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Attention: Kevin Rohrbough, P.E.
Client Manager

Subject: Updated Preliminary Geotechnical Investigation and
Slope Stability Evaluation
Ridgegate – Mesa Tops Road Alignment
Douglas County, Colorado
Project No. DN52,378-125-L2

CTL|Thompson performed a Preliminary Geotechnical Investigation for the proposed road alignment for Cabela Drive within the Ridgegate – Mesa Tops development in Lone Tree, Colorado (Project No. DN52,378.000-115-R1; report dated March 12, 2025). We have been requested to review proposed grading plans and perform slope stability evaluation for the proposed road alignment. The purpose of our evaluation was to assess slope stability for the existing slopes relative to planned cuts and fills for the Mesa Tops Road Alignment. This letter is based on our understanding of the planned development, previous investigations, and our experience. The discussions and criteria presented in this letter are intended for planning purposes only. This letter has been revised to address review comments.

PREVIOUS INVESTIGATIONS

CTL|Thompson performed a Preliminary Geotechnical Investigation within the Ridgegate Mesa Tops development under our Project No. DN52,036-115-R1 and presented our results in a report dated November 20, 2023. We drilled and sampled 19 widely-spaced exploratory borings. We encountered sandy clay and clayey sand over claystone and sandstone bedrock. Bedrock was very hard and practical drill rig refusal was encountered in nine borings at depths of 12 to 21 feet below existing grades. The primary geotechnical concerns identified were expansive clay and claystone and potentially unstable slopes.

We subsequently performed a Preliminary Geotechnical Investigation for the proposed road alignment under our Project No. DN52,036-115-R1 and presented results in a report dated March 12, 2025. The purpose of the investigation was to determine the type of subgrade soils present at the site, evaluate pavement support characteristics, and provide preliminary pavement design alternatives. We drilled and sampled six exploratory borings along the road alignment. We encountered sandy clay and clean to clayey sand underlain by weathered and comparatively unweathered claystone bedrock. Data from our previous investigations was considered in preparation of this report.

We performed a Geotechnical Consultation which included five borings along the proposed road alignment under Project No. DN47,208.002-145-R2 and presented results in a report dated May 30, 2025. Our borings (TH-11 through TH-15) located along the proposed road alignment encountered up to about 4 feet of native sand and clay underlain by sandstone and/or claytone bedrock. Groundwater was encountered in TH-13 and TH-14 at depths of about 34½ and 37½ feet (approx. elevations 6221 to 6223.5 feet). Summary logs of the exploratory borings are presented in Appendix D.

INVESTIGATION

We investigated subsurface conditions on September 11 and 12, 2024 and between February 13 and 26, 2026 by drilling 22 widely-spaced exploratory borings at the approximate locations shown on Figs. 1A and 1B. Sixteen slope stability borings (TH-101 to TH-106 and TH-201 to TH-210) were drilled along slope areas in conjunction with six pavement borings (TH-1 to TH-6) drilled along the proposed road segment. We were unable to drill two of the proposed slope stability borings (TH-103) on the central portion of the site due to access issues and an additional boring (TH-104A) was drilled near the bottom of the proposed slope. Boring TH-104A is located about 150 feet northeast of the proposed location of TH-104; due to the presence of utilities on the north side of the slope and steep conditions on the south side of the slope, this was the most accessible location for drilling. An alternative location for TH-103 was not selected due to an external waterline laid upon the ground surface preventing access to the slopes south and east of the fire access road where the original boring was proposed. There were no viable access points or alternative locations that would allow access to the slope near TH-103. Drill rig refusal was encountered in one boring (TH-101) at a depth of about 11 feet below existing grade. Boring locations and elevations were staked and surveyed by others. Some borings were moved due to access issues and the approximate locations and elevations were determined by a representative of our firm using a Leica GPS unit referencing the North American Datum of 1983 (NAD83).

Prior to drilling, we contacted the Utility Notification Center of Colorado and local sewer and water districts to identify locations of buried utilities. The borings were advanced to depths of 11 to 50 feet below existing grades using 4-inch diameter, continuous-flight, solid-stem auger and truck- or track-mounted drill rigs. Samples were obtained at approximate 2 to 5-feet intervals using a 2.5-inch diameter (O.D.) modified California barrel samplers driven by blows of a 140-pound hammer falling 30 inches. Bulk samples were collected from auger cuttings of the soils in our pavement borings. Our field representatives were present to observe drilling operations, log the strata encountered, and obtain samples. Summary logs of the exploratory borings are presented in Appendix A.

Samples were returned to our laboratory where they were examined by our engineers. Laboratory tests included dry density, moisture content, particle size analysis (passing the No. 200 sieve, gradation and hydrometer), Atterberg limits, swell-consolidation, direct shear, and water-soluble sulfate concentrations. For swell-consolidation tests, the samples were wetted under an applied pressure of 200 psf. Results of laboratory tests are presented in Appendix B and summarized in Table B-I.

SUBSURFACE CONDITIONS

Strata encountered in our exploratory borings consisted of about 1 to 20 feet of sandy clay and/or clean to clayey sand underlain by weathered and comparatively unweathered claystone and sandstone bedrock to the maximum explored depth of 50 feet. Drill rig refusal was encountered in one boring (TH-101) at a depth of about 11 feet below existing grade. Pertinent engineering characteristics of the soil and bedrock are presented in the following paragraphs.

We encountered about 1 to 20 feet of sandy clay and/or clean to clayey sand at the ground surface in all borings. The clay was stiff to very stiff and the sand was medium dense to dense based on field penetration resistance tests. One sand sample compressed 0.1 percent, and three clay samples swelled 0.1 to 2.4 percent when wetted under a confining pressure of 200 psf. Six clay samples contained 50 to 74 percent silt and clay-sized particles (fines) and exhibited moderate to high plasticity. Three sand samples contained 9 to 44 percent fines and two samples exhibited low plasticity. One sand sample contained 3 percent gravel-sized particles.

Claystone and sandstone bedrock were encountered in 21 borings at depths of about 1 to 17.5 feet below existing grades (approximate elevations 6147.5 to 6286.5) as shown on Fig. 2. Although not encountered in our borings, previous experience with nearby sites indicates interbedded claystone/sandstone layers may be present on this site. Weathered claystone zones ranging in thickness from 1 to 13 feet were encountered in eight borings. The comparatively unweathered bedrock was medium hard to very hard. Practical drill rig refusal was encountered in one boring (TH-101) at a depth of about 11 feet below existing grade. Two claystone samples compressed 0.9 and 1.3 percent and nine claystone samples swelled 1.3 to 6.4 percent when wetted. The samples that exhibited compression are likely a result of sample disturbance and is not indicative of the bedrock mass. Twenty claystone samples contained 52 to 99 percent fines with seventeen samples exhibiting moderate to high plasticity and four samples containing 27 to 56 percent clay-sized particles. Eight sandstone samples contained 7 to 48 percent fines, with one sample exhibiting low plasticity, and two containing 1 and 21 percent gravel-sized particles. Direct shear tests were performed on one bulk sample and two claystone samples and peak internal friction angles of 17 to 50 degrees with cohesions of 1,100 to 6,070 psf were measured.

Groundwater was encountered during drilling in one boring (TH-102) at a depth of about 19 feet below existing grade. When checked several days after drilling, groundwater was measured in four borings at depths of about 15 to 28.5 feet below existing grade (approximate elevations 6178 to 6268) as shown on Fig. 3. Considering proposed grades, we do not expect that groundwater will influence construction. Groundwater levels may fluctuate seasonally and raise in response to development, precipitation, landscape irrigation, changes in land-use, and flow in nearby drainages.

SITE GEOLOGY

To evaluate the geology of the parcel, we reviewed the 1977 Geologic map of the Highlands Ranch quadrangle[1] and the 1972 Geologic map of the Parker Quadrangle[2], supplemented by borings drilled for this investigation. Excerpts from the geologic maps are presented below in Photo 1.

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[1] Maberry, J.O., and Lindvall, R.M. “Geologic map of the Highlands Ranch quadrangle, Arapahoe and Douglas Counties, Colorado,” Geologic Quadrangle Map GQ-1413, 1977

[2] Maberry, J.O., and Lindvall, R.M., “Geologic Map of the Parker quadrangle, Arapahoe and Douglas Counties, Colorado,” Miscellaneous Geologic Investigations map I-770-A, 1972

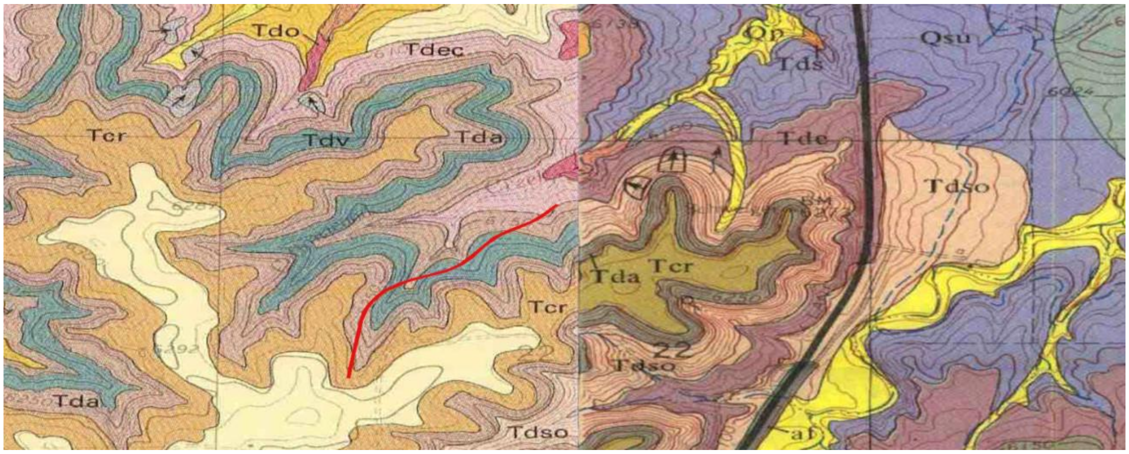


Photo 1: Excerpt from the Geologic Map of the Highlands Ranch (west portion of the site) and Parker (east portion of the site) quadrangles, Arapahoe and Douglas Counties, Colorado.

As shown on the geologic maps, and supported by material encountered in our exploratory borings, the subject area is primarily underlain by the Upper Part of the Dawson Arkose sandstone facies (map symbol Tda) and variegated claystone facies (map symbol Tdv) of the of the Paleocene age. The southern portion of the site is underlain by the Castle Rock Conglomerate (map symbol Tcr). The Castle Rock Conglomerate is a pebble, cobble, and boulder arkosic conglomerate and can be difficult to excavate. Drill rig refusal was encountered in one of our borings. Overburden soils primarily consist of slope wash deposits comprised of silty, sandy, clay and clayey, silty, sand. The mapping is consistent with conditions found in our borings. A geologic map is presented on Fig. 4.

The geologic maps indicate landslides have occurred to the northeast and northwest of the subject site. Based on our experience, there is a risk of landslides within the subject site. More details are contained below in **GEOLOGIC HAZARDS**.

GEOLOGIC HAZARDS

Geologic hazards can affect development risks and costs. We believe potential hazard can be mitigated with proper engineering, design, and construction practices as discussed in this report. No geologic hazards were identified within the scope of this investigation which, in our opinion, will preclude development provided mitigation techniques as discussed in this report are implemented. The identified hazards include:

- Steep Slopes, Landslides, and Debris Flows
- Erosion and Flooding
- Expansive Soil and Bedrock
- Seismicity

These hazards and conceptual mitigation methods are discussed in the following sections. A map depicting geologic hazards is presented in Fig. 5.

Steep Slopes, Landslides, and Debris Flow

Moderate to steep slopes are present on this site. Existing slopes appear to be currently stable. Landslide events of unknown age have been mapped on the geologic plans of the site on the northeastern portion of the site. As part of our investigation we performed a slope stability analysis on various slopes near the proposed road alignment. We also reviewed the Landslide Susceptibility Map of Douglas County, Colorado and Debris Flow Susceptibility Map of Douglas Colorado.

Slope Stability Analysis

We performed slope stability analysis at various locations along the proposed road alignment where steep existing slopes are present and/or where retaining walls are planned. We analyzed the stability of these slopes to evaluate risk of slope failure related to proposed construction. In order to perform the slope stability analysis, we used planned slope grades, estimated subsurface conditions and soil profile, and estimated strength properties of the soil and bedrock types within the subsurface profile. The following paragraphs summarize our analyses. Results are shown in Appendix C.

Nine slope cross-sections were considered, as shown on Figs. 1A and 1B. We were provided the Overall Grading Plan from the Hillcamp Trail Civil Construction Plans dated March 13, 2026. Our analysis and recommendations are based on construction as currently planned. Slope stability should be reevaluated if revisions are made to the planned construction.

Subsurface data was obtained from our exploratory borings, and extrapolation of data was based on our knowledge of the area and available mapping. We used our laboratory test results, in addition to published data and our previous experience to select soil strength parameters for the soils. Strength values and slope geometry were input into a slope stability evaluation program, Slide2, by Rocscience. Input data are summarized in the table below. The complex geologic environment makes it difficult to model subsurface conditions and duplicate in-situ conditions. Therefore, we took a conservative approach when assigning strength values and interpolating lithologies. Strength values assigned to fill materials assume the fill has been moisture-conditioned and compacted to specifications discussed in **SITE DEVELOPMENT** and properly keyed into the natural slope. It is likely that conditions different than used in our analysis may be encountered during construction. If different conditions are encountered, we should be notified to reevaluate our results.

We have reviewed the strength parameters used in the “Engineering Geologic Assessment” prepared by Michael W. West & Associates (MWW) dated March 19, 2008. MWW modeled a weathered claystone/sandstone unit with strength parameters consisting of an internal friction angle of 10.5 degrees and cohesion of 100 psf. These strength properties appear to be applied to a displaced, failed mass in their analysis and were based on back-analysis of a previous slope failure. MWW also ran direct shear testing on two saw-cut specimen that exhibited strengths similar to those stated above. We believe these strength values were used to model residual values. During our investigation we did not observe any indications that the weathered claystone unit we encountered has been disturbed or displaced via slope movements and do not believe residual strengths have developed within the weather claystone unit. To be conservative, we preformed analyses considering these properties for any weathered claystone encountered towards the bottom of the slope, like

MWW, to evaluate stability. Additionally, we previously conducted direct shear testing on a sample of the weathered claystone for the associated roadway extension. Results indicated a peak internal friction angle of 17 degrees and a peak cohesion of 6,070 psf. In our analysis, we also modeled this unit with an internal friction angle of 16 degrees and a cohesion of 395 psf which we believe to be more appropriate for the weathered claystone encountered in our investigation.

The internal friction angle for the Dawson sandstone was increased from 30 degrees to 34 degrees based on back-analyses of stable slopes performed during our concurrent investigation for the Mesa Tops development (Project No. DN52,036-115-R2R). The wall configurations were simplified to better model global stability without internal stability of the walls interfering with failure searches.

SLIDE2 INPUT VALUES

Material	Unit Weight (pcf)	Angle of Internal Friction (degrees)	Cohesion (psf)
Fill, Clay, Sandy	120	26	25
Clay, Sandy	120	26	75
Weathered Claystone	123	16	395
Weathered Claystone (MWW)	123	10.5	100
Claystone	125	18	1000
Sandstone	125	34	50
Interbedded Claystone/Sandstone	125	25	500

In discussions that follow, the term “factor of safety” (FOS) is used. This term describes the ratio of strength available to resist sliding compared to the forces that cause sliding. A FOS of 2.0 means the forces resisting sliding exceed the driving force by 2.0 times. For long-term stability, a typical minimum industry accepted FOS is 1.3, while a FOS of 1.5 is preferred. A FOS of less than 1.0 implies failure conditions.

We modeled the existing slopes, interim conditions during construction of retaining walls/road alignment, and the proposed sections to evaluate the slope stability in each scenario. We also considered various groundwater levels. For the interim conditions, we modeled benched cut slopes before the placement of fill as shown on Fig. 6. For the benching, we assumed vertical heights of 4 feet. Depending on in-situ conditions encountered during excavation, this height may not be possible and the actual benches may be shorter. Although the interim models generally resulted in lower FOS values than the existing and proposed conditions, we believe these values are acceptable due to the short-term duration of these conditions and not indicative of the overall global stability of the slope. We assume that benches cut to allow fill placement will not remain open for more than a day or two. Where retaining walls require excavation into the slope (i.e. along sections D through F), we recommend limiting the extent of excavation to avoid over-exposing claystone bedrock. We modeled a temporary slope layback of about 1.6H:1V in our models. If flatter slope laybacks are necessary to install MSE retaining walls, we recommend a different earth retention system, such as a tie-back wall, be considered.

Results of our analyses are presented in the table below and in Appendix C. Slope stability analysis implies proposed slope configurations for the studied sections are stable. Changes to proposed grading, site grading techniques, and surface drainage will impact slopes stability along these sections.

RESULTS OF SLOPE STABILTY ANALYSIS

Cross-Section	Scenario	Lowest Factor of Safety	
A-A'	Existing, in-situ groundwater	2.4	
	Proposed, in-situ groundwater	2.6	
	Proposed, elevated groundwater (line 2)	2.5	
	Proposed, elevated groundwater (line 3)	2.0	
B-B'	Existing, in-situ groundwater	L to R – 1.6	R to L – 1.4
	Interim, in-situ groundwater	L to R – 1.6	R to L – 1.3
	Proposed, in-situ groundwater	L to R – 1.7	R to L – 1.7
	Proposed, elevated groundwater (line 2)	L to R – 1.7	R to L – 1.7
	Proposed, elevated groundwater (line 3)	L to R – 1.7	R to L – 1.7
C-C'	Existing, in-situ groundwater	1.9	
	Interim, in-situ groundwater	1.9	
	Proposed, in-situ groundwater	1.6	
	Proposed, elevated groundwater (line 2)	1.6	
	Proposed, elevated groundwater (line 3)	1.6	
D-D'	Existing, in-situ groundwater	2.0	
	Interim, in-situ groundwater	1.6*	
	Proposed, in-situ groundwater	1.7	
	Proposed, elevated groundwater (line 2)	1.6	
	Proposed, elevated groundwater (line 5)	1.5	
E-E'	Existing	2.3	
	Interim	1.6	
	Proposed	L to R – 3.6	R to L – 2.0
	Proposed, elevated groundwater (line 1)	L to R – 3.6	R to L – 1.9
	Proposed, elevated groundwater (line 2)	L to R – 3.6	R to L – 1.9
F-F'	Existing, in-situ groundwater	1.9	
	Interim, in-situ groundwater	1.4*	
	Proposed, in-situ groundwater	1.9	
	Proposed, elevated groundwater (line 2)	1.7	
	Proposed, elevated groundwater (line 3)	1.6	

Cross-Section	Scenario	Lowest Factor of Safety	
G-G’	Existing	1.8	
	Interim	1.6**	
	Proposed	L to R – 2.5	R to L – 1.6
	Proposed, elevated groundwater (line 2)	L to R – 2.5	R to L – 1.6
	Proposed, elevated groundwater (line 3)	L to R – 2.5	R to L – 1.5
H-H’	Existing	2.5	
	Interim	1.4	
	Proposed	L to R – 1.7	R to L – 1.7
	Proposed, elevated groundwater (line 2)	L to R – 1.7	R to L – 1.7
	Proposed, elevated groundwater (line 3)	L to R – 1.7	R to L – 1.6
I-I’	Existing	2.1	
	Proposed	2.0	
	Proposed, elevated groundwater (line 1)	2.0	
	Proposed, elevated groundwater (line 2)	2.0	

*Slope Stability for the interim case was modeled considering a 1.6H:1V cut slope in overburden soils.
**Slope Stability for the interim case was modeled considering a 1.3H:1V cut slope for the entire excavation.

Landslides and Debris Flow

As part of our evaluation, we reviewed the 2018 Landslide Inventory and Susceptibility Map of Douglas County, Colorado[3] and the 2018 Debris Flow Susceptibility Map of Douglas County, Colorado[4]. Excerpts of these maps are shown below in Photos 2 and 3, respectively. There are limitations associated with map scaling and scope of the investigation; however, the potential for landslides and debris flows indicated on these maps generally agree with site observations from this investigation. Mapped hazard areas of landslide and debris flows within the subject site are presented on Fig. 5.

The landslide map indicates there are potential landslide deposits and landslide hazard areas present along the proposed road development and to the northwest of the site. We are aware of post-construction slope failures on nearby sites. As discussed previously, slope stability analyses imply existing and proposed slopes are stable. Addition of water to the subsurface from precipitation or irrigation reduces relative stability and may initiate slope failures. Surface drainage should be designed, constructed, and maintained to provide rapid removal of surface runoff.

Additionally, the debris flow map indicates debris flow hazard areas are present within the drainages on-site. The topography of the site encourages water to flow from higher elevations, through these drainage pathways, towards lower lying areas. In large precipitation events, erosion and mud or debris flows can occur through these pathways. The

[3] Lindsey, Kassandra, “Landslide Inventory and Susceptibility for Douglas County, Colorado,” Colorado Geological Survey, (Open File Report, OF-18-07), 2018.
[4] McCoy, Kevin M., F. Scot Fitzgerald, Matthew L. Morgan, and Karen A. Berry. “Debris Flow Susceptibility Map of Douglas County, Colorado,” Colorado Geological Survey (Open File Report, OF-18-08), 2018.

Civil Engineer should evaluate drainage basins present on the site slopes and design surface drainage structures that will reduce the risk of debris flows.

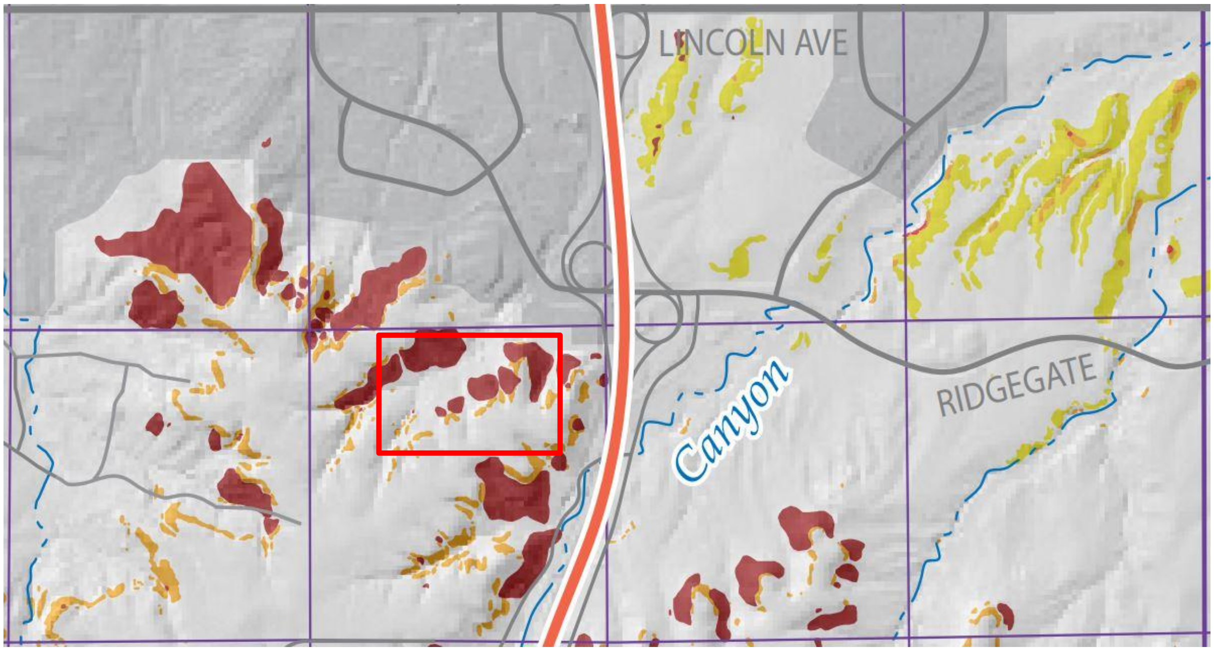


Photo 2: Excerpt from the Landslide Inventory and Susceptibility Map of Douglas County. Approximate site boundary outlined in red.

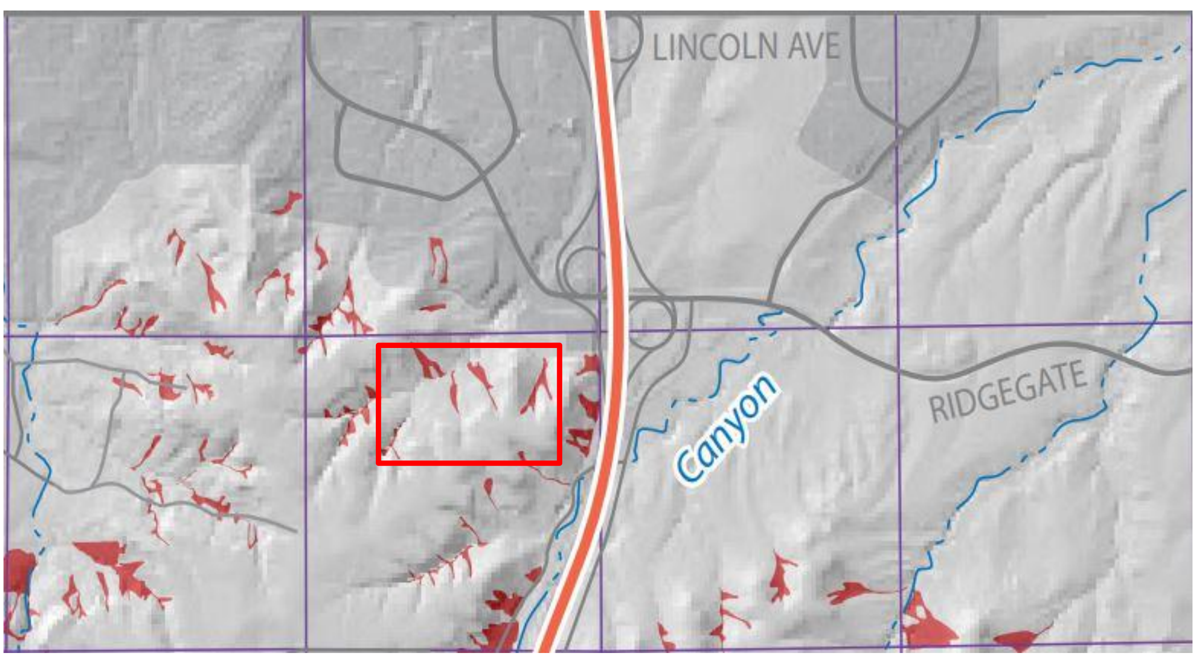


Photo 3: Excerpt from the Debris Flow Susceptibility Map of Douglas County. Approximate site boundary outlined in red.

Permanent, Unretained Slopes

We did not observe evidence of slope instability. Soil cut and fill slopes no steeper than 3H:1V (horizontal:vertical) should be stable. Slopes of 4H:1V are preferable. Engineered slope retention systems may be needed if slopes steeper than 3H:1V are planned. There is potential for differential settlement and slope movements where new fill is placed on steep slopes. Sliding can result along sloping interfaces between new fill and existing ground. An effective way to deal with this issue is to bench slopes steeper than about 20 percent prior to fill placement as shown on Fig. 6. Addition of water to the subsurface from precipitation or landscape irrigation will likely reduce relative stability and may initiate slope failures. Surface drainage should be designed, constructed, and maintained to provide rapid removal of surface runoff.

Nearmap DEM Change Detection

Change detection analysis was performed across the site to identify areas that have recently experienced vertical ground movement. We utilized Digital Elevation Model data (DEM) produced by Nearmap for the analysis. The data sets were created using photogrammetry from airborne vehicles. Heights, or elevations, of points/objects are calculated based off the vehicles internal GPS data and the parallax effect. The DEMs used to compare elevation changes were obtained in August 2018 and August 2023. The DEMs' horizontal spatial reference is the Colorado Central NAD83 system, and the vertical spatial reference is the NAVD88 system. The elevation data from the more recent DEM was subtracted from that of the older DEM, resulting in a new data set that illustrates a decrease in elevation as a positive value.

After our analysis, a site visit was made to investigate areas with measured elevation drops since visual obstructions can skew the data. Locations were removed from consideration based on ground surface morphology and vegetation cover. The results of our analysis are presented in Fig. 5. The areas indicated on Fig. 5 are areas with measured elevation drops of up to about 19 feet. It is unknown if the elevation drops in these locations are the result of slope failure, erosion, or man-made excavations or grade changes. No conclusive observations were made in our review of historical photos.

Erosion and Flooding

There are many drainages present throughout the site near the proposed road alignment. The topography of the site encourages water to flow from the higher elevations, through the drainage pathways, towards the lower lying areas. During peak precipitation events, some accumulation of surface sheet flow in gullies and drainages is expected. Development will increase the number of impervious surfaces and change established drainage paths, which can lead to drainage problems and erosion if surface water flow is not adequately designed. Slopes will require erosion control during and after construction. Re-vegetation or other erosion control measures should be employed to control erosion. We identified two main debris flow channels near the central and eastern portions of the proposed road alignment near TH-4 and TH-6 (Fig. 5). The flow should be diverted away from the proposed alignment in these areas. A sub-fill drain is recommended along the bottom of existing drainages where more than about fifteen feet of site grading fill is planned or in existing drainages that are expected to have periodic flow of collected surface water (Fig. 7).

Expansive Clay and Claystone

Colorado is a challenging location to practice geotechnical engineering. The climate is relatively dry and the near-surface soils are typically dry and comparatively stiff. These soils and related sedimentary bedrock formations react to changes in moisture conditions. Some of the soils swell as they increase in moisture and are referred to as expansive soils. Other soils can compress significantly upon wetting and are identified as compressible or collapsible soils. Much of the land available for development east of the Front Range is underlain by expansive clay and or claystone bedrock near the surface. The soils that exhibit collapsible behavior are more likely west of the Continental Divide; however, both types of soils occur throughout the state.

The clay and claystone are expansive. There is risk that ground heave will damage pavements. Engineering design of grading, pavements, and surface drainage can mitigate, but not eliminate, the effects of expansive soil.

Seismicity

According to the USGS, Colorado's Front Range and eastern plains are considered low seismic hazard zones. The earthquake hazard exhibits higher risk in western Colorado compared to other parts of the state. The Denver Metropolitan area has experienced earthquakes within the past 100 years, shown to be related to deep drilling, liquid injection, and oil/gas extraction. Naturally occurring earthquakes along faults due to tectonic shifts are rare in this area.

The soil and bedrock at this site are not expected to respond unusually to seismic activity. The current IBC and IRC defer the estimation of Seismic Site Classification to ASCE7-22, a structural engineering publication. Updates from the previous versions of ASCE7 include (1) incorporation of additional Site Classifications BC, CD, and DE, (2) removal of tabulated blow-count and shear-strength correlations to shear wave velocity, and (3) requires the engineer to reduce shear wave velocity values by a factor of 1.3 when empirically estimated or not directly measured. The table below summarizes ASCE7-22 Site Classification Criteria.

ASCE7-22 SITE CLASSIFICATION CRITERIA

Seismic Site Class	$\bar{v}_s$, Calculated Using Measured or Estimated Shear Wave Velocity Profile (ft/s)
A. Hard Rock	>5,000
B. Medium Hard Rock	>3,000 to 5,000
BC. Soft Rock	>2,100 to 3,000
C. Very Dense Sand or Hard Clay	>1,450 to 2,100
CD. Dense Sand or Very Stiff Clay	>1,000 to 1,450
D. Medium Dense Sand or Stiff Clay	>700 to 1,000
DE. Loose Sand or Medium Stiff Clay	>500 to 700
E. Very Loose Sand or Soft Clay	≥500
F. Soils requiring Site Response Analysis	See Section 20.2.1

Based on the results of our investigation, the reduced, empirically estimated average shear wave velocity values for the upper 100 feet range between 662 and 1625 feet per second, with an average value of 1183 feet per second. We judge the subsurface likely ranges between Seismic Site Classification DE and C. The field penetration test results along with the empirical estimates imply that shear-wave velocity seismic tests to directly measure $\bar{v}_s$ could likely result in a better Seismic Site Classification. The subsurface conditions indicate low susceptibility to liquefaction from a materials and groundwater perspective.

Other Considerations

Erosion potential on this site is moderate to high due to site slopes and materials present on-site. The soils on the hillslopes are granular and prone to erosion. Erosion can be expected to increase during construction but should return to preconstruction rates or less if proper grading practices, surface drainage design, and revegetation efforts are implemented. Construction sites within the Denver Metropolitan area are subject to the U.S. Environmental Protection Agency (EPA) regulations regarding the control of storm water discharge and soil erosion. We did not identify significant, emotionally recoverable, high-quality aggregate in our borings.

SITE DEVELOPMENT

Excavations

Lenses of very hard, cemented sandstone were found in our borings, and rig refusal was encountered in one boring at a depth of about 11 feet. Harder lenses may require use of rock excavation techniques such as heavy ripping or rock saws. We recommend the owner and the contractor become familiar with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. Based on our investigation and OSHA standard, we anticipate the clay and claystone will classify as Type B soils and the sand and sandstone will classify as Type C soils, which require maximum slop inclinations of 1H:1V and 1.5H:1V (horizontal:vertical), respectively, for temporary excavations in dry conditions. Flatter slopes will be required if seepage is present. The contractor's "competent person" is required to review excavation conditions and refer to OSHA standards when worker exposure is anticipated. Stockpiles and equipment should not be placed within horizontal distance equal to one-half the excavation depth, from the edge of the excavation. A professional engineer should design excavations deeper than 20 feet.

Fill and Backfill

We reviewed available grading plans for the proposed road alignment. The plans indicate proposed cuts of up to about twenty-five and fills of up to about twenty feet will be required for the project. There is increased risk of differential settlement where deep fill is present below the road. Where fill will be placed on slopes of 20 percent or steeper the slopes should be benched prior to placing fill (Fig. 6).

Moist clay was encountered in our borings and observed within the drainages, at the time of our site visit. Significant fills are planned in this area (up to about 20 feet). Our experience suggests the natural clay may compress (settle) under the weight of the new fill, especially if moisture continues to accumulate in the subsurface. We recommend the clay within the drainages be excavated (to sand or bedrock) and replaced with sandier soils having a maximum particle size of 6 inches, containing between 25 to 45 percent fines (passing the No. 200 sieve), a liquid limit less than 30, and a plasticity index less than 15. Potential material should be submitted to our office for approval prior to placement.

A sub-fill drain is recommended along the bottom of the existing drainages where more than about fifteen feet of site grading fill is planned. The drain should slope with the grade of the existing drainages and have a minimum slope of 0.5 percent. A typical sub-fill drain detail is provided on Fig. 7. A perforated pipe should be connected to the end of the drain and protected with a concrete headwall. We recommend re-routing the drainages to avoid installation of sub-fill drains below the proposed road alignment.

Prior to fill placement, the ground surface in areas to be filled should be stripped of debris, vegetation/organics and other deleterious materials, scarified and moisture conditioned to between 1 and 4 percent above optimum moisture content for clay or within 2 percent of optimum moisture content for sand and gravel, and compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). Fill should be moisture conditioned and compacted in accordance with criteria shown in the table below. Utility trench backfill should be moisture conditioned and compacted to Douglas County specifications.

SUMMARY OF COMPACTION AND MOISTURE CONTENT SPECIFICATIONS

Soil Type	Depth of Site Grading Fill	
	≤20 Feet	>20 Feet
Clay (CL, CH)	95% STD, 1 to 4 percent above optimum	98% STD, 2 percent below to 1 percent above optimum
Granular Soils (Sand and Gravel)	95% STD, -2 to +2 percent from optimum	98% STD, 2 percent below to 1 percent above optimum

*Compaction and moisture content percentage specifications based on standard Proctor maximum dry density (STD, ASTM D 698) and optimum moisture content (optimum).

The properties of fill will affect performance of slabs-on-grade, utilities, pavements, flatwork, and other improvements. The on-site soils are suitable for use as new fill provided they are substantially free of debris, vegetation/organics and other deleterious materials. Fill should be placed in thin loose lifts, moisture conditioned and compacted prior to placement of the next lift. The placement and compaction of fill should be observed and tested by a representative of our firm during construction. Guideline site grading specifications are presented in Appendix D.

Our experience indicates fill will settle under its own weight. We estimate potential settlement of about 1 to 2 percent of the fill thickness even if the fill is compacted to the specified criteria. Most of this settlement usually occurs during and soon after construction; for clayey fill, it may continue for longer. Heave or additional settlement may occur after development in response to wetting.

Utilities

Water and sewer lines are usually constructed beneath paved roads. Compaction of trench backfill can have a significant effect on the life and serviceability of pavements. Trench backfill should be placed in thin (8 inches or less) loose lifts and moisture conditioned and compacted to the jurisdictional specifications. Our experience indicates fill and backfill can compress even if properly compacted to the criteria provided. Settlement of the backfill on the order of 1 to 2 percent of the depth of fill due to self-weight of the fill should be anticipated.

For utility installation, our experience indicates use of a self-propelled compactor results in more reliable performance compared to backfill “compacted” by an attachment on a backhoe or trackhoe. The upper portion of the trenches should be widened to allow the use of a self-propelled compactor. Special attention should be paid to backfill placed adjacent to manholes as we have seen instances where settlement in excess to 2 percent has occurred. Any improvements placed over backfill should be designed to accommodate movement. The placement and compaction of utility trench backfill should be observed and tested by a qualified representative during construction.

CONSTRUCTION OBSERVATIONS

This letter has been prepared for the exclusive use of JR Engineering, LLC and your design and construction team to assist in your due diligence assessment of potential site development. The information, conclusions, and recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structures proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the letter are not valid for use by others. Standards of practice evolve in geotechnical engineering. The recommendations provided are preliminary.

We recommend that CTL|Thompson, Inc. provide construction observation services to allow us the opportunity to verify whether soil conditions are consisted with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structures will perform satisfactorily. It is critical that all recommendations in this report are followed during construction.

LIMITATIONS

Our borings were widely spaced to provide a reasonably accurate picture of the range of subsurface conditions for due diligence assessment and preliminary planning of development. The borings are representative of conditions encountered only at the location drilled. Variations in the subsoil conditions not indicated by our borings are likely. We believe this investigation was conducted in a manner consistent with the level of skill and care ordinarily used by geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made.

If we can be of further service in discussing either the contents of this letter or the analysis of the influence of subsurface conditions on the design of the proposed development, please call.

CTL|THOMPSON, INC.

Sharone Richards
Staff Engineer

Robert J. Brown
Staff Engineer

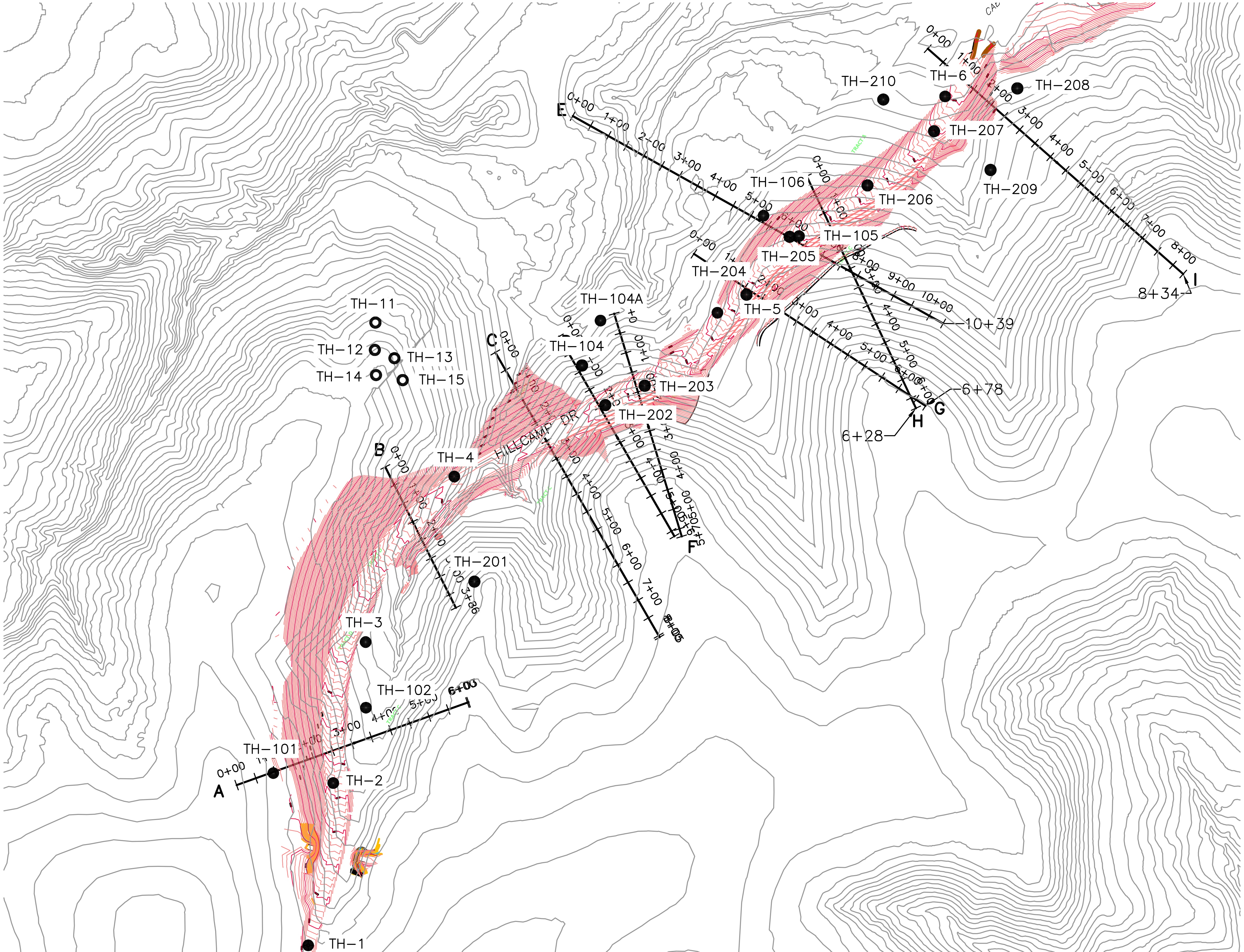
Reviewed By:

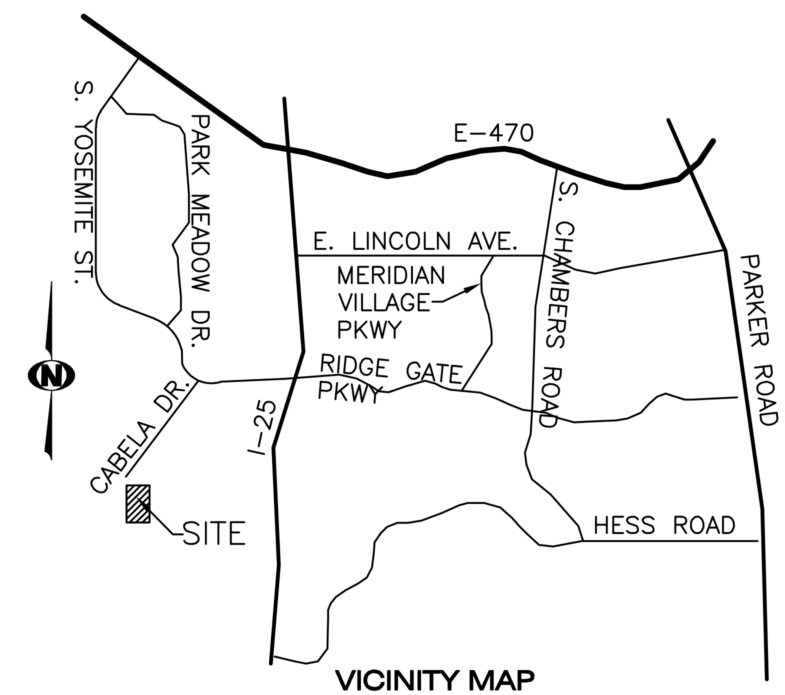
COLORADO LICENSED PROFESSIONAL ENGINEER
ERIN CHRISTINE BOUCHET
0054368

3/27/2026

Erin Bouchet, P.E., P.G.
Associate Engineer | Denver Engineering Manager

Via e-mail: krohrbough@jrengineering.com





VICINITY MAP
NOT TO SCALE

LEGEND:

TH-201 APPROXIMATE LOCATION OF EXPLORATORY BORING

TH-1 APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION

TH-11 APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION

SLOPE STABILITY ANALYSIS SECTION

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T Project No. DN52,378-125-L2

Locations of Exploratory Borings

Fig. 1A

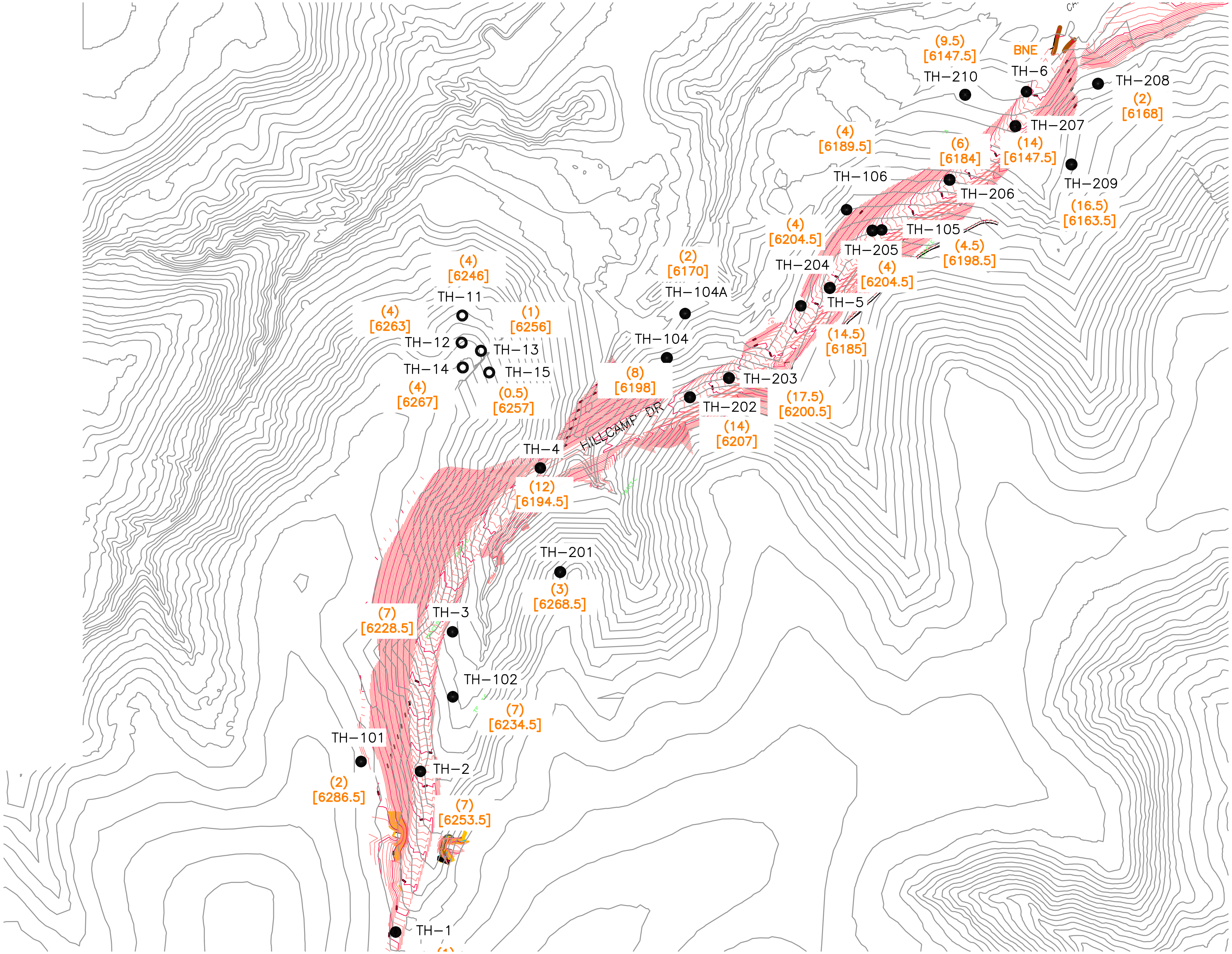
LEGEND:

- ● TH-201 APPROXIMATE LOCATION OF EXPLORATORY BORING
- ● TH-1 APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
- ○ TH-11 APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
- SLOPE STABILITY ANALYSIS SECTION

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T Project No. DN52,378-125-L2

Locations of Exploratory Borings

Fig. 1B



LEGEND:

TH-201 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
TH-11 ○	APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
(1)	INDICATES ESTIMATED DEPTH TO BEDROCK (FEET)
[6282]	INDICATES ESTIMATED BEDROCK ELEVATION (FEET)
BNE	BEDROCK NOT ENCOUNTERED
NOTE:	THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS.

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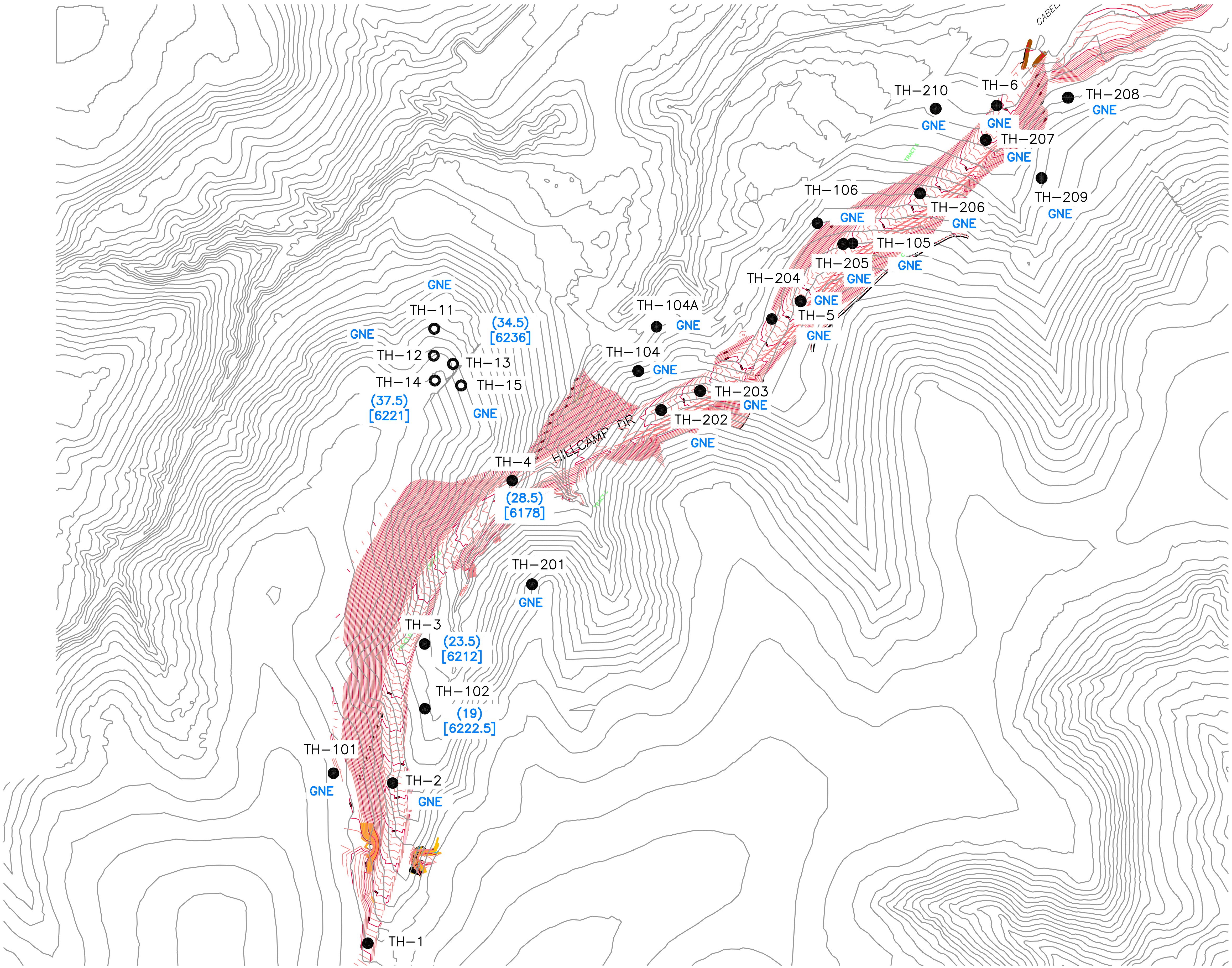
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T Project No. DN52,378-125-L2

Approximate Depth and Elevation of Bedrock

Fig. 2



LEGEND:

TH-201 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
TH-11 ○	APPROXIMATE LOCATION OF EXPLORATORY BORING FROM PREVIOUS INVESTIGATION
(15)	INDICATES APPROXIMATE DEPTH TO GROUNDWATER (FEET)
[6268]	INDICATES APPROXIMATE GROUNDWATER ELEVATION (FEET)
GNE	GROUNDWATER NOT ENCOUNTERED
NOTE:	THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS AND SEASONAL FLUCTUATIONS.

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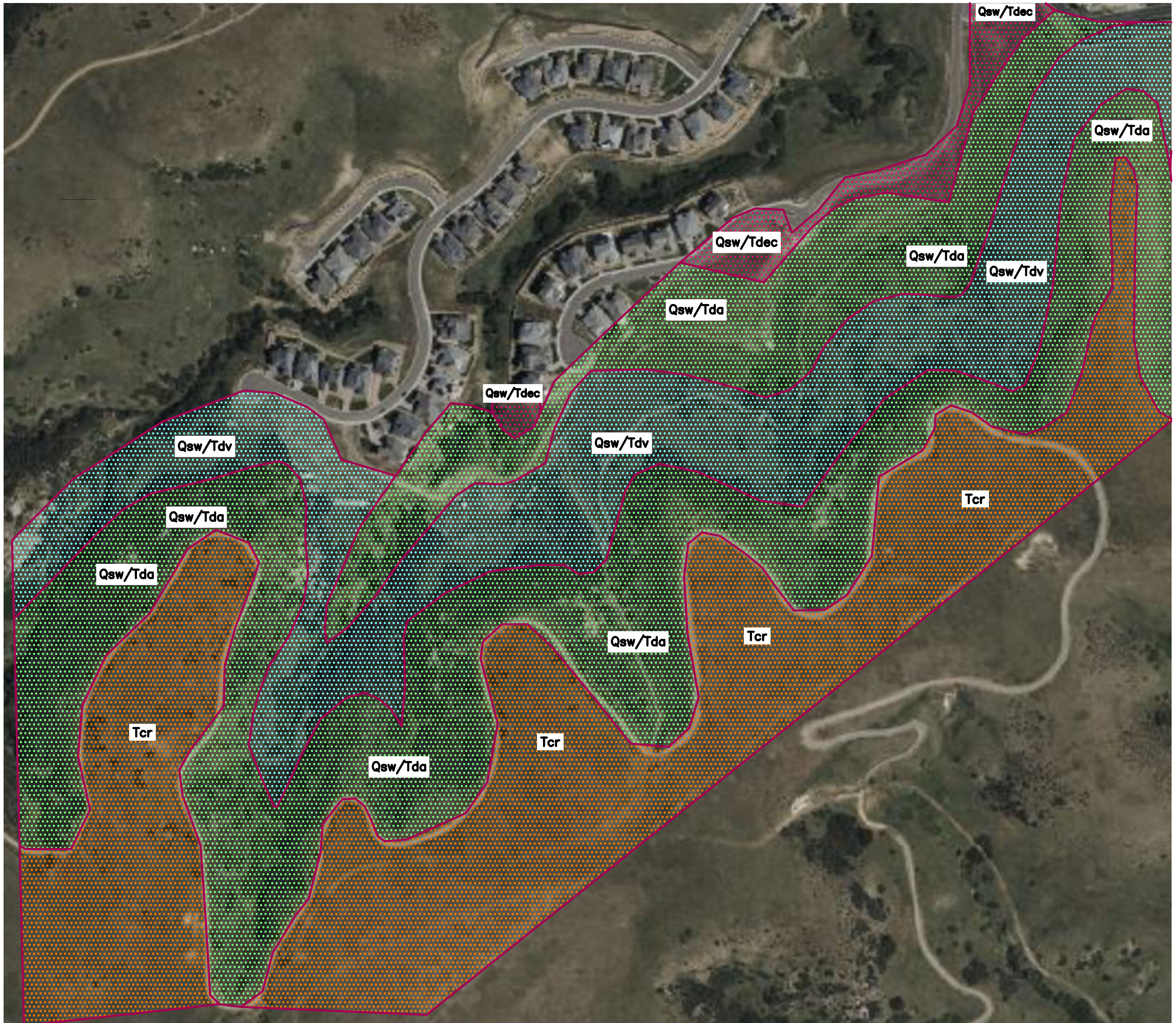
CTL|T Project No. DN52,378-125-L2

Approximate Depth and Elevation of Groundwater

Fig. 3



LEGEND:

Qsw	OVERBURDEN SOILS CONSIST PRIMARILY OF SLOPE WASH COMPRISED OF SILTY, SANDY, CLAY AND CLAYEY, SILTY SAND WITH THICKNESSES RANGING FROM 1 TO 20 FEET. THE CLAYEY SOILS ARE EXPANSIVE.
Tcr	CASTLE ROCK CONGLOMERATE, CEMENTED BOULDERS AND COBBLE RANGING FROM 1/8-INCH TO 4 FEET IN DIAMETER IN A MATRIX OF FINE TO COARSE-GRAINED SANDSTONE, LOCALLY DEEPLY WEATHERED, POORLY SORTED, OUTCROPS OR COVERED BY LOESS.
Tda	ARKOSIC SANDSTONE OF THE UPPER DAWSON ARKOSE FORMATION, FINE TO COARSE-GRAINED WITH CLAYEY MATRIX AND OCCASIONAL CLAYEY LENSES. OUTCROPS OR COVERED BY COLLUVIUM ALONG SLOPES AND ALLUVIUM ALONG DRAINAGE PATHS.
Tdv	CLAYSTONE FACIES OF THE UPPER DAWSON ARKOSE FORMATION, SILTY, OCCASIONALLY SANDY, MAY CONTAIN ARKOSIC SANDSTONE LENSES, BLOCKY WHERE WEATHERED, SWELL POTENTIAL. COVERED BY COLLUVIUM ALONG SLOPES AND ALLUVIUM ALONG DRAINAGE PATHS.
Tdec	CLAYSTONE FACIES OF THE UPPER DENVER FORMATION, SILTY, BLOCKY, HIGH SWELLING PRESSURE POTENTIAL. COVERED BY COLLUVIUM OR LOESS.

N

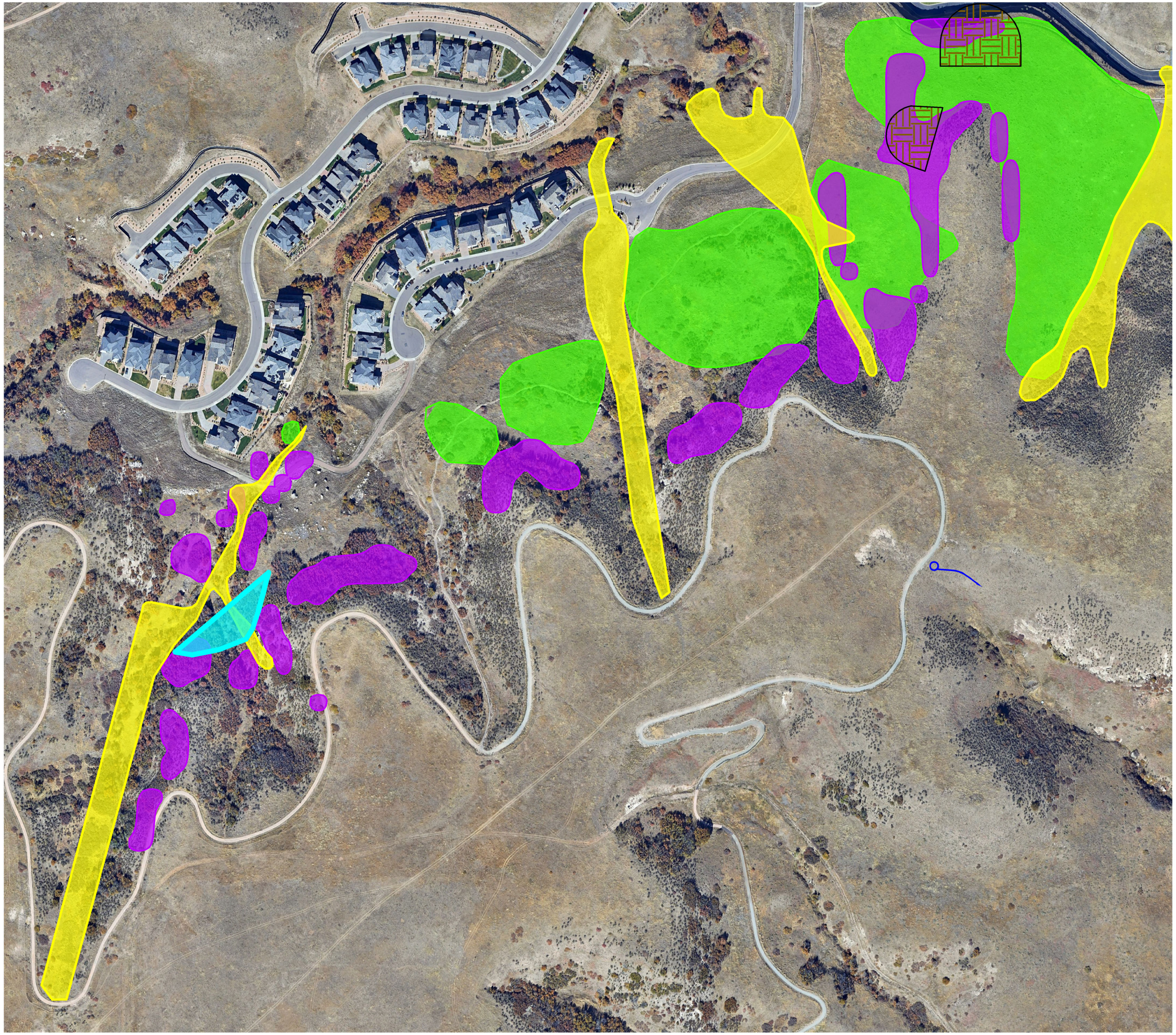
0 150' 300'

SCALE: 1" = 300'

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T Project No. DN52,378-125-L2

Geologic Map

Fig. 4



LEGEND:

INDICATES AREA OF OBSERVED SITE GRADE DISTURBANCE [SEE NEARMAP DEM CHANGE DETECTION SECTION IN REPORT]

INDICATES AREA OF DEBRIS FLOW HAZARD, AS MAPPED ON SUSCEPTIBILITY MAPPED BY CGS (OF–18–08)AND BASED ON FIELD OBSERVATIONS

INDICATES POTENTIAL LANDSLIDE DEPOSIT, INVENTORY MAPPED BY CGS (OF–18–07)

INDICATES AREA OF LANDSLIDE HAZARD, SUSCEPTIBILITY MAPPED BY CGS (OF–18–07)

INDICATES AREA OF MAPPED LANDSLIDE DEPOSITS (MISCELLANEOUS GEOLOGIC INVESTIGATIONS MAP 1–770–A)

INDICATES MAPPED LOCATION OF SPRING OR SEEPAGE AT THE GROUND SURFACE (MISCELLANEOUS GEOLOGIC INVESTIGATIONS MAP 1–770–A)

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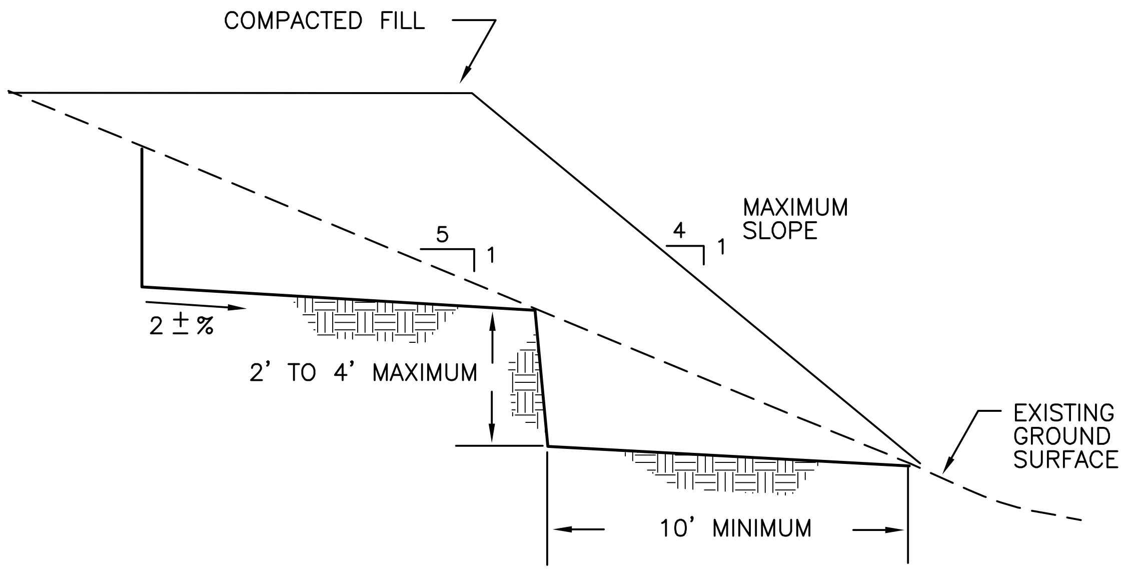
Geologic Hazards Fig. 5



NOTES:

1) NATURAL SLOPES OF 20 PERCENT OR STEEPER ARE TO BE BENCHED PRIOR TO FILL PLACEMENT.

2) SLOPE BENCHES TO OUTSLOPE AT 2± PERCENT.

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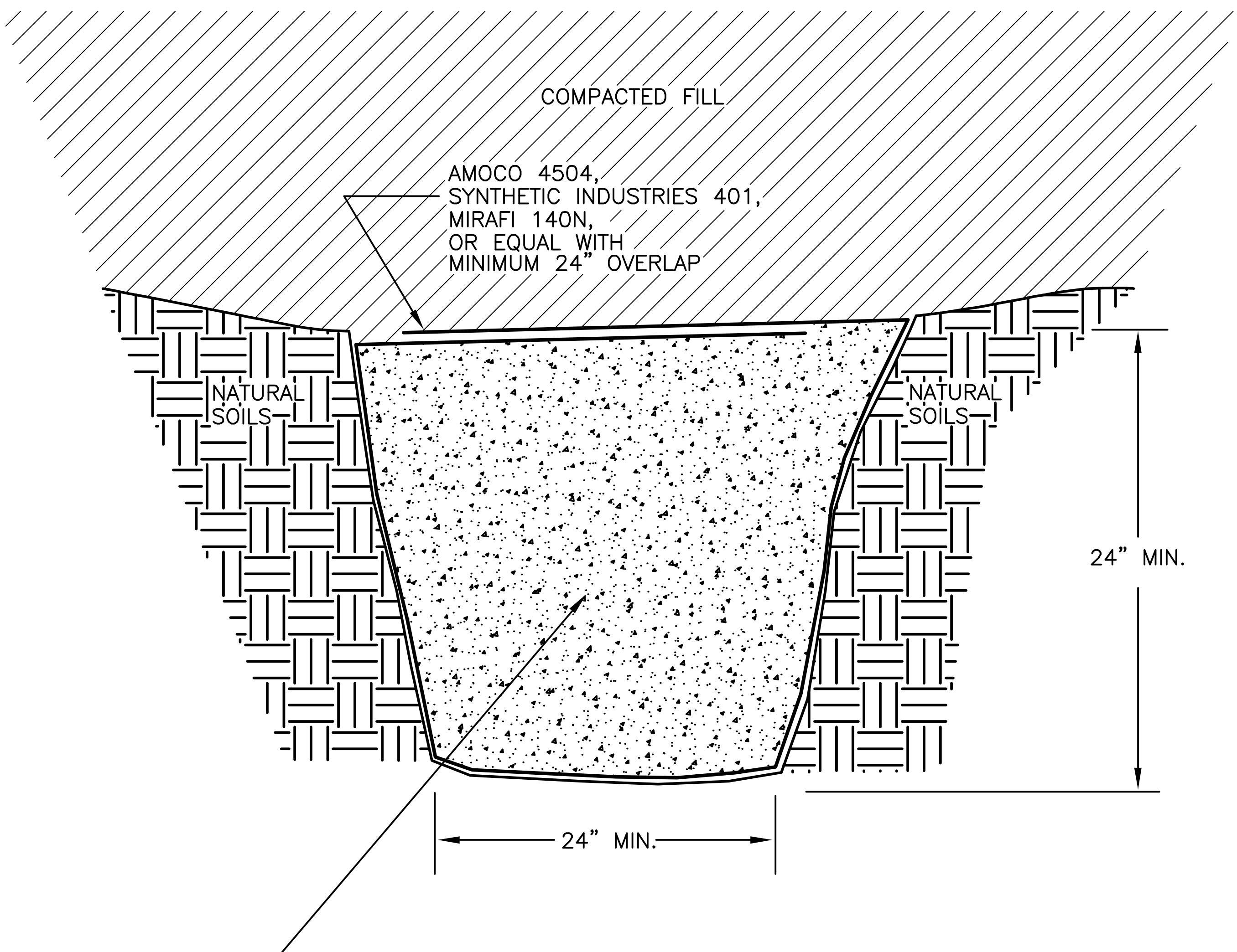
CTL|T Project No. DN52,378-125-L2

Benched Fill Detail

Fig. 6

60-BENCHED-FILL_01

40-SUBDRAIN_01



GRAVEL AND SAND
GRADED AS FOLLOWS

SIEVE SIZE	% PASSING
1 1/2"	100
3/4"	82–100
3/8"	64–80
#4	46–64
#8	34–52
#16	25–42
#30	12–30
#50	5–15
#100	1–3
#200	0–1

NOTE:
THE SAND AND GRAVEL GRADATION CAN BE MET BY MIXING COURSE CONCRETE AGGREGATE NO. 57 AND FINE CONCRETE AGGREGATE NO. 67 IN EQUAL PARTS BY WEIGHT.

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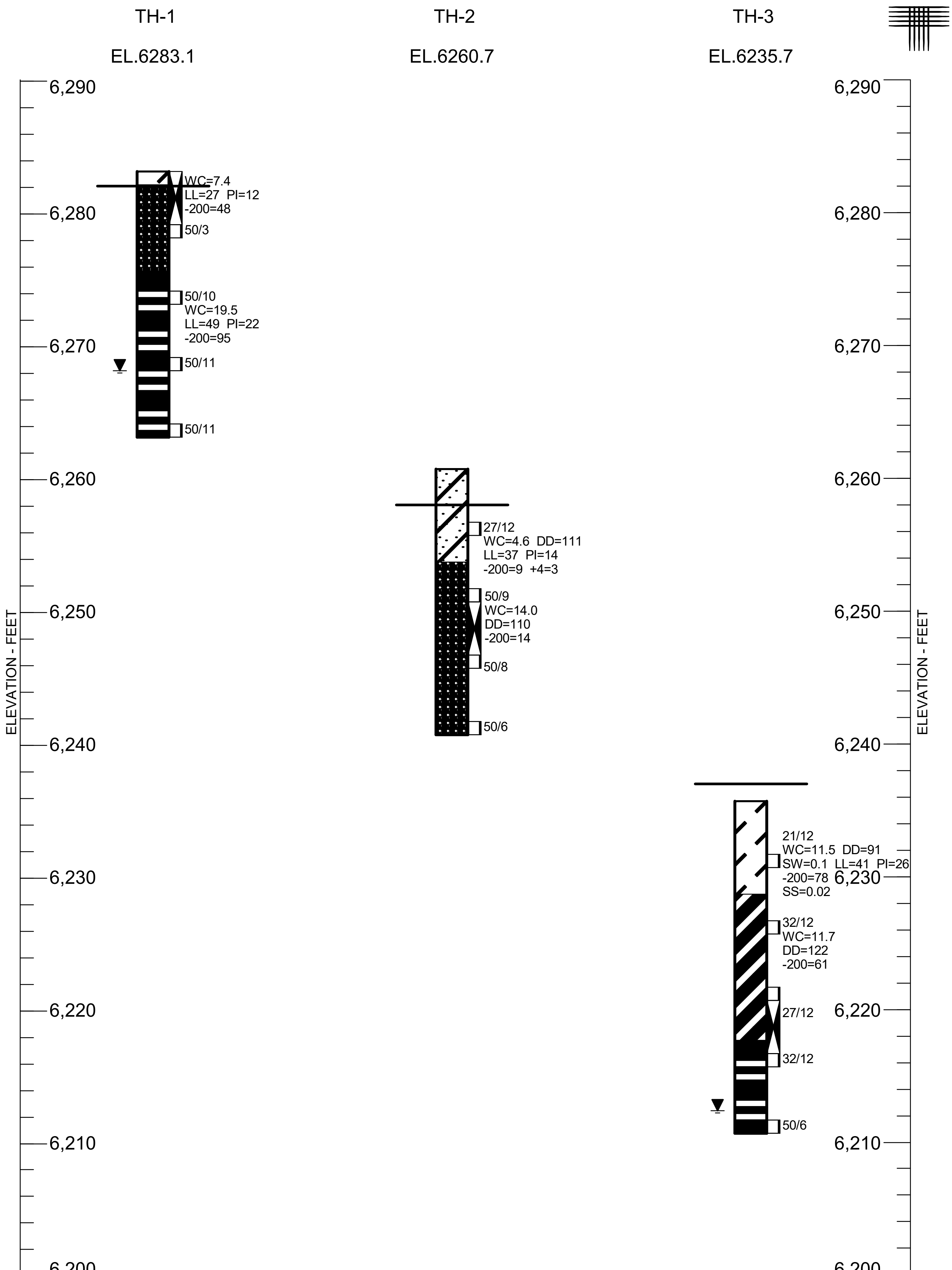
CTL|T Project No. DN52,378-125-L2

Drainage Sub-Drain Fig. 7

APPENDIX A

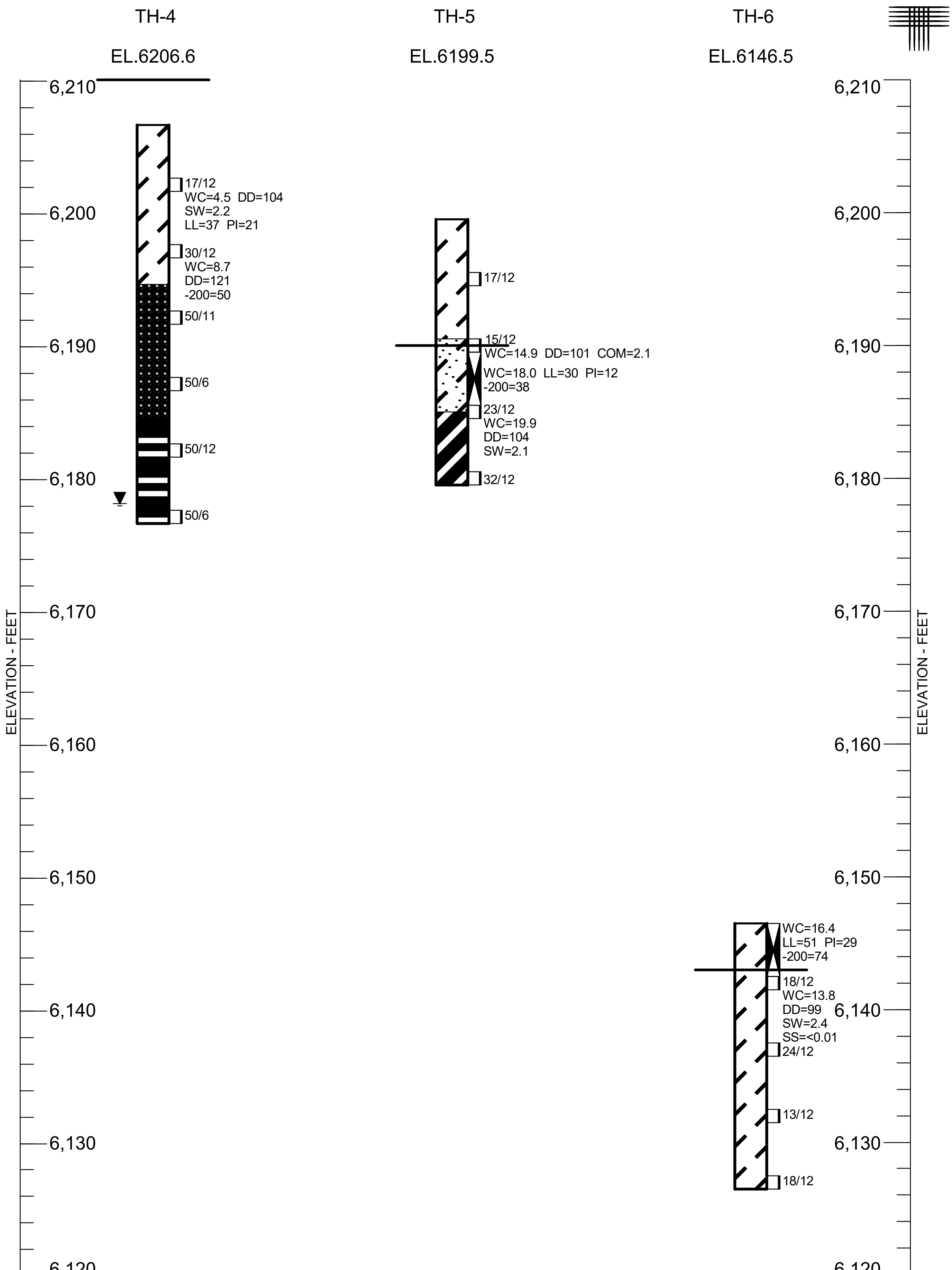
SUMMARY LOGS OF EXPLORATORY BORINGS



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

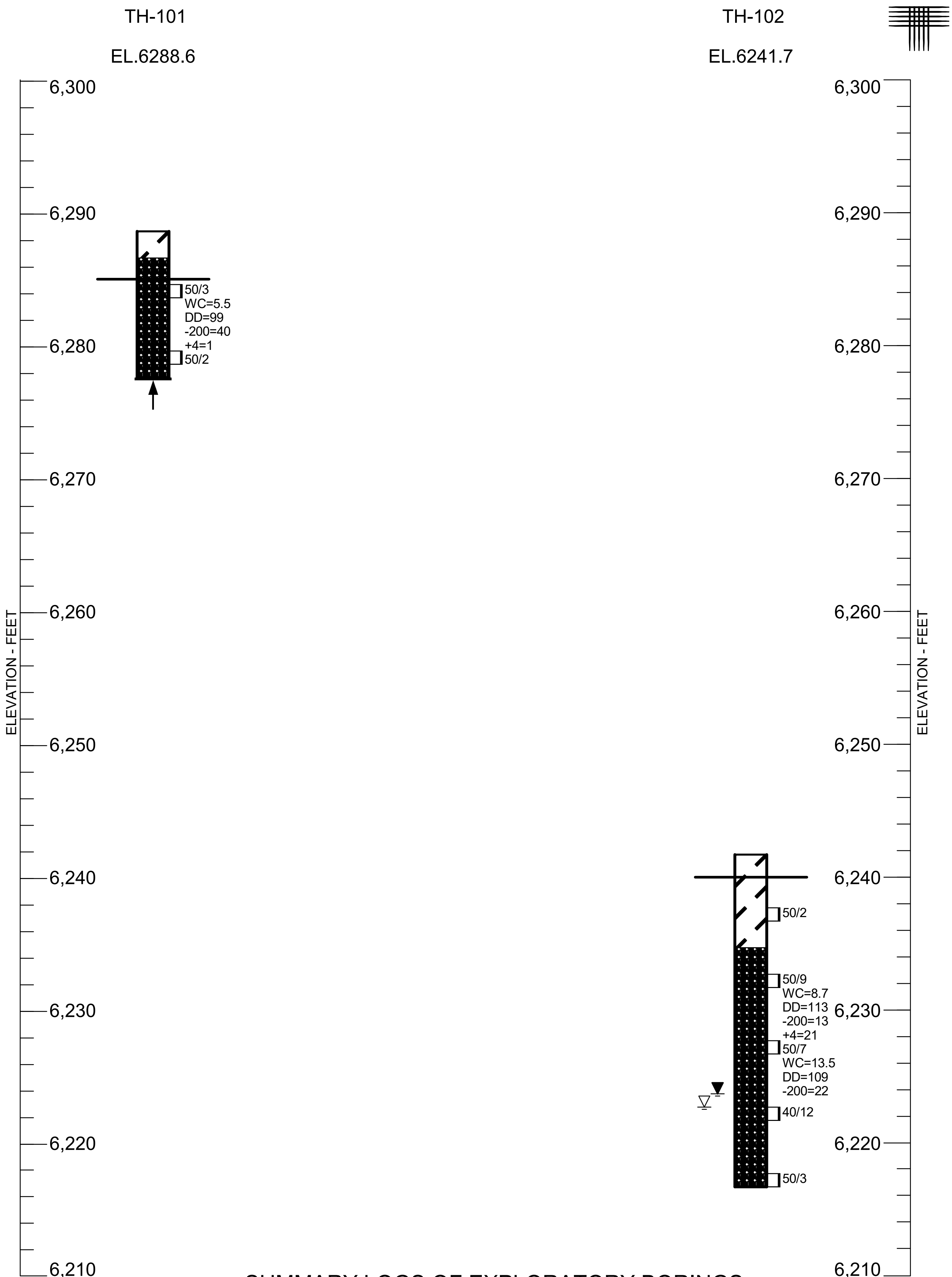
FIG. A-1



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

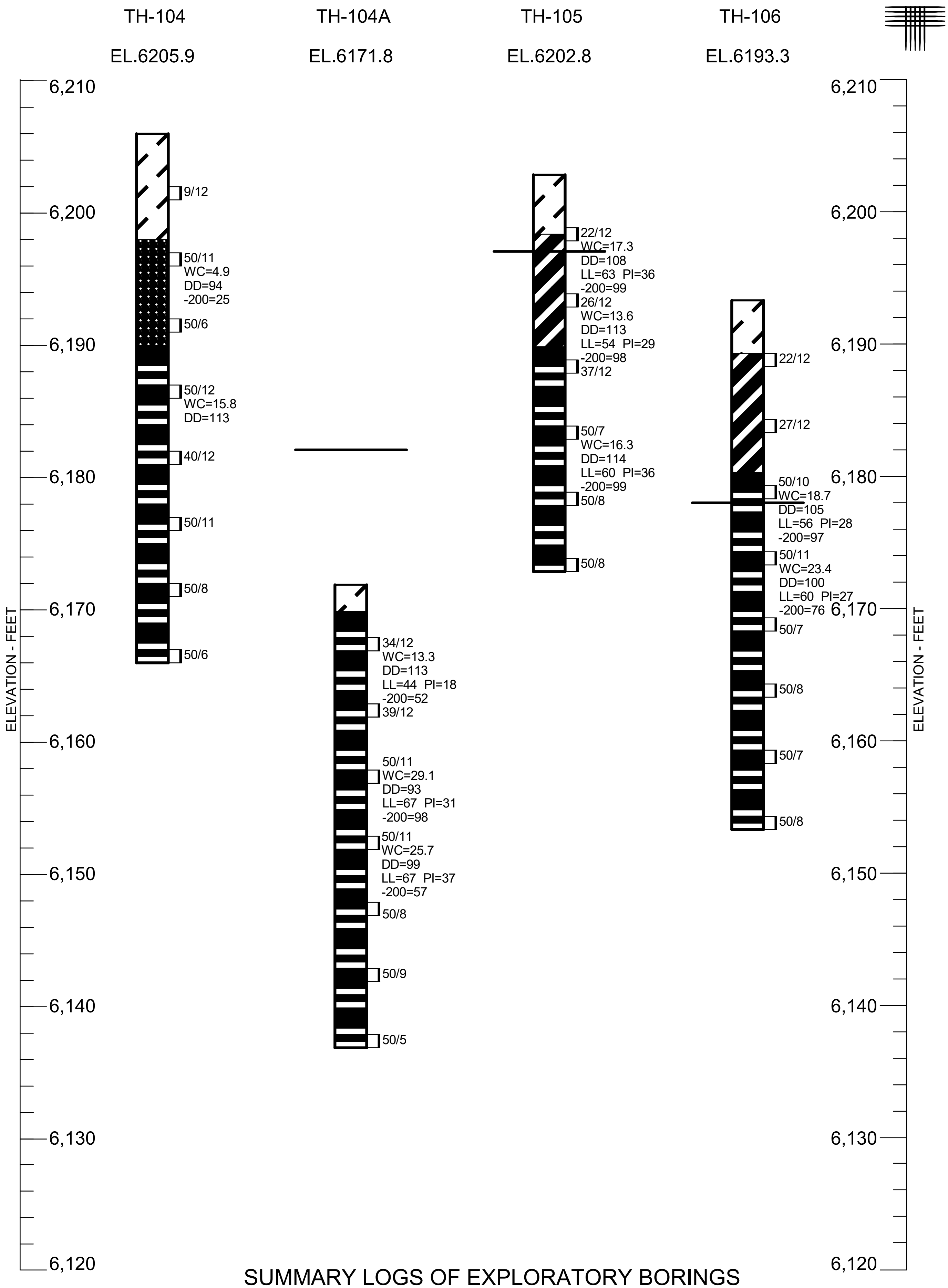
FIG. A-2



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

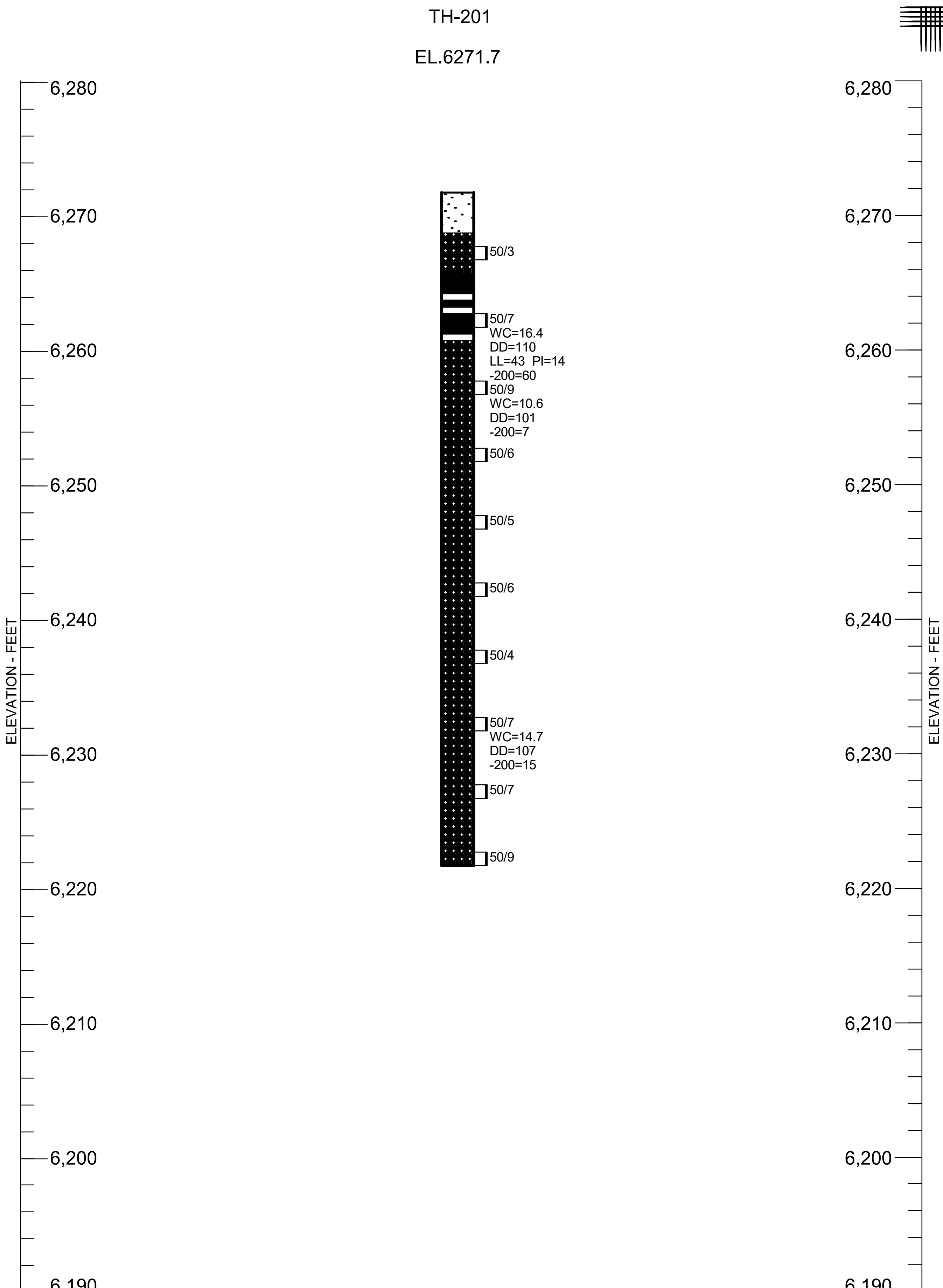
FIG. A-3



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

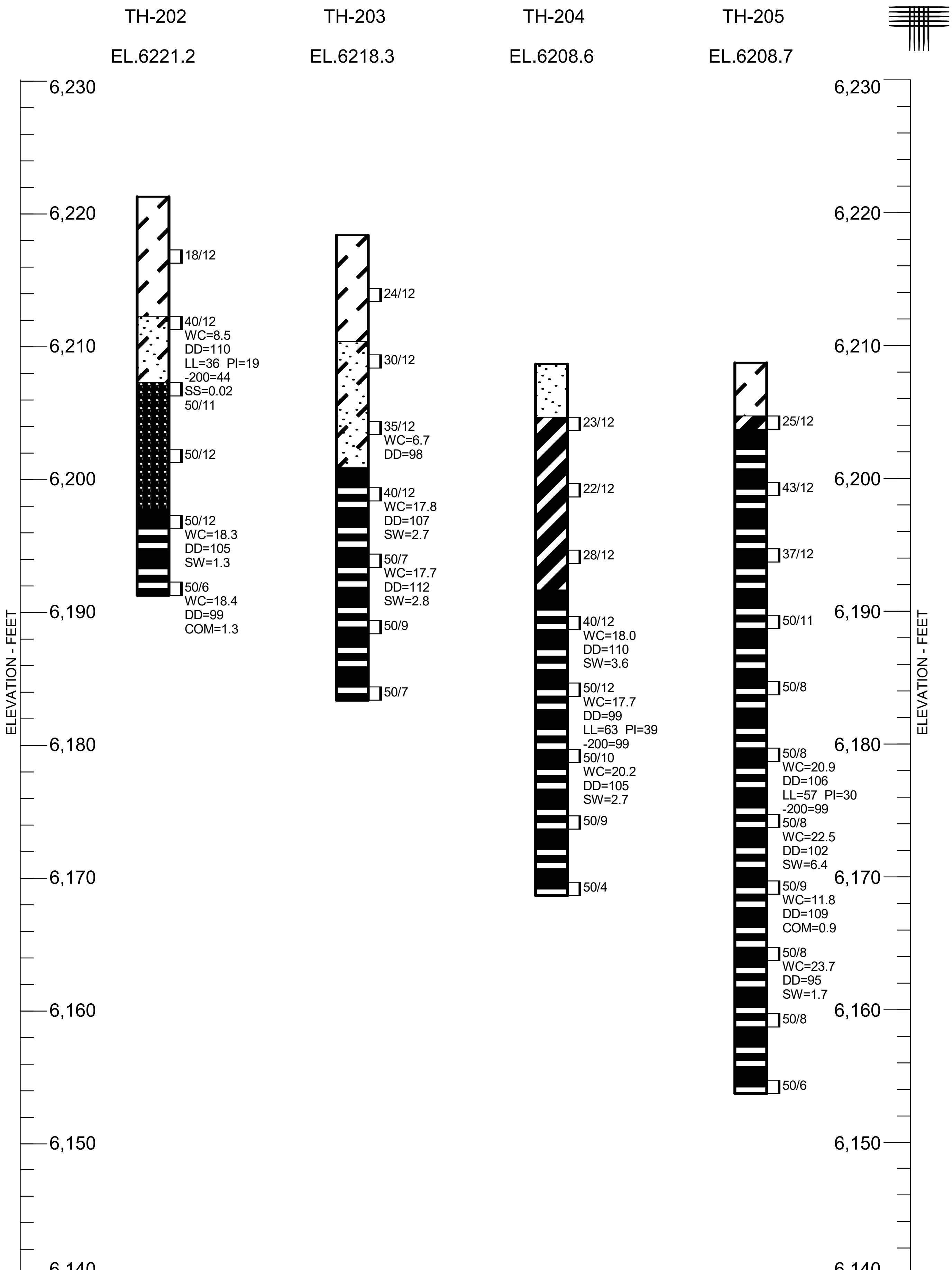
FIG. A-4



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

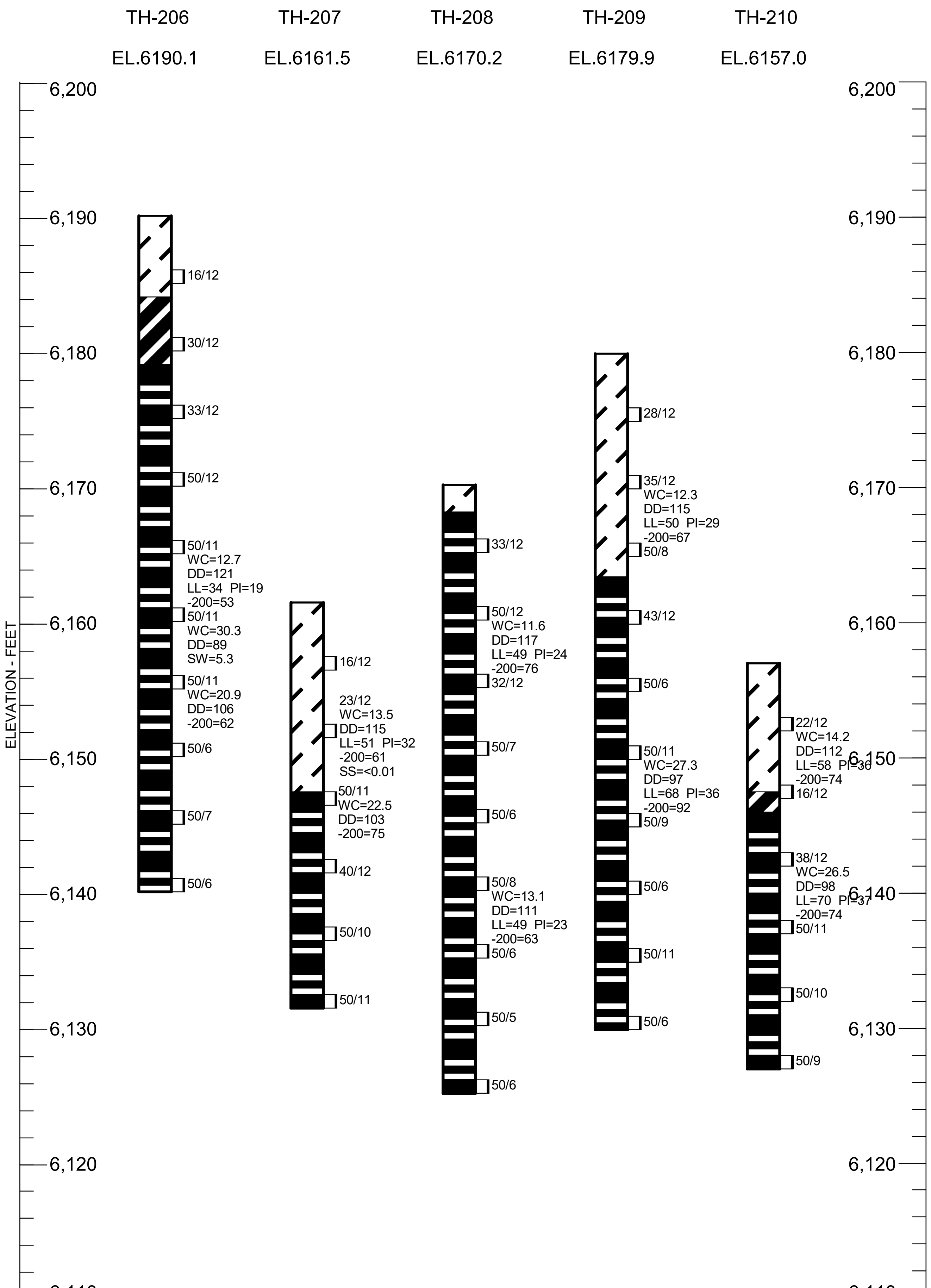
FIG. A-5



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

FIG. A-6



SUMMARY LOGS OF EXPLORATORY BORINGS

JR ENGINEERING, LLC
RIDGEGATE - MESA TOP ROAD ALIGNMENT
CTL|T PROJECT NO. DN52,378-125-L2

LEGEND:

- CLAY, SANDY, OCCASIONAL GRAVELS, STIFF TO VERY STIFF, SLIGHTLY MOIST TO MOIST, BROWN, TAN, OLIVE, GRAY, BLACK, WHITE (CL, CH).
- SAND, CLEAN TO SILTY, MEDIUM DENSE, SLIGHTLY MOIST TO MOIST, BROWN, TAN, GRAY, WHITE (SP-SM).
- SAND, CLAYEY, MOIST, MEDIUM DENSE TO DENSE, BROWN, TAN (SC).
- WEATHERED CLAYSTONE, MOIST, BROWN, TAN, OLIVE, DARK BROWN, GRAY, WHITE, DARK REDDISH BROWN.
- BEDROCK, SANDSTONE, HARD TO VERY HARD, SLIGHTLY MOIST TO MOIST, TAN, WHITE, OLIVE, BLACK, RUST.
- BEDROCK, CLAYSTONE, MEDIUM HARD TO VERY HARD, MOIST, BROWN, GRAY, TAN, OLIVE, DARK GRAY, BLUE, BLACK, RUST.
- DRIVE SAMPLE. THE SYMBOL 16/12 INDICATES 16 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.
- INDICATES BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.
- WATER LEVEL MEASURED AT TIME OF DRILLING.
- WATER LEVEL MEASURED AFTER DRILLING ON SEPTEMBER 18, 2024.
- INDICATES PRACTICAL DRILL RIG REFUSAL.
- INDICATES PROPOSED GRADE.

NOTES:

1. THE BORINGS WERE DRILLED SEPTEMBER 11 AND 12, 2024 AND BETWEEN FEBRUARY 13 AND 23, 2026 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND TRUCK-MOUNTED CME-45 DRILL RIGS.

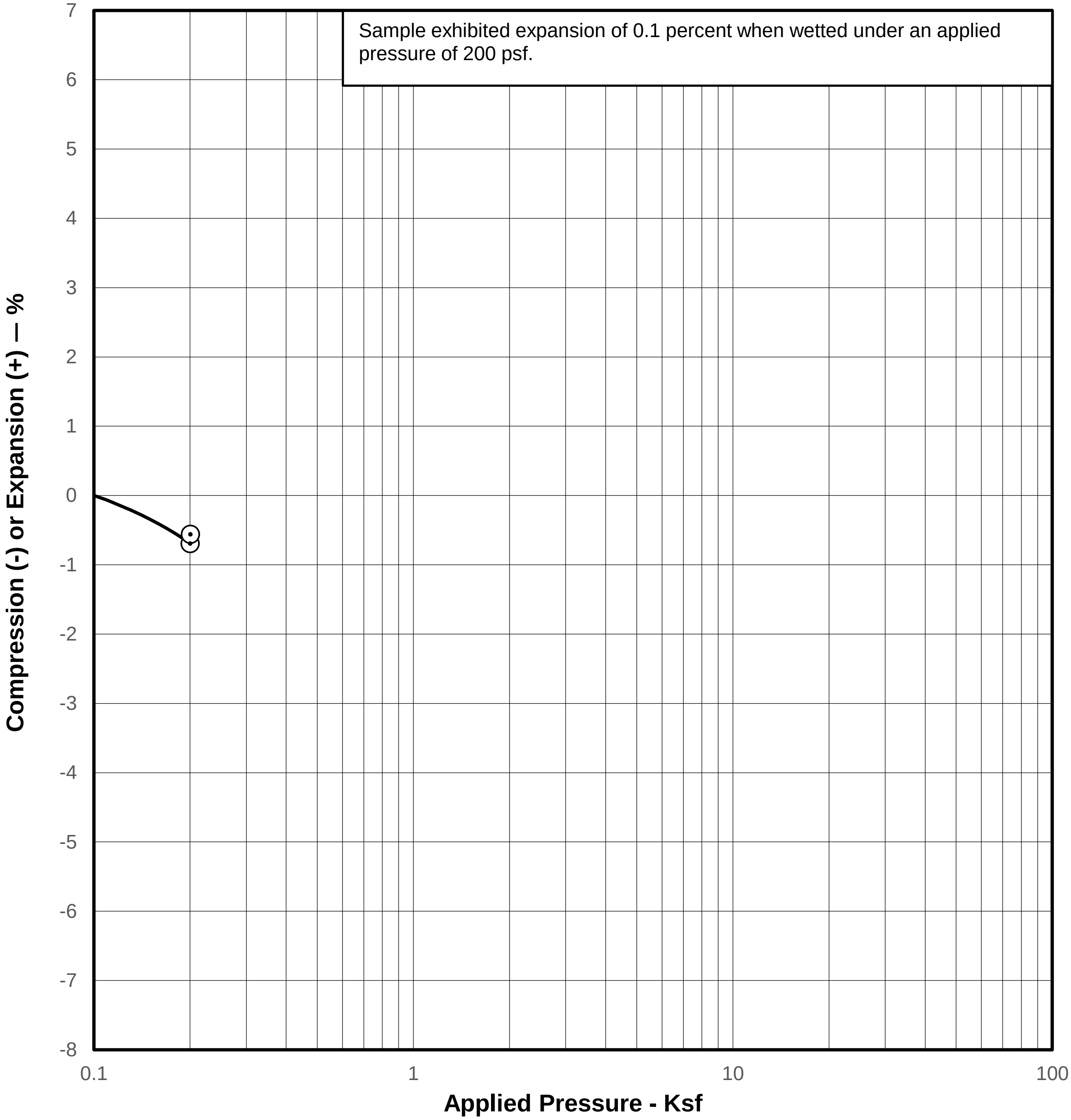
2. BORING LOCATIONS AND ELEVATIONS WERE STAKED AND SURVEYED BY OTHERS. SOME BORING LOCATIONS WERE MOVED DUE TO ACCESS ISSUES. THESE BORING LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY A REPRESENTATIVE OF OUR FIRM USING A LEICA GS18 GPS UNIT REFERENCING THE NORTH AMERICAN DATUM OF 1983 (NAD83).

3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).

4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.

APPENDIX B

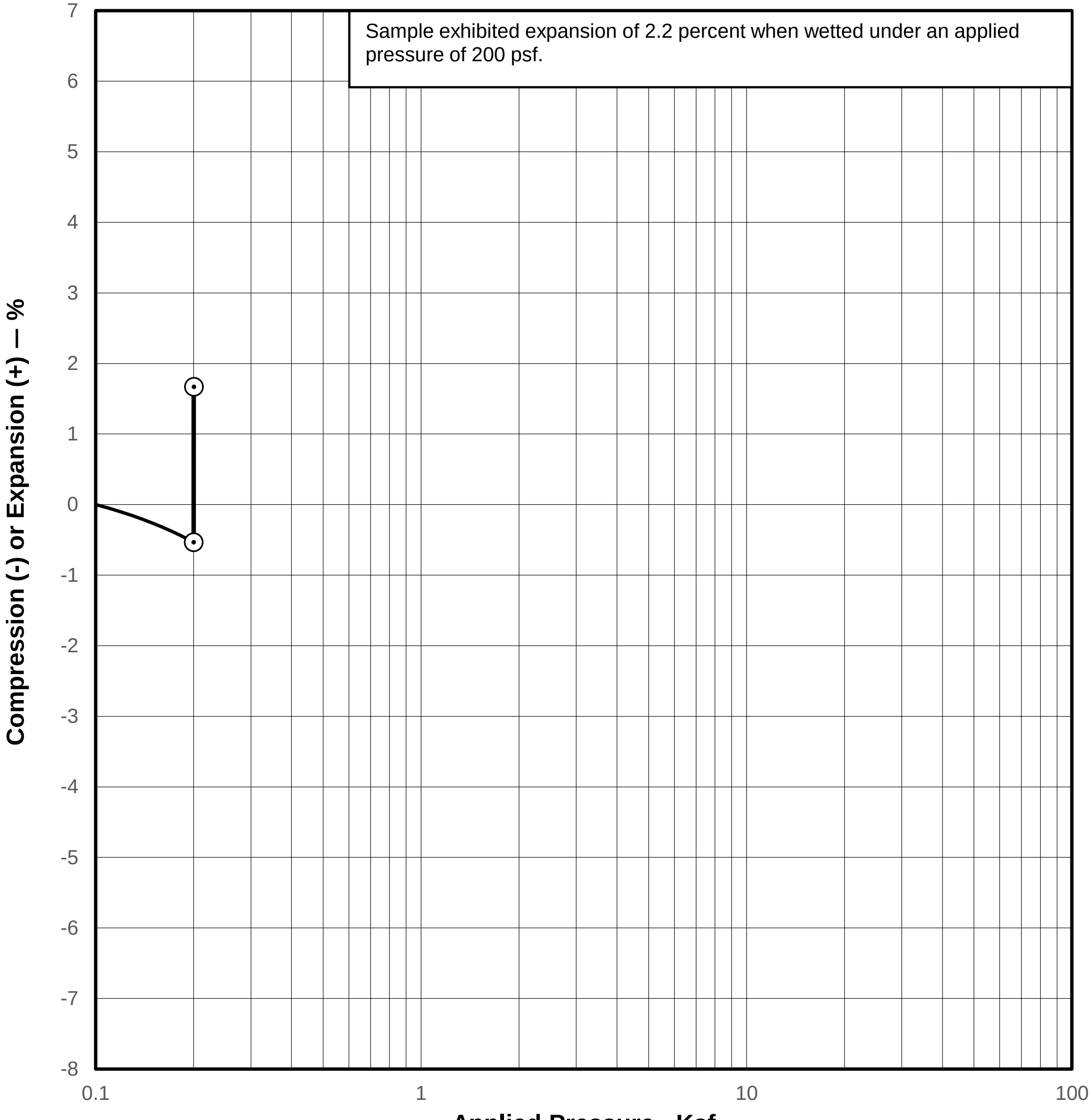
LABORATORY TEST RESULTS AND TABLE B-I



SAMPLE OF: CLAY, SANDY (CL)
FROM: TH-3 AT 4 FEET

MOISTURE CONTENT:	11.5 %	LIQUID LIMIT:	41	SILT AND CLAY:	78 %
DRY UNIT WEIGHT:	91 pcf	PLASTICITY INDEX:	26	SOIL SUCTION:	pf

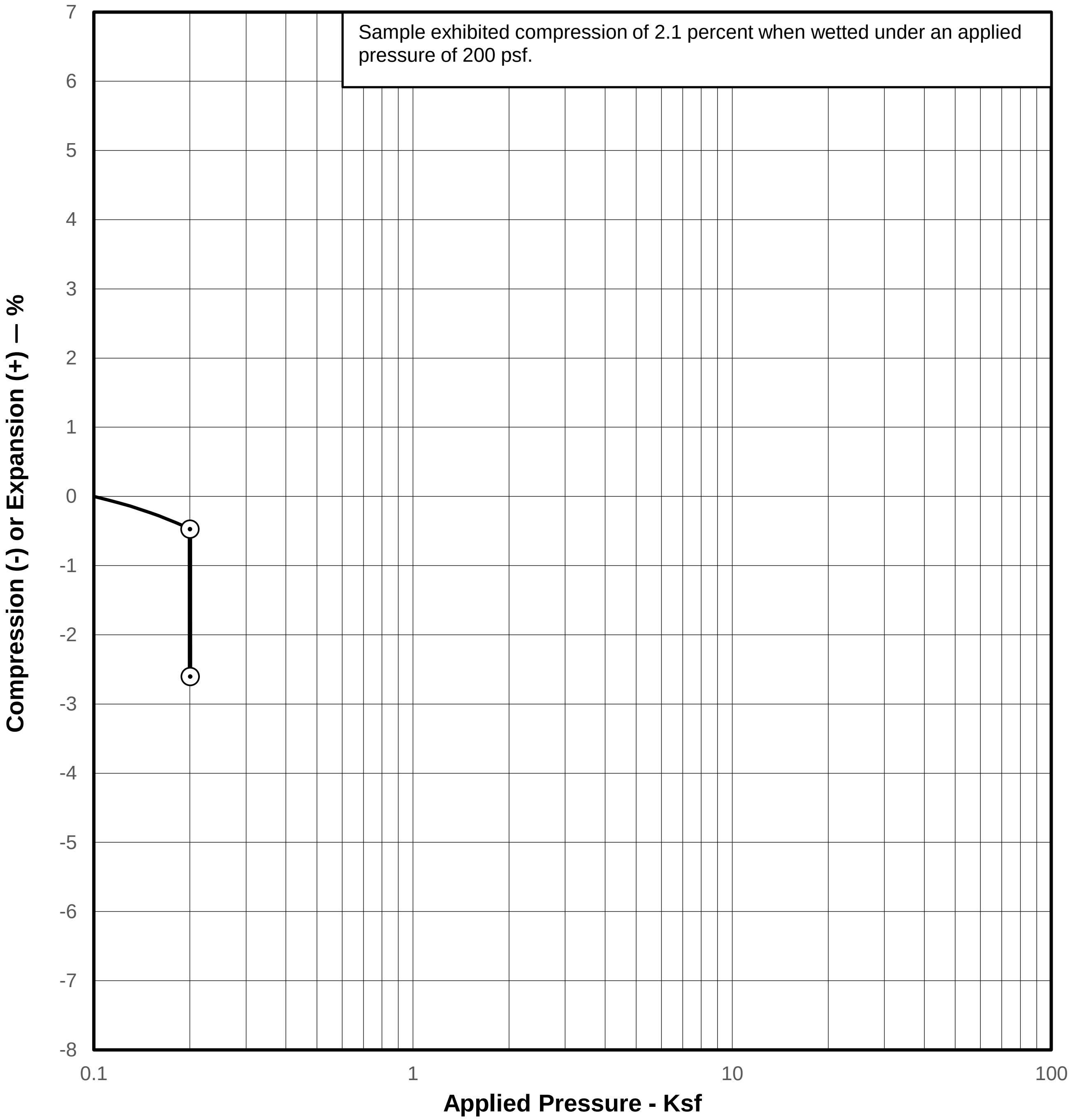
Swell Consolidation Test Results



SAMPLE OF: CLAY, SANDY (CL)
FROM: TH-4 AT 4 FEET

MOISTURE CONTENT: 4.5 % LIQUID LIMIT: 37 SILT AND CLAY: ___ %
DRY UNIT WEIGHT: 104 pcf PLASTICITY INDEX: 21 SOIL SUCTION: ___ pf

Swell Consolidation Test Results

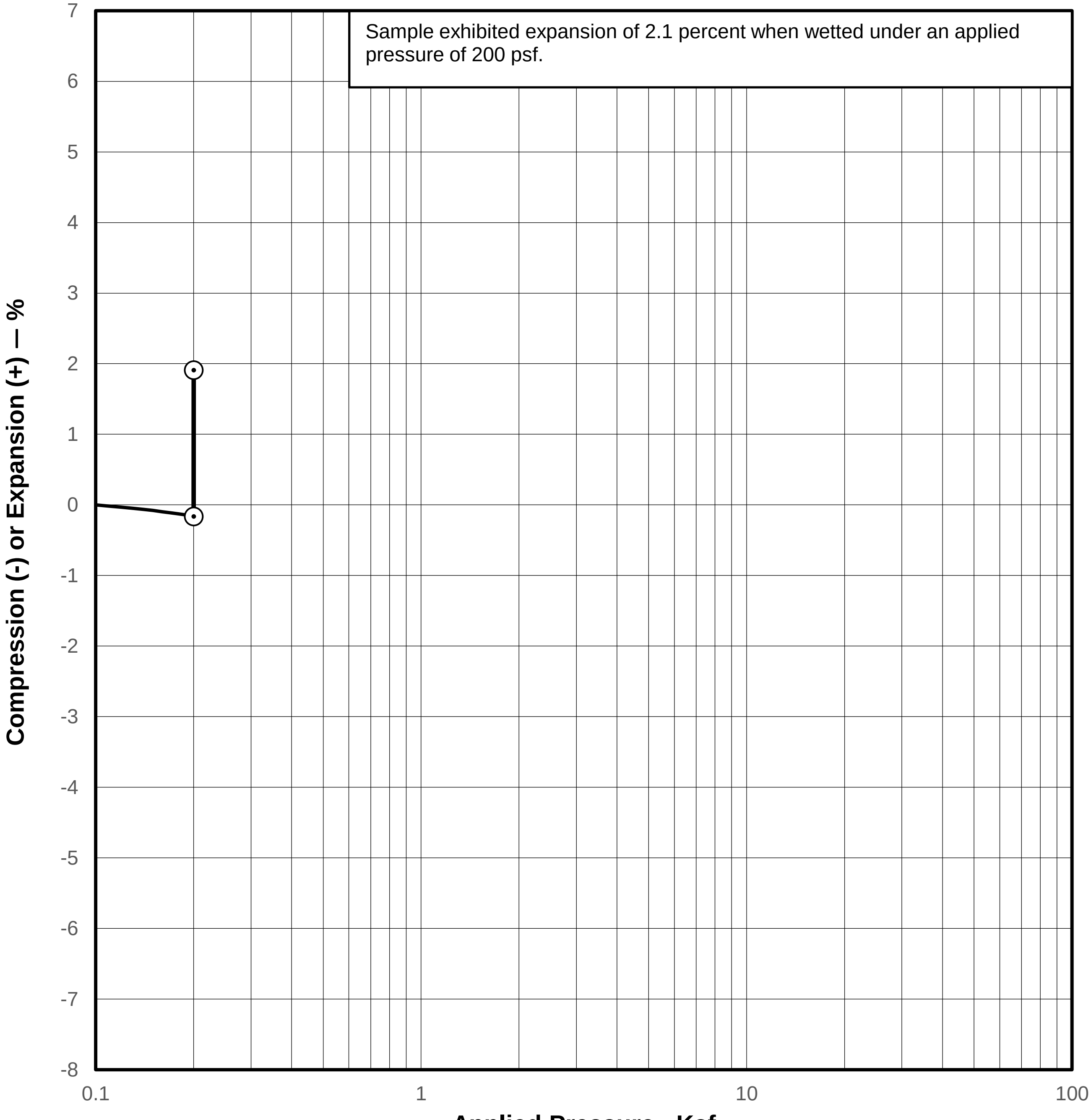


SAMPLE OF: SAND, CLAYEY (SC)

FROM: TH-5 AT 9 FEET

MOISTURE CONTENT:	14.9 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	101 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pf

Swell Consolidation Test Results

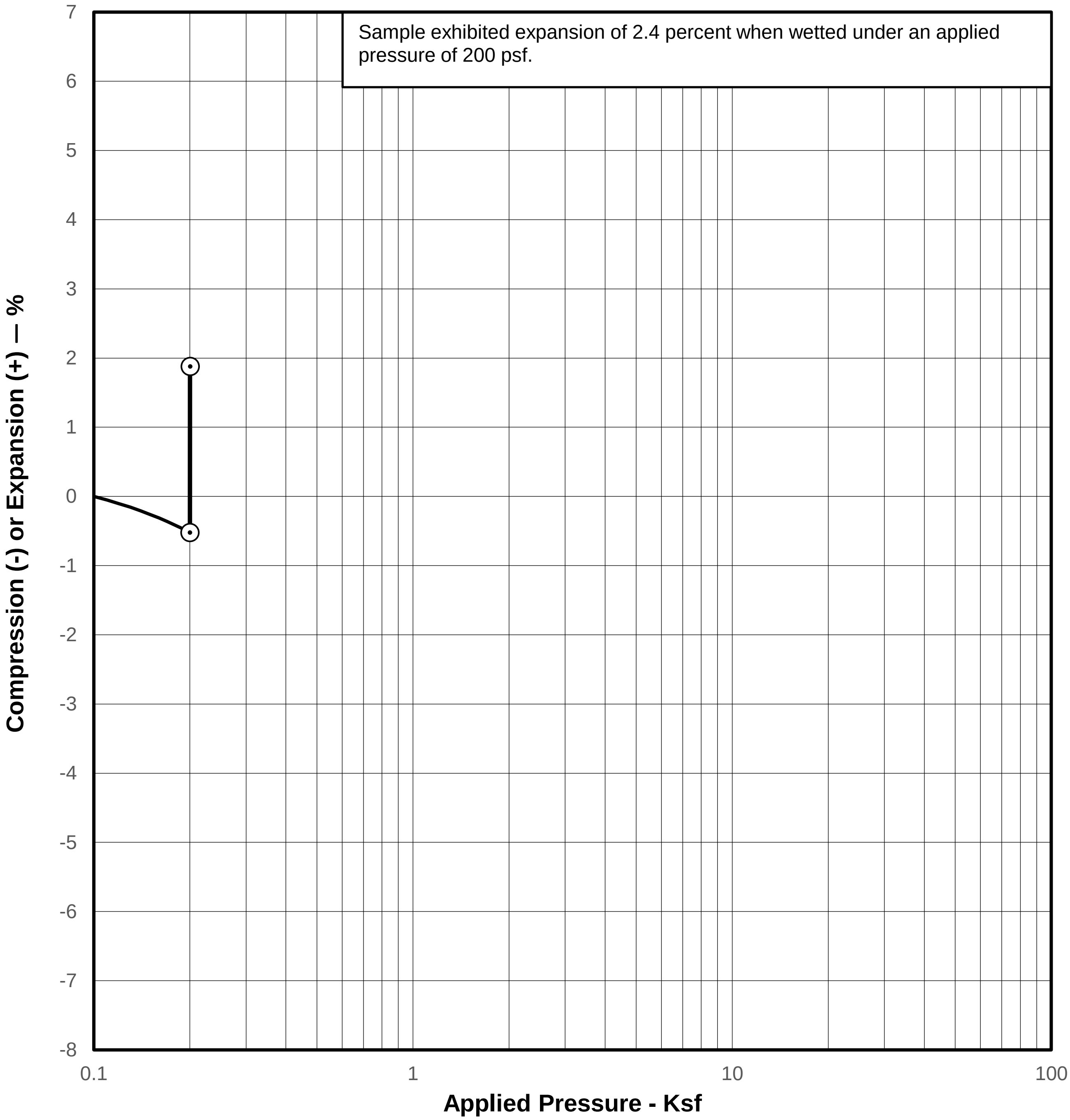


SAMPLE OF: WEATHERED CLAYSTONE

FROM: TH-5 AT 14 FEET

MOISTURE CONTENT:	19.9 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	104 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pf

Swell Consolidation Test Results



SAMPLE OF: CLAY, SANDY (CH)

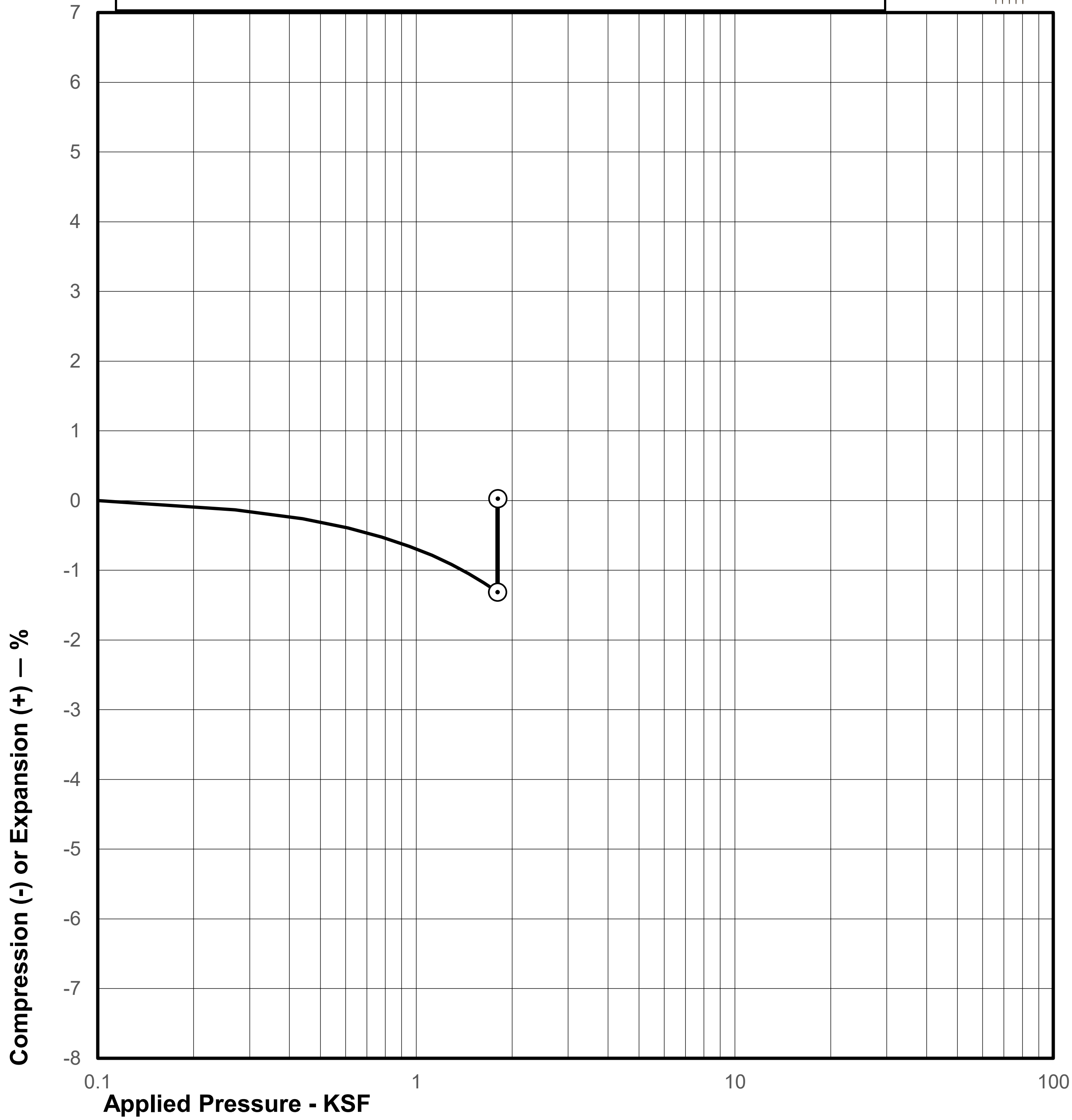
FROM: TH-6 AT 4 FEET

MOISTURE CONTENT:	13.8 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	99 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pf

JR ENGINEERING, LLC
RIDGEGATE MESA TOPS ROAD ALIGNMENT
CTL|T PROJECT NO. DN52378.000E-115-L2

Swell Consolidation Test Results

Sample exhibited expansion of 1.3 percent when wetted under an applied pressure of 1800 psf.



SAMPLE OF: CLAYSTONE

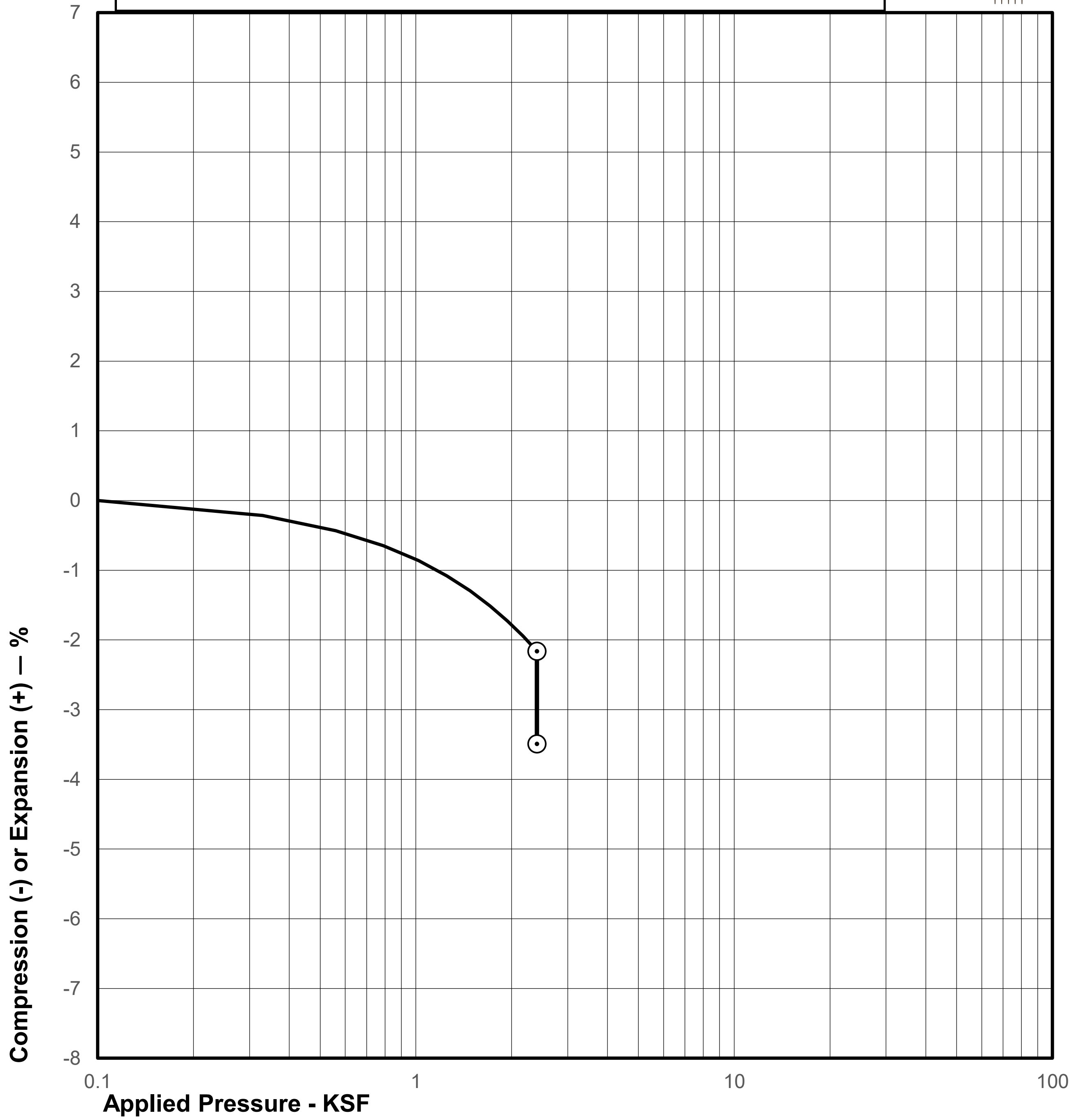
FROM: TH-202 AT 24 FEET

MOISTURE CONTENT:	18.3 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	105 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pF

Swell Consolidation Test Results

FIG B-6

Sample exhibited compression of 1.3 percent when wetted under an applied pressure of 2400 psf.



SAMPLE OF: CLAYSTONE

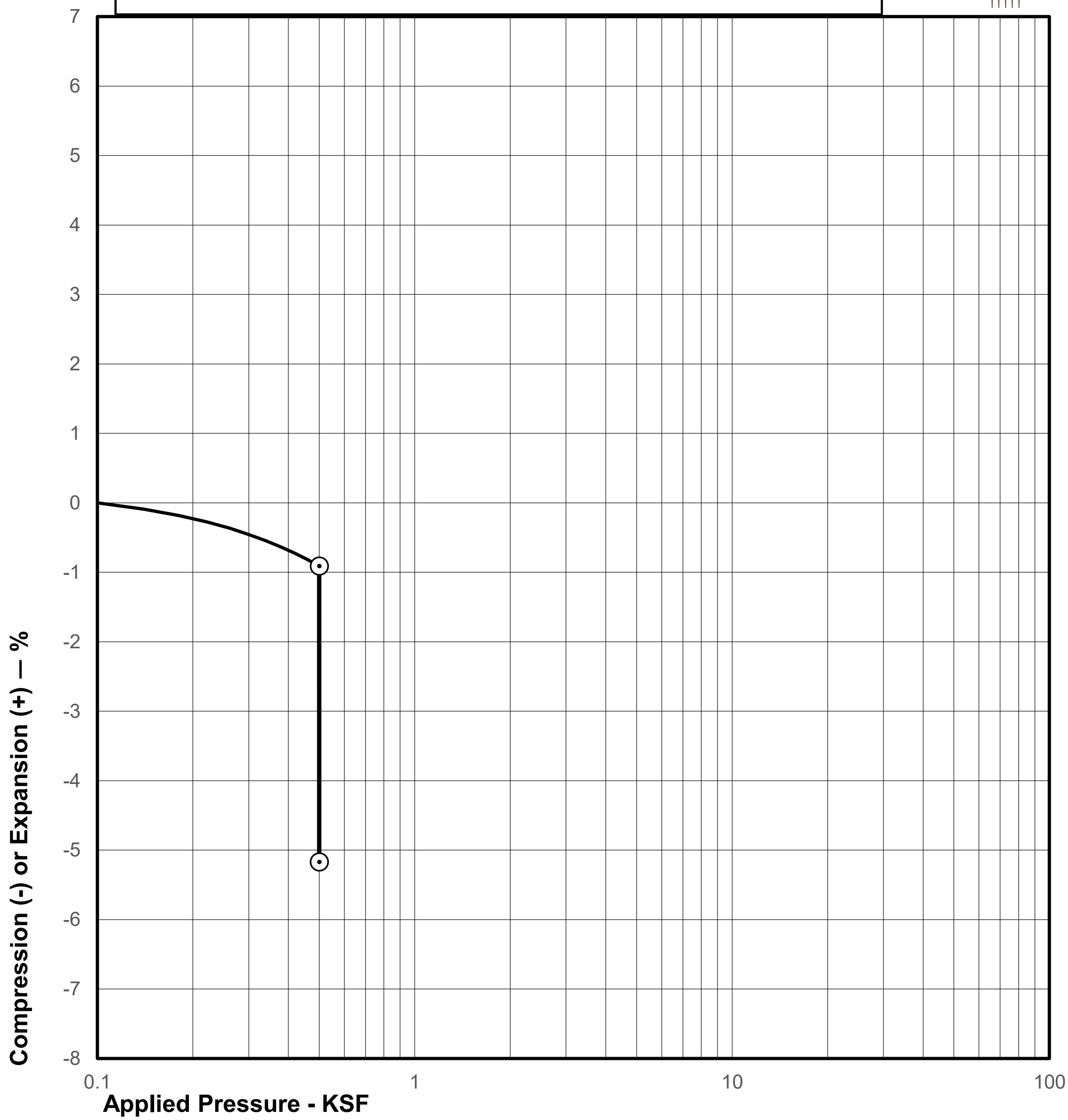
FROM: TH-202 AT 29 FEET

MOISTURE CONTENT:	18.4 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	99 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pF

Swell Consolidation Test Results

FIG B-7

Sample exhibited compression of 4.3 percent when wetted under an applied pressure of 500 psf.



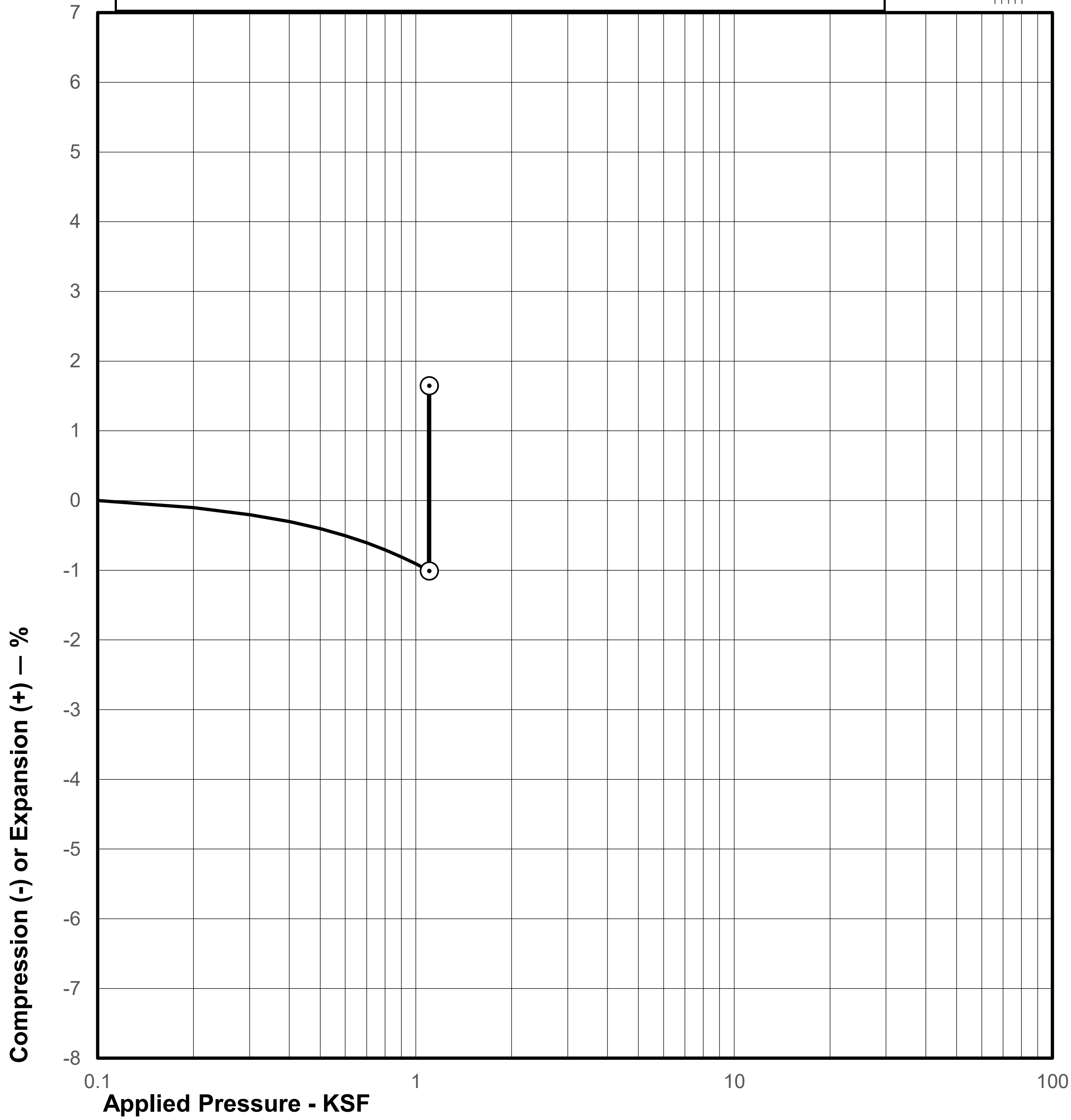
SAMPLE OF: CLAY, SANDY (CL)
FROM: TH-203 AT 14 FEET

MOISTURE CONTENT: 6.7 % LIQUID LIMIT: ____ SILT AND CLAY: ____ %
DRY UNIT WEIGHT: 98 pcf PLASTICITY INDEX: ____ SOIL SUCTION: ____ pF

Swell Consolidation Test Results

FIG B-8

Sample exhibited expansion of 2.7 percent when wetted under an applied pressure of 1100 psf.



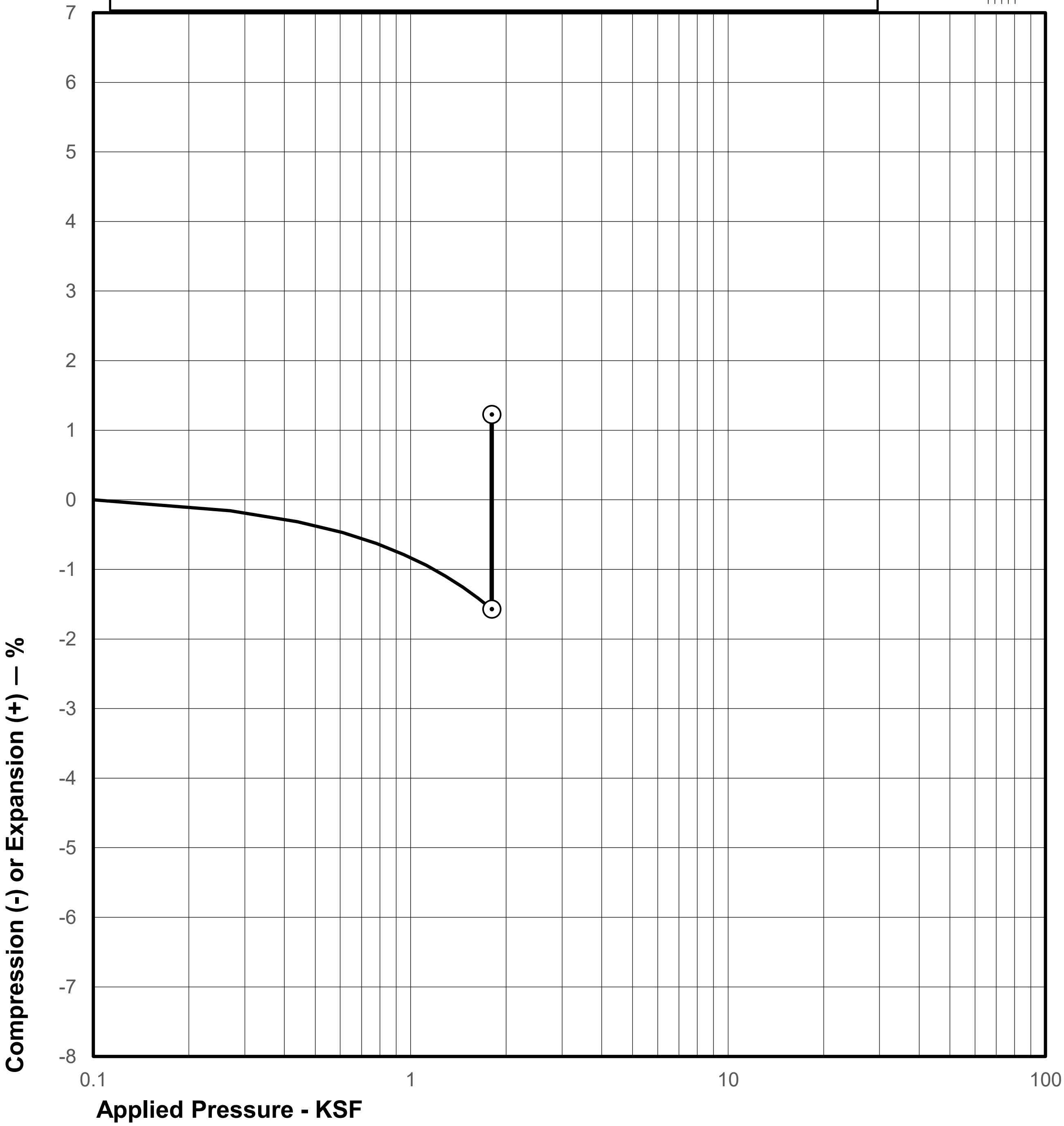
SAMPLE OF: CLAYSTONE
FROM: TH-203 AT 19 FEET

MOISTURE CONTENT:	17.8 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	107 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pF

Swell Consolidation Test Results

FIG B-9

Sample exhibited expansion of 2.8 percent when wetted under an applied pressure of 1800 psf.



SAMPLE OF: CLAYSTONE

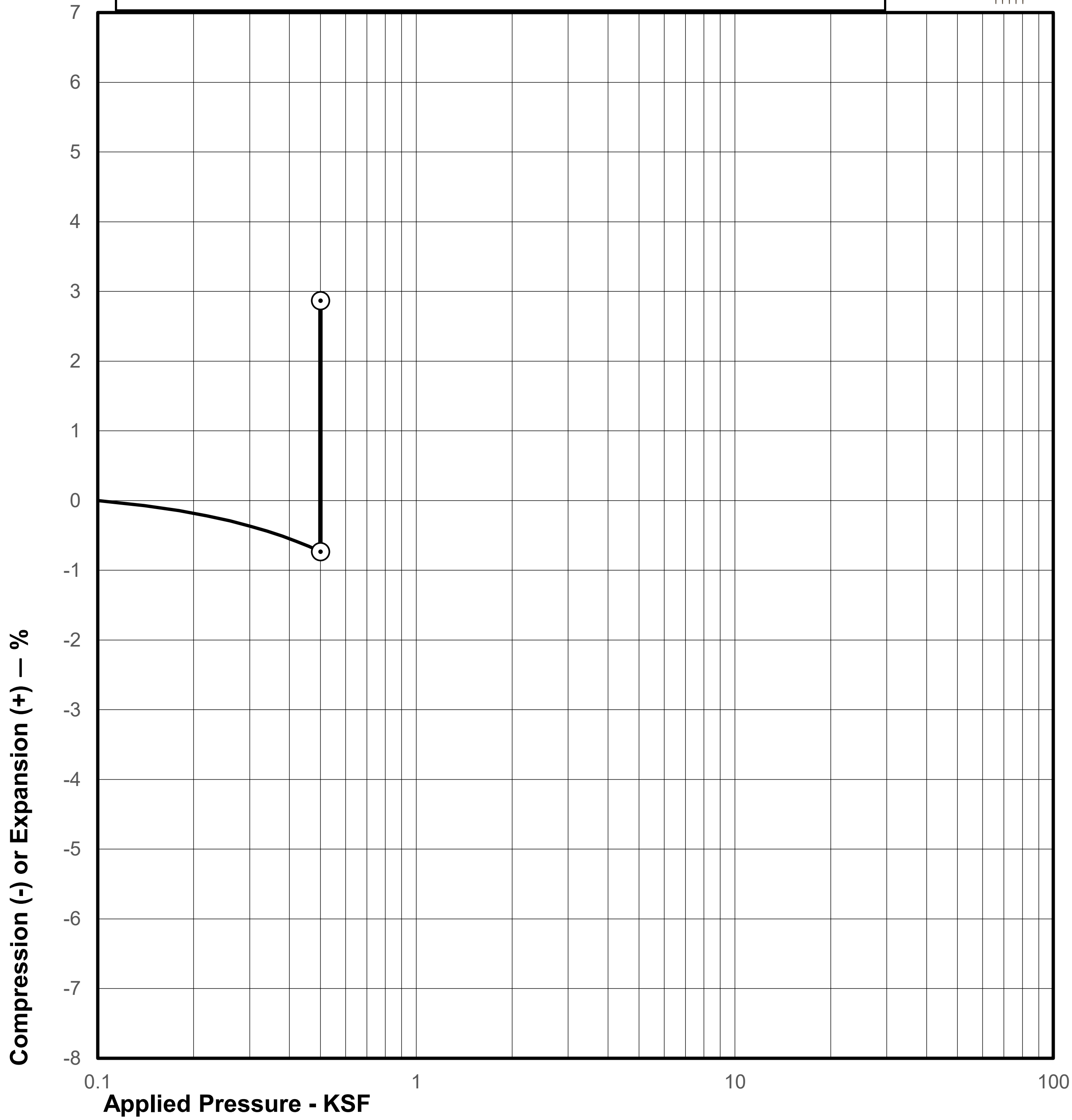
FROM: TH-203 AT 24 FEET

MOISTURE CONTENT:	17.7 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	112 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pF

Swell Consolidation Test Results

FIG B-10

Sample exhibited expansion of 3.6 percent when wetted under an applied pressure of 500 psf.



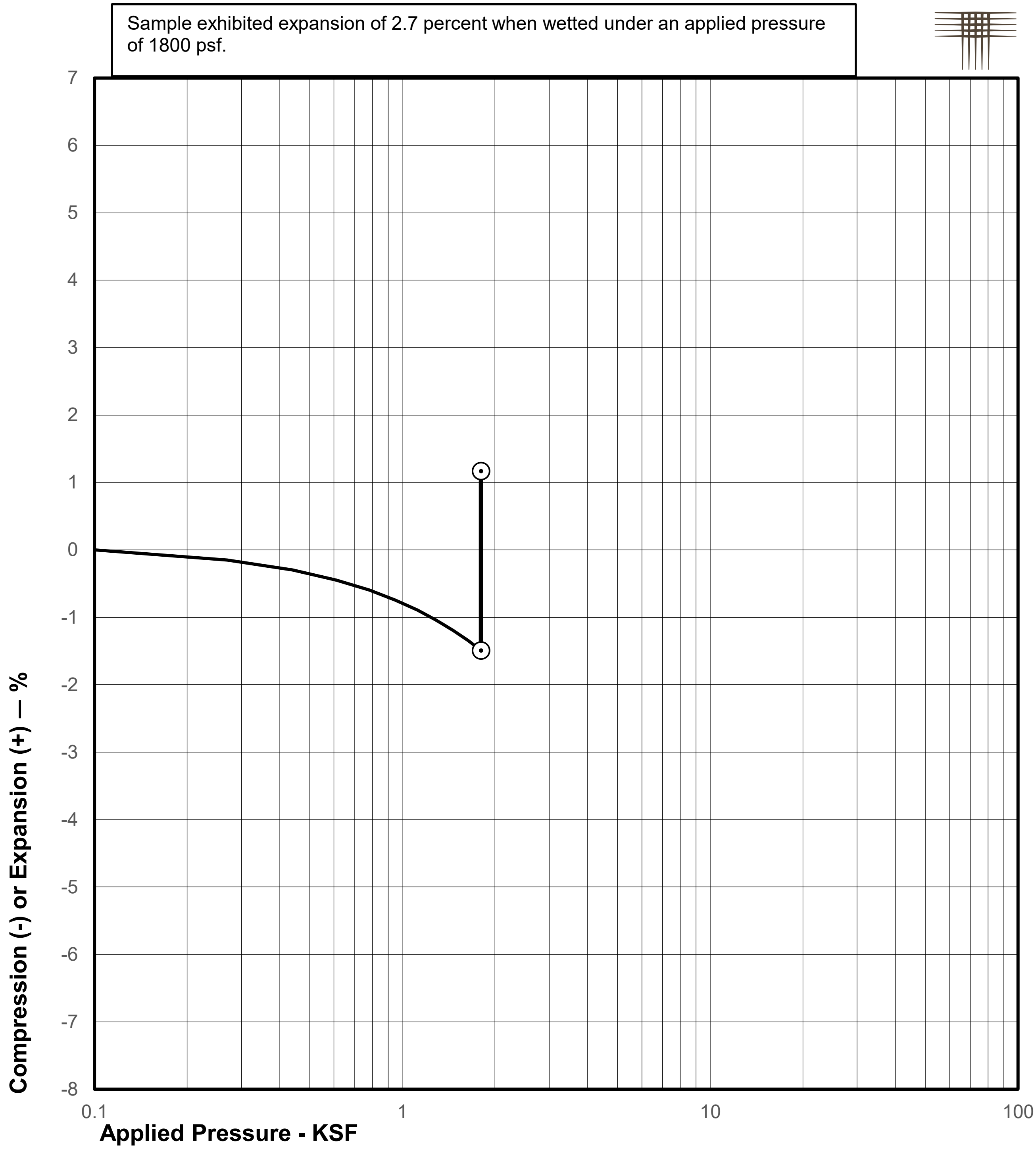
SAMPLE OF: CLAYSTONE

FROM: TH-204 AT 19 FEET

MOISTURE CONTENT:	18.0 %	LIQUID LIMIT:		SILT AND CLAY:	%
DRY UNIT WEIGHT:	110 pcf	PLASTICITY INDEX:		SOIL SUCTION:	pF

Swell Consolidation Test Results

FIG B-11



SAMPLE OF: CLAYSTONE

FROM: TH-204 AT 29 FEET

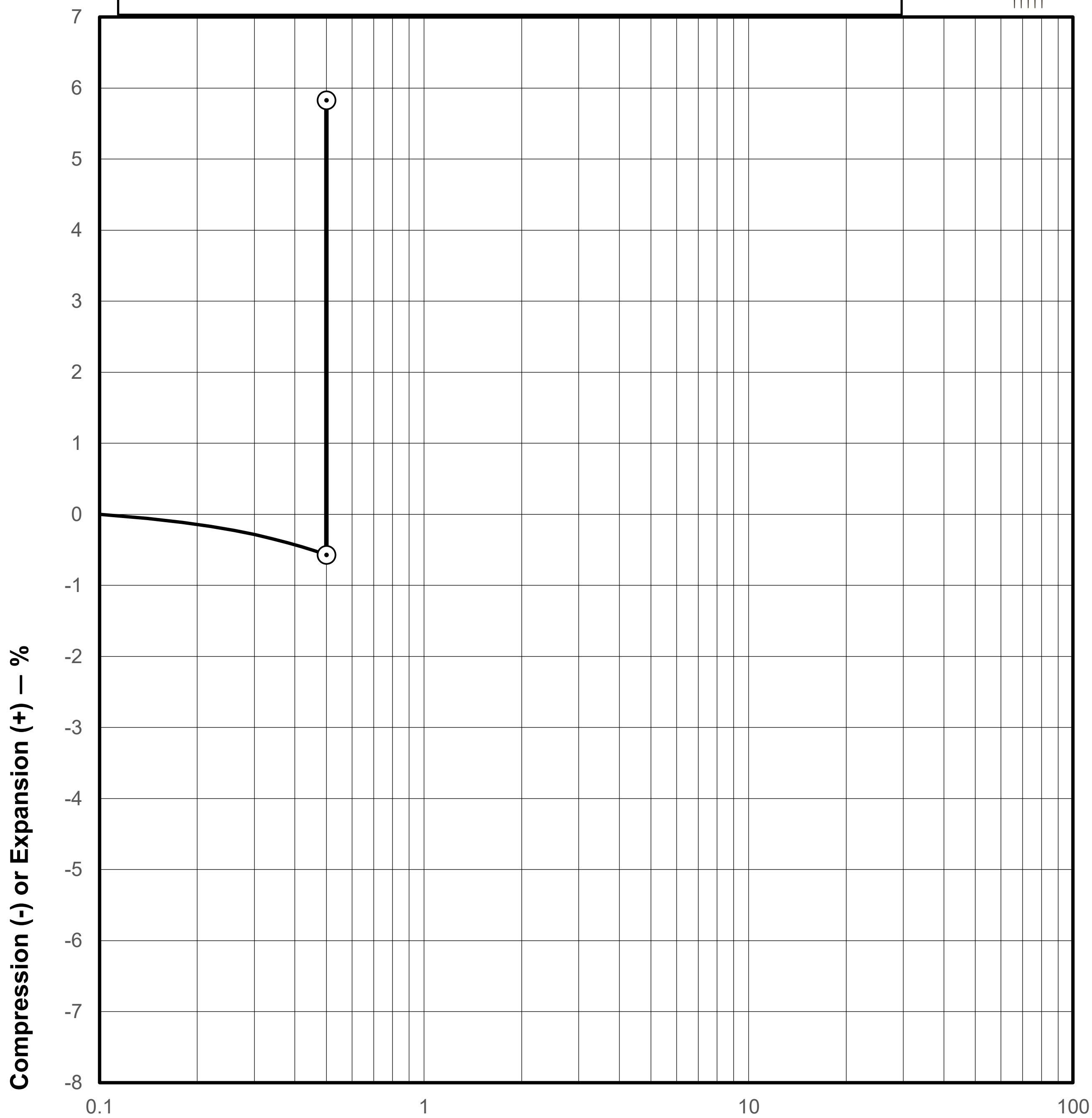
MOISTURE CONTENT: 20.2 % LIQUID LIMIT: ____ SILT AND CLAY: ____ %

DRY UNIT WEIGHT: 105 pcf PLASTICITY INDEX: ____ SOIL SUCTION: ____ pF

Swell Consolidation Test Results

FIG B-12

Sample exhibited expansion of 6.4 percent when wetted under an applied pressure of 500 psf.



SAMPLE OF: CLAYSTONE

FROM: TH-205 AT 34 FEET

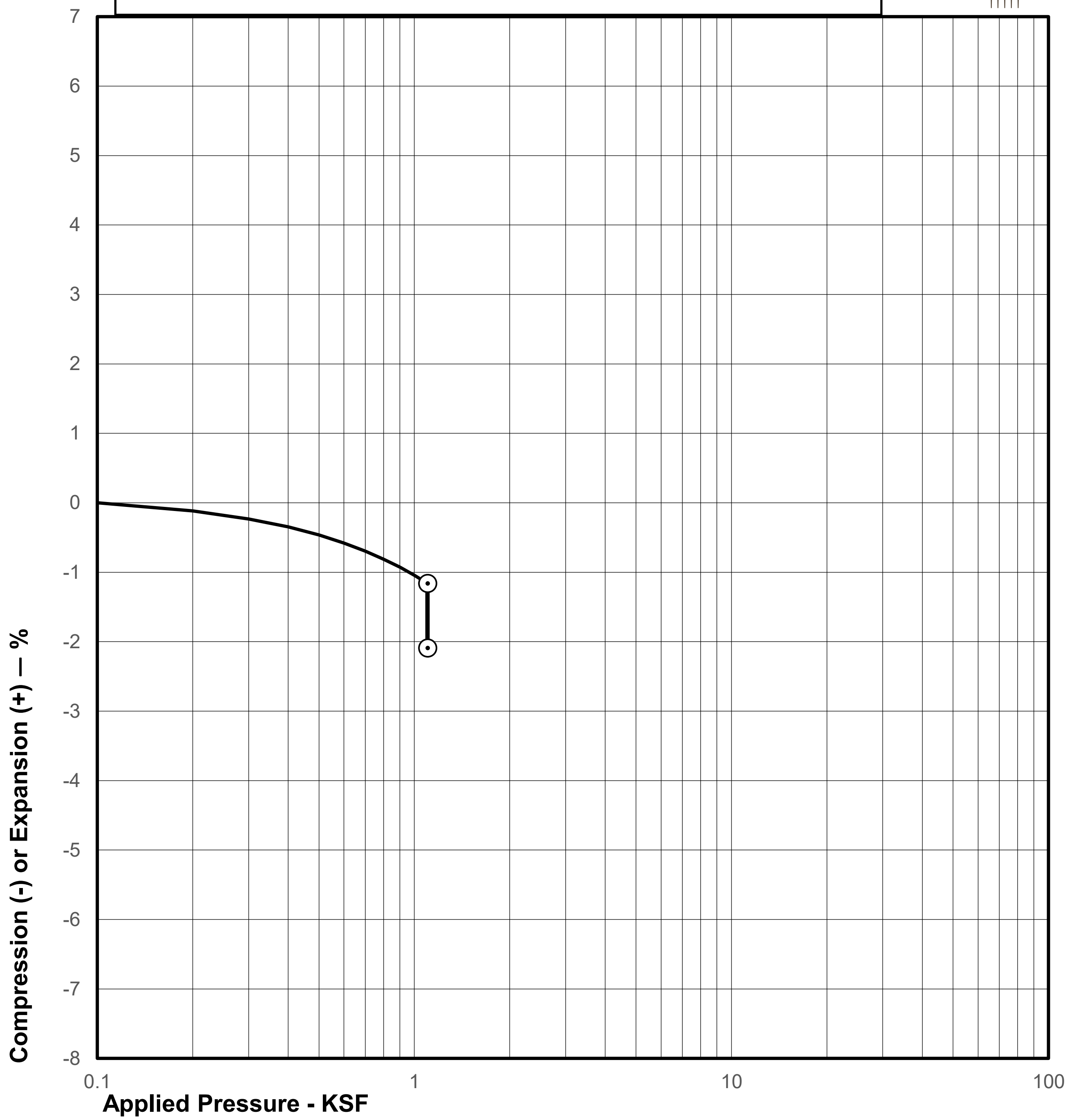
MOISTURE CONTENT: 22.5 % LIQUID LIMIT: ____ SILT AND CLAY: ____ %

DRY UNIT WEIGHT: 102 pcf PLASTICITY INDEX: ____ SOIL SUCTION: ____ pF

Swell Consolidation Test Results

FIG B-13

Sample exhibited compression of 0.9 percent when wetted under an applied pressure of 1100 psf.



SAMPLE OF: CLAYSTONE

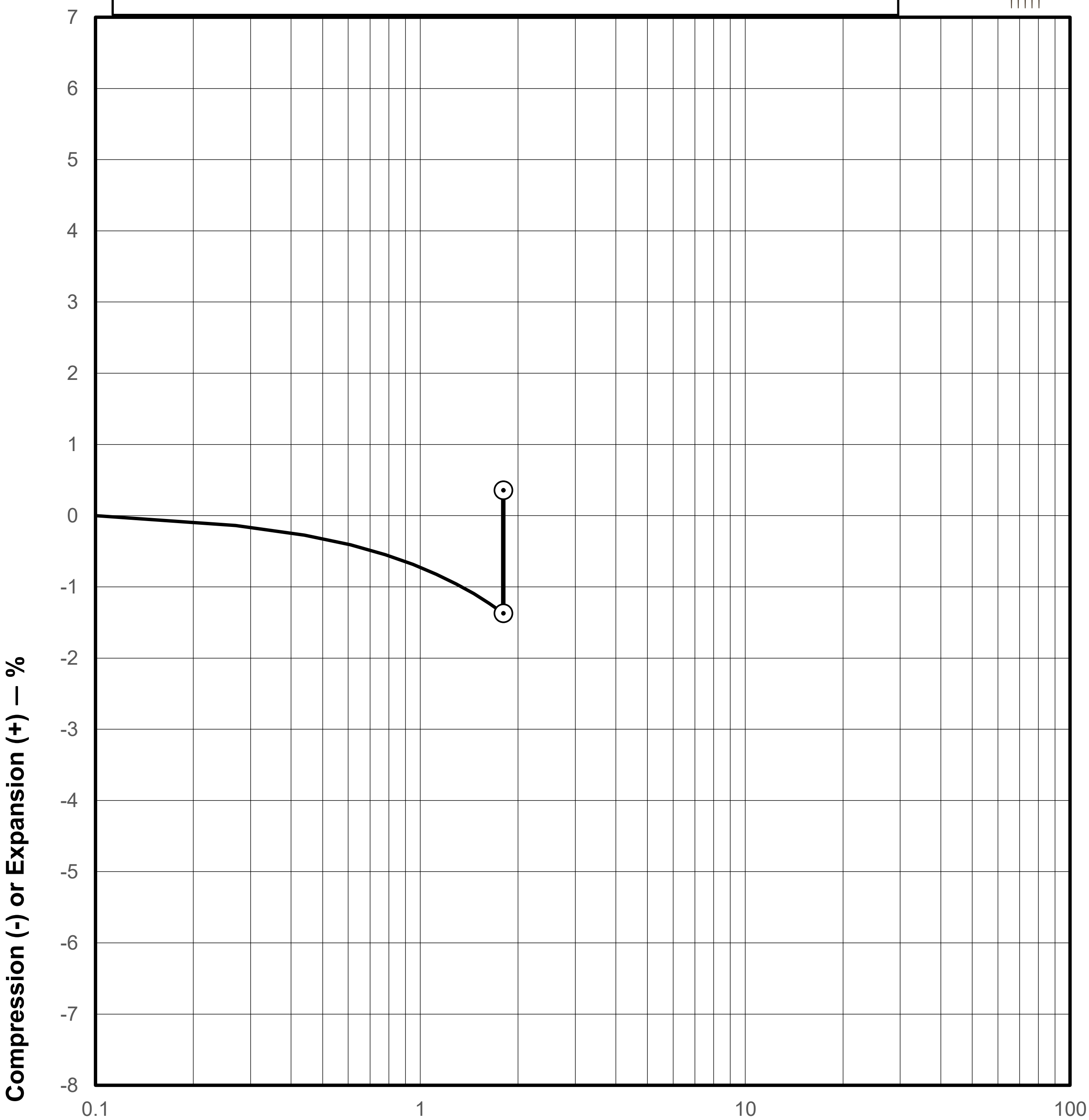
FROM: TH-205 AT 39 FEET

MOISTURE CONTENT:	11.8 %	LIQUID LIMIT:	____	SILT AND CLAY:	____ %
DRY UNIT WEIGHT:	109 pcf	PLASTICITY INDEX:	____	SOIL SUCTION:	____ pF

Swell Consolidation Test Results

FIG B-14

Sample exhibited expansion of 1.7 percent when wetted under an applied pressure of 1800 psf.



SAMPLE OF: CLAYSTONE

FROM: TH-205 AT 44 FEET

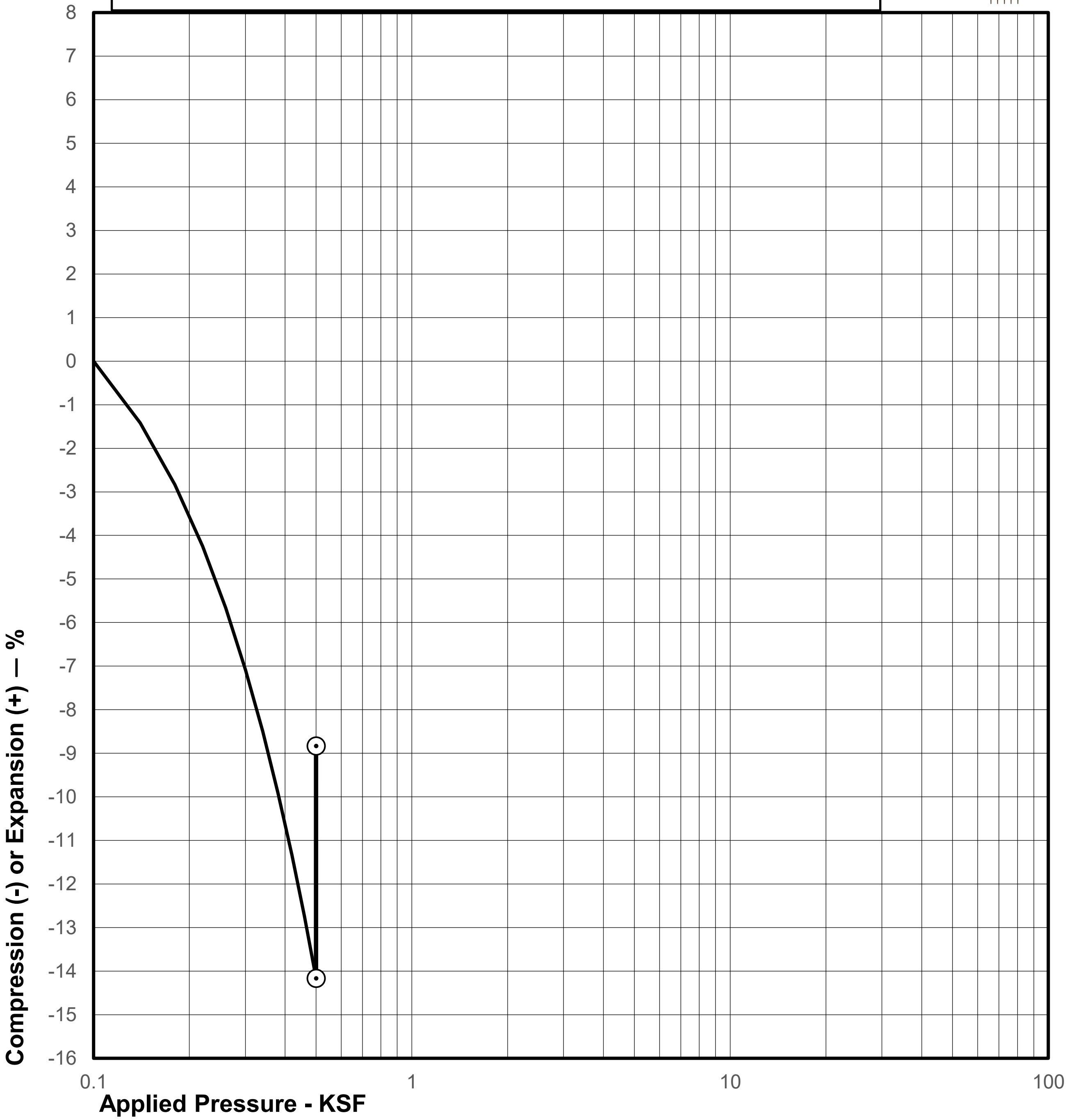
MOISTURE CONTENT: 23.7 % LIQUID LIMIT: ____ SILT AND CLAY: ____ %

DRY UNIT WEIGHT: 95 pcf PLASTICITY INDEX: ____ SOIL SUCTION: ____ pF

Swell Consolidation Test Results

FIG B-15

Sample exhibited expansion of 5.3 percent when wetted under an applied pressure of 500 psf.



SAMPLE OF: CLAYSTONE

FROM: TH-206 AT 29 FEET

MOISTURE CONTENT: 30.3 % LIQUID LIMIT: ____ SILT AND CLAY: ____ %

DRY UNIT WEIGHT: 89 pcf PLASTICITY INDEX: ____ SOIL SUCTION: ____ pF

Swell Consolidation Test Results

FIG B-16

CTL | THOMPSON
Founded in 1971

CTL Thompson, Inc. - Denver
1971 West 12th Avenue
Denver, CO 80204
(303) 825-0777
denver@ctlthompson.com

Proctor Report

Report ID: PTR:24-02929-01

Client: JR Engineering, LLC

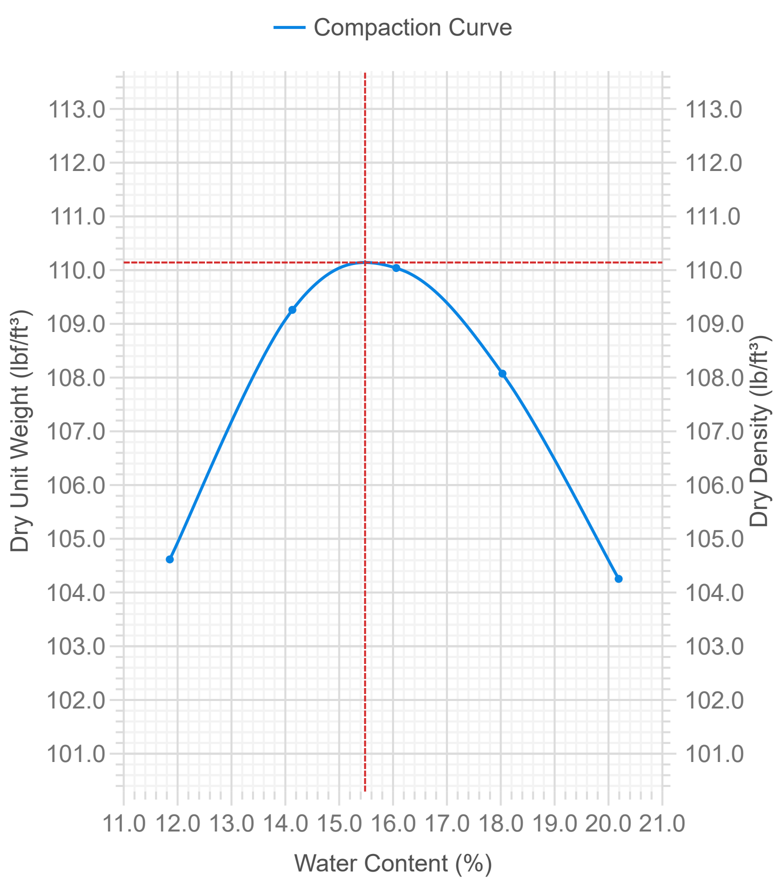
Project: Ridgegate Mesa Tops Road Alignment

Lone Tree CO
DN52378.000E-115

Sample Details

Sample ID: 24-02929-01
Date Sampled: 10/9/2024
Sampling Method:
Source:
Material: CLAY, SANDY (CL)
Specification:
Location:

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D698

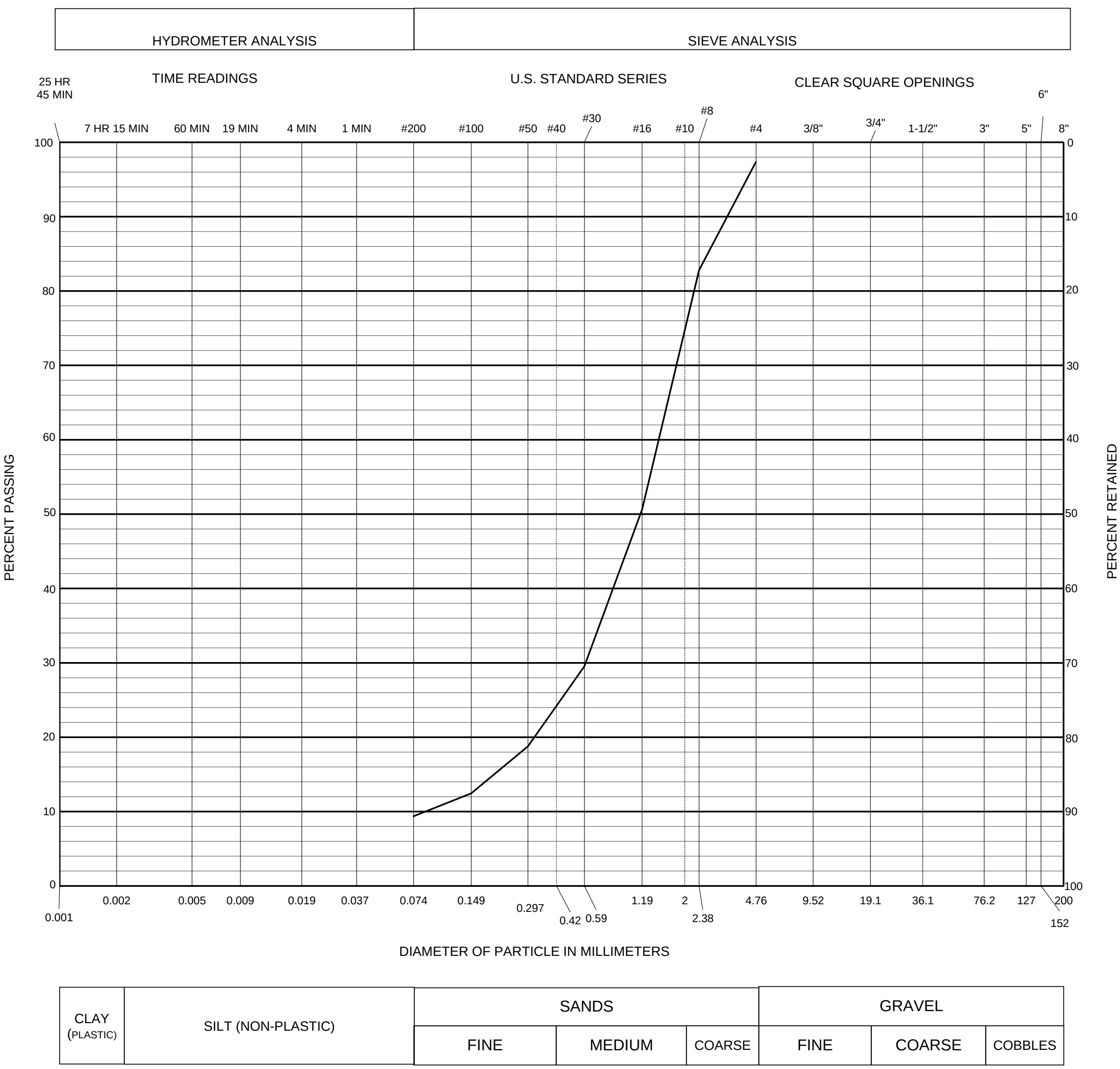
Std. Maximum Dry Unit Weight (lbf/ft³):	**110.0**
Std. Optimum Water Content (%):	**15.5**
Method:	
Preparation Method:	Moist
Determined By:	Estimated
Tested By:	Taqi Hossaini
Date Tested:	10/31/2024

ASTM D4318

Liquid Limit:	**41**
Plastic Limit:	**19**
Plasticity Index:	**22**
Tested By:	Jeffery Jones
Date Tested:	11/6/2024

Comments

FIG B-17

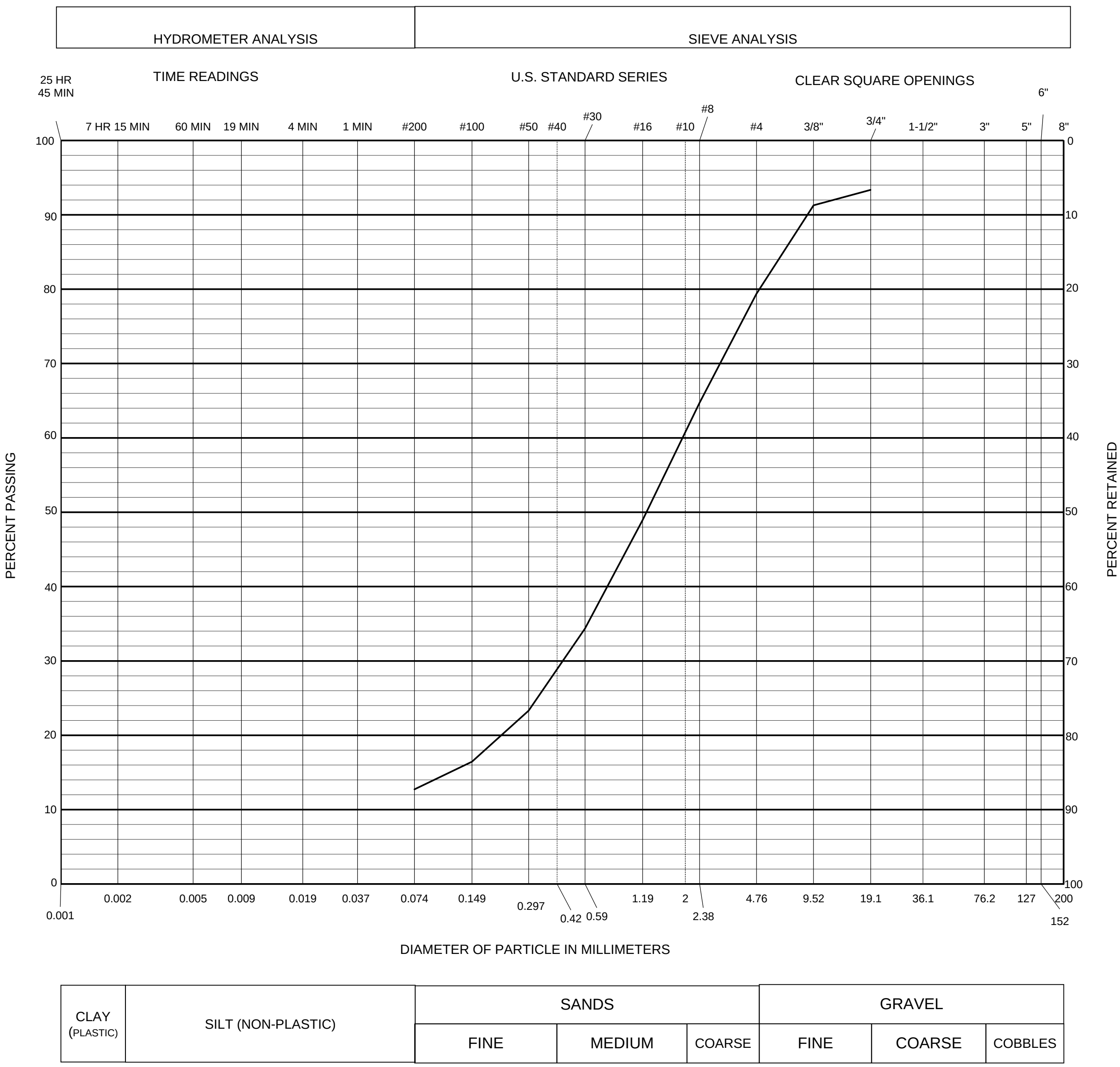


Sample of: SAND, CLEAN TO SILTY (SP-SM)
From: TH-2 AT 4 FEET

Sand & Gravel: 91 %
Silt: - %
Clay: - %
Liquid Limit: 37
Plasticity Index: 14

Size (mm)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	4.75	#N/A	1.19	#N/A	0.297	0.149	0.074	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
% Passing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	97.4	#N/A	50.6	#N/A	18.8	12.5	9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Gradation/ Hydrometer Test Results

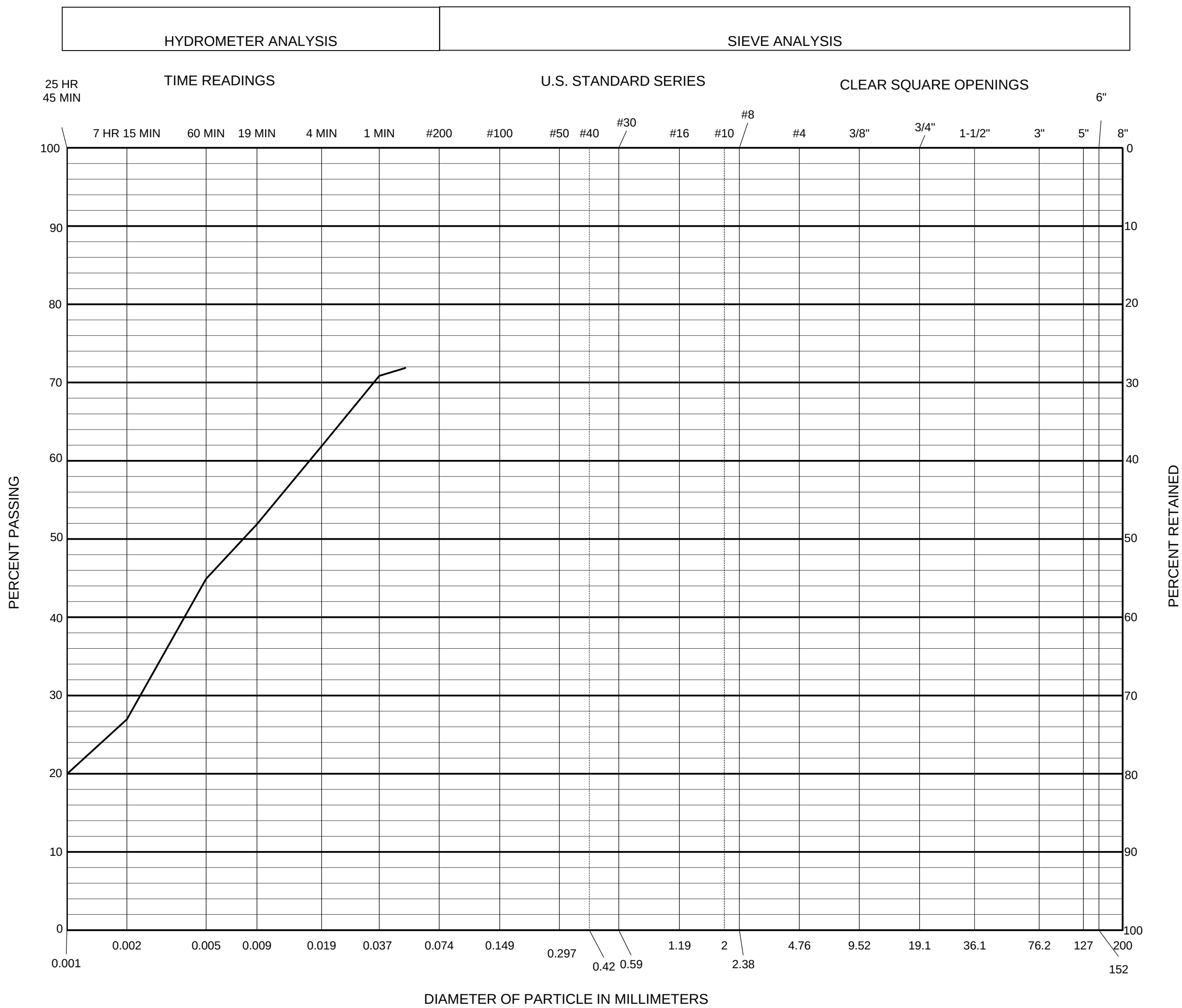


Sample of: SANDSTONE
From: TH-102 AT 9 FEET

Sand & Gravel: 87 % Silt: - %
Clay: - % Liquid Limit: -
Plasticity Index: -

Size (mm)	#N/A	#N/A	#N/A	#N/A	19.05	#N/A	9.53	4.75	#N/A	1.19	#N/A	0.297	0.149	0.074	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
% Passing	#N/A	#N/A	#N/A	#N/A	93.35	#N/A	91.3	79.4	#N/A	49.0	#N/A	23.3	16.5	13	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

Gradation/ Hydrometer Test Results



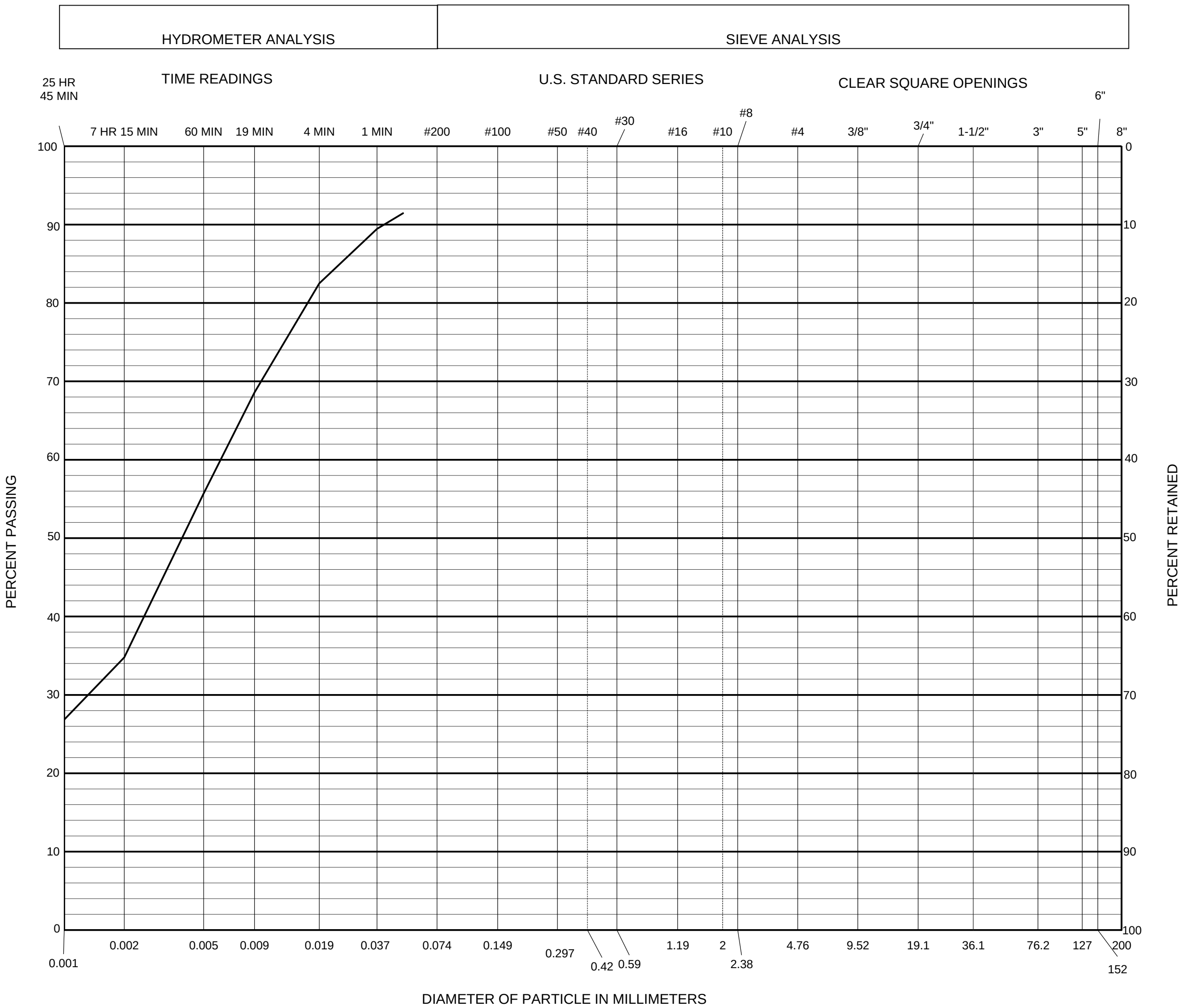
CLAY (PLASTIC)	SILT (NON-PLASTIC)	SANDS			GRAVEL		
		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLES

Sample of: CLAYSTONE
From: TH-104A AT 14 FEET

Sand & Gravel: 2 % Silt: 71 %
Clay: 27 % Liquid Limit: 67
Plasticity Index: 31

Size (mm)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.050	0.037	0.019	0.009	0.005	0.002	0.001
% Passing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	72	71	62	52	45	27	20

Gradation/ Hydrometer Test Results



CLAY (PLASTIC)	SILT (NON-PLASTIC)	SANDS			GRAVEL		
		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLES

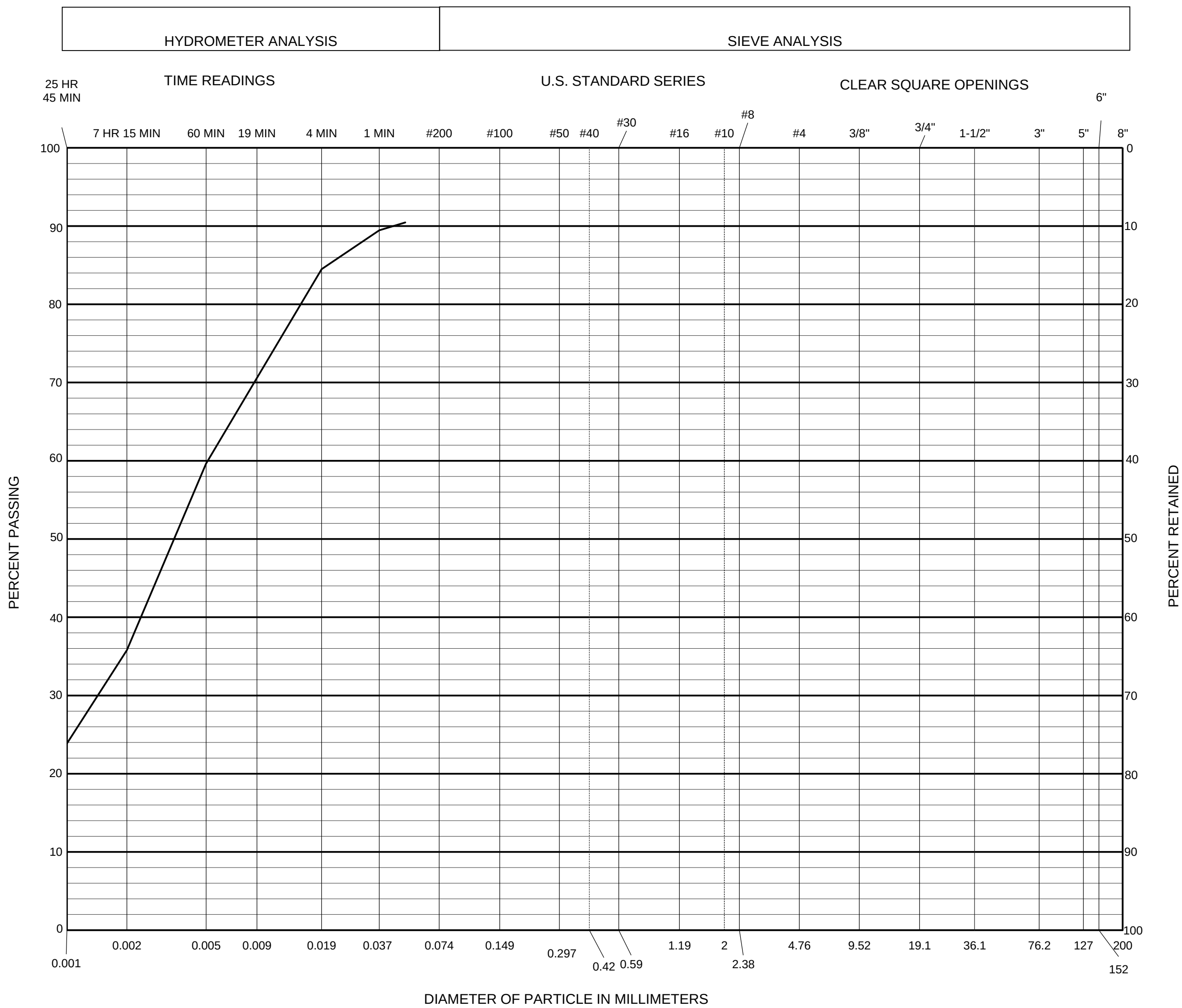
Sample of: WEATHERED CLAYSTONE
From: TH-105 AT 4 FEET

Sand & Gravel: 1 % Silt: 64 %
Clay: 35 % Liquid Limit: 63
Plasticity Index: 36

Size (mm)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.050	0.037	0.019	0.009	0.005	0.002	0.001
% Passing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	91	89	83	69	56	35	27

Gradation/ Hydrometer Test Results

FIG B-21



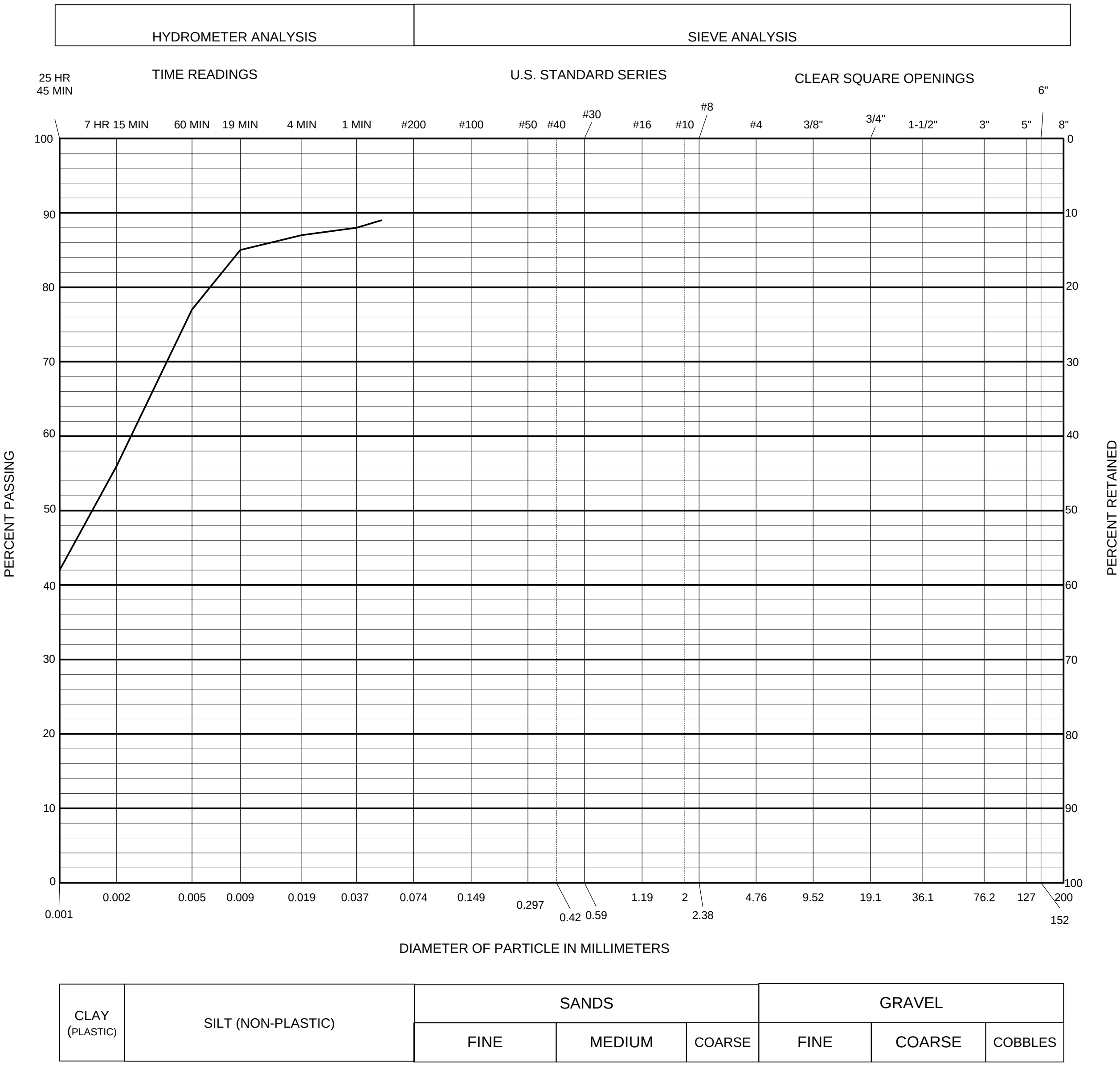
CLAY (PLASTIC)	SILT (NON-PLASTIC)	SANDS			GRAVEL		
		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLES

Sample of: WEATHERED CLAYSTONE
From: TH-105 AT 9 FEET

Sand & Gravel: 2 %
Silt: 62 %
Clay: 36 %
Liquid Limit: 33 %
Plasticity Index: 29 %

Size (mm)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.050	0.037	0.019	0.009	0.005	0.002	0.001
% Passing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	90	89	84	71	60	36	24

Gradation/ Hydrometer Test Results

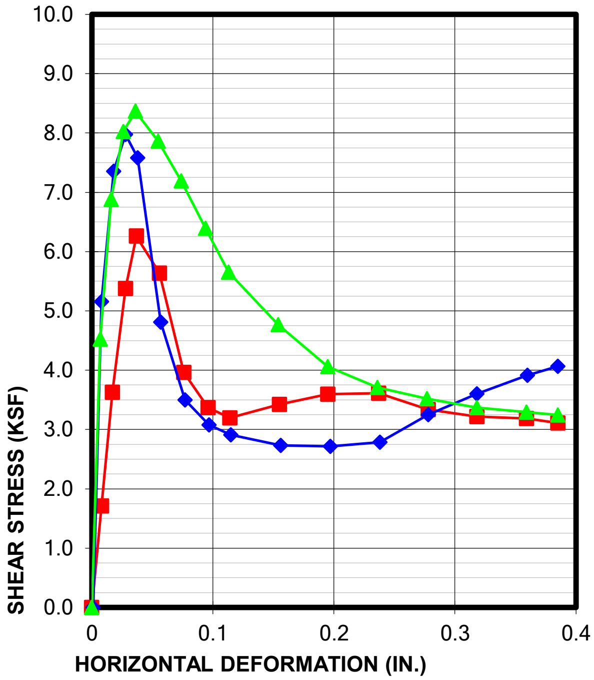


Sample of: CLAYSTONE
From: TH-106 AT 14 FEET

Sand & Gravel: 3 %   Silt: 41 %
Clay: 56 %   Liquid Limit: 56 %
Plasticity Index: 28 %

Size (mm)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.050	0.037	0.019	0.009	0.005	0.002	0.001
% Passing	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	89	88	87	85	77	56	42

Gradation/ Hydrometer Test Results

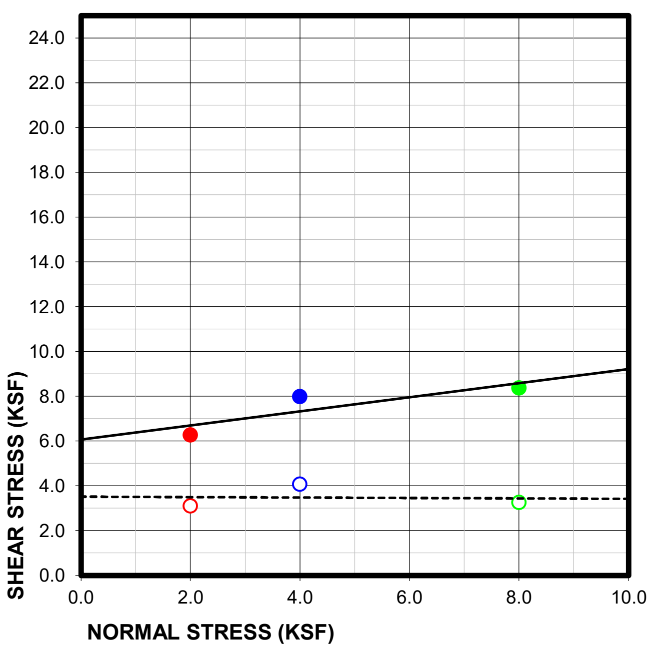


Sample No.	Boring No.	Depth (FT)	Moisture Content (%) Before	Moisture Content (%) After	Dry Density (PCF)
1 ■	TH-105	9	13.6	12.6	112.1
2 ◆	TH-105	9	13.6	15.2	117.8
3 ▲	TH-105	9	13.6	15.1	112.3

LL, %: ______ PI, %: ______ -200: ______ Clay Content, %: ______

Thickness (in): 1.0 Diameter (in): 1.935

Shearing Rate (in/min): 0.0016



Sample No.	Normal Stress (KSF)	Peak Shear Stress (KSF) ●	Large Displacement Shear Stress (KSF) ○	Large Displacement Displacement (IN.) ○
1 ■	2	6.26	3.11	0.39
2 ◆	4	7.98	4.06	0.39
3 ▲	8	8.37	3.25	0.39

Peak ϕ (DEG): 17

Large Displacement. ϕ (DEG): -1

Peak C (PSF): 6070

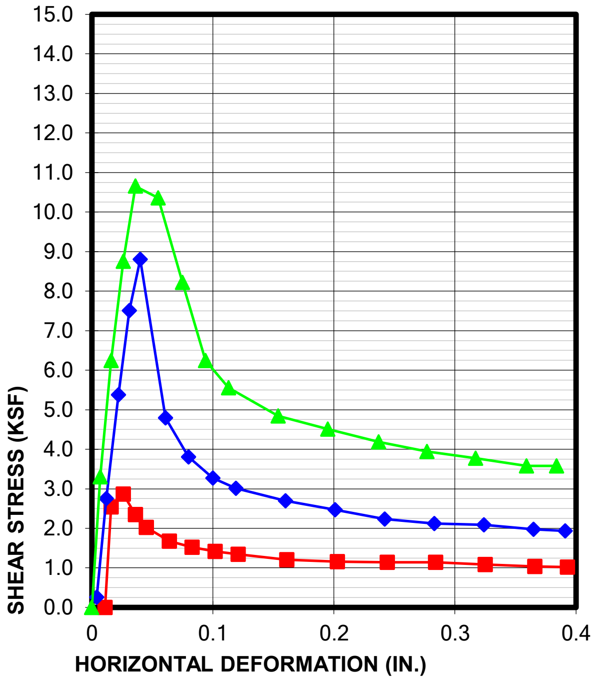
Large Displacement C (PSF): 3520

Sample Description: WEATHERED CLAYSTONE

Sample Type:

Remarks:

Direct Shear Test Results

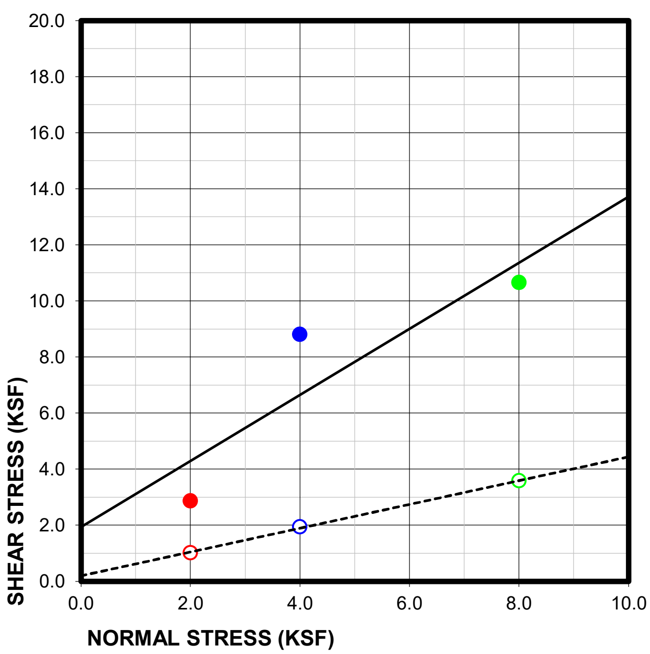


Sample No.	Boring No.	Depth (FT)	Moisture Content (%) Before	Moisture Content (%) After	Dry Density (PCF)
1 ■	TH-106	14	18.7	17.3	105.2
2 ◆	TH-106	14	18.7	17.0	105.2
3 ▲	TH-106	14	18.7	10.6	106.5

LL, %: ______ PI, %: ______ -200: ______ Clay Content, %: ______

Thickness (in): 1.0 Diameter (in): 1.935

Shearing Rate (in/min): 0.0016



Sample No.	Normal Stress (KSF)	Peak Shear Stress (KSF) ●	Large Displacement Shear Stress (KSF) ○	Large Displacement Displacement (IN.) ○
1 ■	2	2.87	1.02	0.39
2 ◆	4	8.8	1.94	0.39
3 ▲	8	10.7	3.58	0.38

Peak ϕ (DEG): 50

Large Displacement. ϕ (DEG): 23

Peak C (PSF): 1940

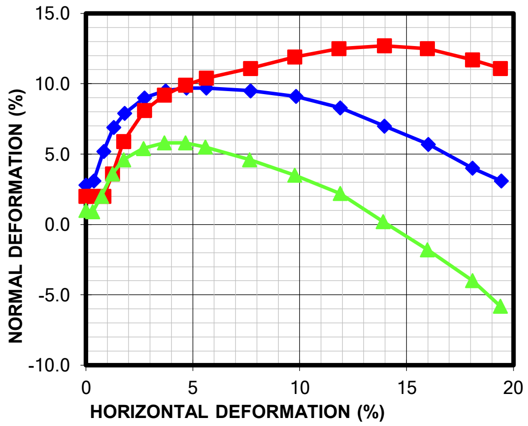
Large Displacement C (PSF): 200

Sample Description: CLAYSTONE

Sample Type:

Remarks:

Direct Shear Test Results



Sample No.		Boring No.	Depth (FT)	Moisture Content (%)		Dry Density (PCF)
				Before	After	
1	■	TH-207	0'-10'	14.9	27.6	113.7
2	◆	TH-207	0'-10'	14.9	24.7	113.7
3	▲	TH-207	0'-10'	14.9	25.4	113.7

Liquid Limit: ---　　Passing 200 (%): ---

Plasticity Index: ---　　Clay Content (%): ---

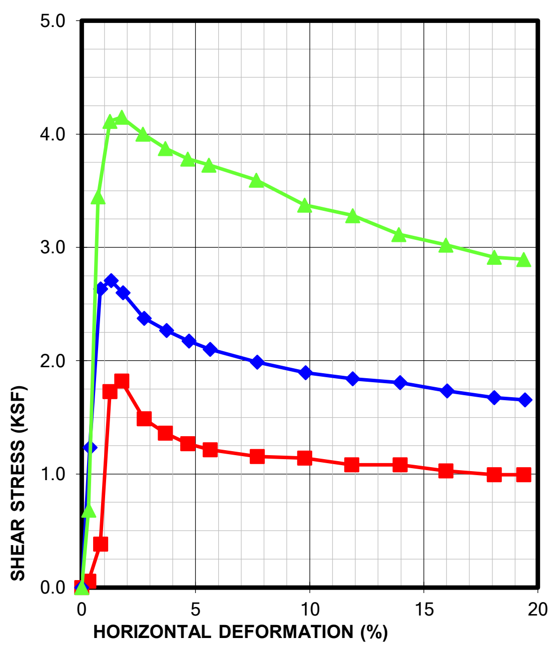
Thickness (in): 1.00　　Diameter (in): 1.935

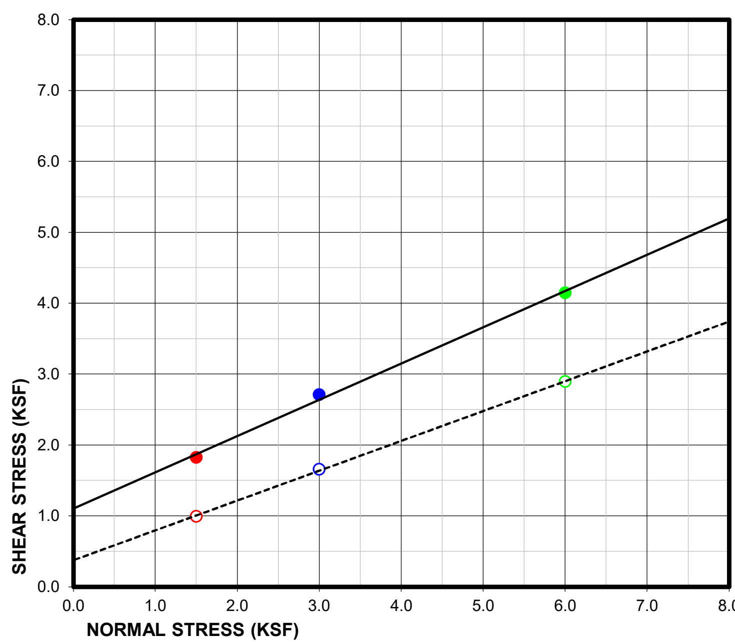
Shearing Rate

inch/min: 0.0063

%/min: 0.33

Sample No.		Normal Stress (KSF)	Consolidation		Failure (Peak)		Large Displacement	
			Final Normal Strain (%)	Loading Duration (min.)	Shear Stress (KSF) ●	Strain at Failure (%) ●	Shear Stress (KSF) ○	Total Strain (%) ○
1	■	1.50	2.0%	1230	1.82	1.8%	0.99	19.4%
2	◆	3.00	2.8%	1200	2.71	1.3%	1.66	19.4%
3	▲	6.00	1.0%	1242	4.15	1.8%	2.89	19.4%





Peak ϕ (DEG):	**27**
Large Displacement ϕ (DEG):	**23**
Peak *C* (PSF):	**1100**
Large Displacement *C* (PSF):	**370**

Description: Clay Sandy

Sample Type: Reconstituted

Remarks:

Direct Shear Test Results

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

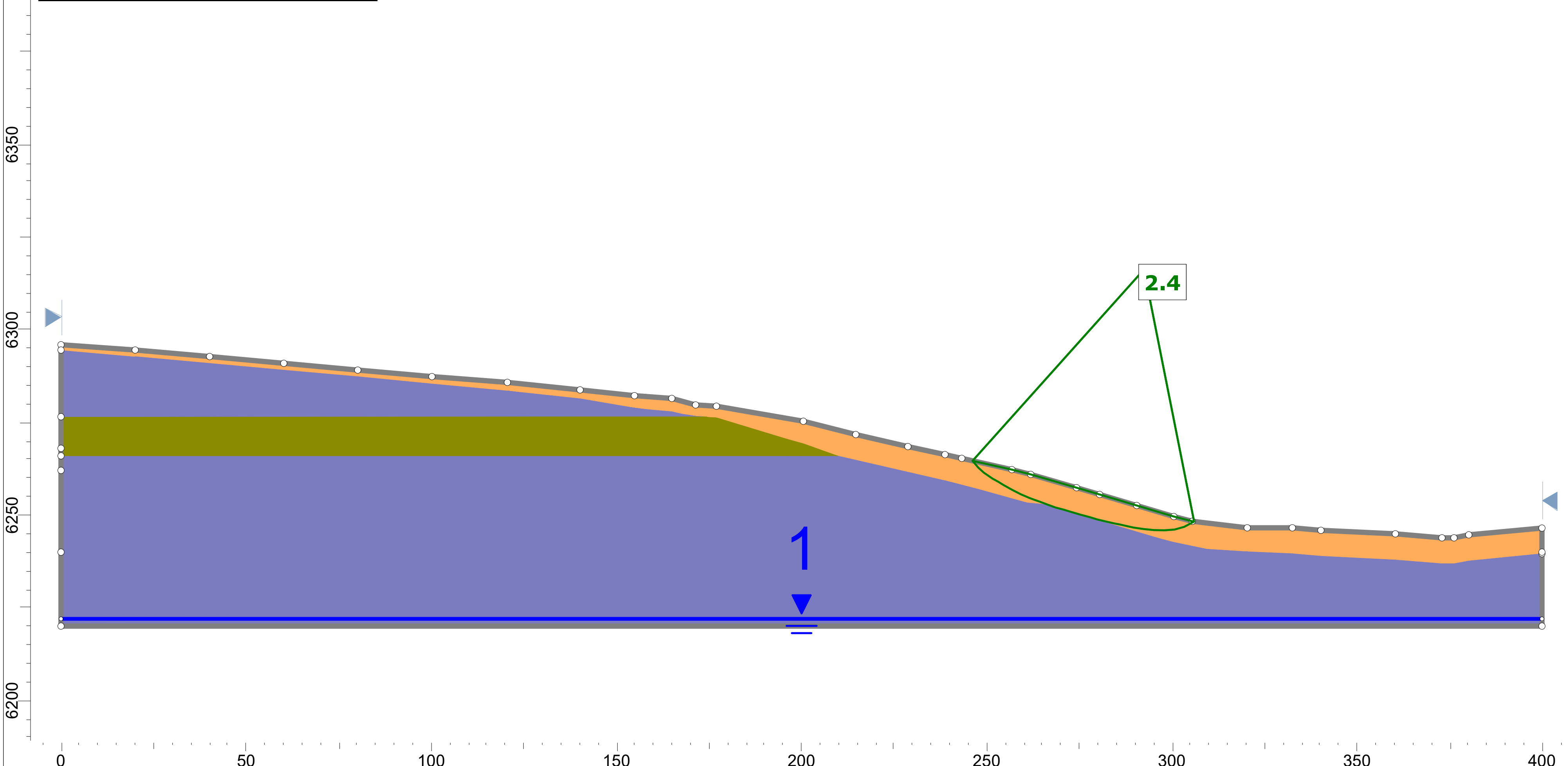
BORING	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA SWELL (%)	SWELL TEST DATA COMPRESSION (%)	SWELL TEST DATA APPLIED PRESSURE (psf)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	SOLUBLE SULFATE CONTENT (%)	RETAINED NO. 4 SIEVE (%)	PASSING NO. 200 SIEVE (%)	CLAY CONTENT (%)	SOIL TYPE
TH-1	0-5	7.4					27	12			48		SANDSTONE
TH-1	9	19.5					49	22			95		CLAYSTONE
TH-2	4	4.6	111				37	14		3	9		SAND, CLEAN TO SILTY (SP-SM)
TH-2	9	14.0	110								14		SANDSTONE
TH-3	4	11.5	91	0.1		200	41	26	0.02		78		CLAY, SANDY (CL)
TH-3	9	11.7	122								61		WEATHERED CLAYSTONE
TH-4	4	4.5	104	2.2		200	37	21					CLAY, SANDY (CL)
TH-4	9	8.7	121								50		CLAY, SANDY (CL)
TH-5	9	14.9	101										SAND, CLAYEY (SC)
TH-5	10-15	18.0					30	12			38		SAND, CLAYEY (SC)
TH-5	14	19.9	104		2.1	200							WEATHERED CLAYSTONE
TH-6	0-5	16.4					51	29			74		CLAY, SANDY (CH)
TH-6	4	13.8	99	2.4		200			<0.01				CLAY, SANDY (CH)
TH-101	4	5.5	99							1	40		SANDSTONE
TH-102	9	8.7	113							21	13		SANDSTONE
TH-102	14	13.5	109								22		SANDSTONE
TH-104A	4	13.3	113				44	18			52		CLAYSTONE
TH-104A	14	29.1	93				67	31			98	27	CLAYSTONE
TH-104A	19	25.7	99				67	37			57		CLAYSTONE
TH-105	4	17.3	108				63	36			99	35	WEATHERED CLAYSTONE
TH-105	9	13.6	113				54	29			98	36	WEATHERED CLAYSTONE
TH-105	19	16.3	114				60	36			99		CLAYSTONE
TH-106	14	18.7	105				56	28			97	56	CLAYSTONE
TH-106	19	23.4	100				60	27			76		CLAYSTONE
TH-104	9	4.9	94								25		SANDSTONE
TH-104	19	15.8	113										CLAYSTONE
TH-201	9	16.4	110				43	14			60		CLAYSTONE
TH-201	14	10.6	101								7		SANDSTONE
TH-201	39	14.7	107								15		SANDSTONE
TH-202	9	8.5	110				36	19	0.02		44		SANDY, CLAYEY (SC)
TH-202	24	18.3	105	1.3		1800							CLAYSTONE
TH-202	29	18.4	99		1.3	2400							CLAYSTONE
TH-203	14	6.7	98		4.3	500							SANDY, CLAYEY (SC)

TH-203	19	17.8	107	2.7		1100							CLAYSTONE
TH-203	24	17.7	112	2.8		1800							CLAYSTONE
TH-204	19	18	110	3.6		500							CLAYSTONE
TH-204	24	17.7	99				63	39			99		CLAYSTONE
TH-204	29	20.2	105	2.7		1800							CLAYSTONE
TH-205	29	20.9	106				57	30			99		CLAYSTONE
TH-205	34	22.5	102	6.4		500							CLAYSTONE
TH-205	39	11.8	109		0.9	1100							CLAYSTONE
TH-205	44	23.7	95	1.7		1800							CLAYSTONE
TH-206	24	12.7	121				34	19			53		CLAYSTONE
TH-206	29	30.3	89	5.3		500							CLAYSTONE
TH-206	34	20.9	106								62		CLAYSTONE
TH-207	0-10	14.9	113.7										CLAY, SANDY (CL)
TH-207	9	13.5	115				51	32	<0.01		61		CLAY, SANDY (CL)
TH-207	14	22.5	103								75		CLAYSTONE
TH-208	9	11.6	117				49	24			76		CLAYSTONE
TH-208	29	13.1	111				49	23			63		CLAYSTONE
TH-209	9	12.3	115				50	29			67		CLAY, SANDY (CL)
TH-209	29	27.3	97				68	36			92		CLAYSTONE
TH-210	4	14.2	112				58	36			74		CLAY, SANDY (CL)

APPENDIX C
SLOPE STABILITY ANALYSIS

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
SANDSTONE		125	Mohr-Coulomb	50	34
INTERBEDDED CLAYSTONE/ SANDSTONE		125	Mohr-Coulomb	500	25

Method Name	Min FS
Janbu corrected	2.4
Spencer	2.4
GLE / Morgenstern-Price	2.4



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section A-A' - Existing

Analysis Description

Drawn By

Scale 1:487

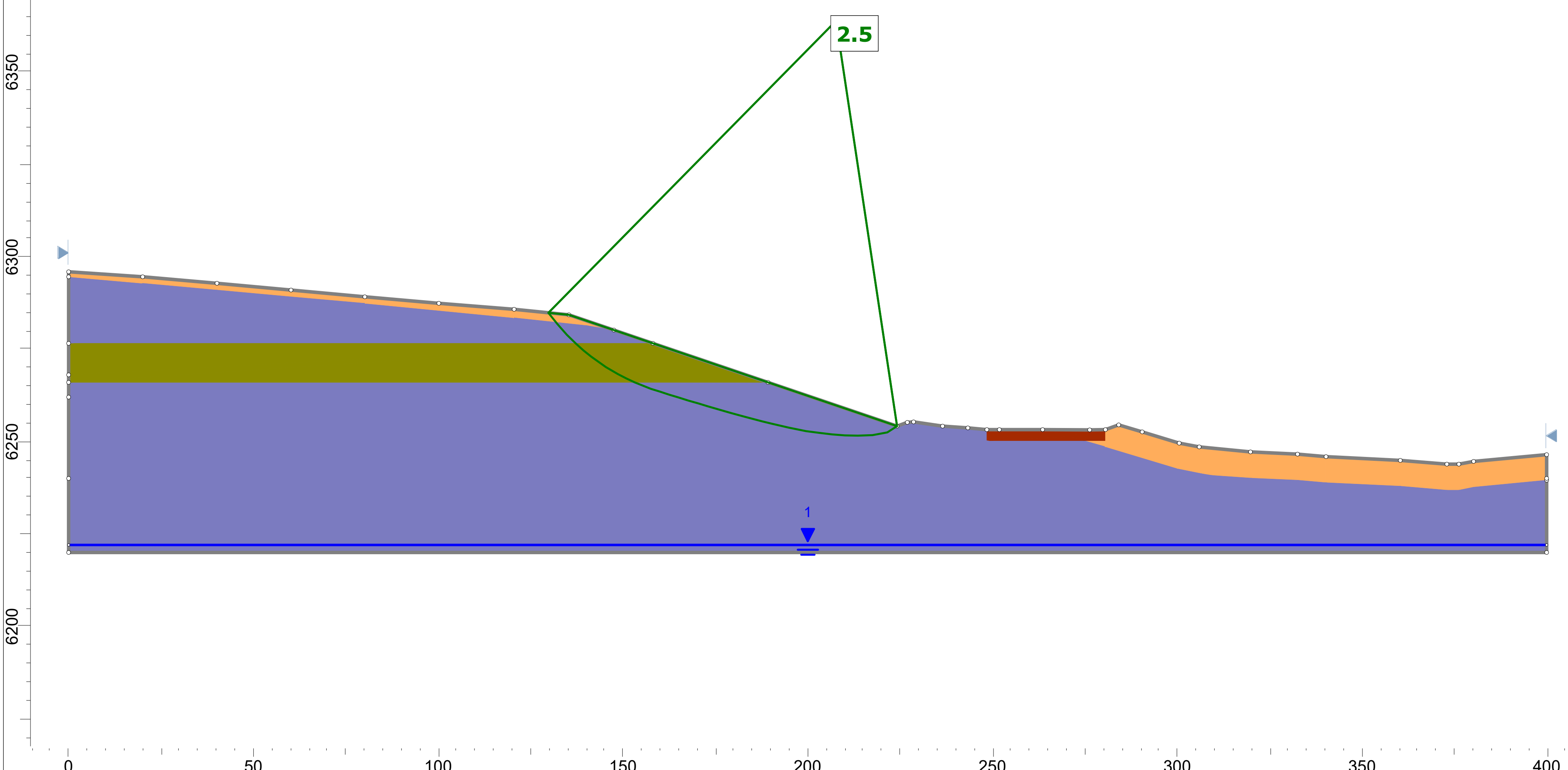
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
SANDSTONE		125	Mohr-Coulomb	50	34
INTERBEDDED CLAYSTONE/ SANDSTONE		125	Mohr-Coulomb	500	25
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.5
Spencer	2.5
GLE / Morgenstern-Price	2.5



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section A-A' - Proposed

Analysis Description

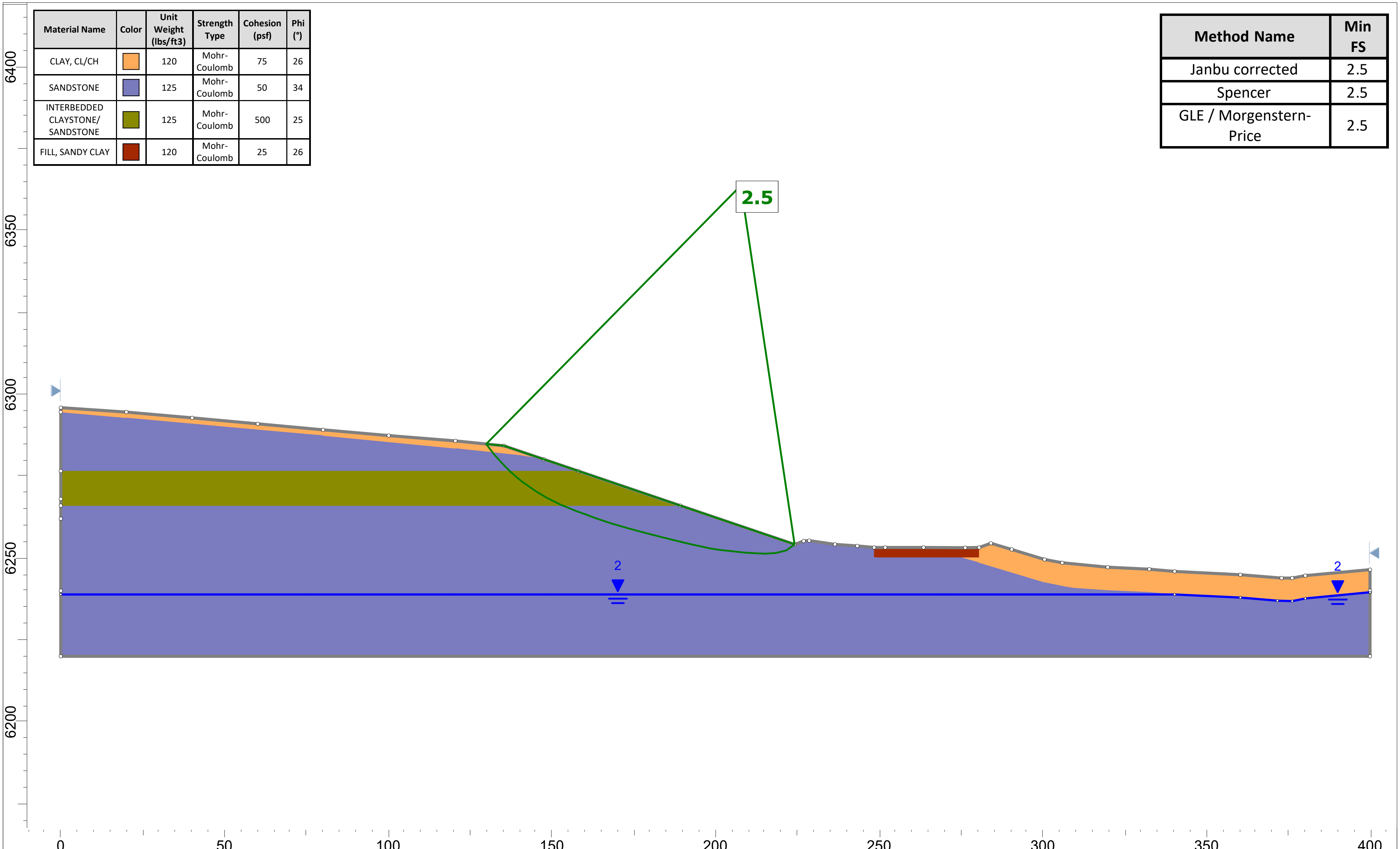
Drawn By

Scale 1:487

Company

Date

File Name



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
SANDSTONE		125	Mohr-Coulomb	50	34
INTERBEDDED CLAYSTONE/ SANDSTONE		125	Mohr-Coulomb	500	25
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.5
Spencer	2.5
GLE / Morgenstern-Price	2.5

ROCSCIENCE

Project

Section A-A' - Proposed

Analysis Description

Drawn By

Scale 1:487

Company

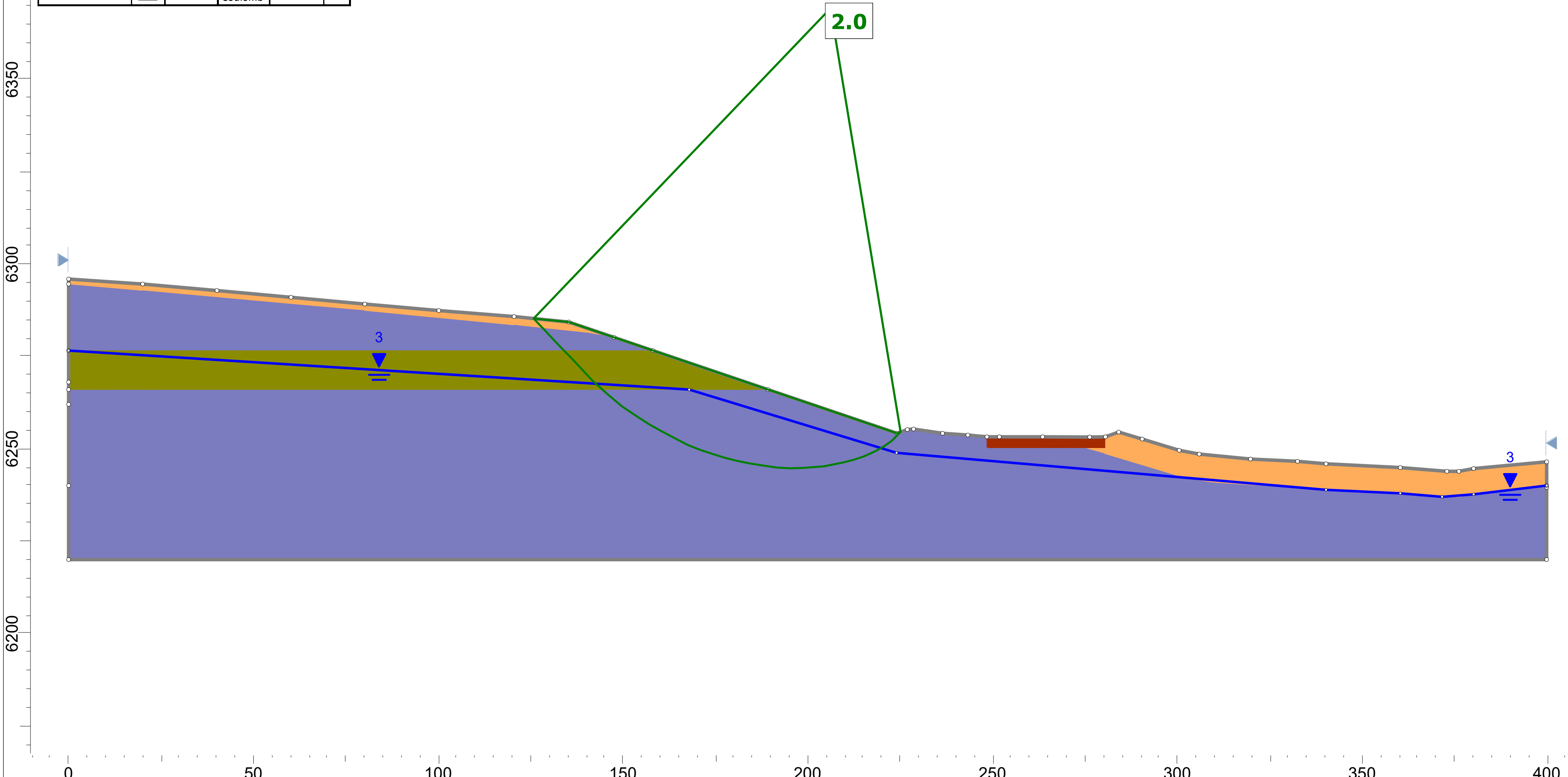
Date

File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
SANDSTONE		125	Mohr-Coulomb	50	34
INTERBEDDED CLAYSTONE/ SANDSTONE		125	Mohr-Coulomb	500	25
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.1
GLE / Morgenstern-Price	2.1



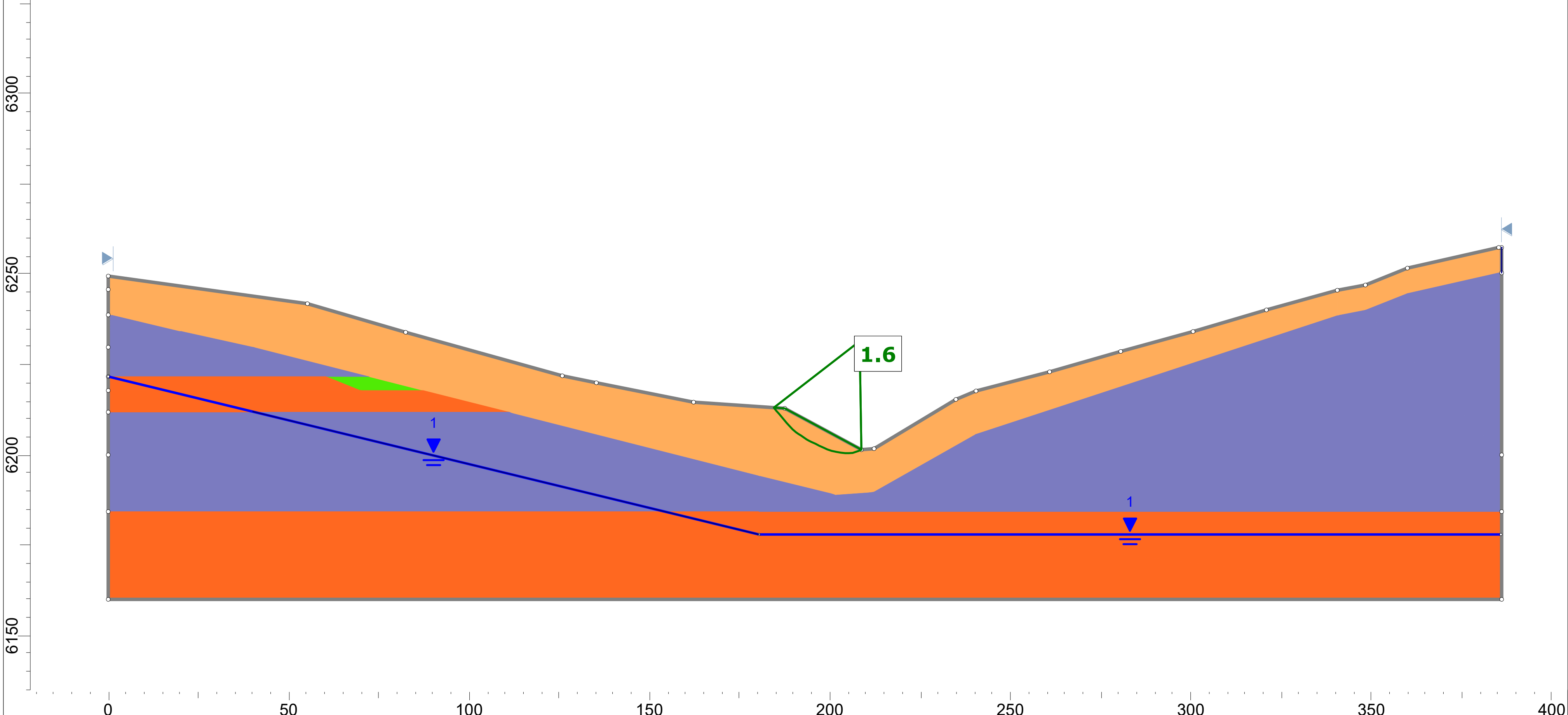
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section A-A' - Proposed		
Analysis Description			
Drawn By		*Scale* 1:487	*Company*
Date			*File Name*

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section B-B' - Existing

Analysis Description

Drawn By

Scale 1:496

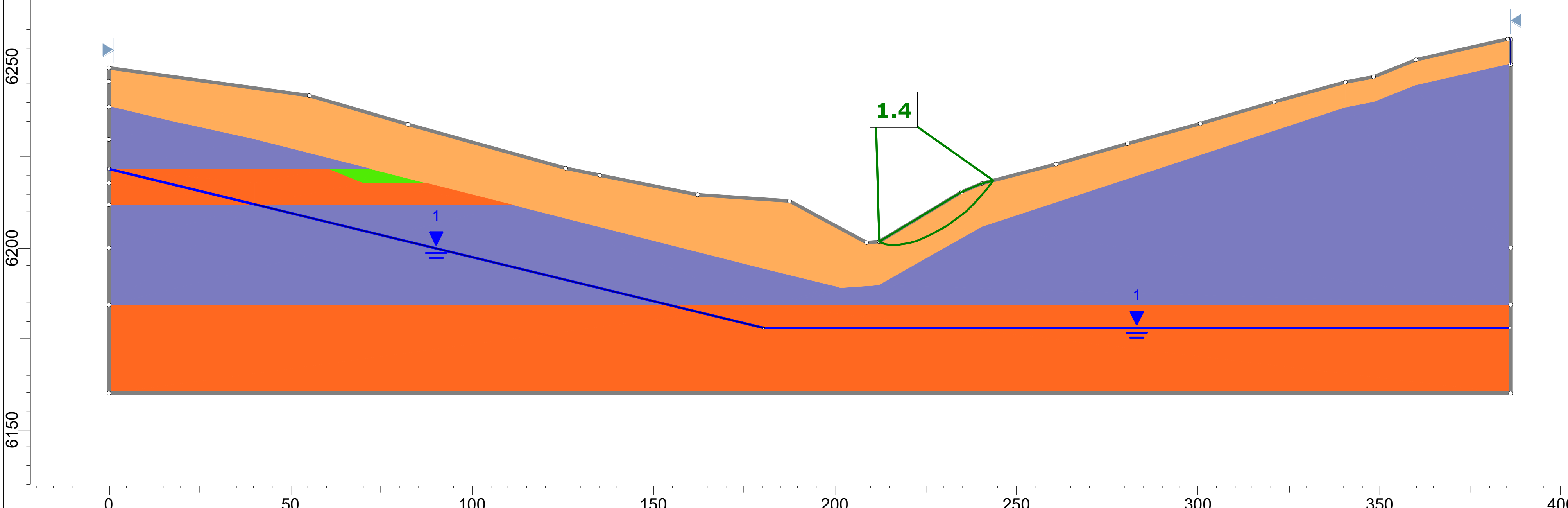
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.4
Spencer	1.4
GLE / Morgenstern-Price	1.4



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section B-B' - Existing

Analysis Description

Drawn By

Scale 1:496

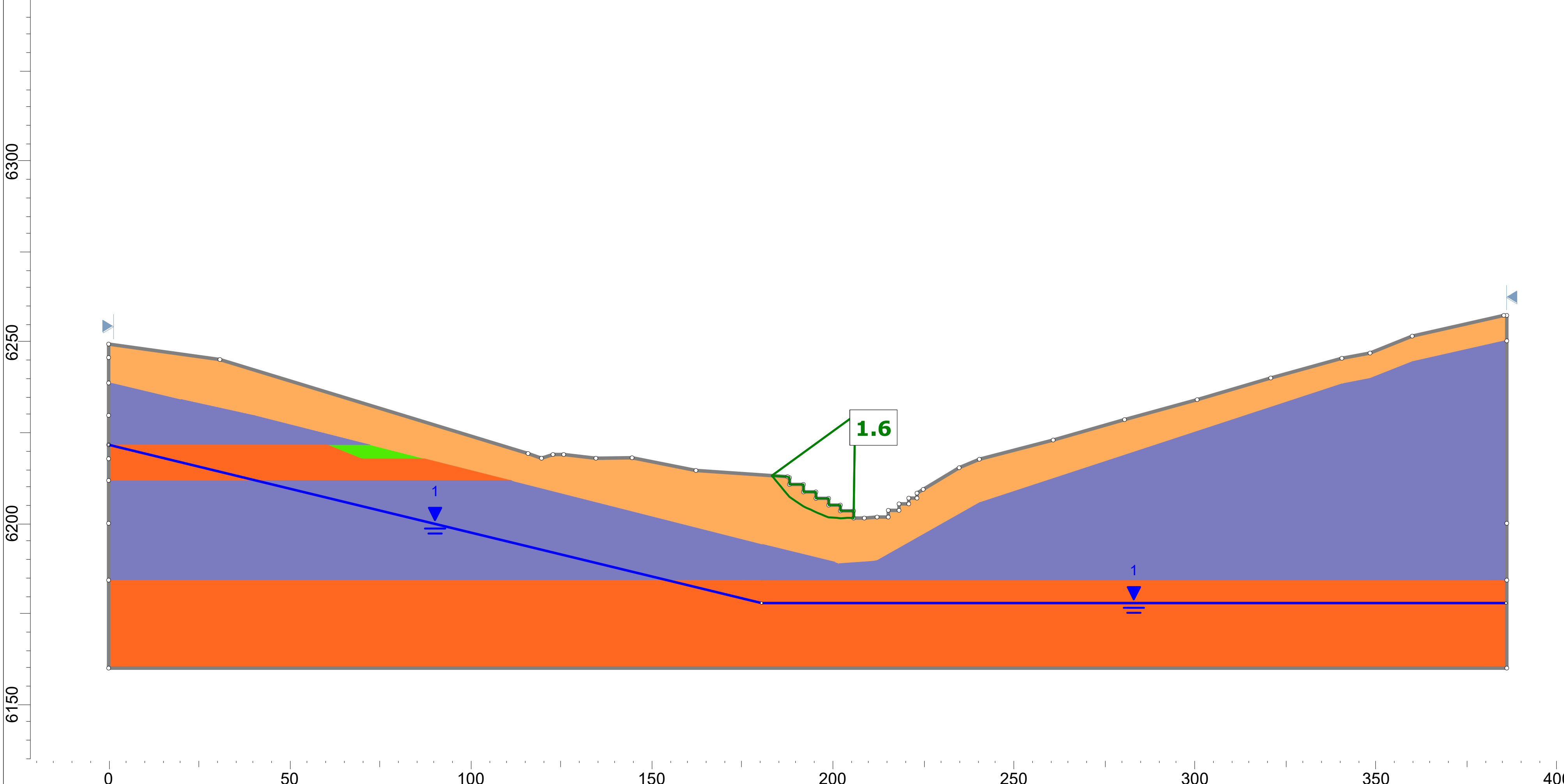
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



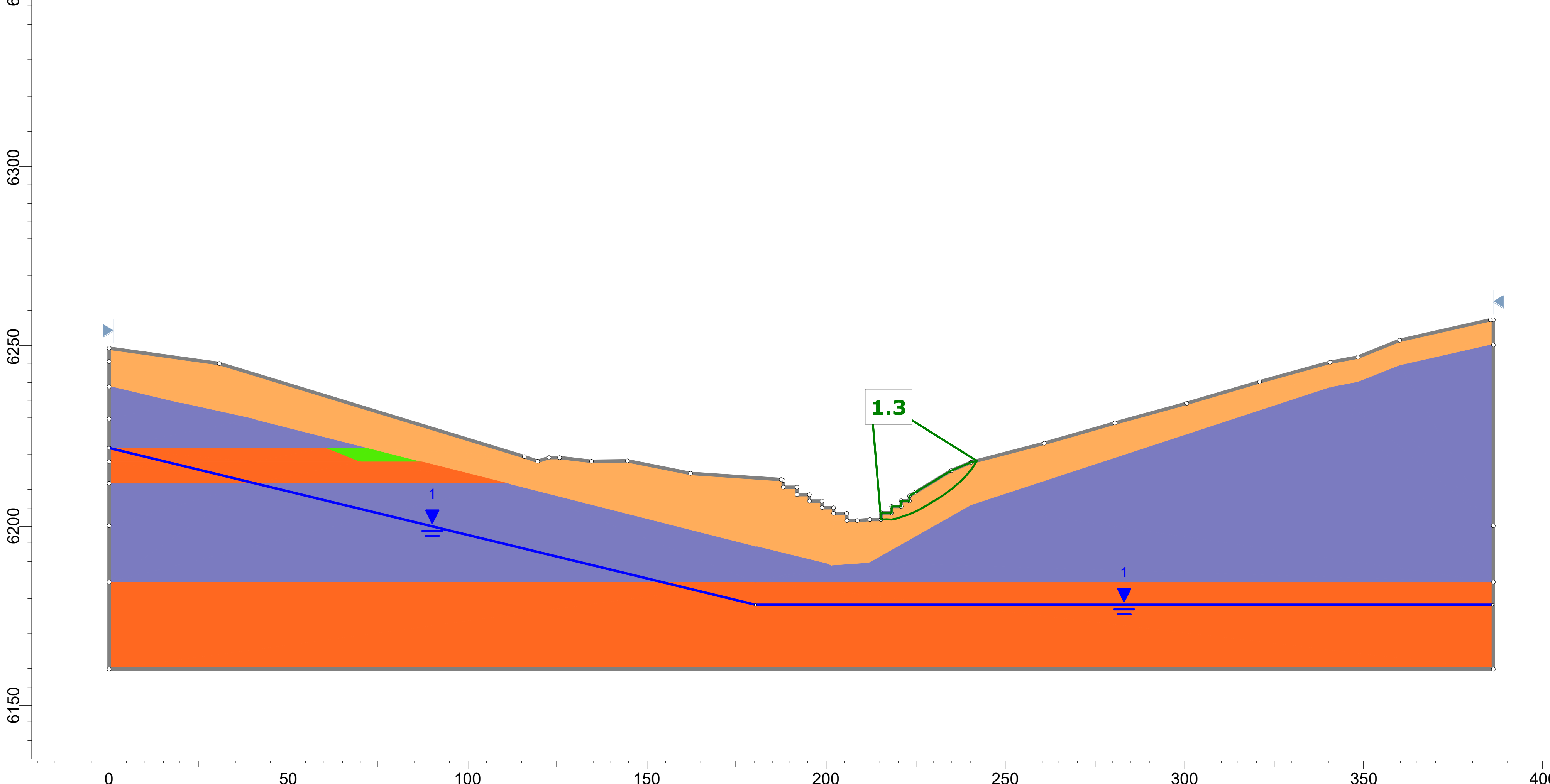
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section B-B' - Interim
Analysis Description	
Drawn By	
Scale	1:496
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.3
Spencer	1.3
GLE / Morgenstern-Price	1.3



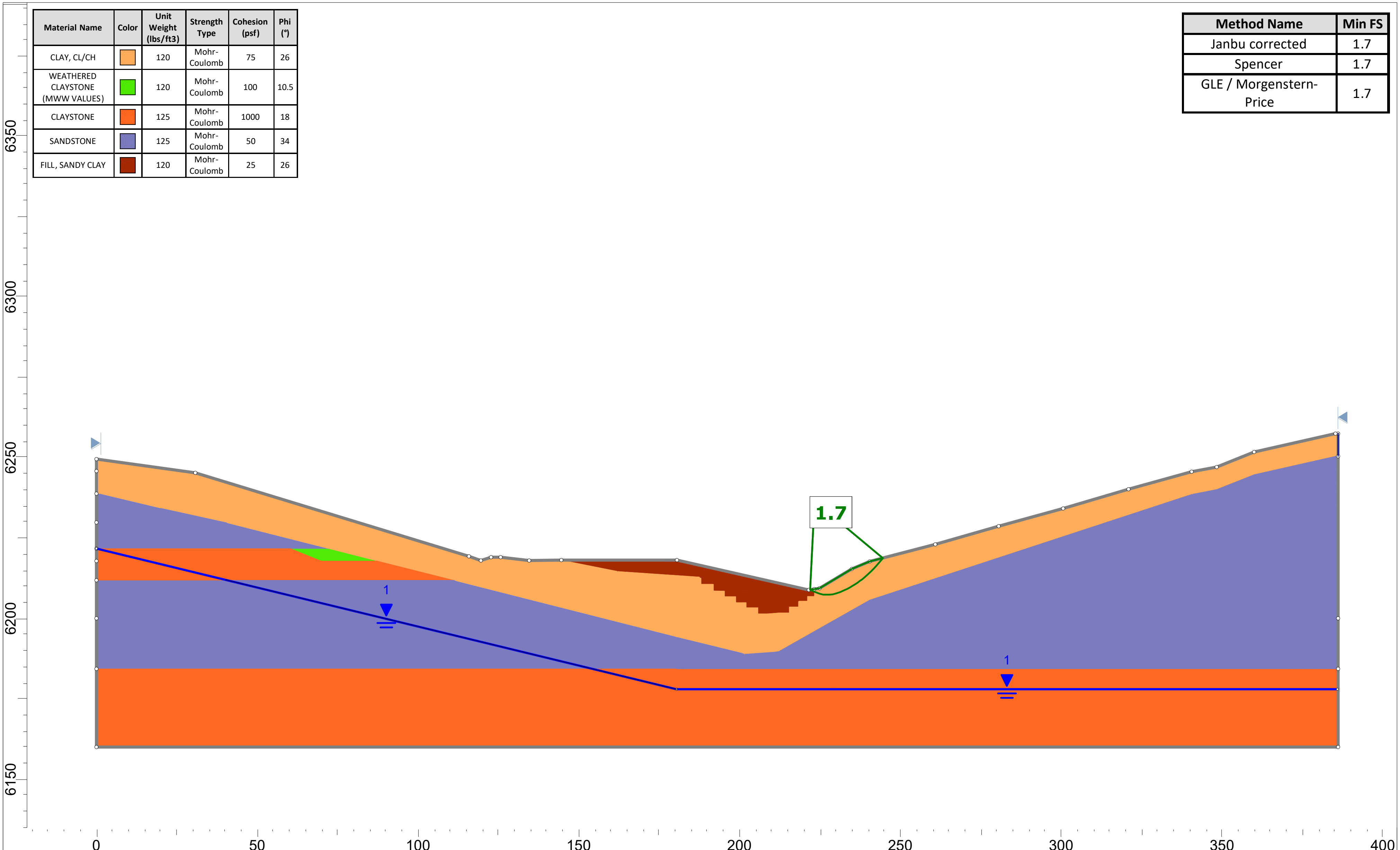
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section B-B' - Interim
Analysis Description	
Drawn By	
Scale	1:496
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



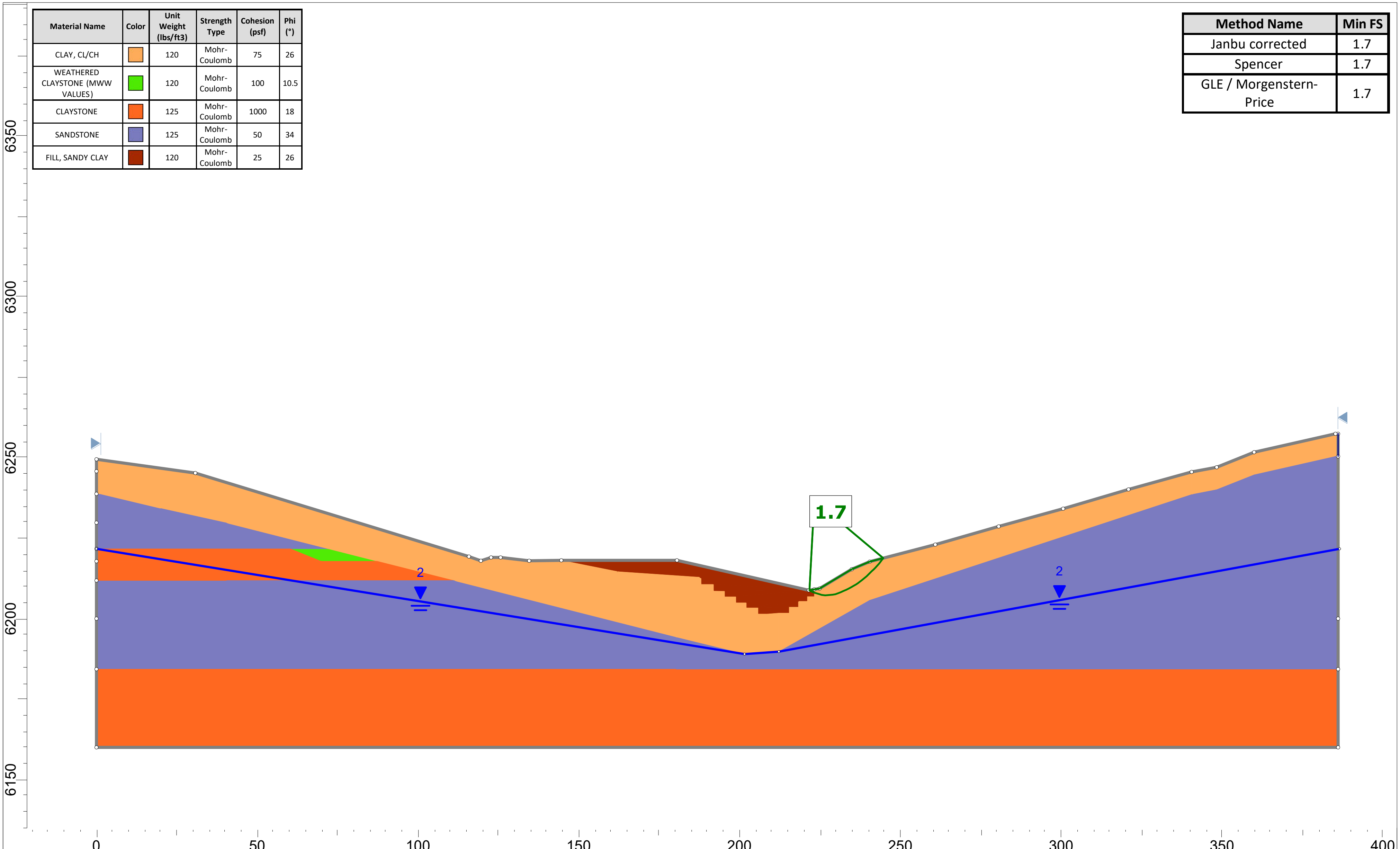
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section B-B' - Proposed		
Analysis Description			
Drawn By	*Scale* 1:496	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



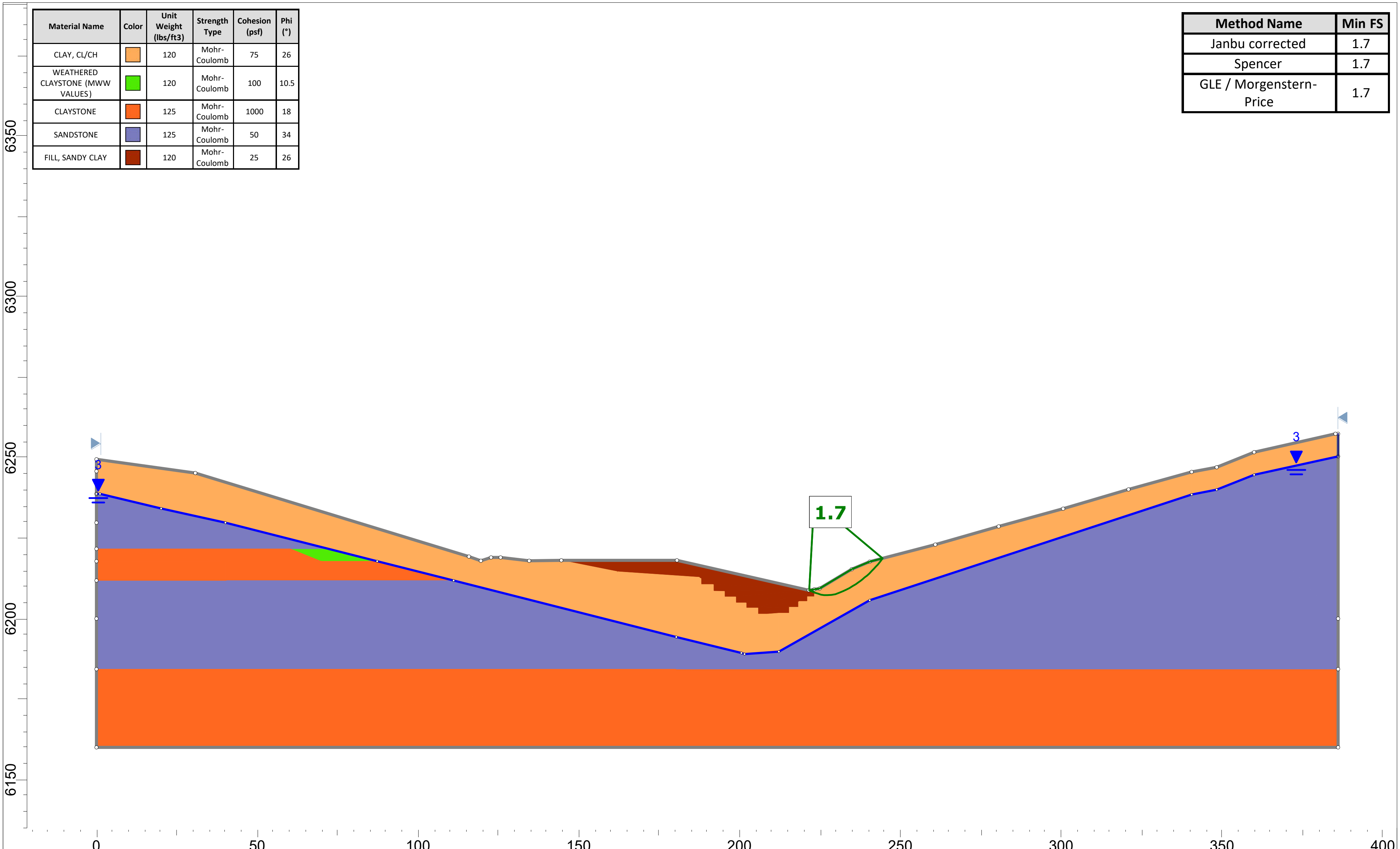
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section B-B' - Proposed
Analysis Description	
Drawn By	*Scale* 1:496
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section B-B' - Proposed

Analysis Description

Drawn By

Scale 1:496

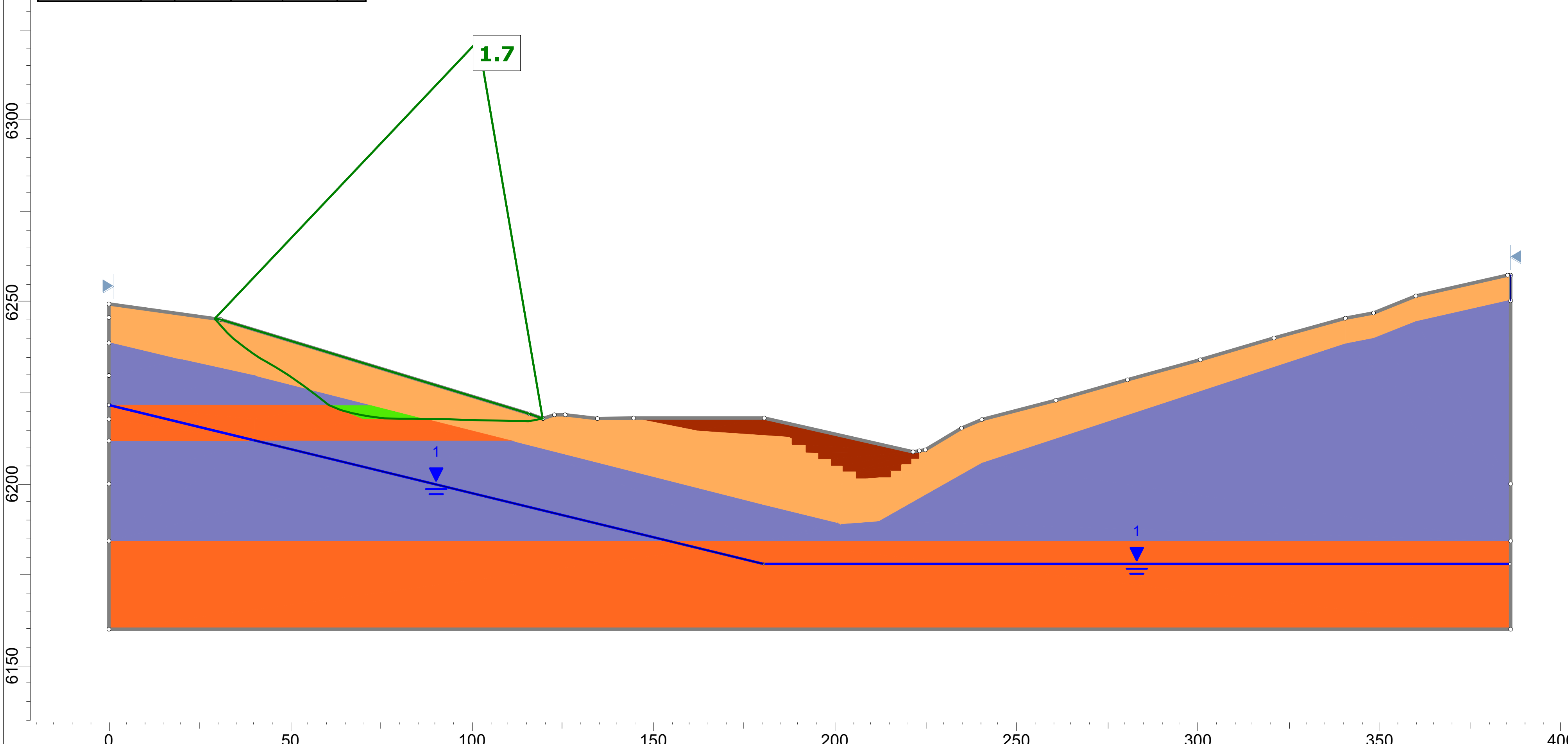
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section B-B' - Proposed

Analysis Description

Drawn By

Scale 1:496

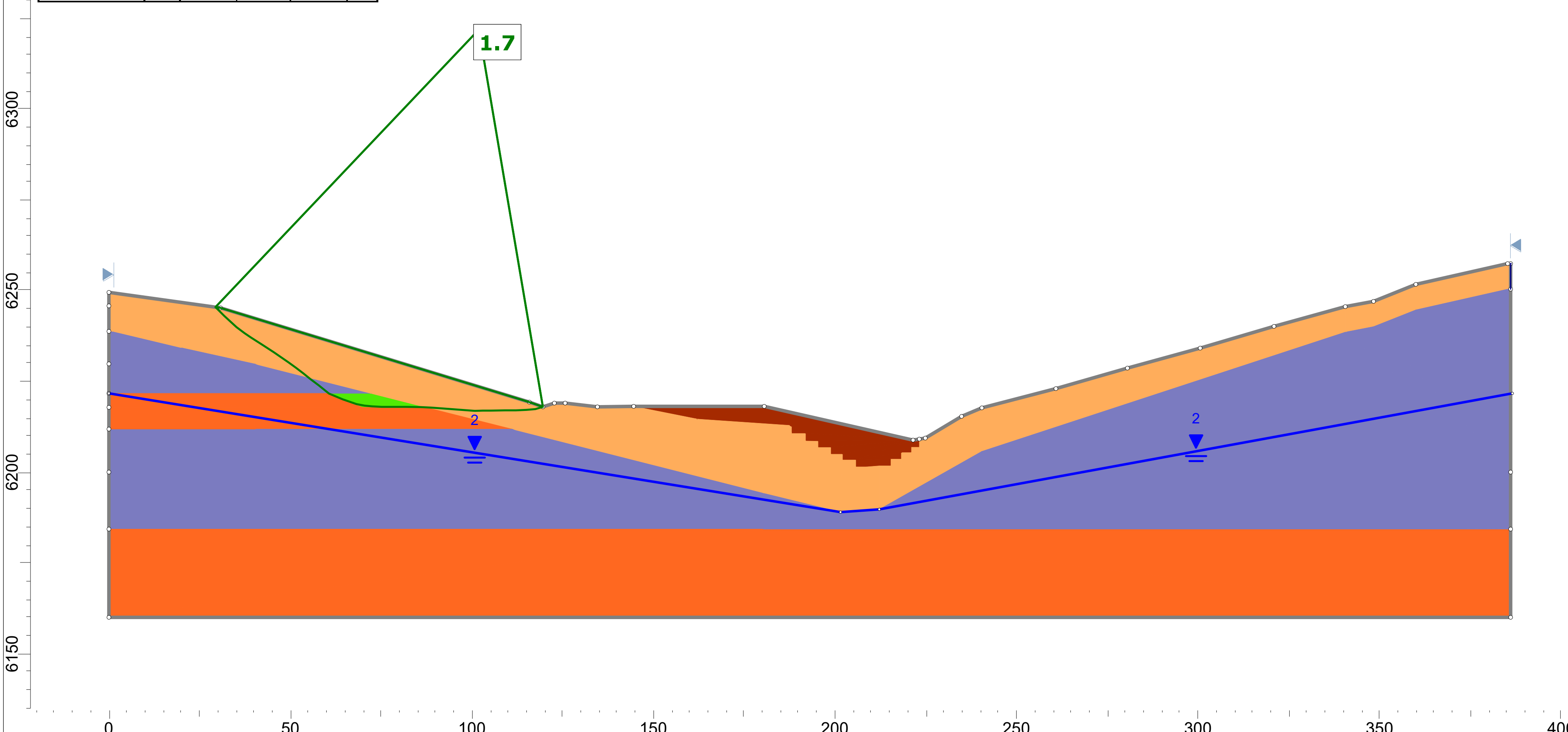
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



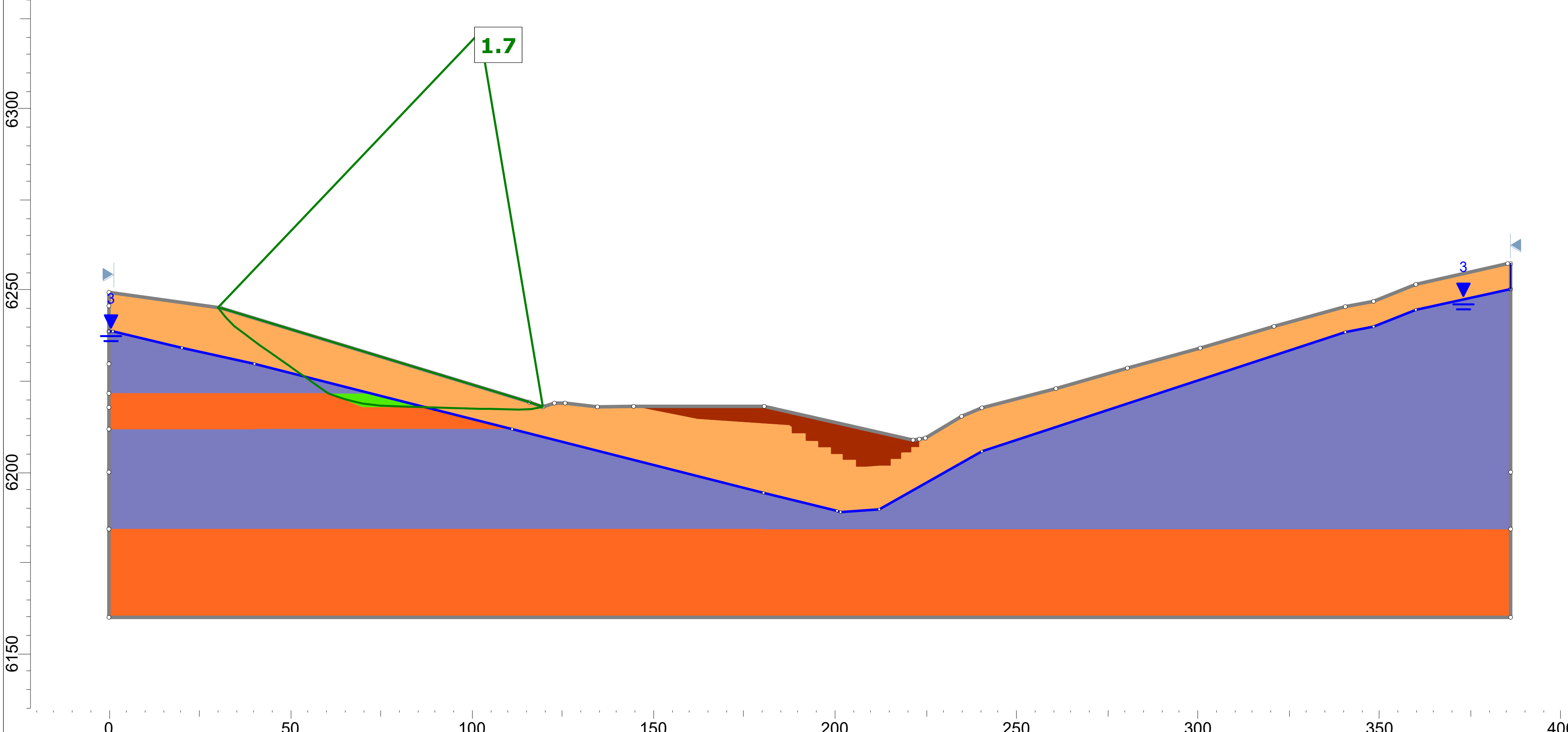
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section B-B' - Proposed		
Analysis Description			
Drawn By		*Scale* 1:496	*Company*
Date			*File Name*

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.7
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section B-B' - Proposed

Analysis Description

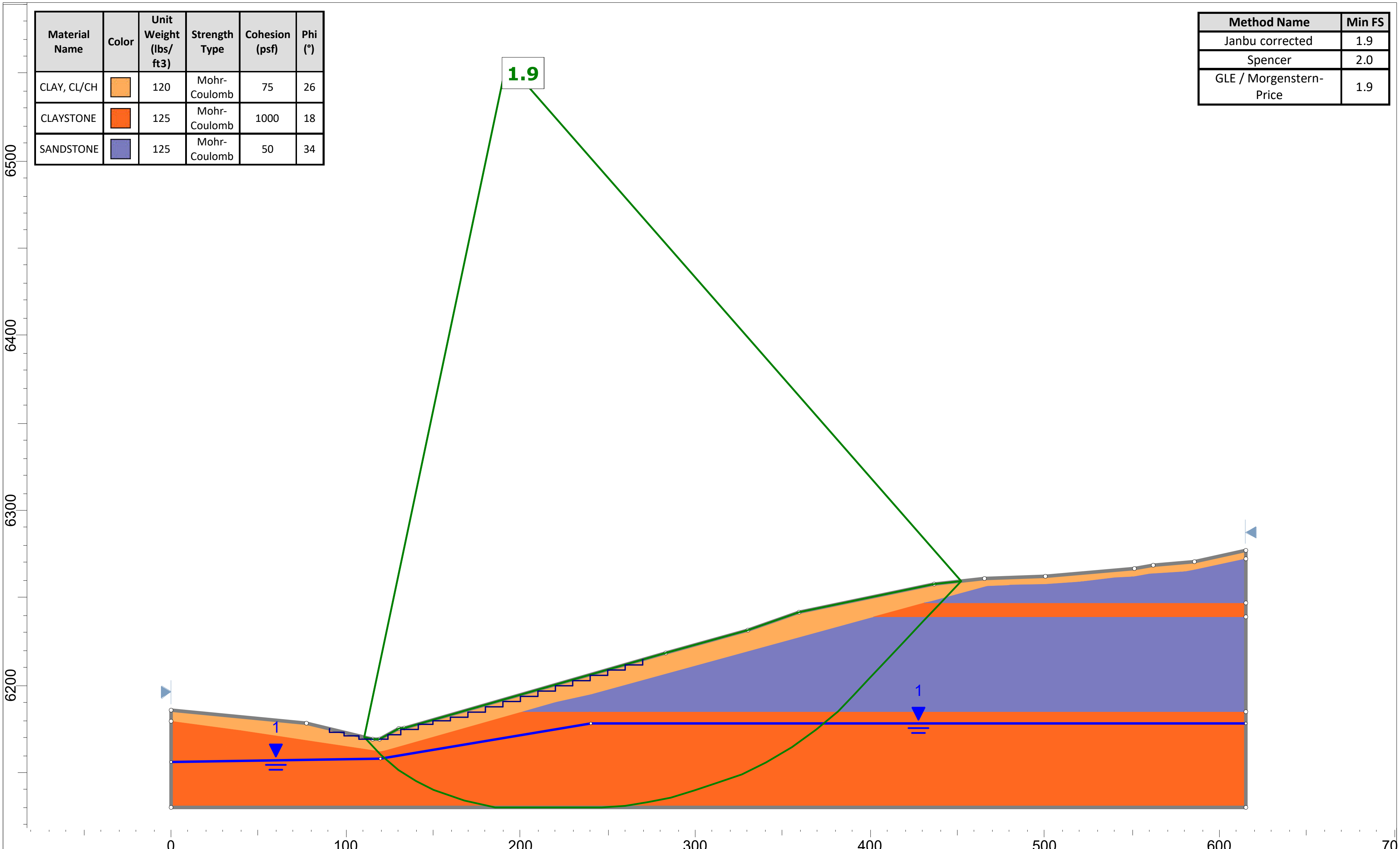
Drawn By

Scale 1:496

Company

Date

File Name



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.9
Spencer	2.0
GLE / Morgenstern-Price	1.9

ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section C-C' - Existing

Analysis Description

Drawn By

Scale 1:913

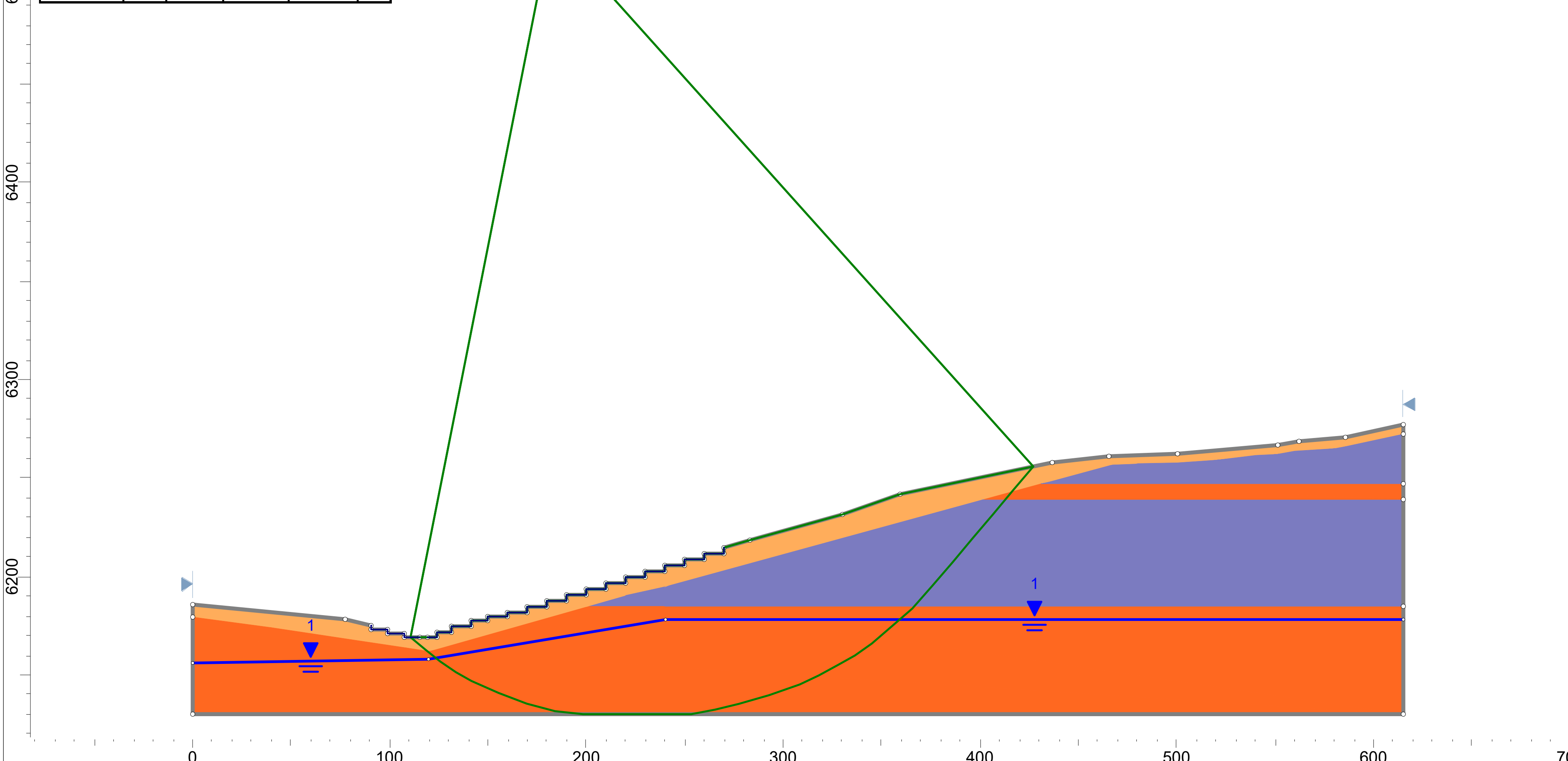
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.9
Spencer	1.9
GLE / Morgenstern-Price	1.9

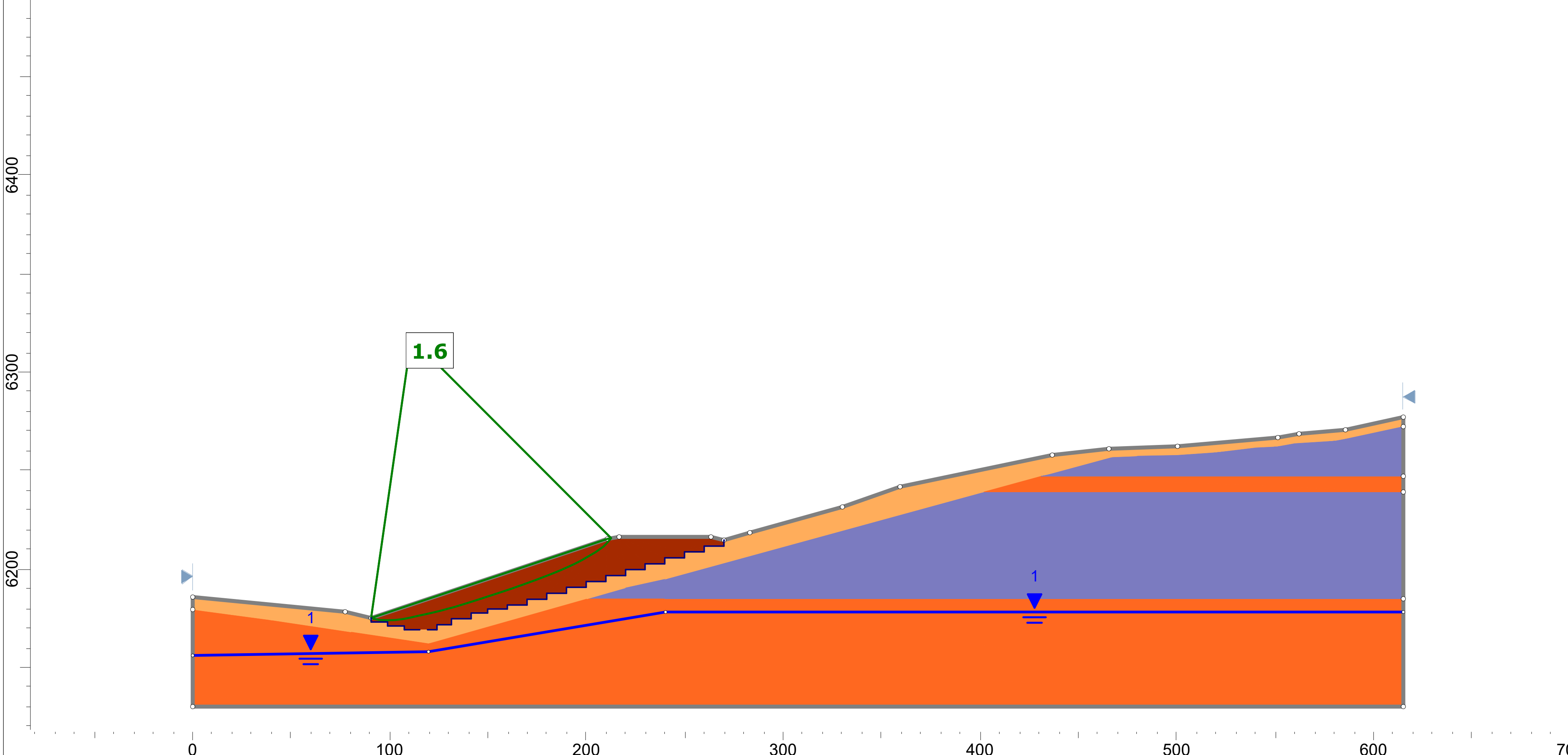


Project	Section C-C' - Interim
Analysis Description	
Drawn By	*Scale* 1:913
Company	
Date	
File Name	

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



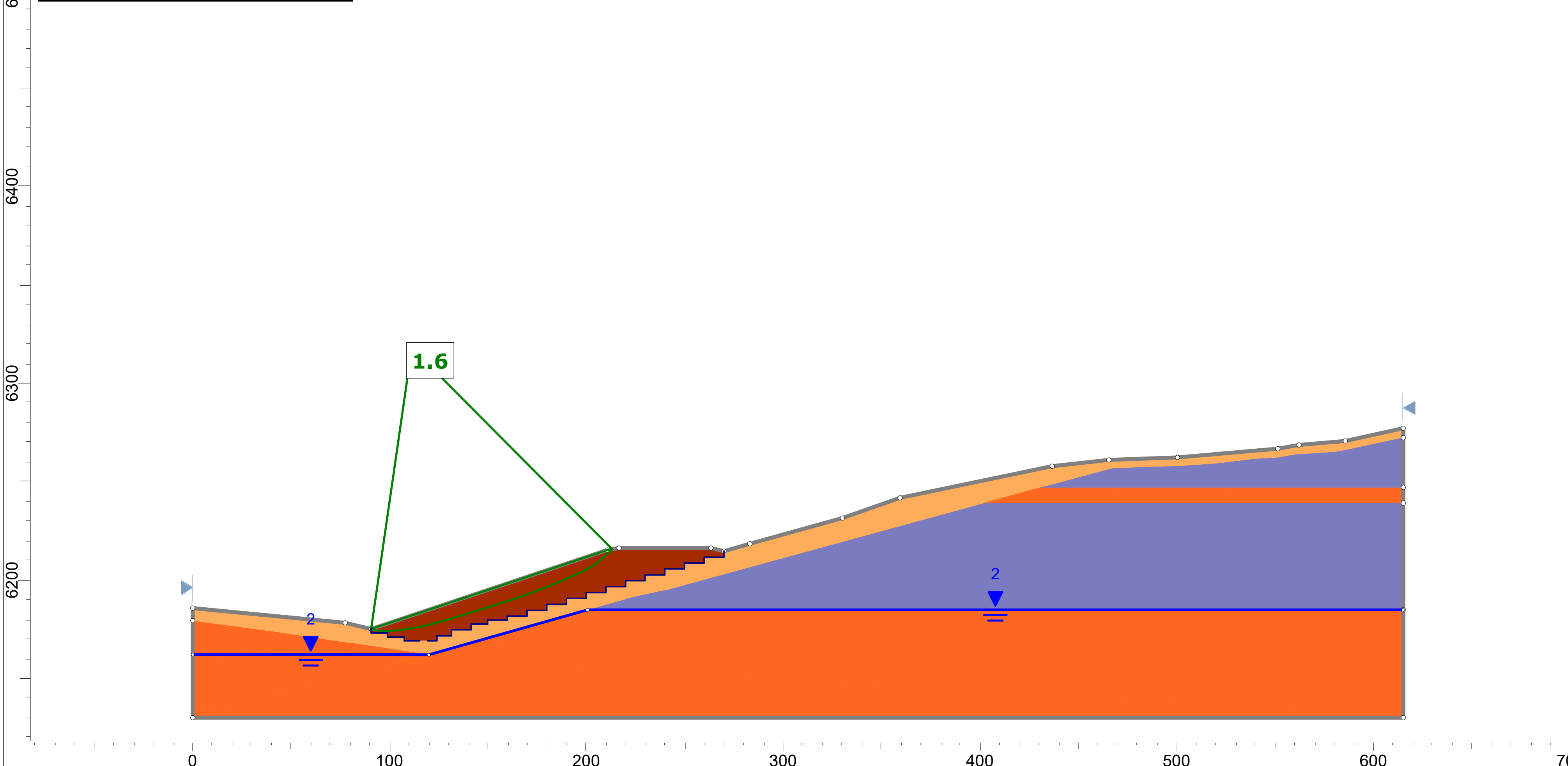
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section C-C' - Proposed
Analysis Description	
Drawn By	
Scale	1:913
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



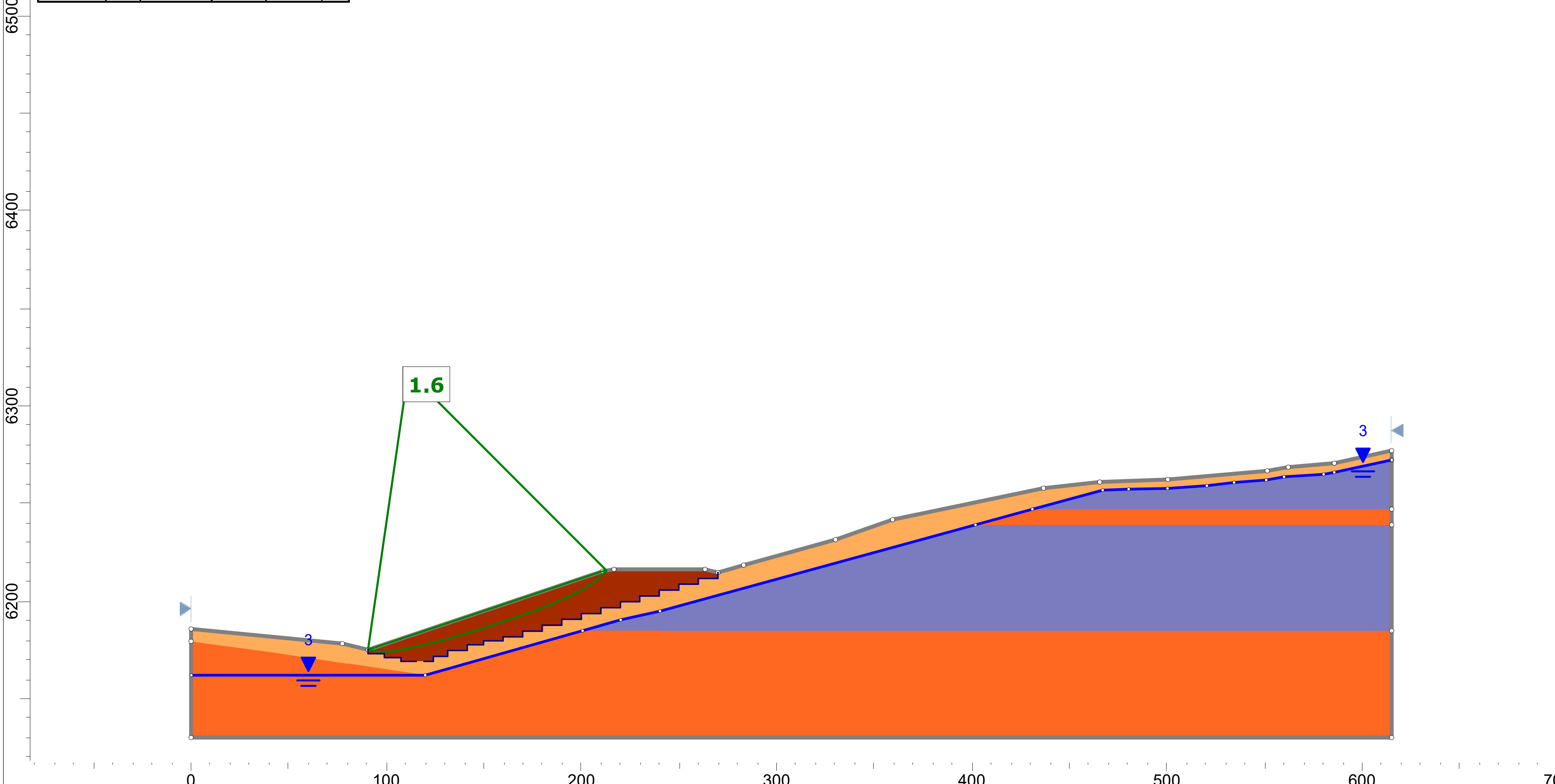
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section C-C' - Proposed
Analysis Description	
Drawn By	*Scale* 1:913
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



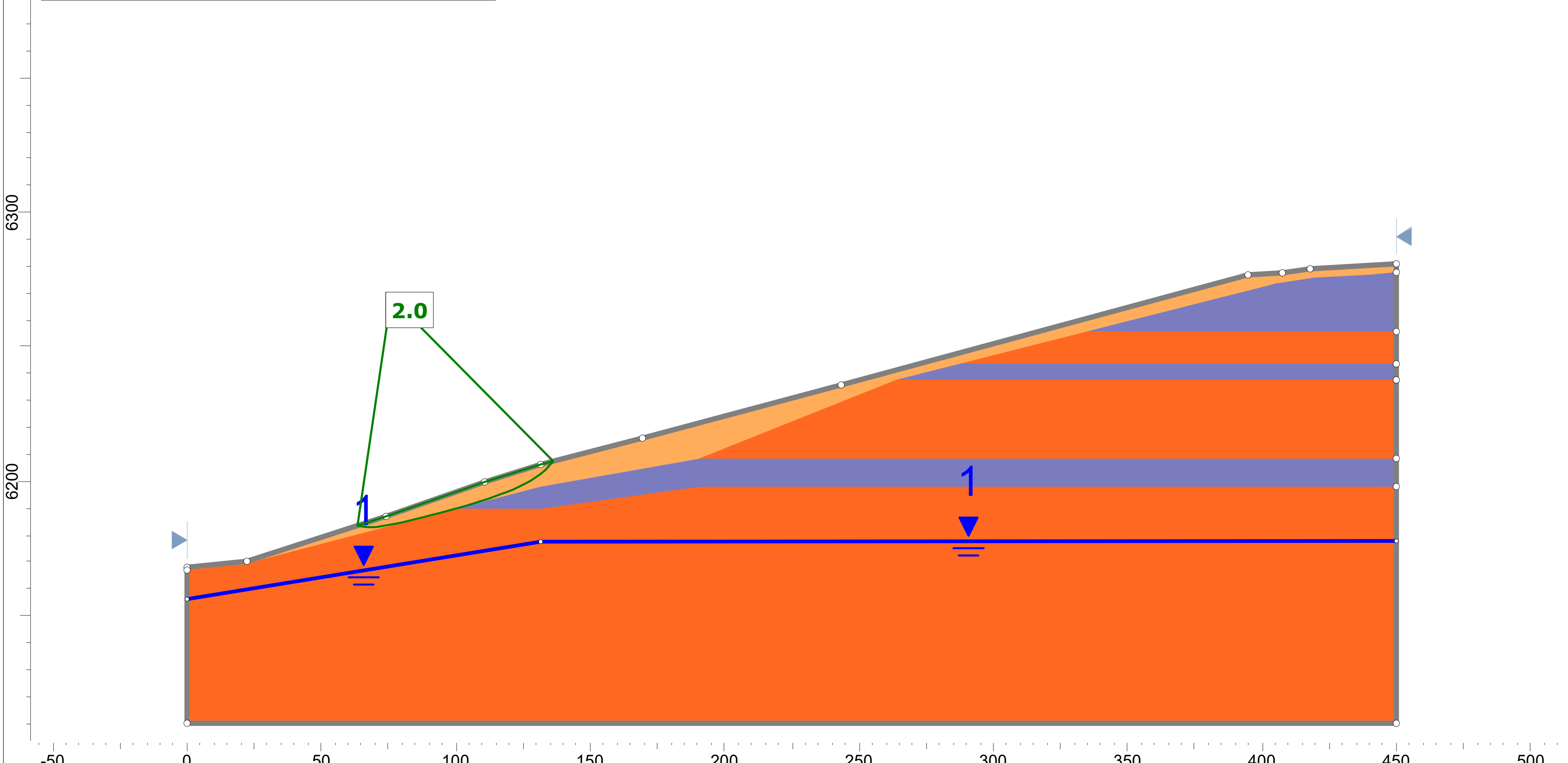
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section C-C' - Proposed		
Analysis Description			
Drawn By	*Scale* 1:913	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.0
GLE / Morgenstern-Price	2.0



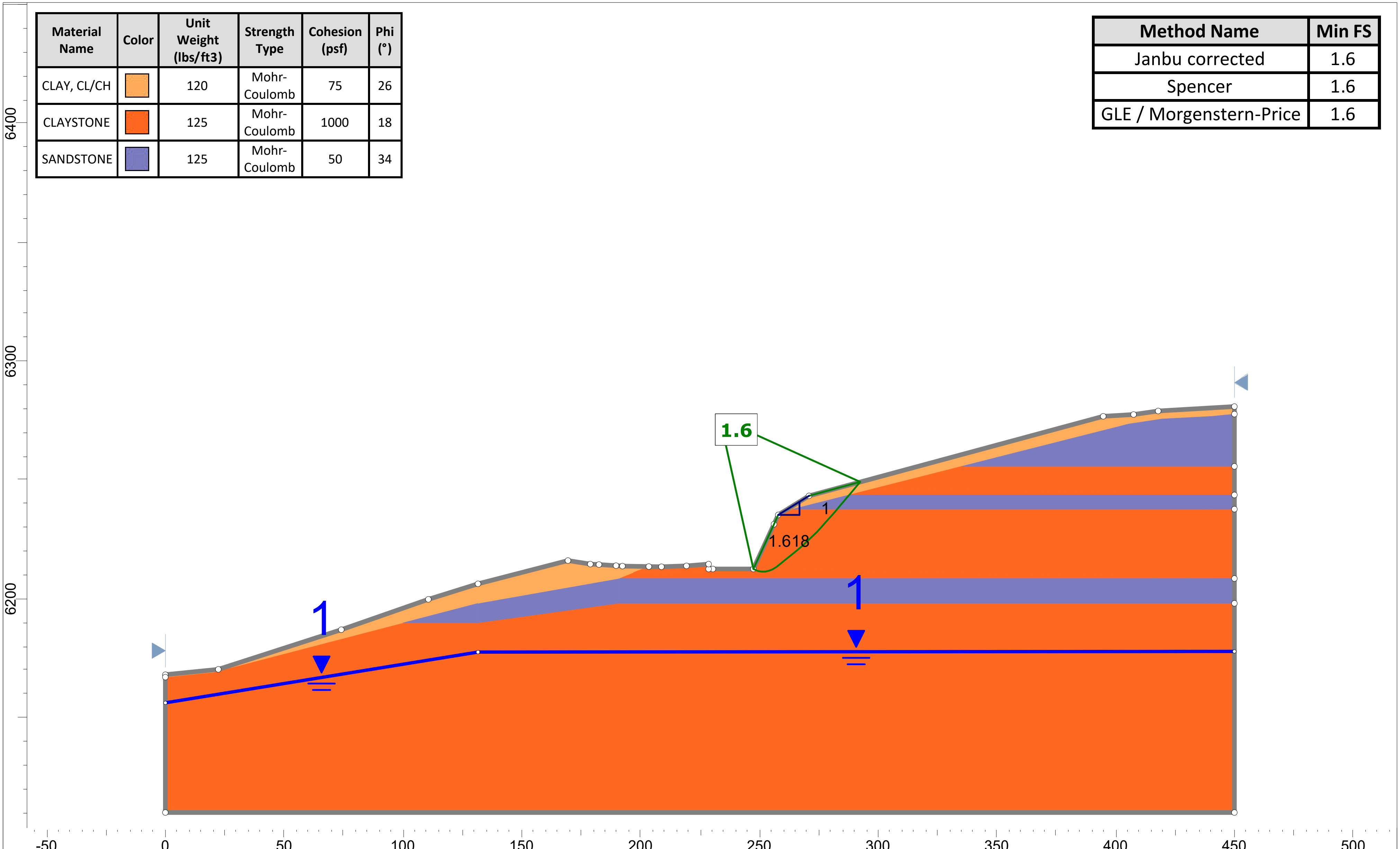
ROCSCIENCE

SLIDEINTERPRET 9.041

Project Section D-D' - Existing			
Analysis Description			
Drawn By	*Scale* 1:671	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6

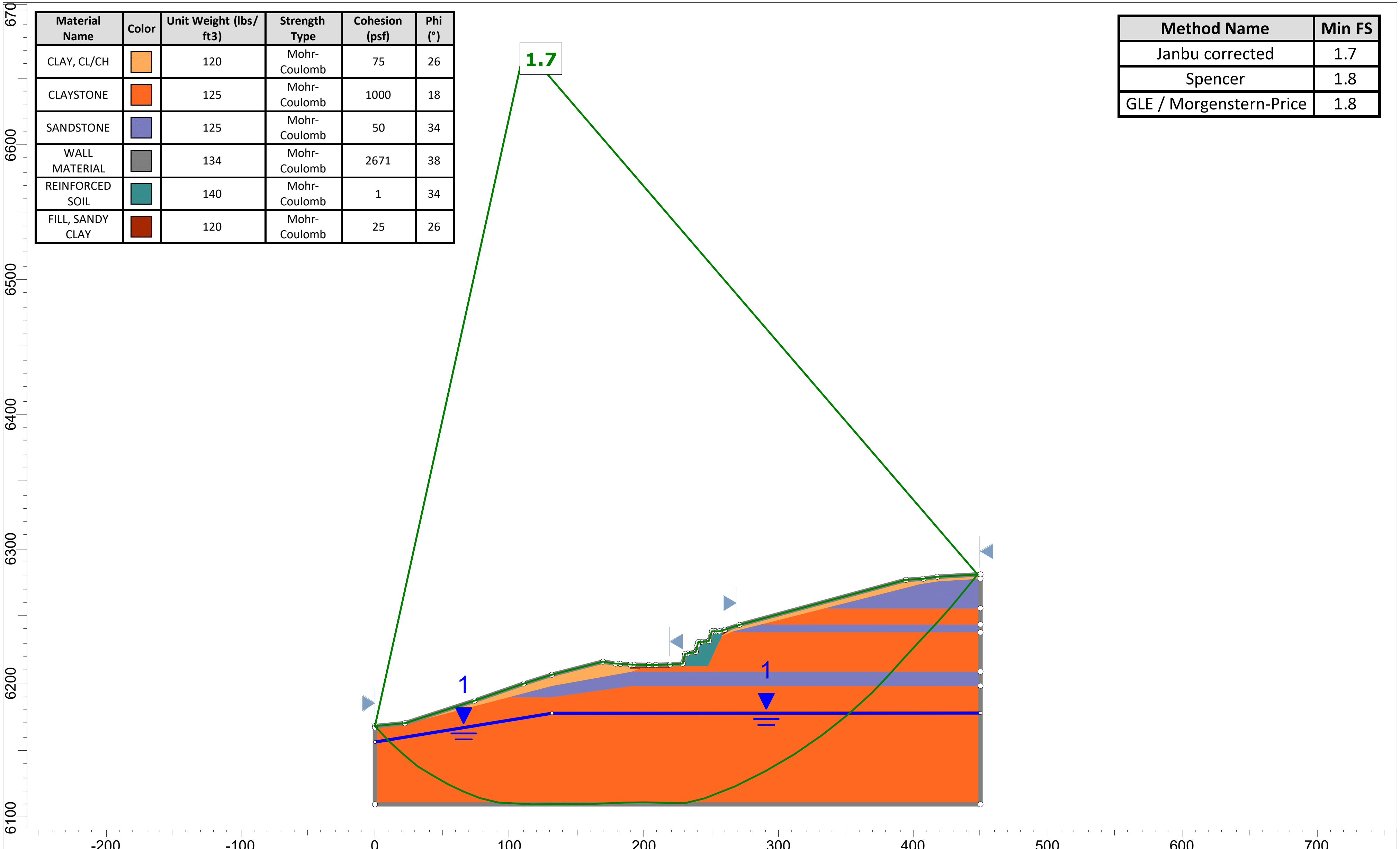


Project: Section D-D' - Interim			
Analysis Description			
Drawn By	Scale 1:671	Company	
Date		File Name	

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

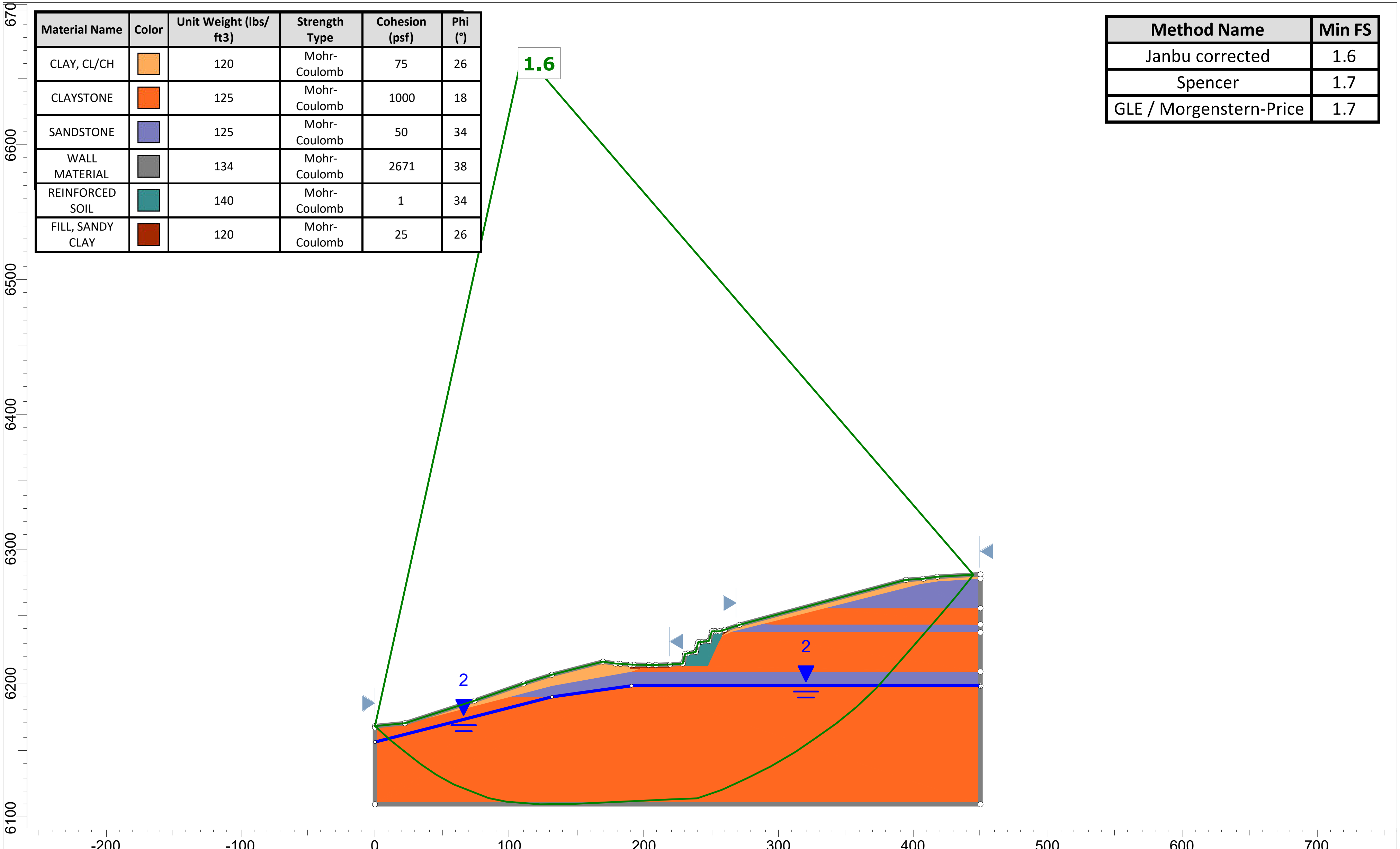
Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.8



ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section D-D' - Proposed		
Analysis Description			
Drawn By		*Scale* 1:1186	*Company*
Date			*File Name*



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.7
GLE / Morgenstern-Price	1.7

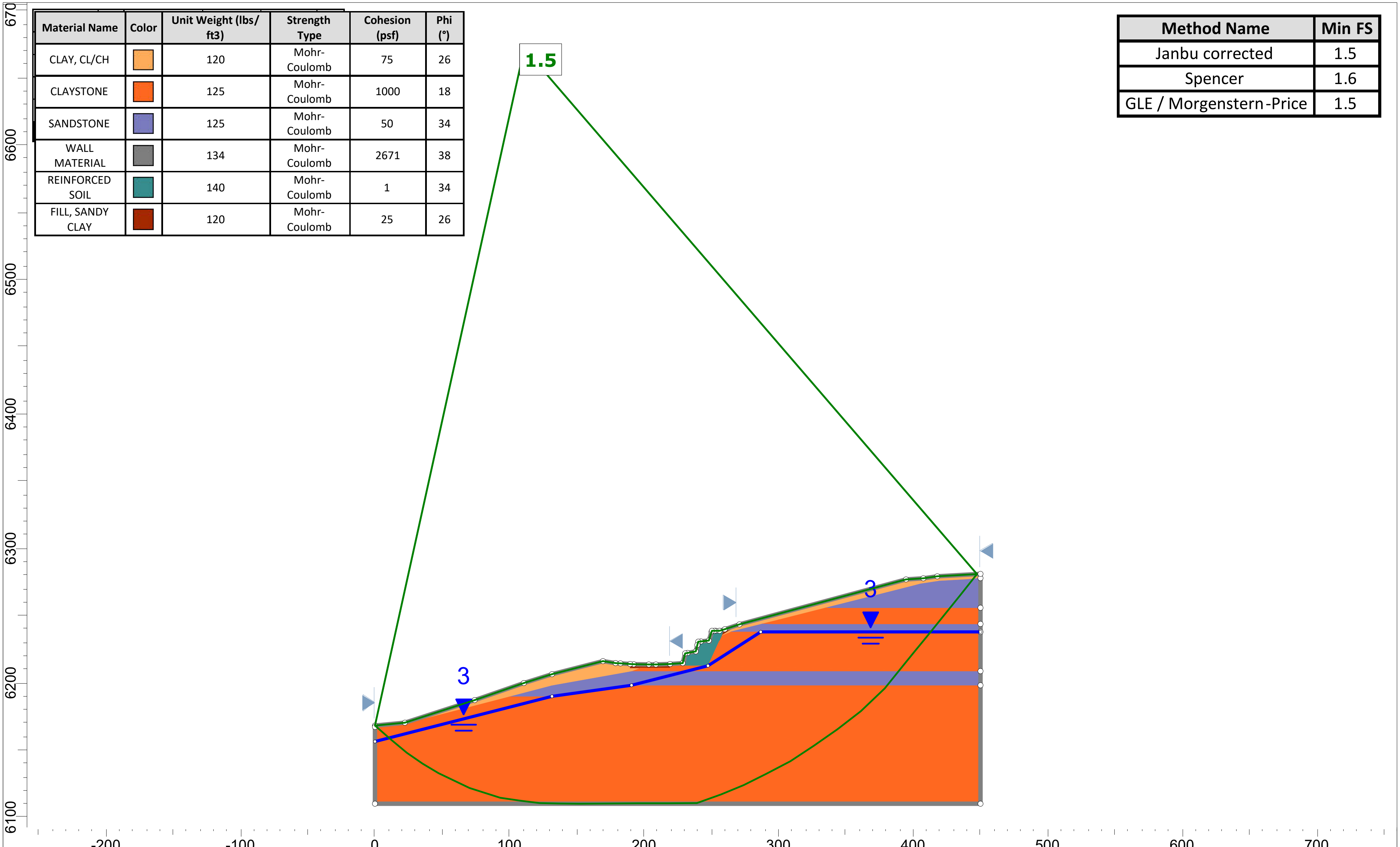
ROCSCIENCE

SLIDEINTERPRET 9.041

Project Section D-D' - Proposed			
Analysis Description			
Drawn By	*Scale* 1:1186	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

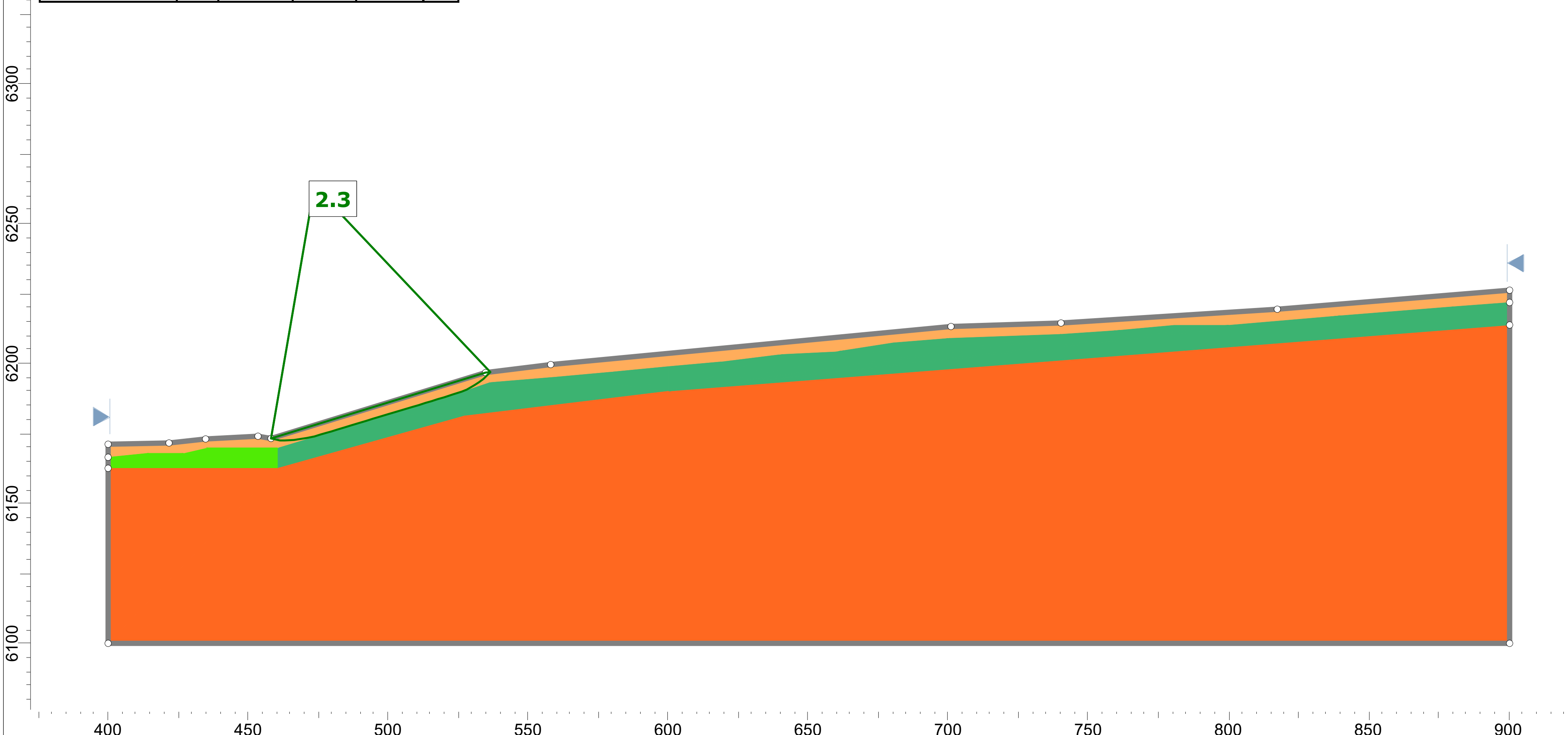
Method Name	Min FS
Janbu corrected	1.5
Spencer	1.6
GLE / Morgenstern-Price	1.5



ROCSCIENCE	*Project* Section D-D' - Proposed		
	Analysis Description		
	Drawn By	*Scale* 1:1186	*Company*
SLIDEINTERPRET 9.041	*Date*		*File Name*

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	2.3
Spencer	2.3
GLE / Morgenstern-Price	2.3

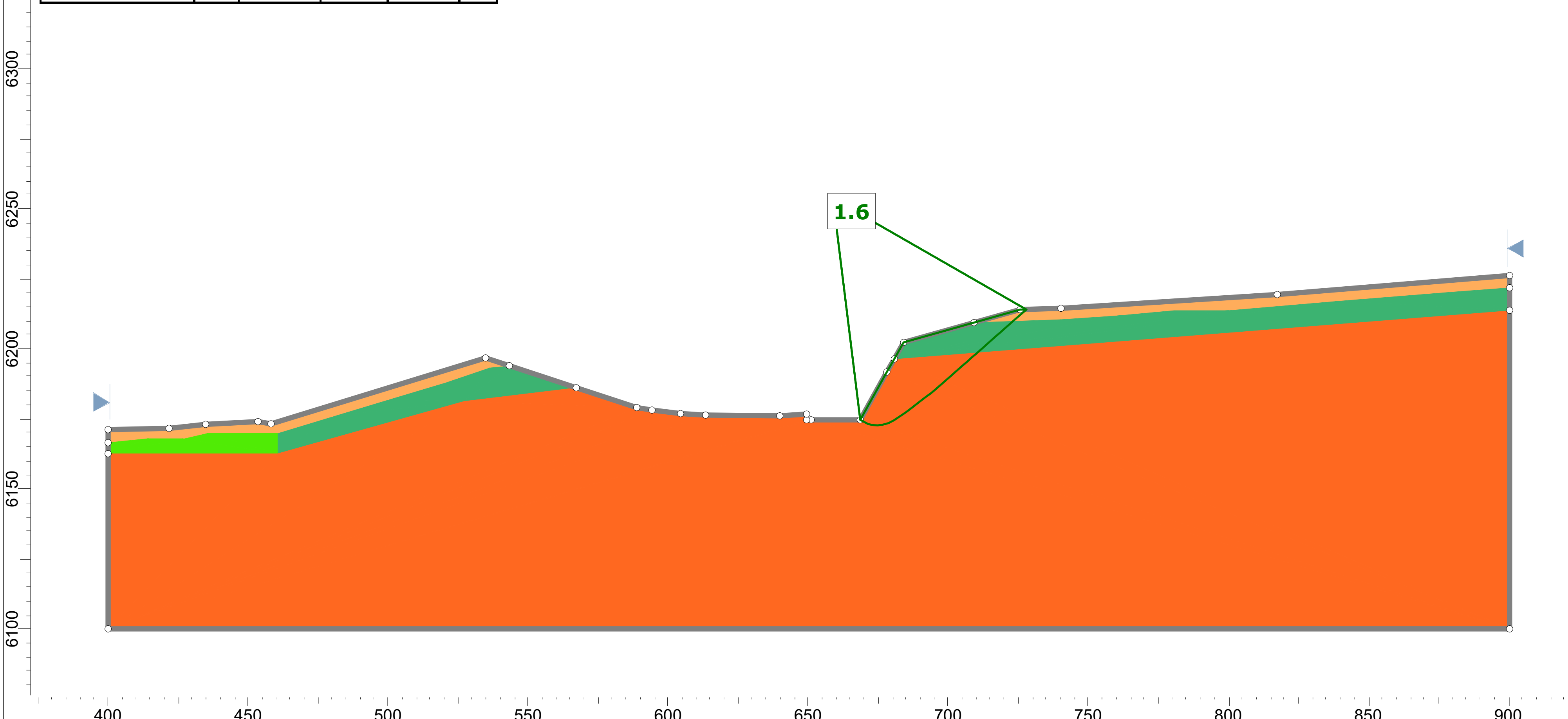


Project	Section E-E' - Existing	
Analysis Description		
Drawn By	*Scale* 1:644	*Company*
Date		*File Name*

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



ROCSCIENCE

Project

Section E-E' - Interim

Analysis Description

Drawn By

Scale 1:644

Company

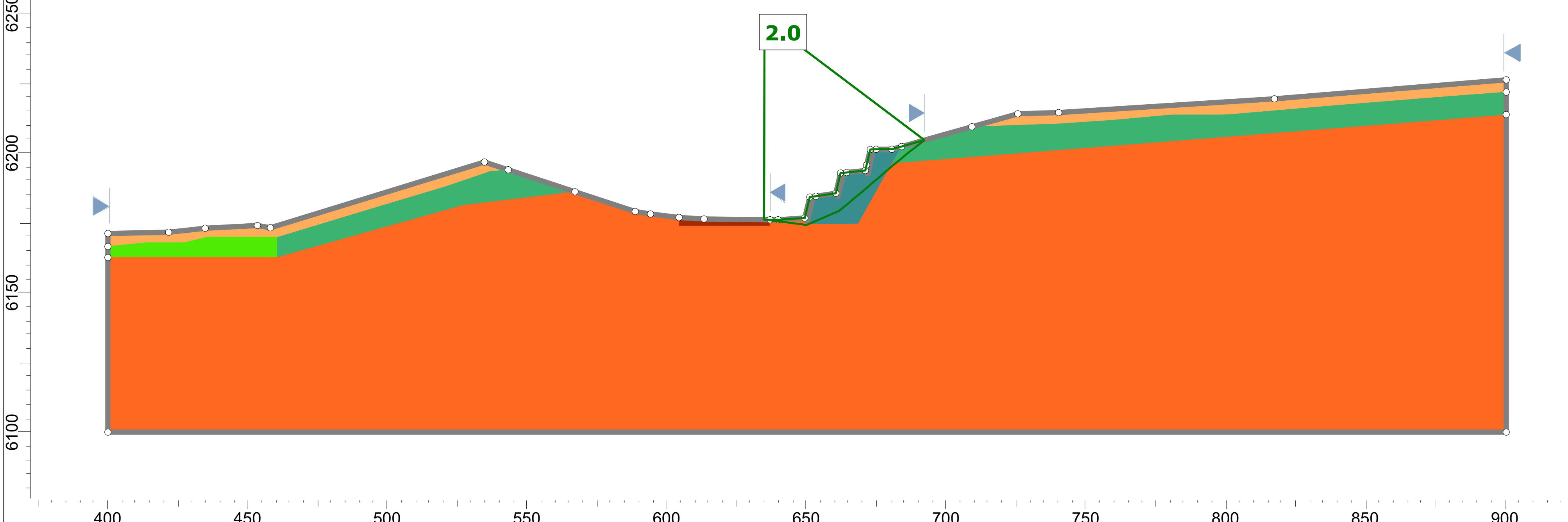
Date

File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.1
GLE / Morgenstern-Price	2.0



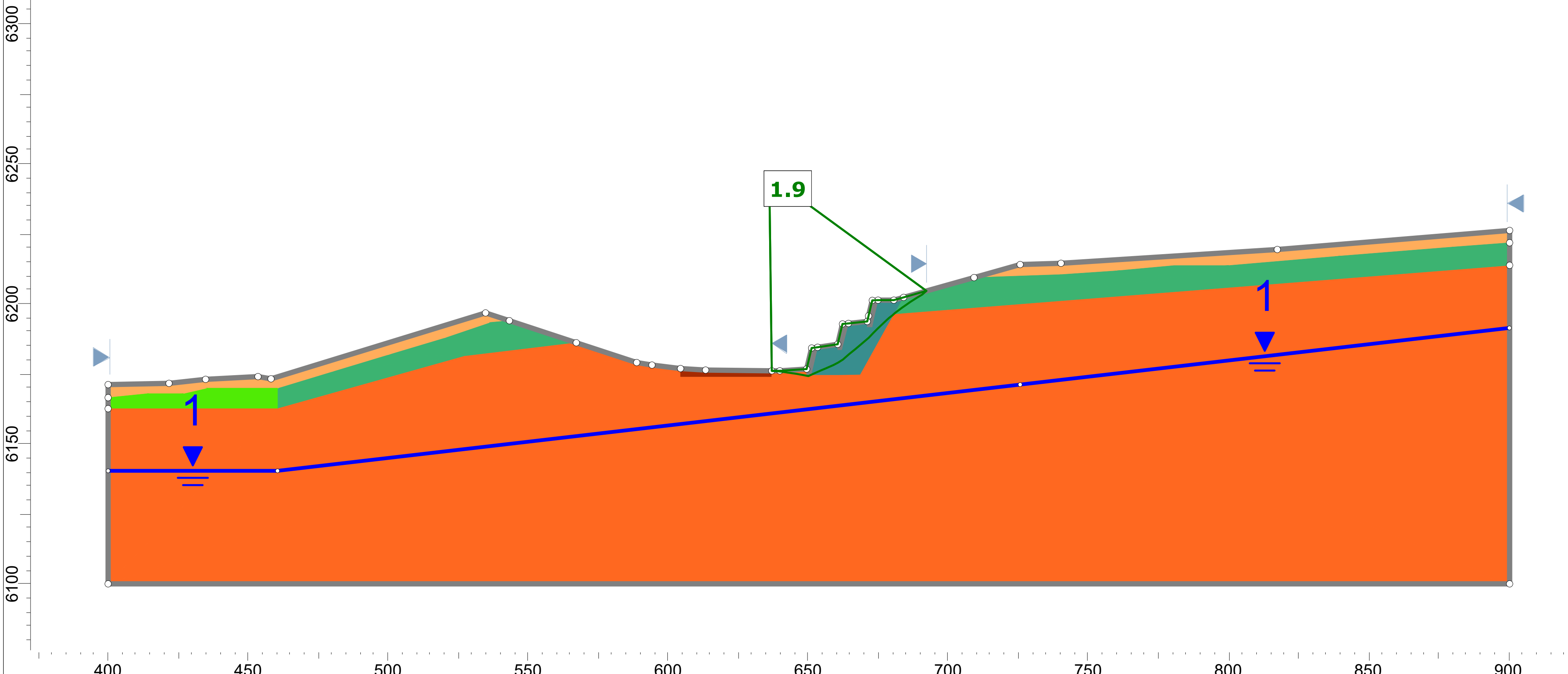
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section E-E' - Proposed		
Analysis Description			
Drawn By		*Scale* 1:644	*Company*
Date			*File Name*

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.9
Spencer	2.0
GLE / Morgenstern-Price	2.0



ROCSCIENCE

Project

Section E-E' - Proposed

Analysis Description

Drawn By

Scale 1:644

Company

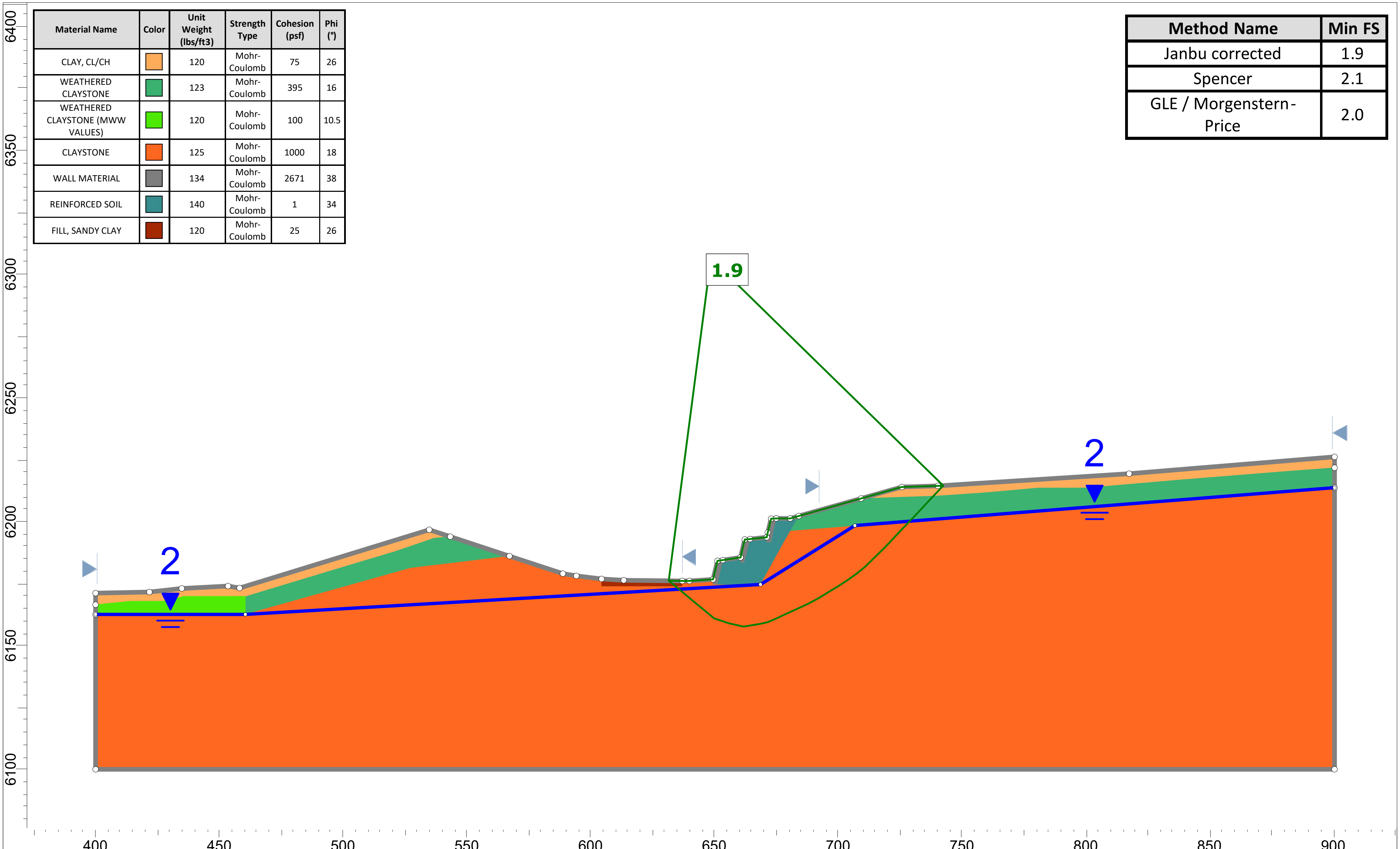
Date

File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

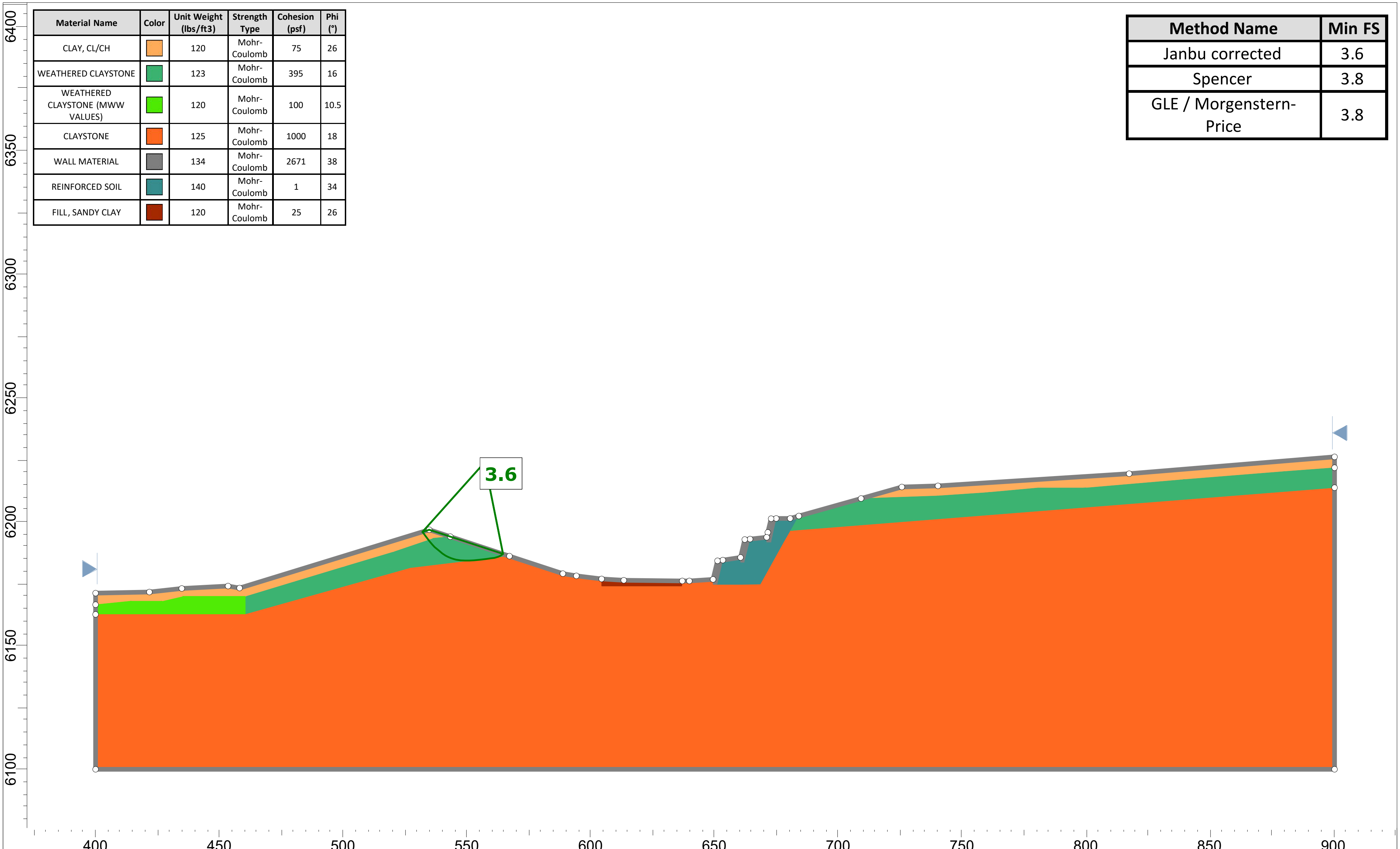
Method Name	Min FS
Janbu corrected	1.9
Spencer	2.1
GLE / Morgenstern-Price	2.0



ROCSCIENCE

Project	Section E-E' - Proposed
Analysis Description	
Drawn By	
Scale	1:644
Company	
Date	
File Name	

SLIDEINTERPRET 9.041



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	3.6
Spencer	3.8
GLE / Morgenstern-Price	3.8

ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section E-E' - Proposed

Analysis Description

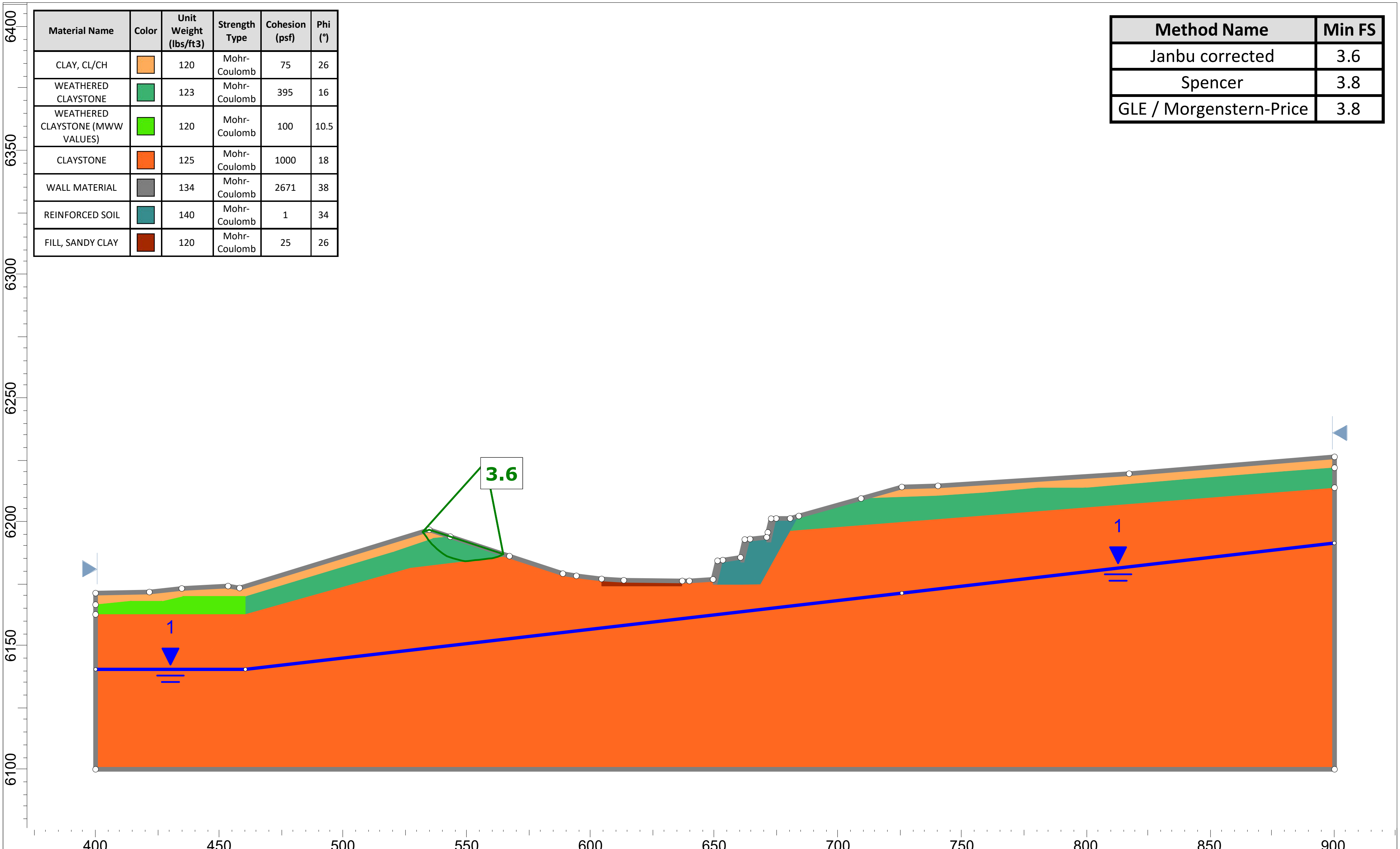
Drawn By

Scale 1:644

Company

Date

File Name



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	3.6
Spencer	3.8
GLE / Morgenstern-Price	3.8

ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section E-E' - Proposed

Analysis Description

Drawn By

Scale 1:644

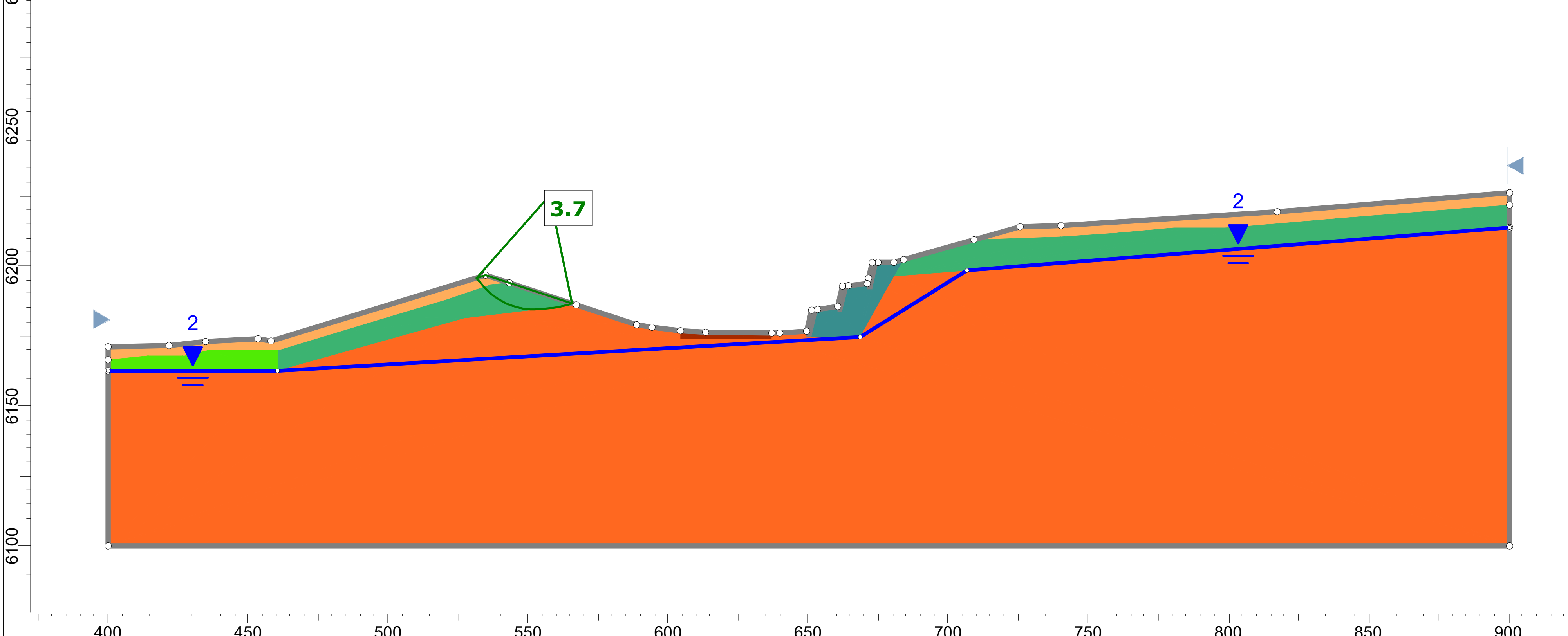
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	3.7
Spencer	3.8
GLE / Morgenstern-Price	3.8



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section E-E' - Proposed

Analysis Description

Drawn By

Scale 1:644

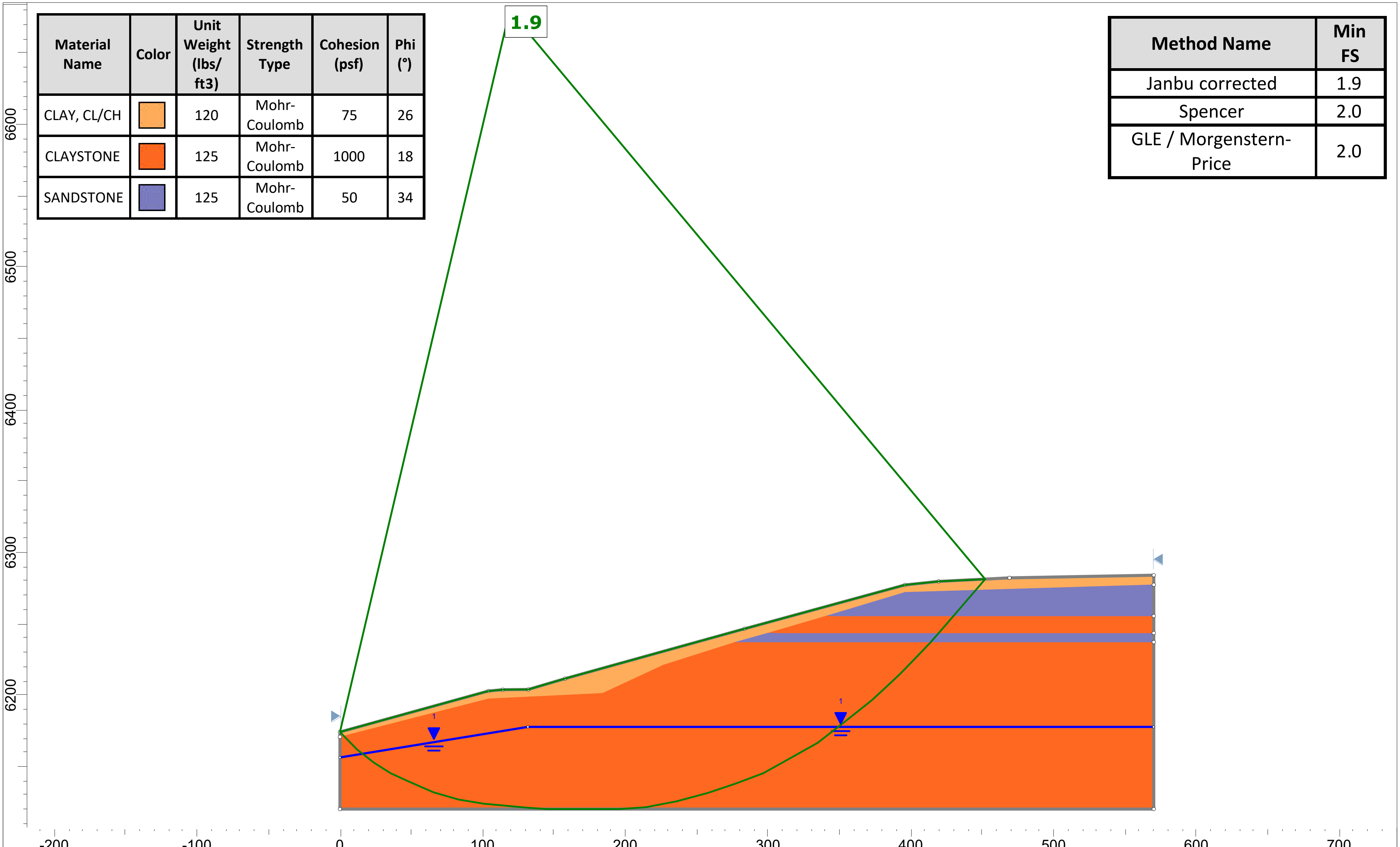
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.9
Spencer	2.0
GLE / Morgenstern-Price	2.0



ROCSCIENCE

Project

Section F-F' - Existing

Analysis Description

Drawn By

Scale 1:1117

Company

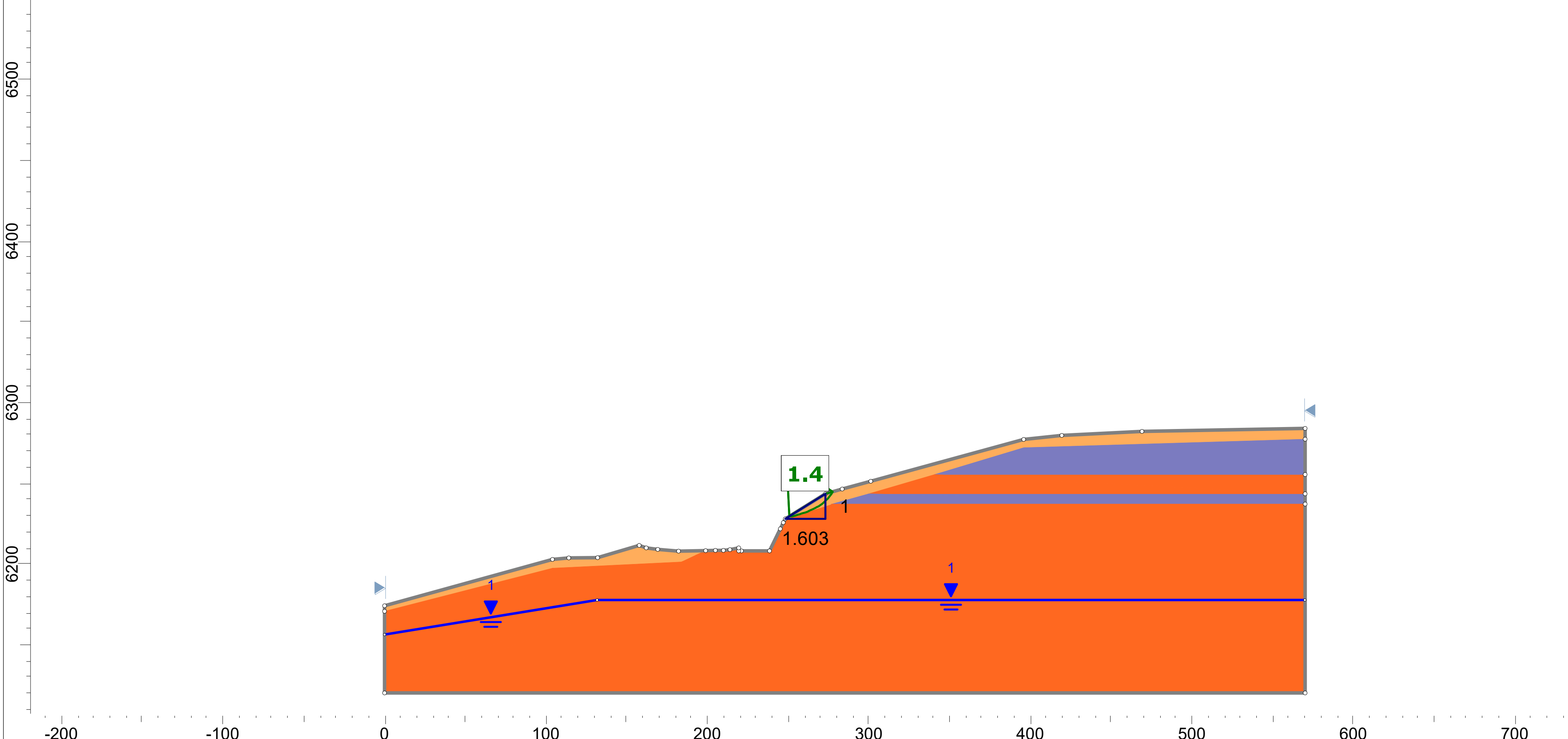
Date

File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34

Method Name	Min FS
Janbu corrected	1.4
Spencer	1.4
GLE / Morgenstern-Price	1.4



ROCSCIENCE

Project

Section F-F' - Interim

Analysis Description

Drawn By

Scale 1:1117

Company

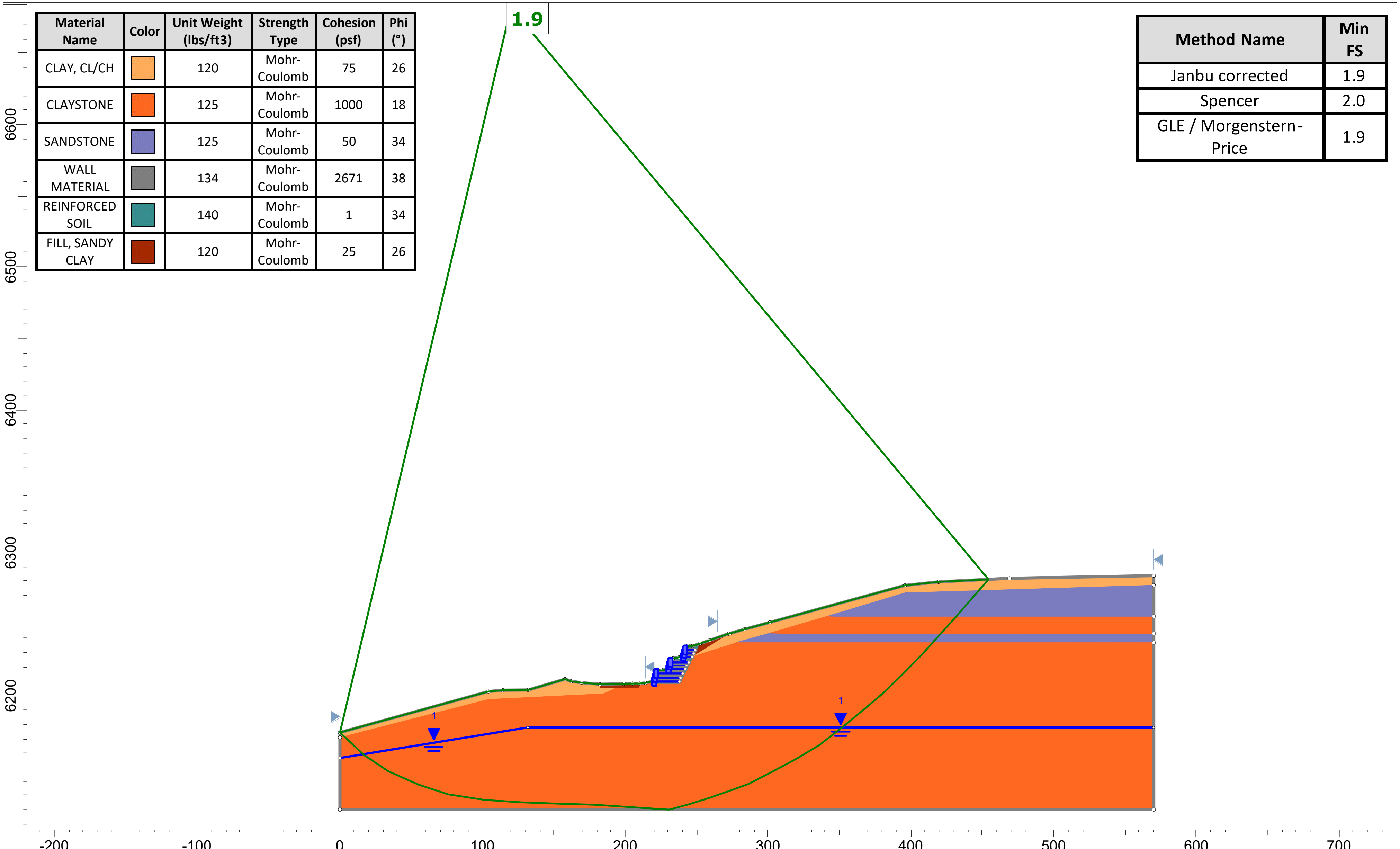
Date

File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.9
Spencer	2.0
GLE / Morgenstern-Price	1.9



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section F-F' - Proposed

Analysis Description

Drawn By

Scale 1:1117

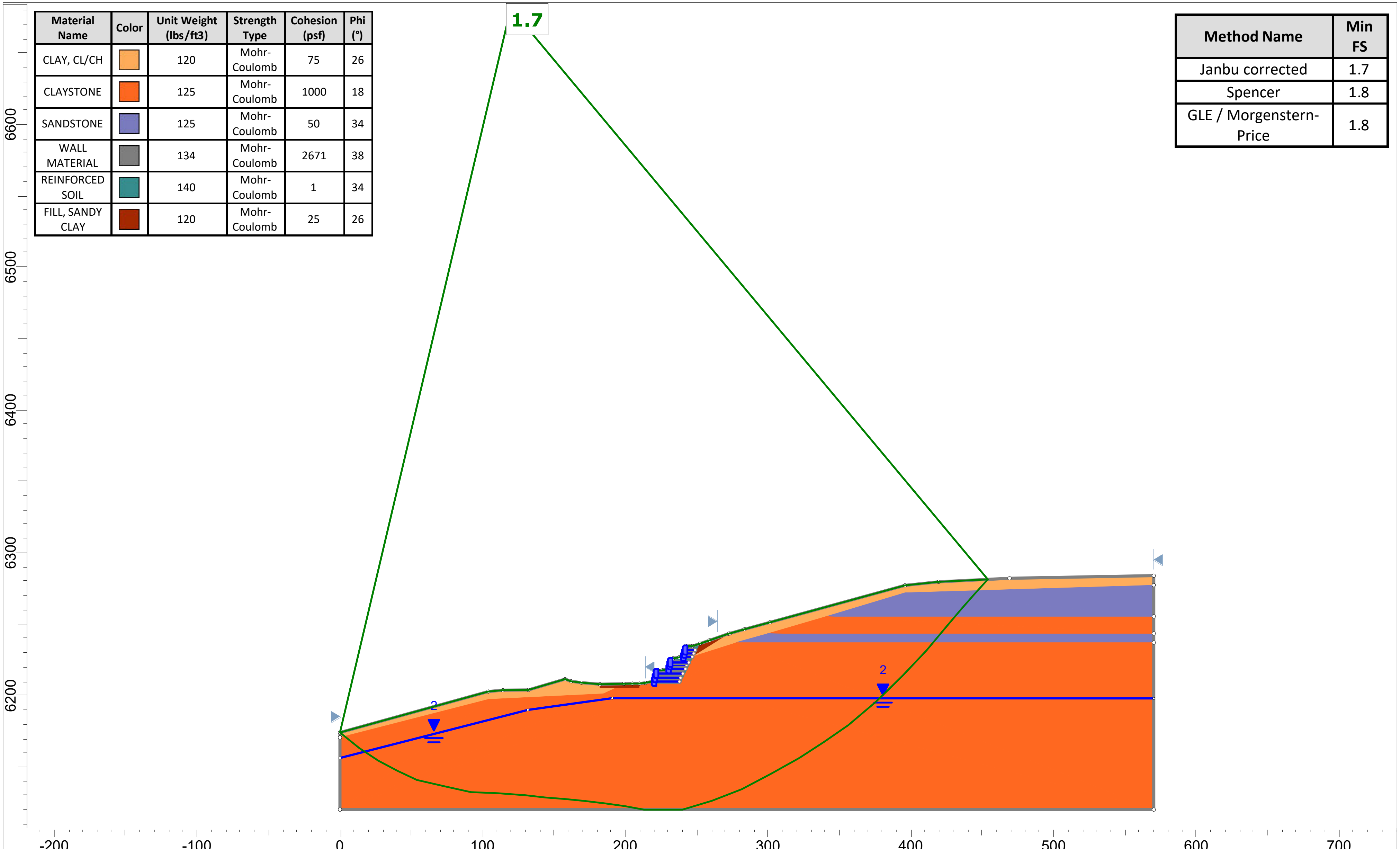
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.8



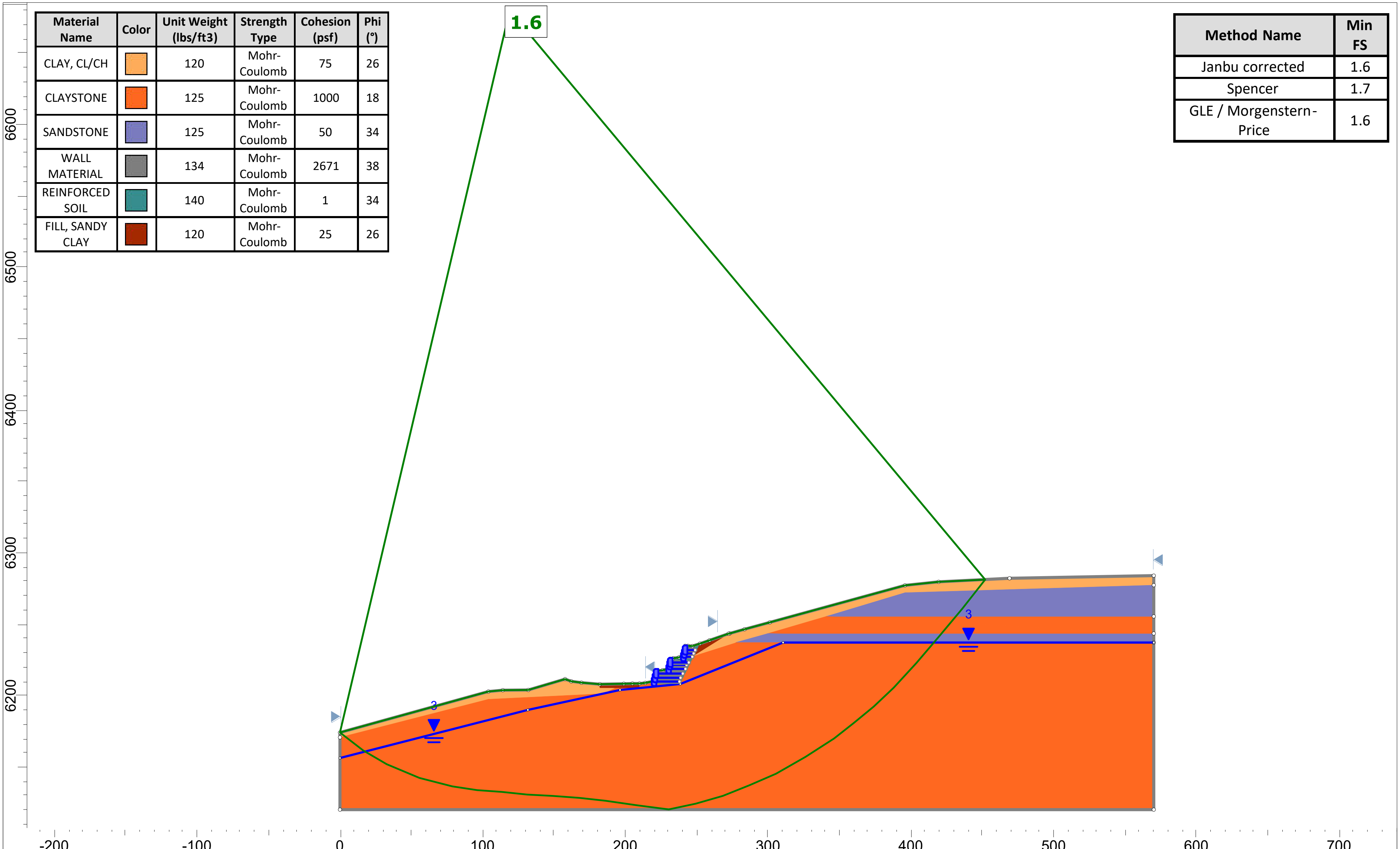
ROCSCIENCE

Project	Section F-F' - Proposed		
Analysis Description			
Drawn By	*Scale* 1:1117	*Company*	
Date		*File Name*	

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
SANDSTONE		125	Mohr-Coulomb	50	34
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.7
GLE / Morgenstern-Price	1.6



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section F-F' - Proposed

Analysis Description

Drawn By

Scale 1:1117

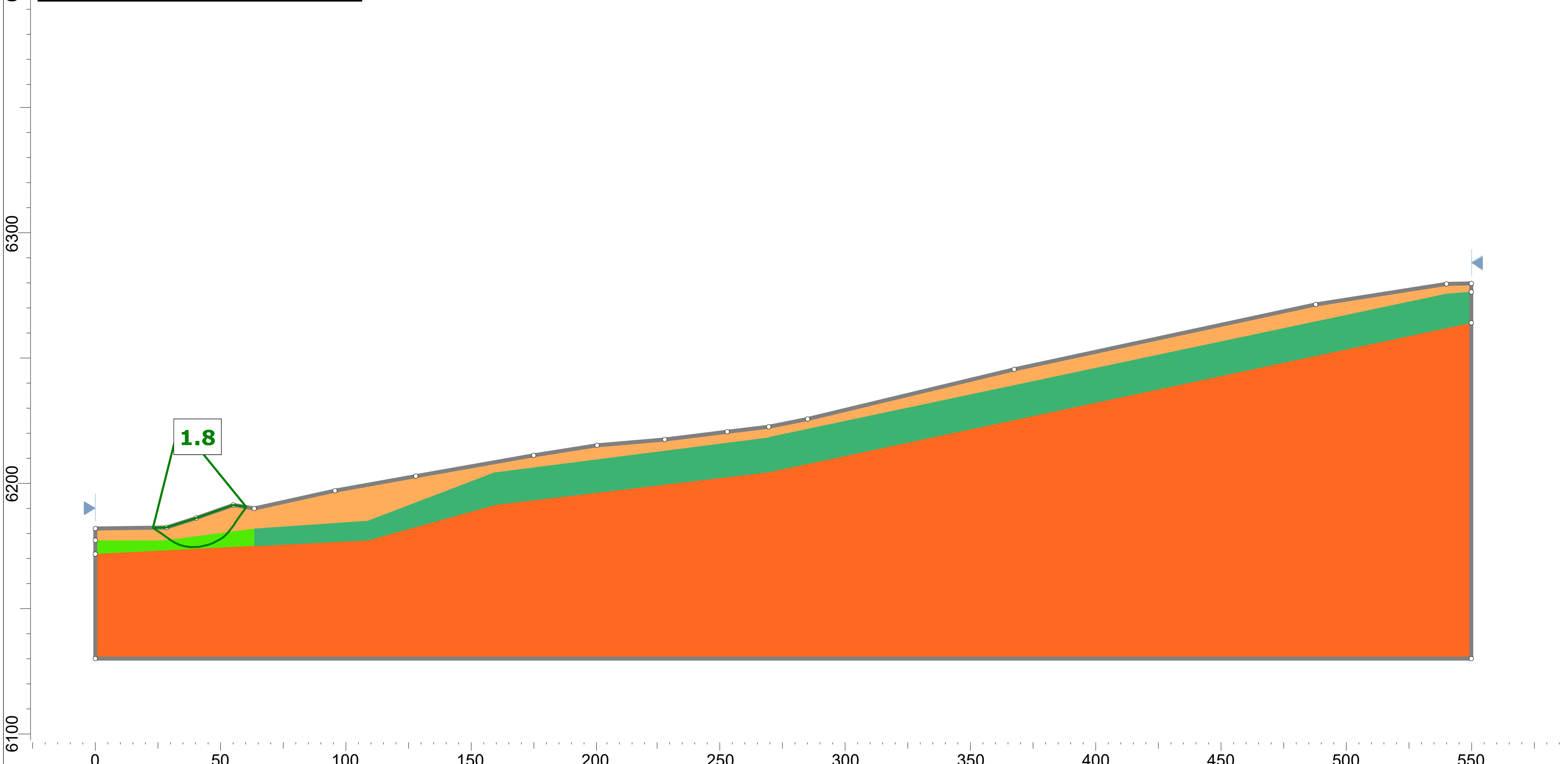
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	1.8
Spencer	2.0
GLE / Morgenstern-Price	2.0



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section G-G' - Existing

Analysis Description

Drawn By

Scale 1:721

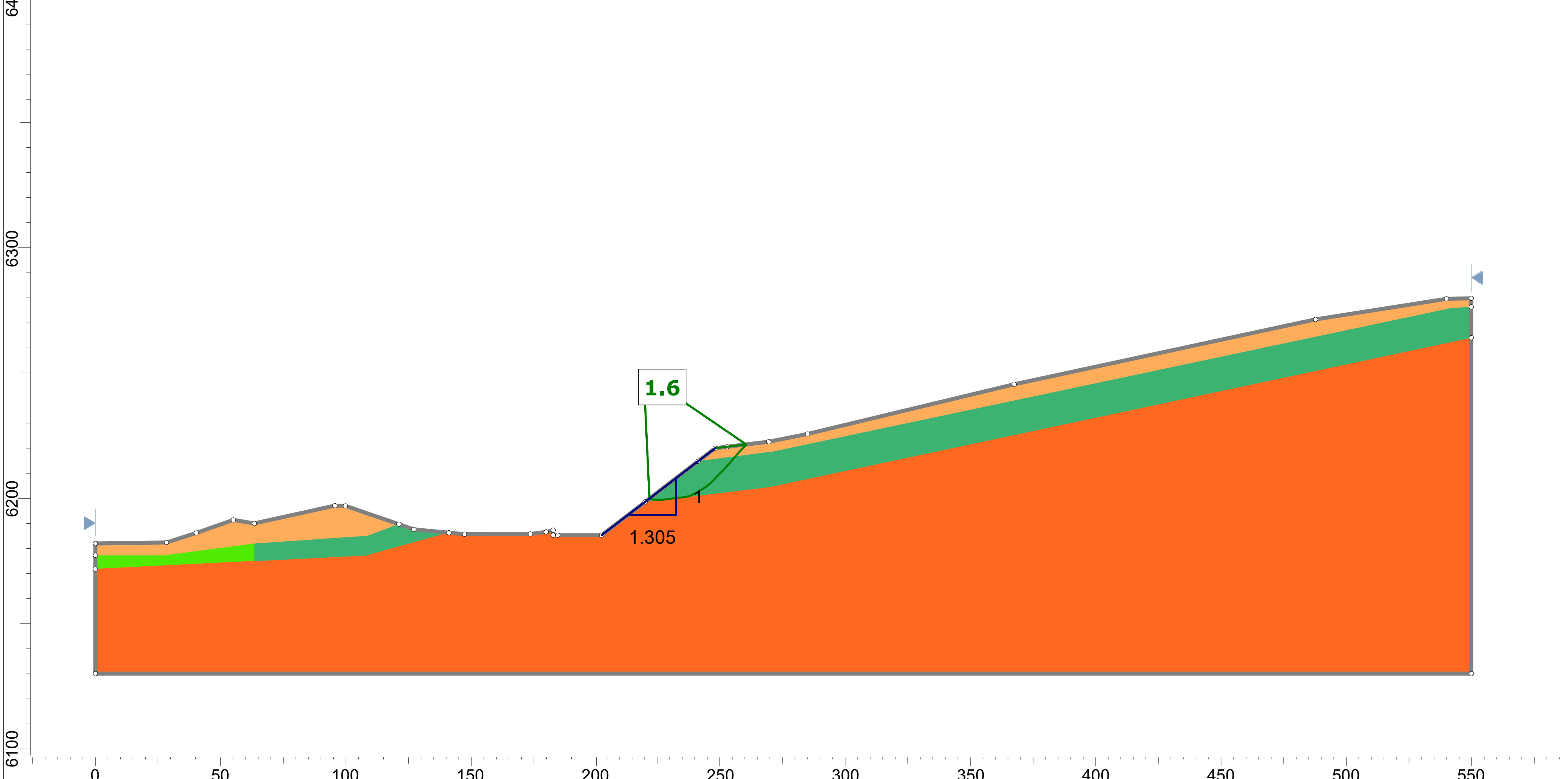
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



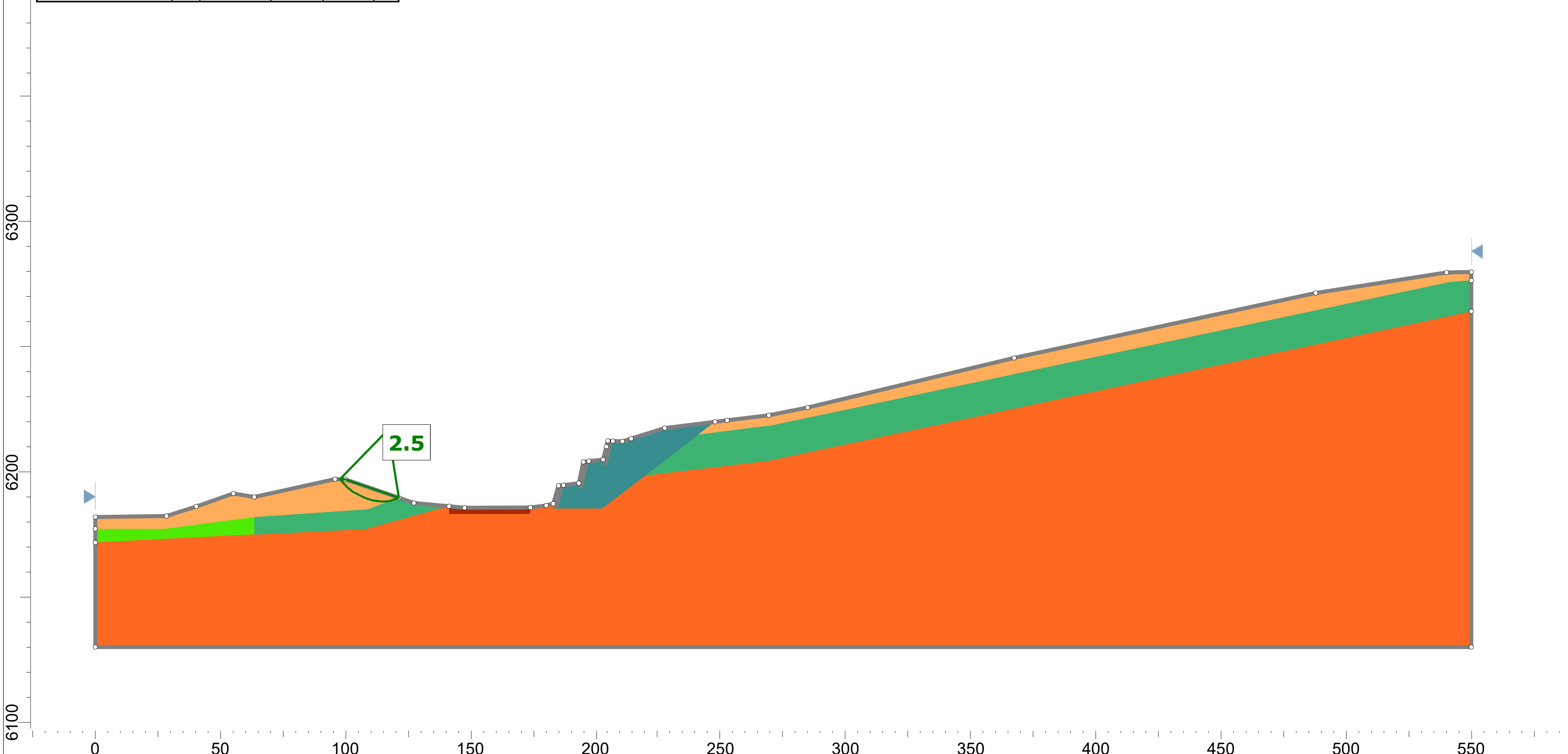
ROCSCIENCE

Project Section G-G' - Interim			
Analysis Description			
Drawn By	*Scale* 1:721	*Company*	
Date		*File Name*	

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.5
Spencer	2.5
GLE / Morgenstern-Price	2.5



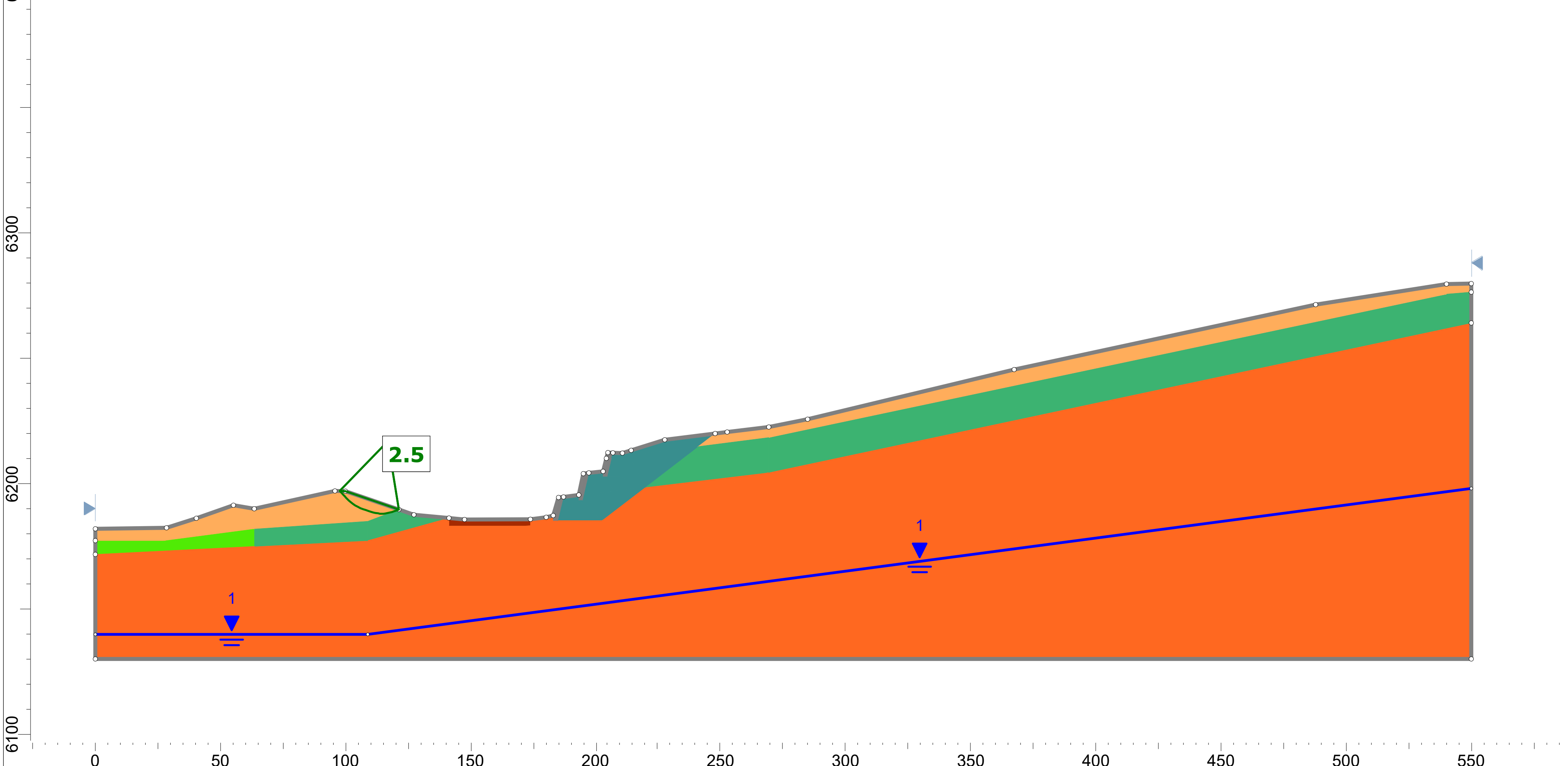
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section G-G' - Proposed
Analysis Description	
Drawn By	*Scale* 1:721
Company	
Date	
File Name	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.5
Spencer	2.5
GLE / Morgenstern-Price	2.5



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section G-G' - Proposed

Analysis Description

Drawn By

Scale 1:721

Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
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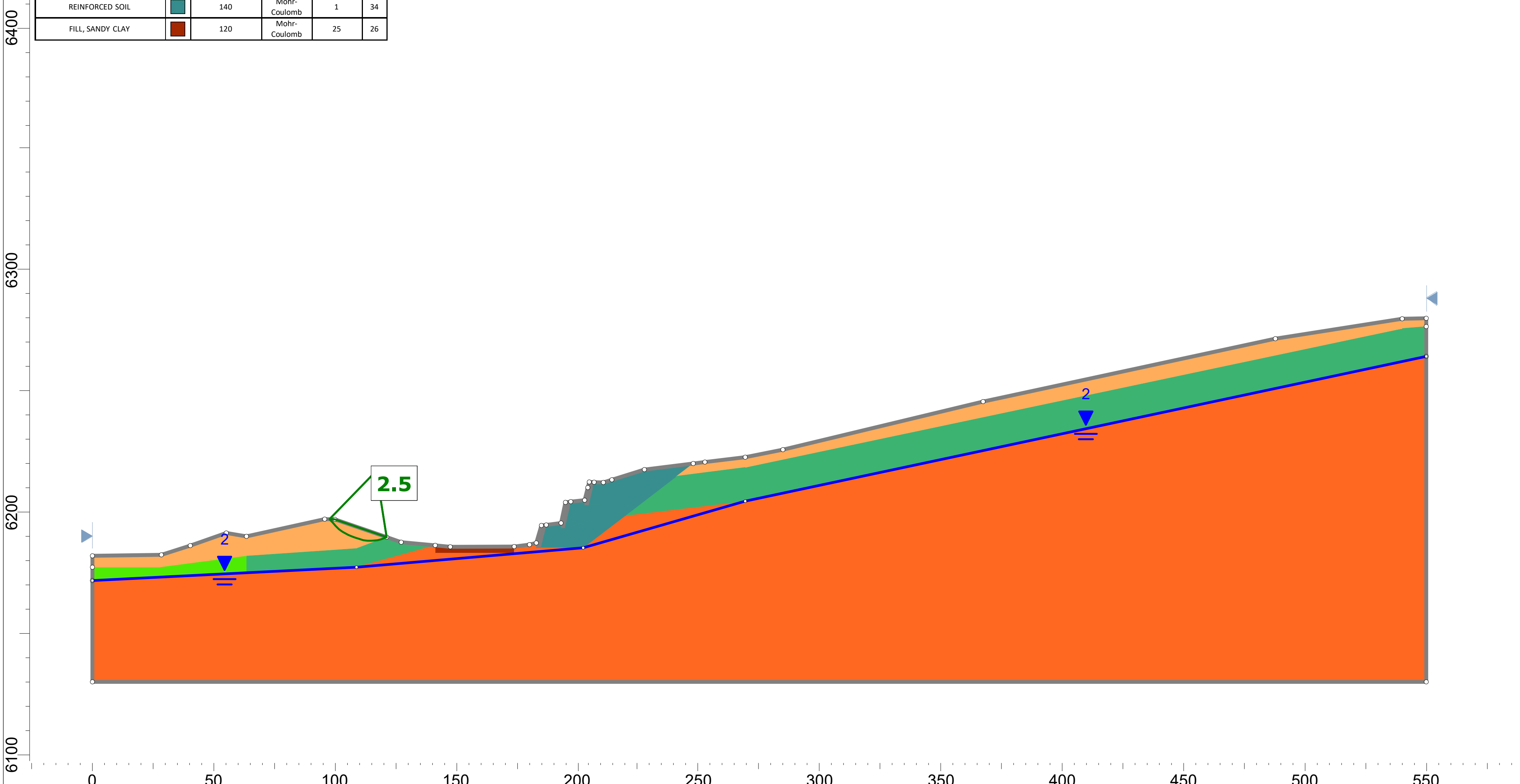
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

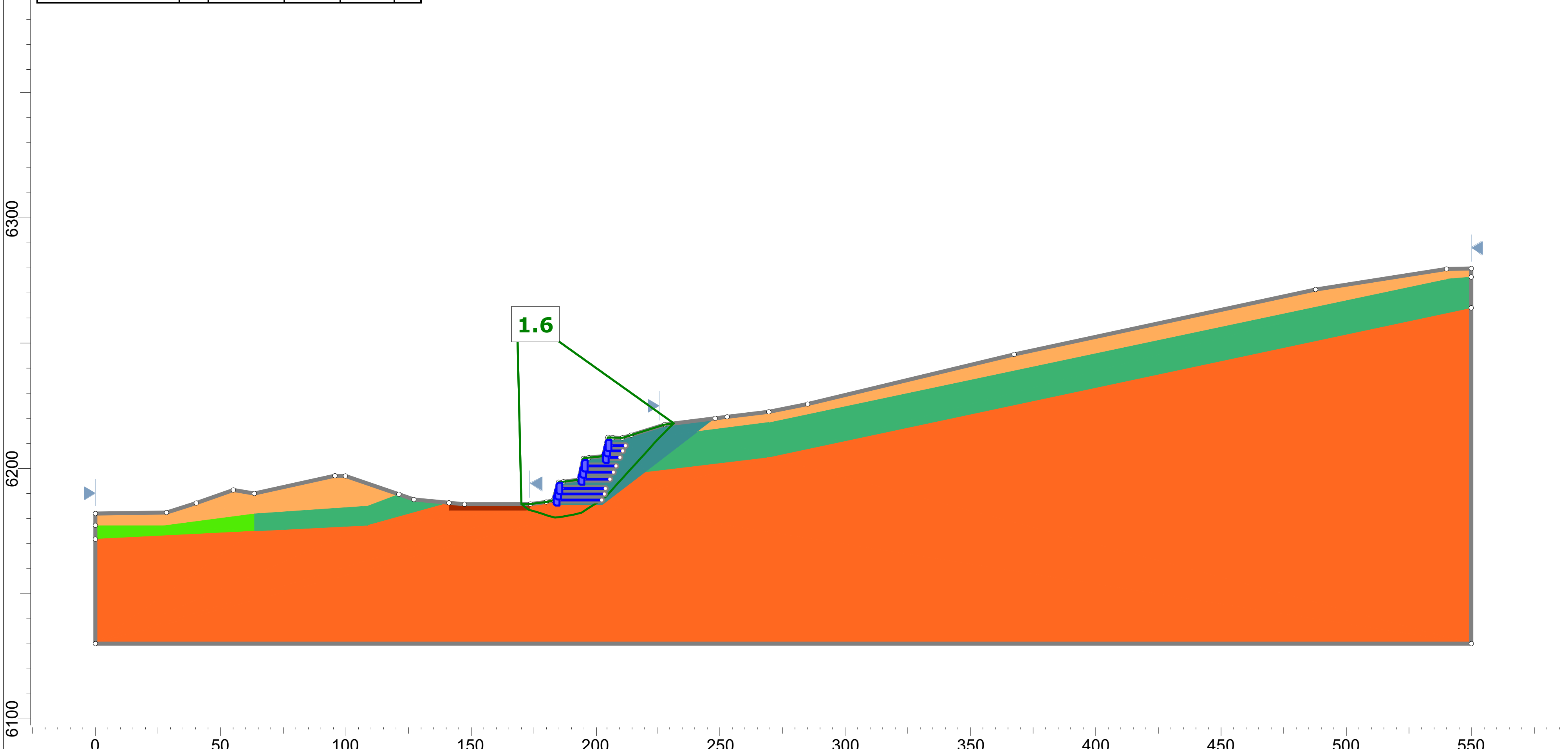
Method Name	Min FS
Janbu corrected	2.5
Spencer	2.5
GLE / Morgenstern-Price	2.5



ROCSCIENCE	Project: Section G-G' - Proposed		
	Analysis Description		
	Drawn By	Scale 1:721	Company
SLIDEINTERPRET 9.041	Date		File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



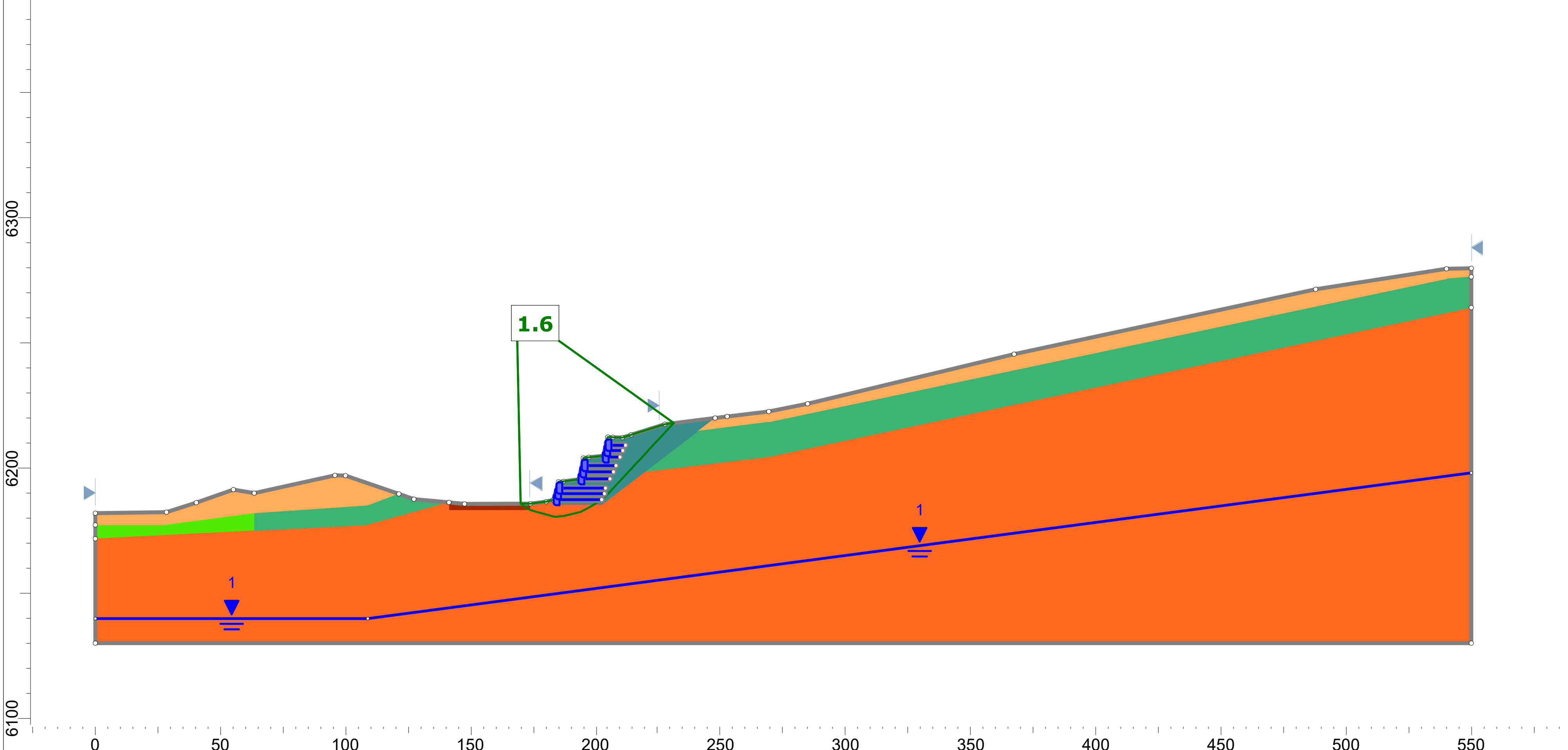
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section G-G' - Proposed		
Analysis Description			
Drawn By	*Scale* 1:721	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section G-G' - Proposed

Analysis Description

Drawn By

Scale 1:721

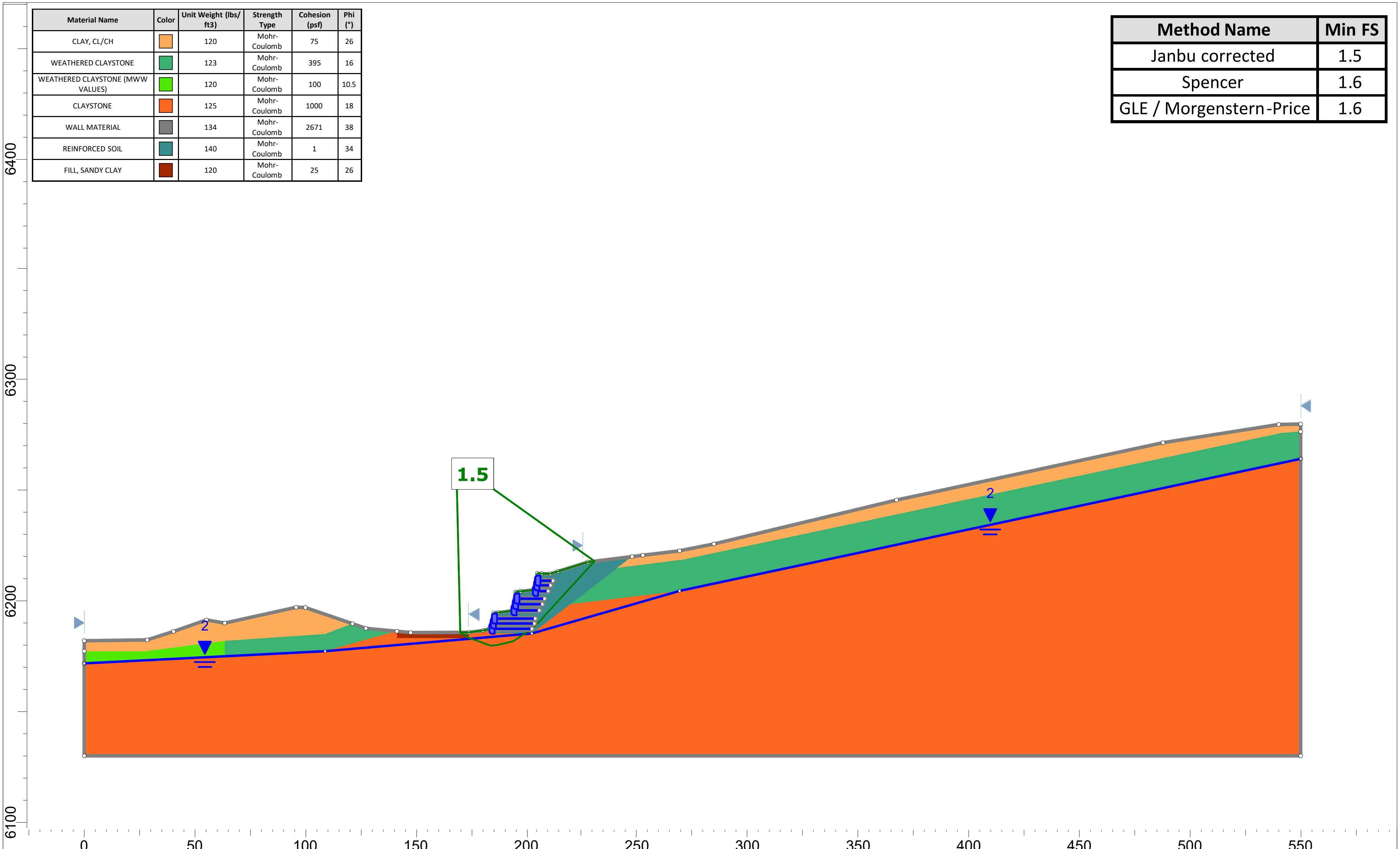
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.5
Spencer	1.6
GLE / Morgenstern-Price	1.6



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section G-G' - Proposed

Analysis Description

Drawn By

Scale 1:721

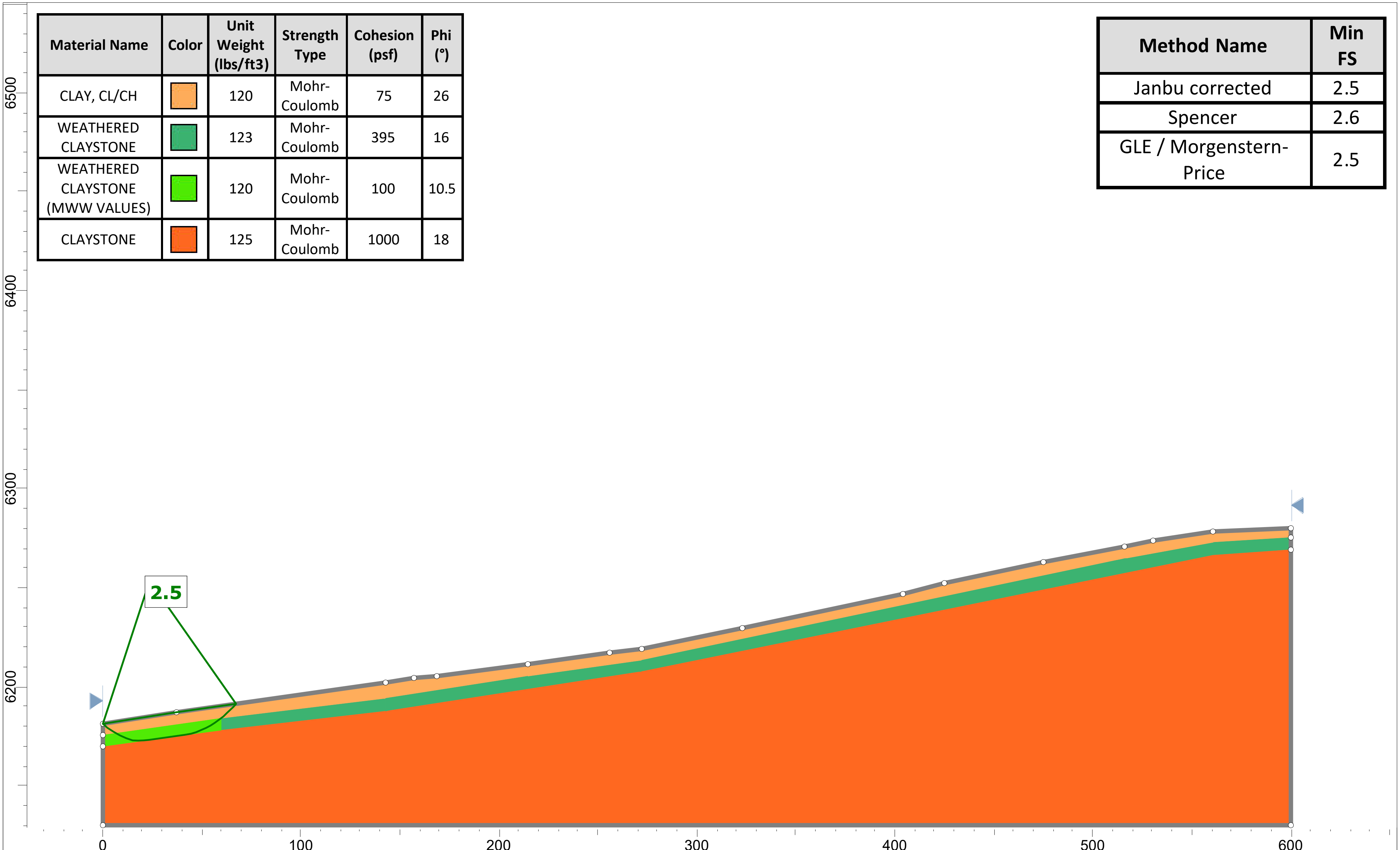
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	2.5
Spencer	2.6
GLE / Morgenstern-Price	2.5



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Existing

Analysis Description

Drawn By

Scale 1:806

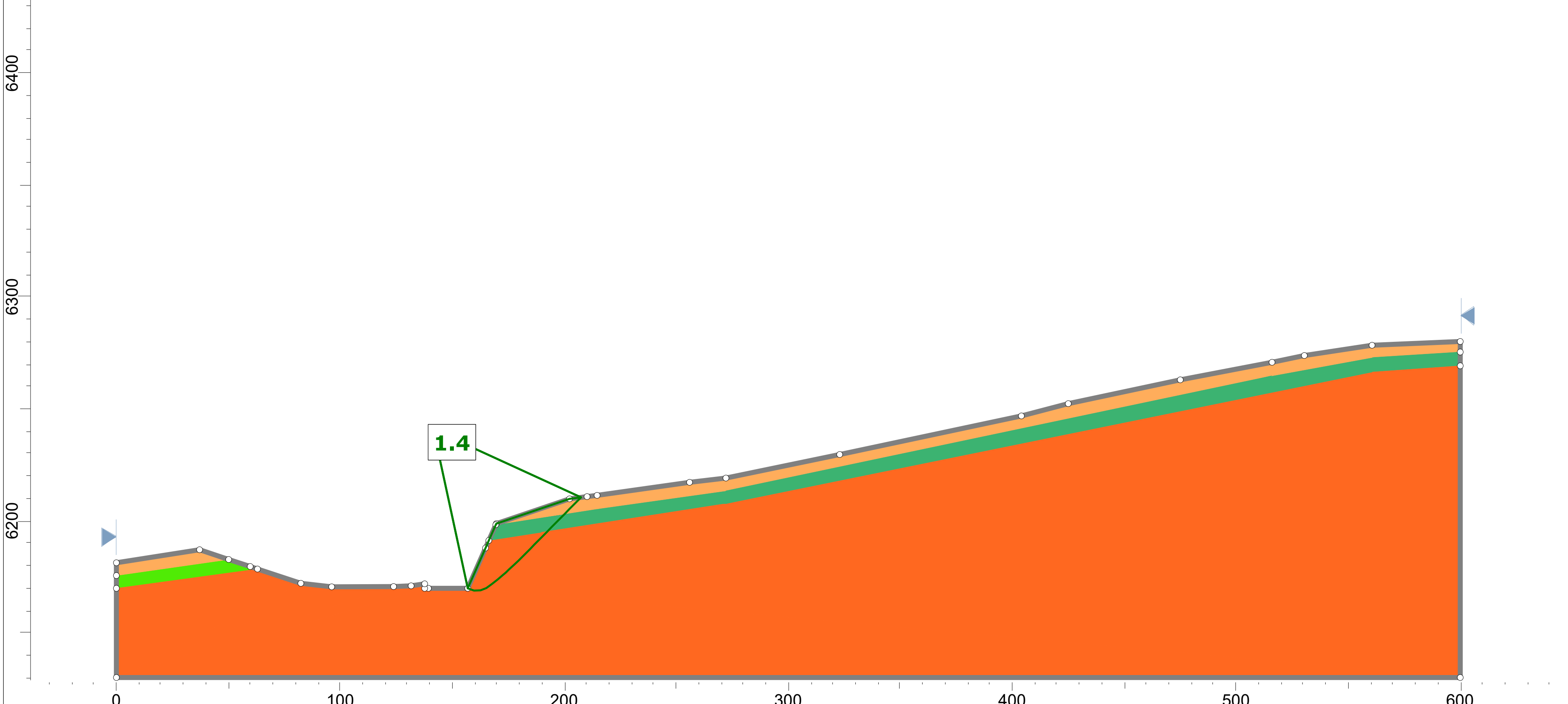
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	1.4
Spencer	1.5
GLE / Morgenstern-Price	1.4



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Interim

Analysis Description

Drawn By

Scale 1:806

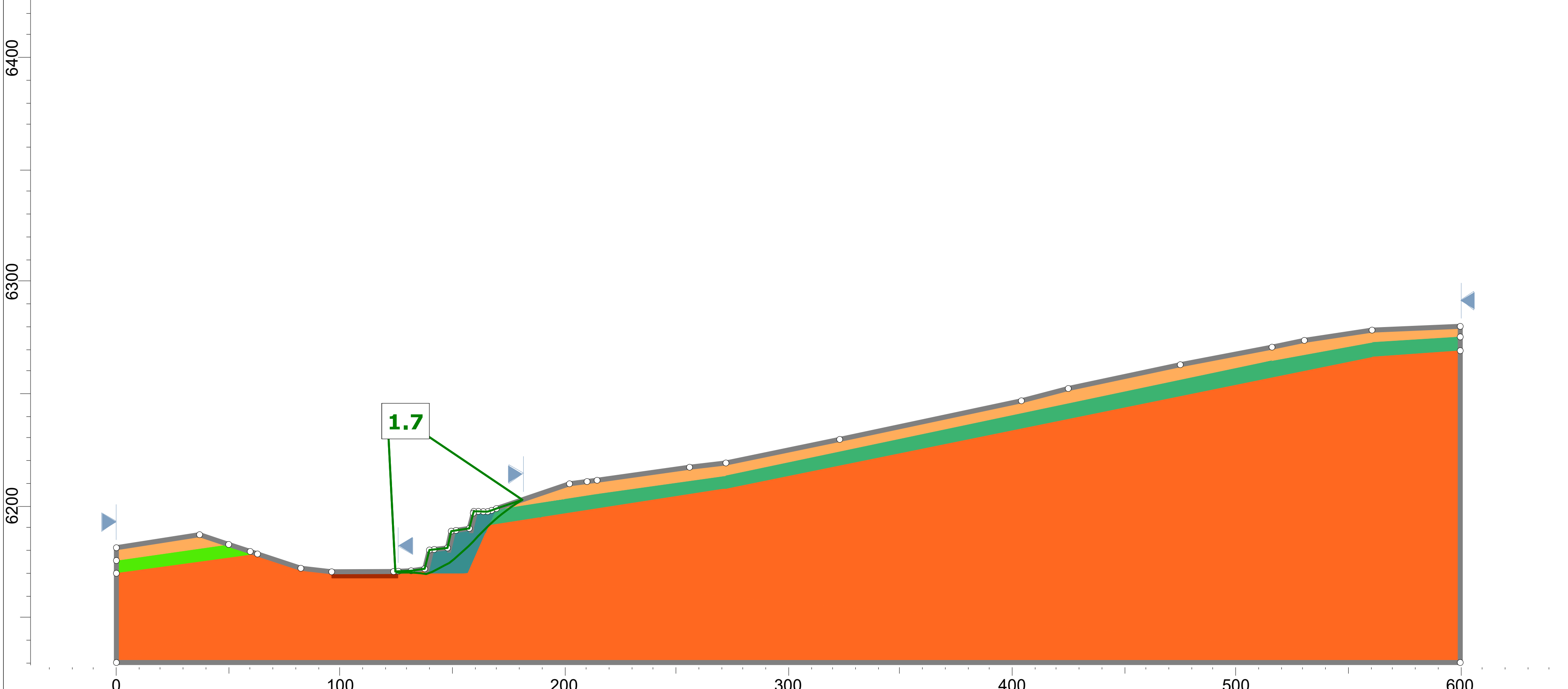
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.8



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Proposed

Analysis Description

Drawn By

Scale 1:806

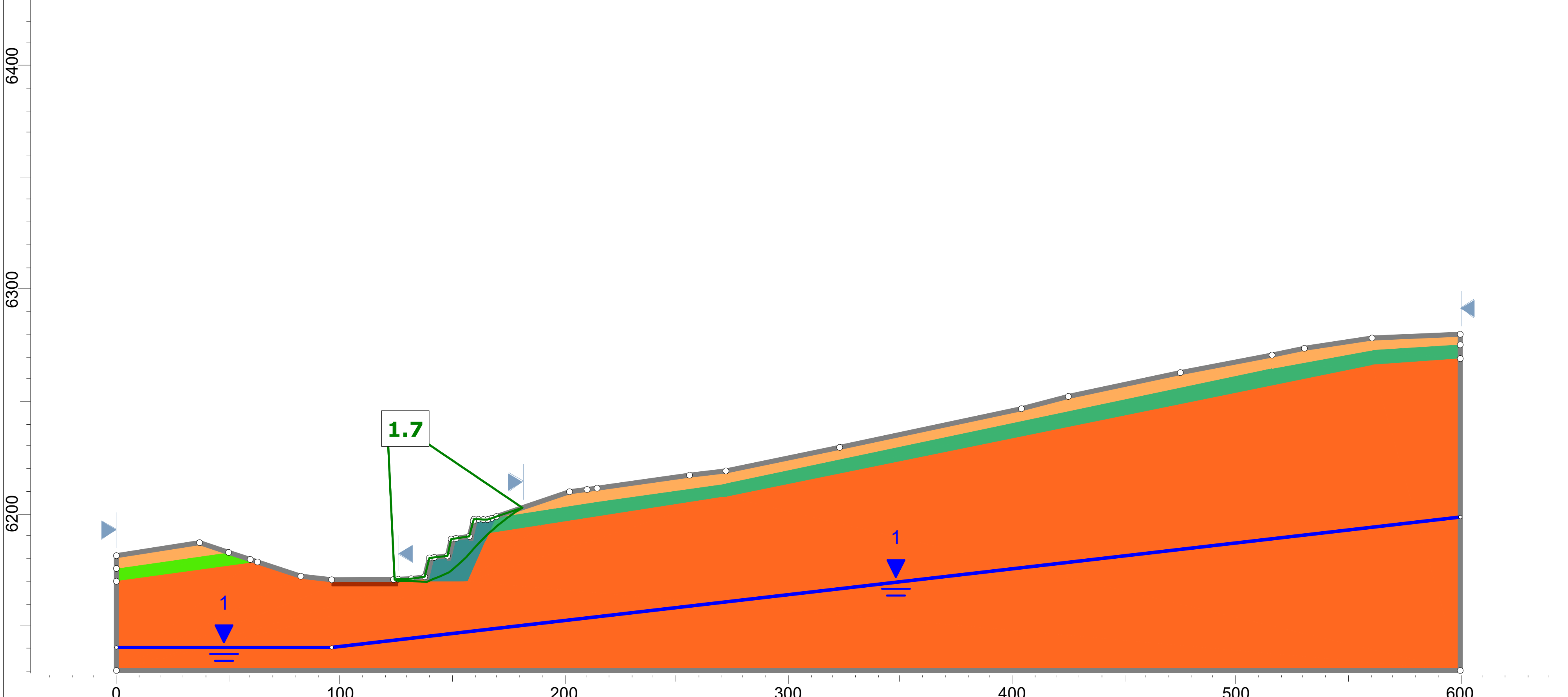
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.8



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Proposed

Analysis Description

Drawn By

Scale 1:806

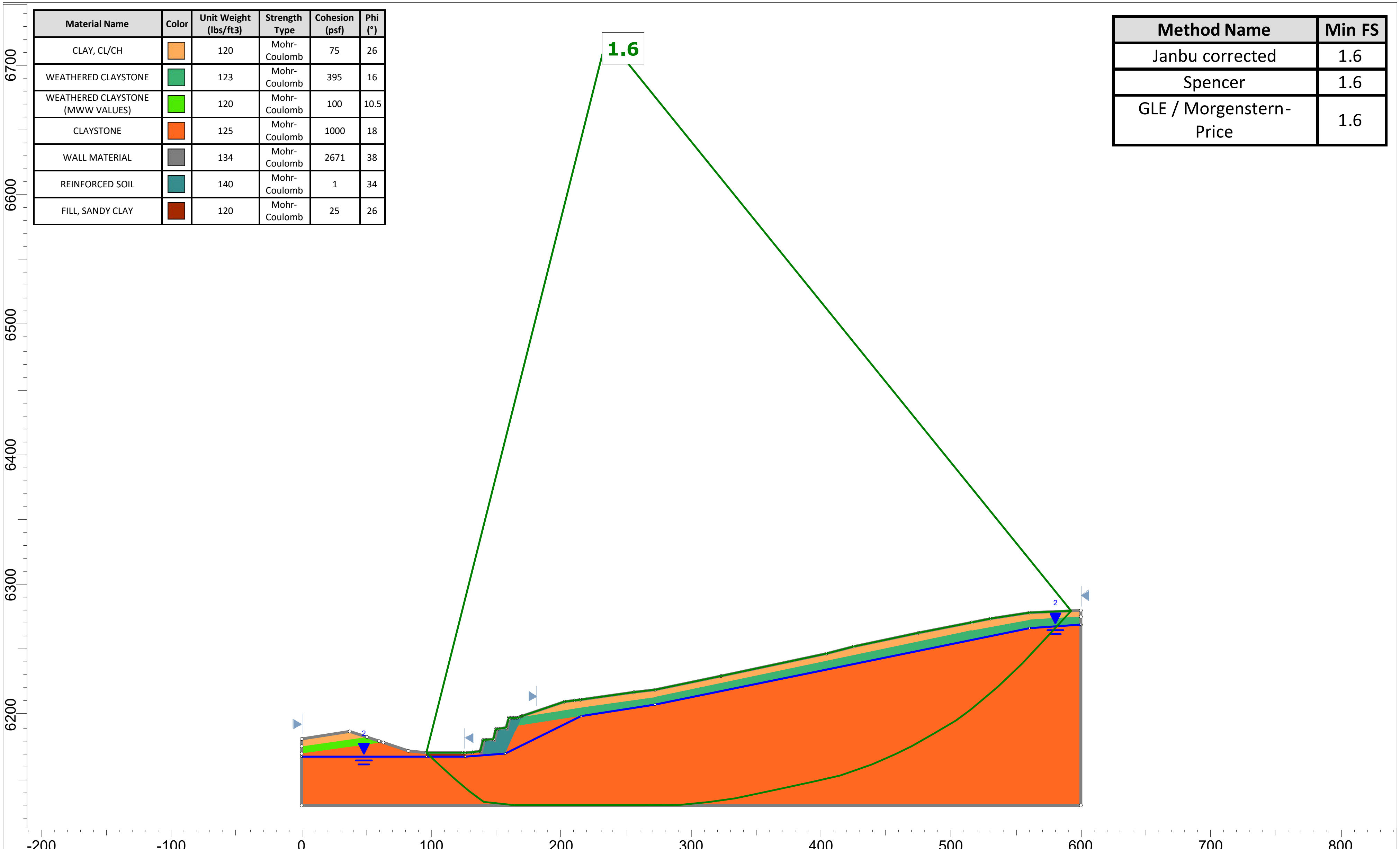
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.6
Spencer	1.6
GLE / Morgenstern-Price	1.6



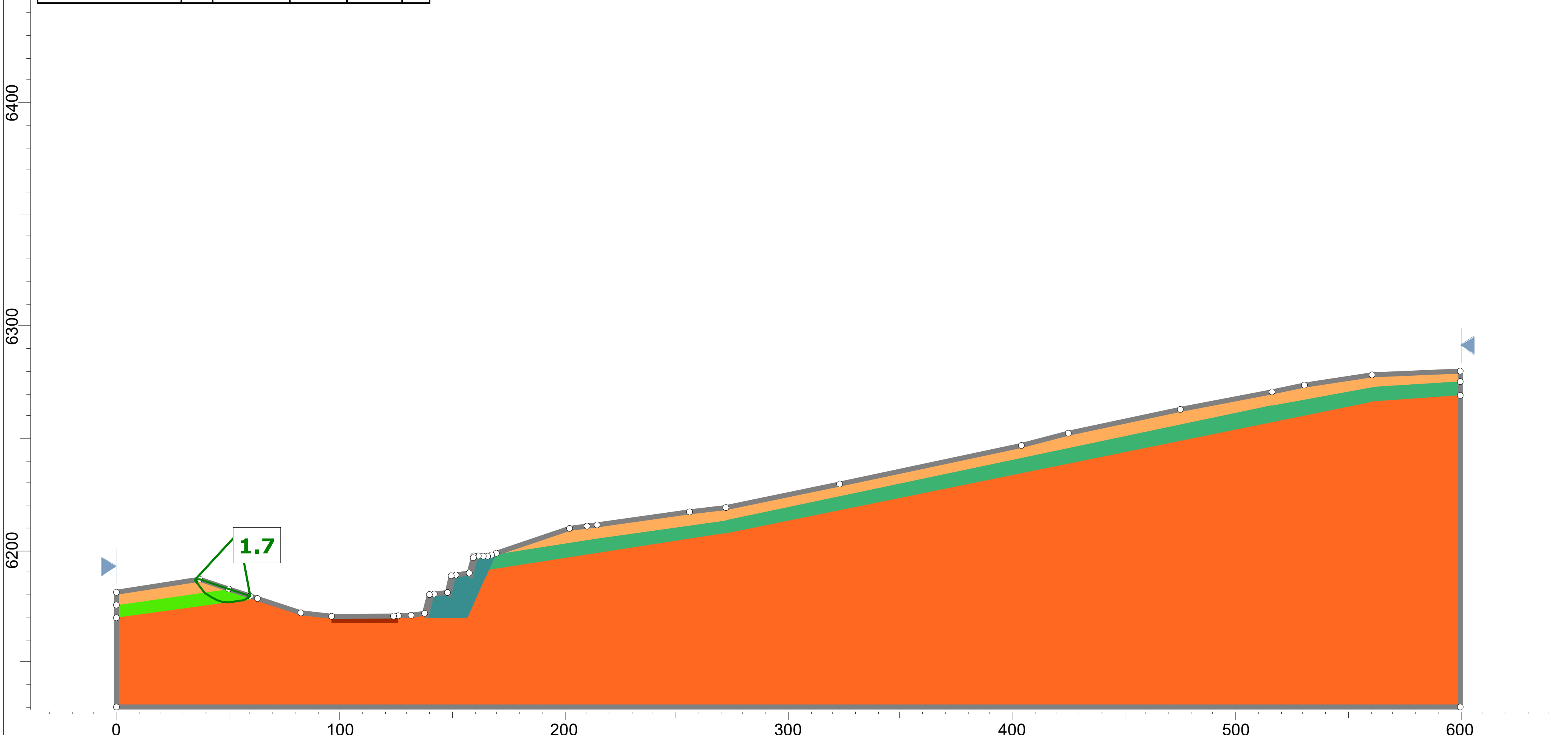
ROCSCIENCE

Project	Section H-H' - Proposed		
Analysis Description			
Drawn By		Scale 1:1228	Company
Date			File Name

SLIDEINTERPRET 9.041

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Proposed

Analysis Description

Drawn By

Scale 1:806

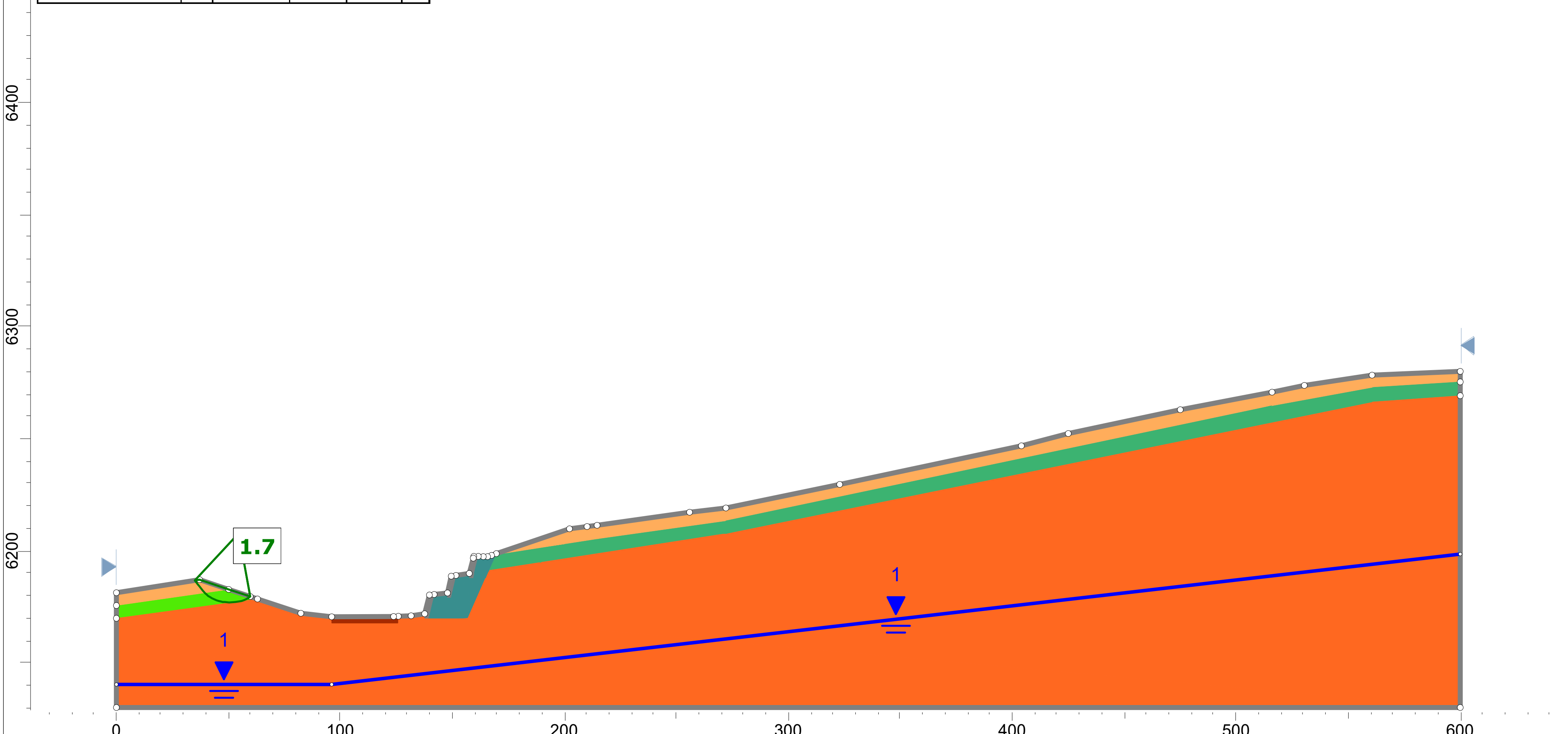
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
WALL MATERIAL		134	Mohr-Coulomb	2671	38
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Proposed

Analysis Description

Drawn By

Scale 1:806

Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
WEATHERED CLAYSTONE		123	Mohr-Coulomb	395	16
WEATHERED CLAYSTONE (MWW VALUES)		120	Mohr-Coulomb	100	10.5
CLAYSTONE		125	Mohr-Coulomb	1000	18
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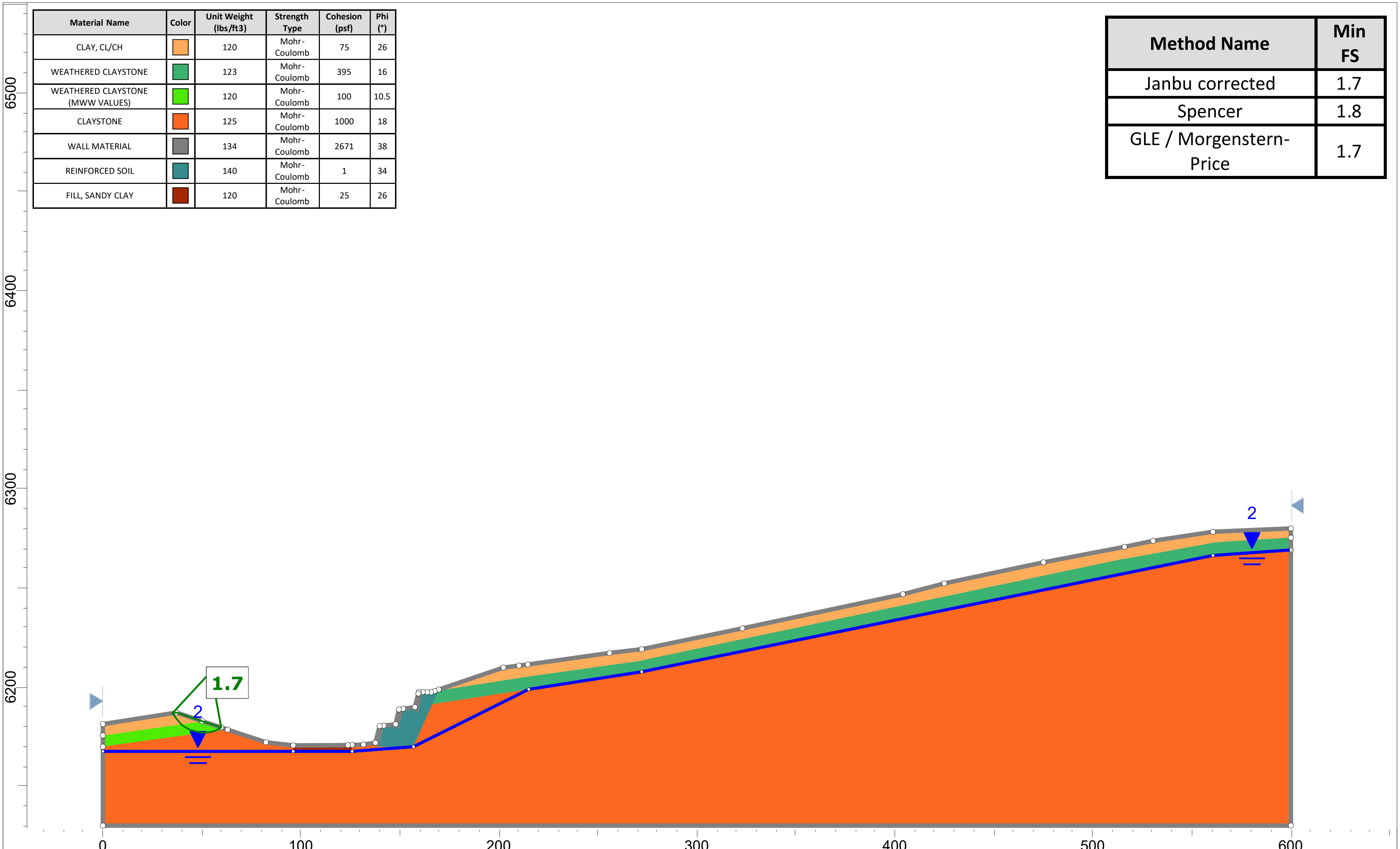
REINFORCED SOIL		140	Mohr-Coulomb	1	34
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	1.7
Spencer	1.8
GLE / Morgenstern-Price	1.7



ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section H-H' - Proposed

Analysis Description

Drawn By

Scale 1:806

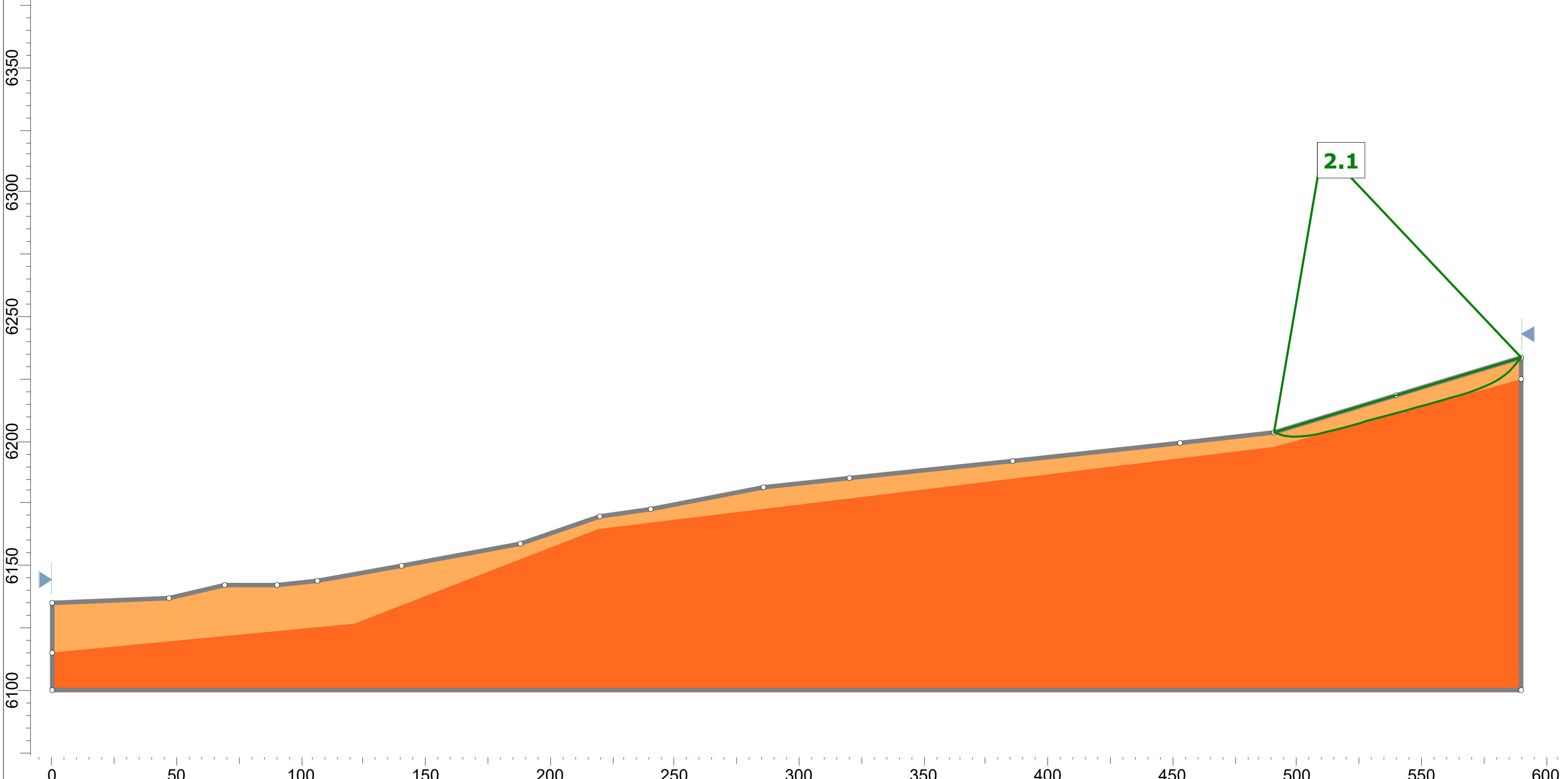
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18

Method Name	Min FS
Janbu corrected	2.1
Spencer	2.1
GLE / Morgenstern-Price	2.1



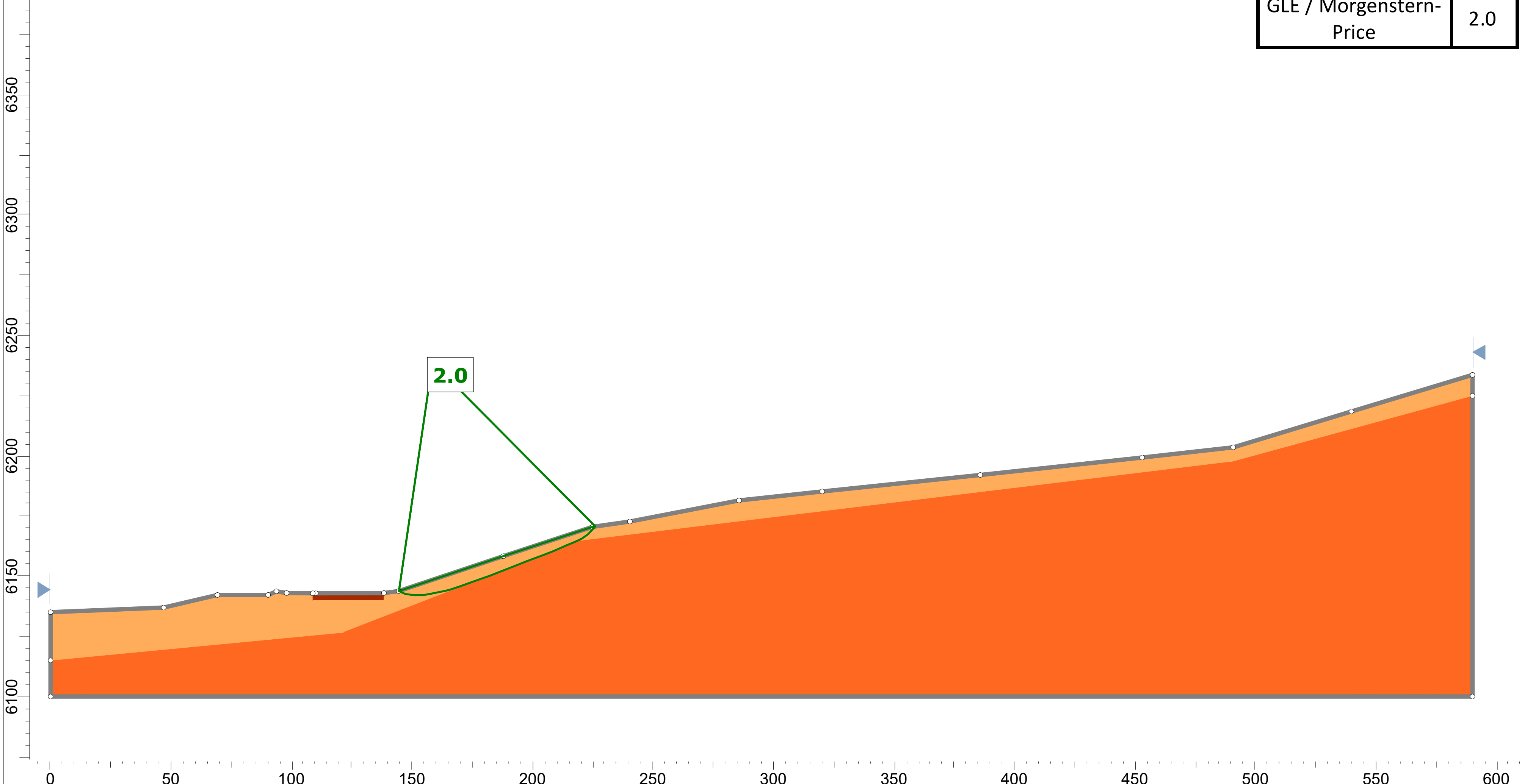
ROCSCIENCE

SLIDEINTERPRET 9.041

Project Section I-I' - Existing			
Analysis Description			
Drawn By	*Scale* 1:725	*Company*	
Date		*File Name*	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.0
GLE / Morgenstern-Price	2.0



ROCSCIENCE

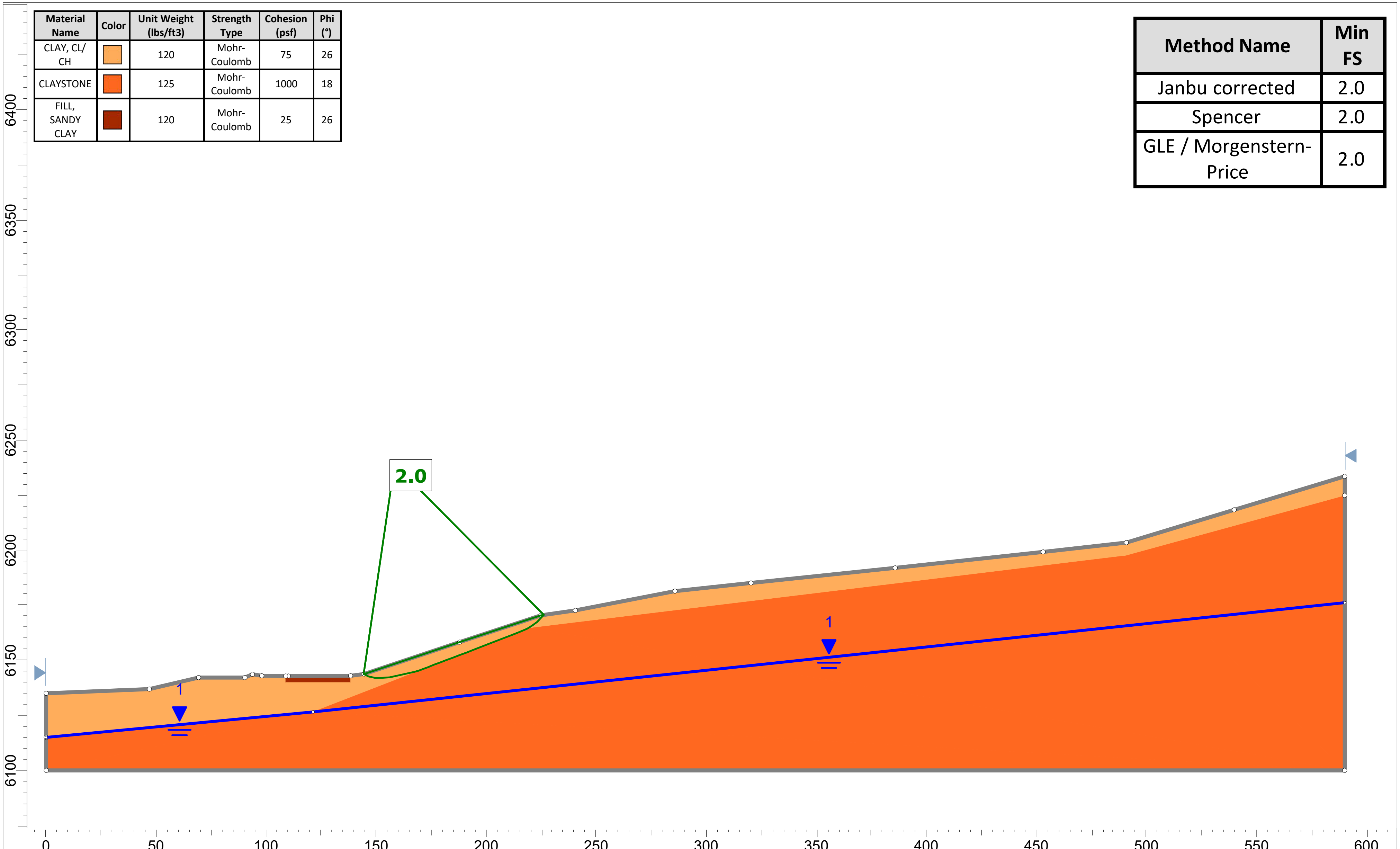
SLIDEINTERPRET 9.041

Project

Section I-I' - Proposed

Analysis Description

Drawn By	*Scale* 1:725	*Company*
Date		*File Name*



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/ CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.0
GLE / Morgenstern-Price	2.0

ROCSCIENCE

SLIDEINTERPRET 9.041

Project

Section I-I' - Proposed

Analysis Description

Drawn By

Scale 1:725

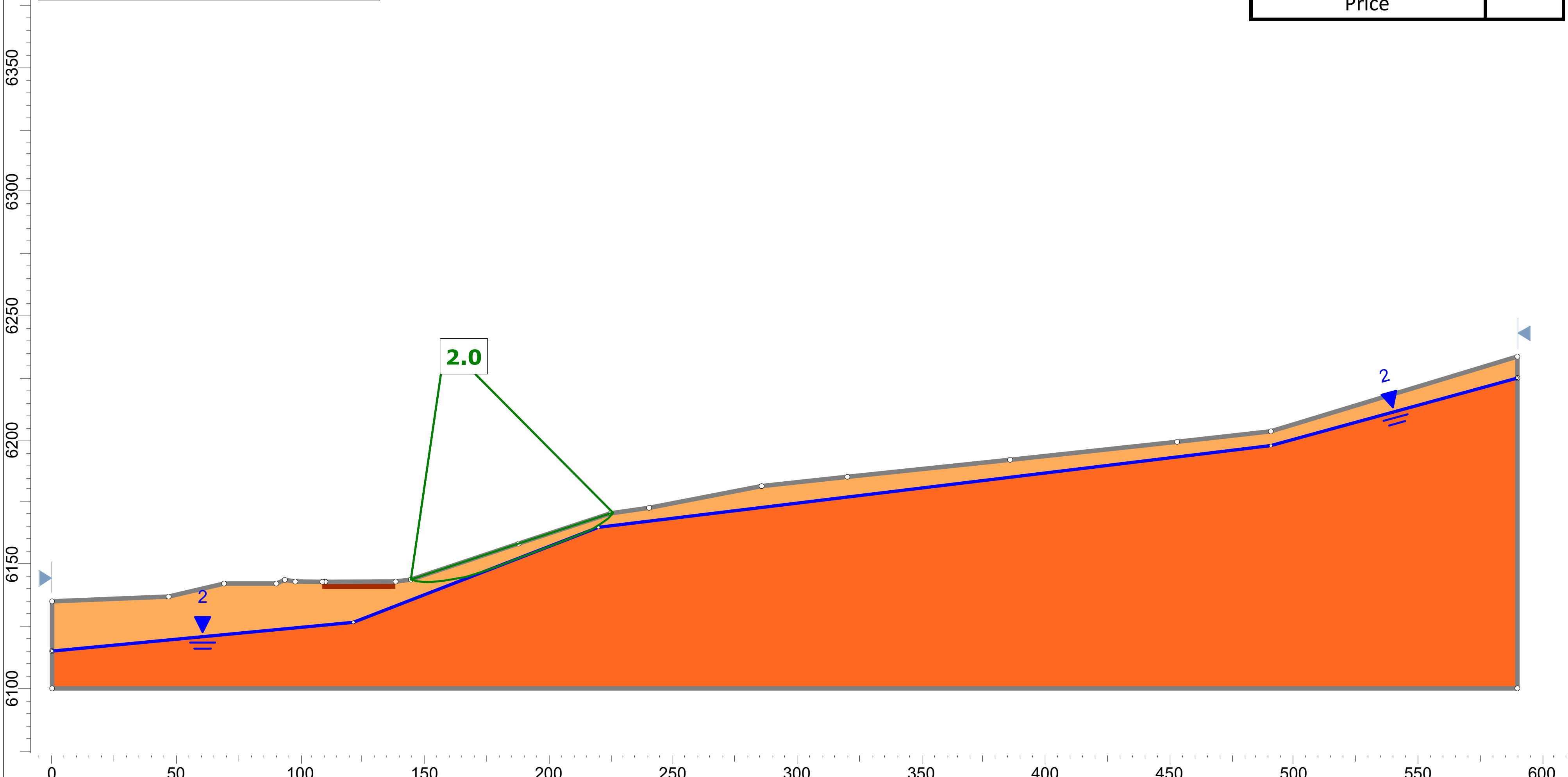
Company

Date

File Name

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
CLAY, CL/ CH		120	Mohr-Coulomb	75	26
CLAYSTONE		125	Mohr-Coulomb	1000	18
FILL, SANDY CLAY		120	Mohr-Coulomb	25	26

Method Name	Min FS
Janbu corrected	2.0
Spencer	2.0
GLE / Morgenstern-Price	2.0



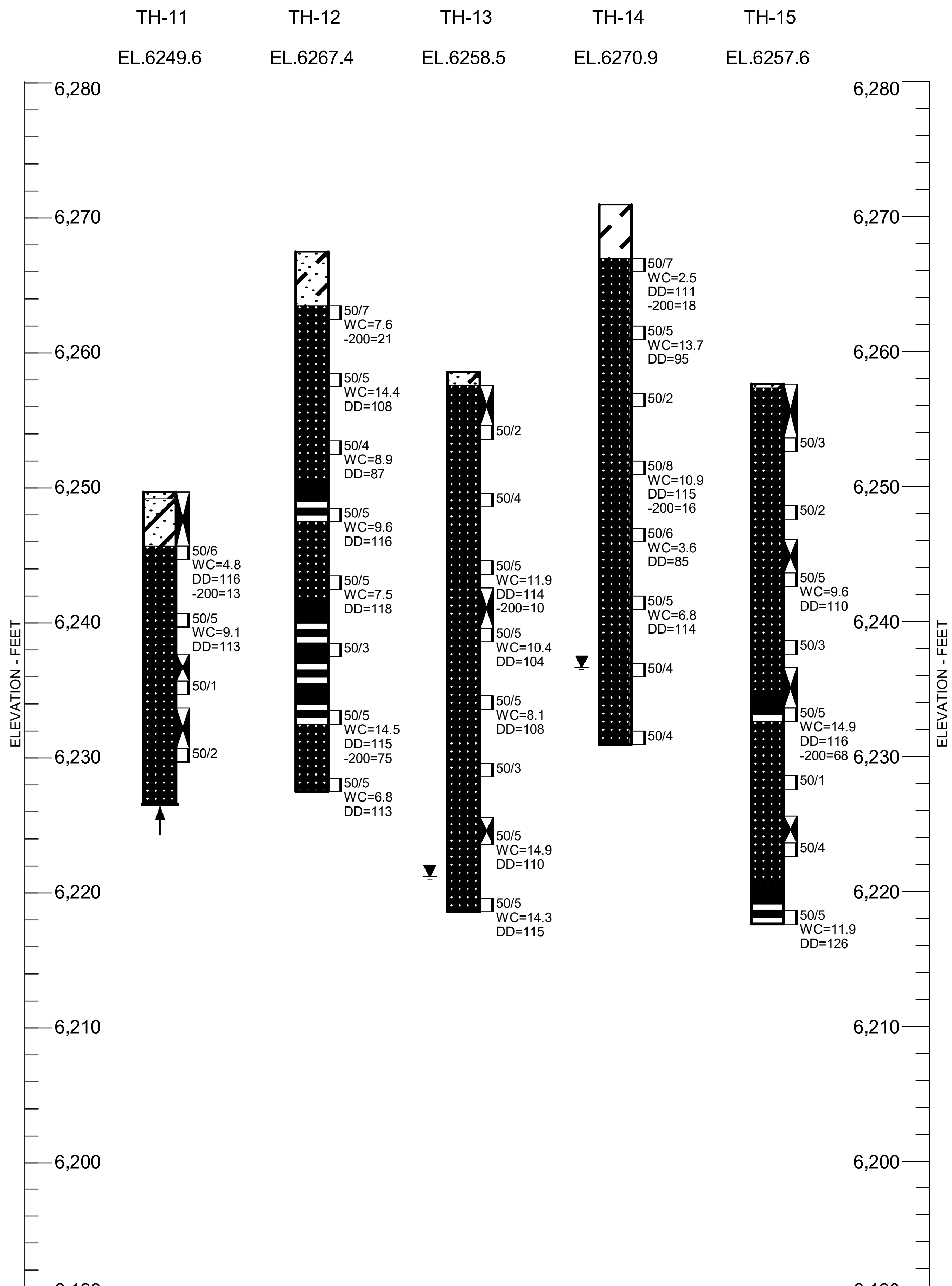
ROCSCIENCE

SLIDEINTERPRET 9.041

Project	Section I-I' - Proposed		
Analysis Description			
Drawn By		*Scale* 1:725	*Company*
Date			*File Name*

APPENDIX D

SUMMARY LOGS OF PREVIOUS INVESIGATION



SUMMARY LOGS OF EXPLORATORY BORINGS

LEGEND:

FILL, CLAY, SANDY, SILTY, MOIST TO VERY MOIST, MEDIUM STIFF TO STIFF, BROWN, GRAY.

CLAY, VERY SANDY TO SLIGHTLY SANDY, SILTY, SOFT TO VERY STIFF, SLIGHTLY MOIST TO MOIST, BROWN, TAN (CL).

SAND, CLAYEY, SILTY, OCCASIONAL GRAVEL, LOOSE TO VERY DENSE, SLIGHTLY MOIST, WHITE, TAN (SC).

GRAVEL, SANDY, SILTY, FREQUENT COBBLES AND BOULDERS, DENSE TO VERY DENSE, SLIGHTLY MOIST TO MOIST, TAN, WHITE (GM).

SAND, SILTY, OCCASIONAL COBBLES, VERY LOOSE TO DENSE, SLIGHTLY MOIST TO VERY MOIST, TAN, WHITE (SM).

BEDROCK CLAYSTONE, MEDIUM HARD TO VERY HARD, MOIST, BROWN, GRAY.

BEDROCK SANDSTONE, MEDIUM HARD TO VERY HARD, MOIST, BLUE, GRAY, RUST, WHITE.

WEATHERED BEDROCK CLAYSTONE, MOIST TO VERY MOIST, GRAY, RUST, OLIVE, MAROON.

DRIVE SAMPLE. THE SYMBOL 19/12 INDICATES 19 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.

WATER LEVEL MEASURED AT TIME OF DRILLING.

WATER LEVEL MEASURED AFTER DRILLING ON JULY 1, 2024.

WATER LEVEL MEASURED AFTER DRILLING ON JULY 5, 2024.

WATER LEVEL MEASURED AFTER DRILLING ON JULY 8, 2024.

WATER LEVEL MEASURED AFTER DRILLING ON SEPTEMBER 6, 2024.

WATER LEVEL MEASURED AFTER DRILLING ON DECEMBER 22, 2024 OR JANUARY 4, 2025.

WATER LEVEL MEASURED AFTER DRILLING ON FEBRUARY 4, 2025.

WATER LEVEL MEASURED AFTER DRILLING ON MARCH 11, 2025.

INDICATES DEPTH AT WHICH TEST HOLE CAVED.

INDICATES PRACTICAL DRILL RIG REFUSAL.

NOTES:

1. THE BORINGS WERE DRILLED BETWEEN JUNE 27 AND DECEMBER 18, 2024 AND FEBRUARY 14 AND 27, 2025 USING A 3-INCH DIAMETE OR 4-INCH DIAMETER CONTINUOUS-FLIGHT SOLID-STEM AUGER AND LIMITED ACCESS DRILL RIG, OR CME-45 DRILL RIG.

2. BORING LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND WERE DETERMINED BY A REPRESENTATIVE OF OUR FIRM USING A LEICA GS18 GPS UNIT REFERENCING THE NORTH AMERICAN DATUM OF 1983 (NAD83).

3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE OVERBURDEN PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).
   UC - INDICATES UNCONFINED COMPRESSIVE STRENGTH (PSF).
   pF - INDICATES SOIL SUCTION VALUE (PSF).
   +4 - INDICATES PASSING NO. 4 SIEVE (%).
   Fc - INDICATES CLAY FRACTION (%).

4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.

APPENDIX E

GUIDELINE SITE GRADING SPECIFICATIONS

GUIDELINE SITE GRADING SPECIFICATIONS

Ridgegate – Mesa Tops Road Alignment
Lone Tree, Colorado

1. DESCRIPTION

This item shall consist of the excavation, transportation, placement and compaction of materials from locations indicated on the plans, or staked by the Engineer, as necessary to achieve preliminary street and overlot elevations. These specifications shall also apply to compaction of excess cut materials that may be placed outside of the development boundaries.

2. GENERAL

The Soils Engineer shall be the Owner's representative. The Soils Engineer shall approve fill materials, method of placement, moisture contents and percent compaction, and shall give written approval of the completed fill.

3. CLEARING JOB SITE

The Contractor shall remove all vegetation and debris before excavation or fill placement is begun. The Contractor shall dispose of the cleared material to provide the Owner with a clean, neat appearing job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures of any kind.

4. SCARIFYING AREA TO BE FILLED

All topsoil and vegetable matter shall be removed from the ground surface upon which fill is to be placed. The surface shall then be plowed or scarified until the surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction.

5. COMPACTING AREA TO BE FILLED

After the foundation for the fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, brought to the proper moisture content (1 to 4 percent above optimum moisture content for clay and within 2 percent of optimum moisture content for sand) and compacted to not less than 95 percent of maximum dry density as determined in accordance with ASTM D698.

6. FILL MATERIALS

Fill soils shall be free from organics, debris or other deleterious substances, and shall not contain rocks or clods having a diameter greater than three (3) inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer.

On-site materials classifying as CL, CH, SC, SM, SW, SP, GP, GC and GM are acceptable. Concrete, asphalt, organic matter and other deleterious materials or debris shall not be used as fill.

7. MOISTURE CONTENT

Fill material shall be moisture-conditioned in accordance with specifications summarized below. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas.

SUMMARY OF MOISTURE CONTENT REQUIREMENTS

Soil Type	Depth of Site Grading Fill	
	≤20 Feet	>20 Feet
Clay (CL, CH)	1 to 4 percent above optimum	2 percent below to 1 percent above optimum
Granular Soils (SC, SM, SW, SP, GP, GC, GM	Within 2 percent of optimum	2 percent below to 1 percent above optimum

*Percentage specification based on optimum moisture content (optimum).

The Contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Soils Engineer, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with any type of watering equipment approved by the Soils Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.

Should too much water be added to any part of the fill, such that the material is too wet to permit the desired compaction from being obtained, rolling and all work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework wet material in an approved manner to hasten its drying.

8. COMPACTION OF FILL AREAS

Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill materials shall be placed such that the thickness of loose materials does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

SUMMARY OF MINIMUM COMPACTION SPECIFICATIONS

Soil Type	Depth of Site Grading Fill	
	≤20 Feet	>20 Feet
Clay (CL, CH)	95% STD	98% STD
Granular Soils (SC, SM, SW, SP, GP, GC, GM	95% STD	98% STD

*Compaction percentage specifications based on standard Proctor maximum dry density (STD).

Compaction shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Engineer for soils classifying as CL, CH, or SC. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Soils Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient trips to ensure that the required density is obtained.

9. COMPACTION OF SLOPES

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and there is not appreciable amount of loose soils on the slopes. Compaction of slopes may be done progressively in increments of three to five feet (3' to 5') in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

10. PLACEMENT OF FILL ON NATURAL SLOPES

Where natural slopes are steeper than 20 percent in grade and the placement of fill is required, benches shall be cut at the rate of one bench for each 5 feet in height (minimum of two benches). Benches shall be at least 10 feet in width. Larger bench widths may be required by the Engineer. Fill shall be placed on completed benches as outlined within this specification.

11. DENSITY TESTS

Field density tests shall be made by the Soils Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is not within specification, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

12. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed materials are as specified.

13. NOTICE REGARDING START OF GRADING

The Contractor shall submit notification to the Soils Engineer and Owner advising them of the start of grading operations at least three (3) days in advance of the starting date. Notification shall also be submitted at least 3 days in advance of any resumption dates when grading operations have been stopped for any reason other than adverse weather conditions

14. REPORTING OF FIELD DENSITY TESTS

Density tests made by the Soils Engineer, as specified under "Density Tests" above, shall be submitted progressively to the Owner. Dry density, moisture content, and percentage compaction shall be reported for each test taken.

15. DECLARATION REGARDING COMPLETED FILL

The Soils Engineer shall provide a written declaration stating that the site was filled with acceptable materials and was placed in general accordance with the specifications.