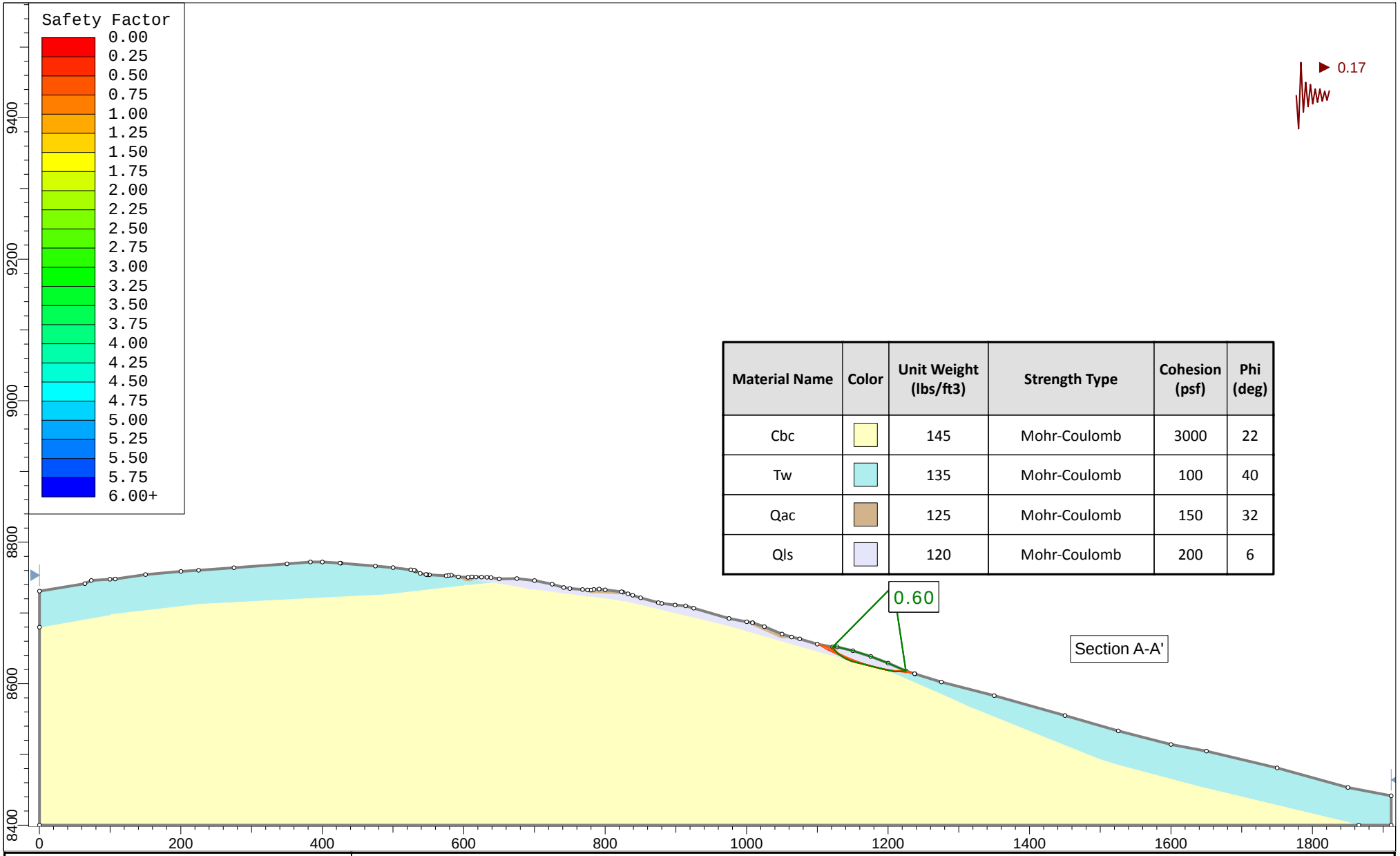
X	Y
750.213	8734.55
768.138	8733.1
775.22	8732.52

Material Boundary

X	Y
825.182	8729.33
832.359	8727.07
838.945	8725

Material Boundary

X	Y
1050.16	8670.22
1063.46	8666.03
1063.61	8666



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2250	*Company* IGES, Inc.
Date	12-27-2018	*File Name*	Section AA.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Qac	Qls
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120
Cohesion [psf]	3000	100	150	200
Friction Angle [°]	22	40	32	6
Water Surface	None	None	None	None
Ru Value	0	0	0	0

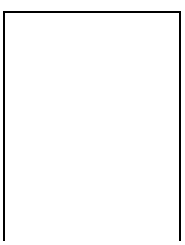
Global Minimums

Method: spencer

FS	0.597932
Axis Location:	1207.185, 8738.358
Left Slip Surface Endpoint:	1121.818, 8651.836
Right Slip Surface Endpoint:	1225.182, 8618.151
Resisting Moment:	4.2297e+06 lb-ft
Driving Moment:	7.07389e+06 lb-ft
Resisting Horizontal Force:	32977.8 lb
Driving Horizontal Force:	55153 lb
Total Slice Area:	1116.91 ft2
Surface Horizontal Width:	103.365 ft
Surface Average Height:	10.8055 ft

Global Minimum Coordinates

Method: spencer



X	Y
1121.82	8651.84
1123.54	8648.78
1125.56	8646.26
1128.59	8643.06
1131.69	8640.83
1134.58	8638.71
1138.51	8636.39
1142.25	8634.43
1149.03	8631.71
1155.81	8629.84
1162.59	8628.26
1169.37	8626.63
1176.15	8624.87
1182.93	8623.11
1189.27	8621.5
1194.97	8620.08
1202.24	8618.55
1209.5	8617.21
1218.02	8617.28
1225.18	8618.15

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3766
Number of Invalid Surfaces: 745

Error Codes:

Error Code -105 reported for 222 surfaces
Error Code -106 reported for 360 surfaces
Error Code -108 reported for 65 surfaces
Error Code -111 reported for 95 surfaces
Error Code -1000 reported for 3 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (spencer) - Safety Factor: 0.597932

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.72513	321.043	-60.5365	Qls	200	6.00001	312.554	186.886	-124.77	0	-124.77	428.489	428.489
2	2.01452	1061.46	-51.3882	Qls	200	6.00001	357.348	213.67	130.058	0	130.058	577.512	577.512
3	3.03712	2663.9	-46.4644	Qls	200	6.00001	401.663	240.167	382.164	0	382.164	804.902	804.902
4	3.09344	3550.09	-35.8048	Qls	200	6.00001	457.605	273.616	700.413	0	700.413	1030.51	1030.51
5	2.8899	3818.55	-36.2918	Qls	200	6.00001	476.348	284.824	807.045	0	807.045	1156.85	1156.85
6	3.93557	5857.02	-30.5484	Qls	200	6.00001	513.833	307.237	1020.3	0	1020.3	1323.55	1323.55
7	3.73528	6099.61	-27.6778	Qls	200	6.00001	541.577	323.826	1178.13	0	1178.13	1462.19	1462.19
8	6.7796	11929.9	-21.8265	Qls	200	6.00001	579.445	346.469	1393.57	0	1393.57	1625.64	1625.64
9	3.37157	6148.04	-15.4662	Qls	200	6.00001	613.658	366.926	1588.2	0	1588.2	1757.99	1757.99
10	3.37157	6095.67	-15.4662	Qls	200	6.00001	611.376	365.561	1575.2	0	1575.2	1744.37	1744.37
11	0.0365731	65.8029	-15.4662	Qls	200	6.00001	610.089	364.792	1567.89	0	1567.89	1736.69	1736.69
12	0.0634201	114.08	-13.1278	Qls	200	6.00001	619.795	370.595	1623.11	0	1623.11	1767.66	1767.66
13	6.7163	11845.4	-13.1278	Qls	200	6.00001	614.493	367.425	1592.94	0	1592.94	1736.26	1736.26
14	3.38986	5806.09	-13.5108	Qls	200	6.00001	605.243	361.894	1540.31	0	1540.31	1685.74	1685.74
15	3.38986	5696.82	-13.5108	Qls	200	6.00001	600.396	358.996	1512.75	0	1512.75	1657.01	1657.01
16	6.77971	11115.8	-14.5133	Qls	200	6.00001	590.303	352.961	1455.32	0	1455.32	1608.13	1608.13
17	3.38986	5372.88	-14.5348	Qls	200	6.00001	582.108	348.061	1408.7	0	1408.7	1559.63	1559.63
18	3.38986	5198.56	-14.5348	Qls	200	6.00001	574.465	343.491	1365.23	0	1365.23	1514.17	1514.17
19	6.3462	9250.27	-14.2372	Qls	200	6.00001	564.248	337.382	1307.11	0	1307.11	1450.27	1450.27
20	2.16969	3015.3	-14.0526	Qls	200	6.00001	554.774	331.717	1253.21	0	1253.21	1392.07	1392.07
21	3.52836	4740.38	-14.0526	Qls	200	6.00001	547.867	327.587	1213.91	0	1213.91	1351.04	1351.04
22	0.107265	140.916	-11.8653	Qls	200	6.00001	550.907	329.405	1231.21	0	1231.21	1346.96	1346.96
23	6.51036	8093.32	-11.8653	Qls	200	6.00001	540.098	322.942	1169.71	0	1169.71	1283.19	1283.19
24	0.646991	749.708	-11.8653	Qls	200	6.00001	527.174	315.214	1096.18	0	1096.18	1206.94	1206.94
25	0.0358601	41.2207	-10.4325	Qls	200	6.00001	530.383	317.133	1114.44	0	1114.44	1212.1	1212.1
26	7.22877	7518.59	-10.4325	Qls	200	6.00001	513.349	306.948	1017.55	0	1017.55	1112.06	1112.06
27	4.25974	3484.72	0.445024	Qls	200	6.00001	511.204	305.665	1005.33	0	1005.33	1001.36	1001.36
28	4.25974	2520.44	0.445024	Qls	200	6.00001	471.066	281.666	776.996	0	776.996	773.337	773.337
29	3.5813	1285.25	6.93501	Qls	200	6.00001	446.357	266.891	636.428	0	636.428	582.136	582.136
30	3.5813	428.416	6.93501	Qls	200	6.00001	400.132	239.252	373.457	0	373.457	324.788	324.788

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 0.597932

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1121.82	8651.84	0	0	0
2	1123.54	8648.78	-865.619	-417.624	25.7553
3	1125.56	8646.26	-1076.97	-519.595	25.7555
4	1128.59	8643.06	-622.415	-300.289	25.7554
5	1131.69	8640.83	128.487	61.9894	25.7553
6	1134.58	8638.71	1113.78	537.35	25.7553
7	1138.51	8636.39	2457.12	1185.45	25.7552
8	1142.25	8634.43	3779.34	1823.37	25.7553
9	1149.03	8631.71	5663	2732.16	25.7554
10	1152.4	8630.78	6120.79	2953.02	25.7553
11	1155.77	8629.85	6565.26	3167.46	25.7553
12	1155.81	8629.84	6570	3169.75	25.7554
13	1155.87	8629.82	6574.09	3171.72	25.7553
14	1162.59	8628.26	6955.88	3355.92	25.7554
15	1165.98	8627.44	7145.86	3447.58	25.7554
16	1169.37	8626.63	7311.24	3527.36	25.7553
17	1176.15	8624.87	7753.05	3740.52	25.7554
18	1179.54	8623.99	7931.28	3826.5	25.7553
19	1182.93	8623.11	8067.57	3892.26	25.7553
20	1189.27	8621.5	8164.05	3938.81	25.7554
21	1191.44	8620.96	8153.58	3933.76	25.7554
22	1194.97	8620.08	8098.48	3907.17	25.7553
23	1195.08	8620.05	8091.09	3903.61	25.7554
24	1201.59	8618.69	7550.74	3642.91	25.7553
25	1202.24	8618.55	7486.12	3611.74	25.7554
26	1202.27	8618.54	7481.47	3609.49	25.7553
27	1209.5	8617.21	6403.11	3089.23	25.7553
28	1213.76	8617.25	4784.69	2308.41	25.7553
29	1218.02	8617.28	3180.86	1534.63	25.7553
30	1221.6	8617.72	1523.61	735.076	25.7553
31	1225.18	8618.15	0	0	0

Entity Information

External Boundary

X	Y
0.182319	8730.8
0.182319	8679.86
0.182319	8400
1865.67	8400
1911.5	8400
1911.5	8441.5
1850.18	8453.25
1750.18	8480.89
1650.18	8504.68
1600.18	8514.08
1525.48	8533.27
1450.18	8555
1350.24	8583.06
1275.32	8602.38
1238.01	8613.88
1237.58	8614.03
1225.18	8618.15
1200.26	8628.99
1175.6	8638.51
1150.18	8646.63
1128.09	8652.01

1121.82	8651.84
1099.93	8655.89
1075.18	8663.34
1063.61	8666
1050.16	8670.22
1025.18	8680.55
1008.7	8686.05
1008.31	8686.12
1000.18	8687.43
975.182	8692.25
925.182	8706.68
913.79	8710
899.02	8711.17
879.994	8713.42
875.182	8714.5
850.182	8721.47
838.945	8725
832.394	8727.07
825.182	8729.33
823.211	8730
800.182	8732.7
791.564	8733.71
783.902	8733.24
779.679	8732.3
775.22	8732.52
768.044	8733.14
750.213	8734.55
741.397	8735.97
725.182	8740.55
700.182	8745.84
675.182	8748.62
650.182	8748.09
638.672	8750
633.056	8750.51
625.182	8750.67
617.391	8750.82
611.663	8750.93
606.201	8750.28
592.599	8750.88
582.624	8753.5
578.685	8752.98
575.182	8752.53
551.543	8753.92
547.964	8754
546.533	8754.43
538.7	8756
531.611	8759.56
529.815	8760.43
525.182	8761.01
500.182	8764.01
475.182	8766.23
426.337	8770.33
425.182	8770.42
400.182	8772
383.404	8772
350.182	8769.4
275.182	8763.83
225.182	8760.28
200.182	8758.79
150.207	8754.24
107.251	8748
99.8346	8747.58
73.5517	8746

64.3563	8741.41

Material Boundary

X	Y
350.182	8769.4
381.606	8771.13
383.404	8772

Material Boundary

X	Y
0.182319	8679.86
100.182	8697.42
225.918	8712.23
375.182	8720
475.182	8725
600.182	8739.37
640.202	8743.45
675.182	8737.94
699.589	8732.73
724.919	8729.38
775.182	8723.11
825.182	8716.87
975.182	8680.87
1051.13	8658.96
1135.09	8635
1195.22	8620.02
1195.3	8620
1219.25	8615
1237.58	8614.03

Material Boundary

X	Y
1195.22	8620.02
1325.18	8562.9
1400.18	8532.7
1500.18	8492.43
1525.18	8484.89
1650.18	8451.69
1865.41	8400.07
1865.67	8400

Material Boundary

X	Y
592.599	8750.88
603.176	8745.26
608.468	8745.26
611.364	8745.86
614.759	8747.95
617.391	8750.82

Material Boundary

X	Y
611.364	8745.86
625.182	8745.3
630.625	8745
640.202	8743.45

Material Boundary

X	Y
768.044	8733.14
768.138	8733.1
774.927	8730.07
784.193	8727.8
820.864	8725.98
832.359	8727.07
832.394	8727.07

Material Boundary

X	Y
1008.31	8686.12
1011.14	8681.66
1046.28	8666.03
1050.18	8665.05
1054.79	8665.07
1060.47	8665.43
1063.61	8666

Material Boundary

X	Y
426.337	8770.33
427.82	8770
475.182	8766.23

Material Boundary

X	Y
551.543	8753.92
573.51	8752.48
575.182	8752.53

Material Boundary

X	Y
578.685	8752.98
581.801	8753.05
582.624	8753.5

Material Boundary

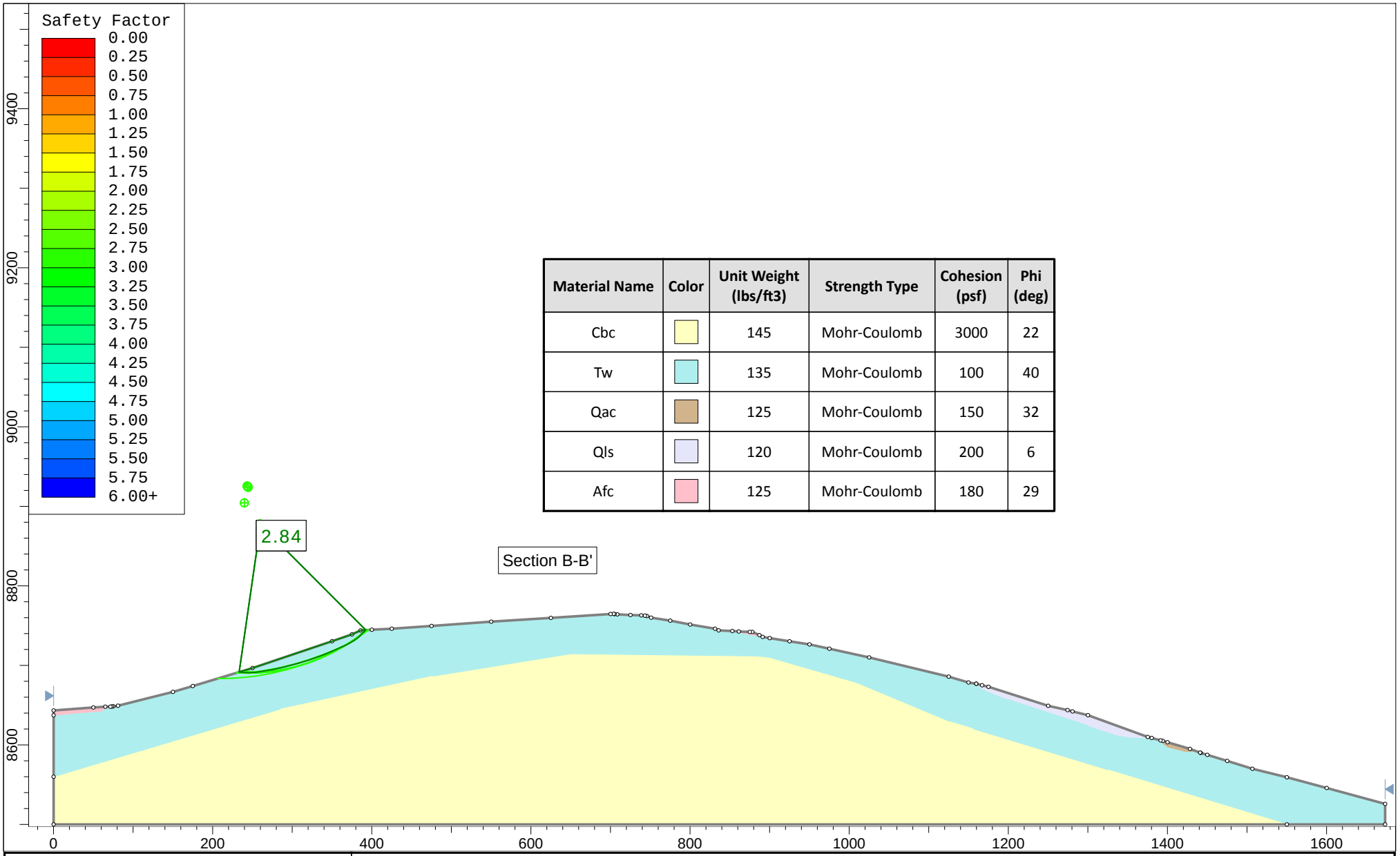
X	Y
750.213	8734.55
768.138	8733.1
775.22	8732.52

Material Boundary

X	Y
825.182	8729.33
832.359	8727.07
838.945	8725

Material Boundary

X	Y
1050.16	8670.22
1063.46	8666.03
1063.61	8666



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6
Afc		125	Mohr-Coulomb	180	29

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section BB.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Qac	Qls	Afc
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120	125
Cohesion [psf]	3000	100	150	200	180
Friction Angle [°]	22	40	32	6	29
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

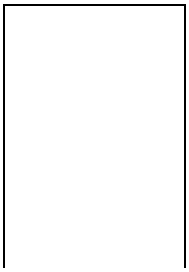
Global Minimums

Method: spencer

FS	2.836440
Axis Location:	260.149, 8877.088
Left Slip Surface Endpoint:	233.416, 8691.566
Right Slip Surface Endpoint:	392.526, 8744.388
Resisting Moment:	3.52407e+07 lb-ft
Driving Moment:	1.24243e+07 lb-ft
Resisting Horizontal Force:	181793 lb
Driving Horizontal Force:	64092.1 lb
Total Slice Area:	1618.62 ft2
Surface Horizontal Width:	159.11 ft
Surface Average Height:	10.1729 ft

Global Minimum Coordinates

Method: spencer



X	Y
233.416	8691.57
236.297	8691
245.292	8690.73
254.288	8691.25
261.916	8692.45
269.784	8693.72
278.194	8695.39
286.604	8697.07
295.463	8699.33
304.322	8701.6
313.204	8704.31
322.086	8707.04
330.993	8710.24
339.899	8713.44
348.832	8717.13
357.096	8720.63
365.387	8724.54
373.808	8728.78
379.545	8732.42
384.652	8736.46
388.589	8740.44
392.526	8744.39

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3292
Number of Invalid Surfaces: 1213

Error Codes:

Error Code -105 reported for 158 surfaces
Error Code -106 reported for 840 surfaces
Error Code -108 reported for 215 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

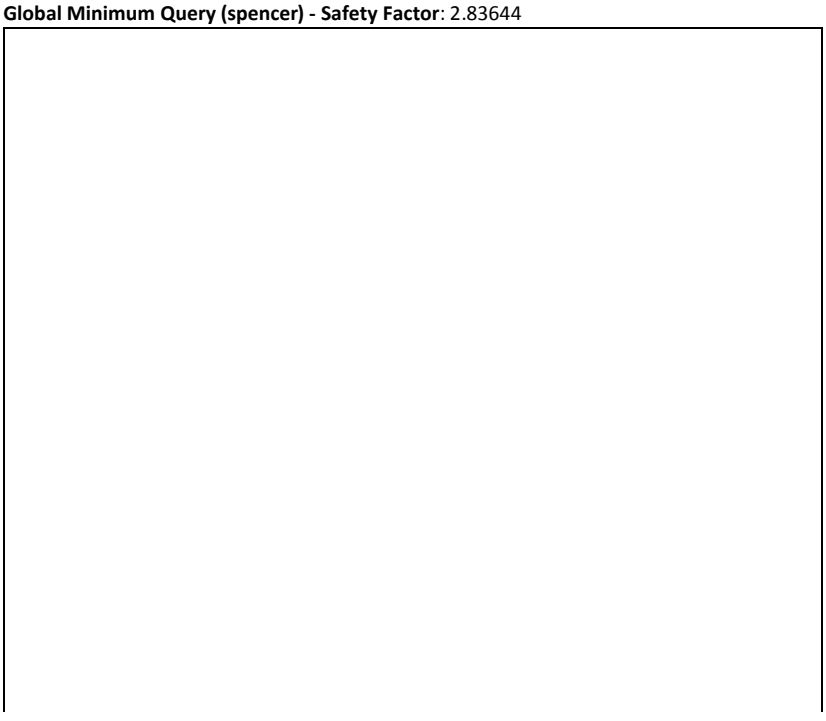
Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.83644

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.88155	279.178	-11.1152	Tw	100	40	78.6958	223.216	146.843	0	146.843	131.382	131.382
2	8.99509	3552.32	-1.69827	Tw	100	40	171.114	485.355	459.248	0	459.248	454.175	454.175
3	4.49762	3013.59	3.31826	Tw	100	40	248.846	705.836	722.007	0	722.007	736.435	736.435
4	4.49762	3720.94	3.31826	Tw	100	40	298.296	846.1	889.166	0	889.166	906.461	906.461
5	7.62849	7671.55	8.88532	Tw	100	40	334.02	947.429	1009.93	0	1009.93	1062.14	1062.14
6	7.86816	9382.48	9.20223	Tw	100	40	387.912	1100.29	1192.1	0	1192.1	1254.94	1254.94
7	4.20484	5572.65	11.2422	Tw	100	40	417.999	1185.63	1293.8	0	1293.8	1376.88	1376.88
8	4.20484	5904.52	11.2422	Tw	100	40	440.718	1250.07	1370.6	0	1370.6	1458.2	1458.2
9	8.40968	12799.7	11.2996	Tw	100	40	474.341	1345.44	1484.26	0	1484.26	1579.04	1579.04
10	4.42962	7198.88	14.2952	Tw	100	40	488.514	1385.64	1532.16	0	1532.16	1656.64	1656.64
11	4.42962	7418.74	14.2952	Tw	100	40	502.337	1424.85	1578.89	0	1578.89	1706.89	1706.89
12	8.85924	15490.8	14.359	Tw	100	40	522.525	1482.11	1647.13	0	1647.13	1780.9	1780.9
13	4.44108	8025.61	16.9924	Tw	100	40	524.277	1487.08	1653.05	0	1653.05	1813.27	1813.27
14	4.44108	8111.41	16.9924	Tw	100	40	529.502	1501.9	1670.72	0	1670.72	1832.53	1832.53
15	8.88215	16474.6	17.0473	Tw	100	40	536.867	1522.79	1695.61	0	1695.61	1860.23	1860.23
16	4.45325	8314.56	19.7565	Tw	100	40	525.179	1489.64	1656.11	0	1656.11	1844.74	1844.74
17	4.45325	8257.39	19.7565	Tw	100	40	521.809	1480.08	1644.72	0	1644.72	1832.13	1832.13
18	8.90651	16337.3	19.8127	Tw	100	40	516.274	1464.38	1626.01	0	1626.01	1812.01	1812.01
19	4.46641	8031.96	22.4146	Tw	100	40	493.266	1399.12	1548.23	0	1548.23	1751.68	1751.68
20	4.46641	7830.89	22.4146	Tw	100	40	481.78	1366.54	1509.4	0	1509.4	1708.12	1708.12
21	4.13209	7055.88	22.9739	Tw	100	40	467.378	1325.69	1460.72	0	1460.72	1658.86	1658.86
22	4.13209	6871.27	22.9739	Tw	100	40	456.047	1293.55	1422.42	0	1422.42	1615.76	1615.76
23	4.1455	6653.55	25.2471	Tw	100	40	430.977	1222.44	1337.67	0	1337.67	1540.9	1540.9
24	4.1455	6357.98	25.2471	Tw	100	40	413.339	1172.41	1278.05	0	1278.05	1472.97	1472.97
25	4.21047	6117.66	26.6945	Tw	100	40	387.417	1098.88	1190.42	0	1190.42	1385.23	1385.23
26	4.21047	5737.94	26.6945	Tw	100	40	365.461	1036.61	1116.21	0	1116.21	1299.97	1299.97
27	5.73627	7066.57	32.4078	Tw	100	40	313.812	890.11	941.617	0	941.617	1140.83	1140.83
28	5.10794	5355.59	38.3705	Tw	100	40	254.346	721.436	740.598	0	740.598	941.977	941.977
29	3.93676	2920.72	45.2995	Tw	100	40	174.168	494.017	469.57	0	469.57	645.569	645.569
30	3.93676	986.875	45.077	Tw	100	40	79.268	224.839	148.777	0	148.777	228.259	228.259

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.83644



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	233.416	8691.57	0	0	0
2	236.297	8691	309.899	99.4084	17.785
3	245.292	8690.73	1971.57	632.433	17.785
4	249.79	8690.99	2902.51	931.056	17.785
5	254.288	8691.25	4012.26	1287.04	17.785
6	261.916	8692.45	5355.91	1718.05	17.785
7	269.784	8693.72	6888.53	2209.68	17.785
8	273.989	8694.56	7564.79	2426.61	17.785
9	278.194	8695.39	8272.39	2653.59	17.785
10	286.604	8697.07	9767.37	3133.14	17.785
11	291.033	8698.2	10201.9	3272.54	17.7851
12	295.463	8699.33	10645	3414.67	17.785
13	304.322	8701.6	11538.6	3701.32	17.7851
14	308.763	8702.96	11623.6	3728.57	17.785
15	313.204	8704.31	11707.7	3755.57	17.7851
16	322.086	8707.04	11858.2	3803.82	17.785
17	326.54	8708.64	11548.1	3704.35	17.785
18	330.993	8710.24	11241.2	3605.91	17.785
19	339.899	8713.44	10621.9	3407.26	17.785
20	344.366	8715.29	9972.8	3199.04	17.785
21	348.832	8717.13	9343.92	2997.31	17.785
22	352.964	8718.88	8716.35	2796	17.785
23	357.096	8720.63	8109.06	2601.2	17.785
24	361.242	8722.59	7280.68	2335.47	17.785
25	365.387	8724.54	6495.73	2083.68	17.785
26	369.598	8726.66	5606.64	1798.48	17.785
27	373.808	8728.78	4782.24	1534.03	17.785
28	379.545	8732.42	3153.5	1011.57	17.785
29	384.652	8736.46	1457.54	467.543	17.785
30	388.589	8740.44	275.175	88.2698	17.785
31	392.526	8744.39	0	0	0

Entity Information

External Boundary

X	Y
0.142327	8500
1550.14	8500
1673.71	8500
1673.71	8525.74
1600.14	8545.71
1550.14	8559.19
1506.81	8570
1475.14	8579.81
1450.14	8587.5
1441.94	8590
1441.21	8590.27
1428.42	8595
1400.14	8603.33
1394.42	8605
1391.42	8605.59
1380.41	8608.62
1375.32	8610
1300.14	8637.29
1280.76	8642
1274.46	8643.64

1250.14	8649.11
1175.14	8673.03
1167.18	8675
1159.77	8676.9
1159.75	8676.91
1150.03	8678.47
1125.14	8685.78
1025.14	8710
975.142	8720.97
950.142	8726.36
925.142	8730.23
900.142	8734.23
891.264	8735.72
887.331	8738
878.465	8742
875.147	8742.03
861.3	8742.64
853.268	8743.07
836.06	8744
831.626	8746
800.142	8751.31
775.142	8756.19
751.114	8760
745.891	8762
743.456	8762.45
738.869	8762.81
725.142	8763.33
708.703	8764.04
705.269	8764.35
704.105	8764.77
700.142	8764.52
625.142	8759.69
550.142	8754.87
475.142	8749.59
425.142	8746.02
400.142	8744.84
385.983	8744
375.142	8739
350.142	8730.39
250.142	8696.61
175.142	8673.99
150.142	8666.59
81.1175	8649.22
75.1423	8648.47
73.3372	8648.24
71.532	8648.01
65.213	8648
50.1423	8647.01
0.142327	8643.28
0.142327	8637.11
0.142327	8560

Material Boundary

X	Y
0.142327	8637.11
25.2128	8639.81
61.2462	8642.42
73.3372	8648.24

Material Boundary

X	Y
1159.75	8676.91
1167.11	8670.45
1180.32	8665
1200.14	8656.82
1300.14	8624.3
1335.78	8612.64
1350.3	8609.92
1380.41	8608.62

Material Boundary

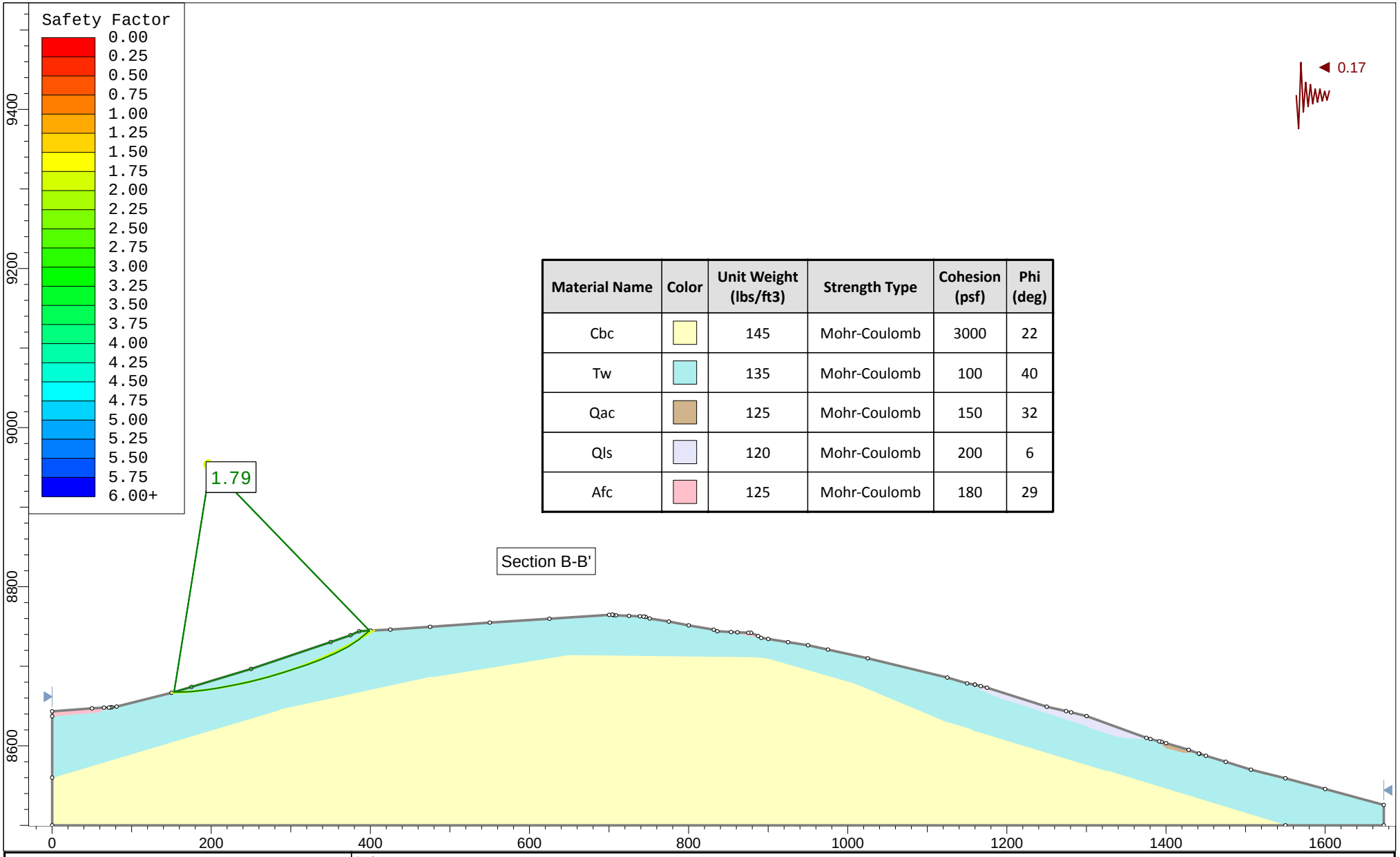
X	Y
1391.42	8605.59
1392.04	8605
1397.05	8600
1400.8	8597.23
1425.14	8590.84
1441.21	8590.27

Material Boundary

X	Y
0.142327	8560
285.205	8645
475.142	8686.03
650.142	8714.5
750.142	8713.32
884.503	8711.73
900.142	8710
1009.67	8678.33
1128.56	8628.52
1156.54	8620
1325.14	8568.68
1550.14	8500

Material Boundary

X	Y
853.268	8743.07
891.264	8735.72



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6
Afc		125	Mohr-Coulomb	180	29

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section BB.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Qac	Qls	Afc
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120	125
Cohesion [psf]	3000	100	150	200	180
Friction Angle [°]	22	40	32	6	29
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

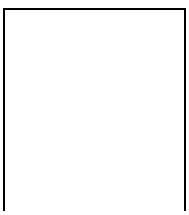
Global Minimums

Method: spencer

FS	1.792920
Axis Location:	198.830, 8951.642
Left Slip Surface Endpoint:	153.312, 8667.531
Right Slip Surface Endpoint:	398.808, 8744.761
Resisting Moment:	1.00644e+08 lb-ft
Driving Moment:	5.61344e+07 lb-ft
Resisting Horizontal Force:	343901 lb
Driving Horizontal Force:	191811 lb
Total Slice Area:	3256.91 ft2
Surface Horizontal Width:	245.496 ft
Surface Average Height:	13.2666 ft

Global Minimum Coordinates

Method: spencer



X	Y
153.312	8667.53
163.09	8667.61
174.18	8668.02
185.271	8669.29
196.362	8670.56
205.587	8672.18
214.813	8673.79
223.918	8675.37
236.34	8677.91
247.966	8680.38
255.588	8682.37
263.209	8684.35
271.73	8686.57
280.888	8689.32
290.045	8692.07
299.203	8694.81
308.958	8698.09
318.714	8701.37
334.388	8707.04
348.205	8712.87
356.32	8716.48
372.011	8724.58
385.409	8733.43
398.808	8744.76

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3096
Number of Invalid Surfaces: 1409

Error Codes:

Error Code -105 reported for 158 surfaces
Error Code -106 reported for 1080 surfaces
Error Code -108 reported for 149 surfaces
Error Code -111 reported for 21 surfaces
Error Code -112 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

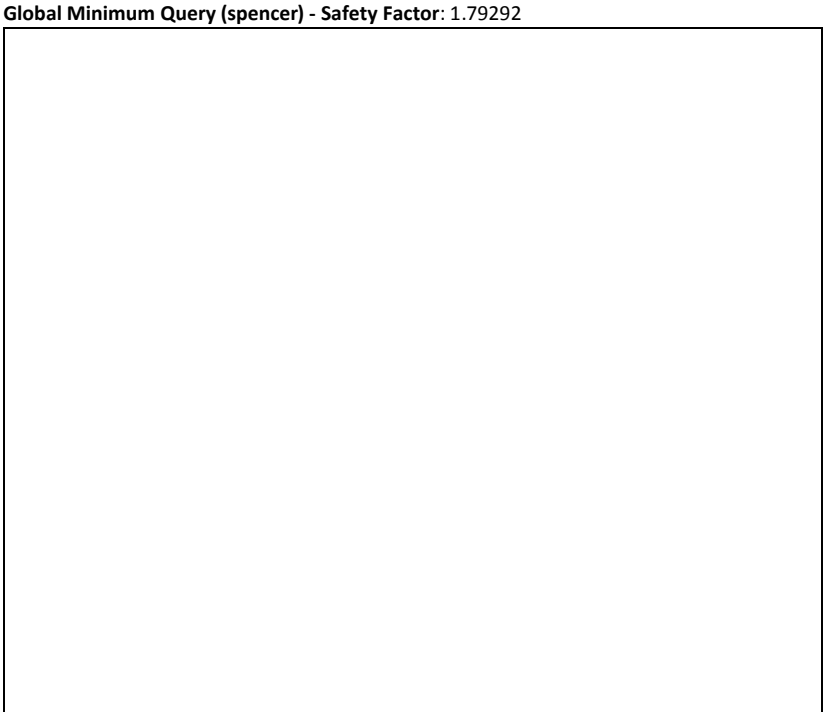
Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.79292

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	9.77841	1853.68	0.493541	Tw	100	40	173.685	311.404	251.941	0	251.941	253.437	253.437
2	11.0901	6355.81	2.10237	Tw	100	40	371.03	665.228	673.612	0	673.612	687.233	687.233
3	5.54549	4638.68	6.52505	Tw	100	40	470.813	844.13	886.82	0	886.82	940.671	940.671
4	5.54549	5415.75	6.52505	Tw	100	40	538.651	965.759	1031.77	0	1031.77	1093.38	1093.38
5	11.091	13163.8	6.52505	Tw	100	40	640.458	1148.29	1249.3	0	1249.3	1322.55	1322.55
6	9.22523	12968.8	9.93955	Tw	100	40	703.657	1261.6	1384.34	0	1384.34	1507.65	1507.65
7	9.22523	14421	9.93955	Tw	100	40	775.333	1390.11	1537.5	0	1537.5	1673.37	1673.37
8	9.10585	15666.6	9.86035	Tw	100	40	848.091	1520.56	1692.95	0	1692.95	1840.36	1840.36
9	6.21063	11427.2	11.5363	Tw	100	40	877.345	1573.01	1755.48	0	1755.48	1934.55	1934.55
10	6.21063	11935.1	11.5363	Tw	100	40	913.554	1637.93	1832.84	0	1832.84	2019.31	2019.31
11	5.81336	11612.4	12.0034	Tw	100	40	939.752	1684.9	1888.81	0	1888.81	2088.62	2088.62
12	5.81336	12018.6	12.0034	Tw	100	40	970.439	1739.92	1954.38	0	1954.38	2160.72	2160.72
13	7.62157	16257.2	14.596	Tw	100	40	957.366	1716.48	1926.45	0	1926.45	2175.75	2175.75
14	7.62157	16852.6	14.596	Tw	100	40	990.2	1775.35	1996.6	0	1996.6	2254.45	2254.45
15	8.52092	19559.9	14.596	Tw	100	40	1025.65	1838.91	2072.35	0	2072.35	2339.43	2339.43
16	9.15738	21642.2	16.7023	Tw	100	40	1018.7	1826.45	2057.5	0	2057.5	2363.17	2363.17
17	9.15738	22069.6	16.7023	Tw	100	40	1037.64	1860.4	2097.97	0	2097.97	2409.32	2409.32
18	9.15738	22497	16.7023	Tw	100	40	1056.58	1894.36	2138.43	0	2138.43	2455.47	2455.47
19	9.7555	24204.7	18.5799	Tw	100	40	1034.81	1855.34	2091.93	0	2091.93	2439.78	2439.78
20	9.75556	24225	18.5901	Tw	100	40	1035.46	1856.49	2093.3	0	2093.3	2441.57	2441.57
21	15.6747	38550.6	19.8592	Tw	100	40	1005.58	1802.92	2029.47	0	2029.47	2392.67	2392.67
22	6.90819	16547.9	22.8826	Tw	100	40	935.206	1676.75	1879.1	0	1879.1	2273.81	2273.81
23	6.90819	16005.1	22.8826	Tw	100	40	906.387	1625.08	1817.51	0	1817.51	2200.06	2200.06
24	8.11579	18025.6	23.97	Tw	100	40	856.541	1535.71	1711.01	0	1711.01	2091.83	2091.83
25	7.84536	16276.1	27.313	Tw	100	40	762.89	1367.8	1510.91	0	1510.91	1904.89	1904.89
26	7.84536	14844.8	27.313	Tw	100	40	700.6	1256.12	1377.82	0	1377.82	1739.63	1739.63
27	6.69871	11206	33.4541	Tw	100	40	568.498	1019.27	1095.54	0	1095.54	1471.17	1471.17
28	6.69871	9921.49	33.4541	Tw	100	40	509.292	913.12	969.039	0	969.039	1305.54	1305.54
29	6.69966	7137.41	40.2167	Tw	100	40	342.351	613.808	612.333	0	612.333	901.813	901.813
30	6.69966	2382.13	40.2167	Tw	100	40	147.133	263.797	195.205	0	195.205	319.615	319.615

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.79292



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	153.312	8667.53	0	0	0
2	163.09	8667.61	1362.02	624.697	24.6388
3	174.18	8668.02	4122.1	1890.61	24.6387
4	179.726	8668.66	5381.93	2468.44	24.6387
5	185.271	8669.29	6793.91	3116.05	24.6387
6	196.362	8670.56	10074.6	4620.73	24.6386
7	205.587	8672.18	12123.4	5560.41	24.6386
8	214.813	8673.79	14338.9	6576.58	24.6387
9	223.918	8675.37	16718.7	7668.09	24.6387
10	230.129	8676.64	17999.6	8255.59	24.6388
11	236.34	8677.91	19321	8861.66	24.6388
12	242.153	8679.15	20475.4	9391.13	24.6388
13	247.966	8680.38	21658.2	9933.58	24.6387
14	255.588	8682.37	22367.7	10259	24.6387
15	263.209	8684.35	23086.9	10588.9	24.6387
16	271.73	8686.57	23902.9	10963.2	24.6388
17	280.888	8689.32	23898.9	10961.3	24.6387
18	290.045	8692.07	23884.5	10954.7	24.6387
19	299.203	8694.81	23859.7	10943.3	24.6387
20	308.958	8698.09	22980	10539.9	24.6388
21	318.714	8701.37	22094.7	10133.8	24.6387
22	334.388	8707.04	19813.4	9087.47	24.6387
23	341.296	8709.95	17982	8247.51	24.6387
24	348.205	8712.87	16223.4	7440.92	24.6387
25	356.32	8716.48	13936.8	6392.14	24.6386
26	364.166	8720.53	11033.5	5060.54	24.6387
27	372.011	8724.58	8424.07	3863.73	24.6387
28	378.71	8729	5478.32	2512.65	24.6387
29	385.409	8733.43	2914.25	1336.63	24.6387
30	392.108	8739.1	525.678	241.104	24.6387
31	398.808	8744.76	0	0	0

Entity Information

External Boundary

X	Y
0.142327	8500
1550.14	8500
1673.71	8500
1673.71	8525.74
1600.14	8545.71
1550.14	8559.19
1506.81	8570
1475.14	8579.81
1450.14	8587.5
1441.94	8590
1441.21	8590.27
1428.42	8595
1400.14	8603.33
1394.42	8605
1391.42	8605.59
1380.41	8608.62
1375.32	8610
1300.14	8637.29
1280.76	8642
1274.46	8643.64

1250.14	8649.11
1175.14	8673.03
1167.18	8675
1159.77	8676.9
1159.75	8676.91
1150.03	8678.47
1125.14	8685.78
1025.14	8710
975.142	8720.97
950.142	8726.36
925.142	8730.23
900.142	8734.23
891.264	8735.72
887.331	8738
878.465	8742
875.147	8742.03
861.3	8742.64
853.268	8743.07
836.06	8744
831.626	8746
800.142	8751.31
775.142	8756.19
751.114	8760
745.891	8762
743.456	8762.45
738.869	8762.81
725.142	8763.33
708.703	8764.04
705.269	8764.35
704.105	8764.77
700.142	8764.52
625.142	8759.69
550.142	8754.87
475.142	8749.59
425.142	8746.02
400.142	8744.84
385.983	8744
375.142	8739
350.142	8730.39
250.142	8696.61
175.142	8673.99
150.142	8666.59
81.1175	8649.22
75.1423	8648.47
73.3372	8648.24
71.532	8648.01
65.213	8648
50.1423	8647.01
0.142327	8643.28
0.142327	8637.11
0.142327	8560

Material Boundary

X	Y
0.142327	8637.11
25.2128	8639.81
61.2462	8642.42
73.3372	8648.24

Material Boundary

X	Y
1159.75	8676.91
1167.11	8670.45
1180.32	8665
1200.14	8656.82
1300.14	8624.3
1335.78	8612.64
1350.3	8609.92
1380.41	8608.62

Material Boundary

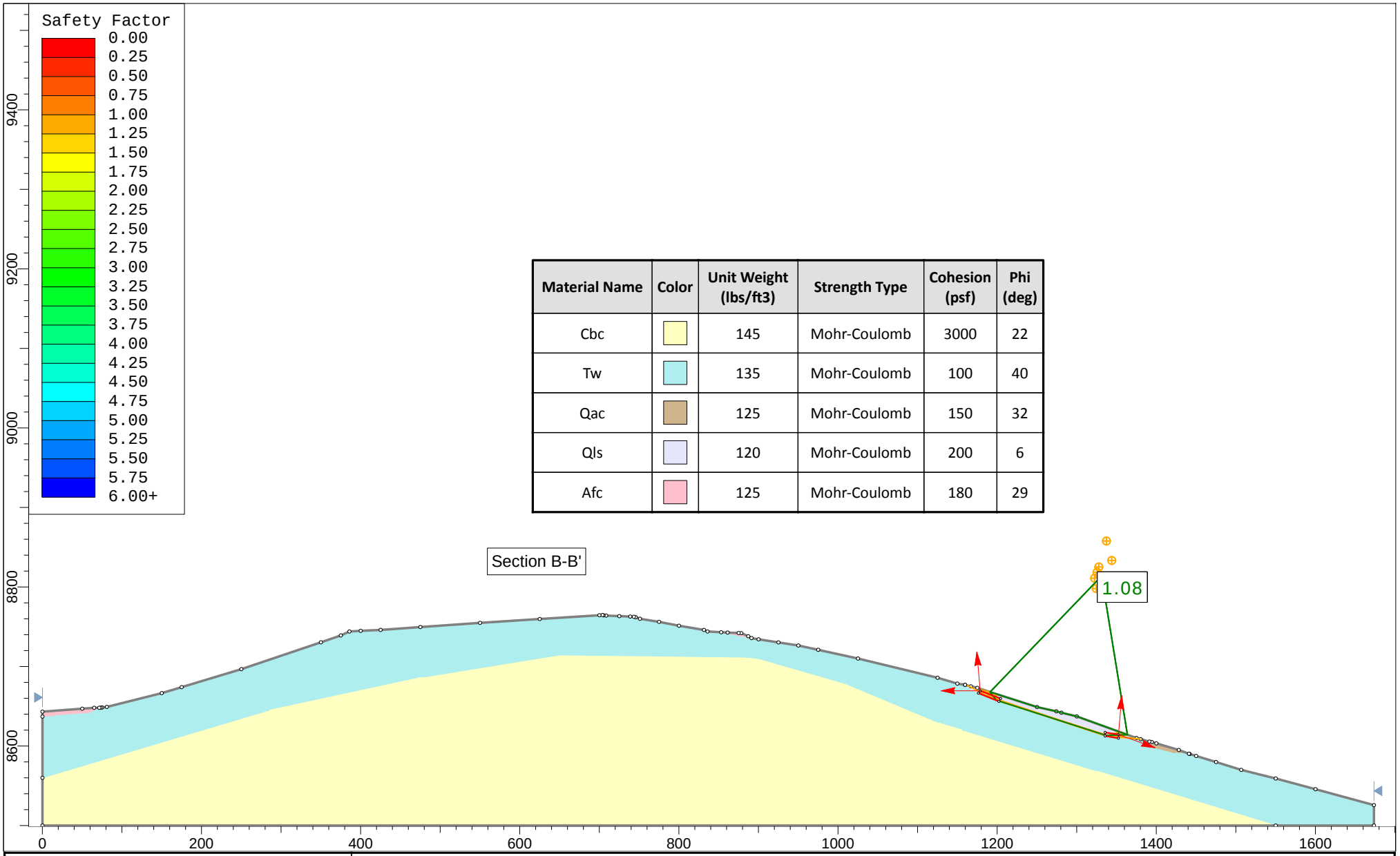
X	Y
1391.42	8605.59
1392.04	8605
1397.05	8600
1400.8	8597.23
1425.14	8590.84
1441.21	8590.27

Material Boundary

X	Y
0.142327	8560
285.205	8645
475.142	8686.03
650.142	8714.5
750.142	8713.32
884.503	8711.73
900.142	8710
1009.67	8678.33
1128.56	8628.52
1156.54	8620
1325.14	8568.68
1550.14	8500

Material Boundary

X	Y
853.268	8743.07
891.264	8735.72



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6
Afc		125	Mohr-Coulomb	180	29

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SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-27-2018	*File Name*	Section BB.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	95
Left Projection Angle (End Angle) [°]:	180
Right Projection Angle (Start Angle) [°]:	-20
Right Projection Angle (End Angle) [°]:	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Qac	Qls	Afc
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120	125
Cohesion [psf]	3000	100	150	200	180
Friction Angle [°]	22	40	32	6	29
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

Global Minimums

Method: spencer

FS	1.083760
Axis Location:	1331.248, 8813.738
Left Slip Surface Endpoint:	1191.146, 8667.924
Right Slip Surface Endpoint:	1363.838, 8614.168
Resisting Moment:	1.05276e+07 lb-ft
Driving Moment:	9.714e+06 lb-ft
Resisting Horizontal Force:	51901.7 lb
Driving Horizontal Force:	47890.5 lb
Total Slice Area:	1498.07 ft2
Surface Horizontal Width:	172.692 ft
Surface Average Height:	8.67479 ft

Global Minimum Coordinates

Method: spencer

X	Y
1191.15	8667.92
1198.88	8657.68
1336.83	8613.38
1363.84	8614.17

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4071
Number of Invalid Surfaces: 929

Error Codes:

Error Code -108 reported for 108 surfaces
Error Code -111 reported for 189 surfaces
Error Code -112 reported for 632 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

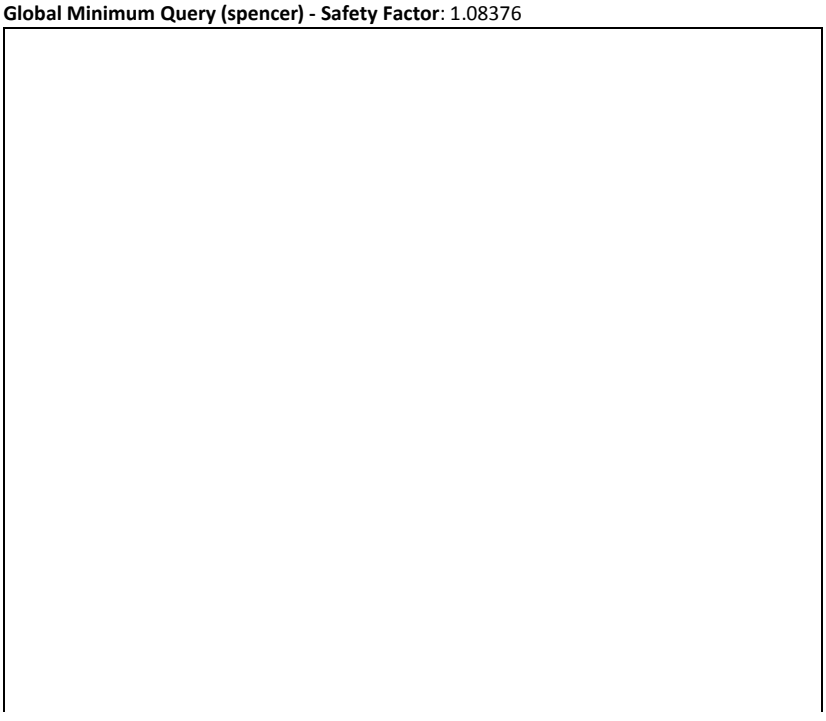
Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.08376

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	7.7361	3610.13	-52.9426	Qls	200	6.00001	202.819	219.807	188.448	0	188.448	457.037	457.037
2	5.74785	5369.04	-17.8047	Qls	200	6.00001	266.706	289.045	847.21	0	847.21	932.864	932.864
3	5.74785	5377.94	-17.8047	Qls	200	6.00001	266.845	289.196	848.646	0	848.646	934.345	934.345
4	5.74785	5386.84	-17.8047	Qls	200	6.00001	266.985	289.347	850.084	0	850.084	935.827	935.827
5	5.74785	5395.74	-17.8047	Qls	200	6.00001	267.124	289.498	851.52	0	851.52	937.308	937.308
6	5.74785	5404.64	-17.8047	Qls	200	6.00001	267.263	289.649	852.957	0	852.957	938.791	938.791
7	5.74785	5413.54	-17.8047	Qls	200	6.00001	267.403	289.8	854.394	0	854.394	940.271	940.271
8	5.74785	5422.44	-17.8047	Qls	200	6.00001	267.542	289.951	855.831	0	855.831	941.754	941.754
9	5.74785	5431.34	-17.8047	Qls	200	6.00001	267.681	290.103	857.268	0	857.268	943.235	943.235
10	5.74785	5441.49	-17.8047	Qls	200	6.00001	267.84	290.275	858.906	0	858.906	944.924	944.924
11	5.74785	5666.18	-17.8047	Qls	200	6.00001	271.359	294.087	895.182	0	895.182	982.33	982.33
12	5.74785	6048.13	-17.8047	Qls	200	6.00001	277.339	300.569	956.847	0	956.847	1045.92	1045.92
13	5.74785	6430.07	-17.8047	Qls	200	6.00001	283.319	307.05	1018.51	0	1018.51	1109.5	1109.5
14	5.74785	6812.01	-17.8047	Qls	200	6.00001	289.299	313.531	1080.17	0	1080.17	1173.08	1173.08
15	5.74785	7142.32	-17.8047	Qls	200	6.00001	294.471	319.136	1133.5	0	1133.5	1228.07	1228.07
16	5.74785	7403.09	-17.8047	Qls	200	6.00001	298.554	323.561	1175.6	0	1175.6	1271.49	1271.49
17	5.74785	7710.01	-17.8047	Qls	200	6.00001	303.36	328.769	1225.15	0	1225.15	1322.58	1322.58
18	5.74785	8019.02	-17.8047	Qls	200	6.00001	308.197	334.012	1275.04	0	1275.04	1374.02	1374.02
19	5.74785	8293.23	-17.8047	Qls	200	6.00001	312.491	338.665	1319.31	0	1319.31	1419.67	1419.67
20	5.74785	8217.98	-17.8047	Qls	200	6.00001	311.313	337.389	1307.17	0	1307.17	1407.15	1407.15
21	5.74785	8052.38	-17.8047	Qls	200	6.00001	308.72	334.578	1280.43	0	1280.43	1379.58	1379.58
22	5.74785	7886.77	-17.8047	Qls	200	6.00001	306.127	331.768	1253.69	0	1253.69	1352.01	1352.01
23	5.74785	7721.16	-17.8047	Qls	200	6.00001	303.534	328.958	1226.95	0	1226.95	1324.44	1324.44
24	5.74785	7555.55	-17.8047	Qls	200	6.00001	300.941	326.148	1200.22	0	1200.22	1296.87	1296.87
25	5.74785	7389.94	-17.8047	Qls	200	6.00001	298.348	323.338	1173.48	0	1173.48	1269.3	1269.3
26	5.40156	6180.22	1.68	Qls	200	6.00001	303.182	328.576	1223.31	0	1223.31	1214.42	1214.42
27	5.40156	4806.84	1.68	Qls	200	6.00001	277.786	301.053	961.458	0	961.458	953.311	953.311
28	5.40156	3433.46	1.68	Qls	200	6.00001	252.391	273.531	699.602	0	699.602	692.2	692.2
29	5.40156	2060.07	1.68	Qls	200	6.00001	226.996	246.009	437.744	0	437.744	431.087	431.087
30	5.40156	686.691	1.68	Qls	200	6.00001	201.833	218.739	178.286	0	178.286	172.366	172.366

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.08376



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1191.15	8667.92	0	0	0
2	1198.88	8657.68	361.23	74.9621	11.7236
3	1204.63	8655.83	391.804	81.307	11.7236
4	1210.38	8653.99	424.231	88.0361	11.7236
5	1216.13	8652.14	458.508	95.1494	11.7236
6	1221.87	8650.29	494.637	102.647	11.7236
7	1227.62	8648.45	532.618	110.529	11.7236
8	1233.37	8646.6	572.449	118.794	11.7236
9	1239.12	8644.76	614.133	127.444	11.7235
10	1244.86	8642.91	657.667	136.479	11.7236
11	1250.61	8641.07	703.313	145.951	11.7236
12	1256.36	8639.22	795.697	165.122	11.7235
13	1262.11	8637.37	967.528	200.781	11.7236
14	1267.86	8635.53	1218.81	252.926	11.7236
15	1273.6	8633.68	1549.53	321.558	11.7236
16	1279.35	8631.84	1948.97	404.448	11.7236
17	1285.1	8629.99	2402.64	498.595	11.7236
18	1290.85	8628.14	2920.16	605.99	11.7236
19	1296.6	8626.3	3501.95	726.723	11.7236
20	1302.34	8624.45	4140.78	859.293	11.7236
21	1308.09	8622.61	4763.96	988.615	11.7236
22	1313.84	8620.76	5352.7	1110.79	11.7236
23	1319.59	8618.91	5906.98	1225.81	11.7236
24	1325.33	8617.07	6426.82	1333.69	11.7236
25	1331.08	8615.22	6912.2	1434.42	11.7236
26	1336.83	8613.38	7363.14	1528	11.7236
27	1342.23	8613.53	5531.32	1147.86	11.7236
28	1347.63	8613.69	3878.18	804.797	11.7236
29	1353.04	8613.85	2403.73	498.82	11.7236
30	1358.44	8614.01	1107.97	229.925	11.7236
31	1363.84	8614.17	0	0	0

Entity Information

Block Search Window

X	Y
1176.44	8666.6
1202.25	8656.14
1204.33	8659.77
1178.82	8669.41

Block Search Window

X	Y
1352.47	8609.82
1352.47	8614.39
1335.78	8617.15
1335.78	8612.64

External Boundary

X	Y
0.142327	8500
1550.14	8500
1673.71	8500
1673.71	8525.74

1600.14	8545.71
1550.14	8559.19
1506.81	8570
1475.14	8579.81
1450.14	8587.5
1441.94	8590
1441.21	8590.27
1428.42	8595
1400.14	8603.33
1394.42	8605
1391.42	8605.59
1380.41	8608.62
1375.32	8610
1300.14	8637.29
1280.76	8642
1274.46	8643.64
1250.14	8649.11
1175.14	8673.03
1167.18	8675
1159.77	8676.9
1159.75	8676.91
1150.03	8678.47
1125.14	8685.78
1025.14	8710
975.142	8720.97
950.142	8726.36
925.142	8730.23
900.142	8734.23
891.264	8735.72
887.331	8738
878.465	8742
875.147	8742.03
861.3	8742.64
853.268	8743.07
836.06	8744
831.626	8746
800.142	8751.31
775.142	8756.19
751.114	8760
745.891	8762
743.456	8762.45
738.869	8762.81
725.142	8763.33
708.703	8764.04
705.269	8764.35
704.105	8764.77
700.142	8764.52
625.142	8759.69
550.142	8754.87
475.142	8749.59
425.142	8746.02
400.142	8744.84
385.983	8744
375.142	8739
350.142	8730.39
250.142	8696.61
175.142	8673.99
150.142	8666.59
81.1175	8649.22
75.1423	8648.47
73.3372	8648.24

71.532	8648.01
65.213	8648
50.1423	8647.01
0.142327	8643.28
0.142327	8637.11
0.142327	8560

Material Boundary

X	Y
0.142327	8637.11
25.2128	8639.81
61.2462	8642.42
73.3372	8648.24

Material Boundary

X	Y
1159.75	8676.91
1167.11	8670.45
1180.32	8665
1200.14	8656.82
1300.14	8624.3
1335.78	8612.64
1350.3	8609.92
1380.41	8608.62

Material Boundary

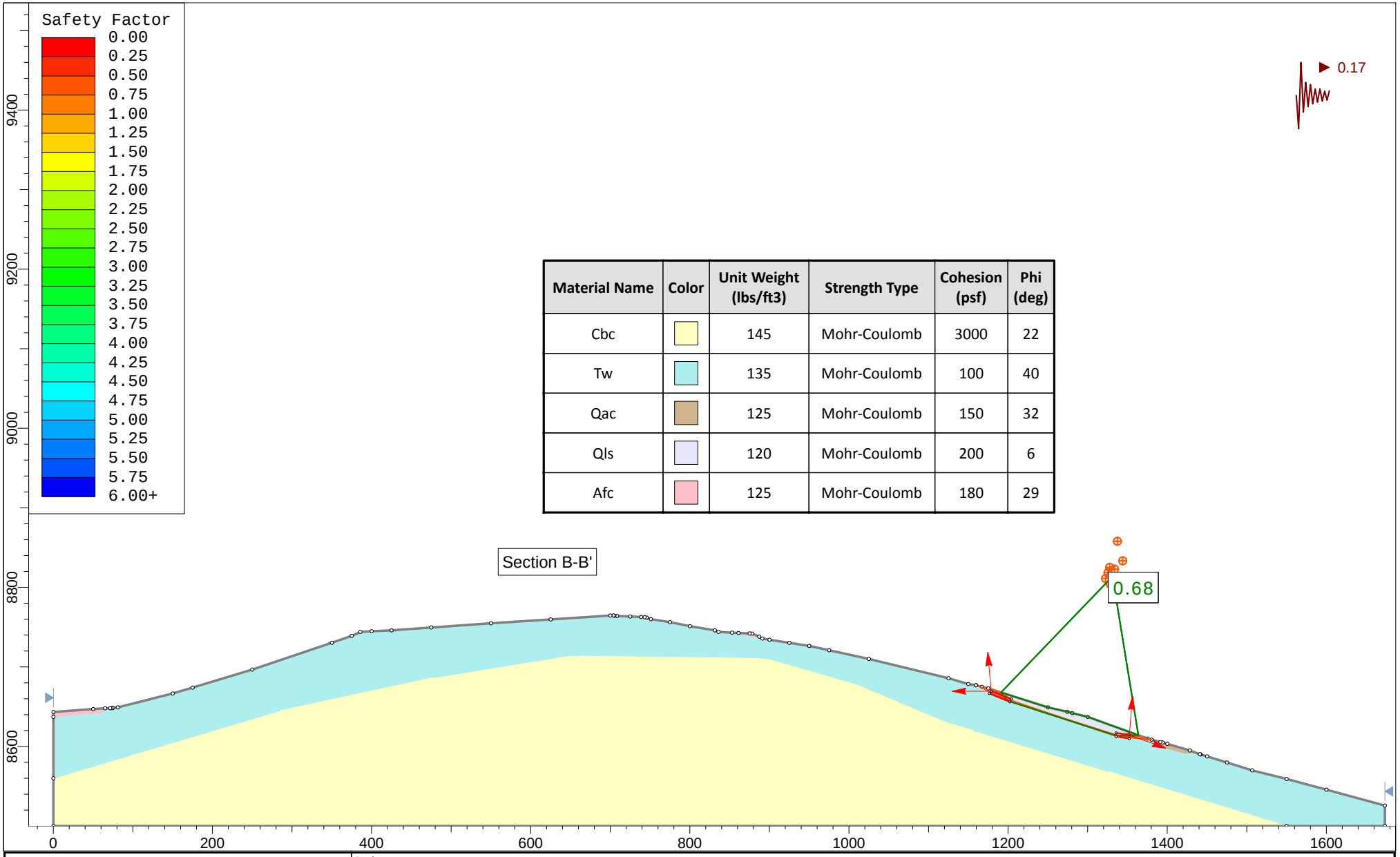
X	Y
1391.42	8605.59
1392.04	8605
1397.05	8600
1400.8	8597.23
1425.14	8590.84
1441.21	8590.27

Material Boundary

X	Y
0.142327	8560
285.205	8645
475.142	8686.03
650.142	8714.5
750.142	8713.32
884.503	8711.73
900.142	8710
1009.67	8678.33
1128.56	8628.52
1156.54	8620
1325.14	8568.68
1550.14	8500

Material Boundary

X	Y
853.268	8743.07
891.264	8735.72



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Cbc		145	Mohr-Coulomb	3000	22
Tw		135	Mohr-Coulomb	100	40
Qac		125	Mohr-Coulomb	150	32
Qls		120	Mohr-Coulomb	200	6
Afc		125	Mohr-Coulomb	180	29

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase I & II			
Analysis Description	Method : Spencer			
Drawn By	EBF	*Scale*	1:2000	*Company* IGES, Inc.
Date	12-27-2018			*File Name* Section BB.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase I & II

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	95
Left Projection Angle (End Angle) [°]:	180
Right Projection Angle (Start Angle) [°]:	-20
Right Projection Angle (End Angle) [°]:	85
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Qac	Qls	Afc
Color					
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125	120	125
Cohesion [psf]	3000	100	150	200	180
Friction Angle [°]	22	40	32	6	29
Water Surface	None	None	None	None	None
Ru Value	0	0	0	0	0

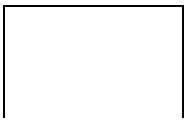
Global Minimums

Method: spencer

FS	0.683781
Axis Location:	1331.248, 8813.738
Left Slip Surface Endpoint:	1191.146, 8667.924
Right Slip Surface Endpoint:	1363.838, 8614.168
Resisting Moment:	1.0303e+07 lb-ft
Driving Moment:	1.50676e+07 lb-ft
Resisting Horizontal Force:	51063.2 lb
Driving Horizontal Force:	74677.8 lb
Total Slice Area:	1498.07 ft2
Surface Horizontal Width:	172.692 ft
Surface Average Height:	8.67479 ft

Global Minimum Coordinates

Method: spencer



X	Y
1191.15	8667.92
1198.88	8657.68
1336.83	8613.38
1363.84	8614.17

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3699
Number of Invalid Surfaces: 1301

Error Codes:

Error Code -108 reported for 65 surfaces
Error Code -111 reported for 597 surfaces
Error Code -112 reported for 639 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

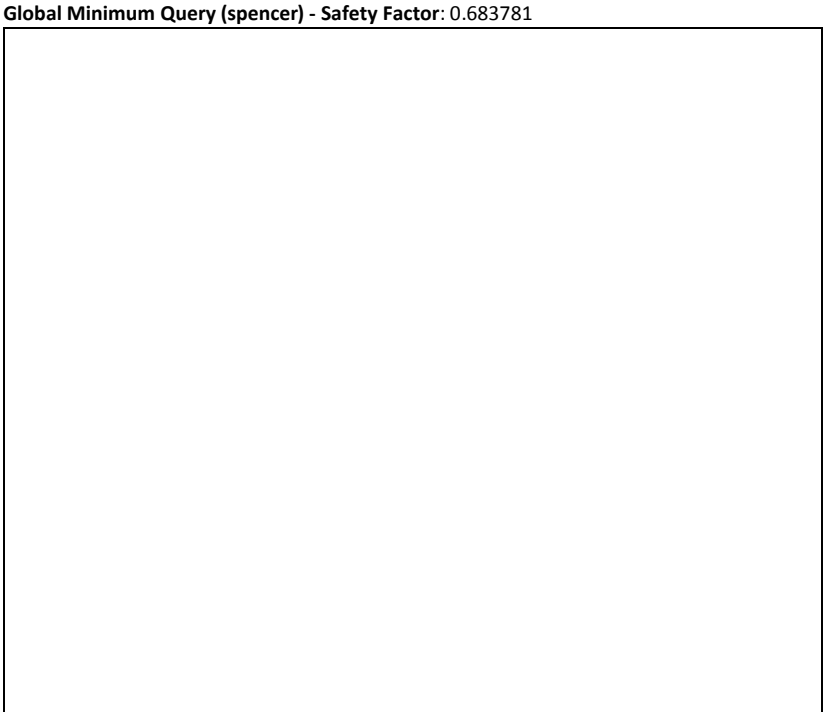
Slice Data

Global Minimum Query (spencer) - Safety Factor: 0.683781

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	7.7361	3610.13	-52.9426	Qls	200	6.00001	306.233	209.396	89.3986	0	89.3986	494.938	494.938
2	5.74785	5369.04	-17.8047	Qls	200	6.00001	415.52	284.125	800.395	0	800.395	933.841	933.841
3	5.74785	5377.94	-17.8047	Qls	200	6.00001	415.725	284.265	801.728	0	801.728	935.241	935.241
4	5.74785	5386.84	-17.8047	Qls	200	6.00001	415.93	284.405	803.06	0	803.06	936.638	936.638
5	5.74785	5395.74	-17.8047	Qls	200	6.00001	416.135	284.545	804.394	0	804.394	938.038	938.038
6	5.74785	5404.64	-17.8047	Qls	200	6.00001	416.34	284.685	805.727	0	805.727	939.437	939.437
7	5.74785	5413.54	-17.8047	Qls	200	6.00001	416.545	284.826	807.06	0	807.06	940.836	940.836
8	5.74785	5422.44	-17.8047	Qls	200	6.00001	416.75	284.966	808.394	0	808.394	942.235	942.235
9	5.74785	5431.34	-17.8047	Qls	200	6.00001	416.955	285.106	809.727	0	809.727	943.635	943.635
10	5.74785	5441.49	-17.8047	Qls	200	6.00001	417.189	285.266	811.248	0	811.248	945.23	945.23
11	5.74785	5666.18	-17.8047	Qls	200	6.00001	422.363	288.803	844.909	0	844.909	980.553	980.553
12	5.74785	6048.13	-17.8047	Qls	200	6.00001	431.158	294.817	902.128	0	902.128	1040.6	1040.6
13	5.74785	6430.07	-17.8047	Qls	200	6.00001	439.952	300.831	959.345	0	959.345	1100.64	1100.64
14	5.74785	6812.01	-17.8047	Qls	200	6.00001	448.747	306.845	1016.56	0	1016.56	1160.68	1160.68
15	5.74785	7142.32	-17.8047	Qls	200	6.00001	456.354	312.046	1066.04	0	1066.04	1212.6	1212.6
16	5.74785	7403.09	-17.8047	Qls	200	6.00001	462.359	316.152	1105.11	0	1105.11	1253.6	1253.6
17	5.74785	7710.01	-17.8047	Qls	200	6.00001	469.425	320.984	1151.09	0	1151.09	1301.85	1301.85
18	5.74785	8019.02	-17.8047	Qls	200	6.00001	476.541	325.85	1197.38	0	1197.38	1350.42	1350.42
19	5.74785	8293.23	-17.8047	Qls	200	6.00001	482.855	330.167	1238.46	0	1238.46	1393.53	1393.53
20	5.74785	8217.98	-17.8047	Qls	200	6.00001	481.123	328.983	1227.19	0	1227.19	1381.7	1381.7
21	5.74785	8052.38	-17.8047	Qls	200	6.00001	477.309	326.375	1202.38	0	1202.38	1355.67	1355.67
22	5.74785	7886.77	-17.8047	Qls	200	6.00001	473.495	323.767	1177.57	0	1177.57	1329.63	1329.63
23	5.74785	7721.16	-17.8047	Qls	200	6.00001	469.683	321.16	1152.76	0	1152.76	1303.6	1303.6
24	5.74785	7555.55	-17.8047	Qls	200	6.00001	465.868	318.552	1127.95	0	1127.95	1277.57	1277.57
25	5.74785	7389.94	-17.8047	Qls	200	6.00001	462.056	315.945	1103.14	0	1103.14	1251.53	1251.53
26	5.40156	6180.22	1.68	Qls	200	6.00001	486.071	332.366	1259.38	0	1259.38	1245.12	1245.12
27	5.40156	4806.84	1.68	Qls	200	6.00001	446.631	305.398	1002.8	0	1002.8	989.699	989.699
28	5.40156	3433.46	1.68	Qls	200	6.00001	407.193	278.431	746.219	0	746.219	734.276	734.276
29	5.40156	2060.07	1.68	Qls	200	6.00001	367.754	251.463	489.638	0	489.638	478.852	478.852
30	5.40156	686.691	1.68	Qls	200	6.00001	328.793	224.822	236.169	0	236.169	226.526	226.526

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 0.683781



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1191.15	8667.92	0	0	0
2	1198.88	8657.68	-843.805	-259.486	17.0937
3	1204.63	8655.83	-846.312	-260.257	17.0937
4	1210.38	8653.99	-846.024	-260.169	17.0937
5	1216.13	8652.14	-842.942	-259.221	17.0937
6	1221.87	8650.29	-837.066	-257.414	17.0937
7	1227.62	8648.45	-828.395	-254.748	17.0937
8	1233.37	8646.6	-816.931	-251.222	17.0937
9	1239.12	8644.76	-802.672	-246.837	17.0937
10	1244.86	8642.91	-785.619	-241.593	17.0937
11	1250.61	8641.07	-765.38	-235.369	17.0937
12	1256.36	8639.22	-674.601	-207.453	17.0937
13	1262.11	8637.37	-463.915	-142.663	17.0937
14	1267.86	8635.53	-133.322	-40.999	17.0936
15	1273.6	8633.68	317.178	97.5384	17.0937
16	1279.35	8631.84	871.373	267.964	17.0937
17	1285.1	8629.99	1507.43	463.565	17.0937
18	1290.85	8628.14	2239.85	688.798	17.0937
19	1296.6	8626.3	3069.28	943.862	17.0937
20	1302.34	8624.45	3984.78	1225.4	17.0937
21	1308.09	8622.61	4876.67	1499.67	17.0937
22	1313.84	8620.76	5716.57	1757.96	17.0937
23	1319.59	8618.91	6504.48	2000.25	17.0936
24	1325.33	8617.07	7240.39	2226.56	17.0937
25	1331.08	8615.22	7924.32	2436.88	17.0937
26	1336.83	8613.38	8556.25	2631.21	17.0937
27	1342.23	8613.53	6777	2084.06	17.0937
28	1347.63	8613.69	5018.36	1543.24	17.0936
29	1353.04	8613.85	3280.31	1008.76	17.0937
30	1358.44	8614.01	1562.86	480.608	17.0936
31	1363.84	8614.17	0	0	0

Entity Information

Block Search Window

X	Y
1176.44	8666.6
1202.25	8656.14
1204.33	8659.77
1178.82	8669.41

Block Search Window

X	Y
1352.47	8609.82
1352.47	8614.39
1335.78	8617.15
1335.78	8612.64

External Boundary

X	Y
0.142327	8500
1550.14	8500
1673.71	8500
1673.71	8525.74

1600.14	8545.71
1550.14	8559.19
1506.81	8570
1475.14	8579.81
1450.14	8587.5
1441.94	8590
1441.21	8590.27
1428.42	8595
1400.14	8603.33
1394.42	8605
1391.42	8605.59
1380.41	8608.62
1375.32	8610
1300.14	8637.29
1280.76	8642
1274.46	8643.64
1250.14	8649.11
1175.14	8673.03
1167.18	8675
1159.77	8676.9
1159.75	8676.91
1150.03	8678.47
1125.14	8685.78
1025.14	8710
975.142	8720.97
950.142	8726.36
925.142	8730.23
900.142	8734.23
891.264	8735.72
887.331	8738
878.465	8742
875.147	8742.03
861.3	8742.64
853.268	8743.07
836.06	8744
831.626	8746
800.142	8751.31
775.142	8756.19
751.114	8760
745.891	8762
743.456	8762.45
738.869	8762.81
725.142	8763.33
708.703	8764.04
705.269	8764.35
704.105	8764.77
700.142	8764.52
625.142	8759.69
550.142	8754.87
475.142	8749.59
425.142	8746.02
400.142	8744.84
385.983	8744
375.142	8739
350.142	8730.39
250.142	8696.61
175.142	8673.99
150.142	8666.59
81.1175	8649.22
75.1423	8648.47
73.3372	8648.24

71.532	8648.01
65.213	8648
50.1423	8647.01
0.142327	8643.28
0.142327	8637.11
0.142327	8560

Material Boundary

X	Y
0.142327	8637.11
25.2128	8639.81
61.2462	8642.42
73.3372	8648.24

Material Boundary

X	Y
1159.75	8676.91
1167.11	8670.45
1180.32	8665
1200.14	8656.82
1300.14	8624.3
1335.78	8612.64
1350.3	8609.92
1380.41	8608.62

Material Boundary

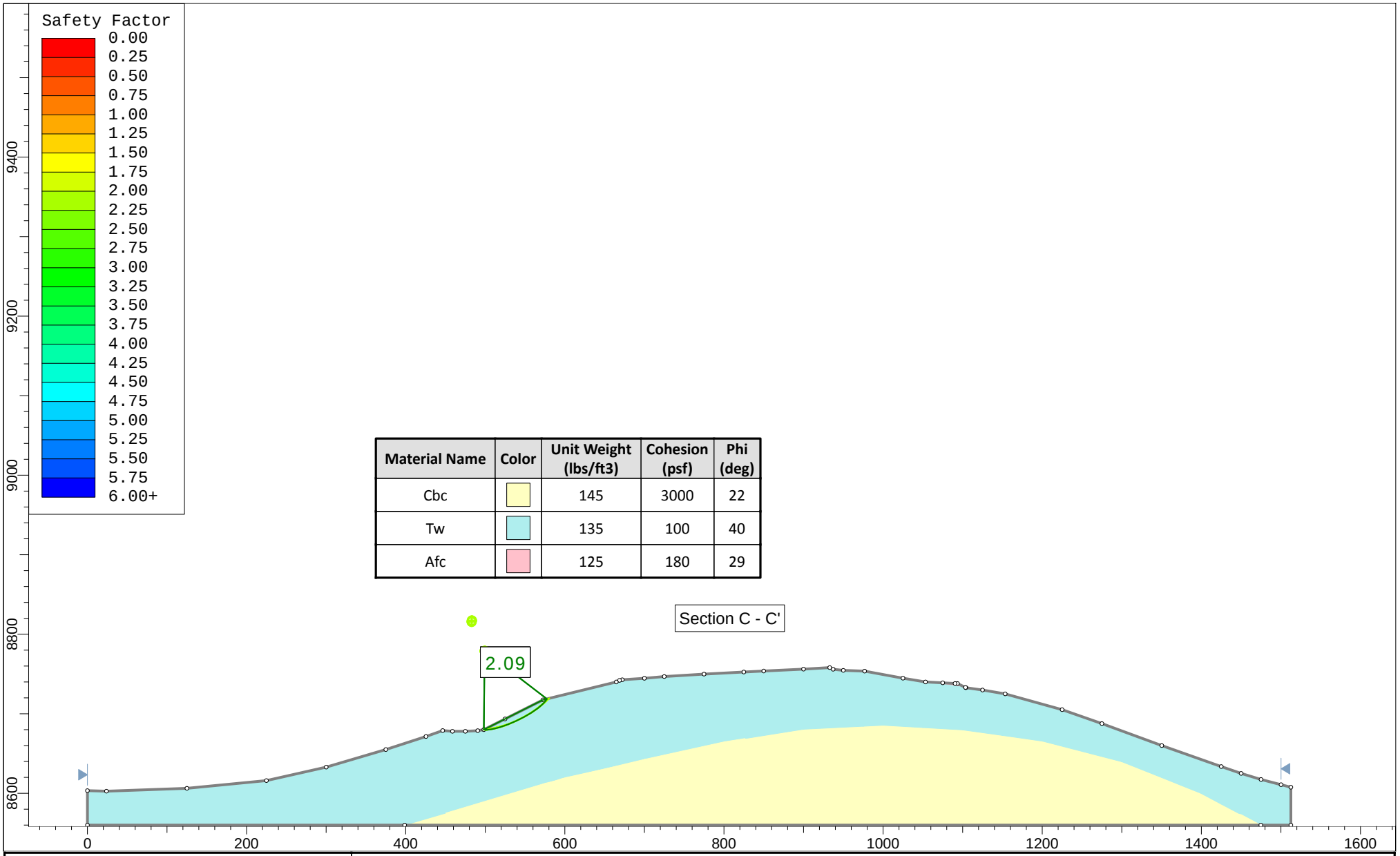
X	Y
1391.42	8605.59
1392.04	8605
1397.05	8600
1400.8	8597.23
1425.14	8590.84
1441.21	8590.27

Material Boundary

X	Y
0.142327	8560
285.205	8645
475.142	8686.03
650.142	8714.5
750.142	8713.32
884.503	8711.73
900.142	8710
1009.67	8678.33
1128.56	8628.52
1156.54	8620
1325.14	8568.68
1550.14	8500

Material Boundary

X	Y
853.268	8743.07
891.264	8735.72



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Cbc		145	3000	22
Tw		135	100	40
Afc		125	180	29

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase II & III		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section CC.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase II & III

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Afc
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125
Cohesion [psf]	3000	100	180
Friction Angle [°]	22	40	29
Water Surface	None	None	None
Ru Value	0	0	0

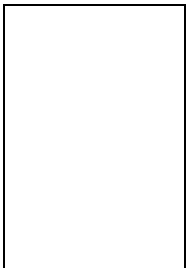
Global Minimums

Method: spencer

FS	2.088530
Axis Location:	499.239, 8778.686
Left Slip Surface Endpoint:	498.195, 8680.000
Right Slip Surface Endpoint:	577.561, 8718.639
Resisting Moment:	6.47899e+06 lb-ft
Driving Moment:	3.10218e+06 lb-ft
Resisting Horizontal Force:	59682.1 lb
Driving Horizontal Force:	28576.2 lb
Total Slice Area:	555.548 ft2
Surface Horizontal Width:	79.366 ft
Surface Average Height:	6.99982 ft

Global Minimum Coordinates

Method: spencer



X	Y
498.195	8680
501.12	8679.67
504.149	8679.95
507.177	8680.4
510.574	8681.03
513.971	8681.86
517.401	8682.79
520.849	8683.85
525.144	8685.33
529.785	8686.98
532.998	8688.37
536.21	8689.81
539.422	8691.33
542.634	8692.89
545.846	8694.55
549.058	8696.24
552.27	8697.96
555.095	8699.6
557.495	8701.03
559.896	8702.47
563.436	8704.9
566.867	8707.36
570.233	8710.22
572.874	8712.89
575.218	8715.43
577.561	8718.64

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3100
Number of Invalid Surfaces: 1406

Error Codes:

Error Code -105 reported for 639 surfaces
Error Code -106 reported for 619 surfaces
Error Code -108 reported for 130 surfaces
Error Code -111 reported for 1 surface
Error Code -1000 reported for 17 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-1000 = No valid slip surface is generated

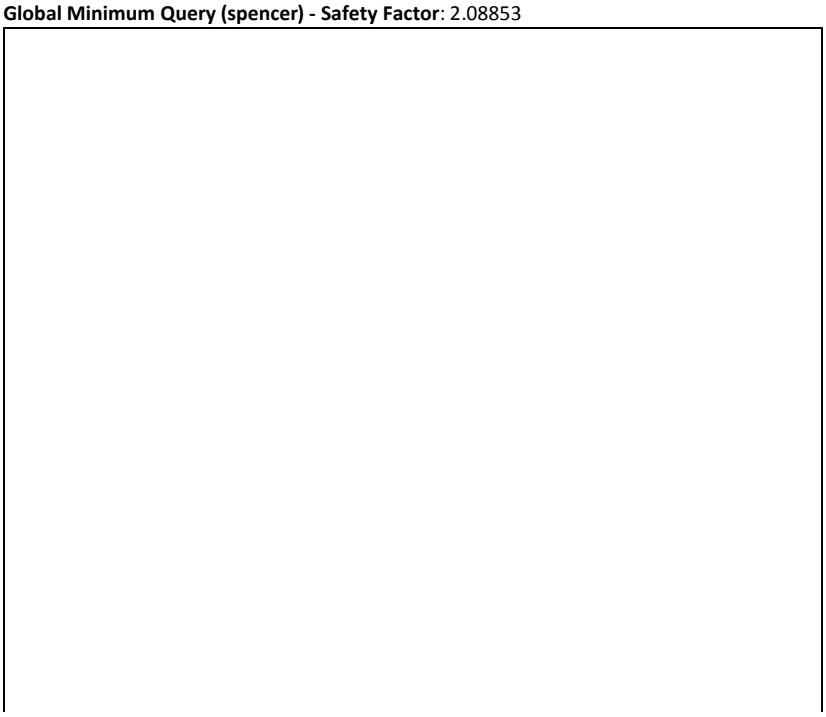
Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.08853

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.92524	355.942	-6.47485	Tw	100	40	130.82	273.222	206.438	0	206.438	191.591	191.591
2	3.02844	989.941	5.37993	Tw	100	40	201.822	421.512	383.162	0	383.162	402.169	402.169
3	3.02844	1462.43	8.42517	Tw	100	40	259.581	542.143	526.924	0	526.924	565.372	565.372
4	3.39668	2132.85	10.56	Tw	100	40	311.356	650.276	655.793	0	655.793	713.837	713.837
5	1.69834	1240.23	13.643	Tw	100	40	338.017	705.959	722.151	0	722.151	804.195	804.195
6	1.69834	1341.48	13.643	Tw	100	40	361.38	754.753	780.303	0	780.303	868.018	868.018
7	1.71516	1451.68	15.2268	Tw	100	40	374.919	783.03	814	0	814	916.052	916.052
8	1.71516	1543.24	15.2268	Tw	100	40	395.336	825.672	864.823	0	864.823	972.432	972.432
9	1.72422	1637.03	16.9801	Tw	100	40	404.1	843.975	886.632	0	886.632	1010.02	1010.02
10	1.72422	1716.25	16.9801	Tw	100	40	421.211	879.712	929.227	0	929.227	1057.84	1057.84
11	2.14741	2235.94	19.0329	Tw	100	40	425.698	889.084	940.392	0	940.392	1087.25	1087.25
12	2.14741	2334.16	19.0329	Tw	100	40	442.213	923.575	981.5	0	981.5	1134.05	1134.05
13	2.3206	2628.34	19.6426	Tw	100	40	454.746	949.751	1012.69	0	1012.69	1175	1175
14	2.3206	2734.1	19.6426	Tw	100	40	471.05	983.802	1053.27	0	1053.27	1221.4	1221.4
15	3.21221	3907.17	23.3398	Tw	100	40	459.996	960.716	1025.76	0	1025.76	1224.25	1224.25
16	3.21209	3993.3	24.1998	Tw	100	40	463.426	967.879	1034.3	0	1034.3	1242.57	1242.57
17	3.21209	4050.32	25.3371	Tw	100	40	461.875	964.64	1030.44	0	1030.44	1249.13	1249.13
18	3.21209	4082.69	25.8646	Tw	100	40	461.728	964.333	1030.07	0	1030.07	1253.92	1253.92
19	3.21196	4085.08	27.3074	Tw	100	40	452.642	945.357	1007.46	0	1007.46	1241.16	1241.16
20	3.21196	4059.27	27.7246	Tw	100	40	447.423	934.456	994.466	0	994.466	1229.61	1229.61
21	3.21196	4019.79	28.1872	Tw	100	40	440.624	920.257	977.544	0	977.544	1213.68	1213.68
22	2.82494	3473.04	30.1191	Tw	100	40	421.91	881.172	930.966	0	930.966	1175.73	1175.73
23	2.4007	2878.68	30.88	Tw	100	40	408.18	852.497	896.791	0	896.791	1140.89	1140.89
24	2.4007	2803.54	30.9602	Tw	100	40	398.265	831.788	872.111	0	872.111	1111.04	1111.04
25	3.54032	3924.04	34.4071	Tw	100	40	361.937	755.916	781.69	0	781.69	1029.58	1029.58
26	3.43068	3481.06	35.7046	Tw	100	40	328.866	686.846	699.375	0	699.375	935.729	935.729
27	3.36559	2980.9	40.3536	Tw	100	40	273.303	570.802	561.081	0	561.081	793.299	793.299
28	2.64164	1893	45.215	Tw	100	40	212.943	444.738	410.842	0	410.842	625.389	625.389
29	2.34338	1145.98	47.3041	Tw	100	40	153.537	320.666	262.98	0	262.98	429.39	429.39
30	2.34338	417.507	53.8986	Tw	100	40	74.9678	156.572	67.4203	0	67.4203	170.222	170.222

Interslice Data

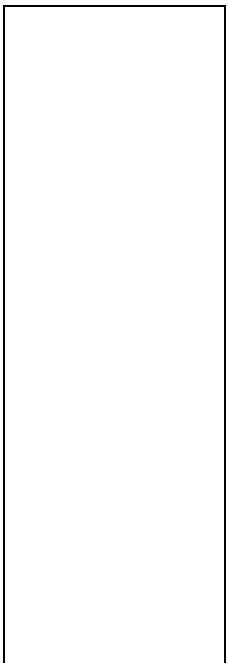
Global Minimum Query (spencer) - Safety Factor: 2.08853



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	498.195	8680	0	0	0
2	501.12	8679.67	451.216	205	24.4336
3	504.149	8679.95	953.148	433.042	24.4336
4	507.177	8680.4	1502.92	682.819	24.4336
5	510.574	8681.03	2145.24	974.644	24.4337
6	512.272	8681.45	2421.62	1100.21	24.4336
7	513.971	8681.86	2713.72	1232.92	24.4336
8	515.686	8682.33	2976.74	1352.42	24.4337
9	517.401	8682.79	3251.06	1477.05	24.4337
10	519.125	8683.32	3481.01	1581.52	24.4336
11	520.849	8683.85	3718.05	1689.21	24.4336
12	522.997	8684.59	3935.56	1788.04	24.4337
13	525.144	8685.33	4158.09	1889.14	24.4337
14	527.465	8686.16	4374.59	1987.5	24.4336
15	529.785	8686.98	4595.32	2087.78	24.4336
16	532.998	8688.37	4651.18	2113.16	24.4336
17	536.21	8689.81	4646.68	2111.12	24.4337
18	539.422	8691.33	4563.09	2073.14	24.4336
19	542.634	8692.89	4442.12	2018.18	24.4336
20	545.846	8694.55	4225.28	1919.67	24.4337
21	549.058	8696.24	3983.66	1809.89	24.4336
22	552.27	8697.96	3716.27	1688.41	24.4337
23	555.095	8699.6	3382.47	1536.75	24.4336
24	557.495	8701.03	3074.91	1397.02	24.4337
25	559.896	8702.47	2775	1260.76	24.4336
26	563.436	8704.9	2160.97	981.791	24.4337
27	566.867	8707.36	1564.82	710.943	24.4337
28	570.233	8710.22	880.16	399.882	24.4337
29	572.874	8712.89	349.21	158.656	24.4336
30	575.218	8715.43	41.0737	18.6609	24.4336
31	577.561	8718.64	0	0	0

Entity Information

External Boundary



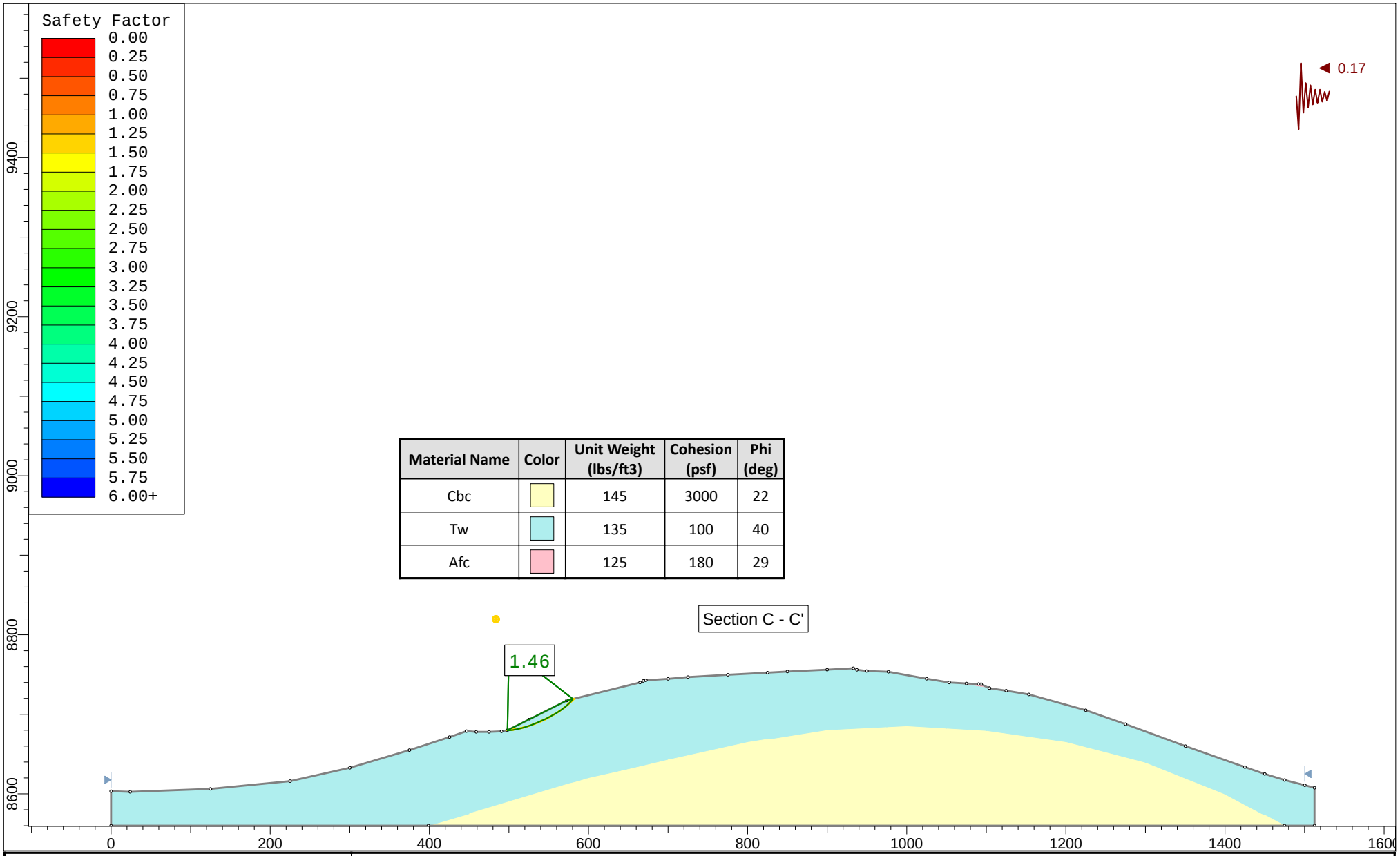
X	Y
1.51619e-06	8560
398.77	8560
1474.79	8560
1512.5	8560
1512.5	8607.68
1500.23	8610.84
1475	8617.42
1450	8625
1425	8633.66
1350.3	8660
1275	8687.64
1225	8705.2
1153.5	8725
1125	8729.8
1104.1	8732.8
1103.65	8733.02
1093.49	8738
1090.41	8738.05
1075	8738.84
1053.44	8740
1025	8744.73
976.909	8753.55
950	8754.53
937.28	8756
932.949	8758
900	8756.16
850	8753.78
825	8752.43
775.08	8749.79
725	8746.81
700	8744.61
672.258	8742.79
668.812	8742
664.775	8740
572.732	8717.46
524.934	8693.44
498.195	8680
490.626	8678.68
475	8677.93
458.83	8677.9
446.597	8678.93
425.424	8671.43
375	8655
300.171	8632.88
225	8615.99
125	8606.24
24.004	8602.6
1.51619e-06	8603.39

Material Boundary

X	Y
1053.44	8740
1103.65	8733.02

Material Boundary

X	Y
398.77	8560
450	8575
575	8612.54
598.284	8620
700	8642.58
800.413	8664.75
825	8668.67
900	8680.56
975	8684.37
1000	8685.56
1050	8682.65
1100	8679.73
1150	8672.72
1200.45	8665.6
1250.39	8652.63
1300	8639.74
1350	8619.81
1374.55	8610
1399.18	8600.16
1425	8586.44
1450	8573.17
1474.79	8560



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Cbc		145	3000	22
Tw		135	100	40
Afc		125	180	29

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase II & III		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-27-2018		*File Name* Section CC.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase II & III

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Afc
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	125
Cohesion [psf]	3000	100	180
Friction Angle [°]	22	40	29
Water Surface	None	None	None
Ru Value	0	0	0

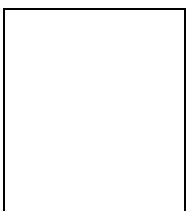
Global Minimums

Method: spencer

FS	1.458710
Axis Location:	499.964, 8781.878
Left Slip Surface Endpoint:	498.195, 8680.000
Right Slip Surface Endpoint:	580.405, 8719.336
Resisting Moment:	6.52682e+06 lb-ft
Driving Moment:	4.47438e+06 lb-ft
Resisting Horizontal Force:	58887.9 lb
Driving Horizontal Force:	40369.8 lb
Total Slice Area:	582.323 ft2
Surface Horizontal Width:	82.2096 ft
Surface Average Height:	7.08339 ft

Global Minimum Coordinates

Method: spencer



X	Y
498.195	8680
501.113	8679.91
504.674	8680.29
508.236	8680.97
511.984	8681.76
515.764	8682.61
519.859	8683.81
521.919	8684.45
525.442	8685.61
530.414	8687.49
533.439	8688.69
536.465	8689.89
539.482	8691.25
542.498	8692.62
545.515	8693.99
548.532	8695.55
551.549	8697.11
555.096	8698.97
558.332	8700.91
560.934	8702.5
562.986	8703.72
566.1	8705.88
569.221	8708.09
572.224	8710.71
575.023	8713.29
577.713	8715.97
580.405	8719.34

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 2953
Number of Invalid Surfaces: 1553

Error Codes:

Error Code -105 reported for 555 surfaces
Error Code -106 reported for 811 surfaces
Error Code -108 reported for 58 surfaces
Error Code -111 reported for 115 surfaces
Error Code -1000 reported for 14 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-1000 = No valid slip surface is generated

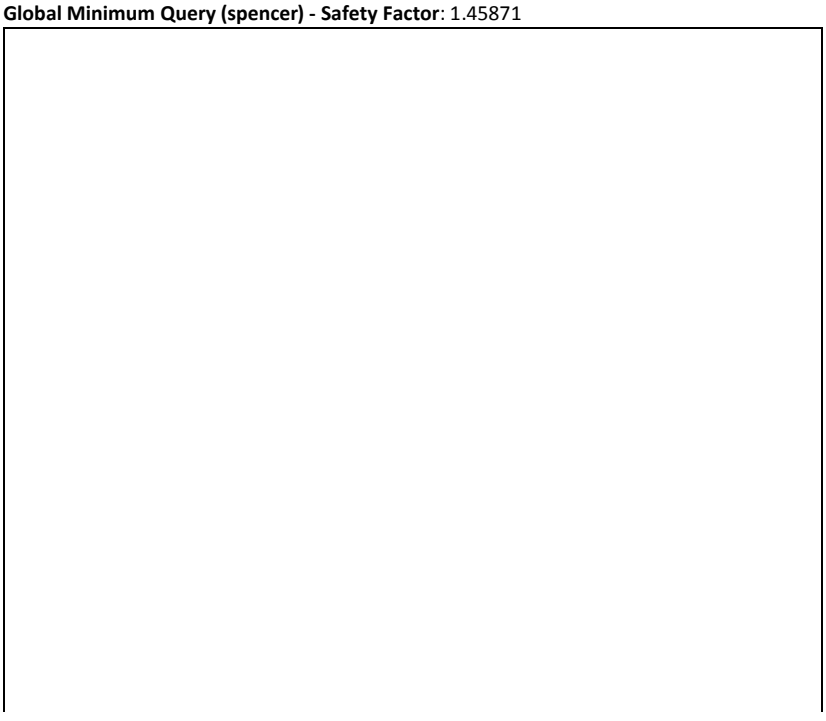
Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.45871

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.91774	307.267	-1.83044	Tw	100	40	204.091	297.71	235.622	0	235.622	229.1	229.1
2	1.7806	459.367	6.20212	Tw	100	40	268.999	392.392	348.459	0	348.459	377.691	377.691
3	1.7806	628.042	6.20212	Tw	100	40	332.549	485.093	458.936	0	458.936	495.075	495.075
4	3.56197	1692.67	10.7736	Tw	100	40	371.261	541.562	526.234	0	526.234	596.878	596.878
5	1.8739	1100.88	11.8096	Tw	100	40	427.58	623.715	624.14	0	624.14	713.541	713.541
6	1.8739	1240.1	11.8096	Tw	100	40	470.561	686.412	698.857	0	698.857	797.245	797.245
7	3.78048	2910	12.6912	Tw	100	40	522.294	761.875	788.792	0	788.792	906.412	906.412
8	2.04728	1779.62	16.4428	Tw	100	40	532.119	776.208	805.875	0	805.875	962.918	962.918
9	2.04728	1897.1	16.4428	Tw	100	40	561.818	819.529	857.502	0	857.502	1023.31	1023.31
10	2.06048	2024.26	17.1224	Tw	100	40	582.02	848.998	892.622	0	892.622	1071.92	1071.92
11	3.52283	3701.88	18.2084	Tw	100	40	602.597	879.014	928.392	0	928.392	1126.61	1126.61
12	2.48606	2766.49	20.7671	Tw	100	40	600.033	875.274	923.936	0	923.936	1151.47	1151.47
13	2.48606	2869.27	20.7671	Tw	100	40	619.43	903.569	957.654	0	957.654	1192.55	1192.55
14	3.02527	3620.64	21.5415	Tw	100	40	629.199	917.819	974.639	0	974.639	1223.01	1223.01
15	3.02528	3753.06	21.5887	Tw	100	40	648.748	946.335	1008.62	0	1008.62	1265.33	1265.33
16	3.01682	3838.12	24.4115	Tw	100	40	625.902	913.009	968.907	0	968.907	1252.98	1252.98
17	3.01682	3898.13	24.3812	Tw	100	40	634.912	926.153	984.571	0	984.571	1272.33	1272.33
18	3.01683	3957.68	24.4489	Tw	100	40	642.58	937.338	997.899	0	997.899	1290.05	1290.05
19	3.01712	3978.55	27.3292	Tw	100	40	609.02	888.384	939.559	0	939.559	1254.29	1254.29
20	3.01711	3961.57	27.276	Tw	100	40	607.379	885.99	936.707	0	936.707	1249.88	1249.88
21	3.54605	4627.12	27.7124	Tw	100	40	598.794	873.467	921.782	0	921.782	1236.32	1236.32
22	3.23673	4136.48	30.9788	Tw	100	40	550.986	803.729	838.671	0	838.671	1169.46	1169.46
23	2.60175	3220.01	31.3944	Tw	100	40	531.411	775.175	804.641	0	804.641	1128.94	1128.94
24	2.05249	2475.88	30.6241	Tw	100	40	527.661	769.705	798.124	0	798.124	1110.48	1110.48
25	3.1138	3591.16	34.8145	Tw	100	40	467.46	681.888	693.466	0	693.466	1018.53	1018.53
26	3.12024	3337.37	35.2706	Tw	100	40	434.504	633.815	636.175	0	636.175	943.487	943.487
27	3.00386	2857.87	41.1039	Tw	100	40	351.439	512.648	491.774	0	491.774	798.396	798.396
28	2.79816	2140.08	42.6287	Tw	100	40	286.276	417.593	378.494	0	378.494	642.003	642.003
29	2.69014	1350.95	44.9255	Tw	100	40	200.555	292.552	229.475	0	229.475	429.51	429.51
30	2.69203	492.032	51.3573	Tw	100	40	100.904	147.19	56.239	0	56.239	182.447	182.447

Interslice Data

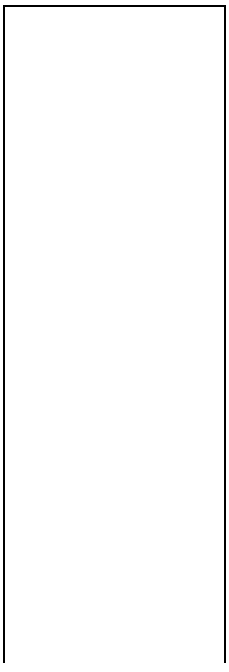
Global Minimum Query (spencer) - Safety Factor: 1.45871



Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	498.195	8680	0	0	0
2	501.113	8679.91	565.223	361.296	32.5871
3	502.893	8680.1	898.684	574.448	32.5871
4	504.674	8680.29	1295.25	827.937	32.5871
5	508.236	8680.97	1973.25	1261.32	32.5871
6	510.11	8681.36	2342.8	1497.54	32.5871
7	511.984	8681.76	2739.96	1751.41	32.5871
8	515.764	8682.61	3548.24	2268.07	32.5871
9	517.812	8683.21	3848.19	2459.8	32.5871
10	519.859	8683.81	4157.77	2657.69	32.5871
11	521.919	8684.45	4446.28	2842.11	32.5872
12	525.442	8685.61	4863.98	3109.1	32.5871
13	527.928	8686.55	5014.38	3205.24	32.5871
14	530.414	8687.49	5163.73	3300.71	32.5871
15	533.439	8688.69	5287.8	3380.01	32.5871
16	536.465	8689.89	5405	3454.93	32.5871
17	539.482	8691.25	5314.12	3396.84	32.5871
18	542.498	8692.62	5220.65	3337.09	32.5871
19	545.515	8693.99	5117.68	3271.28	32.5872
20	548.532	8695.55	4813.87	3077.07	32.5871
21	551.549	8697.11	4515.75	2886.51	32.5871
22	555.096	8698.97	4135.5	2643.46	32.5872
23	558.332	8700.91	3586	2292.21	32.5872
24	560.934	8702.5	3143.62	2009.43	32.5871
25	562.986	8703.72	2836.02	1812.81	32.5871
26	566.1	8705.88	2179.52	1393.17	32.5871
27	569.221	8708.09	1563.99	999.715	32.587
28	572.224	8710.71	844.985	540.123	32.5871
29	575.023	8713.29	307.363	196.47	32.5872
30	577.713	8715.97	1.50878	0.964425	32.5871
31	580.405	8719.34	0	0	0

Entity Information

External Boundary



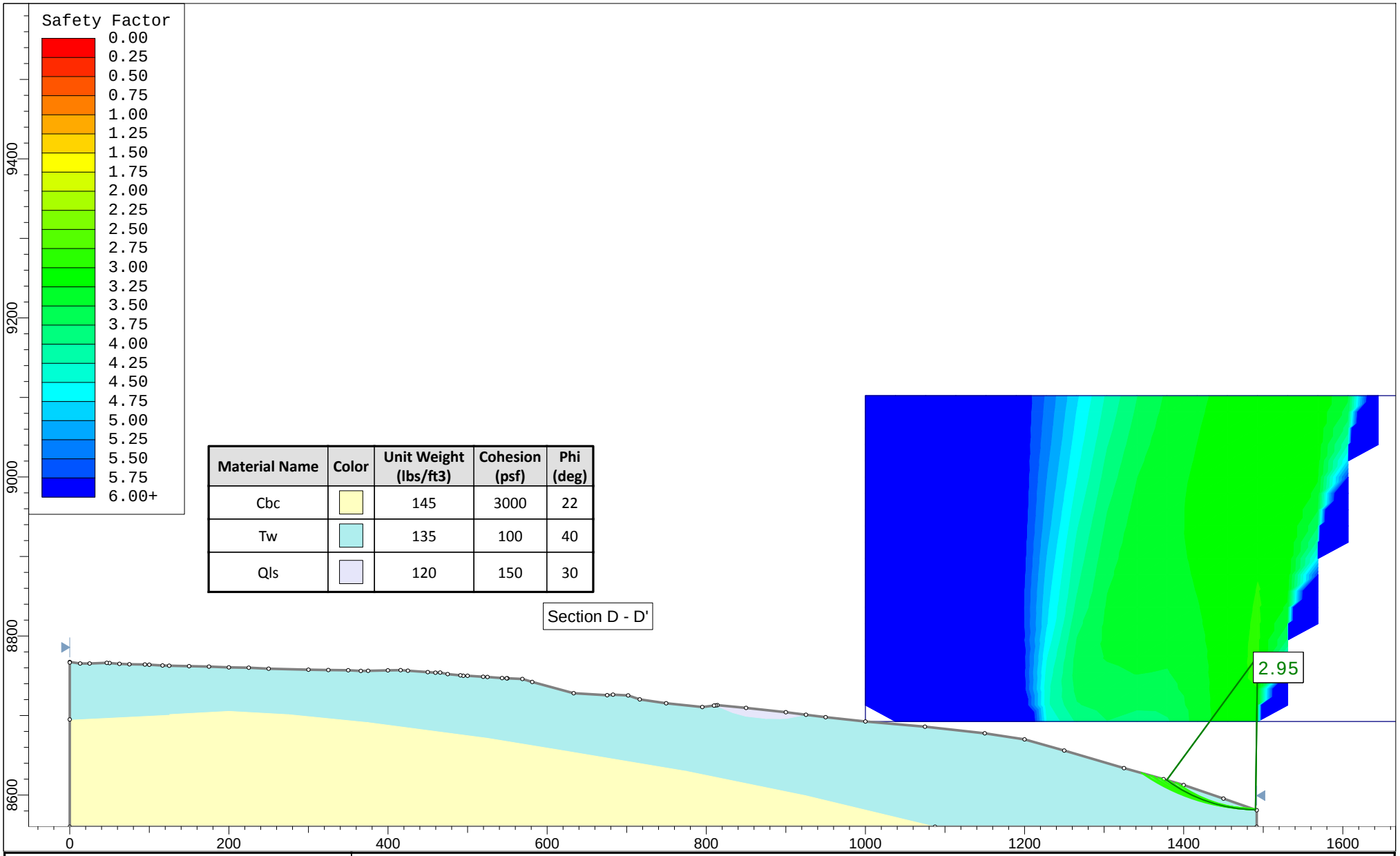
X	Y
1.51619e-06	8560
398.77	8560
1474.79	8560
1512.5	8560
1512.5	8607.68
1500.23	8610.84
1475	8617.42
1450	8625
1425	8633.66
1350.3	8660
1275	8687.64
1225	8705.2
1153.5	8725
1125	8729.8
1104.1	8732.8
1103.65	8733.02
1093.49	8738
1090.41	8738.05
1075	8738.84
1053.44	8740
1025	8744.73
976.909	8753.55
950	8754.53
937.28	8756
932.949	8758
900	8756.16
850	8753.78
825	8752.43
775.08	8749.79
725	8746.81
700	8744.61
672.258	8742.79
668.812	8742
664.775	8740
572.732	8717.46
524.934	8693.44
498.195	8680
490.626	8678.68
475	8677.93
458.83	8677.9
446.597	8678.93
425.424	8671.43
375	8655
300.171	8632.88
225	8615.99
125	8606.24
24.004	8602.6
1.51619e-06	8603.39

Material Boundary

X	Y
1053.44	8740
1103.65	8733.02

Material Boundary

X	Y
398.77	8560
450	8575
575	8612.54
598.284	8620
700	8642.58
800.413	8664.75
825	8668.67
900	8680.56
975	8684.37
1000	8685.56
1050	8682.65
1100	8679.73
1150	8672.72
1200.45	8665.6
1250.39	8652.63
1300	8639.74
1350	8619.81
1374.55	8610
1399.18	8600.16
1425	8586.44
1450	8573.17
1474.79	8560



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Cbc		145	3000	22
Tw		135	100	40
Qls		120	150	30

Section D - D'

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase II & III		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-24-2018		*File Name* Section DD.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase II & III

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Cbc	Tw	Qls
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	120
Cohesion [psf]	3000	100	150
Friction Angle [°]	22	40	30
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS	2.948520
Center:	1492.995, 8774.428
Radius:	193.026
Left Slip Surface Endpoint:	1378.779, 8618.821
Right Slip Surface Endpoint:	1490.251, 8581.422
Resisting Moment:	1.87304e+07 lb-ft
Driving Moment:	6.35248e+06 lb-ft
Resisting Horizontal Force:	91310 lb
Driving Horizontal Force:	30968.1 lb
Total Slice Area:	782.336 ft2
Surface Horizontal Width:	111.472 ft
Surface Average Height:	7.01825 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces:	2664
Number of Invalid Surfaces:	2187

Error Codes:

Error Code -102 reported for 17 surfaces
Error Code -103 reported for 1088 surfaces
Error Code -106 reported for 16 surfaces
Error Code -108 reported for 4 surfaces

Error Code -112 reported for 6 surfaces
Error Code -1000 reported for 1056 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (spencer) - Safety Factor: 2.94852

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	3.71572	394.661	-35.6002	Tw	100	40	53.5733	157.962	69.0762	0	69.0762	107.431	107.431
2	3.71572	1151.42	-34.2547	Tw	100	40	98.1062	289.268	225.559	0	225.559	292.369	292.369
3	3.71572	1844.58	-32.9304	Tw	100	40	140.215	413.426	373.526	0	373.526	464.341	464.341
4	3.71572	2477	-31.6257	Tw	100	40	179.881	530.383	512.911	0	512.911	623.686	623.686
5	3.71572	3051.25	-30.3391	Tw	100	40	217.088	640.088	643.651	0	643.651	770.706	770.706
6	3.71572	3566.11	-29.0691	Tw	100	40	251.599	741.845	764.922	0	764.922	904.783	904.783
7	3.71572	3963.43	-27.8146	Tw	100	40	279.627	824.485	863.408	0	863.408	1010.93	1010.93
8	3.71572	4285.17	-26.5745	Tw	100	40	303.525	894.95	947.386	0	947.386	1099.21	1099.21
9	3.71572	4556.73	-25.3477	Tw	100	40	324.732	957.478	1021.9	0	1021.9	1175.73	1175.73
10	3.71572	4779.65	-24.1331	Tw	100	40	343.224	1012	1086.88	0	1086.88	1240.65	1240.65
11	3.71572	4955.33	-22.93	Tw	100	40	358.975	1058.45	1142.23	0	1142.23	1294.09	1294.09
12	3.71572	5085.07	-21.7376	Tw	100	40	371.957	1096.72	1187.85	0	1187.85	1336.15	1336.15
13	3.71572	5170.02	-20.5549	Tw	100	40	382.141	1126.75	1223.63	0	1223.63	1366.93	1366.93
14	3.71572	5211.24	-19.3813	Tw	100	40	389.49	1148.42	1249.45	0	1249.45	1386.47	1386.47
15	3.71572	5209.7	-18.2161	Tw	100	40	393.967	1161.62	1265.19	0	1265.19	1394.84	1394.84
16	3.71572	5166.28	-17.0587	Tw	100	40	395.534	1166.24	1270.69	0	1270.69	1392.06	1392.06
17	3.71572	5081.79	-15.9084	Tw	100	40	394.14	1162.13	1265.8	0	1265.8	1378.14	1378.14
18	3.71572	4956.94	-14.7646	Tw	100	40	389.745	1149.17	1250.35	0	1250.35	1353.07	1353.07
19	3.71572	4792.39	-13.6269	Tw	100	40	382.29	1127.19	1224.15	0	1224.15	1316.83	1316.83
20	3.71572	4582.41	-12.4946	Tw	100	40	371.251	1094.64	1185.37	0	1185.37	1267.64	1267.64
21	3.71572	4322.19	-11.3672	Tw	100	40	356.156	1050.13	1132.33	0	1132.33	1203.93	1203.93
22	3.71572	4023.63	-10.2443	Tw	100	40	337.763	995.902	1067.69	0	1067.69	1128.74	1128.74
23	3.71572	3687.4	-9.12533	Tw	100	40	316.017	931.781	991.279	0	991.279	1042.04	1042.04
24	3.71572	3313.89	-8.00988	Tw	100	40	290.836	857.536	902.797	0	902.797	943.723	943.723
25	3.71572	2903.42	-6.89747	Tw	100	40	262.135	772.909	801.941	0	801.941	833.651	833.651
26	3.71572	2456.26	-5.78767	Tw	100	40	229.818	677.622	688.382	0	688.382	711.676	711.676
27	3.71572	1972.67	-4.68005	Tw	100	40	193.783	571.374	561.761	0	561.761	577.625	577.625
28	3.71572	1452.83	-3.57417	Tw	100	40	153.921	453.839	421.689	0	421.689	431.303	431.303
29	3.71572	896.882	-2.46963	Tw	100	40	110.11	324.663	267.743	0	267.743	272.492	272.492
30	3.71572	304.951	-1.36601	Tw	100	40	62.7405	184.992	101.289	0	101.289	102.785	102.785

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 2.94852

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1378.78	8618.82	0	0	0
2	1382.5	8616.16	-15.2986	-4.85208	17.5969
3	1386.21	8613.63	190.936	60.5568	17.5968
4	1389.93	8611.22	568.888	180.427	17.5968
5	1393.64	8608.94	1074.18	340.684	17.5968
6	1397.36	8606.76	1667.32	528.802	17.5968
7	1401.07	8604.69	2312.44	733.408	17.5968
8	1404.79	8602.73	2965.99	940.688	17.5969
9	1408.51	8600.88	3599.05	1141.47	17.5969
10	1412.22	8599.12	4191.23	1329.28	17.5968
11	1415.94	8597.45	4725.29	1498.66	17.5968
12	1419.65	8595.88	5186.93	1645.08	17.5969
13	1423.37	8594.4	5564.68	1764.88	17.5968
14	1427.08	8593	5849.7	1855.28	17.5968
15	1430.8	8591.7	6035.74	1914.28	17.5968
16	1434.52	8590.47	6119.03	1940.7	17.5968
17	1438.23	8589.33	6098.2	1934.09	17.5968
18	1441.95	8588.28	5974.27	1894.79	17.5969
19	1445.66	8587.3	5750.59	1823.85	17.5969
20	1449.38	8586.4	5432.85	1723.07	17.5968
21	1453.09	8585.57	5029.45	1595.13	17.5968
22	1456.81	8584.82	4551.98	1443.7	17.5969
23	1460.53	8584.15	4013.98	1273.07	17.5969
24	1464.24	8583.56	3431.44	1088.31	17.5969
25	1467.96	8583.03	2822.85	895.289	17.5968
26	1471.67	8582.58	2209.33	700.706	17.5968
27	1475.39	8582.21	1614.68	512.109	17.5969
28	1479.1	8581.9	1065.54	337.946	17.5969
29	1482.82	8581.67	591.509	187.602	17.5969
30	1486.54	8581.51	225.293	71.4533	17.5968
31	1490.25	8581.42	0	0	0

Entity Information

External Boundary

X	Y
-0.00123985	8767.28
-0.00123985	8766.6
-0.00123985	8695
-0.00123985	8560
1087.54	8560.04
1491.77	8560
1491.77	8580.89
1450	8595.55
1400.04	8612.6
1374.75	8620
1325	8633.8
1249.91	8656
1200	8670
1150	8677.61
1074.96	8685.91
999.999	8692.5
949.999	8697.9
925.323	8700.98
899.999	8704.15
849.999	8709.58

814.031	8713.06
811.978	8712.79
809.72	8712.5
795.037	8710.61
749.596	8715.35
716.356	8720.29
701.773	8725.22
682.832	8726.26
675.518	8725.58
633.338	8728
581.307	8742.18
568.916	8746
549.999	8746.72
549.211	8746.76
543.413	8747.03
524.999	8748.37
519.663	8748.74
499.999	8749.91
494.642	8750.02
491.03	8750.58
474.999	8752.07
465.613	8754
459.583	8753.87
449.999	8754.54
424.999	8756.37
415.804	8757.04
399.919	8756.72
374.999	8756.26
365.871	8756.04
349.999	8756.91
324.999	8757.14
299.999	8757.59
249.999	8758.81
224.999	8760.13
199.999	8760.48
174.999	8761.46
149.999	8762
124.999	8762.65
116.675	8762.87
99.9988	8763.87
94.5484	8764.2
74.9988	8764.45
62.5952	8764.92
49.9988	8765.93
46.5318	8766.21
24.9988	8765.38
13.1033	8765.38

Material Boundary

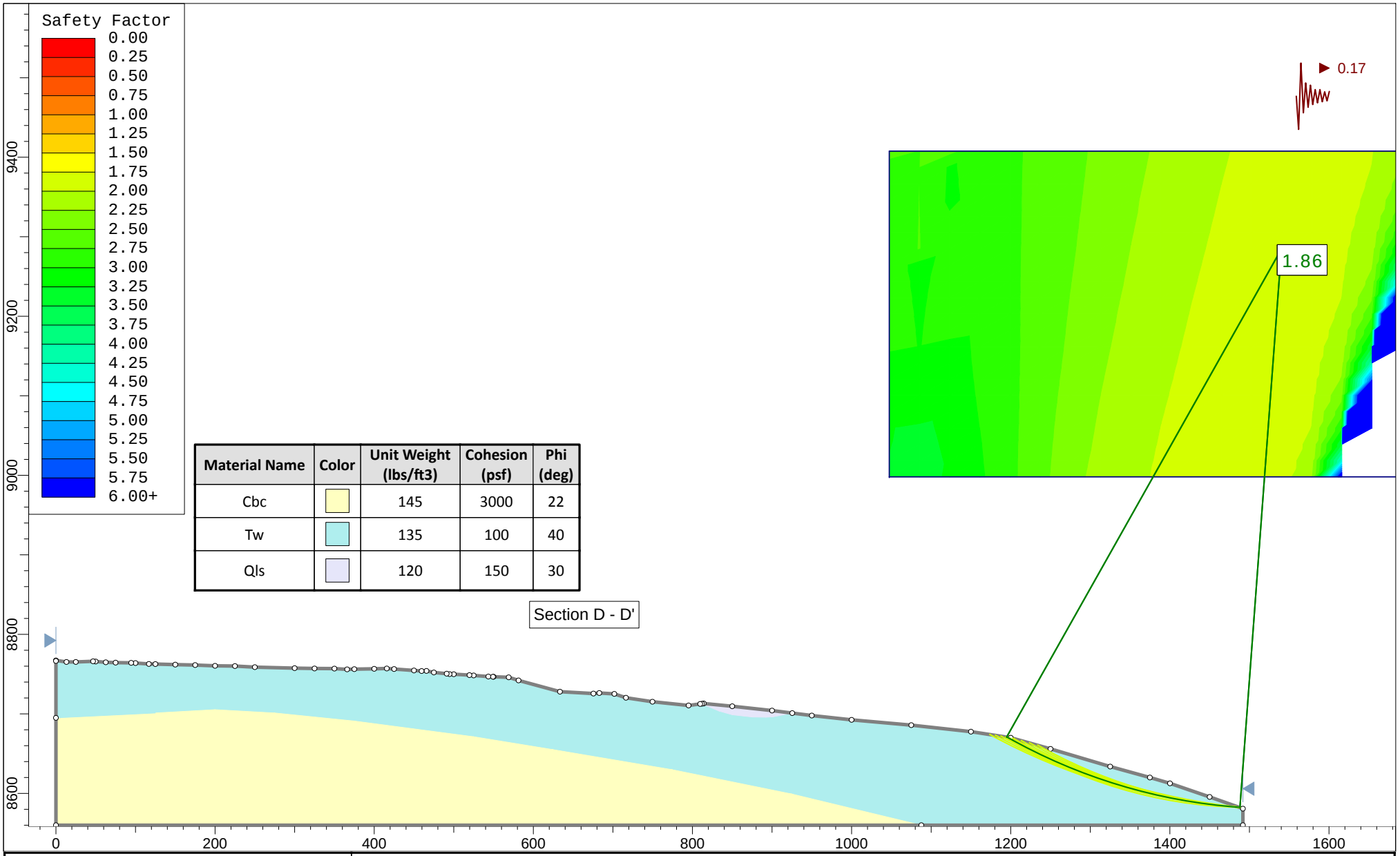
X	Y
-0.00123985	8766.6
0.284035	8766.6
13.1033	8765.38

Material Boundary

X	Y
-0.00123985	8695
124.999	8701.2
199.999	8705.27
274.999	8701.14
374.999	8691.01
524.999	8671.34
624.999	8655
774.999	8629.8
924.999	8599.18
1087.54	8560.04

Material Boundary

X	Y
811.978	8712.79
817.957	8710
833.226	8703.59
849.893	8698.95
874.937	8696.18
892.096	8695.89
901.432	8696.42
920.16	8700
924.779	8700.88
925.323	8700.98



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Cbc		145	3000	22
Tw		135	100	40
Qls		120	150	30

IGES®

SLIDEINTERPRET 8.008

Project	Summit Powder Mountain Resort - The Overlook - Phase II & III		
Analysis Description	Method : Spencer		
Drawn By	EBF	*Scale* 1:2000	*Company* IGES, Inc.
Date	12-24-2018	*File Name*	Section DD.slim

Slide Analysis Information

Summit Powder Mountain Resort - The Overlook - Phase II & III

Project Summary

Slide Modeler Version: 8.008

General Settings

Units of Measurement:	Imperial Units
Time Units:	seconds
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical

Analysis Methods Used
Spencer

Number of slices:	30
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Grid Search
Radius Increment:	10
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.17

Materials

Property	Cbc	Tw	Qls
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	145	135	120
Cohesion [psf]	3000	100	150
Friction Angle [°]	22	40	30
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: spencer

FS	1.860560
Center:	1540.250, 9284.770
Radius:	704.513
Left Slip Surface Endpoint:	1194.737, 8670.800
Right Slip Surface Endpoint:	1488.055, 8582.193
Resisting Moment:	3.208e+08 lb-ft
Driving Moment:	1.72421e+08 lb-ft
Resisting Horizontal Force:	435891 lb
Driving Horizontal Force:	234279 lb
Total Slice Area:	4093.38 ft2
Surface Horizontal Width:	293.318 ft
Surface Average Height:	13.9554 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3577
Number of Invalid Surfaces: 1274

Error Codes:

Error Code -102 reported for 5 surfaces

Error Code -103 reported for 541 surfaces
Error Code -106 reported for 16 surfaces
Error Code -108 reported for 3 surfaces
Error Code -109 reported for 5 surfaces
Error Code -1000 reported for 704 surfaces

Error Codes

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-1000 = No valid slip surface is generated

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.86056

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	9.77726	2405.79	-28.9145	Tw	100	40	131.074	243.871	171.458	0	171.458	243.858	243.858
2	9.77726	6022.3	-28.01	Tw	100	40	254.689	473.864	445.553	0	445.553	581.03	581.03
3	9.77726	9138.58	-27.113	Tw	100	40	364.481	678.138	688.998	0	688.998	875.617	875.617
4	9.77726	12000.8	-26.2231	Tw	100	40	468.322	871.342	919.251	0	919.251	1149.93	1149.93
5	9.77726	14614.9	-25.34	Tw	100	40	566.091	1053.25	1136.04	0	1136.04	1404.11	1404.11
6	9.77726	16973.8	-24.4633	Tw	100	40	657.216	1222.79	1338.09	0	1338.09	1637.09	1637.09
7	9.77726	18952.2	-23.5927	Tw	100	40	736.843	1370.94	1514.65	0	1514.65	1836.46	1836.46
8	9.77726	20657.2	-22.7278	Tw	100	40	808.386	1504.05	1673.28	0	1673.28	2011.9	2011.9
9	9.77726	22134	-21.8683	Tw	100	40	873.14	1624.53	1816.86	0	1816.86	2167.3	2167.3
10	9.77726	23386.6	-21.014	Tw	100	40	930.972	1732.13	1945.1	0	1945.1	2302.73	2302.73
11	9.77726	24419	-20.1646	Tw	100	40	981.731	1826.57	2057.65	0	2057.65	2418.17	2418.17
12	9.77726	25234.9	-19.3197	Tw	100	40	1025.26	1907.56	2154.17	0	2154.17	2513.61	2513.61
13	9.77726	25837.5	-18.4792	Tw	100	40	1061.4	1974.8	2234.29	0	2234.29	2589.01	2589.01
14	9.77726	26284.5	-17.6428	Tw	100	40	1092.12	2031.96	2302.42	0	2302.42	2649.76	2649.76
15	9.77726	26694.8	-16.8103	Tw	100	40	1121.96	2087.48	2368.59	0	2368.59	2707.55	2707.55
16	9.77726	26913.2	-15.9814	Tw	100	40	1144.61	2129.62	2418.81	0	2418.81	2746.62	2746.62
17	9.77726	26930	-15.1559	Tw	100	40	1159.4	2157.13	2451.59	0	2451.59	2765.63	2765.63
18	9.77726	26747.5	-14.3337	Tw	100	40	1166.12	2169.63	2466.48	0	2466.48	2764.45	2764.45
19	9.77726	26334.3	-13.5144	Tw	100	40	1163.14	2164.1	2459.9	0	2459.9	2739.46	2739.46
20	9.77726	25581.5	-12.698	Tw	100	40	1145.5	2131.27	2420.77	0	2420.77	2678.88	2678.88
21	9.77726	24619.1	-11.8841	Tw	100	40	1118.23	2080.53	2360.31	0	2360.31	2595.63	2595.63
22	9.77726	23149.3	-11.0727	Tw	100	40	1068	1987.08	2248.94	0	2248.94	2457.95	2457.95
23	9.77726	21176.3	-10.2636	Tw	100	40	994.147	1849.67	2085.18	0	2085.18	2265.2	2265.2
24	9.77726	19015.4	-9.45646	Tw	100	40	909.877	1692.88	1898.32	0	1898.32	2049.87	2049.87
25	9.77726	16667.8	-8.65125	Tw	100	40	814.889	1516.15	1687.7	0	1687.7	1811.69	1811.69
26	9.77726	14134.8	-7.84775	Tw	100	40	708.856	1318.87	1452.6	0	1452.6	1550.3	1550.3
27	9.77726	11367.2	-7.04581	Tw	100	40	589.102	1096.06	1187.06	0	1187.06	1259.87	1259.87
28	9.77726	8340.94	-6.24525	Tw	100	40	453.986	844.669	887.462	0	887.462	937.143	937.143
29	9.77726	5131.63	-5.44591	Tw	100	40	306.546	570.347	560.537	0	560.537	589.762	589.762
30	9.77726	1740.74	-4.64764	Tw	100	40	145.57	270.841	203.6	0	203.6	215.434	215.434

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.86056

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	1194.74	8670.8	0	0	0
2	1204.51	8665.4	52.7589	21.1769	21.87
3	1214.29	8660.2	902.374	362.203	21.87
4	1224.07	8655.19	2339.66	939.117	21.8701
5	1233.85	8650.38	4225.58	1696.1	21.87
6	1243.62	8645.75	6432.36	2581.88	21.87
7	1253.4	8641.3	8840.93	3548.66	21.87
8	1263.18	8637.03	11322.5	4544.73	21.87
9	1272.95	8632.93	13779.3	5530.87	21.87
10	1282.73	8629.01	16130.5	6474.59	21.8699
11	1292.51	8625.25	18304.7	7347.32	21.87
12	1302.29	8621.66	20240.3	8124.25	21.87
13	1312.06	8618.23	21884.8	8784.32	21.87
14	1321.84	8614.97	23194.8	9310.15	21.87
15	1331.62	8611.86	24139.3	9689.26	21.87
16	1341.4	8608.9	24698.5	9913.72	21.87
17	1351.17	8606.1	24849.9	9974.48	21.87
18	1360.95	8603.46	24579.1	9865.8	21.87
19	1370.73	8600.96	23881	9585.59	21.87
20	1380.5	8598.61	22760.2	9135.71	21.87
21	1390.28	8596.4	21236.6	8524.13	21.87
22	1400.06	8594.35	19339.5	7762.66	21.87
23	1409.84	8592.43	17130.5	6875.99	21.87
24	1419.61	8590.66	14697.1	5899.25	21.87
25	1429.39	8589.03	12120.5	4865.02	21.8699
26	1439.17	8587.55	9493.17	3810.46	21.87
27	1448.95	8586.2	6919.39	2777.37	21.87
28	1458.72	8584.99	4523.53	1815.7	21.87
29	1468.5	8583.92	2450.03	983.416	21.87
30	1478.28	8582.99	846.189	339.651	21.87
31	1488.05	8582.19	0	0	0

Entity Information

External Boundary

X	Y
-0.00123985	8767.28
-0.00123985	8766.6
-0.00123985	8695
-0.00123985	8560
1087.54	8560.04
1491.77	8560
1491.77	8580.89
1450	8595.55
1400.04	8612.6
1374.75	8620
1325	8633.8
1249.91	8656
1200	8670
1150	8677.61
1074.96	8685.91
999.999	8692.5
949.999	8697.9
925.323	8700.98

899.999	8704.15
849.999	8709.58
814.031	8713.06
811.978	8712.79
809.72	8712.5
795.037	8710.61
749.596	8715.35
716.356	8720.29
701.773	8725.22
682.832	8726.26
675.518	8725.58
633.338	8728
581.307	8742.18
568.916	8746
549.999	8746.72
549.211	8746.76
543.413	8747.03
524.999	8748.37
519.663	8748.74
499.999	8749.91
494.642	8750.02
491.03	8750.58
474.999	8752.07
465.613	8754
459.583	8753.87
449.999	8754.54
424.999	8756.37
415.804	8757.04
399.919	8756.72
374.999	8756.26
365.871	8756.04
349.999	8756.91
324.999	8757.14
299.999	8757.59
249.999	8758.81
224.999	8760.13
199.999	8760.48
174.999	8761.46
149.999	8762
124.999	8762.65
116.675	8762.87
99.9988	8763.87
94.5484	8764.2
74.9988	8764.45
62.5952	8764.92
49.9988	8765.93
46.5318	8766.21
24.9988	8765.38
13.1033	8765.38

Material Boundary

X	Y
-0.00123985	8766.6
0.284035	8766.6
13.1033	8765.38

Material Boundary

X	Y
-0.00123985	8695
124.999	8701.2
199.999	8705.27
274.999	8701.14
374.999	8691.01
524.999	8671.34
624.999	8655
774.999	8629.8
924.999	8599.18
1087.54	8560.04

Material Boundary

X	Y
811.978	8712.79
817.957	8710
833.226	8703.59
849.893	8698.95
874.937	8696.18
892.096	8695.89
901.432	8696.42
920.16	8700
924.779	8700.88
925.323	8700.98

The Outlook
01628-027
10/4/2018

c'	150	psf	Effective Cohesion
ϕ'	29	deg	Effective Friction Angle
Y_{sat}	135	pcf	Saturated Unit Weight of Soil
Y_w	62.4	pcf	Unit weight of water
h	4	ft	Depth to shear surface
β	18.4	deg	Slope Gradient (3H:1V)

FS 1.82

Input Variable
Calculated Value

This model assumes c>0 and the face of the slope is saturated to depth h

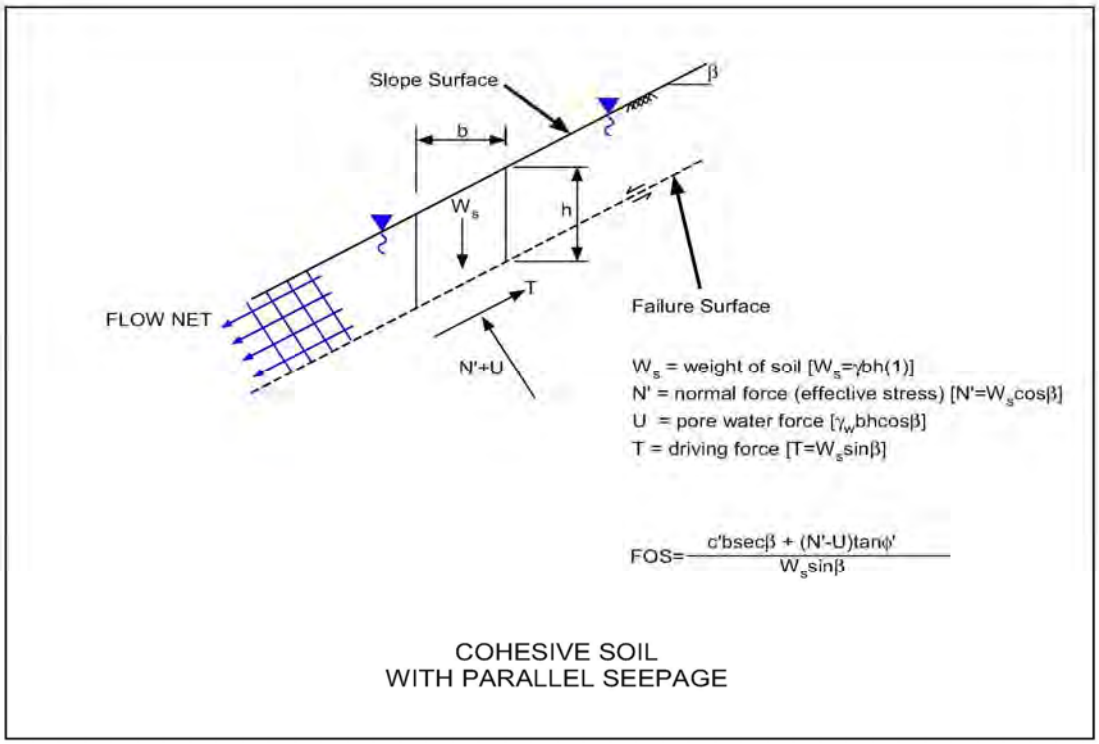


Figure D-2